HALIFAX

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Item No. 12.1.1
Transportation Standing Committee
March 25, 2021

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: *- Original Signed -*

Jacques Dubé, Chief Administrative Officer

DATE: December 21, 2020

SUBJECT: **Herring Cove Road Bus Lane and Active Transportation Infrastructure**

ORIGIN

On November 29th, 2018 the Transportation Standing Committee put and passed the following motion:

"THAT the Transportation Standing Committee request a staff report on adding a dedicated bus or high-occupancy vehicle (HOV) lane and active transportation infrastructure (including sidewalks, bike lanes and/or shared AT greenway) from Spryfield to the Armdale Roundabout and also to Mumford Terminal and to downtown."

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter, section **318 (2)** In so far as is consistent with their use by the public, the Council has full control over the streets in the Municipality.

Halifax Regional Municipality Charter, section **322 (1)** The Council may design, lay out, open, expand, construct, maintain, improve, alter, repair, light, water, clean, and clear streets in the Municipality.

RECOMMENDATION

It is recommended that the Transportation Standing Committee recommend that Regional Council direct the Chief Administrative Officer to:

1. Endorse the Herring Cove Road functional plan and further integrate with the recommendations of the recently approved *Rapid Transit Strategy (2020).*

2. Initiate efforts to acquire property to widen various sections of Herring Cove Road to accommodate dedicated active transportation and transit infrastructure.

EXECUTIVE SUMMARY

Herring Cove Road is the primary arterial road connecting the Spryfield area to the Halifax Peninsula. There was a vision to widen the length of the road to four lanes dating back to the 1970's that has been partially implemented over time. This has resulted in an inconsistent cross-section with sidewalk gaps that favors car movement over pedestrians, cyclists, and public transit. With the adoption of the *Integrated Mobility Plan* (2017), new plans for strategic corridors, including Herring Cove Road, are needed to address the mobility needs of all road users.

The Herring Cove Road Functional Plan project was completed in September 2019. The project scope included functional level design (30% design) for Herring Cove Road between the Armdale Roundabout and civic 554, south of Greystone Drive. Key features of the project focused on the active transportation needs of the corridor by adding sidewalk where critical gaps exist, upgrading existing sidewalks, connecting bus stops, and included protected cycling infrastructure. Transit priority measures were included where possible, most notably with an inbound transit lane from Cowie Hill Road to the Armdale Roundabout.

In 2020, the *Rapid Transit Strategy* (RTS) was completed after the Herring Cove Road Functional Plan and recommended a more significant investment in transit along Herring Cove Road with transit only lanes between Greystone Drive and the Armdale Roundabout and Bus Rapid Transit (BRT). The "Yellow Line" would operate at a high frequency all day with headways of 10 minutes or less with travel times that would be competitive with private vehicles.

A preliminary design project (60% design) was completed for Herring Cove Road between the Armdale Roundabout and Glenora Avenue in September 2020 to integrate the Herring Cove Road Functional Plan with the recommendations of the *Rapid Transit Strategy*. The 60% design has provided a better understanding around some of the more complex design aspects with retaining walls, utility impacts and land acquisition as well as more detailed cost estimates for capital budget planning.

On February 10, 2021, the federal government announced a new plan to spend $14.9 billion on public transit across the country over the next 8 years. It is not clear how the funds will be distributed, but it is likely that HRM will received some amount of funding towards the construction of the RTS network, including Herring Cove Road. Federal funding cannot be used to purchase land, so all land acquisition would be funded solely by HRM.

This report recommends that the Transportation Standing Committee endorses the continuation of integrating the Herring Cove Road functional plan with the Rapid Transit Strategy and investigate property acquisition where needed leading to the future construction of active transportation and transit infrastructure along Herring Cove Road. If the staff recommendations are approved, an additional preliminary design project will be completed for the remainder of the "Yellow Line" route between Glenora Avenue and Greystone Drive. The limits of the study area for these projects have been included in the ongoing capital budget discussions and would be implemented in phases over the next 5 to 10 years.

BACKGROUND

With Regional Council adoption of the *Integrated Mobility Plan* (IMP), HRM's approach to transportation infrastructure planning and design has been transformed. It has been recognized that to meet the region's non-auto mode share targets and improve the sustainability of the transportation system, increased priority for non-auto modes (transit, walking, cycling) will be required. For corridors such as Herring Cove Road – *"existing road corridors that are key to regional traffic flow, transit, goods movement and active transportation"* IMP Action 121 recommends the development of 'Strategic Corridor' plans that guide their development over time.

Strategic corridor planning undertaken as recommended by the IMP should explicitly consider the Plan's overarching objectives, which support investment in infrastructure and programs aimed at improving transportation sustainability and creating complete communities. As such, strategic corridor plans should include a focus on assessing the feasibility of reconfiguring the corridor to include improved transit and active transportation facilities, as well as considering the potential for enhancement from a 'Complete Streets' perspective. Though the IMP does recommend strategic "bottleneck" improvements to the roadway network where possible, it also discourages further investment in additional roadway infrastructure in favor of encouraging non-auto modes.

There have been various studies of the Herring Cove Road corridor over a period of approximately 40 years. During that time, transportation planning has evolved as per the direction in the IMP from focusing on moving people in private vehicles to providing infrastructure for all modes and prioritizing active transportation and public transit to create a more sustainable transportation network. Key studies that have been completed in the past include the following:

- During the 1970's, plans to widen Herring Cove Road to a consistent 4-lane cross section (between Armdale Roundabout and Old Sambro Road) were made in response to significant planned growth in the Mainland South area. Though some 4-lane sections have since been constructed, the effectiveness of this capacity is limited by the 2-lane sections closer to the Armdale roundabout, where widening to four lanes represents a significant challenge due to topography and property constraints.

- In 2005, the *Herring Cove Road Community Development & Streetscape Planning Project* (Ekistics Planning + Design) was completed. This project attempted to establish a vision for Herring Cove Road and the abutting community, considering various transportation infrastructure and urban design improvements.

- Inspired by the 2005 Ekistics plan, a 'road diet' was considered on the 1km section of Herring Cove Road between Old Sambro Road and Dentith Road in 2010. The project, which reached the detailed design stage, included reduction from four lanes to three lanes, and the addition of bike lanes and streetscaping features. However, the project did not proceed to construction.

In November 2018, Alta Planning & Design was hired to complete a functional plan of Herring Cove Road between the Armdale Roundabout and 554 Herring Cove Road. The goal of the project was to create two design options with a cohesive vision for this 5.5 km corridor while focusing on the principles of the IMP, prioritizing active transportation and transit movement before private vehicles. This work addressed the following items:

- Pedestrian improvements including closing sidewalk gaps between Greystone Drive and civic 554 and Glenora Avenue and Cherry Lane.
- The *Making Connections: Active Transportation Priorities Plan* identifies Herring Cove Road as a "Desired Bikeway".
- The IMP designates Herring Cove Road between Cowie Hill Road and the Armdale Roundabout as a Transit Priority Corridor, where transit movement should be prioritized over private vehicle movement through transit priority measures.
- Herring Cove Road serves regional movement for commuting between Spryfield and the rest of Halifax but is also important for local travel. Herring Cove Road is the primary main street for business activity in Spryfield.
- There is significant development between multiple subdivisions currently under construction and in the planning stage in the area, most of which is at the southern end of the study area.

In addition to its status as a 'strategic corridor', Herring Cove Road is identified in the IMP as a proposed 'Transit Priority Corridor', between Cowie Hill Road and the Armdale Roundabout, where increased transit priority measures are desired. The recently completed *Rapid Transit Strategy (2020)* expands on the importance of transit infrastructure along Herring Cove Road by identifying the corridor for Bus Rapid

Transit. The “Yellow Line” connects Spryfield to Downtown Halifax along Herring Cove Road, from

Greystone Drive to the Halifax Shopping Centre, and continues to the QEII Hospital, and Scotia Square. It’s estimated that with the proposed transit priority measures, this route will provide a 22% improvement in time savings versus comparable existing bus routes and operate at a higher frequency.

In late 2019, Crandall Engineering (a division of Englobe) was hired to further a section of the design completed by Alta Planning & Design in early 2019. The original functional plan was completed to a 30% design level, which generally considers the streets layout and operations. Crandall Engineering completed a 60% design for Herring Cove Road between the Armdale Roundabout and Glenora Avenue, although most of their effort was focused between the roundabout and Cowie Hill Road. This section required a closer attention to detail due to the steep slopes requiring retaining walls as well as utility and property impacts. The Crandall design also included changes to the Alta plan to accommodate the recently approved *Rapid Transit Strategy*, which began after the Alta Planning & Design project had completed.

DISCUSSION

Herring Cove Road is a key arterial roadway that links the Spryfield and Purcells Cove areas (and points beyond) to the Regional Centre via the Armdale Roundabout. It currently accommodates more than 15,000 vehicles per day and is served by three Halifax Transit routes. A key commuter route, Herring Cove Road is subject to heavy volumes and congestion during weekday morning and afternoon peak periods. It also functions as Spryfield’s ‘main street’, with a concentration of mixed-use development that includes residential, commercial, institutional, and recreational.

Despite its significance in the regional transportation network and importance to the local community, Herring Cove Road lacks a consistent vision in terms of how it should look and function. It has an inconsistent cross section that ranges from two to four lanes, and disconnected pedestrian and bicycle facilities that limit the potential for active transportation uses. Peak period traffic congestion and the lack of transit priority measures force buses to sit in traffic, increasing delays and impacting service reliability.

The following tasks were included in the Alta Planning & Design scope of work for the Herring Cove Road Functional Plan project:

- A review of existing infrastructure and traffic conditions;
- Public engagement on the existing conditions and the priorities of residents and stakeholders;
- Conceptual design of two options based on the IMP and citizen priorities;
- Public engagement on the two conceptual designs options;
- Functional design expanding on the conceptual designs and incorporating feedback received from residents and stakeholders; and
- Submit final design report, drawings and cost estimates.

Existing Conditions

The existing conditions review highlighted the variability of the street’s cross-section along the study area. In general, the review noted that some sections of the street have no sidewalk on either side, there is no cycling infrastructure, inaccessible bus stops, no transit priority measures, and traffic lanes range between two and five. A detailed review of the existing conditions can be found in the Herring Cove Road Functional Plan Existing Conditions Report (Attachment “A”).

Pedestrian infrastructure is very inconsistent along the corridor. The table below lists the sections of Herring Cove Road with gaps or sub-standard sidewalks, which also leads to many inaccessible bus stops within these sections:

Table 1: Locations with deficient sidewalk along Herring Cove Road within the study area during the development of the functional plan.

Deficiency	Side of Street	Limits	
No sidewalk*	West	Greystone Drive	Civic 569
No sidewalk*	East	Lynnett Road	Civic 554
No sidewalk	East	Cherry Lane	Glenora Avenue
Sub-standard (asphalt)	West	Glenora Avenue	Osborne Street
No sidewalk	East	Old Sambro Road	Osborne Street
Sub-standard (asphalt)	East	Osborne Street	Purcells Cove Road
Sub-standard (asphalt)	West	Purcells Cove Road	Armdale Roundabout

** New sidewalk construction completed during September 2020*

Although Herring Cove Road is a common cycling route for both local and regional commuting, as well as recreationally, cycling infrastructure within the study area is limited to the newly constructed painted cycling lanes between Greystone Drive and civic 554. There are also sections south of the study area with paved shoulders and painted bicycle lanes. The entire length of Herring Cove Road is designated as a "Desired Bikeway" in HRM's *Active Transportation Priorities Plan.* There have been serious injury and fatal collisions with cyclists in the area over the past few years, which reinforces the need for safe cycling infrastructure.

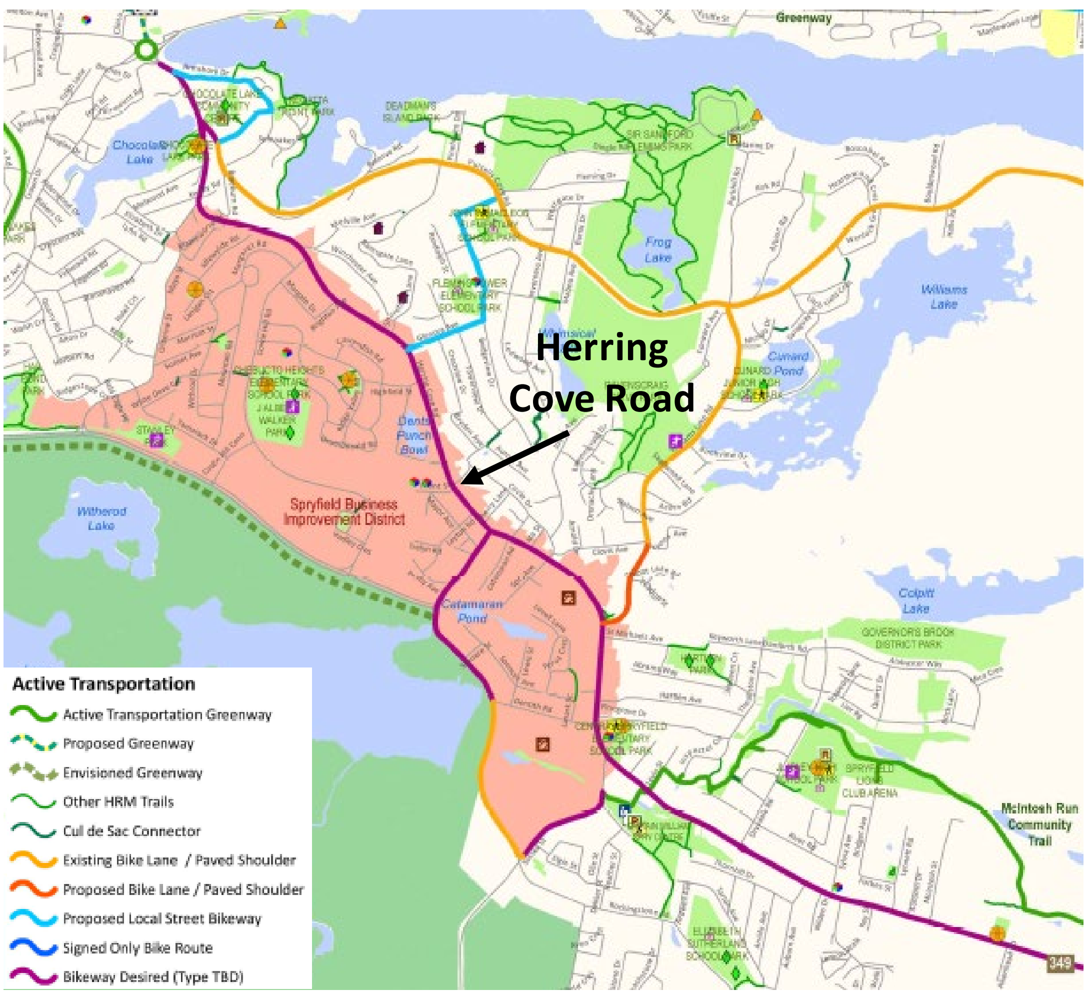

Figure 1: Excerpt of Herring Cove Road from the Making Connections: 2014-19 Active Transportation Priorities Plan

Transit ridership in the Spryfield area has seen an increase in the past few years. The area is served by three routes: 9, 14, and 32. Although transit ridership and service are strong along the corridor, some bus stops are not connected by sidewalks and do not meet accessibility standards.

Table 2: Change in transit ridership between Q2 18/19 and Q2 19/20

Route	Q2 18/19 Boardings per weekday	Q2 19/20 Boardings per weekday	Percent change
9 A/B	6406	7097	+10.8%
14	2501	2609	+4.3%
32	436	481	+10.3%
Total	**9343**	**10187**	**+9%**

Traffic on Herring Cove Road operates well in most locations but is notably congested inbound near the Armdale Roundabout. The St. Margaret's Bay Road and Herring Cove Road approaches to the roundabout both have high traffic volumes during the AM peak hours and experience significant queueing and delays. Queueing on Herring Cove Road can extend from the roundabout as far as Cowie Hill Road during the AM peak. Other than several side streets, notably Osborne Street, the intersections along Herring Cove Road operate adequately under current traffic volumes. A detailed report on the existing traffic conditions can be found in Existing Conditions Report in Attachment "A".

Functional Plan Development (30% design)

Two design options were completed for the corridor, an "Interim Design" option and an "Ultimate Design" option. The Interim Design option was framed to be easier to implement, require little to no property acquisition, and address near to medium term needs of the corridor. The Ultimate Design option was intended to address the long-term needs of the corridor with full buildout of known developments in the area. This option was expected to require significant capital planning, utility coordination, property acquisition, etc. The intention of the two options was to create implementation options that could be phased in over time based on capital planning and value-based decisions, compared to choosing one option over the other, while accommodating all modes of travel.

The "Interim Design" generally provides the following changes to the street:

- Sidewalk gaps along the corridor are completed and upgrades to existing or additional pedestrian crossings would be further considered.
- Protected uni-directional cycling lanes are added with pre-fabricated curbs, similar to what has been constructed on South Park Street between Spring Garden Road and Inglis Street. Some traffic lanes would be removed in various sections to create space for cycling lanes within the existing curb to curb widths.
- An inbound transit queue bypass lane is included at Old Sambro Road, as well as an outbound queue bypass lane at Dentith Road.
- Traffic capacity is reduced in some sections but remains within an acceptable level of service.

An example of a typical cross-section is found below:

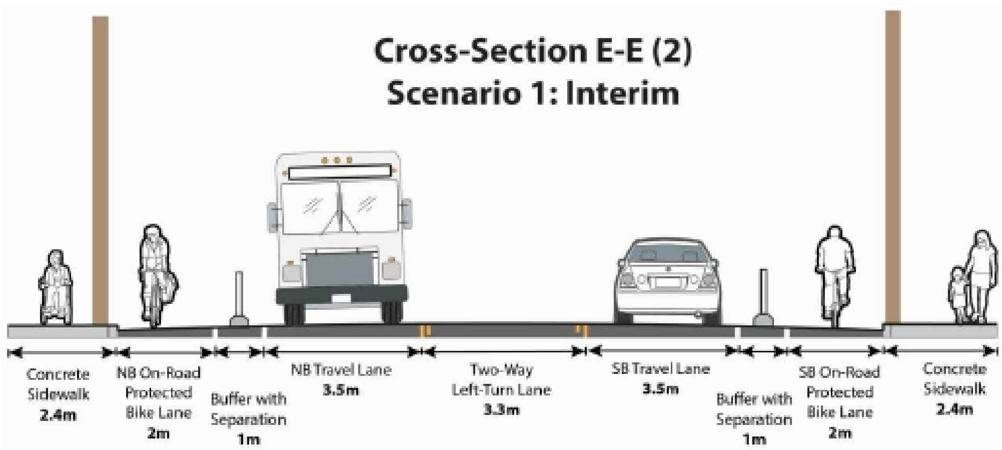

Figure 2: Example cross-section of interim design between Williams Lake Road and Dentith Road

The "Ultimate Design" provided similar benefits for pedestrians and cyclists, but also includes significant transit priority inbound between Cowie Hill Road and the Armdale Roundabout, where transit priority is needed most. The following changes to the street are included in the Ultimate Design:

- Sidewalk gaps along the corridor are completed and upgrades to existing/additional pedestrian crossings would be further considered.
- Opportunities for treed and planted boulevards to separate pedestrians and cyclists from traffic.
- Raised curbs offer a more permanent protected cycling lane and will reduce maintenance over time compared to pre-fabricated curbs but will have a higher initial cost.
- A dedicated inbound transit only lane is included from Cowie Hill Road to the Armdale Roundabout, a southbound queue bypass lane at Cowie Hill Road, a northbound queue bypass lane at Williams Lake Road, and a northbound queue bypass lane at Old Sambro Road.
- In some sections, traffic lanes are retained to ease future congestion.

An example cross-section is found below:

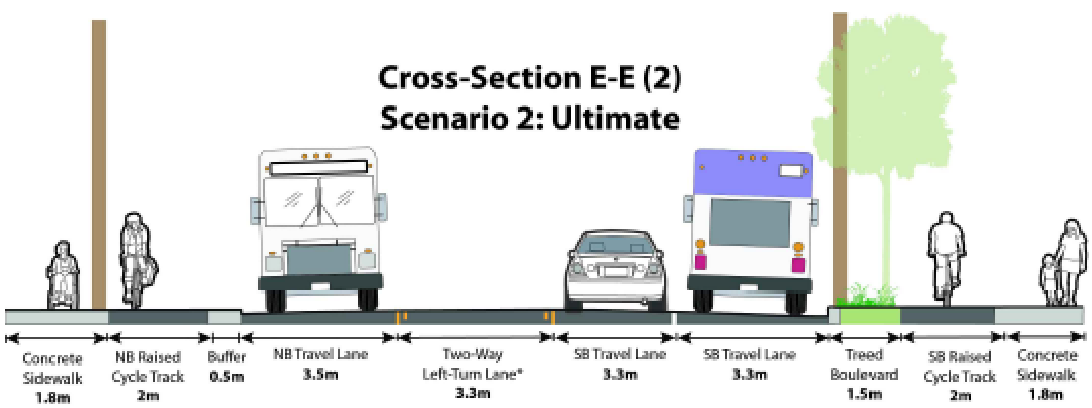

Figure 3: Example cross-section of "Ultimate" design between Williams Lake Road and Dentith Road

The Herring Cove Road Functional Plan Final Report (Attachment B) assumes some lane widths narrower than minimum lane widths in HRM's Municipal Design Guidelines (Red Book). Any exceptions to HRM's Design Guidelines, including but not limited to lane widths, would be evaluated during detailed design and ultimately be subject to approval of the Municipal Engineer. Efforts to increase boulevard widths would also be considered to increase pedestrian and cyclist comfort and provide space for municipal operations, including snow storage, during detailed design.

Preliminary Design Project (60% Design)

At the conclusion of the Herring Cove Road Functional Plan project, it was determined that the scope and final deliverables did not provide the level of detail required to advance to detailed design between the Armdale Roundabout and Cowie Hill Road due to the complicated nature of this section. The functional plan provided a strong base understanding of what infrastructure should be included in the cross-section, but did not result in a strong understanding of property impacts, required retaining wall heights and locations, driveway grading, utility impacts, etc. As a result, a request for proposals for a 60% design project was issued to several consultants, with Crandall Engineering (a division of Englobe) being the successful proponent.

Crandall advanced the completed functional plans to a higher level of detail, while also considering additional options. The *Rapid Transit Strategy* study was taking place in parallel with the 60% design project, which resulted in a recommendation of significant investment in Bus Rapid Transit along Herring Cove Road. During this process, it was decided that Crandall would advance the "Ultimate Design" from the Alta functional plan, as well as an option with transit lanes in both directions compared to only in the inbound direction between the Armdale Roundabout and Glenora Avenue. This would further explore the constructability, property impacts, and provide more detailed cost estimates.

The 60% design did include a change to the recommended cycling infrastructure from the original functional plan. The functional plan recommended uni-directional cycling lanes for the majority of the corridor but would transition to a multi-use path between Cowie Hill Road and the Armdale Roundabout to better fit within the available space. In order to better accommodate transit lanes, the 60% design recommended that this transition take place further south, at the Glenora Avenue intersection. The Herring Cove Road 60% Design Final Report is included as Attachment "C".

Further evaluation of the Herring Cove Road Functional Plan will be required to ensure the rest of the Herring Cove corridor, from Glenora Avenue to civic 554, includes the active transportation infrastructure recommended in the Herring Cove Road Functional Plan and the bus rapid transit infrastructure recommended in the *Rapid Transit Strategy.* It is expected that the process of taking the 30% design for the remainder of the corridor to 60% design will begin in early 2021. Changes to the Herring Cove Road Functional Plan and/or *Bus Rapid Transit* infrastructure recommendations are possible when the two plans are integrated as various trade-offs, property requirements, etc. are evaluated.

Rapid Transit Strategy "Yellow Line"

The "Yellow Line" route from the recently approved *Rapid Transit Strategy* provides preliminary recommendations for transit stations and bus lanes that will connect Spryfield to the Mumford Terminal and continue to Downtown Halifax with stops at the Halifax Shopping Centre, QEII Hospital, Spring Garden Road, and Scotia Square. The Herring Cove Road 60% Design project is the first section of the route with designs completed, although detailed design has not begun. Functional design work for the remainder of the route would be programmed into the coming years, if funding agreements with Provincial and Federal Governments can be secured.

Figure 4: Rapid Transit Strategy "Yellow Line"

Halifax Urban Greenway Functional Plan

The Herring Cove Road Functional Plan provides approximately 5.5km of pedestrian and cycling infrastructure from Spryfield to the Armdale Roundabout. The Halifax Urban Greenway is an active transportation route from the *Active Transportation Priorities Plan* that connects the Chain of Lakes Trail to the south end of the Halifax Peninsula and predominantly follows the rail cut. A functional plan completed by WSP in 2019 recommended a route for the greenway but requires further study prior to implementation. A connection to the proposed Herring Cove Road cycling lanes and multi-use path would be included in the further study and implementation of the Halifax Urban Greenway. The Halifax Urban Greenway will provide a direct connection to the Mumford Terminal and to various routes downtown via connections to the future Norwood Street Local Street Bikeway, and the South Street connection to University Avenue/Morris Street future protected cycling infrastructure.

Figure 5: Halifax Urban Greenway route (Active Transportation Priorities Plan 2014-19

Land Use Considerations

A plan to widen Herring Cove Road in its entirety to four lanes has been envisioned since the 1970s, but only a section of this has been completed between Old Sambro Road and Greystone Drive. A list of road network projects throughout the municipality, including the widening of Herring Cove Road, that were meant to have been required to meet future traffic demand was developed for the 2006 Regional Plan and updated in the 2014 Regional Plan. The Herring Cove Road project would widen the road to four lanes between Old Sambro Road and the Armdale Roundabout to complete the 4-lane aimed at reducing vehicle congestion and enabling more development. The project was changed from "planned" in the 2006 Regional Plan to "programmed" in the 2014 Regional Plan, meaning it went from a future project anticipated to be constructed within the life of the plan (2031) to a project to be included in the three-year capital budget. The project was put on hold in anticipation of the IMP. The IMP changed considerations on how Regional Plan road projects are evaluated, which lead to this functional plan.

There is a significant amount of development potential in Spryfield along the Herring Cove Road corridor. There are multiple developments near the southern end of the study area mostly between Greystone Drive and MacIntosh Run. The combination of development allowed through as of right permissions as well as discretionary planning processes could lead to the construction of approximately 2,300 new units. While the Regional Plan supports this development, with this area designated as a growth node, traffic generated by this amount of development would increase stress on the street network, especially with the vehicle capacity restrictions of the Armdale Roundabout. This reinforces the need to provide alternative modes of transportation to increase the people moving capacity along the corridor, most notably through the recommendation of the *Rapid Transit Strategy* to provide bus rapid transit, which benefits from increased development and population growth.

Funding Opportunities

On February 10, 2021, the federal government announced a new plan to spend $14.9 billion on public transit across the country over the next 8 years. It is not clear how the funds will be distributed, but it is likely that HRM will received some amount of funding towards the construction of the RTS network, including Herring Cove Road. Federal funding cannot be used to purchase land, so all land acquisition would be funded solely by HRM. In order to fully benefit from this new funding stream, land will need to be purchased in advance.

Next Steps

If the recommendations of this report are approved, a request for proposals (RFP) will be issued to complete the preliminary design (60% design) for Herring Cove Road between Glenora Avenue and Greystone Drive to integrate the Herring Cove Road Functional Plan and the *Rapid Transit Strategy* recommendations. Construction and detailed design of the entire corridor has been included in the 5-10 year Capital Budget and would be implemented in phases.

FINANCIAL IMPLICATIONS

If the recommendations of this report are approved, the design changes outlined in the functional plan in alignment with the *Rapid Transit Strategy* will be included in the Capital Budget process prior to proceeding to property acquisition and construction. Unless the Municipality receives funding from other levels of government, the reconfiguration of the corridor would be phased over several years as routine recapitalization projects become a priority due to the condition of the pavement. It is currently expected that the entire length of the study area will require recapitalization within 10 years.

The class 'D' construction costs for the Herring Cove Road Functional Plan Interim and Ultimate Design options were approximately $2.2 million and $21.6 million, respectively, and did not include property acquisition. The Interim Design estimate did not include repaving, where the Ultimate Design estimate does include repaving. The Herring Cove Road 60% Design (Armdale Roundabout to Glenora Avenue) class 'C' estimates for Option 1 and Option 2 were $10.3 million and $12.2 million respectively, which also did not include property acquisition. The cost of property acquisition associated with Option 2 is expected to be much higher than Option 1 as the cross section is wider.

Additional work will be needed to update the cost estimates of the Herring Cove Road Functional Plan, which primarily focused on active transportation, with the recommendations of the *Rapid Transit Strategy*.

Currently, there are funds in the proposed 21/22 Capital budget which address the continued work on the functional plan and potential property acquisition. While the property acquisition account is for all IMP related projects and not just Herring Cove Road, there would be funds available in the account below should the opportunity to acquire a property arise.

The 4- year estimated financial implications are summarized as follows:

Fiscal Year	**2021/22**	**2022/23**	**2023/24**	**2024/25**
Capital – CT190005 **Major Strategic Multi Modal Corridor: Herring Cove Road**	$250,000	$200,000	$0	$200,000
Capital – CT190009 **IMP Land Acquisition**	$3,000,000	$1,000,000	$1,000,000	$1,000,000

RISK CONSIDERATION

Capital costs may increase due to unforeseen complications due to utility impacts, geotechnical conditions, and related to retaining walls. Property acquisition costs have not been included in the financial implications section of the report as they are unknown at this time.

COMMUNITY ENGAGEMENT

There were two phases of engagement for this project. Each included a key stakeholder meeting with community groups and businesses along the corridor, a public open house, and online participation. The purpose of the first phase of engagement was to receive input on the existing conditions and confirm that the project objectives aligned with the community vision. There was a fairly high volume of participation with a public open house that had over 100 attendees, and online participation with over 2,200 page visits and 855 completed surveys. Key findings from the first phase of engagement were that while commuting by car was the most popular, many residents were interested in walking, cycling, and taking transit if new sidewalks, cycling and transit priority infrastructure was constructed.

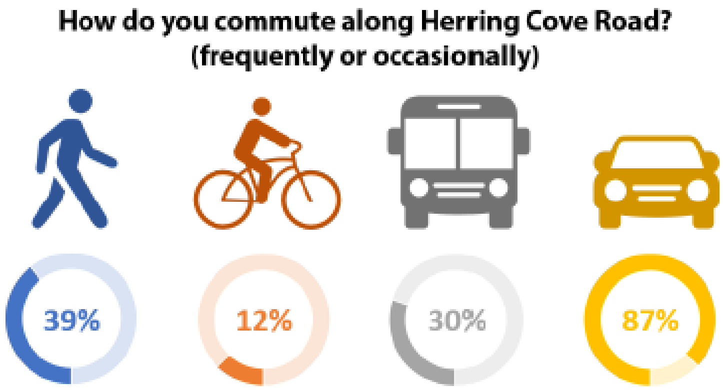

Figure 6:Public engagement survey results: How often do you use Herring Cove Road as a commuter (traveling to work or school)?

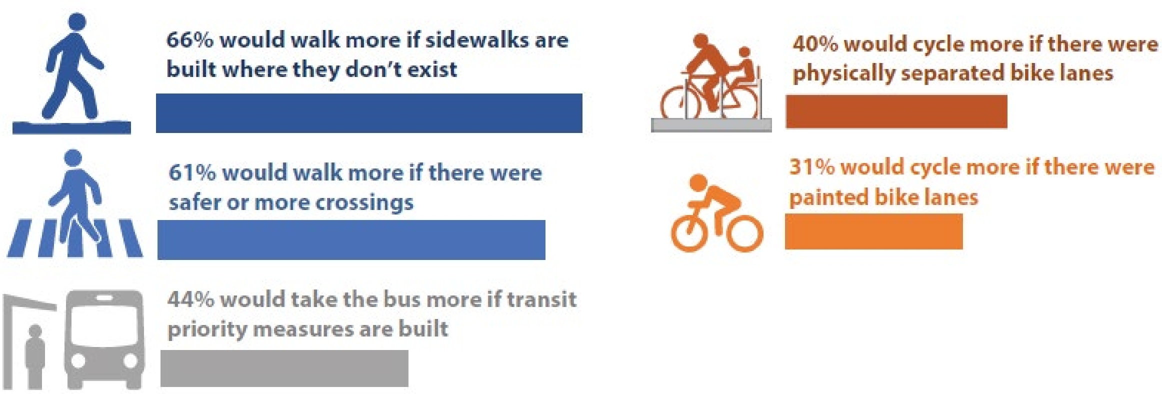

Figure 7: Public engagement results: To what extent would these infrastructure improvements increase the likelihood that you would travel by the transportation options?

The purpose of the second phase of engagement was to present concept plans to the public and confirm that the design options achieved the project objectives and receive input on anything that the project team may have missed. Engagement was not as high as phase one but was still well attended with over 55 open house attendees, 1,330 online page visits, and 130 completed surveys. The concept designs were generally well received and supportive. The expectation was not that the public would choose one option over the other, as it was expected that "Ultimate Design" option would be constructed eventually, but the "Interim Design" option could be constructed in some or all sections for quicker implementation, but the public did feel that the "Ultimate Design" option met the objectives best. One common comment received in the open comment section of the online survey was that the "Ultimate Design" option should be implemented immediately. The detailed reports for each phase of engagement can be found in Attachment "D".

ENVIRONMENTAL IMPLICATIONS

The project supports investment in sustainable modes of transportation and is consistent with the Integrated Mobility Plan's objectives to reduce dependency on private vehicles and increase the number of trips made by active transportation and transit. This project aligns with the HalifACT 2050 plan to decarbonize transportation through expanding the active transportation and transit infrastructure. Expanding and improving active transportation and transit networks improves the likelihood that residents will choose lower

carbon transportation methods, reducing congestion, improving air quality and improving the physical and mental health of residents. The project will help reduce greenhouse gas emissions with the expected increase in residents transitioning from traveling by private vehicle to active transportation and transit.

ALTERNATIVES

The Transportation Standing Committee could recommend that Halifax Regional Council recommend either or both of the recommendations not be approved or be modified. Changes to the recommendations may require a supplementary staff report.

ATTACHMENTS

Attachment A: Herring Cove Road Functional Plan Existing Conditions Report
https://www.shapeyourcityhalifax.ca/7786/widgets/29675/documents/52457
Attachment B: Herring Cove Road Functional Plan Final Report
https://www.shapeyourcityhalifax.ca/7786/widgets/29675/documents/52458
Attachment C: Herring Cove Road 60% Design Final Report
https://www.shapeyourcityhalifax.ca/7786/widgets/29675/documents/52459
Attachment D: Herring Cove Road Community Engagement
https://www.shapeyourcityhalifax.ca/7786/widgets/29675/documents/52460

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

Report Prepared by: Harrison McGrath, P.Eng., Program Engineer, Strategic Transportation Planning, Planning & Development, 902.329.1475

Attachment A:

Herring Cove Road Functional Plan Existing Conditions Report

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Memorandum

Date: March 12, 2019

To: Harrison McGrath, Halifax Regional Municipality

From: Kate Whitfield, Alta Planning + Design

Cc: Florence Allaire, Harbourside Transportation

Matt Pinder, Alta Planning + Design

Re: **Herring Cove Road Functional Plan – Existing Conditions Report – FINAL**

Introduction

Purpose of this Document

This technical memorandum includes an inventory of existing conditions along Herring Cove Road within the Herring Cove Road Functional Plan study area. The document also includes a review of the physical and traffic operational constraints. Existing conditions information is based on a review of existing and planned infrastructure data from the Halifax Regional Municipality (HRM), plus transit ridership data, crash data and traffic volume counts.

This memorandum contains the following appendices:

- **Appendix I:** Harbourside Engineering Level of Service Report
- **Appendix II:** Existing Conditions Maps and Cross Sections

Project Background

Herring Cove Road is an arterial roadway that links the Spryfield and Purcells Cove areas (and points beyond) to the Regional Centre via the Armdale Roundabout. It currently accommodates more than 15,000 vehicles per day, and is served by three Halifax Transit routes. A key commuter route, Herring Cove Road is subject to heavy volumes and congestion during weekday morning and afternoon peak periods. It also functions as Spryfield's 'main street', with a concentration of mixed-use development that includes residential, commercial, institutional, and recreational.

Despite its significance in the regional transportation network and importance to the local community, Herring Cove Road lacks a consistent vision in terms of how it should look and function. It has an inconsistent cross section that ranges from two to four lanes, and disconnected pedestrian and bicycle facilities that limit the potential for active transportation uses. Peak period traffic congestion and the lack of transit priority measures forces buses to sit in traffic, increasing delays and impacting service reliability.

Figure 1 - Herring Cove Road near Dentith Road (Source: Spryfield Community Association)

Project Purpose and Need

The objective of the project is to develop a functional plan for Herring Cove Road that will provide a corridor-wide vision; a vision which directly informs how the transportation infrastructure is reinstated as part of routine capital projects, as well as enable the strategic preservation (and acquisition) of right-of-way to facilitate future works. The design will complement the objectives and principles of the Integrated Mobility Plan (IMP) focusing on Complete Streets and putting pedestrians first. A vision for the corridor will enable HRM to more effectively justify any necessary trade-offs that may be required. The need for this study is time-sensitive due to the urgent need for state of good repair work on several sections.

General Site Description

Herring Cove Road is a busy corridor for transit and motorists, as well as a popular area for pedestrians and cyclists. It is also a key point of entry onto the Halifax peninsula. The road functions as Spryfield's 'main street', with a concentration of mixed-use development that includes residential, commercial, institutional, and recreational. There are a number of development applications in the area mostly near the outer limit of the study area.

There are issues with pinch points, bottlenecks and other constraints on traffic in the corridor. The roadway cross-section is highly variable throughout the corridor (i.e., different number of travel lanes, sections with and without sidewalks). There are property constraints in some sections.

Some sections have improved sidewalks recently built that include a boulevard with trees. For other sections of the corridor, there is only a sidewalk on one side of the road, or no sidewalks. There are no existing cycling facilities on Herring Cove Road. Maps with more detailed information on the existing conditions have been included in Appendix II. The maps include cross-sections representing the existing configuration of the roadway.

Study Area

The study area includes Herring Cove Road between the Armdale Roundabout and the 500 Block, a distance of approximately 5km. The study area corridor is broken down into eight different roadway segments for the analysis as defined below. The segments are divided up based on the study intersections and other locations where there are changes to the cross-section (lane drops, added lanes or changes to active transportation (AT) facilities). The segments are as follows:

1. **Armdale Roundabout to Purcells Cove Road:** Three-lane cross-section with one lane inbound, one lane outbound and one reversible lane. Concrete sidewalk on east side of the road, and substandard asphalt sidewalk on west side of the road along this segment
2. **Purcells Cove Road to Cowie Hill Road:** Two-lane cross-section with one lane inbound and one lane outbound. Substandard asphalt sidewalk on east side of the road and paved shoulder on west side of the road along this segment
3. **Cowie Hill Road to Highfield Street:** Two-lane cross-section with one lane inbound and one lane outbound. A concrete sidewalk on the east side of the road and a mix of concrete and substandard asphalt sidewalk on the west side of the road along this segment
4. **Highfield Street to Old Sambro Road:** Three-lane cross-section with one lane inbound and two lanes outbound. A concrete sidewalk on the west side of the road and intermittent sections of asphalt sidewalk on the east side of the road along this segment
5. **Old Sambro Road to Sussex Street:** Four-lane cross-section with two lanes inbound and two lanes outbound. A painted median with intermittent raised median islands and intermittent left turn lanes are provided. Concrete sidewalks on both sides of the road along this segment
6. **Sussex Street to Greystone Drive:** Four-lane cross-section with two lanes inbound and two lanes outbound. A painted median with intermittent left turn lanes is provided. Concrete sidewalks on both sides of the road along this segment
7. **Greystone Drive to Lynnett Road (500 block):** Three-lane cross section with two lanes inbound and one lane outbound. A concrete sidewalk on the east side of the road along this segment
8. **Past Lynnett Road (500 block):** Two-lane cross-section with one lane inbound and one lane outbound. No sidewalks along this segment, only paved shoulders

Policy Framework

Integrated Mobility Plan (2017)

This project fits within the bigger picture of the Integrated Mobility Plan (IMP) which was adopted in 2017. The IMP includes the identification of ‘Strategic Corridors.’ Herring Cove Road is one such corridor, considered key to regional traffic flow, transit, goods movement and active transportation.

As a ‘Strategic Corridor’, a plan is required to guide the development of Herring Cove Road over time. The plan is required to assess the feasibility of reconfiguring the corridor to include improved transit and active transportation facilities, as well as consider the potential for enhancement from a ‘Complete Streets’ perspective. Complete Streets is a holistic, flexible and context-sensitive approach to street design and maintenance. It aims to improve the comfort and safety of all users of transportation modes, including pedestrians, bicyclists and transit users. The Complete Streets approach also recognizes that, in addition to moving people and goods, streets can be destinations and important public spaces. Direction to design complete streets was also a transportation objective of the Regional Municipal Planning Strategy (2014).

Though the IMP does recommend strategic ‘bottleneck’ improvements to the roadway network where possible, it also discourages further investment in additional roadway infrastructure in favor of encouraging non-auto modes.

In addition to its status as a ‘Strategic Corridor’, Herring Cove Road is identified in the IMP as a proposed ‘Transit Priority Corridor’, where increased transit priority measures are desired. The IMP also specifically identifies addition of sidewalk upgrades (in the vicinity of the 500 block) as a key short-term action.

Regional Municipal Planning Strategy (Regional Plan) (2014)

The Regional Plan provides a vision and principles to guide the land use and design, transportation, open space and cultural heritage of the many communities and areas that are a part of the HRM. The strategy designates Spryfield as an “Urban District Growth Centre”. The following table from the plan (p.46) outlines the vision for the designation.

Centre Type	Centre Name	Land Uses and Design	Transit, AT and Parking	Open Space	Cultural Heritage
Urban District Growth Centre	Spryfield Bedford West Sunnyside Mall Sackville Russell Lake Port Wallace Sandy Lake Hwy. 102 West Corridor Bedford South	• Mix of low, medium and high density residential, commercial, institutional and recreation uses • In established residential neighbourhoods, low to medium density residential uses • Existing retail plazas and shopping centres • Encourage infill or redevelopment of large parking lots into traditional blocks with streetwalls and step-backs • Pedestrian oriented facades	• Connecting point for transit routes to other centres and Regional Centre • Enhance pedestrian linkages • Street or shared surface parking at the rear wherever possible • Access to AT routes • Short interconnected blocks for ease of walkability	• Streetscaping featuring landscaped pocket parks and tree-lined streets • Interconnected private and public open space linked with greenbelt corridors • Improved quality and quantity of parkland • Focus on waterfront parks and trails • Private and public realm urban forest canopy cover to be maintained and improved • Riparian canopy cover to be maintained and improved • Provisions for food security	• Built and natural heritage to be maintained and improved • Heritage features integrated with new development • Public art integrated with new development • Scenic public views preserved • Cultural heritage corridors

Figure 2 - Future Characteristics of Urban District Growth Centres, from Halifax Regional Municipal Planning Strategy p.46

Municipal Design Guidelines

The municipality's *Municipal Design Guidelines* provide design guidance for municipal streets. Much of the content is based on the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads — a national guideline commonly adopted by municipal and provincial jurisdictions across Canada. Though periodic updates are made to the *Municipal Design Guidelines*, many of the current street design standards are outdated.

The *Municipal Design Guidelines* (also known as the Red Book) are currently being updated by HRM to include guidelines for road retrofitting and transportation design for the municipality's urban areas and to enable street designs that accommodate people of all ages and abilities including those with physical, visual, auditory and mental disabilities.

Active Transportation Priorities Plan (2014)

This plan includes policies and strategies to encourage walking and cycling and create safe and comfortable connections from where people live to where they work, shop, study, access services and catch transit.

Goal #1 of the *Active Transportation Priorities Plan* is to establish a connected pedestrian network. The plan acknowledges the incomplete state of sidewalk networks throughout Spryfield.

According to Recommendation #21 of the *Active Transportation Priorities Plan*, where a bike route is desired and pedestrian facilities are also needed, consideration should be given to building an AT Greenway beside the road to serve both modes. AT Greenways are 3-4m wide paved or crusher dust trails that form part of a network intended for walking, cycling, and other active modes.

Herring Cove Road is identified in this plan as being desired as a route for a bikeway (type to be determined). The plan also recommends that bikeway implementation should focus on infrastructure that meets the needs of new cyclists, and that any candidate bicycle routes should consider protected bicycle lanes.

Moving Forward Together Plan (2016)

This plan directs improvements to transit service to better meet the needs of residents today and into the future. It prioritizes service to areas with high ridership or high ridership potential and reduces inefficient, low ridership services. It describes a future network that is easier to understand and navigate for current and potential transit users.

Herring Cove Road Community Development & Streetscape Planning Project (2005)

In 2005, the Herring Cove Road Community Development & Streetscape Planning Project was completed. This project attempted to establish a vision for Herring Cove Road and the abutting community, considering various transportation infrastructure and urban design improvements.

Inspired by the 2005 Ekistics plan, a 'road diet' was considered on the 1km section of Herring Cove Road between Old Sambro Road and Dentith Road in 2010. The project, which reached the detailed design stage, included reduction from four lanes to three lanes, and addition of bike lanes and streetscaping features. Ultimately, Regional Council decided to reject most elements of the design in favor of reinstatement of the status quo.

Roadway Character

General

Herring Cove Road is classified as an Arterial road and currently accommodates more than 15,000 vehicles per day. Sections of the road are subject to heavy volumes and congestion during weekday mornings and afternoon peak periods (for example, near the Armdale Roundabout). The posted speed limit is 50 km/h. The design speed is also 50km/h.

Existing conditions maps (Appendix II) were developed to illustrate and communicate the existing conditions along the eight segments of the corridor. Each segment has its own map, as well as an illustration of a typical cross-section of the roadway for that segment. The maps show pedestrian facilities, including existing concrete sidewalks and substandard asphalt sidewalks, as well as where no sidewalks currently exist. Signalized intersections, crosswalks with pedestrian activated beacons, and marked crosswalks are identified with callout boxes. Callout boxes are also used to identify other features, such as the reversible lane, bus stops, bus lay-bys, and destinations along the corridor. Each segment includes a representative cross-section illustration to visualize the existing conditions of the right-of way.

Figure 3 - Pedestrian Crosswalk at Sussex Street

Pedestrians

The sidewalks along Herring Cove Road are inconsistent and incomplete. Some sections have a concrete sidewalk on both sides of the road, while other sections have a sidewalk on only one side. In some sections there are no sidewalks at all, or substandard asphalt sidewalks with little separation from the roadway. Sections largely containing no concrete sidewalks include:

- Purcells Cove Road to Cowie Hill Road, 800-metres
- Lynnett Road to 500 Block, 600-metres

As part of the construction work on the 500 block segment, a section of concrete sidewalks are planned to be added in 2019. The extent of this work is represented on the maps in Appendix II.

Pedestrian crossings are provided along the corridor at signalized intersections, pedestrian-activated beacon crosswalks, and marked crosswalks. Crossing guards are present at some crossings near schools during school hours. In general, pedestrian crossings are spaced at intervals of 150-350m, though the spacing between crossings in some sections exceeds 500m:

- Lawnwood Avenue to Cowie Hill Road: 525-metre gap
- Glenora Avenue to Mont Street: 585-metre gap
- Sussex Street to Drysdale Road: 615-metre gap
- Sylvia Avenue to 500 Block: 685-metre gap

Figure 4 - Pedestrian crossing Herring Cove Road at Dentith Road

Figure 5 - Pedestrian Crosswalk at the 500 Block

Cycling

There are no existing cycling facilities in the corridor, and cyclists are expected to share the road with vehicles.

There are no consistent parallel cycling routes to the corridor. Existing bike lanes on Purcells Cove connect to Herring Cove Road.

Figure 6 - Cyclist climbing Herring Cove Road hill on the sidewalk near the Armdale Roundabout

Transit

Herring Cove Road is serviced by three Halifax Transit routes, including two all-day routes (Route 9, comprised of routes 9A and 9B, and Route 14) and one urban express route (Route 32). During peak periods, the combination of these routes results in as many as 13 buses per hour using the corridor in each direction. Route 9 Herring Cove is identified in the *Moving Forward Together Plan* as a Corridor Route, which provides all day, frequent service along the Herring Cove Road corridor, providing a direct connection to downtown Halifax via Mumford Terminal and Quinpool Road.

Of the 39 Halifax Transit bus stops within the study area, 18 include a lay-by, and four lay-bys are used as time-points. Thirty-three of the bus stops are listed as accessible, and most of the non-accessible stops are in the 500 Block area.

Sidewalk access to transit stops varies along the corridor. Twelve of 39 transit stops are not currently connected by concrete sidewalk.

Transit stops are spaced frequently along the corridor, and roughly half of stops include a lay-by area, including four lay-bys currently used as time-points. Most bus stops along the study area are designated as accessible currently, though six are not. Many of the existing bus stops do not have a connecting concrete sidewalk. There are currently no transit priority measures (improvements that allow buses to bypass traffic), although Halifax Transit has begun implementing these measures elsewhere in HRM.

According to the Q1 2018/19 Halifax Transit Quarterly Report, published on November 1, 2018, Route 9 (the combination of routes 9A and 9B) carried an average of 5,882 boardings per weekday in Q1 2018/19, ranking it second in boardings for all Halifax Transit routes on weekdays. Route 14 carried 2,327 average boardings per weekday in Q1 2018/19, and Route 34 carried 451.

Transit delay data for routes 19 and 20 (now 9A and 9B) was provided by HRM. The data shows that delays on these routes typically occur in the AM peak period between Winchester Avenue and the Armdale Roundabout. This segment of delays is consistent with the vehicle traffic congestion patterns on Herring Cove Road. In the PM peak period, no notable delays occur for these routes along Herring Cove Road.

Figure 7 - Halifax Transit bus stop near Dentith Road

Motor Vehicles

The roadway has variable cross-sections, ranging from two lanes to four. There are left-turns lanes at some intersections and for access to plazas, and at some points, a painted median serves as a continuous two-way left-turn lane. Right-turn channels are present at four intersections: Purcells Cove Road, Cowie Hill Road, Dentith Road, and Sussex Street. Right-turn channels improve vehicle movement at intersections, but reduce the pedestrian level of service of intersections.

Motor vehicle lane widths vary from as narrow as ~3.2m to as wide as ~5.5m. There are four signalized intersections along the corridor, and a significant number of uncontrolled intersections. Driveway access points are frequent along most of the corridor.

Figure 8 - Existing reversible lane configuration near the Armdale Roundabout

Trucks

Herring Cove Road is designated as a truck route but carries a low percentage of truck traffic (less than one percent of all traffic). Trucks complete commercial deliveries for the area but there is no major through traffic.

Land Use Character

The land uses adjacent to Herring Cove Road vary, from single detached houses with driveways and small commercial lots, to mid-rise apartment buildings, and big-box style retail. The setbacks of buildings from the road varies throughout the corridor. The majority of buildings that front onto the road have an access/driveway onto the road.

There are many different key origins and destinations along the corridor. They include:

- Captain William Spry Community Centre
- Central Spryfield School
- Chebucto Connections
- Chocolate Lake Park and Beach
- Chocolate Lake Recreation Centre
- Churches and Places of Worship
- Daycare Centres
- Elizabeth Sutherland School
- J.L. Ilsley High School
- McIntosh Run Community Trail
- Sobeys
- Spryfield Medical Centre
- Spryfield Shopping Mall
- Various businesses

Development Potential

There are proposals and active development projects along the corridor. Development has been particularly focused around the area south of Sussex Street, on side streets off of Herring Cove Road.

The development trend along the road will likely continue, given the Spryfield's designation in the Regional Municipal Planning Strategy as an Urban District Growth Centre. This designation encourages infill and redevelopment of parking lots, and a mix of low, medium, and high density residential, commercial, institutional, and recreational uses.

The location and frequency of driveways along Herring Cove Road has been identified as a challenge for transit reliability and access. The redevelopment of parcels along the road could present an opportunity to limit and relocate driveways and access to address these challenges.

The existing conditions maps (Appendix II) include callout boxes with the number of new units for planned developments along the corridor.

Roadway Level of Service

Multimodal Transportation Demand Projections

Demand projections were developed for the corridor for a study horizon of 15 years.

Historical traffic volume data along Herring Cove Road have shown no long-term traffic growth along the corridor. However, there are a number of residential developments along the corridor that have been either approved or are currently in the planning approval process and it is assumed that these developments will be completed by the 15-year planning horizon. The study assumes that any future growth along the Herring Cove Road corridor will be attributable to these developments.

Future traffic volumes forecasts for the developments were quantified using trip generation rates from the 10th edition of the *Trip Generation Manual* published by the *Institute of Transportation Engineers* (ITE). The vehicle trip estimates were adjusted to reflect trips made using non-auto transportation modes including transit and active transportation (walking and cycling).

For the Herring Cove Road corridor, which is considered as an inner suburban area, the *Integrated Mobility Plan* set the target that by 2031, at least 26 percent of trips will be made using non-auto modes. The non-auto mode targets are that:

- At least 20 percent of trips will be made by transit
- At least 6 percent of trips will be made by active transportation

The full analysis is located in Appendix I.

Vehicle Level of Service (LOS) Analysis

Synchro Studio (Version 10) software was used to complete the intersection performance analysis for vehicle movements. The study intersections were evaluated with the existing and projected AM and PM peak hour traffic volumes. Performance for each intersection is summarized in Figure 9.

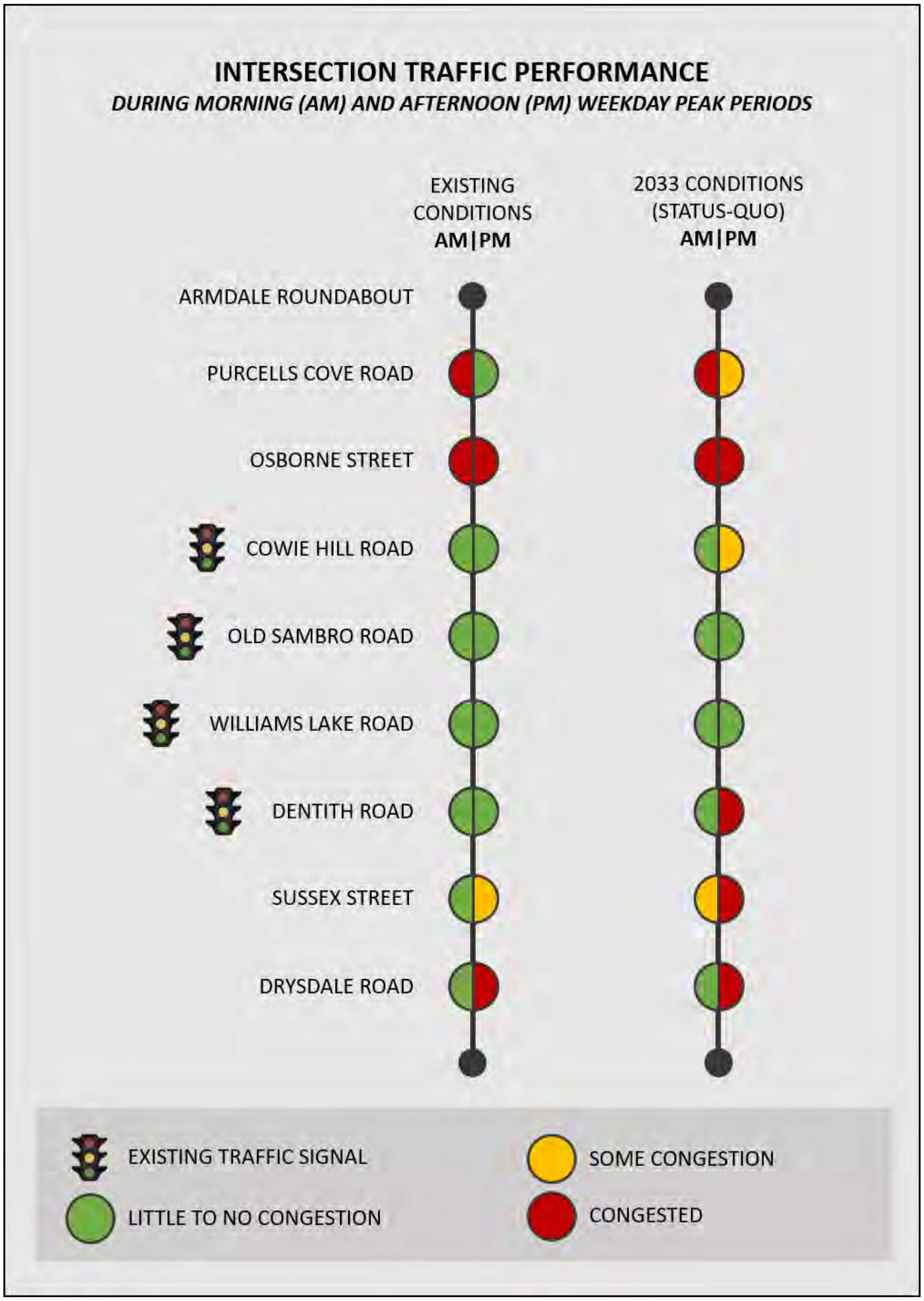

Figure 9 - Traffic analysis summary

Existing Conditions (2018)

The existing conditions scenario provides an assessment of current operations based on current traffic volumes and existing lane configurations. It should be noted that the AM peak hour operations at the Armdale Roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale Roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road and Purcells Cove Road, and Herring Cove Road and Osborne Street were supplemented by field observations.

Under existing conditions, the analysis finds that all of the intersections are operating at an acceptable performance during AM and PM peak hours, with the following exceptions:

- **Herring Cove Road and Purcells Cove Road:** Unacceptable performance (LOS F) during the AM peak hour due to queue spillbacks from the Armdale Roundabout
- **Herring Cove Road and Osborne Street:** Unacceptable performance (LOS F) during the AM peak hour due to queue spillbacks from the Armdale Roundabout

A traffic signal warrant analysis was completed for the five unsignalized study intersections along Herring Cove Road using existing traffic volumes. Though the analysis finds that traffic signals are warranted at Purcells Cove Road and Osborne Street under existing conditions, traffic signals should not be considered for these intersections due to the negative impact of spillbacks into the roundabout.

The traffic signal warrant report and worksheets can be found in Appendix I.

Future Conditions (2033)

The future conditions scenario provides an assessment of future operations based on the development projections with no modifications to the study intersections other than the optimization of signal timings at signalized intersections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road and Purcells Cove Road and Herring Cove Road and Osborne Street were modified to reflect the queues from the Armdale Roundabout.

Under future conditions, the analysis finds that all of the intersections are operating at an acceptable performance during AM and PM peak hours, with the following exceptions:

- **Herring Cove Road and Purcells Cove Road:** Unacceptable performance (LOS F) during the AM peak hour due to queue spillbacks from the Armdale Roundabout
- **Herring Cove Road and Osborne Street:** Unacceptable performance (LOS F) during the AM peak hour due to queue spillbacks from the Armdale Roundabout, and unacceptable performance (LOS F) during the PM peak hour due to eastbound movements (Osborne Street) operating over capacity
- **Herring Cove Road and Glenora Avenue:** Unacceptable performance (LOS F) during the PM peak hour, due to westbound movements (Glenora Avenue) operating over capacity
- **Herring Cove Road and Dentith Road:** Unacceptable performance (LOS F) during the PM peak hour, due to eastbound right movement (Dentith Road), northbound left movement (Herring Cove Road), and southbound movements (Herring Cove Road) operating over capacity. The 95th-percentile queues for the northbound left movement (Herring Cove Road) will significantly exceed the storage capacity of the left turn lane during both the AM and PM peak hour and northbound queues will extend into the intersections of Herring Cove Road & Sussex Street
- **Herring Cove Road and Sussex Street:** Unacceptable performance (LOS F) during the PM peak hour due to eastbound left movements (Sussex Street) operating over capacity
- **Herring Cove Road and Drysdale Road:** Unacceptable performance (LOS F) during the AM and PM peak hours due to westbound movements (Drysdale Road) operating over capacity

A traffic signal warrant analysis was completed using future traffic volumes for the three unsignalized study intersections which did not warrant traffic signals under existing conditions. The signals warrant analysis indicates that traffic signals under future conditions, traffic signals will be warranted at the intersections of Sussex Street and Drysdale Road. Due to the proximity of the Sussex Street intersection to the traffic signal at the Dentith Road intersection, traffic signals should not be considered for the intersection of Sussex Street. Traffic signals will be warranted in the future at the intersection of Drysdale Road. Based on the future status quo LOS results, traffic signals are recommended at the intersection to improve future operations. The traffic signal warrant report and worksheets can be found in Appendix I.

The full LOS analysis is located in Appendix I.

Multi-Modal Level of Service (MMLOS) Analysis

A multi-modal level of service (MMLOS) analysis was completed for the corridor to better understand existing and future status quo conditions for all modes along Herring Cove Road. The level of service was evaluated for the following modes:

- Pedestrian (PLOS)
- Bicycle (BLOS)
- Transit (TLOS)
- Truck (TkLOS)
- Auto (LOS)

As HRM's MMLOS Guidelines were not yet fully developed at the time of this study, the methodology for the analysis is based on the City of Ottawa's *MMLOS Guidelines* (September 2015). The methodology includes the evaluation of level of service for roadway segments and signalized intersections, with the exception of the auto mode for which level of service is only evaluated at signalized intersections. The methodology and assumptions for the analysis is detailed in Appendix I.

The existing conditions analysis finds that level of service for pedestrians, bicycles, transit, and trucks currently performs in the "Satisfactory" (LOS D) to "Unacceptable" (LOS F) range, while auto level of service generally ranges from "Very Good" (LOS B) to "Good" (LOS C).

Under future status quo conditions, the MMLOS results for segments will remain the same as under existing conditions. Increases in traffic volumes and the optimization of signal timings at signalized intersection will affect PLOS, TLOS and LOS. BLOS and TkLOS will remain the same as under existing conditions.

PLOS will deteriorate at Herring Cove Road and Cowie Hill Road due to the longer cycle length and improve at Old Sambro Road due to the shorter cycle length. PLOS will remain the same at Williams Lake Road and Dentith Road. TLOS and LOS will deteriorate at all four signalized intersections along the corridor.

The full results of the analysis are located in Appendix I.

Collisions

Motor Vehicle Collisions

Collision data was provided by HRM for the period of 2012 to 2014. A total of 327 collisions were reported along Herring Cove Road over the three-year period, including 250 property damage only (PDO) collisions, 73 non-fatal injury collisions, two fatal collisions and two listed as other.

The incident reports provide some information regarding collision configuration and vehicle maneuver however insufficient information is provided to develop intersection collision diagrams.

The top three intersections for reported collisions were:

- **Herring Cove Road and Dentith Road (19 collisions):** The most common collision configuration reported was completing a left turn across opposing traffic
- **Herring Cove Road and Purcells Cove Road (18 collisions):** The most common collision configuration reported was rear end collisions
- **Herring Cove Road and Old Sambro Road (15 collisions):** The most common collision configuration reported was rear end collisions

The full analysis of motor vehicle-pedestrian collisions is in Appendix I.

Motor Vehicle-Pedestrian Collisions

Motor vehicle-pedestrian collision data from 2013 to 2018 was provided by HRM and is summarized by pedestrian injury severity. A total of 36 collisions were reported along Herring Cove Road over the six-year period, including 6 collisions with no pedestrian injury, 20 with minor pedestrian injury, 7 with moderate pedestrian injury, 2 with major pedestrian injury and one with a pedestrian fatality.

The specific location of the motor vehicle-pedestrian collision was provided for all 16 collisions. The three locations with the highest number of collisions reported were:

- Herring Cove Road and Dentith Road (5 collisions)
- Herring Cove Road and Cowie Hill Road (4 collisions)
- Herring Cove Road and Williams Lake Road (3 collisions), including the fatal collision

The full analysis of motor vehicle-pedestrian collisions is located in Appendix I.

Other Constraints

Topography

Topography is a significant constraint along the corridor, specifically in Segments 1 and 2, from the Armdale Roundabout to Cowie Hill Road. Along these segments, there is steep topography adjacent to either side of the roadway, making any widening technically challenging and potentially costly. The slope and winding character of the road could limit sightlines in some areas.

Utilities

Details on utilities along Herring Cove Road were received via emails from NS Power, Eastlink, and Bell Alliant. There are above-ground utility poles on both sides of Herring Cove Road carrying double-circuit power lines (identified by NS Power and Eastlink), as well as a major international fibre optic line buried underneath the road (identified by Bell Alliant). Both of these services have been identified as being highly-complex to relocate.

Right-of-Way

The right-of-way varies significantly along the length of the corridor. Many parcels of land were purchased by HRM over the past several decades for a planned widening and realignment of the roadway, which was only partially implemented. Along parts of the roadway with a four-lane cross section (Segments 5 and 6), the sidewalk abuts edge of the right-of-way.

There are several instances where private businesses have off-street parking located in the public right-of-way, including at Purcells Cove Road and Osborne Street.

Appendix I: Harbourside Engineering Level of Service Report

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11 March 2019

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T: 613.319.0335
E: katewhitfield@altaplanning.com

Re: Herring Cove Road Functional Plan - Existing Conditions Report

Ms. Whitfield,

Harbourside Transportation Consultants has completed the intersection performance analysis and the multi-modal level of service analysis to support the existing conditions report for the Herring Cove Road Functional Plan. The methodology and results of the analyses are documented in the following sections.

Existing Traffic Volumes: Turning movement counts for the morning (AM) peak hours (7:00am to 9:00am) and afternoon (PM) peak hours (4:00pm to 6:00pm) were provided by HRM. The counts used in the analysis are summarized in Table 1. The turning movement counts were adjusted using the HRM's average annual weekday traffic (AAWT) conversion factors to account for day of week and month of data collection. The counts were then factored using a background growth rate of 1.0 percent per year and balanced to obtain estimated 2018 traffic volumes. The existing traffic design volumes can be found in Appendix A.

Table 1: Summary of Traffic Count Data

Intersection	Date of Data Collection
Herring Cove Road & Purcells Cove Road	Thursday, November 28, 2013 (AM) Monday, October 21, 2013 (PM)
Herring Cove Road & Osborne Street	Tuesday, July 12, 2016 (AM) Monday, July 11, 2016 (PM)
Herring Cove Road & Cowie Hill Road	Tuesday, October 23, 2018
Herring Cove Road & Glenora Avenue	Tuesday, May 24, 2016
Herring Cove Road & Old Sambro Road	Thursday, October 19, 2017
Herring Cove Road & Williams Lake Road/Bradford Street	Thursday, December 13, 2018
Herring Cove Road & Dentith Road	Tuesday, January 22, 2019
Herring Cove Road & Sussex Street	Thursday, May 4, 2017
Herring Cove Road & Drysdale Road	Monday, June 20, 2016

Transportation Demand Projections: Historical traffic volume data along Herring Cove Road has shown no long-term traffic growth along the corridor. However, there are a number of residential developments along the corridor that have been either approved or are currently in the planning approval process. The proposed developments are summarized in Table 2. It was assumed that these developments will be completed by the 15-year planning horizon. The study assumes that any future growth along the Herring Cove Road corridor will be attributable to these developments.

Future traffic volumes forecasts for the developments were quantified using trip generation rates from the 10th edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers (ITE). The vehicle trip estimates were adjusted to reflect trips made using non-auto transportation modes such as transit and active transportation (walking and bicycling). For the Herring Cove Road corridor, which is considered as an inner suburban area, the *Integrated Mobility Plan* set the target that by 2031, at least 26 percent of trips will be made using non-auto modes. The non-auto mode targets are that at least 20 percent of trips will be made by transit and at least 6 percent of trips will be made by active transportation.

Table 2: Summary of Projected Development

Development	Location	Description	AM Traffic Volumes	PM Traffic Volumes
383 Herring Cove Road	Herring Cove Road & Sussex Street	82 multifamily mid-rise units 5,790 ft^2 commercial	36 vph	60 vph
Drysdale Road	Drysdale Road	45 single-family units 50 multifamily mid-rise units	52 vph	67 vph
Governor's Brook (Phase 2-6)	Drysdale Road	128 single-family units 36 multifamily low-rise units	112 vph	148 vph
Governor's Brook (Phase 7-12)	Drysdale Road	419 single-family units 48 multifamily mid-rise units	329 vph	437 vph
Hilden Avenue	South of Drysdale Road	28 single-family units	21 vph	28 vph
Lynnett Road	South of Drysdale Road	6 single-family units 23 multifamily low-rise units 50 multifamily mid-rise units	34 vph	41 vph
Green Acres	South of Drysdale Road	1,060 single-family units	785 vph	1,050 vph
MacIntosh Run	South of Drysdale Road	350 single-family units	259 vph	347 vph
Chambers Hill	South of Drysdale Road	52 single-family units	39 vph	52 vph
Briarwood	South of Drysdale Road	275 single-family units	204 vph	273 vph
Holly Drive	South of Drysdale Road	17 single-family units	13 vph	17 vph
Total Development Projections		2,669 residential units 5,790 ft^2 commercial	1,884 vph	2,520 vph
Non-Auto Mode Share Target (26 percent)			-490 vph	-655 vph
Total Trip Generation Estimate			**1,394 vph**	**1,865 vph**

The trips associated with the projected developments were distributed to Herring Cove Road using a modified version of the trip distribution used in the Green Acres traffic study. The trip distribution from the Green Acres traffic study shown in Table 4 was developed for a smaller study area that did not include any intersections north of Dentith Road.

Table 3: Green Acres Traffic Study Trip Distribution

Direction	Gateway	Distribution
North	Herring Cove Road	60%
South	Herring Cove Road	10 %
West	Dentith Road	25%
	Sussex Street	5%

The distribution was modified by splitting the northbound distribution to account for the additional gateways north of Dentith Road. The trip distribution used in the analysis is shown in Table 4. The same distribution was used for the trips during both peak hours. The future traffic design volumes can be found in Appendix A.

Table 4: Modified Trip Distribution

Direction	Gateway	Distribution
North	Herring Cove Road	45%
South	Herring Cove Road	10 %
East	Williams Lake Road	5%
West	Old Sambro Road	10%
	Dentith Road	25%
	Sussex Street	5%

Intersection Performance Analysis: The performance of an intersection can be evaluated using a number of measures of effectiveness (MOEs), including level of service (LOS), delay, volume-to-capacity ratio (v/c) and vehicle queuing are the primary measures of effectiveness used in traffic analyses.

Level of service is a qualitative measure used to describe the level of performance of an intersection in terms of traffic movement. Level of service for intersections is defined in terms of delay, which is a measure of driver discomfort, frustration and increased travel time. The quality of traffic movement is divided into six levels ranging from A to F, where level of service A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level of service F represents the worst quality of traffic where the level of congestion is considered unacceptable to most drivers. The level of service criteria for intersections (Table 5) are stated in terms of average control delay per vehicle.

The volume-to-capacity (v/c) ratio is a measure of how the peak hour traffic volume on an approach to an intersection compares to the theoretical maximum volume that could be accommodated on that intersection approach. As the v/c ratio approaches 1.0, the movement has reduced ability to accommodate any additional volume of traffic.

Table 5: Level of Service Criteria for Intersections

Level of Service	Description	Signalized Intersection Control Delay	Unsignalized Intersection Control Delay
A	No congestion; most vehicles do not stop. **(Excellent)**	≤ 10 sec/veh	≤ 10 sec/veh
B	Very light congestion; some vehicles stop. **(Very Good)**	10-20 sec/veh	10-15 sec/veh
C	Light congestion; most vehicles stop. **(Good)**	20-35 sec/veh	15-25 sec/veh
D	Noticeable congestion; vehicles must sometimes wait through more than one red light. No long-standing queues are formed. **(Satisfactory)**	35-55 sec/veh	25-35 sec/veh
E	Congestion; vehicles must sometimes wait through more than one red light. Long-standing queues are formed. (Unsatisfactory)	55-80 sec/veh	35-50 sec/veh
F	Severe congestion; demand exceeds the capacity of the intersection. **(Unacceptable)**	≥ 80 sec/veh	≥ 50 sec/veh

The 95th percentile queue (95th% queue) is the estimated length in metres of a queue of vehicles stopped on an intersection approach which is only exceeded five percent of the time. Since a stopped vehicle occupies approximately seven metres of queue length, a 95th% queue of 14 metres indicates that less than five times of out 100 the queue may exceed two vehicles on the approach. The 95th% queue is typically used to determine if sufficient vehicle storage is available to maintain efficient traffic flow.

Synchro Studio (Version 10) software was used to complete the intersection performance analysis. The study intersections were evaluated with the existing and projected AM and PM peak hour traffic volumes. The detailed Synchro reports for the analysis are included in Appendix B.

Existing Conditions (2018): The existing conditions scenario provides an assessment of current operations based on current traffic volumes and existing lane configurations. It should be noted that the AM peak hour operations at the Armdale roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road/Purcells Cove Road and Herring Cove Road/Osborne Street were supplemented by field observations.

The results for the intersection performance analysis for existing conditions are summarized in Table 6. The operations at each study intersection under existing conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection is unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) operate at LOS F. Based on observations in the field, the northbound queues at the intersection extend to the intersection of Herring Cove Road & Osborne

Street (approximately 280 metres). Significant queues are also observed on the westbound approach (Purcells Cove Road). The overall performance of the unsignalized intersection is acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection is unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) operate at LOS F. Based on observations in the field, the northbound queues at the intersection extend up near the intersection of Herring Cove Road & Cowie Hill Road (approximately 480 metres). Significant queues are also observed on the eastbound approach (Osborne Street). During the PM peak hour, the eastbound movements (Osborne Street) operate at LOS F and are over capacity. The overall performance of the unsignalized intersection is acceptable during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection is acceptable during both peak hours.
- **Herring Cove Road & Glenora Avenue:** The overall performance of the unsignalized intersection is acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) operate at LOS E. The overall performance of the unsignalized intersection is acceptable during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection is acceptable during both peak hours.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection is acceptable during both peak hours.
- **Herring Cove Road & Dentith Road:** The overall performance of the signalized intersection is acceptable during both peak hours. However, the 95th% queues for the northbound left movement (Herring Cove Road) exceed the storage capacity of the left turn lane during both peak hours.
- **Herring Cove Road & Sussex Street:** The overall performance of the unsignalized intersection is acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) operates at LOS F. The overall performance of the unsignalized intersection is acceptable during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** The overall performance of the unsignalized intersection is acceptable during both peak hours.

Table 6: Intersection Performance Analysis – Existing Conditions

Existing Conditions (2018)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		**-**	**F**				**5.0**	**A**			
Purcells Cove Road	WB Right*	-	F	F	-	-	21.3	C	C	0.55	25.1
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	11.3	A	B	0.22	6.1	14.4	A	B	0.60	31.2
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		**-**	**F**				**11.2**	**B**			
Osborne Street	EB Left*	-	F	F	-	-	185.7	F	F	1.08	54.0
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	11.9	A	B	0.06	1.5
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		**8.7**	**A**				**13.2**	**B**			
Cowie Hill Road	EB Left	13.5	B	B	0.31	18.1	28.3	C	C	0.57	48.6
	EB Right										
Herring Cove Road	NB Left	6.7	A	A	0.03	3.9	11.0	A	B	0.32	13.3
	NB Through	9.2		A	0.47	68.3	8.0		A	0.40	50.3
	SB Through	7.4	A	A	0.28	36.5	14.0	B	B	0.73	125.7
	SB Right	2.5		A	0.07	4.7	2.2		A	0.11	6.1
Herring Cove Road & Glenora Avenue		**3.1**	**A**				**3.4**	**A**			
Glenora Avenue	WB Left	20.3	C	C	0.37	12.9	39.5	E	E	0.53	21.3
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	8.6	A	A	0.05	1.5	8.6	A	A	0.08	2.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		**12.2**	**B**				**14.5**	**B**			
Old Sambro Road	EB Left	22.6	B	C	0.43	29.5	28.9	B	C	0.51	42.0
	EB Right	6.7		A	0.40	13.3	7.4		A	0.54	18.4
Herring Cove Road	NB Left	7.4	A	A	0.43	21.2	10.9	A	B	0.58	28.2
	NB Through	7.3		A	0.31	28.5	8.1		A	0.39	45.8
	SB Through	16.7	B	B	0.52	33.5	18.6	B	B	0.65	64.1
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		**12.3**	**B**				**14.3**	**B**			
Bradford Street	EB Left	14.7	A	B	0.01	1.8	23.6	B	C	0.13	13.1
	EB Through	7.7		A	0.08	5.4	8.5		A	0.37	18.5
	EB Right										
Williams Lake Road	WB Left	19.1	B	B	0.47	28.9	30.5	C	C	0.55	43.8
	WB Through										
	WB Right										
Herring Cove Road	NB Left	7.9	A	A	0.10	9.0	8.1	A	A	0.25	14.0
	NB Through	8.6		A	0.38	37.5	8.2		A	0.37	42.0
	NB Right										
	SB Left	17.4	B	B	0.12	10.0	17.6	B	B	0.25	18.4
	SB Through	15.5		B	0.36	40.9	17.5		B	0.57	77.2
	SB Right										
Herring Cove Road & Dentith Road		**11.9**	**B**				**20.4**	**C**			
Dentith Road	EB Left	39.8	C	D	0.55	49.3	43.4	C	D	0.67	67.0
	EB Right	8.4		A	0.48	18.0	21.6		C	0.81	60.4
Herring Cove Road	NB Left	8.2	A	A	0.50	33.4	21.4	B	C	0.74	64.4
	NB Through	5.8		A	0.19	21.6	7.0		A	0.18	26.6
	SB Through	11.5	B	B	0.29	34.2	19.5	B	B	0.60	102.1
	SB Right										
Herring Cove Road & Sussex Street		**1.1**	**A**				**5.0**	**A**			
Sussex Street	EB Left	25.4	C	D	0.18	4.6	161.8	F	F	0.82	28.9
	EB Right	10.8		B	0.06	1.5	17.9		C	0.16	4.6
Herring Cove Road	NB Left	9.0	A	A	0.03	0.8	13.4	A	B	0.11	3.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		**1.8**	**A**				**2.7**	**A**			
Drysdale Road	WB Left	13.7	B	B	0.22	6.1	18.7	C	C	0.34	11.4
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	9.0	A	A	0.07	1.5	9.4	A	A	0.20	6.1
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

Future Conditions - Status Quo (2033): The future conditions scenario provides an assessment of future operations based on the development projections with no modifications to the study intersections other than the optimization of signal timings at signalized intersections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were modified to reflect the queues from the Armdale roundabout.

The results for the intersection performance analysis for future status quo conditions are summarized in Table 7. The operations at each study intersection under future status quo conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will continue to operate at LOS F. The northbound queues at the intersection will continue to extend to the intersection of Herring Cove Road & Osborne Street and significant queues will continue to be observed on the westbound approach (Purcells Cove Road). During the PM peak hour, the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will continue to operate at LOS F. The northbound queues at the intersection will continue to extend to the intersection of Herring Cove Road & Cowie Hill Road (approximately 480 metres) and significant queues will continue to be observed on the eastbound approach (Osborne Street). During the PM peak hour, the eastbound movements (Osborne Street) will continue to operate at LOS F and over capacity. The overall performance of the intersection will be unacceptable (LOS F) during the PM peak hour.

- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The southbound through movement (Herring Cove Road) will also be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Glenora Avenue:** During the AM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be nearing unacceptable (LOS E) during the PM peak hour.

- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during both peak hours. However, the 95th% queues for the northbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

Table 7: Intersection Performance Analysis – Future Conditions

Future Conditions - Status Quo (2033)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		**-**	**F**				**8.6**	**A**			
Purcells Cove Road	WB Right*	-	F	F	-	-	60.2	F	F	0.87	58.5
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	16.6	A	C	0.35	11.4	27.6	A	D	0.80	62.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		**-**	**F**				**70.2**	**F**			
Osborne Street	EB Left* / EB Right*	-	F	F	-	-	1748.1	F	F	4.23	106.4
Herring Cove Road	NB Left*	-	F	F	-	-	16.9	A	C	0.10	2.3
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		**12.3**	**B**				**40.3**	**D**			
Cowie Hill Road	EB Left / EB Right	24.5	C	C	0.42	24.0	46.2	D	D	0.71	54.9
Herring Cove Road	NB Left	5.1	B	A	0.03	3.6	132.3	C	F	1.01	30.8
	NB Through	14.4		B	0.76	228.1	9.6		A	0.59	106.4
	SB Through	6.3	A	A	0.36	56.7	54.7	D	D	1.05	391.1
	SB Right	1.8		A	0.06	4.1	2.8		A	0.10	7.9
Herring Cove Road & Glenora Avenue		**9.3**	**A**				**48.9**	**E**			
Glenora Avenue	WB Left / WB Right	112.4	F	F	0.92	49.4	1062.6	F	F	2.87	95.0
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	10.8	A	B	0.07	1.5	10.0	A	B	0.11	3.0
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		**15.5**	**B**				**25.6**	**C**			
Old Sambro Road	EB Left	24.1	B	C	0.44	28.1	37.0	C	D	0.57	43.9
	EB Right	6.9		A	0.46	14.1	19.9		B	0.79	46.8
Herring Cove Road	NB Left	18.2	B	B	0.75	43.6	43.3	C	D	0.88	99.7
	NB Through	15.8		B	0.78	110.9	11.4		B	0.62	124.6
	SB Through / SB Right	14.6	B	B	0.54	39.8	29.2	C	C	0.88	168.1
Herring Cove Road & Williams Lake Road/Bradford Street		**14.1**	**B**				**22.0**	**C**			
Bradford Street	EB Left	16.3	A	B	0.01	1.9	24.2	B	C	0.13	12.2
	EB Through / EB Right	8.4		A	0.09	5.5	7.9		A	0.36	17.3
Williams Lake Road	WB Left / WB Through / WB Right	24.6	C	C	0.57	32.7	47.5	D	D	0.80	58.7
Herring Cove Road	NB Left	7.7	B	A	0.11	8.9	13.2	B	B	0.41	15.9
	NB Through / NB Right	12.4		B	0.67	104.4	11.5		B	0.56	82.8
	SB Left	20.2	B	C	0.21	11.5	21.8	C	C	0.34	21.0
	SB Through / SB Right	14.7		B	0.41	58.8	28.2		C	0.88	190.2
Herring Cove Road & Dentith Road		**22.4**	**C**				**114.3**	**F**			
Dentith Road	EB Left	29.8	B	C	0.48	39.4	39.9	F	D	0.50	74.8
	EB Right	7.2		A	0.56	18.0	123.2		F	1.19	240.0
Herring Cove Road	NB Left	41.0	C	D	0.93	140.3	184.7	E	F	1.30	204.2
	NB Through	9.3		A	0.50	64.9	12.2		B	0.40	64.0
	SB Through / SB Right	31.9	C	C	0.77	81.8	151.5	F	F	1.25	315.4
Herring Cove Road & Sussex Street		**6.4**	**A**				**183.3**	**F**			
Sussex Street	EB Left	303.7	F	F	1.13	38.0	9628.1	F	F	18.48	85.1
	EB Right	12.9		B	0.12	3.0	92.8		F	0.82	39.5
Herring Cove Road	NB Left	10.8	A	B	0.13	3.0	44.0	A	E	0.51	19.8
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		**98.4**	**F**				**601.6**	**F**			
Drysdale Road	WB Left / WB Right	609.4	F	F	2.23	252.3	6340.3	F	F	14.37	314.6
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	15.4	A	C	0.31	9.9	26.1	A	D	0.77	54.7
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.

- **Herring Cove Road & Dentith Road:** The overall performance of the signalized intersection will be acceptable during AM peak hour. However, the 95th% queues for the northbound left movement (Herring Cove Road) will significantly exceed the storage capacity of the left turn lane during AM peak hour. Northbound queues will extend into the intersections of Herring Cove Road & Sussex Street. During the PM peak hour, the eastbound right movement (Dentith Road), the northbound left movement (Herring Cove Road) and the southbound movements (Herring Cove Road) will operate at LOS F and be over capacity. The 95th% queues for the northbound left movement (Herring Cove Road) will significantly exceed the storage capacity of the left turn lane during PM peak hour. Northbound queues will extend into the intersections of Herring Cove Road & Sussex Street. The overall performance of the signalized intersection will be unacceptable (LOS F) during PM peak hour.

- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The northbound left movement (Herring Cove Road) will operate at LOS E. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour.

- **Herring Cove Road & Drysdale Road:** During the AM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour. During the PM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour. The 95th% queues for the southbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during PM peak hour.

The intersection capacity utilization (ICU) at each signalized intersection under future status quo conditions is summarized in Table 8. The ICU provides a measure of an intersection's capacity, indicating how much reserve capacity is available or how much the intersection is over capacity.

Table 8: Future Status Quo - Intersection Capacity Utilization

Signalized Intersection	AM Peak Hour	PM Peak Hour
Herring Cove Road & Cowie Hill Road	70.2%	90.5%
Herring Cove Road & Old Sambro Road	58.1%	76.8%
Herring Cove Road & Williams Lake Road	67.6%	94.4%
Herring Cove Road & Dentith Road	77.6%	104.2%

The ICU values indicate that there will be at least 20 percent reserve capacity at each intersection during the AM peak hour. During the PM peak hour, there will be some reserve capacity at the intersections of Herring Cove Road & Cowie Hill Road and Herring Cove Road & Old Sambro Road. The intersection of

Herring Cove Road & Williams Lake Road will have little to no reserve capacity and the intersection of Herring Cove Road & Dentith Road will be over capacity.

Traffic Signal Warrant Analysis: A traffic signal warrant analysis is normally completed to determine if the installation of traffic signals at an intersection will provide a positive impact on an intersection operation, meaning that the benefits of reduced delay and improved safety for the minor street vehicles will outweigh the impacts of increased delay and potential additional collisions for the major street vehicles.

The Transportation Association of Canada developed the *Canadian Traffic Signal Warrant Matrix Procedure* in 2005 to provide a basis for making rational, defensible decisions on the installation of traffic signals. The matrix uses a “cumulative factors methodology” to evaluate vehicle to vehicle and vehicle to pedestrian interactions while considering local factors such as demographics and roadway characteristics. The procedure also incorporates collision prediction theory which anticipates the amount of collisions based on traffic volume and intersection geometry. The Canadian Traffic Signal Warrant Matrix Procedure considers 100 warrant points as an indication that traffic signals will provide a positive impact.

A traffic signal warrant analysis was completed for the five unsignalized study intersections along Herring Cove Road using existing traffic volumes. The traffic signal warrant worksheets can be found in Appendix C. The signal warrants analysis generated the following warrant points:

- Herring Cove Road & Purcells Cove Road = 244 points
- Herring Cove Road & Osborne Street = 123 points
- Herring Cove Road & Glenora Avenue = 48 points
- Herring Cove Road & Sussex Street = 78 points
- Herring Cove Road & Drysdale Road = 35 points

The signals warrant analysis indicates that traffic signals under existing conditions, traffic signals are warranted at the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street. It should be noted that due to the proximity of the Purcells Cove Road intersection to the Armdale roundabout, traffic signals at the intersection would create queues that would likely interfere with the operations at the roundabout. While warranted, traffic signals should not be considered for this intersection due to the negative impact of spillbacks into the roundabout.

A traffic signal warrant analysis was completed using future traffic volumes for the three unsignalized study intersections which did not warrant traffic signals under existing conditions. The traffic signal warrant worksheets can be found in Appendix C. The signal warrants analysis generated the following warrant points:

- Herring Cove Road & Glenora Avenue = 100 points
- Herring Cove Road & Sussex Street = 203 points
- Herring Cove Road & Drysdale Road = 247 points

The signals warrant analysis indicates that traffic signals under future conditions, traffic signals will be warranted at the intersections of Herring Cove Road & Sussex Street and Herring Cove Road & Drysdale Road. Due to the proximity of the Sussex Street intersection to the traffic signal at the Herring Cove Road

& Dentith Road intersection, traffic signals should not be considered for the intersection of Herring Cove Road & Sussex Street.

The intersection of Herring Cove Road & Glenora Avenue scores 100-points which is the threshold for traffic signals. While the warrant indicates that the intersection would warrant traffic signals in the future, since these warrant calculations are based on expanding the projected AM and PM peak hour traffic volume forecasts proportionally to the six hours observed in existing traffic counts and given that the intersection only scores the threshold, it cannot be concluded that traffic signals will be warranted.

Traffic signals will be warranted in the future at the intersection of Herring Cove Road & Drysdale Road. Based on the future status quo LOS results, traffic signals are recommended at the intersection to improve future operations.

Multi-Modal Level of Service Analysis: A multi-modal level of service (MMLOS) analysis was undertaken along the corridor to better understand existing and future status quo conditions for all modes along Herring Cove Road. The level of service was evaluated for the following modes:

- Pedestrian;
- Bicycle;
- Transit;
- Truck; and
- Auto.

The methodology for the analysis is based on the City of Ottawa's *MMLOS Guidelines* (September 2015). The methodology includes the evaluation of level of service for roadway segments and signalized intersections, with the exception of the auto mode for which level of service is only evaluated at signalized intersections.

Pedestrian Level of Service (PLOS): PLOS is used to evaluate pedestrian comfort, safety and convenience. The segment analysis evaluates the quality of pedestrian facilities and the impact of adjacent traffic while the signalized intersection analysis evaluates pedestrian delay and pedestrian exposure to traffic at signalized intersections. The PLOS methodology follows a weakest link approach, meaning that the segment is scored using the worst section and the signalized intersection is scored using the worst approach.

The methodology for the evaluation of segment PLOS uses an evaluation table approach based on facility type (sidewalk width and boulevard width) and roadway characteristics (motor vehicle traffic volume, presence of on-street parking and operating speed).

The methodology for the evaluation of signalized intersection PLOS includes two methods: Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) and pedestrian delay. The PETSI method assigns points to the intersection approach based on a number of crossing characteristics (crossing distance, presence of a median and/or crossing refuge), signal phasing and timing features (left turn conflicts, right turn conflicts, right turns on red and pedestrian intervals), curb radii and crosswalk treatments. The pedestrian delay at a signalized intersection is calculated using the *Highway Capacity Manual* (HCM) equation to calculate average delay to pedestrians based on the signal timing plan.

Bicycle Level of Service (BLOS): BLOS is used to evaluate the level of traffic stress experienced by cyclists. The segment analysis evaluates the quality and type of bicycle facilities and the impact of adjacent traffic as well as unsignalized lane crossings along the corridor, while the signalized intersection analysis evaluates the type of bicycle facilities and crossing conditions. The BLOS methodology follows a weakest link approach, meaning that the segment is scored using the worst section and the signalized intersection is scored using the worst approach.

The methodology for the evaluation of segment BLOS uses an evaluation table approach and includes two components: facility type and unsignalized crossing. The facility type (physically separated bikeway, bike lanes adjacent to parking lane, bike lanes not adjacent to parking lane and mixed traffic) is evaluated based on roadway characteristics (bike lane width, parking lane width, number of travel lanes, operating speed, frequency of bike lane blockage). The unsignalized lane crossing is evaluated based on the characteristics of the side street being crossed (presence of median refuge, number of travel lanes, operating speed).

The methodology for the evaluation of signalized intersection BLOS uses an evaluation table approach and includes two components: right turns and left turns. Right turns are evaluated based on facility type (bike lanes or higher order facility, pocket bike lanes and mixed traffic) and roadway characteristics (right turn lane configuration, storage lane length, turning speed based on curb radii). Left turns are evaluated based on facility type (bike lanes or higher order facility, pocket bike lanes and mixed traffic, presence of left turn bike boxes) and roadway characteristics (left turn lane configuration, number of lanes crossed, operating speed).

Transit Level of Service (TLOS): TLOS is used to evaluate the relative attractiveness of transit and travel time. The segment analysis evaluates the type of transit facility and transit travel time, while the signalized intersection analysis evaluates average signal delay and transit priority.

The methodology for the evaluation of segment TLOS uses an evaluation table approach based on facility type (segregated right-of-way, bus lane, mixed traffic) and the level of exposure to delay (exposure to congestion, parking and driveway friction, incident potential).

The methodology for the evaluation of signalized intersection TLOS evaluates transit delay at a signalized intersection, which is the travel time from the end of a queue to entering the signalized intersection.

Truck Level of Service (TkLOS): TkLOS is used to evaluate the physical space available for trucks to operate safely within travel lanes and negotiate turning maneuvers at signalized intersections. The segment analysis evaluates the roadway geometry, while the signalized intersection analysis evaluates the intersection geometry.

The methodology for the evaluation of segment TkLOS uses an evaluation table approach based on lane width and the number of travel lanes in each direction. The methodology for the evaluation of signalized intersection TkLOS uses an evaluation table approach based on corner radii and the number of receiving lanes upon departure from the intersection.

Auto Level of Service (LOS): Signalized intersection LOS is based on the results of intersections performance analysis. LOS is not evaluated for segments.

The following segments of Herring Cove Road were included in the MMLOS analysis:

- Segment 1. Armdale Roundabout to Purcells Cove Road,
- Segment 2. Purcells Cove Road to Cowie Hill Road,
- Segment 3. Cowie Hill Road to Highfield Street,
- Segment 4. Highfield Street to Old Sambro Road,
- Segment 5. Old Sambro Road to Sussex Street,
- Segment 6. Sussex Street to Greystone Drive,
- Segment 7. Greystone Drive to Lynnett Road, and
- Segment 8. Past Lynnett Road.

The Herring Cove Road corridor includes four signalized intersections which were included in the MMLOS analysis: Herring Cove Road & Cowie Hill Road, Herring Cove Road & Old Sambro Road, Herring Cove Road & Williams Lake Road, and Herring Cove Road & Dentith.

A number of assumptions were made for the MMLOS evaluation including:

- Average Annual Daily Traffic (AADT): AADT counts were not available for each segment. Based on the counts provided, an AADT > 3000 vehicles per day was assumed for all segments.
- Operating speed: Operating speed measurements were not available for each segment. The operating speed in segment 8 was measured to be >60 km/h in the rural two-lane cross section. Based on this count, an operating >50-60 km/h was assumed for the other segments.
- Side street operating speed: A side street operating speed of 50 km/h was assumed for all segments.

The results of the MMLOS analysis for existing conditions are summarized in Table 9 for segments and in Table 10 for signalized intersections. The detailed MMLOS analysis data entry forms can be found in Appendix D.

Table 9: Segment MMMLOS Analysis – Existing Conditions (2018)

Segment MMLOS Existing Conditions (2018)	PLOS	BLOS	TLOS	TkLOS
1. Armdale Roundabout to Purcells Cove Road	F	D	D	A
2. Purcells Cove Road to Cowie Hill Road	F	D	E	B
3. Cowie Hill Road to Highfield Street	F	D	F	B
4. Highfield Street to Old Sambro Road	F	D	F	D
5. Old Sambro Road to Sussex Street	E	E	F	C
6. Sussex Street to Greystone Drive	E	E	F	C
7. Greystone Drive to Lynnett Road	F	D	F	A
8. Past Lynnett Road	F	F	F	D

Table 10: Signalized Intersection MMLOS Analysis – Existing Conditions (2018)

Signalized Intersection MMLOS Existing Conditions (2018)	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Herring Cove Road & Cowie Hill Road	**C**	**E**	**D**	**E**	**B**
Herring Cove Road & Old Sambro Road	**D**	**D**	**C**	**E**	**B**
Herring Cove Road & Williams Lake Road	**F**	**F**	**C**	**F**	**B**
Herring Cove Road & Dentith Road	**E**	**F**	**D**	**B**	**C**

The results of the MMLOS analysis for future status quo conditions are summarized in Table 11 for segments and Table 12 for signalized intersections. The detailed MMLOS analysis data entry forms can be found in Appendix D. Under future status quo conditions, the MMLOS results for segments will remain the same as under existing conditions. Increases in traffic volumes and the optimization of signal timings at signalized intersection will affect PLOS, TLOS and LOS. BLOS and TkLOS will remain the same as under existing conditions.

PLOS will deteriorate at Herring Cove Road & Cowie Hill Road due to the longer cycle length and improve at Old Sambro Road due to the shorter cycle length. PLOS will remain the same at Williams Lake Road and Dentith Road where the PLOS was governed by the PETSI approach. TLOS and LOS will deteriorate at all four signalized intersections.

Table 11: Segment MMMLOS Analysis – Future Conditions – Status Quo (2033)

Segment MMLOS Future Conditions - Status Quo (2033)	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
1. Armdale Roundabout to Purcells Cove Road	F	D	D	A
2. Purcells Cove Road to Cowie Hill Road	F	D	E	B
3. Cowie Hill Road to Highfield Street	F	D	F	B
4. Highfield Street to Old Sambro Road	F	D	F	D
5. Old Sambro Road to Sussex Street	E	E	F	C
6. Sussex Street to Greystone Drive	E	E	F	C
7. Greystone Drive to Lynnett Road	F	D	F	A
8. Past Lynnett Road	F	F	F	D

Table 12: Signalized Intersection MMLOS Analysis – Future Conditions – Status Quo (2033)

Signalized Intersection MMLOS Future Conditions - Status Quo (2033)	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Herring Cove Road & Cowie Hill Road	D	E	F	E	D
Herring Cove Road & Old Sambro Road	C	D	D	E	C
Herring Cove Road & Williams Lake Road	F	F	F	F	C
Herring Cove Road & Dentith Road	E	F	F	B	F

Collision Data Review: Collision data was provided by HRM for motor vehicle collisions and motor-vehicle pedestrian collisions. The data was reviewed to identify any locations in the study where are a high number of collisions are observed.

Motor vehicle collision data from 2012 to 2014 is summarized by collision severity in Table 13. A total of 327 collisions were reported along Herring Cove Road over the three-year period, including 250 property damage only (PDO) collisions, 73 non-fatal injury collisions, two fatal collisions and two listed as other.

Table 13: Summary of Motor Vehicle Collisions

Collision Type	Number of Collisions
Property Damage Only (PDO)	250
Non-Fatal Injury	73
Fatal	2
Other	2
Total Motor Vehicle Collisions	**327**

Of the 327 collisions, 148 collisions were reported with specific locations on Herring Cove Road. The motor vehicle collisions are summarized by location in Table 14. The three locations with the highest number of collisions reported were Herring Cove Road and Dentith Road (19 collisions), Herring Cove Road and Purcells Cove Road (18 collisions) and Herring Cove Road and Old Sambro Road (15 collisions). Less than 10 collisions were reported at all other intersections. The incident reports provide some information regarding collision configuration and vehicle maneuver however insufficient information is provided to develop intersection collision diagrams.

Table 14: Motor Vehicle Collisions by Location

Segment	Location	PDO	Injury	Fatal	Other	Total Collisions
1. Armdale Roundabout to Purcells Cove Road	Armdale Roundabout	7	2	-	-	9
	Armshore Drive	1	-	-	-	1
	Forest Avenue	4	1	-	-	5
2. Purcells Cove Road to Cowie Hill Road	Purcells Cove Road	13	3	-	2	18
	Melwood Avenue	2	-	-	-	2
	Lawnwood Avenue	1	1	-	-	2
	Keddy Road	1	-	-	-	1
	Osborne Street	1	-	-	-	1
	Maplewood Drive	2	-	-	-	2
	Winchester Avenue	1	-	-	-	1
3. Cowie Hill Road to Highfield Street	Cowie Hill Road	2	2	-	-	4
	Brighton Avenue	2	1	-	-	3
	Shoreham Road	-	1	-	-	1
	Glenora Avenue	6	1	-	-	7

Table 14: Motor Vehicle Collisions by Location (Continued)

Segment	Location	PDO	Injury	Fatal	Other	Total Collisions
4. Highfield Street to Old Sambro Road	Highfield Street	1	-	-	-	1
	Punchbowl Drive	5	-	-	-	5
	McMullen Road	2	-	-	-	2
	Mont Street	2	-	-	-	2
	Layton Road	1	-	-	-	1
	Cherry Lane	-	1	-	-	1
5. Old Sambro Road to Sussex Street	Old Sambro Road	10	5	-	-	15
	Circle Drive/Spry Avenue	4	-	-	-	4
	Williams Lake Road	2	5	1	-	8
	St. Michaels Avenue	1	1	-	-	2
	McDonalds	1	-	-	-	1
	Royal Bank	1	-	-	-	1
	Hartlen Avenue	-	1	-	-	1
	Pine Grove Drive	1	-	-	-	1
	Dentith Road	15	4	-	-	19
6. Sussex Street to Greystone Drive	Sussex Street	4	3	-	-	7
	Aldergrove Drive	1	1	-	-	2
	Drysdale Road	4	2	-	-	6
	Auburn Avenue	2	-	-	-	2
	Hilden Drive	-	1	-	-	1
	Sylvia Avenue	-	3	-	-	3
7. Greystone Drive to Lynnett Road	Greystone Drive	1	-	-	-	1
8. Past Lynnett Road	Lynnett Road	-	1	-	-	1
	Autumn Drive	1	-	-	-	1
	McIntosh Street	1	-	-	-	1
	Green Acres Road	1	-	-	-	1
	Princeton Avenue	1	-	-	-	1
Total Motor Vehicle Collisions		**105**	**40**	**1**	**2**	**148**

The following collision configurations were reported for the 19 collisions at **Herring Cove Road and Dentith Road**:

- left turn across opposing traffic (5)
- vehicle crossing the path of other to the left (4)
- right angle (2)

- hit a pedestrian (2)
- left turn into traffic (1)
- rear-end (1)
- ran off the road to the left (1)
- vehicle crossing the path of other to the right (1)
- same direction sideswipe (1)
- not specified - hit another moving vehicle (1)

The most common collision configuration reported was completing a left turn across opposing traffic. While the movement is not specified in the incident reports, due to the 3-leg configuration of Herring Cove Road and Dentith Road the left turn movement can only be the northbound left turn on Herring Cove Road.

The following collision configurations were reported for the 18 collisions at **Herring Cove Road and Purcells Road**:

- rear-end (11)
- not specified - hit another moving vehicle (4)
- same direction sideswipe (2)
- vehicle crossing the path of other to the left (1)

The most common collision configuration reported was rear end collisions. The most common vehicle maneuver associated with the rear end collisions was “going straight ahead” indicating that the rear end collisions are likely occurring on Herring Cove Road.

The following collision configurations were reported for the 15 collisions at **Herring Cove Road and Old Sambro Road**:

- rear-end (8)
- left turn across opposing traffic (3)
- same direction sideswipe (2)
- right turning conflict (1)
- hit a pedestrian (1)

The most common collision configuration reported was rear end collisions. “Going straight ahead” was the vehicle maneuver associated with half of the rear end collisions, indicating that the majority of rear end collisions are likely occurring on Herring Cove Road. The second most common collision configuration reported was completing a left turn across opposing traffic. While the movement is not specified in the incident reports, due to the 3-leg configuration of Herring Cove Road and Old Sambro Road, the left turn movement can only be the northbound left turn on Herring Cove Road.

Motor vehicle-pedestrian collision data from 2013 to 2018 is summarized by pedestrian injury severity in Table 15. A total of 36 collisions were reported along Herring Cove Road over the six-year period, including 6 collisions with no pedestrian injury, 20 with minor pedestrian injury, 7 with moderate pedestrian injury, 2 with major pedestrian injury and one with a pedestrian fatality.

Table 15: Summary of Motor Vehicle-Pedestrian Collisions

Pedestrian Injury Severity	Number of Collisions
None	6
Minor	20
Moderate	7
Major	2
Fatal	1
Total Motor Vehicle-Pedestrian Collisions	**36**

The specific location of the motor vehicle-pedestrian collision was provided for all 16 collisions. The motor vehicle-pedestrian collisions are summarized by location in listed in Table 16. The three locations with the highest number of collisions reported were Herring Cove Road and Dentith Road (5 collisions), Herring Cove Road and Cowie Hill Road (4 collisions) and Herring Cove Road and Williams Lake Road (3 collisions). The fatal collision was reported at the intersection of Herring Cove Road and Williams Lake Road.

Table 16: Motor Vehicle-Pedestrian Collisions by Location

Segment	Location	Number of Collisions
1. Armdale Roundabout to Purcells Cove Road	-	0
2. Purcells Cove Road to Cowie Hill Road	-	0
3. Cowie Hill Road to Highfield Street	Cowie Hill Road	4
4. Highfield Street to Old Sambro Road	Highfield Street	1
	Civic Address 191	1
	Civic Address 205	1
	Civic Address 231	1
5. Old Sambro Road to Sussex Street	Old Sambro Road	1
	Williams Lake Road	3
	Dentith Road	5
	Sussex Street	2
	Civic Address 318	1
	Civic Address 357	1
6. Sussex Street to Greystone Drive	Aldergrove Drive	2
	Drysdale Road	2
	Sylvia Avenue	1
	Civic Address 368	1
	Civic Address 374	1
	Civic Address 432	1
	Civic Address 486	1

Table 16: Motor Vehicle-Pedestrian Collisions by Location (Continued)

Segment	Location	Number of Collisions
7. Greystone Drive to Lynnett Road	Lynnett Road	1
8. Past Lynnett Road	Civic Address 519	1
	Civic Address 548	1
	Civic Address 565	1
	Civic Address 900	1
	Civic Address 916	1
Total Motor Vehicle-Pedestrian Collisions		**36**

If you have any questions or additional discussion, please feel free to contact the undersigned.

Regards,

[redacted]

Harbourside Transportation Consultants
Michael MacDonald, P. Eng.
Senior Transportation Engineer, Principal
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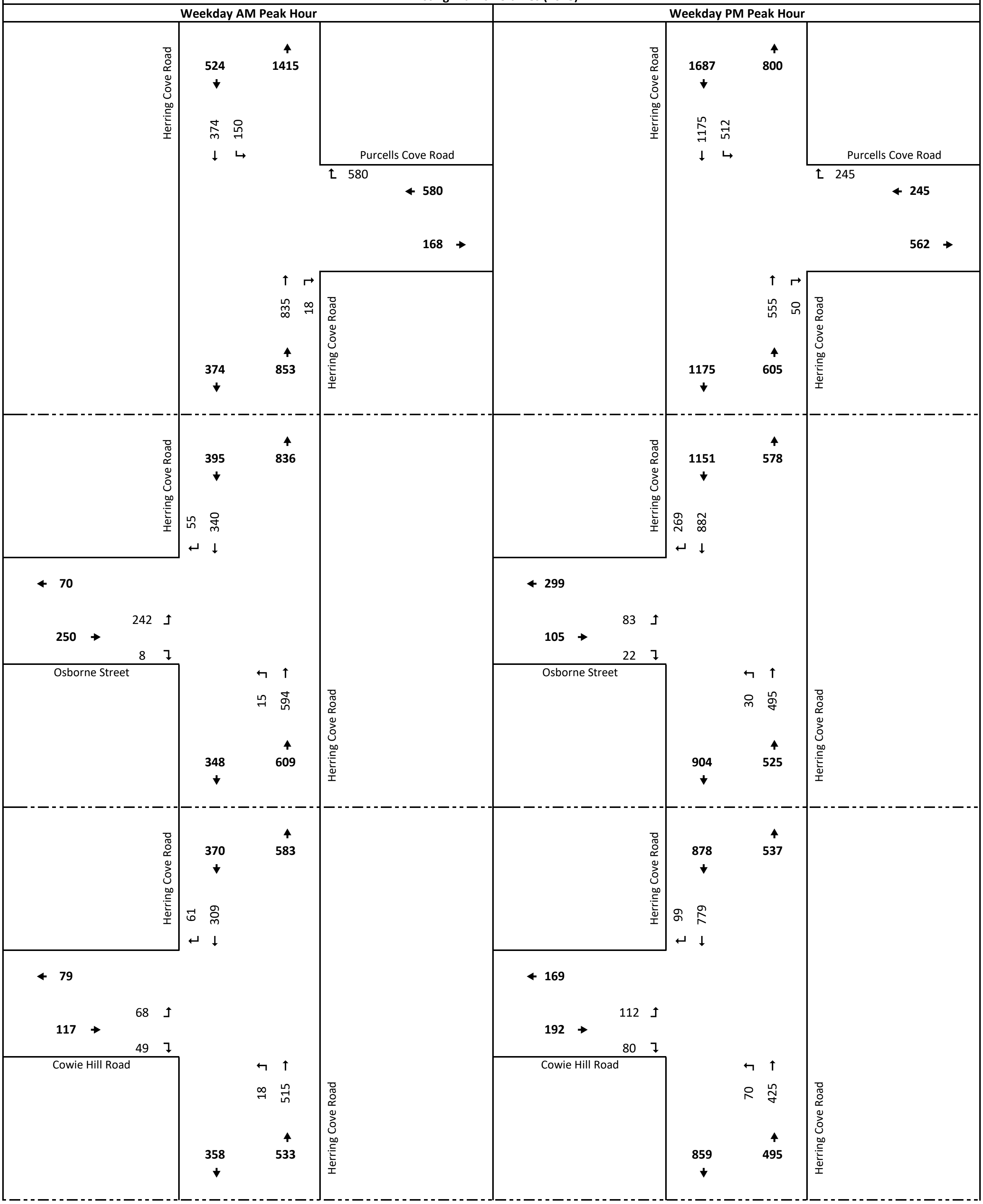
Email: mmacdonald@harboursideengineering.ca

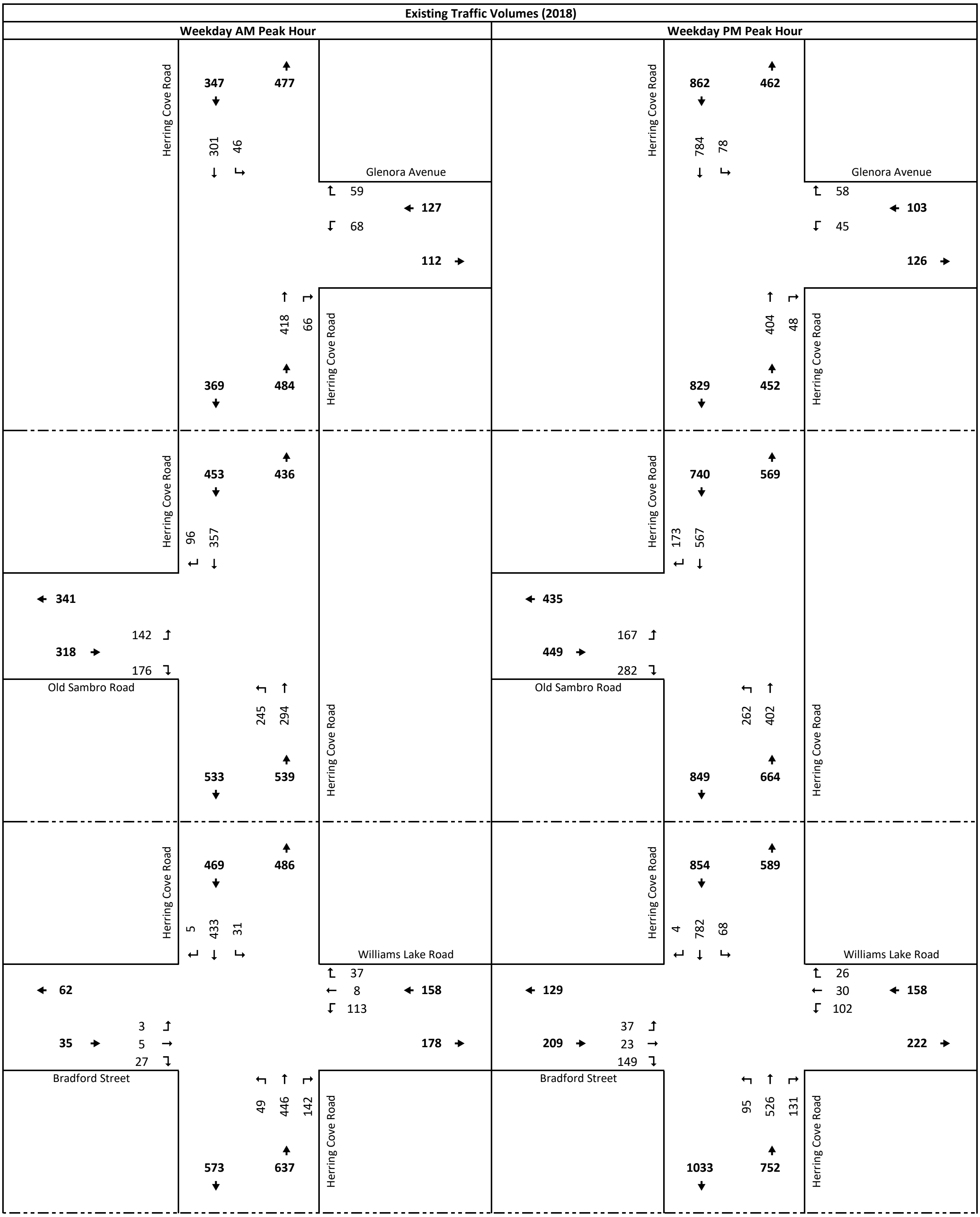
Appendix A – Traffic Volumes
Appendix B – Synchro Reports
Appendix C – Traffic Signal Warrants
Appendix D – MMLOS Analysis

Appendix A

Traffic Volumes

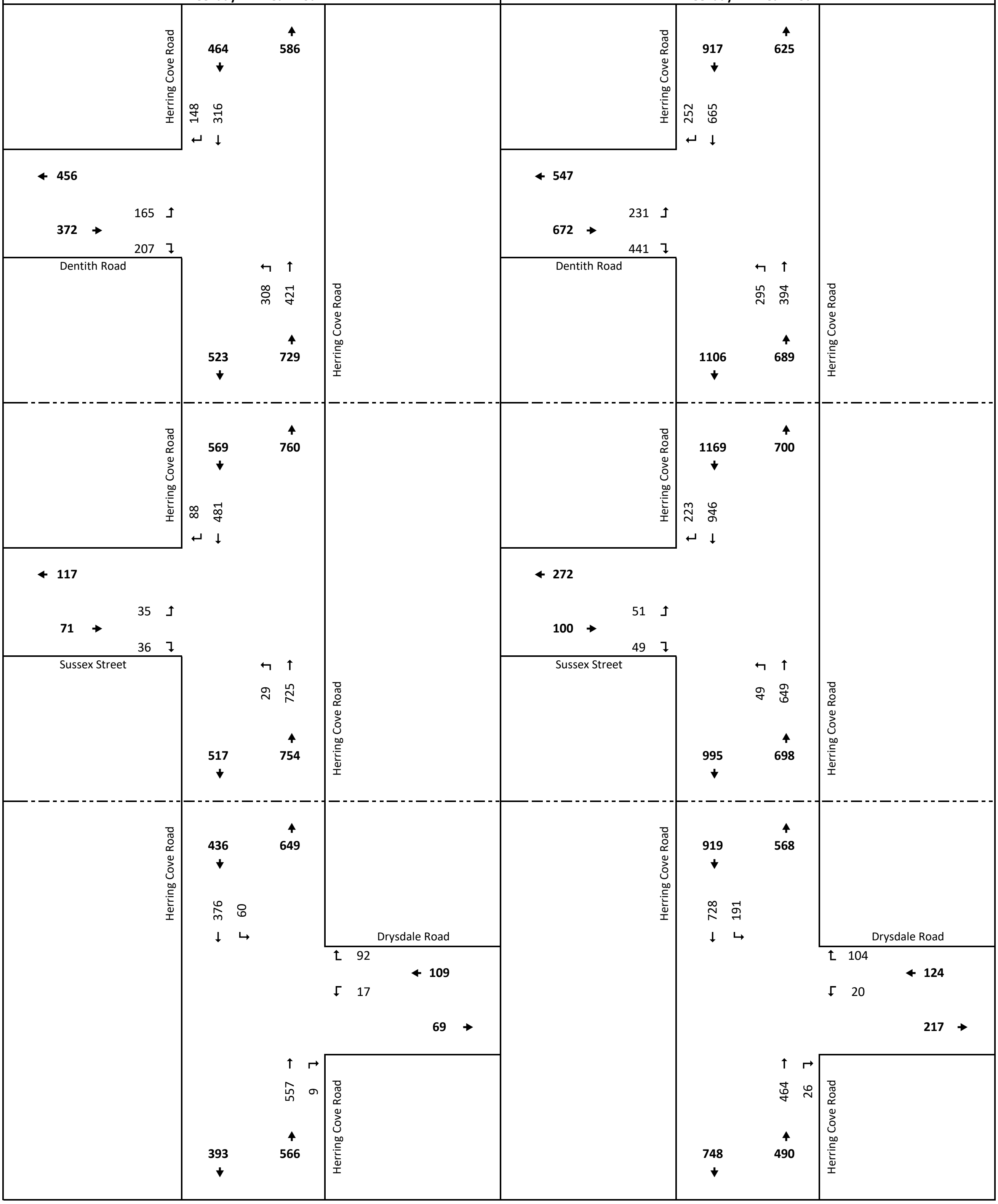
Existing Traffic Volumes (2018)

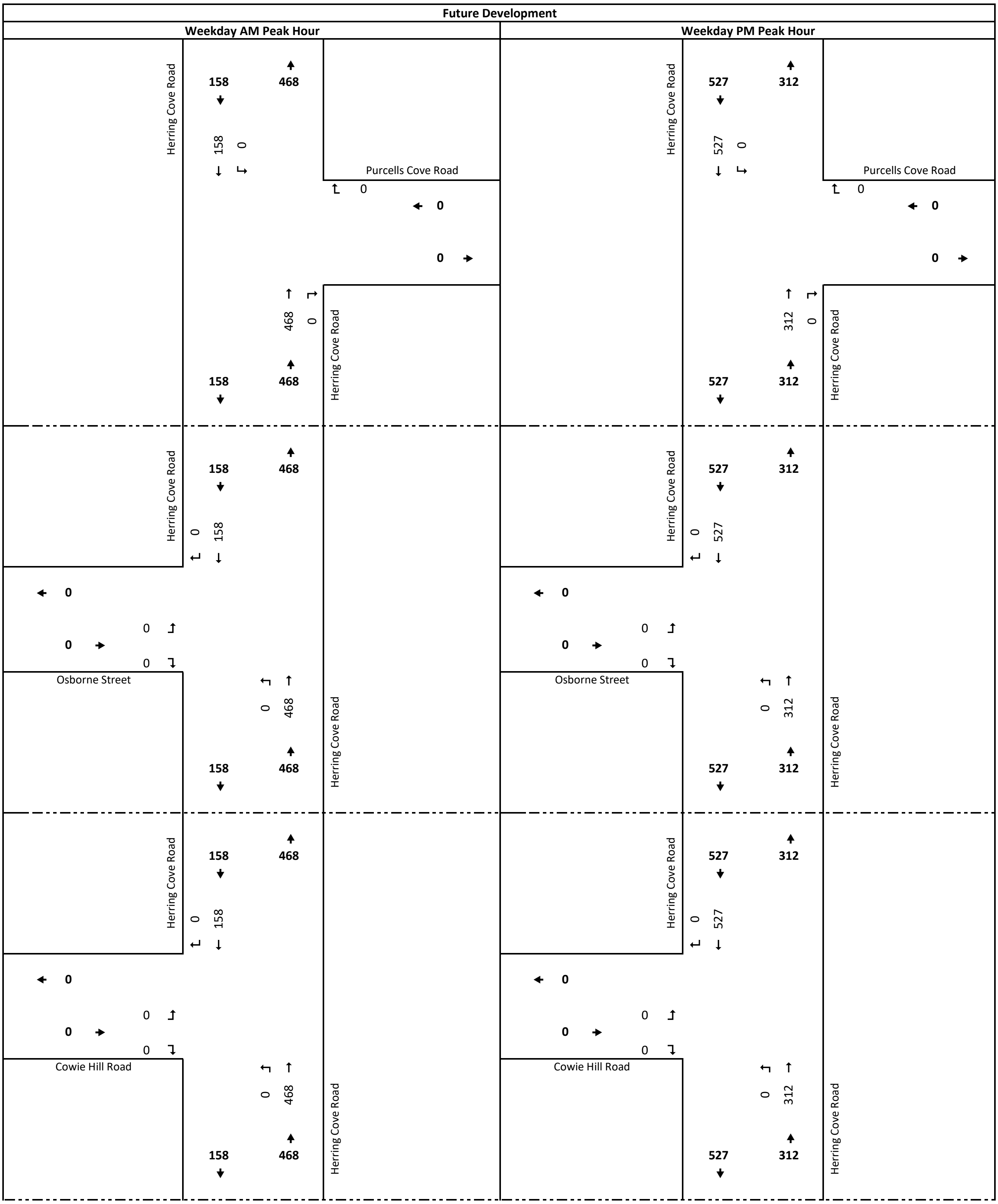



Existing Traffic Volumes (2018)
Weekday AM Peak Hour
Weekday PM Peak Hour
Herring Cove Road
Glenora Avenue
Old Sambro Road
Williams Lake Road
Bradford Street
347
477
301
46
59
127
68
112
418
66
369
484
453
436
96
357
341
142
318
176
245
294
533
539
469
486
5
433
31
37
8
158
113
62
3
35
5
27
178
49
446
142
573
637
862
462
784
78
58
103
45
126
404
48
829
452
740
569
173
567
435
167
449
282
262
402
849
664
854
589
4
782
68
26
30
158
102
129
37
209
23
149
222
95
526
131
1033
752

Existing Traffic Volumes (2018)

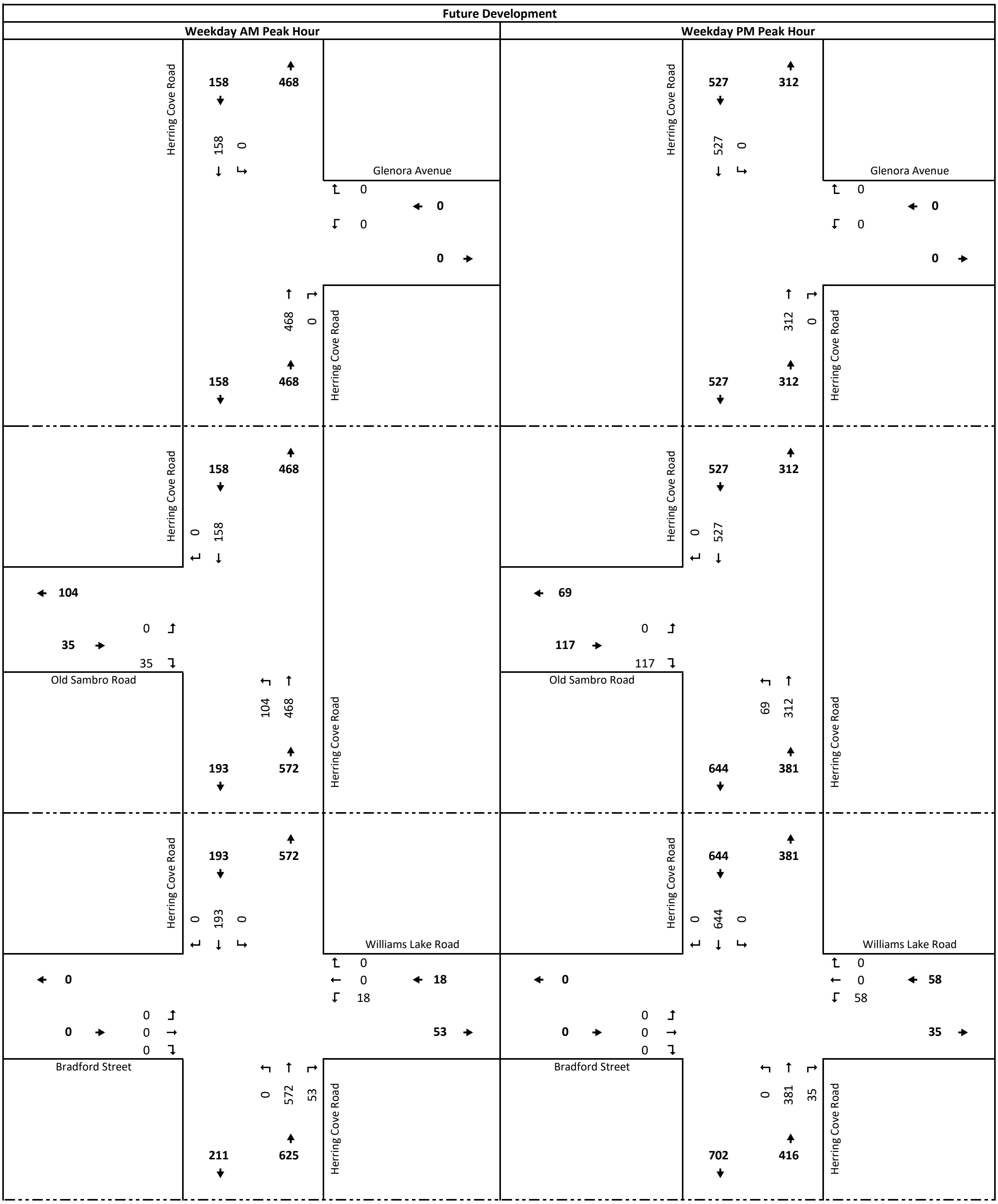
Weekday AM Peak Hour	Weekday PM Peak Hour

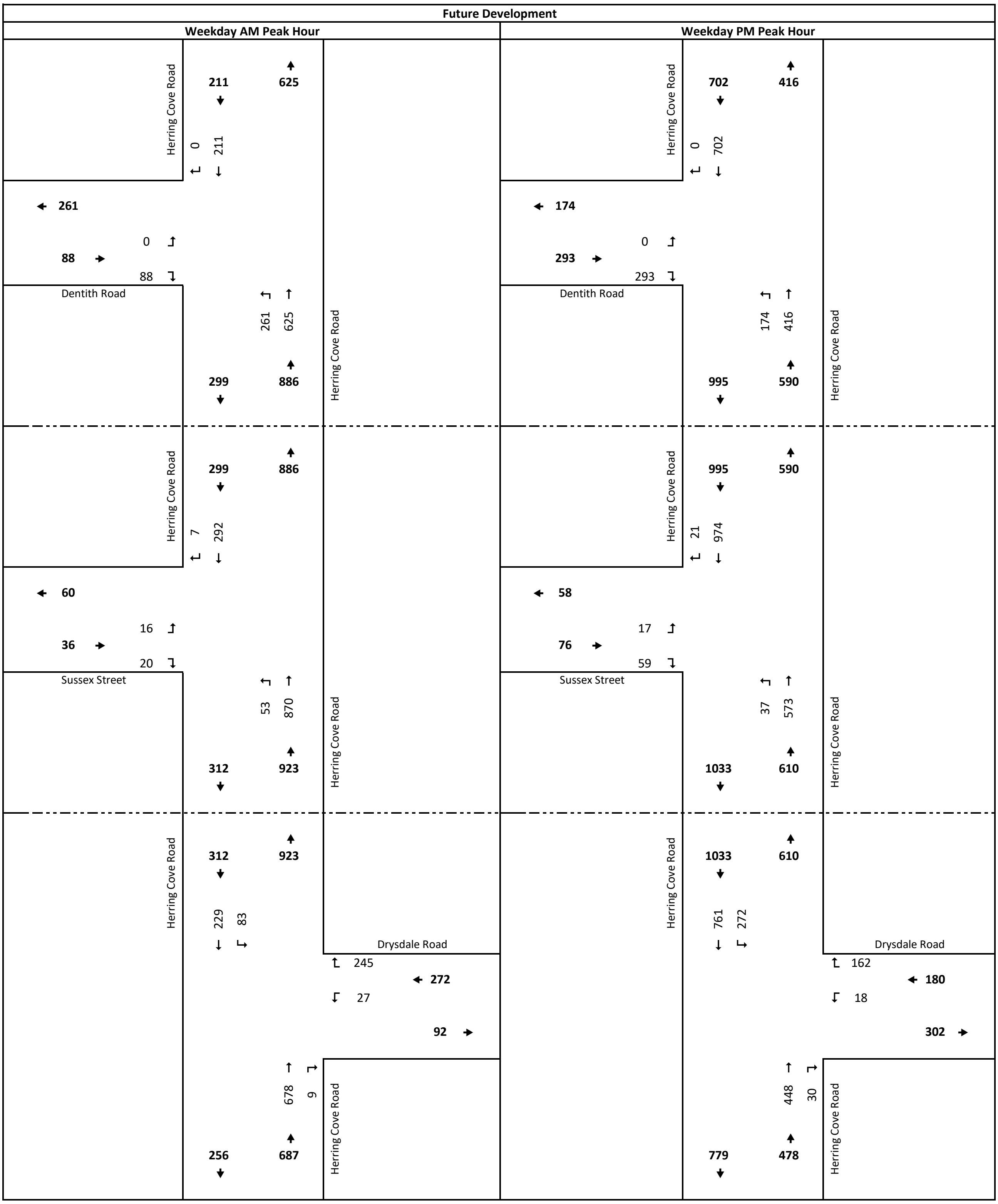




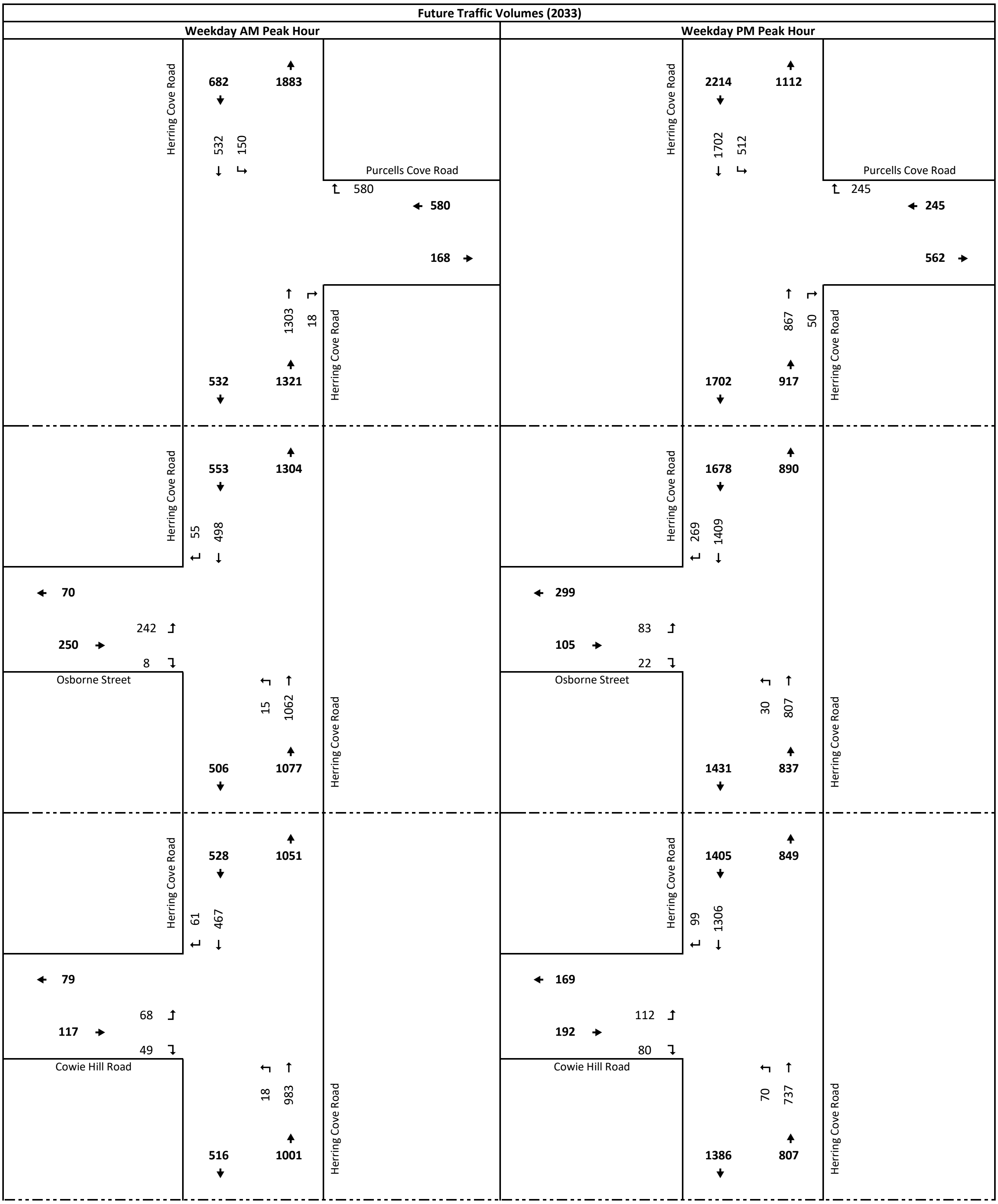
Future Development
Weekday AM Peak Hour
Weekday PM Peak Hour
Herring Cove Road
Purcells Cove Road
Osborne Street
Cowie Hill Road
158
468
527
312
0

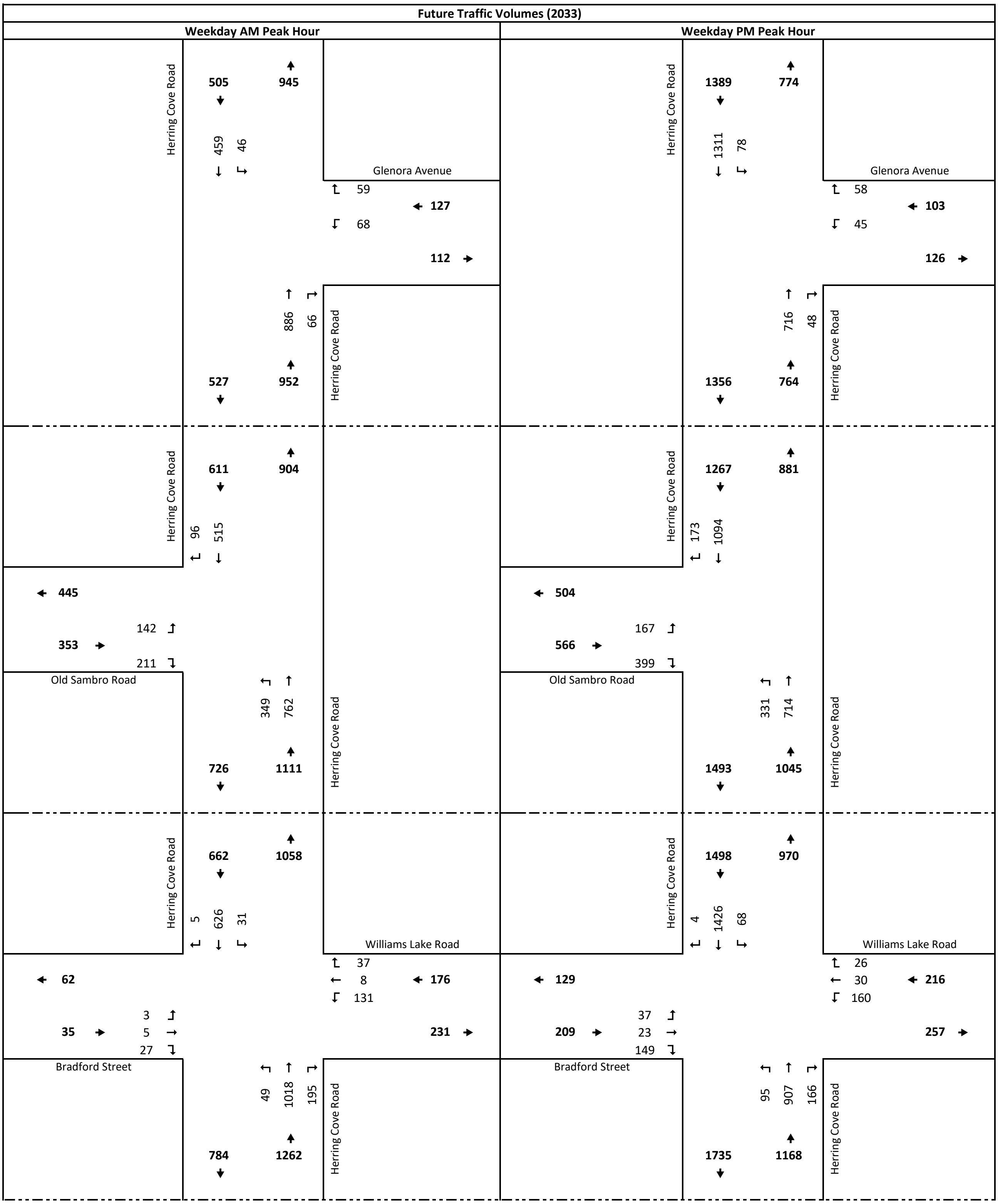
Future Development



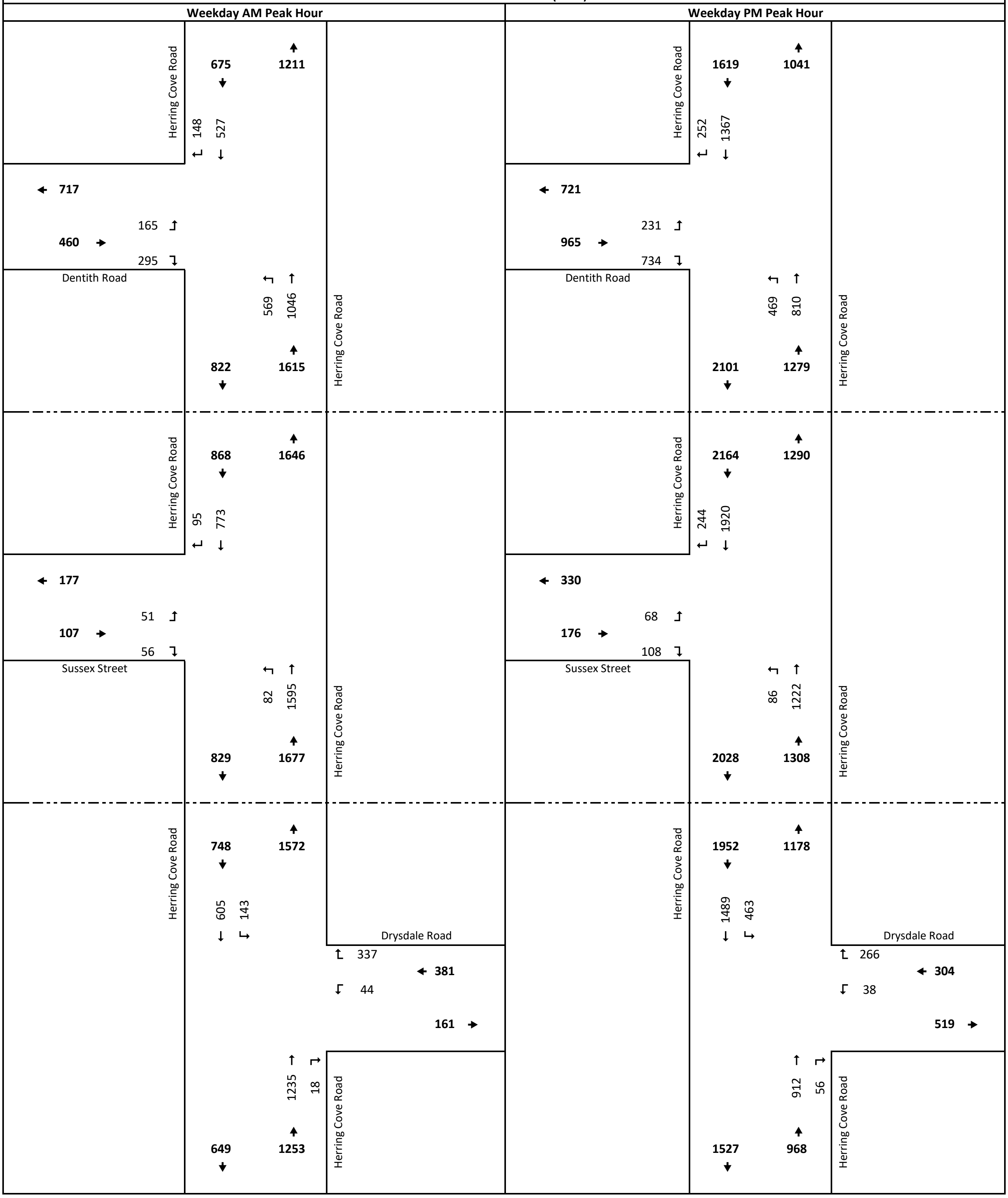

Future Development
Weekday AM Peak Hour
Weekday PM Peak Hour
Herring Cove Road
Dentith Road
Sussex Street
Drysdale Road
211
625
0
211
261
0
88
88
261
625
299
886
299
886
7
292
60
16
36
20
53
870
312
923
312
923
229
83
245
272
27
92
678
9
256
687
702
416
0
702
174
0
293
293
174
416
995
590
995
590
21
974
58
17
76
59
37
573
1033
610
1033
610
761
272
162
180
18
302
448
30
779
478

Future Traffic Volumes (2033)




Future Traffic Volumes (2033)
Weekday AM Peak Hour
Weekday PM Peak Hour
Herring Cove Road
Glenora Avenue
505
945
459
46
59
127
68
112
886
66
527
952
611
904
96
515
445
142
353
211
Old Sambro Road
349
762
726
1111
662
1058
5
626
31
Williams Lake Road
37
8
176
131
62
3
35
5
27
231
Bradford Street
49
1018
195
784
1262
1389
774
1311
78
58
103
45
126
716
48
1356
764
1267
881
173
1094
504
167
566
399
331
714
1493
1045
1498
970
4
1426
68
26
30
216
160
129
37
209
23
149
257
95
907
166
1735
1168

Future Traffic Volumes (2033)



Appendix B

Synchro Reports

Intersection	
Int Delay, s/veh	134.2

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	835	18	150	374	0	580
Future Vol, veh/h	835	18	150	374	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	908	20	163	407	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	928	0	-	918
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	737	-	0	~ 329
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	737	-	-	~ 329
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.2	$ 450
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	329	737	-
HCM Lane V/C Ratio	-	-	1.916	0.221	-
HCM Control Delay (s)	-	-	$ 450	11.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	43.2	0.8	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	555	50	512	1175
Future Vol, veh/h	0	245	555	50	512	1175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	603	54	557	1277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	630	0	0	657	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	482	-	-	931	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	482	-	-	931	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.3	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	931	-
HCM Lane V/C Ratio	-	-	0.552	0.598	-
HCM Control Delay (s)	-	-	21.3	14.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	3.3	4.1	-

Intersection	
Int Delay, s/veh	27.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	594	340	55
Future Vol, veh/h	242	8	15	594	340	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	646	370	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	400	430	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 242	650	1129	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 237	650	1129	-	-	-
Mov Cap-2 Maneuver	~ 237	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	138.5	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	242	-	-
HCM Lane V/C Ratio	0.014	-	1.123	-	-
HCM Control Delay (s)	8.2	0	138.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	12.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	11.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	495	882	269
Future Vol, veh/h	83	22	30	495	882	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	538	959	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1709	1105	1251	0	-	0
Stage 1	1105	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	100	256	556	-	-	-
Stage 1	317	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	256	556	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	185.7		0.7		0	
HCM LOS	F					

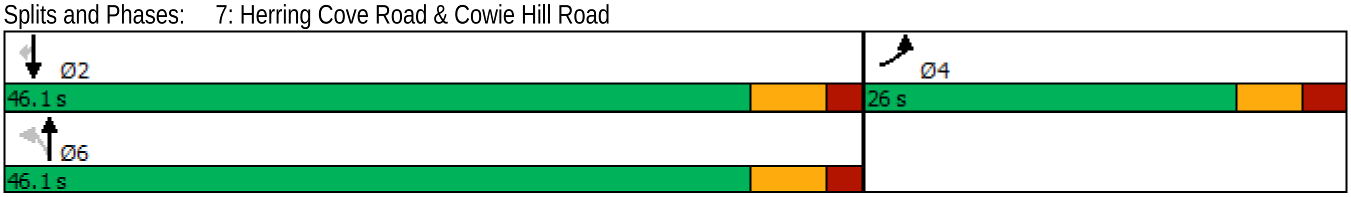
Minor Lane/Major Mvmt		NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)		556	-	106	-	-
HCM Lane V/C Ratio		0.059	-	1.077	-	-
HCM Control Delay (s)		11.9	0	185.7	-	-
HCM Lane LOS		B	A	F	-	-
HCM 95th %tile Q(veh)		0.2	-	7.1	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	515	309	61
Future Volume (vph)	68	49	18	515	309	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.99			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1707	0	1789	1883	1883	1601
Flt Permitted	0.972		0.558			
Satd. Flow (perm)	1701	0	1045	1883	1883	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	49					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	560	336	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	560	336	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		46.1	46.1	46.1	46.1
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	10.2		30.1	30.1	30.1	30.1
Actuated g/C Ratio	0.22		0.64	0.64	0.64	0.64
v/c Ratio	0.31		0.03	0.47	0.28	0.07
Control Delay	13.5		6.7	9.2	7.4	2.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.5		6.7	9.2	7.4	2.5
LOS	B		A	A	A	A
Approach Delay	13.5			9.1	6.6	
Approach LOS	B			A	A	
Stops (vph)	61		11	282	145	9
Fuel Used(l)	4		1	36	20	3
CO Emissions (g/hr)	75		23	676	368	60

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	14		5	130	71	12
VOC Emissions (g/hr)	17		5	156	85	14
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	5.3		0.6	24.8	12.7	0.0
Queue Length 95th (m)	18.1		3.9	68.3	36.5	4.7
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	799		873	1574	1574	1309
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.16		0.02	0.36	0.21	0.05

Intersection Summary	
Area Type: Other	
Cycle Length: 72.1	
Actuated Cycle Length: 47.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 45.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road

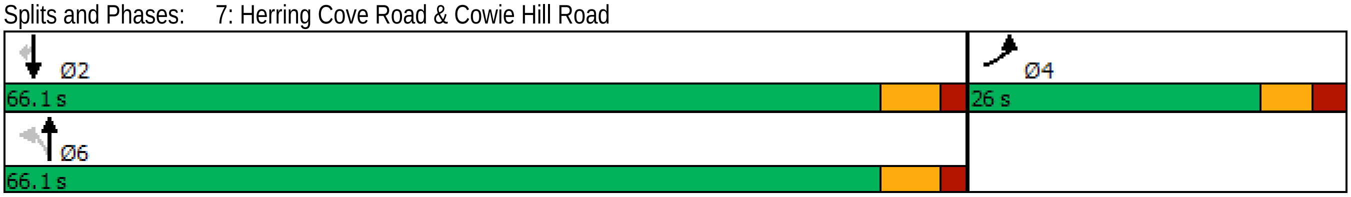


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	425	779	99
Future Volume (vph)	112	80	70	425	779	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.208			
Satd. Flow (perm)	1694	0	392	1883	1883	1546
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	36					90
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	462	847	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	462	847	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		66.1	66.1	66.1	66.1
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	13.3		41.1	41.1	41.1	41.1
Actuated g/C Ratio	0.20		0.61	0.61	0.61	0.61
v/c Ratio	0.57		0.32	0.40	0.73	0.11
Control Delay	28.3		11.0	8.0	14.0	2.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	28.3		11.0	8.0	14.0	2.2
LOS	C		B	A	B	A
Approach Delay	28.3			8.4	12.7	
Approach LOS	C			A	B	
Stops (vph)	132		32	191	496	11
Fuel Used(l)	9		5	29	57	5
CO Emissions (g/hr)	177		91	533	1057	96

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	34		18	103	204	19
VOC Emissions (g/hr)	41		21	123	244	22
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	17.4		3.8	24.4	61.4	0.7
Queue Length 95th (m)	48.6		13.3	50.3	125.7	6.1
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	557		347	1666	1666	1378
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.38		0.22	0.28	0.51	0.08

Intersection Summary	
Area Type: Other	
Cycle Length: 92.1	
Actuated Cycle Length: 67.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 73.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection						
Int Delay, s/veh	3.1					
Movement	**WBL**	**WBR**	**NBT**	**NBR**	**SBL**	**SBT**
Lane Configurations						
Traffic Vol, veh/h	68	59	418	66	46	301
Future Vol, veh/h	68	59	418	66	46	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	454	72	50	327

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	490	0	0	526	0
Stage 1	490	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	578	-	-	1041	-
Stage 1	616	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	284	578	-	-	1041	-
Mov Cap-2 Maneuver	284	-	-	-	-	-
Stage 1	580	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	20.3		0		1.1	
HCM LOS	C					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	372	1041	-
HCM Lane V/C Ratio	-	-	0.371	0.048	-
HCM Control Delay (s)	-	-	20.3	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.2	-

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	404	48	78	784
Future Vol, veh/h	45	58	404	48	78	784
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	439	52	85	852

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1487	465	0	0	491	0
Stage 1	465	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	137	597	-	-	1072	-
Stage 1	632	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	116	597	-	-	1072	-
Mov Cap-2 Maneuver	116	-	-	-	-	-
Stage 1	537	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.5	0	0.8
HCM LOS	E		

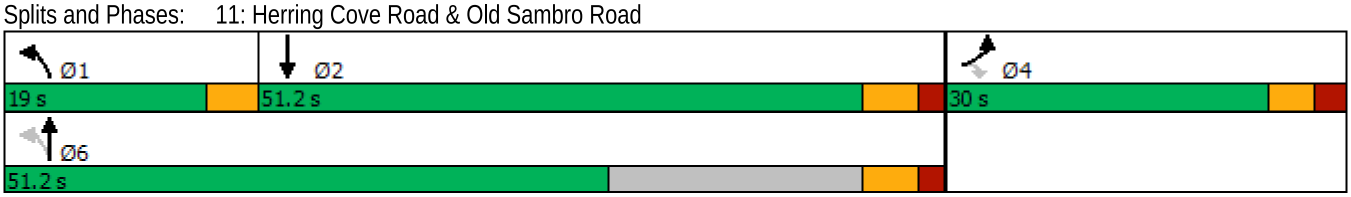
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	212	1072	-
HCM Lane V/C Ratio	-	-	0.528	0.079	-
HCM Control Delay (s)	-	-	39.5	8.6	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	2.8	0.3	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	176	245	294	357	96
Future Volume (vph)	142	176	245	294	357	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	0.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3464	0
Flt Permitted	0.950		0.361			
Satd. Flow (perm)	1789	1601	680	1883	3464	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		191			44	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	191	266	320	388	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	191	266	320	492	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	19.0	51.2	51.2	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.0	10.0	28.9	26.7	12.9	
Actuated g/C Ratio	0.20	0.20	0.59	0.54	0.26	
v/c Ratio	0.43	0.40	0.43	0.31	0.52	
Control Delay	22.6	6.7	7.4	7.3	16.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.6	6.7	7.4	7.3	16.7	
LOS	C	A	A	A	B	
Approach Delay	13.8			7.3	16.7	
Approach LOS	B			A	B	
Stops (vph)	112	29	101	138	318	
Fuel Used(l)	8	5	18	22	48	
CO Emissions (g/hr)	140	88	330	403	886	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	27	17	64	78	171	
VOC Emissions (g/hr)	32	20	76	93	204	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	11.6	0.0	9.1	13.0	16.7	
Queue Length 95th (m)	29.5	13.3	21.2	28.5	33.5	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0				
Base Capacity (vph)	896	898	747	1883	3122	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.17	0.21	0.36	0.17	0.16	

Intersection Summary	
Area Type: Other	
Cycle Length: 100.2	
Actuated Cycle Length: 49.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road

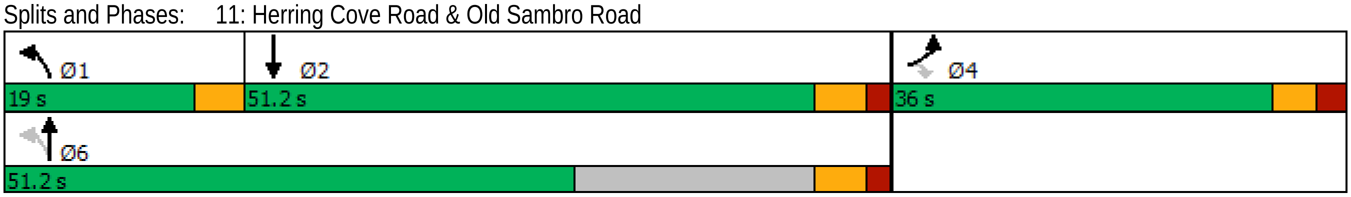


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	282	262	402	567	173
Future Volume (vph)	167	282	262	402	567	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	0.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.965	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3453	0
Flt Permitted	0.950		0.215			
Satd. Flow (perm)	1789	1601	405	1883	3453	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		307			47	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	307	285	437	616	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	307	285	437	804	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	36.0	36.0	19.0	51.2	51.2	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	12.3	12.3	38.3	36.0	21.4	
Actuated g/C Ratio	0.20	0.20	0.63	0.59	0.35	
v/c Ratio	0.51	0.54	0.58	0.39	0.65	
Control Delay	28.9	7.4	10.9	8.1	18.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.9	7.4	10.9	8.1	18.6	
LOS	C	A	B	A	B	
Approach Delay	15.4			9.2	18.6	
Approach LOS	B			A	B	
Stops (vph)	136	37	103	186	532	
Fuel Used(l)	10	8	20	30	79	
CO Emissions (g/hr)	182	140	364	554	1473	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	35	27	70	107	284	
VOC Emissions (g/hr)	42	32	84	128	340	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	17.9	0.0	11.5	22.0	35.1	
Queue Length 95th (m)	42.0	18.4	28.2	45.8	64.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0				
Base Capacity (vph)	915	969	608	1790	2659	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.20	0.32	0.47	0.24	0.30	

Intersection Summary	
Area Type: Other	
Cycle Length: 106.2	
Actuated Cycle Length: 60.9	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 58.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road

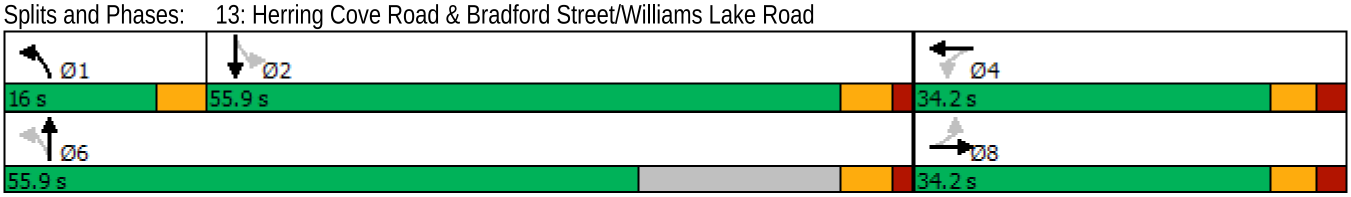


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Future Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99			0.99		0.99	0.99		0.99	1.00	
Frt		0.872			0.969			0.964			0.998	
Flt Protected	0.950				0.965		0.950			0.950		
Satd. Flow (prot)	1789	1621	0	0	1756	0	1789	3411	0	1789	3570	0
Flt Permitted	0.716				0.766		0.395			0.409		
Satd. Flow (perm)	1347	1621	0	0	1390	0	738	3411	0	762	3570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			14			76			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	123	9	40	53	485	154	34	471	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	172	0	53	639	0	34	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	34.2	34.2		34.2	34.2		16.0	55.9		55.9	55.9	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	13.1	13.1			13.1		26.7	24.7		18.6	18.6	
Actuated g/C Ratio	0.26	0.26			0.26		0.53	0.49		0.37	0.37	
v/c Ratio	0.01	0.08			0.47		0.10	0.38		0.12	0.36	
Control Delay	14.7	7.7			19.1		7.9	8.6		17.4	15.5	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	14.7	7.7			19.1		7.9	8.6		17.4	15.5	
LOS	B	A			B		A	A		B	B	
Approach Delay		8.3			19.1			8.5			15.6	
Approach LOS		A			B			A			B	
Stops (vph)	4	11			107		23	287		25	303	
Fuel Used(l)	0	1			8		3	33		3	37	
CO Emissions (g/hr)	3	13			142		51	618		51	692	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	2			27		10	119		10	134	
VOC Emissions (g/hr)	1	3			33		12	143		12	160	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.2	0.3			11.6		1.8	12.7		2.1	17.1	
Queue Length 95th (m)	1.8	5.4			28.9		9.0	37.5		10.0	40.9	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	790	962			821		653	3344		706	3309	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.00	0.04			0.21		0.08	0.19		0.05	0.14	

Intersection Summary	
Area Type: Other	
Cycle Length: 106.1	
Actuated Cycle Length: 50.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 53.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road

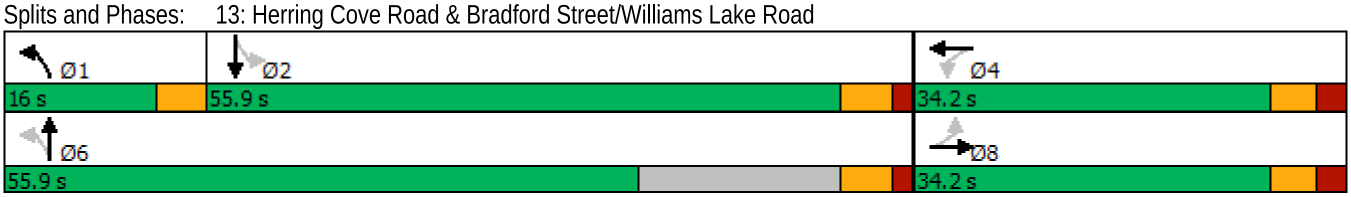


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Future Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	0.98			0.99		1.00	0.99		0.99	1.00	
Frt		0.870			0.978			0.970			0.999	
Flt Protected	0.950				0.969		0.950			0.950		
Satd. Flow (prot)	1789	1601	0	0	1779	0	1789	3447	0	1789	3574	0
Flt Permitted	0.686				0.696		0.219			0.380		
Satd. Flow (perm)	1284	1601	0	0	1269	0	411	3447	0	711	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			9			54			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	111	33	28	103	572	142	74	850	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	172	0	103	714	0	74	854	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	34.2	34.2		34.2	34.2		16.0	55.9		55.9	55.9	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	15.9	15.9			15.9		38.4	36.3		27.4	27.4	
Actuated g/C Ratio	0.24	0.24			0.24		0.59	0.55		0.42	0.42	
v/c Ratio	0.13	0.37			0.55		0.25	0.37		0.25	0.57	
Control Delay	23.6	8.5			30.5		8.1	8.2		17.6	17.5	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	23.6	8.5			30.5		8.1	8.2		17.6	17.5	
LOS	C	A			C		A	A		B	B	
Approach Delay		11.1			30.5			8.2			17.5	
Approach LOS		B			C			A			B	
Stops (vph)	28	33			117		35	288		42	543	
Fuel Used(l)	2	3			9		5	36		6	68	
CO Emissions (g/hr)	30	61			172		94	673		107	1264	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	6	12			33		18	130		21	244	
VOC Emissions (g/hr)	7	14			40		22	155		25	292	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	3.9	2.4			17.4		4.5	19.2		5.6	40.3	
Queue Length 95th (m)	13.1	18.5			43.8		14.0	42.0		18.4	77.2	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	606	841			603		519	3161		547	2751	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.07	0.22			0.29		0.20	0.23		0.14	0.31	

Intersection Summary	
Area Type: Other	
Cycle Length: 106.1	
Actuated Cycle Length: 65.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 74.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road

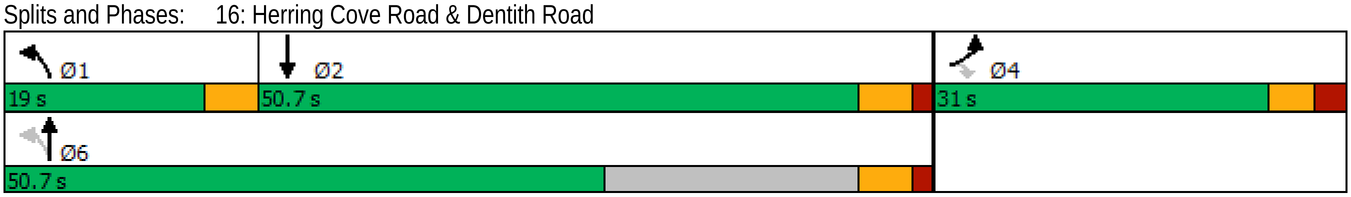


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	207	308	421	316	148
Future Volume (vph)	165	207	308	421	316	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.97	0.96	0.99		0.99	
Frt		0.850			0.952	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	3579	3369	0
Flt Permitted	0.950		0.412			
Satd. Flow (perm)	1740	1532	770	3579	3369	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225			100	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	225	335	458	343	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	225	335	458	504	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	31.0	31.0	19.0	50.7	50.7	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	16.3	16.3	62.8	61.1	45.4	
Actuated g/C Ratio	0.18	0.18	0.70	0.68	0.51	
v/c Ratio	0.55	0.48	0.50	0.19	0.29	
Control Delay	39.8	8.4	8.2	5.8	11.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.8	8.4	8.2	5.8	11.5	
LOS	D	A	A	A	B	
Approach Delay	22.3			6.8	11.5	
Approach LOS	C			A	B	
Stops (vph)	142	27	107	141	205	
Fuel Used(l)	13	8	8	10	27	
CO Emissions (g/hr)	237	141	148	187	498	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	46	27	29	36	96	
VOC Emissions (g/hr)	55	33	34	43	115	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	28.2	0.0	21.8	15.5	22.1	
Queue Length 95th (m)	49.3	18.0	33.4	21.6	34.2	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			30.0			
Base Capacity (vph)	505	594	714	2590	1763	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.35	0.38	0.47	0.18	0.29	

Intersection Summary	
Area Type: Other	
Cycle Length: 100.7	
Actuated Cycle Length: 89.2	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 57.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 16: Herring Cove Road & Dentith Road

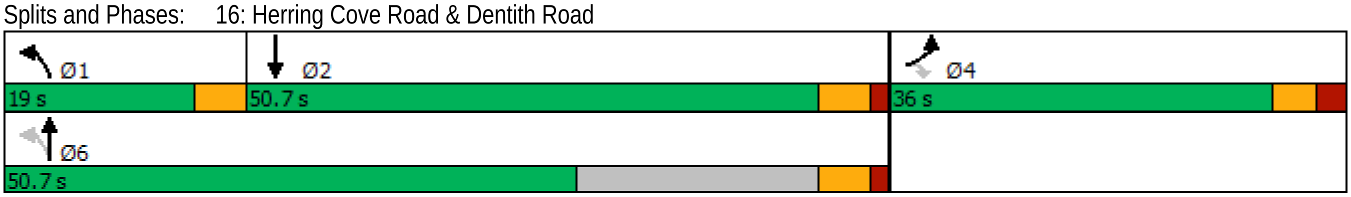


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	441	295	394	665	252
Future Volume (vph)	231	441	295	394	665	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.98	0.94			0.98	
Frt		0.850			0.959	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	3579	3378	0
Flt Permitted	0.950		0.182			
Satd. Flow (perm)	1757	1504	343	3579	3378	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		349			65	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	479	321	428	723	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	479	321	428	997	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	36.0	36.0	19.0	50.7	50.7	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	19.6	19.6	64.0	62.3	45.4	
Actuated g/C Ratio	0.21	0.21	0.68	0.66	0.48	
v/c Ratio	0.67	0.81	0.74	0.18	0.60	
Control Delay	43.4	21.6	21.4	7.0	19.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	43.4	21.6	21.4	7.0	19.5	
LOS	D	C	C	A	B	
Approach Delay	29.1			13.1	19.5	
Approach LOS	C			B	B	
Stops (vph)	201	137	119	140	607	
Fuel Used(l)	19	22	11	10	63	
CO Emissions (g/hr)	345	418	205	184	1174	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	67	81	40	36	227	
VOC Emissions (g/hr)	79	96	47	43	271	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	42.8	21.6	20.6	14.4	66.2	
Queue Length 95th (m)	67.0	60.4	#64.4	26.6	102.1	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			30.0			
Base Capacity (vph)	577	721	467	2465	1669	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.44	0.66	0.69	0.17	0.60	

Intersection Summary	
Area Type: Other	
Cycle Length: 105.7	
Actuated Cycle Length: 93.7	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 72.3%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	36	29	725	481	88
Future Vol, veh/h	35	36	29	725	481	88
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	38	39	32	788	523	96

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1040	326	630	0	-	0
Stage 1	582	-	-	-	-	-
Stage 2	458	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	226	670	948	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	214	660	938	-	-	-
Mov Cap-2 Maneuver	214	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	598	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	938	-	214	660	-	-
HCM Lane V/C Ratio	0.034	-	0.178	0.059	-	-
HCM Control Delay (s)	9	-	25.4	10.8	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	0.2	-	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	49	49	649	946	223
Future Vol, veh/h	51	49	49	649	946	223
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	53	53	705	1028	242

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1673	732	1335	0	-	0
Stage 1	1214	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	87	364	513	-	-	-
Stage 1	244	-	-	-	-	-
Stage 2	603	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	68	332	482	-	-	-
Mov Cap-2 Maneuver	68	-	-	-	-	-
Stage 1	204	-	-	-	-	-
Stage 2	567	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	91.3	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	482	-	68	332	-	-
HCM Lane V/C Ratio	0.11	-	0.815	0.16	-	-
HCM Control Delay (s)	13.4	-	161.8	17.9	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	3.8	0.6	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	92	557	9	60	376
Future Vol, veh/h	17	92	557	9	60	376
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	300	-
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	18	100	605	10	65	409

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	945	308	0	0	615	0
Stage 1	610	-	-	-	-	-
Stage 2	335	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	260	688	-	-	961	-
Stage 1	505	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	242	688	-	-	961	-
Mov Cap-2 Maneuver	242	-	-	-	-	-
Stage 1	471	-	-	-	-	-
Stage 2	697	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	534	961	-
HCM Lane V/C Ratio	-	-	0.222	0.068	-
HCM Control Delay (s)	-	-	13.7	9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	104	464	26	191	728
Future Vol, veh/h	20	104	464	26	191	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	300	-
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	22	113	504	28	208	791

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1330	266	0	0	532	0
Stage 1	518	-	-	-	-	-
Stage 2	812	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	146	732	-	-	1032	-
Stage 1	563	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	732	-	-	1032	-
Mov Cap-2 Maneuver	117	-	-	-	-	-
Stage 1	449	-	-	-	-	-
Stage 2	397	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.7	0	1.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	396	1032	-
HCM Lane V/C Ratio	-	-	0.34	0.201	-
HCM Control Delay (s)	-	-	18.7	9.4	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.5	0.8	-

Intersection	
Int Delay, s/veh	296.1

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	1303	18	150	532	0	580
Future Vol, veh/h	1303	18	150	532	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	1416	20	163	578	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1436	0	-	1426
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	473	-	0	~ 166
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	473	-	-	~ 166
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.6	$ 1314.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	166	473	-
HCM Lane V/C Ratio	-	-	3.798	0.345	-
HCM Control Delay (s)	-	-	$ 1314.5	16.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	61.9	1.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	867	50	512	1702
Future Vol, veh/h	0	245	867	50	512	1702
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	942	54	557	1850

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	969	0	0	996	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	308	-	-	695	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	308	-	-	695	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.2	0	6.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	695	-
HCM Lane V/C Ratio	-	-	0.865	0.801	-
HCM Control Delay (s)	-	-	60.2	27.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	7.7	8.2	-

Intersection	
Int Delay, s/veh	132.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	1062	498	55
Future Vol, veh/h	242	8	15	1062	498	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	1154	541	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1757	571	601	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	1186	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 93	520	976	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	290	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	520	976	-	-	-
Mov Cap-2 Maneuver	~ 89	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 994.3	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	976	-	91	-	-
HCM Lane V/C Ratio	0.017	-	2.986	-	-
HCM Control Delay (s)	8.8	0	$ 994.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	26.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	70.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	807	1409	269
Future Vol, veh/h	83	22	30	807	1409	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	877	1532	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2621	1678	1824	0	-	0
Stage 1	1678	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 27	117	335	-	-	-
Stage 1	166	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	117	335	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay,	$ 1748.1	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	335	-	27	-	-
HCM Lane V/C Ratio	0.097	-	4.227	-	-
HCM Control Delay (s)	16.9		$ 1748.1	-	-
HCM Lane LOS	C	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	14	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

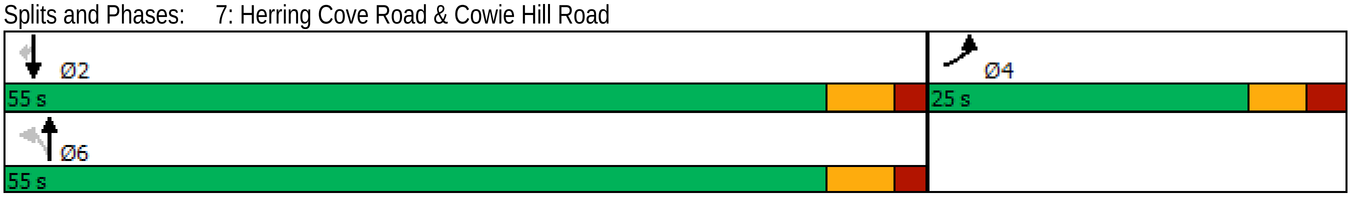
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	983	467	61
Future Volume (vph)	68	49	18	983	467	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1706	0	1789	1883	1883	1601
Flt Permitted	0.972		0.456			
Satd. Flow (perm)	1700	0	855	1883	1883	1552
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	42					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	1068	508	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	1068	508	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	25.0		55.0	55.0	55.0	55.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	11.3		52.8	52.8	52.8	52.8
Actuated g/C Ratio	0.16		0.75	0.75	0.75	0.75
v/c Ratio	0.42		0.03	0.76	0.36	0.06
Control Delay	24.5		5.1	14.4	6.3	1.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	24.5		5.1	14.4	6.3	1.8
LOS	C		A	B	A	A
Approach Delay	24.5			14.3	5.8	
Approach LOS	C			B	A	
Stops (vph)	69		6	557	172	6
Fuel Used(l)	5		1	74	28	3
CO Emissions (g/hr)	97		21	1372	530	58

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	19		4	265	102	11
VOC Emissions (g/hr)	22		5	316	122	13
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	11.5		0.7	85.1	24.0	0.0
Queue Length 95th (m)	24.0		3.6	#228.1	56.7	4.1
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	512		639	1407	1407	1176
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.25		0.03	0.76	0.36	0.06

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 70.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 12.3 Intersection LOS: B
Intersection Capacity Utilization 70.2% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	737	1306	99
Future Volume (vph)	112	80	70	737	1306	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.96
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1708	0	1789	1883	1883	1601
Flt Permitted	0.972		0.056			
Satd. Flow (perm)	1692	0	105	1883	1883	1544
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	32					55
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	801	1420	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	801	1420	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	25.0		75.0	75.0	75.0	75.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	15.7		71.6	71.6	71.6	71.6
Actuated g/C Ratio	0.16		0.72	0.72	0.72	0.72
v/c Ratio	0.71		1.01	0.59	1.05	0.10
Control Delay	46.2		132.3	9.6	54.7	2.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	46.2		132.3	9.6	54.7	2.8
LOS	D		F	A	D	A
Approach Delay	46.2			20.2	51.0	
Approach LOS	D			C	D	
Stops (vph)	152		43	350	958	16
Fuel Used(l)	13		12	51	139	5
CO Emissions (g/hr)	234		217	949	2586	99

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	45		42	183	499	19
VOC Emissions (g/hr)	54		50	219	596	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	31.5		~14.2	66.0	~296.9	2.6
Queue Length 95th (m)	54.9		#30.8	106.4	#391.1	7.9
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	352		75	1356	1356	1127
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.59		1.01	0.59	1.05	0.10

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 99.4

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 40.3 Intersection LOS: D

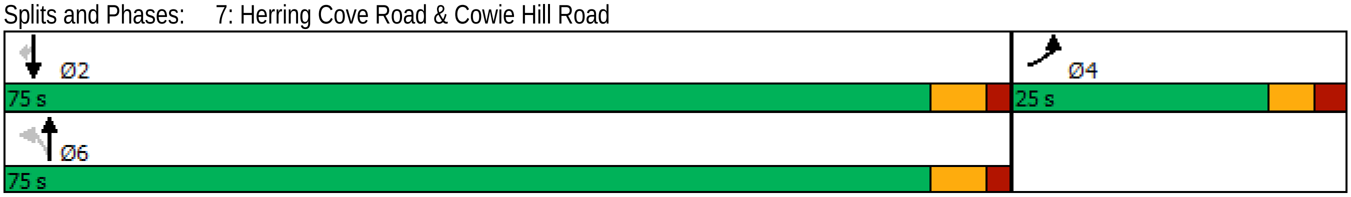
Intersection Capacity Utilization 90.5% ICU Level of Service E

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	9.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	886	66	46	459
Future Vol, veh/h	68	59	886	66	46	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	963	72	50	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1598	999	0	0	1035	0
Stage 1	999	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	295	-	-	672	-
Stage 1	356	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	105	295	-	-	672	-
Mov Cap-2 Maneuver	105	-	-	-	-	-
Stage 1	319	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	112.4	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	150	672	-
HCM Lane V/C Ratio	-	-	0.92	0.074	-
HCM Control Delay (s)	-	-	112.4	10.8	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	6.5	0.2	-

Intersection						
Int Delay, s/veh	48.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	716	48	78	1311
Future Vol, veh/h	45	58	716	48	78	1311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	778	52	85	1425

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2399	804	0	0	830	0
Stage 1	804	-	-	-	-	-
Stage 2	1595	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 37	383	-	-	802	-
Stage 1	440	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 18	383	-	-	802	-
Mov Cap-2 Maneuver	~ 18	-	-	-	-	-
Stage 1	216	-	-	-	-	-
Stage 2	183	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1062.6	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	39	802	-
HCM Lane V/C Ratio	-	-	2.871	0.106	-
HCM Control Delay (s)	-	-	$ 1062.6	10	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	12.5	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

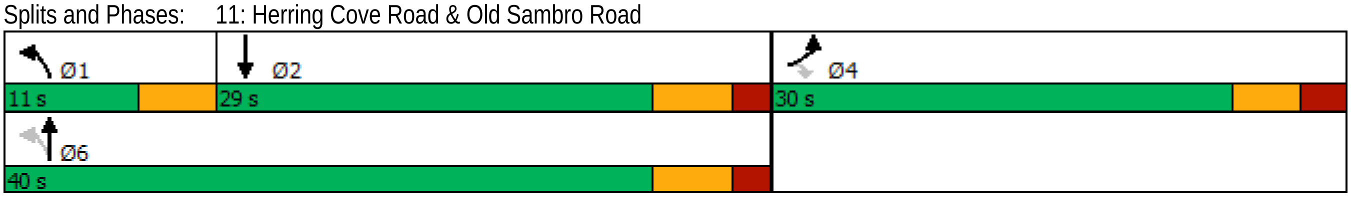
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	211	349	762	515	96
Future Volume (vph)	142	211	349	762	515	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	0.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3496	0
Flt Permitted	0.950		0.293			
Satd. Flow (perm)	1789	1601	552	1883	3496	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			32	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	229	379	828	560	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	229	379	828	664	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.1	10.1	31.5	29.2	18.0	
Actuated g/C Ratio	0.19	0.19	0.61	0.56	0.35	
v/c Ratio	0.44	0.46	0.75	0.78	0.54	
Control Delay	24.1	6.9	18.2	15.8	14.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	6.9	18.2	15.8	14.6	
LOS	C	A	B	B	B	
Approach Delay	13.8			16.6	14.6	
Approach LOS	B			B	B	
Stops (vph)	114	34	141	525	416	
Fuel Used(l)	8	6	28	65	63	
CO Emissions (g/hr)	144	106	523	1207	1171	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28	20	101	233	226	
VOC Emissions (g/hr)	33	24	121	278	270	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	13.8	0.0	14.2	50.6	23.3	
Queue Length 95th (m)	28.1	14.1	#43.6	#110.9	39.8	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0				
Base Capacity (vph)	848	879	506	1257	1592	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.26	0.75	0.66	0.42	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



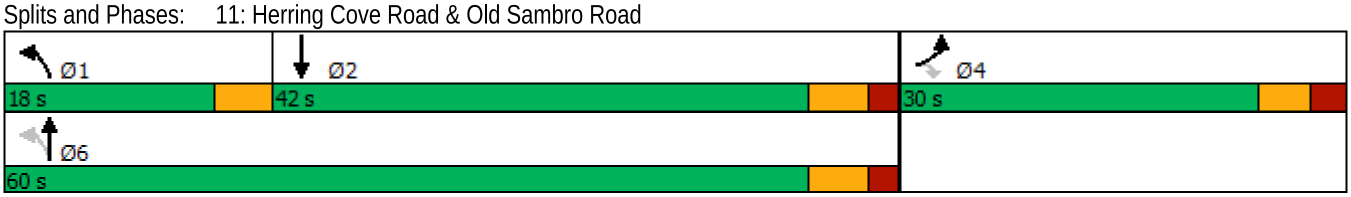
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	399	331	714	1094	173
Future Volume (vph)	167	399	331	714	1094	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	0.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.980	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3507	0
Flt Permitted	0.950		0.101			
Satd. Flow (perm)	1789	1601	190	1883	3507	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		320			23	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	434	360	776	1189	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	434	360	776	1377	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	18.0	60.0	42.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	14.4	14.4	56.0	53.8	35.7	
Actuated g/C Ratio	0.18	0.18	0.70	0.67	0.44	
v/c Ratio	0.57	0.79	0.88	0.62	0.88	
Control Delay	37.0	19.9	43.3	11.4	29.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.0	19.9	43.3	11.4	29.2	
LOS	D	B	D	B	C	
Approach Delay	25.0			21.5	29.2	
Approach LOS	C			C	C	
Stops (vph)	144	120	183	394	1014	
Fuel Used(l)	11	16	34	56	148	
CO Emissions (g/hr)	204	298	636	1044	2756	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	39	57	123	202	532	
VOC Emissions (g/hr)	47	69	147	241	636	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.6	15.6	35.3	54.3	92.4	
Queue Length 95th (m)	43.9	46.8	#99.7	124.6	#168.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0				
Base Capacity (vph)	535	703	411	1264	1579	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.34	0.62	0.88	0.61	0.87	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 80.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 25.6 — Intersection LOS: C
Intersection Capacity Utilization 76.8% — ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road

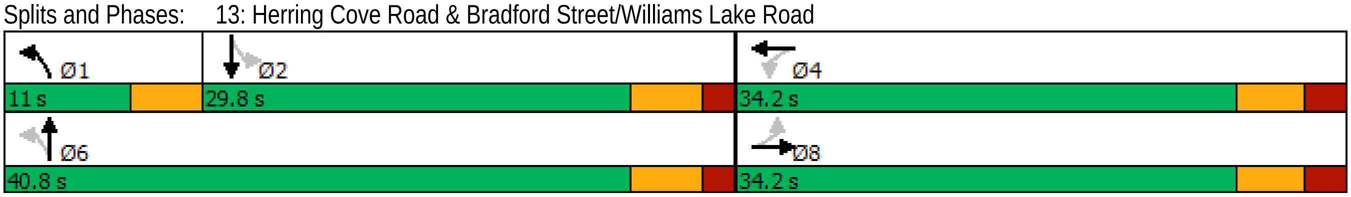


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Future Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99			1.00		1.00	0.99		1.00	1.00	
Frt		0.872			0.972			0.976			0.999	
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1622	0	0	1760	0	1789	3471	0	1789	3574	0
Flt Permitted	0.683				0.759		0.310			0.188		
Satd. Flow (perm)	1286	1622	0	0	1383	0	582	3471	0	353	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			20			39			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	142	9	40	53	1107	212	34	680	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	191	0	53	1319	0	34	685	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	34.2	34.2		34.2	34.2		11.0	40.8		29.8	29.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	14.1	14.1			14.1		36.4	34.5		28.3	28.3	
Actuated g/C Ratio	0.23	0.23			0.23		0.60	0.57		0.46	0.46	
v/c Ratio	0.01	0.09			0.57		0.11	0.67		0.21	0.41	
Control Delay	16.3	8.4			24.6		7.7	12.4		20.2	14.7	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	16.3	8.4			24.6		7.7	12.4		20.2	14.7	
LOS	B	A			C		A	B		C	B	
Approach Delay		9.0			24.6			12.2			15.0	
Approach LOS		A			C			B			B	
Stops (vph)	3	11			126		21	775		26	409	
Fuel Used(l)	0	1			9		3	76		3	53	
CO Emissions (g/hr)	2	13			175		50	1418		53	977	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	0	3			34		10	274		10	189	
VOC Emissions (g/hr)	1	3			40		11	327		12	225	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.3	0.4			16.9		1.9	42.5		2.4	27.9	
Queue Length 95th (m)	1.9	5.5			32.7		8.9	104.4		11.5	58.8	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	600	772			656		488	2060		164	1660	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.01	0.04			0.29		0.11	0.64		0.21	0.41	

Intersection Summary	
Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 60.9	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 67.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Future Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	0.98			0.99			0.99		1.00	1.00	
Frt		0.870			0.984			0.977				
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1604	0	0	1782	0	1789	3478	0	1789	3578	0
Flt Permitted	0.659				0.637		0.092			0.235		
Satd. Flow (perm)	1235	1604	0	0	1170	0	173	3478	0	442	3578	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			8			37				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	174	33	28	103	986	180	74	1550	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	235	0	103	1166	0	74	1554	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	34.2	34.2		34.2	34.2		11.0	55.8		44.8	44.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	19.9	19.9			19.9		49.9	48.0		39.6	39.6	
Actuated g/C Ratio	0.25	0.25			0.25		0.62	0.60		0.49	0.49	
v/c Ratio	0.13	0.36			0.80		0.41	0.56		0.34	0.88	
Control Delay	24.2	7.9			47.5		13.2	11.5		21.8	28.2	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	24.2	7.9			47.5		13.2	11.5		21.8	28.2	
LOS	C	A			D		B	B		C	C	
Approach Delay		10.8			47.5			11.6			27.9	
Approach LOS		B			D			B			C	
Stops (vph)	29	32			187		37	589		46	1104	
Fuel Used(l)	2	3			16		5	64		6	138	
CO Emissions (g/hr)	31	59			299		102	1199		113	2568	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	6	11			58		20	231		22	496	
VOC Emissions (g/hr)	7	14			69		24	277		26	592	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	4.9	3.0			33.5		5.8	50.6		7.2	116.1	
Queue Length 95th (m)	12.2	17.3			58.7		15.9	82.8		21.0	#190.2	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	439	675			421		251	2218		218	1768	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.09	0.28			0.56		0.41	0.53		0.34	0.88	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.2

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.88

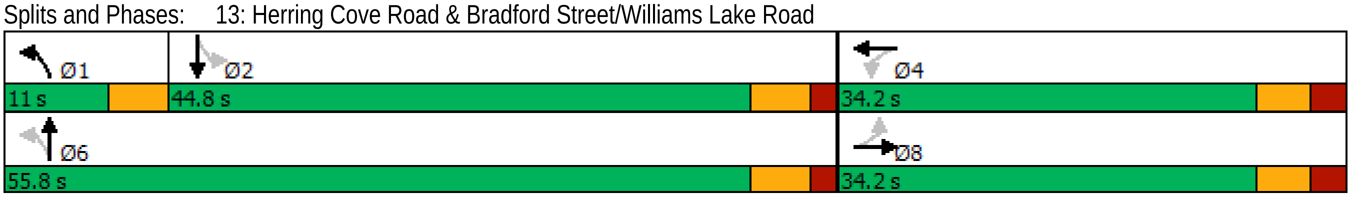
Intersection Signal Delay: 22.0 Intersection LOS: C

Intersection Capacity Utilization 94.4% ICU Level of Service F

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



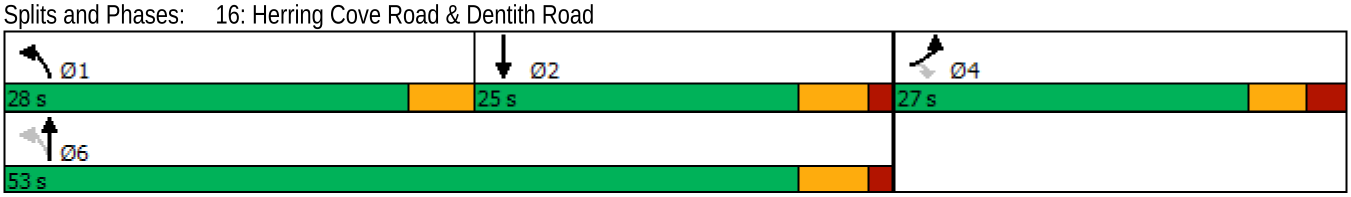
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	295	569	1046	527	148
Future Volume (vph)	165	295	569	1046	527	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.98	0.96			0.99	
Frt		0.850			0.967	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	3579	3438	0
Flt Permitted	0.950		0.169			
Satd. Flow (perm)	1750	1542	318	3579	3438	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		321			42	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	321	618	1137	573	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	321	618	1137	734	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	27.0	27.0	28.0	53.0	25.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	15.8	15.8	49.3	47.6	20.3	
Actuated g/C Ratio	0.21	0.21	0.66	0.63	0.27	
v/c Ratio	0.48	0.56	0.93	0.50	0.77	
Control Delay	29.8	7.2	41.0	9.3	31.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.8	7.2	41.0	9.3	31.9	
LOS	C	A	D	A	C	
Approach Delay	15.3			20.4	31.9	
Approach LOS	B			C	C	
Stops (vph)	133	36	360	529	548	
Fuel Used(l)	11	10	33	32	55	
CO Emissions (g/hr)	210	195	609	589	1026	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	40	38	118	114	198	
VOC Emissions (g/hr)	48	45	140	136	237	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	22.2	0.0	74.1	49.5	53.1	
Queue Length 95th (m)	39.4	18.0	#140.3	64.9	#81.8	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			30.0			
Base Capacity (vph)	502	664	681	2266	958	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.48	0.91	0.50	0.77	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 75.2	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 22.4	Intersection LOS: C
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



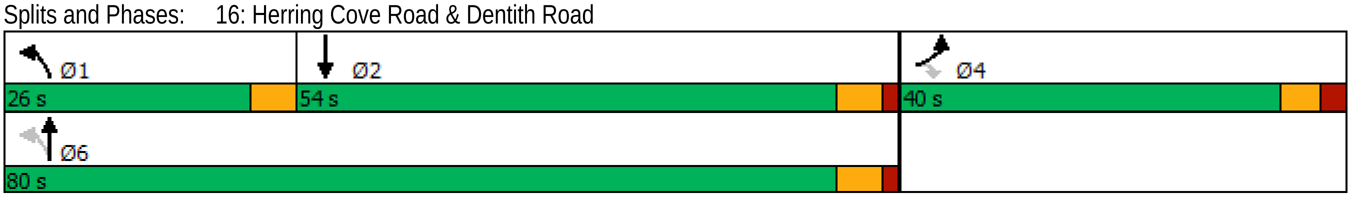
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	734	469	810	1367	252
Future Volume (vph)	231	734	469	810	1367	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.98	0.93			0.99	
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	3579	3462	0
Flt Permitted	0.950		0.076			
Satd. Flow (perm)	1752	1493	143	3579	3462	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		345			21	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	798	510	880	1486	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	798	510	880	1760	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	40.0	40.0	26.0	80.0	54.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	34.0	34.0	76.0	74.3	48.3	
Actuated g/C Ratio	0.28	0.28	0.63	0.62	0.40	
v/c Ratio	0.50	1.19	1.30	0.40	1.25	
Control Delay	39.9	123.2	184.7	12.2	151.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.9	123.2	184.7	12.2	151.5	
LOS	D	F	F	B	F	
Approach Delay	103.2			75.5	151.5	
Approach LOS	F			E	F	
Stops (vph)	189	370	308	387	1303	
Fuel Used(l)	18	98	79	26	281	
CO Emissions (g/hr)	328	1821	1471	481	5228	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	63	352	284	93	1009	
VOC Emissions (g/hr)	76	420	339	111	1206	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	49.3	~165.2	~138.5	51.5	~272.4	
Queue Length 95th (m)	74.8	#240.0	#204.2	64.0	#315.4	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			30.0			
Base Capacity (vph)	506	670	392	2215	1406	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.50	1.19	1.30	0.40	1.25	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.30
Intersection Signal Delay: 114.3 Intersection LOS: F
Intersection Capacity Utilization 104.2% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	56	82	1595	773	95
Future Vol, veh/h	51	56	82	1595	773	95
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	61	89	1734	840	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1948	488	954	0	-	0
Stage 1	903	-	-	-	-	-
Stage 2	1045	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	57	526	716	-	-	-
Stage 1	356	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 49	518	709	-	-	-
Mov Cap-2 Maneuver	~ 49	-	-	-	-	-
Stage 1	308	-	-	-	-	-
Stage 2	297	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	151.5	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	709	-	49	518	-	-
HCM Lane V/C Ratio	0.126	-	1.131	0.118	-	-
HCM Control Delay (s)	10.8	-	$ 303.7	12.9	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	5	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	183.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	108	86	1222	1920	244
Future Vol, veh/h	68	108	86	1222	1920	244
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	74	117	93	1328	2087	265

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3135	1273	2417	0	-	0
Stage 1	2285	-	-	-	-	-
Stage 2	850	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 9	158	194	-	-	-
Stage 1	~ 63	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 4	144	182	-	-	-
Mov Cap-2 Maneuver	~ 4	-	-	-	-	-
Stage 1	~ 29	-	-	-	-	-
Stage 2	356	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay,	$ 3776.9	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	182	-	4	144	-	-
HCM Lane V/C Ratio	0.514	-	18.478	0.815	-	-
HCM Control Delay (s)	44		$ 9628.1	92.8	-	-
HCM Lane LOS	E	-	F	F	-	-
HCM 95th %tile Q(veh)	2.6	-	11.2	5.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	98.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	337	1235	18	143	605
Future Vol, veh/h	44	337	1235	18	143	605
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	300	-
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	48	366	1342	20	155	658

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1991	681	0	0	1362	0
Stage 1	1352	-	-	-	-	-
Stage 2	639	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	53	393	-	-	501	-
Stage 1	206	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 37	393	-	-	501	-
Mov Cap-2 Maneuver	~ 37	-	-	-	-	-
Stage 1	142	-	-	-	-	-
Stage 2	488	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	$ 609.4		0		2.9	
HCM LOS	F					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	186	501	-
HCM Lane V/C Ratio	-	-	2.227	0.31	-
HCM Control Delay (s)	-	-	$ 609.4	15.4	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	33.2	1.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	601.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	266	912	56	463	1489
Future Vol, veh/h	38	266	912	56	463	1489
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	300	-
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	41	289	991	61	503	1618

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2837	526	0	0	1052	0
Stage 1	1022	-	-	-	-	-
Stage 2	1815	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 14	496	-	-	657	-
Stage 1	308	-	-	-	-	-
Stage 2	115	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 3	496	-	-	657	-
Mov Cap-2 Maneuver	~ 3	-	-	-	-	-
Stage 1	72	-	-	-	-	-
Stage 2	115	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 6340.3	0	6.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	23	657	-
HCM Lane V/C Ratio	-	-	14.367	0.766	-
HCM Control Delay (s)	-	-	$ 6340.3	26.1	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	41.4	7.2	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Appendix C

Traffic Signal Warrants

2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	**Herring Cove Road**	**Direction (EW or NS)**	**NS**	**Date:** **2018**
Side Street (name)	**Purcells Cove Road**	**Direction (EW or NS)**	**EW**	**City:** **Halifax, NS**
Quadrant (if appl)				

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1				1	
Herring Cove Road	SB			1				1	
Purcells Cove Road	WB					1			
Purcells Cove Road	EB								

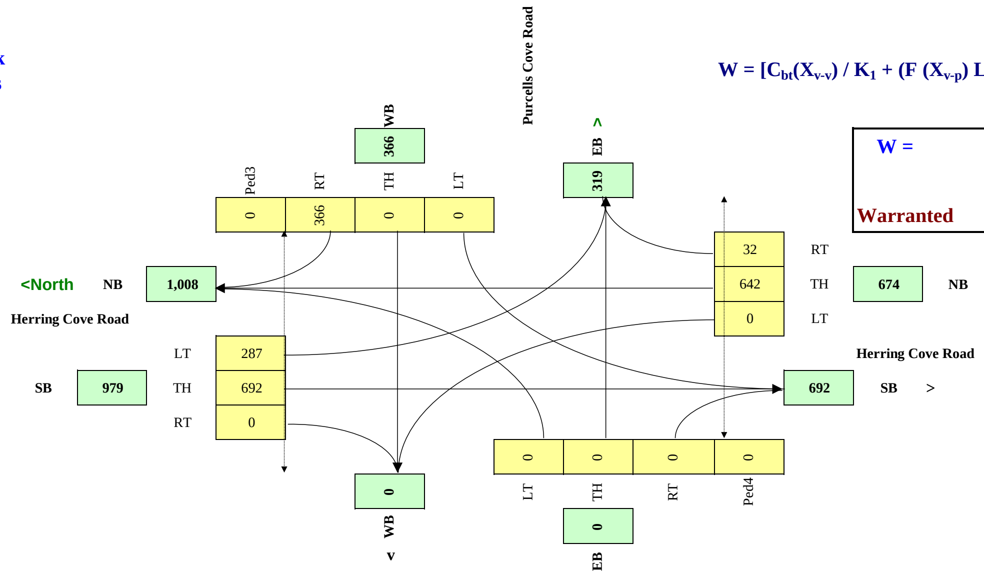
Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Purcells Cove Road	EW		2.0%	n	

Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1 NS**	**Ped2 NS**	**Ped3 EW**	**Ped4 EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S side**
7:00 - 8:00	0	824	5	120	252	0	0	0	586	0	0	0	0	0	0	0
8:00 - 9:00	0	711	19	150	325	0	0	0	581	0	0	0	0	0	0	0
11:00 - 12:00	0	596	36	251	606	0	0	0	288	0	0	0	0	0	0	0
12:00 - 13:00	0	638	39	266	620	0	0	0	281	0	0	0	0	0	0	0
16:00 - 17:00	0	525	41	421	1174	0	0	0	215	0	0	0	0	0	0	0
17:00 - 18:00	0	556	51	512	1176	0	0	0	245	0	0	0	0	0	0	0
Total (6-hour peak)	**0**	**3,850**	**191**	**1,720**	**4,153**	**0**	**0**	**0**	**2,196**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**642**	**32**	**287**	**692**	**0**	**0**	**0**	**366**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\ (X_{v\text{-}p})\ L) / K_2] \times C_i$$



W =	**244**	**244**	**0**
		Veh	***Ped***

Warranted

2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	**Herring Cove Road**	**Direction (EW or NS)**	**NS**	**Date:**	**2018**
Side Street (name)	**Osborne Street**	**Direction (EW or NS)**	**EW**	**City:**	**Halifax, NS**
Quadrant (if appl)					

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1				1	
Herring Cove Road	SB			1				1	
Osborne Street	WB								
Osborne Street	EB			1					

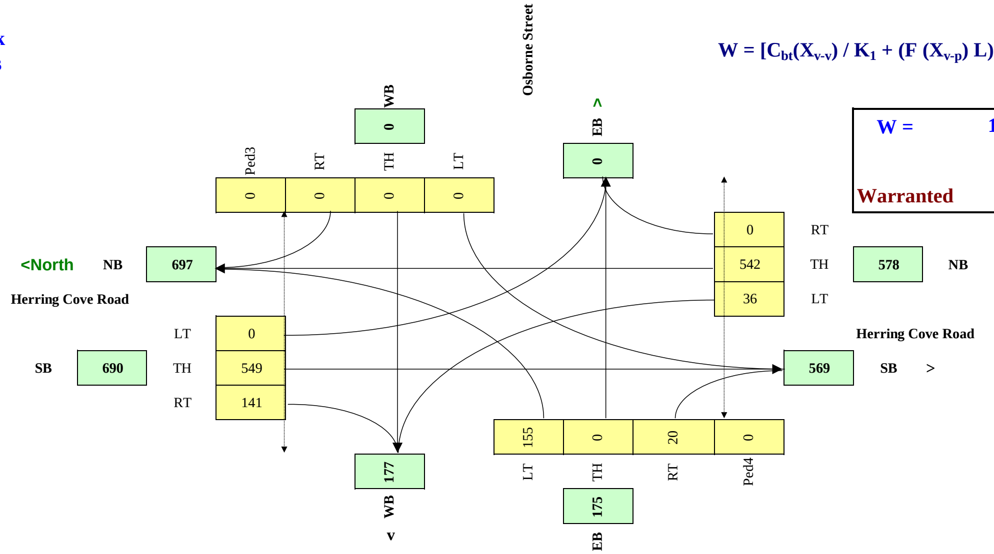
Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Osborne Street	EW		2.0%	n	

Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1 NS**	**Ped2 NS**	**Ped3 EW**	**Ped4 EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S side**
7:00 - 8:00	6	691	0	0	236	41	0	0	0	233	0	11	0	0	0	0
8:00 - 9:00	121	594	0	0	316	55	0	0	0	242	0	9	0	0	0	0
11:00 - 12:00	22	515	0	0	545	127	0	0	0	130	0	26	0	0	0	0
12:00 - 13:00	13	481	0	0	555	112	0	0	0	139	0	24	0	0	0	0
16:00 - 17:00	30	495	0	0	807	270	0	0	0	83	0	23	0	0	0	0
17:00 - 18:00	26	473	0	0	834	240	0	0	0	104	0	28	0	0	0	0
Total (6-hour peak)	**218**	**3,249**	**0**	**0**	**3,293**	**845**	**0**	**0**	**0**	**931**	**0**	**121**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**36**	**542**	**0**	**0**	**549**	**141**	**0**	**0**	**0**	**155**	**0**	**20**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W =	**123**	**123**	**0**
		Veh	***Ped***
Warranted			

2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Herring Cove Road	Direction (EW or NS)	NS	Date: 2018
Side Street (name)	Glenora Avenue	Direction (EW or NS)	EW	City: Halifax, NS
Quadrant (if appl)				

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1				1	
Herring Cove Road	SB			1				1	
Glenora Avenue	WB			1					
Glenora Avenue	EB			1					

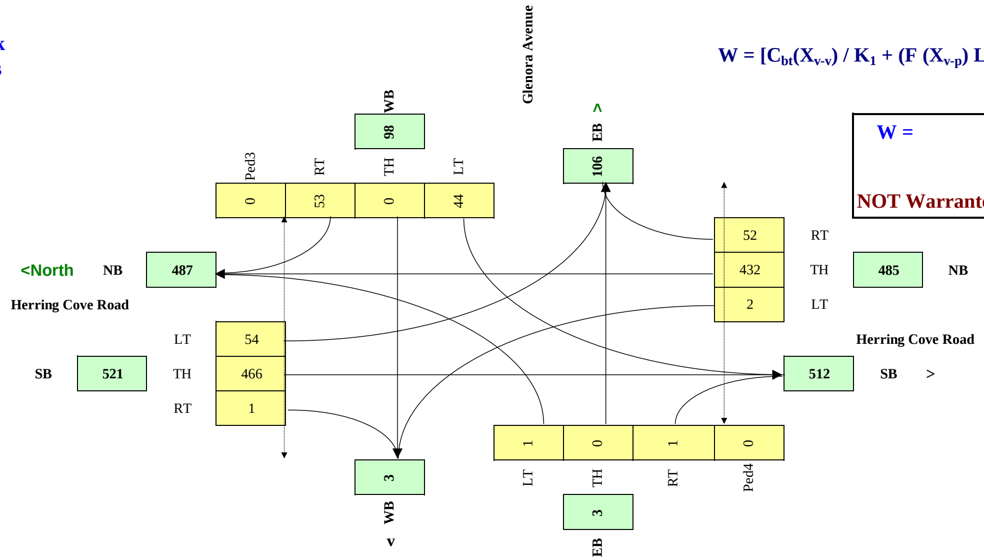
Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Glenora Avenue	EW		2.0%	n	

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S side
7:00 - 8:00	0	517	64	34	201	0	49	0	61	0	0	0	0	0	0	0
8:00 - 9:00	5	419	66	47	301	0	68	0	59	0	0	0	0	0	0	0
11:00 - 12:00	0	433	39	39	380	0	32	2	45	3	0	3	0	0	0	0
12:00 - 13:00	2	445	36	33	470	4	38	0	36	3	0	2	0	0	0	0
16:00 - 17:00	0	404	49	78	785	2	46	0	58	2	0	0	0	0	0	0
17:00 - 18:00	2	373	56	92	661	0	33	0	61	0	0	3	0	0	0	0
Total (6-hour peak)	**9**	**2,591**	**310**	**323**	**2,798**	**6**	**266**	**2**	**320**	**8**	**0**	**8**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**2**	**432**	**52**	**54**	**466**	**1**	**44**	**0**	**53**	**1**	**0**	**1**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W =	48	48	0
		Veh	*Ped*

NOT Warranted

2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	**Herring Cove Road**	**Direction (EW or NS)**	**NS**	**Date:** **2018**
Side Street (name)	**Sussex Street**	**Direction (EW or NS)**	**EW**	**City:** **Halifax, NS**
Quadrant (if appl)				

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB	1		2				2	
Herring Cove Road	SB			2				2	
Sussex Street	WB								
Sussex Street	EB	1				1			

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Sussex Street	EW		2.0%	n	

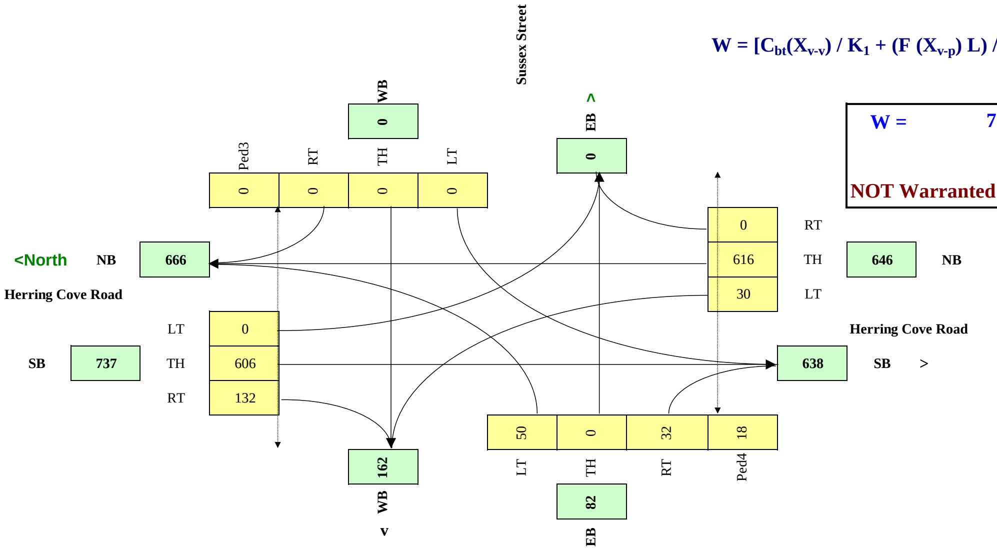
Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1 NS**	**Ped2 NS**	**Ped3 EW**	**Ped4 EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S side**
7:00 - 8:00	12	654	0	0	313	44	0	0	0	48	0	13	5	0	0	4
8:00 - 9:00	30	726	0	0	481	89	0	0	0	35	0	37	12	0	0	5
11:00 - 12:00	21	524	0	0	482	114	0	0	0	57	0	22	19	0	2	10
12:00 - 13:00	25	540	0	0	549	136	0	0	0	44	0	30	31	0	0	31
16:00 - 17:00	46	618	0	0	941	229	0	0	0	60	0	47	50	0	0	15
17:00 - 18:00	47	633	0	0	868	177	0	0	0	58	0	42	61	0	0	45
Total (6-hour peak)	**181**	**3,695**	**0**	**0**	**3,634**	**789**	**0**	**0**	**0**	**302**	**0**	**191**	**178**	**0**	**2**	**110**
Average (6-hour peak)	**30**	**616**	**0**	**0**	**606**	**132**	**0**	**0**	**0**	**50**	**0**	**32**	**30**	**0**	**0**	**18**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$$

W =	**76**	**44**	**32**
		Veh	***Ped***

NOT Warranted



2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Herring Cove Road	Direction (EW or NS)	NS	Date:	2018
Side Street (name)	Drysdale Road	Direction (EW or NS)	EW	City:	Halifax, NS
Quadrant (if appl)					

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1	1			2	
Herring Cove Road	SB	1		2				2	
Drysdale Road	WB			1					
Drysdale Road	EB								

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

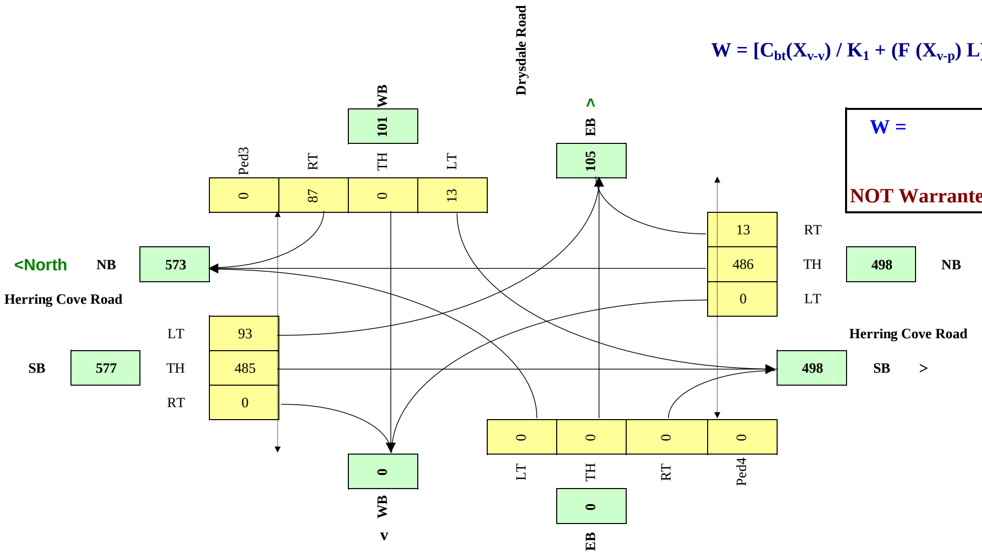
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Drysdale Road	EW		2.0%	n	

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S side
7:00 - 8:00	0	622	3	47	239	0	5	0	95	0	0	0	0	0	0	0
8:00 - 9:00	0	557	10	60	376	0	18	0	93	0	0	0	0	0	0	0
11:00 - 12:00	0	411	8	59	416	0	9	0	77	0	0	0	0	0	0	0
12:00 - 13:00	0	381	11	69	416	0	7	0	63	0	0	0	0	0	0	0
16:00 - 17:00	0	478	17	129	732	0	19	0	92	0	0	0	0	0	0	0
17:00 - 18:00	0	464	26	191	729	0	21	0	104	0	0	0	0	0	0	0
Total (6-hour peak)	**0**	**2,913**	**75**	**555**	**2,908**	**0**	**79**	**0**	**524**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**486**	**13**	**93**	**485**	**0**	**13**	**0**	**87**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\ (X_{v\text{-}p})\ L) / K_2] \times C_i$$

W =	35	35	0
		Veh	*Ped*
NOT Warranted			



2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	**Herring Cove Road**	**Direction (EW or NS)**	**NS**	**Date:** **2033**
Side Street (name)	**Glenora Avenue**	**Direction (EW or NS)**	**EW**	**City:** **Halifax, NS**
Quadrant (if appl)				

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1				1	
Herring Cove Road	SB			1				1	
Glenora Avenue	WB			1					
Glenora Avenue	EB			1					

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Glenora Avenue	EW		2.0%	n	

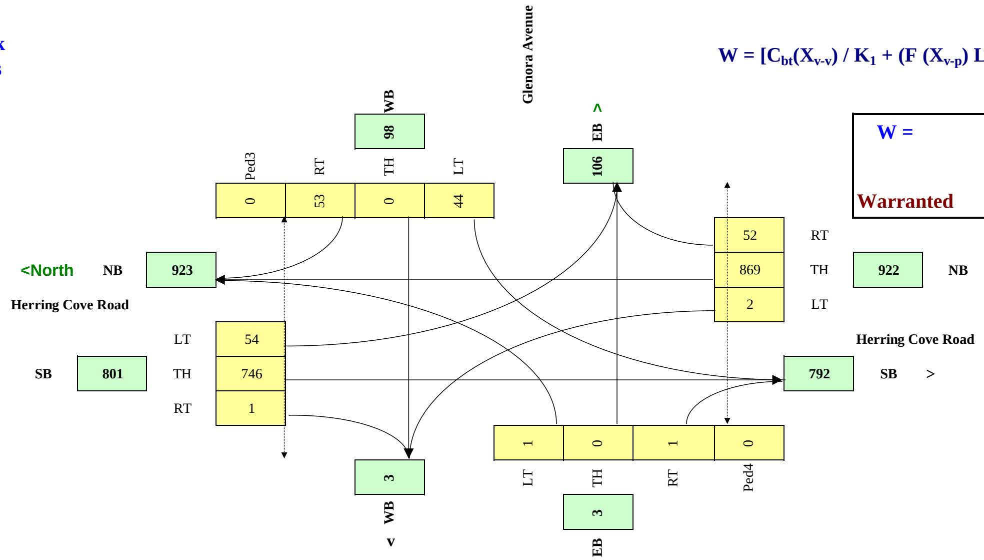
Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1 NS**	**Ped2 NS**	**Ped3 EW**	**Ped4 EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S side**
7:00 - 8:00	0	1093	64	34	307	0	49	0	61	0	0	0	0	0	0	0
8:00 - 9:00	5	886	66	47	459	0	68	0	59	0	0	0	0	0	0	0
11:00 - 12:00	0	916	39	39	579	0	32	2	45	3	0	3	0	0	0	0
12:00 - 13:00	2	941	36	33	717	4	38	0	36	3	0	2	0	0	0	0
16:00 - 17:00	0	716	49	78	1311	2	46	0	58	2	0	0	0	0	0	0
17:00 - 18:00	2	661	56	92	1104	0	33	0	61	0	0	3	0	0	0	0
Total (6-hour peak)	**9**	**5,213**	**310**	**323**	**4,477**	**6**	**266**	**2**	**320**	**8**	**0**	**8**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**2**	**869**	**52**	**54**	**746**	**1**	**44**	**0**	**53**	**1**	**0**	**1**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\ (X_{v\text{-}p})\ L) / K_2] \times C_i$$

W =	**100**	**100**	**0**
		Veh	***Ped***

Warranted



2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	**Herring Cove Road**	**Direction (EW or NS)**	**NS**	**Date:**	**2033**
Side Street (name)	**Sussex Street**	**Direction (EW or NS)**	**EW**	**City:**	**Halifax, NS**
Quadrant (if appl)					

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB	1		2				2	
Herring Cove Road	SB			2				2	
Sussex Street	WB								
Sussex Street	EB	1				1			

Demographics		
Elementary School	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

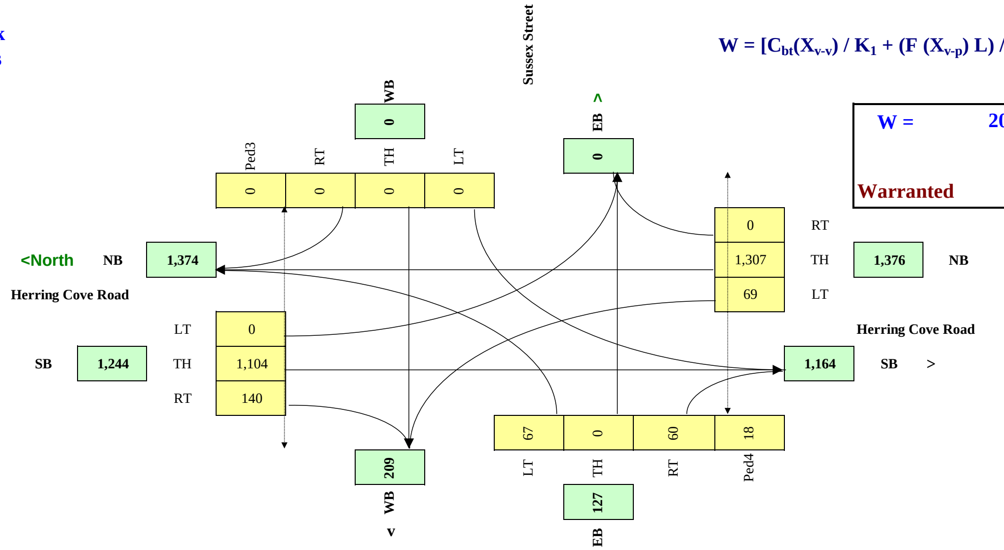
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Sussex Street	EW		2.0%	n	

Traffic Input	**NB**			**SB**			**WB**			**EB**			**Ped1** **NS**	**Ped2** **NS**	**Ped3** **EW**	**Ped4** **EW**
	LT	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**LT**	**Th**	**RT**	**W Side**	**E Side**	**N Side**	**S side**
7:00 - 8:00	33	1437	0	0	503	47	0	0	0	70	0	20	5	0	0	4
8:00 - 9:00	82	1595	0	0	773	95	0	0	0	51	0	56	12	0	0	5
11:00 - 12:00	57	1151	0	0	775	122	0	0	0	83	0	33	19	0	2	10
12:00 - 13:00	68	1186	0	0	882	145	0	0	0	64	0	45	31	0	0	31
16:00 - 17:00	86	1222	0	0	1920	244	0	0	0	68	0	108	50	0	0	15
17:00 - 18:00	88	1252	0	0	1771	189	0	0	0	66	0	97	61	0	0	45
Total (6-hour peak)	**414**	**7,843**	**0**	**0**	**6,624**	**841**	**0**	**0**	**0**	**402**	**0**	**359**	**178**	**0**	**2**	**110**
Average (6-hour peak)	**69**	**1,307**	**0**	**0**	**1,104**	**140**	**0**	**0**	**0**	**67**	**0**	**60**	**30**	**0**	**0**	**18**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F\,(X_{v-p})\,L) / K_2] \times C_i$$

W =	**203**	**141**	**62**
		Veh	***Ped***
Warranted			



2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Herring Cove Road	Direction (EW or NS)	NS	Date:	2033
Side Street (name)	Drysdale Road	Direction (EW or NS)	EW	City:	Halifax, NS
Quadrant (if appl)					

Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Herring Cove Road	NB			1	1			2	
Herring Cove Road	SB	1		2				2	
Drysdale Road	WB			1					
Drysdale Road	EB								

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	410816
Central Business District	(y/n)	n

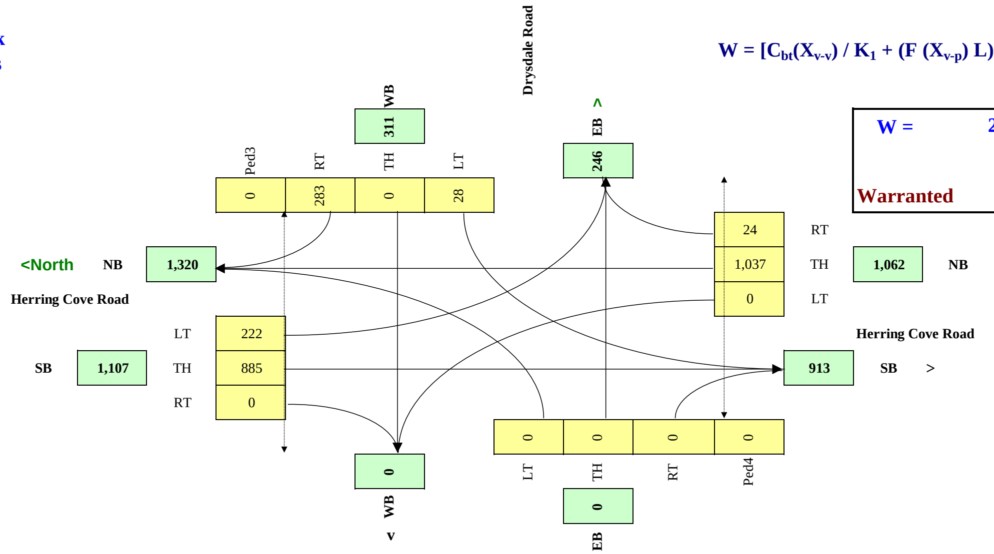
Other input		Speed (Km/h)	Trucks %	Bus Rt (y/n)	Median (m)
Herring Cove Road	NS	50	2.0%	y	0.0
Drysdale Road	EW		2.0%	n	

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S side
7:00 - 8:00	0	1378	5	110	385	0	11	0	346	0	0	0	0	0	0	0
8:00 - 9:00	0	1235	18	143	605	0	44	0	337	0	0	0	0	0	0	0
11:00 - 12:00	0	912	14	139	667	0	22	0	283	0	0	0	0	0	0	0
12:00 - 13:00	0	846	20	163	667	0	18	0	230	0	0	0	0	0	0	0
16:00 - 17:00	0	939	35	313	1496	0	35	0	233	0	0	0	0	0	0	0
17:00 - 18:00	0	912	56	463	1489	0	38	0	266	0	0	0	0	0	0	0
Total (6-hour peak)	**0**	**6,222**	**147**	**1,331**	**5,310**	**0**	**167**	**0**	**1,696**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**1,037**	**24**	**222**	**885**	**0**	**28**	**0**	**283**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$$

W =	247	247	0
		Veh	*Ped*
Warranted			



Appendix D

MMLOS Analysis

Segment MMLOS Analysis - Existing Conditions (2018)									
Segment		1. Armdale Roundabout to Purcells Cove Road		2. Purcells Cove Road to Cowie Hill Road		3. Cowie Hill Road to Highfield Street		4. Highfield Street to Old Sambro Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	1.8m	1.5m	No sidewalk	1.5m	1.8m	1.5m	1.5m	1.8m
	Boulevard Width	0m	0m	0m	0m	0.5 - 2.0m	0m	0m	0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Direction PLOS	F	F	F	F	E	F	F	F
	Segment PLOS	**F**		**F**		**F**		**F**	
Cyclist	Travel Lanes	3		2		2		3	
	Type of Bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	D	D	D	D	D	D	D	D
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	D	D	D	D	D	D	D	D
	Segment BLOS	**D**		**D**		**D**		**D**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	Low	Low	Medium	Medium	High	High	High	High
	Direction TLOS	D	D	E	E	F	F	F	F
	Segment TLOS	**D**		**E**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.5m	≤ 3.5m	> 3.7m	> 3.7m	> 3.7m	> 3.7m	≤ 3.5m	≤ 3.2m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≥ 3 lanes	≥ 3 lanes
	Direction TkLOS	A	A	B	B	B	B	A	D
	Segment TkLOS	**A**		**B**		**B**		**D**	

Segment MMLOS Analysis - Existing Conditions (2018)									
Segment		5. Old Sambro Road to Sussex Street		6. Sussex Street to Greystone Drive		7. Greystone Drive to Lynnett Road		8. Past the Lynnett Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	1.5m	1.5m	1.5m	1.5m	1.5m	No sidewalk	No sidewalk	No sidewalk
	Boulevard Width	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0m	0m	0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Direction PLOS	E	E	E	E	E	F	F	F
	Segment PLOS	**E**		**E**		**F**		**F**	
Cyclist	Travel Lanes	4		4		3		2	
	Type of Bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	E	E	E	E	D	D	F	F
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	E	E	E	E	D	D	F	F
	Segment BLOS	**E**		**E**		**D**		**F**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	High	High	High	High	High	High	High	High
	Direction TLOS	F	F	F	F	F	F	F	F
	Segment TLOS	**F**		**F**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.3m	≤ 3.3m	≤ 3.3m	≤ 3.3m	> 3.7m	> 3.7m	≤ 3.3m	≤ 3.3m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	C	C	C	C	A	A	D	D
	Segment TkLOS	**C**		**C**		**A**		**D**	

Signalized Intersection MMLOS Analysis - Existing Conditions (2018)							
Intersection		Herring Cove Road & Cowie Hill Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Cowie Hill Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	88	3	105
	Median (>2.4 m)	No		No		No	
	Island Refuge	Yes	0	No	-4	Yes	0
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 15m to 25m	-8	No right turn	0	> 5m to 10m	-5
	Channelization	Right turn channel	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	72		67		75	
	PETSI PLOS	C		C		B	
	Cycle Length			92.1			
	Pedestrian Green Time (Walk Time)	19		19		19	
	Average Pedestrian Crossing Delay (s)	29		29		29	
	Delay PLOS	C		C		C	
	Approach PLOS	C		C		C	
	Overall Intersection PLOS			**C**			
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	> 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	25 to 50m		N/A		N/A	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	No		N/A		Yes	
	Right-Turns BLOS	E		-		-	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		D		B	
	Approach BLOS	E		D		B	
	Overall Intersection BLOS			**E**			
Transit	AM Average Signal Delay	≤ 10 sec		≤ 10 sec		≤ 20 sec	
	AM Approach TLOS	B		B		C	
	PM Average Signal Delay	≤ 20 sec		≤ 10 sec		≤ 30 sec	
	PM Approach TLOS	C		B		D	
	Overall Intersection TLOS			**D**			
Truck	Effective Corner Radius	> 15m		N/A		10 - 15m	
	Number of Receiving Lanes	1 lane		N/A		1 lane	
	Approach TkLOS	C		-		E	
	Overall Intersection TkLOS			**E**			
Auto	AM Approach LOS	A		A		B	
	AM Intersection LOS			A			
	PM Approach LOS	B		A		C	
	PM Intersection LOS			B			
	Overall Intersection LOS			**B**			

Signalized Intersection MMLOS Analysis - Existing Conditions (2018)							
Intersection		Herring Cove Road & Old Sambro Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Old Sambro Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	90	3	105
	Median (>2.4 m)	Yes		Yes		No	
	Island Refuge	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 5m to 10m	-5
	Channelization	None	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	70		69		71	
	PETSI PLOS	C		C		C	
	Cycle Length	106.2					
	Pedestrian Green Time (Walk Time)	24		24		22	
	Average Pedestrian Crossing Delay (s)	32		32		33	
	Delay PLOS	D		D		D	
	Approach PLOS	D		D		D	
	Overall Intersection PLOS	**D**					
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		25 to 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		D	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		D		D	
	Approach BLOS			D		D	
	Overall Intersection BLOS	**D**					
Transit	AM Average Signal Delay	≤ 20 sec		< 10 sec		N/A	
	AM Approach TLOS	C		B		-	
	PM Average Signal Delay	≤ 20 sec		≤ 10 sec		N/A	
	PM Approach TLOS	C		B		-	
	Overall Intersection TLOS	**C**					
Truck	Effective Corner Radius	10 - 15m		N/A		< 10m	
	Number of Receiving Lanes	1 lane		N/A		≥ 2 lanes	
	Approach TkLOS	E		-		D	
	Overall Intersection TkLOS	**E**					
Auto	AM Approach LOS	B		A		B	
	AM Intersection LOS	B					
	PM Approach LOS	B		A		B	
	PM Intersection LOS	B					
	Overall Intersection LOS	B					

Signalized Intersection MMLOS Analysis - Existing Conditions (2018)									
Intersection		Herring Cove Road & Willams Lake Road							
Approach		North (SB)		South (NB)		East (WB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Williams Lake Road	Points	Bradford Street	Points
Pedestrian	Travel Lanes Crossed	6	55	6	55	2	120	3	105
	Median (>2.4 m)	No		No		No		No	
	Island Refuge	No	-4	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
	Corner Radius	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5
	Channelization	None	0	None	0	None	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	21		21		86		71	
	PETSI PLOS	F		F		B		C	
	Cycle Length	106.1							
	Pedestrian Green Time (Walk Time)	28		28		20		20	
	Average Pedestrian Crossing Delay (s)	29		29		35		35	
	Delay PLOS	C		C		D		D	
	Approach PLOS	F		F		D		D	
	Overall Intersection PLOS	F							
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		N/A		N/A	
	Dual Right Turn	No		No		No		No	
	Shared Through-Right	Yes		Yes		Yes		Yes	
	Right-Turns BLOS	-		-		-		-	
	Bike Box	No		No		No		No	
	Number of Lanes Crossed for Left Turns	≥ 2 lanes		≥ 2 lanes		No lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h		50 km/h	
	Dual Left Turn	No		No		No		No	
	Left-Turns BLOS	F		F		B		D	
	Approach BLOS	F		F		B		D	
	Overall Intersection BLOS	F							
Transit	AM Average Signal Delay	≤ 20 sec		< 10 sec		N/A		N/A	
	AM Approach TLOS	C		B		-		-	
	PM Average Signal Delay	≤ 20 sec		≤ 10 sec		N/A		N/A	
	PM Approach TLOS	C		B		-		-	
	Overall Intersection TLOS	C							
Truck	Effective Corner Radius	< 10m		< 10m		10 - 15m		10 - 15m	
	Number of Receiving Lanes	1 lane		1 lane		≥ 2 lanes		≥ 2 lanes	
	Approach TkLOS	F		F		B		B	
	Overall Intersection TkLOS	F							
Auto	AM Approach LOS	B		A		B		A	
	AM Intersection LOS	B							
	PM Approach LOS	B		A		C		B	
	PM Intersection LOS	B							
	Overall Intersection LOS	B							

Signalized Intersection MMLOS Analysis - Existing Conditions (2018)							
Intersection		Herring Cove Road & Dentith Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Dentith Road	Points
Pedestrian	Travel Lanes Crossed	5	75	6	55	4	88
	Median (>2.4 m)	Yes		No		No	
	Island Refuge	Yes	0	Yes	0	Yes	0
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 15m to 25m	-8
	Channelization	Right turn channel with receiving lane	-3	None	0	Right turn channel	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	41		38		55	
	PETSI PLOS	E		E		D	
	Cycle Length			105.7			
	Pedestrian Green Time (Walk Time)	21		21		13	
	Average Pedestrian Crossing Delay (s)	34		34		41	
	Delay PLOS	D		D		E	
	Approach PLOS	E		E		E	
	Overall Intersection PLOS			**E**			
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	> 25 km/h		N/A		> 25 km/h	
	Right Turn Storage Length	N/A		N/A		> 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		F	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		≥ 2 lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		F		D	
	Approach BLOS			F		F	
	Overall Intersection BLOS			**F**			
Transit	AM Average Signal Delay	≤ 20 sec		< 10 sec		≤ 30 sec	
	AM Approach TLOS	C		B		D	
	PM Average Signal Delay	≤ 20 sec		≤ 20 sec		≤ 30 sec	
	PM Approach TLOS	C		C		D	
	Overall Intersection TLOS			**D**			
Truck	Effective Corner Radius	10 - 15m		N/A		> 15m	
	Number of Receiving Lanes	≥ 2 lanes		N/A		≥ 2 lanes	
	Approach TkLOS	B		-		A	
	Overall Intersection TkLOS			**B**			
Auto	AM Approach LOS	B		A		C	
	AM Intersection LOS			B			
	PM Approach LOS	B		B		C	
	PM Intersection LOS			C			
	Overall Intersection LOS			**C**			

Segment MMLOS Analysis - Future Conditions - Status Quo (2033)

Segment		1. Armdale Roundabout to Purcells Cove Road		2. Purcells Cove Road to Cowie Hill Road		3. Cowie Hill Road to Highfield Street		4. Highfield Street to Old Sambro Road	
		Northbound	**Southbound**	**Northbound**	**Southbound**	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Pedestrian	Sidewalk Width	1.8m	1.5m	No sidewalk	1.5m	1.8m	1.5m	1.5m	1.8m
	Boulevard Width	0m	0m	0m	0m	0.5 - 2.0m	0m	0m	0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Direction PLOS	F	F	F	F	E	F	F	F
	Segment PLOS	**F**		**F**		**F**		**F**	
Cyclist	Travel Lanes	3		2		2		3	
	Type of Bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	D	D	D	D	D	D	D	D
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	D	D	D	D	D	D	D	D
	Segment BLOS	**D**		**D**		**D**		**D**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	Low	Low	Medium	Medium	High	High	High	High
	Direction TLOS	D	D	E	E	F	F	F	F
	Segment TLOS	**D**		**E**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.5m	≤ 3.5m	> 3.7m	> 3.7m	> 3.7m	> 3.7m	≤ 3.5m	≤ 3.2m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≥ 3 lanes	≥ 3 lanes
	Direction TkLOS	A	A	B	B	B	B	A	D
	Segment TkLOS	**A**		**B**		**B**		**D**	

Segment MMLOS Analysis - Future Conditions - Status Quo (2033)									
Segment		5. Old Sambro Road to Sussex Street		6. Sussex Street to Greystone Drive		7. Greystone Drive to Lynnett Road		8. Past the Lynnett Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	1.5m	1.5m	1.5m	1.5m	1.5m	No sidewalk	No sidewalk	No sidewalk
	Boulevard Width	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0.5 - 2.0m	0m	0m	0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Direction PLOS	E	E	E	E	E	F	F	F
	Segment PLOS	**E**		**E**		**F**		**F**	
Cyclist	Travel Lanes	4		4		3		2	
	Type of Bikeway	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	E	E	E	E	D	D	F	F
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	E	E	E	E	D	D	F	F
	Segment BLOS	**E**		**E**		**D**		**F**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	High	High	High	High	High	High	High	High
	Direction TLOS	F	F	F	F	F	F	F	F
	Segment TLOS	**F**		**F**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.3m	≤ 3.3m	≤ 3.3m	≤ 3.3m	> 3.7m	> 3.7m	≤ 3.3m	≤ 3.3m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	C	C	C	C	A	A	D	D
	Segment TkLOS	**C**		**C**		**A**		**D**	

Signalized Intersection MMLOS Analysis - Future Conditions - Status Quo (2033)							
Intersection		Herring Cove Road & Cowie Hill Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Cowie Hill Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	88	3	105
	Median (>2.4 m)	No		No		No	
	Island Refuge	Yes	0	No	-4	Yes	0
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 15m to 25m	-8	No right turn	0	> 5m to 10m	-5
	Channelization	Right turn channel	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	72		67		75	
	PETSI PLOS	C		C		B	
	Cycle Length			100			
	Pedestrian Green Time (Walk Time)	19		19		19	
	Average Pedestrian Crossing Delay (s)	33		33		33	
	Delay PLOS	D		D		D	
	Approach PLOS	D		D		D	
	Overall Intersection PLOS			**D**			
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	> 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	25 to 50m		N/A		N/A	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	No		N/A		Yes	
	Right-Turns BLOS	E		-		-	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		D		B	
	Approach BLOS	E		D		B	
	Overall Intersection BLOS			**E**			
Transit	AM Average Signal Delay	≤ 10 sec		≤ 20 sec		≤ 30 sec	
	AM Approach TLOS	B		C		D	
	PM Average Signal Delay	> 40 sec		≤ 30 sec		> 40 sec	
	PM Approach TLOS	F		D		F	
	Overall Intersection TLOS			**F**			
Truck	Effective Corner Radius	> 15m		N/A		10 - 15m	
	Number of Receiving Lanes	1 lane		N/A		1 lane	
	Approach TkLOS	C		-		E	
	Overall Intersection TkLOS			**E**			
Auto	AM Approach LOS	A		B		C	
	AM Intersection LOS			B			
	PM Approach LOS	D		C		D	
	PM Intersection LOS			D			
	Overall Intersection LOS			**D**			

Signalized Intersection MMLOS Analysis - Future Conditions - Status Quo (2033)							
Intersection		Herring Cove Road & Old Sambro Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Old Sambro Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	90	3	105
	Median (>2.4 m)	Yes		Yes		No	
	Island Refuge	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 5m to 10m	-5
	Channelization	None	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	70		69		71	
	PETSI PLOS	C		C		C	
	Cycle Length			90			
	Pedestrian Green Time (Walk Time)	24		24		22	
	Average Pedestrian Crossing Delay (s)	24		24		26	
	Delay PLOS	C		C		C	
	Approach PLOS	C		C		C	
	Overall Intersection PLOS			**C**			
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		25 to 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		D	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		D		D	
	Approach BLOS	-		D		D	
	Overall Intersection BLOS			**D**			
Transit	AM Average Signal Delay	≤ 20 sec		≤ 20 sec		N/A	
	AM Approach TLOS	C		C		-	
	PM Average Signal Delay	≤ 30 sec		≤ 30 sec		N/A	
	PM Approach TLOS	D		D		-	
	Overall Intersection TLOS			**D**			
Truck	Effective Corner Radius	10 - 15m		N/A		< 10m	
	Number of Receiving Lanes	1 lane		N/A		≥ 2 lanes	
	Approach TkLOS	E		-		D	
	Overall Intersection TkLOS			**E**			
Auto	AM Approach LOS	B		B		B	
	AM Intersection LOS			B			
	PM Approach LOS	C		C		C	
	PM Intersection LOS			C			
	Overall Intersection LOS			**C**			

Signalized Intersection MMLOS Analysis - Future Conditions - Status Quo (2033)									
Intersection		Herring Cove Road & Willams Lake Road							
Approach		North (SB)		South (NB)		East (WB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Williams Lake Road	Points	Bradford Street	Points
Pedestrian	Travel Lanes Crossed	6	55	6	55	2	120	3	105
	Median (>2.4 m)	No		No		No		No	
	Island Refuge	No	-4	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
	Corner Radius	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5
	Channelization	None	0	None	0	None	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	21		21		86		71	
	PETSI PLOS	F		F		B		C	
	Cycle Length	90							
	Pedestrian Green Time (Walk Time)	28		28		20		20	
	Average Pedestrian Crossing Delay (s)	21		21		27		27	
	Delay PLOS	C		C		C		C	
	Approach PLOS	F		F		C		C	
	Overall Intersection PLOS	F							
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		N/A		N/A	
	Dual Right Turn	No		No		No		No	
	Shared Through-Right	Yes		Yes		Yes		Yes	
	Right-Turns BLOS	-		-		-		-	
	Bike Box	No		No		No		No	
	Number of Lanes Crossed for Left Turns	≥ 2 lanes		≥ 2 lanes		No lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h		50 km/h	
	Dual Left Turn	No		No		No		No	
	Left-Turns BLOS	F		F		B		D	
	Approach BLOS	F		F		B		D	
	Overall Intersection BLOS	F							
Transit	AM Average Signal Delay	≤ 20 sec		≤ 20 sec		≤ 30 sec		N/A	
	AM Approach TLOS	C		C		D		-	
	PM Average Signal Delay	≤ 30 sec		≤ 20 sec		> 40 sec		N/A	
	PM Approach TLOS	D		C		F		-	
	Overall Intersection TLOS	F							
Truck	Effective Corner Radius	< 10m		< 10m		10 - 15m		10 - 15m	
	Number of Receiving Lanes	1 lane		1 lane		≥ 2 lanes		≥ 2 lanes	
	Approach TkLOS	F		F		B		B	
	Overall Intersection TkLOS	F							
Auto	AM Approach LOS	B		A		C		A	
	AM Intersection LOS	B							
	PM Approach LOS	C		B		D		B	
	PM Intersection LOS	C							
	Overall Intersection LOS	C							

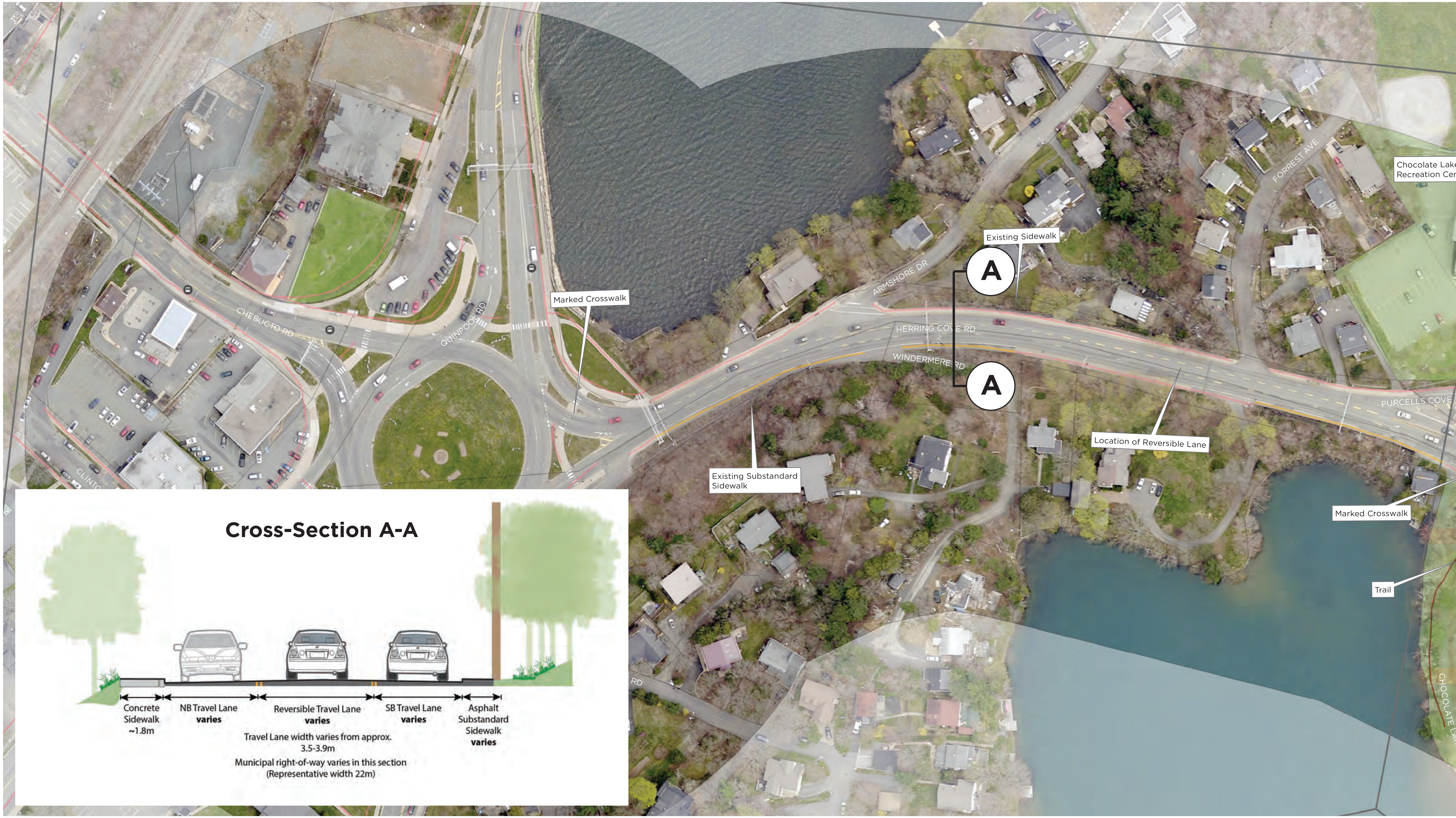
Signalized Intersection MMLOS Analysis - Future Conditions - Status Quo (2033)							
Intersection		**Herring Cove Road & Dentith Road**					
Approach		**North (SB)**		**South (NB)**		**West (EB)**	
		Herring Cove Road	**Points**	**Herring Cove Road**	**Points**	**Dentith Road**	**Points**
Pedestrian	Travel Lanes Crossed	5	75	6	55	4	88
	Median (>2.4 m)	Yes		No		No	
	Island Refuge	Yes	0	Yes	0	Yes	0
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR allowed	-3
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 15m to 25m	-8
	Channelization	Right turn channel with receiving lane	-3	None	0	Right turn channel	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	41		38		55	
	PETSI PLOS	E		E		D	
	Cycle Length			120			
	Pedestrian Green Time (Walk Time)	21		21		13	
	Average Pedestrian Crossing Delay (s)	41		41		48	
	Delay PLOS	E		E		E	
	Approach PLOS	E		E		E	
	Overall Intersection PLOS			**E**			
Cyclist	Type of Bikeway	Mixed traffic		Mixed traffic		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	> 25 km/h		N/A		> 25 km/h	
	Right Turn Storage Length	N/A		N/A		> 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		F	
	Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		≥ 2 lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		F		D	
	Approach BLOS			F		F	
	Overall Intersection BLOS			**F**			
Transit	AM Average Signal Delay	≤ 40 sec		≤ 30 sec		≤ 20 sec	
	AM Approach TLOS	E		D		C	
	PM Average Signal Delay	> 40 sec		> 40 sec		> 40 sec	
	AM Approach TLOS	F		F		F	
	Overall Intersection TLOS			**F**			
Truck	Effective Corner Radius	10 - 15m		N/A		> 15m	
	Number of Receiving Lanes	≥ 2 lanes		N/A		≥ 2 lanes	
	Approach TkLOS	B		-		A	
	Overall Intersection TkLOS			**B**			
Auto	AM Approach LOS	C		C		B	
	AM Intersection LOS			C			
	PM Approach LOS	F		E		F	
	PM Intersection LOS			F			
	Overall Intersection LOS			**F**			

Appendix II: Existing Conditions Maps and Cross-Sections

HERRING COVE ROAD FUNCTIONAL PLAN

Segment 1. Armdale Roundabout to Purcells Cove Road

HALIFAX



- Sidewalk
- Existing Substandard Sidewalk
- Planned Sidewalk
- Trail
- Walkway
- Bus Stop
- Daycare
- Fire Station
- Police Community Office
- Library
- Paramedic Base Station
- Place of Worship
- Public School
- Recreation Facility
- Stairs
- HRM Park
- Parcel

0 30 60 METRES

Data provided by Halifax Regional Municipality.
Map produced January 2019.

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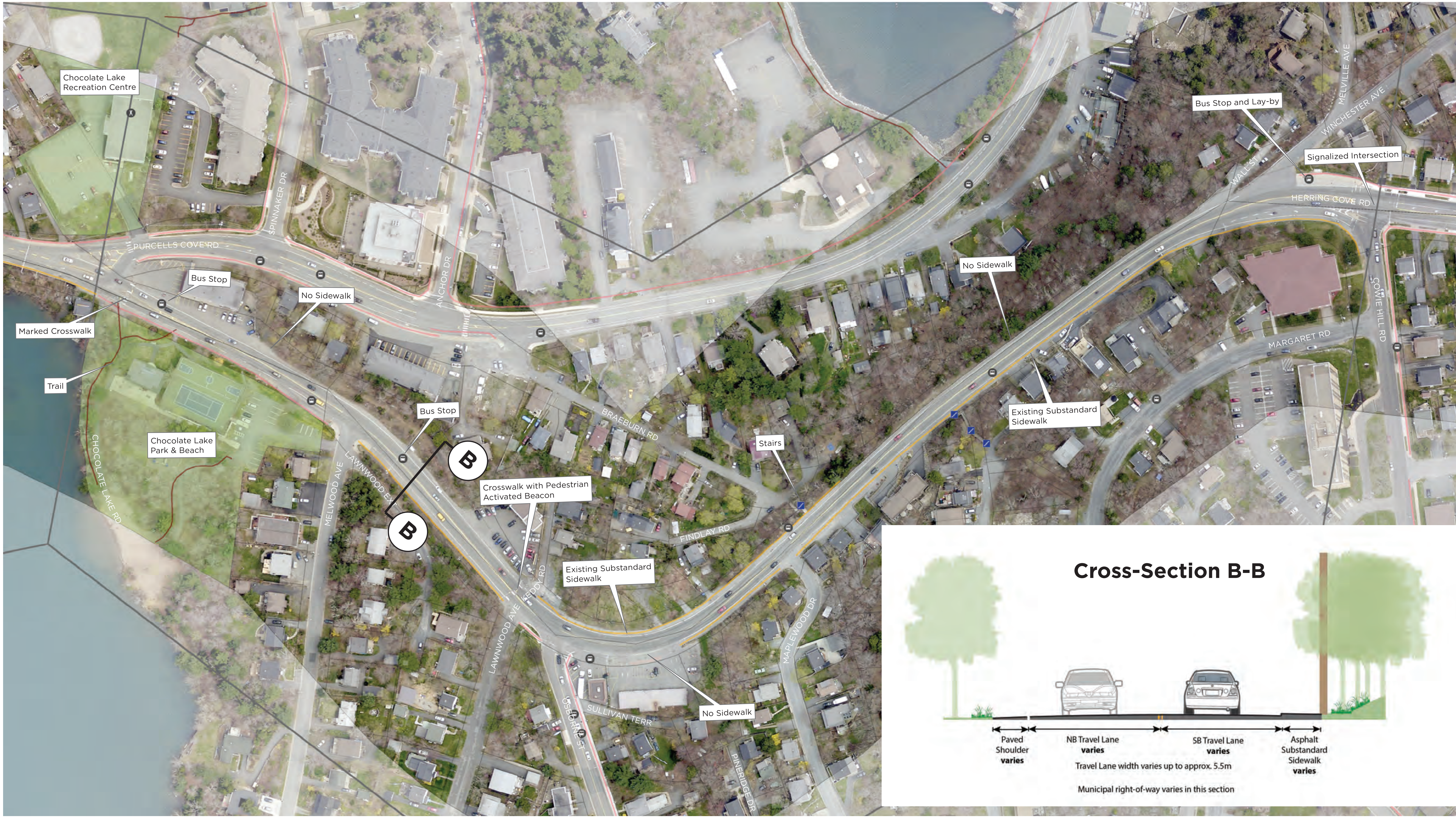
HERRING COVE ROAD FUNCTIONAL PLAN

Segment 2. Purcells Cove Road to Cowie Hill Road

HALIFAX



- Sidewalk
- Existing Substandard Sidewalk
- Planned Sidewalk
- Trail
- Walkway
- Bus Stop
- Daycare
- Fire Station
- Police Community Office
- Library
- Paramedic Base Station
- Place of Worship
- Public School
- Recreation Facility
- Stairs
- HRM Park
- Parcel

METRES 0 40 80

Data provided by Halifax Regional Municipality.
Map produced January 2019.

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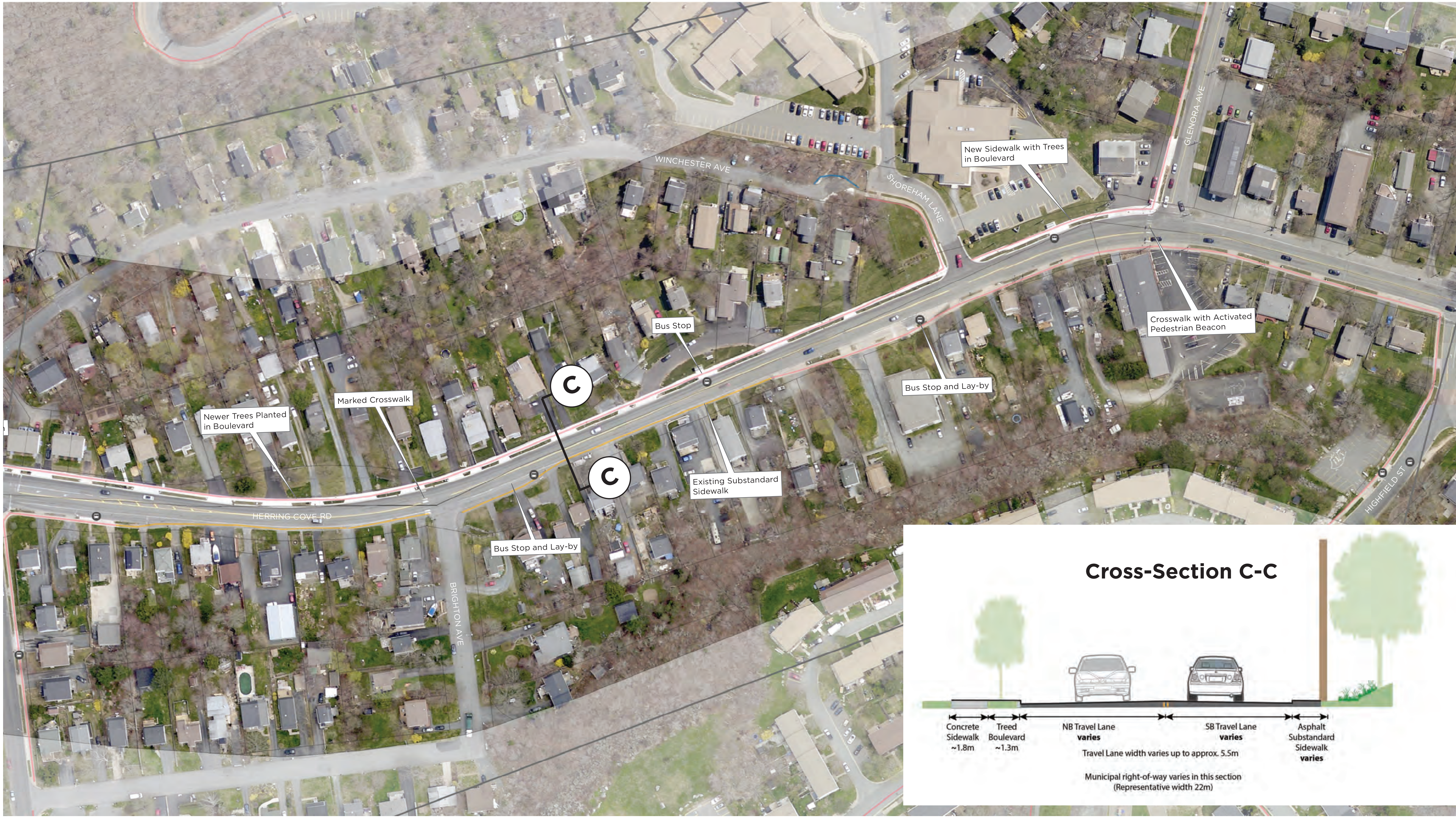
HERRING COVE ROAD FUNCTIONAL PLAN

Segment 3. Cowie Hill Road to Highfield Street

HALIFAX



Sidewalk
Existing Substandard Sidewalk
Planned Sidewalk
Trail
Walkway

Bus Stop
Daycare
Fire Station

Police Community Office
Library
Paramedic Base Station

Place of Worship
Public School
Recreation Facility

Stairs
HRM Park
Parcel

0 40 80 METRES

Data provided by Halifax Regional Municipality.
Map produced January 2019.

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HERRING COVE ROAD FUNCTIONAL PLAN

Segment 4. Highfield Street to Old Sambro Road

- Sidewalk
- Existing Substandard Sidewalk
- Planned Sidewalk
- Trail
- Walkway
- Bus Stop
- Daycare
- Fire Station
- Police Community Office
- Library
- Paramedic Base Station
- Place of Worship
- Public School
- Recreation Facility
- Stairs
- HRM Park
- Parcel

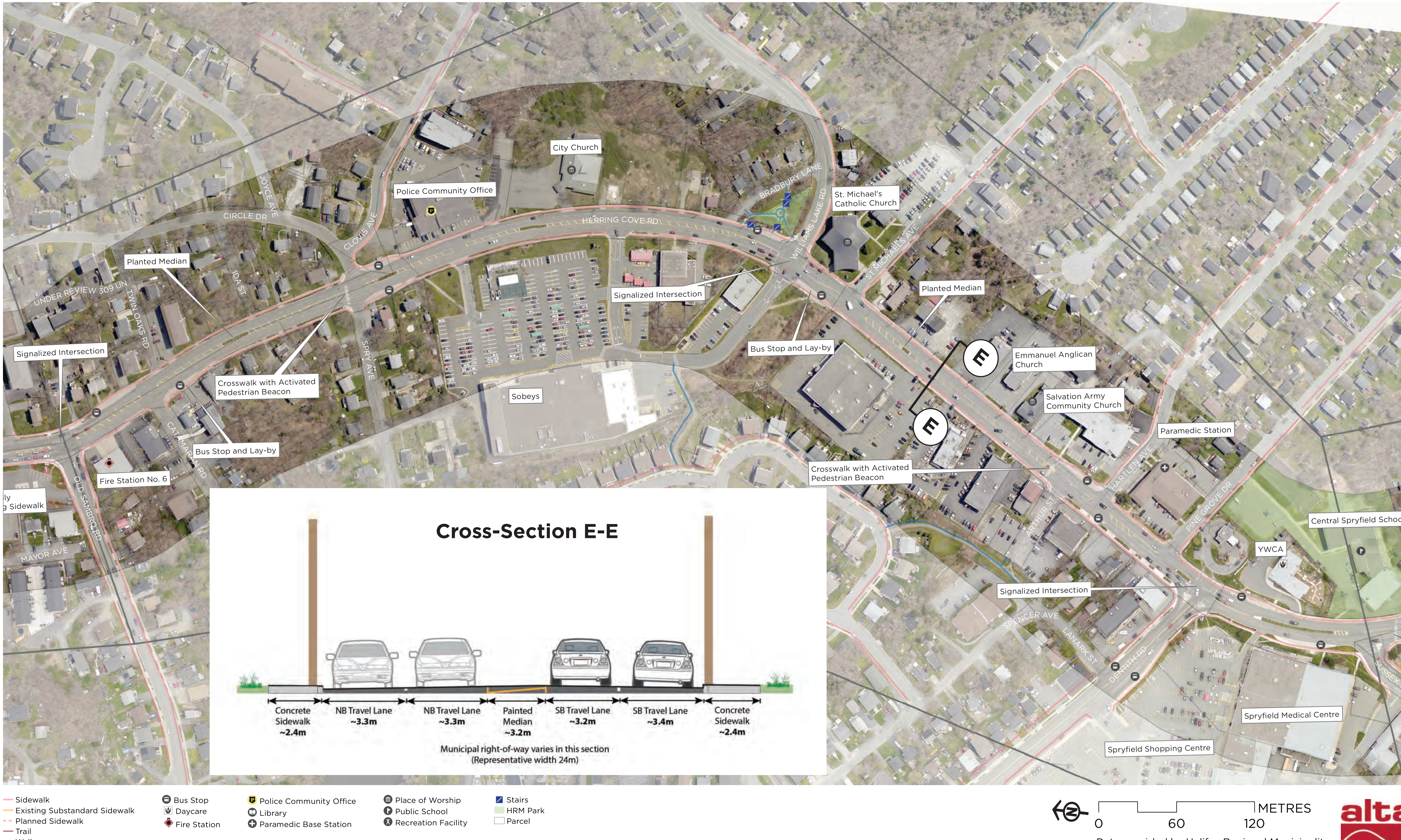
METRES 0 40 80

Data provided by Halifax Regional Municipality.
Map produced January 2019.

HERRING COVE ROAD FUNCTIONAL PLAN

Segment 5. Old Sambro Road to Sussex Street

HALIFAX



Data provided by Halifax Regional Municipality.
Map produced January 2019.

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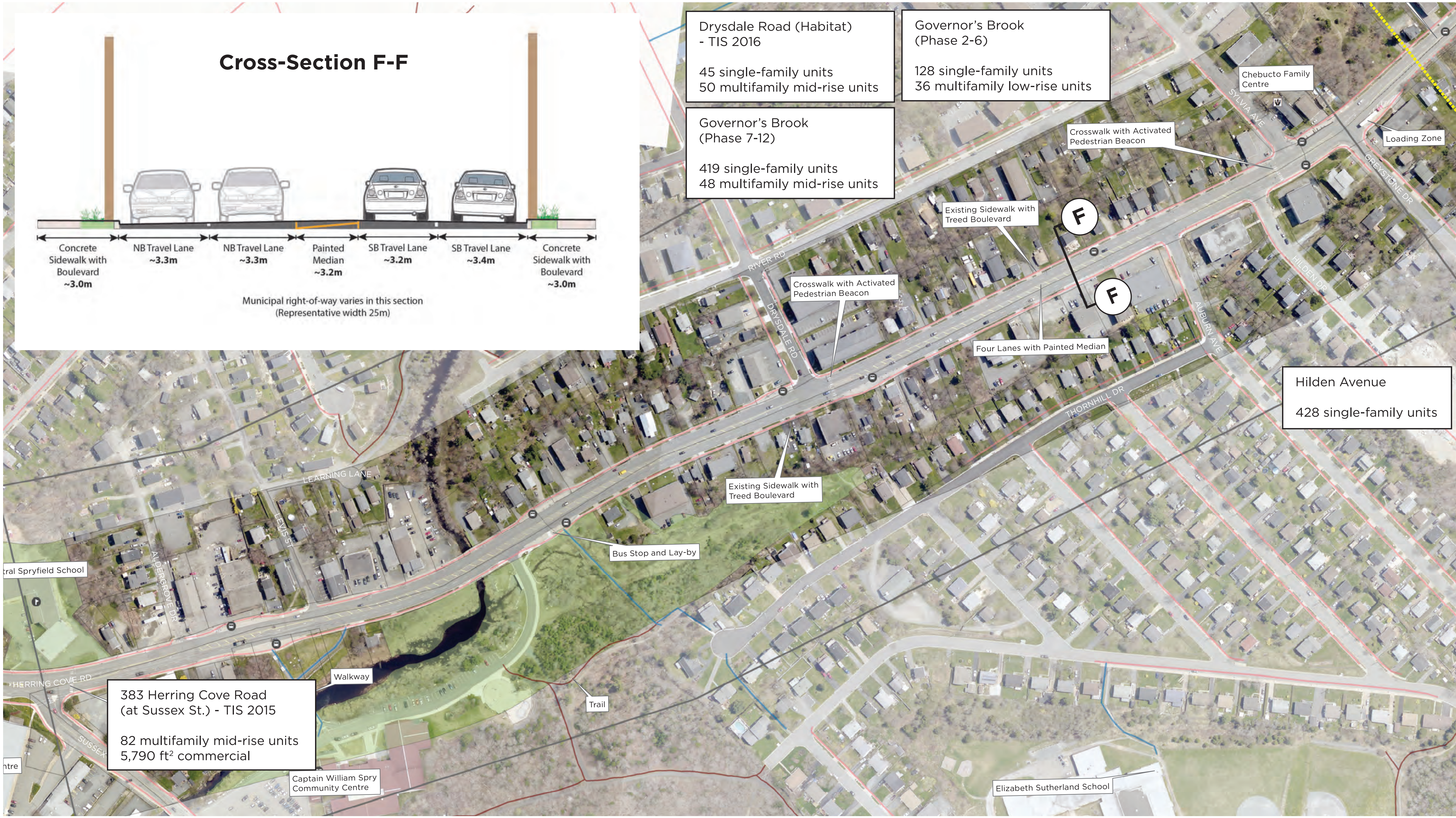
HERRING COVE ROAD FUNCTIONAL PLAN

Segment 6. Sussex Street to Greystone Drive

HALIFAX



- Sidewalk
- Existing Substandard Sidewalk
- Planned Sidewalk
- Trail
- Walkway
- Bus Stop
- Daycare
- Fire Station
- Police Community Office
- Library
- Paramedic Base Station
- Place of Worship
- Public School
- Recreation Facility
- Stairs
- HRM Park
- Parcel

0 70 140 METRES

Data provided by Halifax Regional Municipality.
Map produced January 2019.

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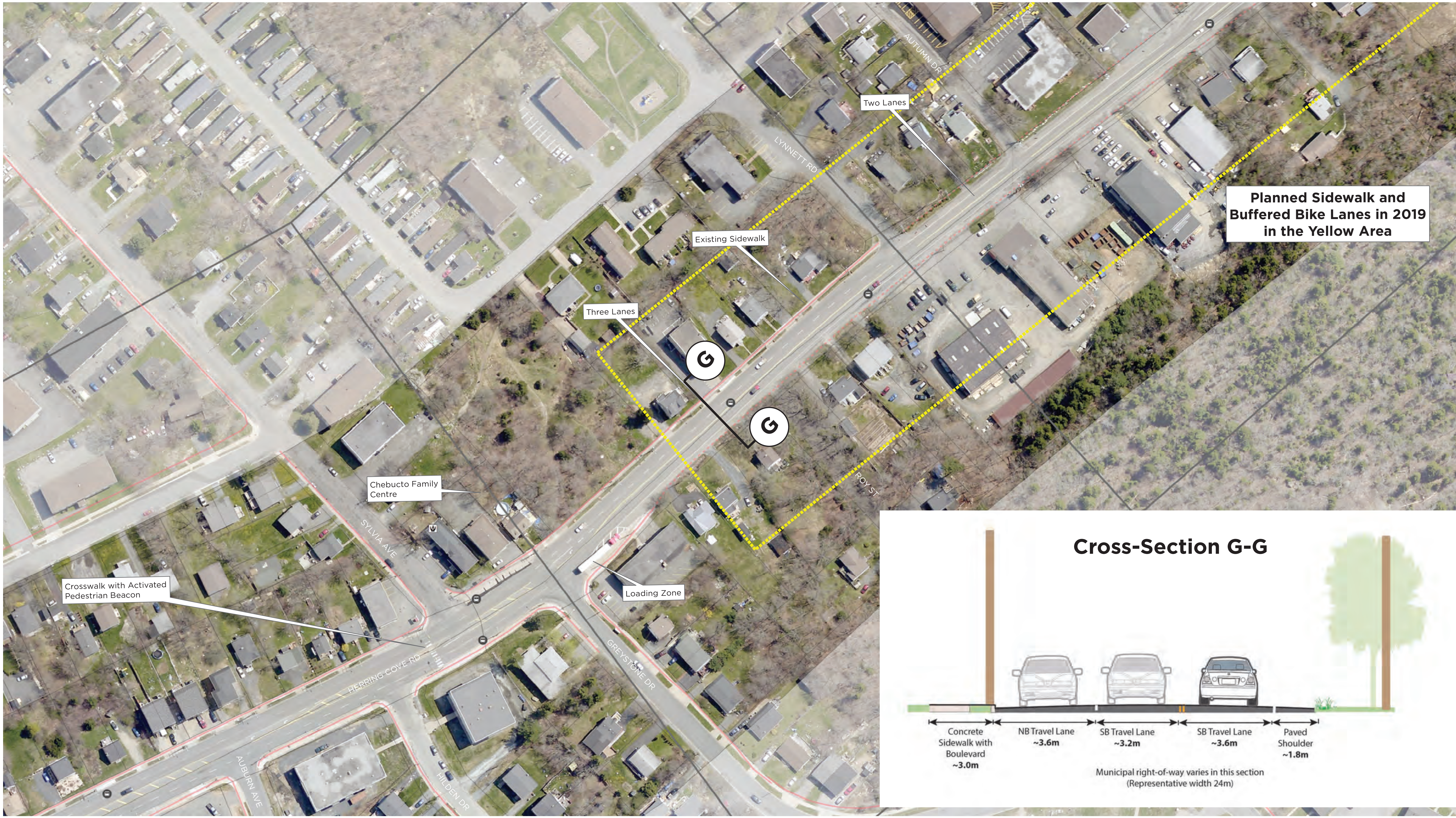
HERRING COVE ROAD FUNCTIONAL PLAN

Segment 7. Greystone Drive to Lynnett Road (500 block)

HALIFAX



Sidewalk
Existing Substandard Sidewalk
Planned Sidewalk
Trail
Walkway

Bus Stop
Daycare
Fire Station

Police Community Office
Library
Paramedic Base Station

Place of Worship
Public School
Recreation Facility

Stairs
HRM Park
Parcel

0 40 80 METRES

Data provided by Halifax Regional Municipality.
Map produced January 2019.

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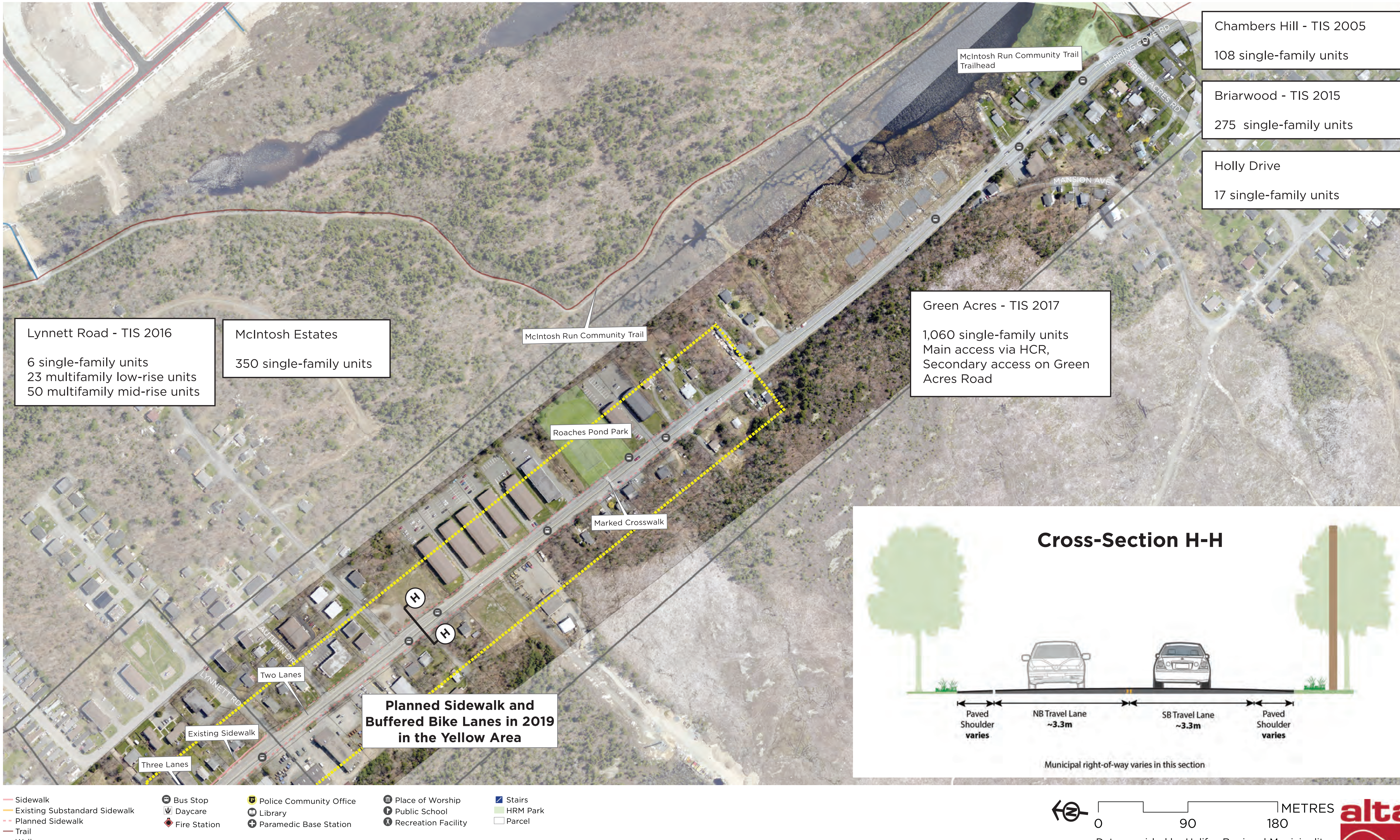
HERRING COVE ROAD FUNCTIONAL PLAN

Segment 8. Past Lynnett Road (500 block)



Data provided by Halifax Regional Municipality.
Map produced January 2019.

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T: 613.319.0335
E: katewhitfield@altaplanning.com

Re: Herring Cove Road Functional Plan – Functional Design Report – Draft LOS Analysis

Ms. Whitfield,

Harbourside Transportation Consultants has completed the intersection performance analysis to support the functional design report for the Herring Cove Road Functional Plan. This draft report only includes the vehicle level of service (LOS) analysis, the multimodal level of service analysis (MMLOS) will follow as part of a future version. The methodology and results of the analyses are documented in the following sections.

Intersection Performance Analysis: The performance of an intersection can be evaluated using a number of measures of effectiveness (MOEs), including level of service (LOS), delay, volume-to-capacity ratio (v/c) and vehicle queuing are the primary measures of effectiveness used in traffic analyses.

Level of service is a qualitative measure used to describe the level of performance of an intersection in terms of traffic movement. Level of service for intersections is defined in terms of delay, which is a measure of driver discomfort, frustration and increased travel time. The quality of traffic movement is divided into six levels ranging from A to F, where level of service A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level of service F represents the worst quality of traffic where the level of congestion is considered unacceptable to most drivers. The level of service criteria for intersections (Table 1) are stated in terms of average control delay per vehicle.

The volume-to-capacity (v/c) ratio is a measure of how the peak hour traffic volume on an approach to an intersection compares to the theoretical maximum volume that could be accommodated on that intersection approach. As the v/c ratio approaches 1.0, the movement has reduced ability to accommodate any additional volume of traffic.

The 95th percentile queue (95th% queue) is the estimated length in metres of a queue of vehicles stopped on an intersection approach which is only exceeded five percent of the time. Since a stopped vehicle occupies approximately seven metres of queue length, a 95th% queue of 14 metres indicates that less than five times of out 100 the queue may exceed two vehicles on the approach. The 95th% queue is typically used to determine if sufficient vehicle storage is available to maintain efficient traffic flow.

Synchro Studio (Version 10) software was used to complete the intersection performance analysis. The study intersections were evaluated with the existing and projected AM and PM peak hour traffic volumes. The detailed Synchro reports for the analysis are included in Appendix A.

Table 1: Level of Service Criteria for Intersections

Level of Service	Description	Signalized Intersection Control Delay	Unsignalized Intersection Control Delay
A	No congestion; most vehicles do not stop. **(Excellent)**	≤ 10 sec/veh	≤ 10 sec/veh
B	Very light congestion; some vehicles stop. **(Very Good)**	10-20 sec/veh	10-15 sec/veh
C	Light congestion; most vehicles stop. **(Good)**	20-35 sec/veh	15-25 sec/veh
D	Noticeable congestion; vehicles must sometimes wait through more than one red light. No long-standing queues are formed. **(Satisfactory)**	35-55 sec/veh	25-35 sec/veh
E	Congestion; vehicles must sometimes wait through more than one red light. Long-standing queues are formed. **(Unsatisfactory)**	55-80 sec/veh	35-50 sec/veh
F	Severe congestion; demand exceeds the capacity of the intersection. **(Unacceptable)**	≥ 80 sec/veh	≥ 50 sec/veh

Ultimate Conditions

The Ultimate Conditions scenario includes providing one northbound lane (inbound) and one southbound lane (outbound) from the Armdale Roundabout to south of Glenora and one northbound lane (inbound) and two southbound lanes (outbound) from Old Sambro Road to south of Drysdale Road. Changes at each study intersection are described below:

- **Herring Cove Road & Purcells Cove Road:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Osborne Street:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Cowie Hill Road:** Geometric changes to remove channelization for the southbound right turn. Minor changes to pedestrian timings.
- **Herring Cove Road & Glenora Avenue:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Old Sambro Road:** Lane reconfiguration on Herring Cove Road to convert the northbound left turn lane from a continuous lane to a storage lane with approximately 100 metres of storage. The two southbound through lanes on Herring Cove Road are maintained.
- **Herring Cove Road & Williams Lake Road/Bradford Street:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane and to provide a northbound right turn storage lane with approximately 25 metres of storage. Lane reconfiguration on Williams Lake Road to provide a westbound left turn storage lane with approximately 25 metres of storage. The two southbound through lanes on Herring Cove Road are maintained. Traffic signal modifications to

provide a protected + permitted phase for the southbound left turn on Herring Cove Road and changes to pedestrian timings.

- **Herring Cove Road & Dentith Road:** New multi lane roundabout.
- **Herring Cove Road & Sussex Street:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane; the two southbound through lanes on Herring Cove Road are maintained. No changes to intersection control.
- **Herring Cove Road & Drysdale Road:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane and extend the existing southbound left turn storage lane to provide approximately 100 metres of storage. The two southbound through lanes on Herring Cove Road are maintained. Lane reconfiguration on Drysdale Road to provide a westbound left turn storage lane with approximately 25 metres of storage. New traffic signal with a protected + permitted phase for the southbound left turn on Herring Cove Road.

Ultimate Conditions – Existing Traffic Volumes (2018): The existing conditions scenario provides an assessment of operations based on current traffic volumes. It should be noted that the AM peak hour operations at the Armdale roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were supplemented by field observations.

The results for the intersection performance analysis for ultimate conditions using existing traffic volumes are summarized in Table 2. The operations at each study intersection under ultimate conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will operate at LOS F and are over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.

- **Herring Cove Road & Glenora Avenue:** The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Dentith Road:** The overall performance of the roundabout will be acceptable during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour the eastbound left movement (Sussex Street) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.

Ultimate Conditions – Future Traffic Volumes (2033): The future conditions scenario provides an assessment of operations based future development projections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were modified to reflect the queues from the Armdale roundabout.

The results for the intersection performance analysis for ultimate conditions using future traffic volumes are summarized in Table 3. The operations at each study intersection under future ultimate conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will continue to operate at LOS F. During the PM peak hour, the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will continue to operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will continue to operate at LOS F and over capacity. The overall performance of the intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The southbound through movement (Herring Cove Road) will also be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Glenora Avenue:** During the AM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be nearing unacceptable (LOS E) during the PM peak hour.

- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during the both peak hours. The 95th% queues for the eastbound right movement (Old Sambro Road) will exceed the storage capacity of the right turn lane during the PM peak hour.

- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound left movement (Williams Lake Road) will operate at LOS E. The 95th% queues for the westbound left movement (Old Sambro Road) will exceed the storage capacity of the left turn lane during both peak hours and the 95th% queues for the northbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

- **Herring Cove Road & Dentith Road:** The overall performance of the roundabout will be acceptable during both peak hours.

- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left and right movements (Sussex Street) will operate at LOS F; the left movement will be over capacity. The northbound left movement (Herring Cove Road) will operate at LOS E. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour.

- **Herring Cove Road & Drysdale Road:** During the AM peak hour, the northbound movements (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be nearing unacceptable (LOS E) during the AM peak hour. During the PM peak hour, the northbound movements will operate at LOS E and be over capacity. The southbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour. The 95th% queues for the southbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

Table 2: Intersection Performance Analysis – Ultimate Conditions (2018)

Ultimate Conditions (2018)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				5.0	A			
Purcells Cove Road	WB Right*	-	F	F	-	-	21.3	C	C	0.55	25.1
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	11.3	A	B	0.22	6.1	14.4	A	B	0.60	31.2
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				11.2	B			
Osborne Street	EB Left*	-	F	F	-	-	185.7	F	F	1.08	54.0
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	11.9	A	B	0.06	1.5
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		9.5	A				14.5	B			
Cowie Hill Road	EB Left	11.1	B	B	0.29	13.6	18.8	B	B	0.52	29.1
	EB Right										
Herring Cove Road	NB Left	7.8	B	A	0.03	4.3	15.1	B	B	0.37	17.1
	NB Through	10.6		B	0.48	75.5	9.2		A	0.42	55.1
	SB Through	8.3	A	A	0.29	39.8	17.7	B	B	0.78	156.3
	SB Right	3.1		A	0.07	5.4	3.0		A	0.12	7.3
Herring Cove Road & Glenora Avenue		3.1	A				3.4	A			
Glenora Avenue	WB Left	20.3	C	C	0.37	12.9	39.5	E	E	0.53	21.3
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	8.6	A	A	0.05	1.5	8.6	A	A	0.08	2.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		11.4	B				14.0	B			
Old Sambro Road	EB Left	19.4	B	B	0.41	24.8	23.7	B	C	0.49	32.3
	EB Right	5.9		A	0.39	11.8	6.6		A	0.53	15.7
Herring Cove Road	NB Left	8.6	A	A	0.48	21.2	15.9	B	B	0.66	33.7
	NB Through	7.9		A	0.33	28.5	8.8		A	0.42	45.1
	SB Through	14.9	B	B	0.52	27.8	16.8	B	B	0.66	52.0
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		12.8	B				15.8	B			
Bradford Street	EB Left	16.0	A	B	0.01	1.8	18.8	A	B	0.14	9.5
	EB Through	8.6		A	0.08	5.6	7.6		A	0.40	14.1
	EB Right										
Williams Lake Road	WB Left	20.0	B	C	0.36	23.2	25.0	C	C	0.44	21.8
	WB Through	8.3		A	0.11	7.0	12.2		B	0.16	9.9
	WB Right										
Herring Cove Road	NB Left	6.9	B	A	0.08	8.0	7.8	B	A	0.24	13.5
	NB Through	16.1		B	0.49	101.2	21.0		C	0.65	128.6
	NB Right	6.1		A	0.18	15.3	5.8		A	0.18	13.7
	SB Left	6.9	B	A	0.06	5.8	7.1	B	A	0.16	10.3
	SB Through	11.5		B	0.25	36.8	16.5		B	0.57	70.5
	SB Right										
Herring Cove Road & Dentith Road		2.2	A				2.9	A			
Dentith Road	EB Left	2.0	A	A	0.19	7.0	3.1	A	A	0.39	7.0
	EB Right										
Herring Cove Road	NB Left	2.4	A	A	0.35	7.0	2.4	A	A	0.34	7.0
	NB Through										
	SB Through	2.2	A	A	0.23	7.0	3.0	A	A	0.46	7.0
	SB Right										
Herring Cove Road & Sussex Street		1.6	A				10.3	B			
Sussex Street	EB Left	44.2	D	E	0.30	8.4	368.5	F	F	1.26	40.3
	EB Right	10.8		B	0.06	1.5	17.9		C	0.16	4.6
Herring Cove Road	NB Left	9.0	A	A	0.03	0.8	13.4	A	B	0.11	3.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		9.8	A				8.8	A			
Drysdale Road	WB Left	20.6	B	C	0.07	6.0	20.7	B	C	0.08	6.7
	WB Right	8.6		A	0.31	10.1	8.5		A	0.34	10.7
Herring Cove Road	NB Through	14.3	B	B	0.56	97.7	16.0	B	B	0.63	68.8
	NB Right										
	SB Left	3.5	A	A	0.12	4.6	5.3	A	A	0.37	12.3
	SB Through	3.9		A	0.16	12.0	4.7		A	0.32	24.6

* Synchro results supplemented by field observations.

Table 3: Intersection Performance Analysis – Ultimate Conditions (2033)

Ultimate Conditions (2033)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				8.6	A			
Purcells Cove Road	WB Right*	-	F	F	-	-	60.2	F	F	0.87	58.5
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	16.6	A	B	0.35	11.4	27.6	A	D	0.80	57.4
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				70.2	F			
Osborne Street	EB Left*	-	F	F	-	-	1748.1	F	F	4.23	106.4
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	16.9	A	C	0.10	2.3
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		12.5	B				37.8	D			
Cowie Hill Road	EB Left	23.9	C	C	0.41	23.5	52.6	D	D	0.73	60.7
	EB Right										
Herring Cove Road	NB Left	5.3	B	A	0.03	3.7	165.1	C	F	1.10	34.7
	NB Through	14.8		B	0.76	231.9	9.2		A	0.58	107.9
	SB Through	6.5	A	A	0.36	58.9	47.5	D	D	1.03	417.0
	SB Right	1.9		A	0.06	4.3	2.8		A	0.09	8.0
Herring Cove Road & Glenora Avenue		9.3	A				48.9	E			
Glenora Avenue	WB Left	112.4	F	F	0.92	49.4	1062.6	F	F	2.87	95.0
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	10.8	A	B	0.07	1.5	10.0	A	B	0.11	3.0
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		15.5	B				25.6	C			
Old Sambro Road	EB Left	24.1	B	C	0.44	28.1	37.0	C	D	0.57	43.9
	EB Right	6.9		A	0.46	14.1	19.9		B	0.79	46.8
Herring Cove Road	NB Left	18.2	B	B	0.75	43.6	43.3	C	D	0.88	99.7
	NB Through	15.8		B	0.78	110.9	11.4		B	0.62	124.6
	SB Through	14.6	B	B	0.54	39.8	29.2	C	C	0.88	168.1
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		25.4	C				25.8	C			
Bradford Street	EB Left	20.3	B	C	0.01	2.1	31.8	B	C	0.14	14.6
	EB Through	10.5		B	0.10	6.5	12.4		B	0.42	24.1
	EB Right										
Williams Lake Road	WB Left	29.4	C	C	0.51	31.6	61.7	D	E	0.79	60.1
	WB Through	10.2		B	0.14	8.1	20.0		C	0.16	15.0
	WB Right										
Herring Cove Road	NB Left	6.2	C	A	0.09	7.7	17.2	C	B	0.47	18.8
	NB Through	39.4		D	0.96	301.8	36.3		D	0.92	270.9
	NB Right	7.1		A	0.22	24.9	7.3		A	0.20	20.2
	SB Left	6.7	B	A	0.11	5.5	10.9	B	B	0.33	10.1
	SB Through	12.0		B	0.33	53.0	20.2		C	0.77	156.3
	SB Right										
Herring Cove Road & Dentith Road		5.1	A				10.5	B			
Dentith Road	EB Left	2.4	A	A	0.25	7.0	14.5	B	B	0.81	84.0
	EB Right										
Herring Cove Road	NB Left	6.8	A	A	0.77	35.0	4.3	A	A	0.63	14.0
	NB Through										
	SB Through	2.9	A	A	0.38	7.0	13.1	B	B	0.87	147.0
	SB Right										
Herring Cove Road & Sussex Street		33.8	D				370.2	F			
Sussex Street	EB Left	1727.3	F	F	3.70	58.5	19661.8	F	F	36.96	86.6
	EB Right	12.9		B	0.12	3.0	91.3		F	0.81	38.8
Herring Cove Road	NB Left	10.8	A	B	0.13	3.0	43.6	A	E	0.51	19.8
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		78.6	E				37.7	D			
Drysdale Road	WB Left	36.4	D	D	0.15	18.3	48.6	C	D	0.26	18.2
	WB Right	46.7		D	0.88	88.0	16.0		B	0.72	24.1
Herring Cove Road	NB Through	126.8	F	F	1.21	451.3	70.6	E	E	1.06	341.6
	NB Right										
	SB Left	50.4	B	D	0.81	52.4	85.0	C	F	1.04	172.7
	SB Through	6.5		A	0.26	34.9	5.1		A	0.57	85.2

* Synchro results supplemented by field observations.

Interim Conditions

The Interim Conditions scenario includes a typical road diet on the Herring Cove Road to provide one northbound lane (inbound) and one southbound lane (outbound) throughout the entire corridor. Changes at each study intersection are described below:

- **Herring Cove Road & Purcells Cove Road:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Osborne Street:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Cowie Hill Road:** Geometric changes to remove channelization for the southbound right turn. Minor changes to pedestrian timings.
- **Herring Cove Road & Glenora Avenue:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Old Sambro Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and to convert the northbound left turn lane from a continuous lane to a storage lane with approximately 100 metres of storage.
- **Herring Cove Road & Williams Lake Road/Bradford Street:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane. Minor changes to pedestrian timings.
- **Herring Cove Road & Dentith Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane and provide one southbound right turn storage lane with approximately 35 metres of storage and one northbound left turn storage lane with approximately 100 metres of storage. Geometric changes to remove channelization for southbound and eastbound right turns. Minor changes to pedestrian timings.
- **Herring Cove Road & Sussex Street:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane No changes to intersection control.
- **Herring Cove Road & Drysdale Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane. No changes to intersection control.

Interim Conditions – Existing Traffic Volumes (2018): The existing conditions scenario provides an assessment of operations based on current traffic volumes. It should be noted that the AM peak hour operations at the Armdale roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were supplemented by field observations.

The results for the intersection performance analysis for interim conditions using existing traffic volumes are summarized in Table 4. The operations at each study intersection under interim conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will operate at LOS F and are over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Glenora Avenue:** The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Dentith Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** The overall performance of the unsignalized intersection will be acceptable during both peak hours.

Interim Conditions – Future Traffic Volumes (2033): The future conditions scenario provides an assessment of operations based future development projections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were modified to reflect the queues from the Armdale roundabout.

The results for the intersection performance analysis for interim conditions using future traffic volumes are summarized in Table 5. The operations at each study intersection under future interim conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will continue to operate at LOS F. During the

PM peak hour, the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will continue to operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will continue to operate at LOS F and over capacity. The overall performance of the intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The southbound through movement (Herring Cove Road) will also be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Glenora Avenue:** During the AM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be nearing unacceptable (LOS E) during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) and the southbound through and right movements (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be unacceptable (LOS F) during the PM peak hour. The 95th% queues for the northbound left movement (Herring Cove Road) and the eastbound right movement (Old Sambro Road) will exceed the storage capacity of the turning turn lanes during the PM peak hour.
- **Herring Cove Road & Williams Lake Road:** During the AM peak hour the northbound movements (Herring Cove Road) will be over capacity. The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the southbound through and right movements (Herring Cove Road) and the westbound movements (Williams Lake Road) will operate at LOS F and be over capacity. The southbound left movement (Herring Cove Road) will also operate at LOS F. The overall performance of the signalized intersection will be unacceptable (LOS F) during PM peak hour. The 95th% queues for the northbound and southbound left movements (Herring Cove Road) will exceed the storage capacity of the left turn lanes during PM peak hour.
- **Herring Cove Road & Dentith Road:** During the AM peak hour, the northbound left movement will operate at LOS E and be over capacity. The overall performance of the signalized intersection will be acceptable during AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road), southbound through movement (Herring Cove Road) and eastbound right movement (Dentith Road) will operate at LOS F and be over capacity. The overall performance of

the signalized intersection will be unacceptable (LOS F) during PM peak hour. The 95th% queues for the northbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during both peak hours.

- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left and right movements (Sussex Street) will operate at LOS F and be over capacity. The northbound left movement (Herring Cove Road) will operate at LOS E. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** During the AM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour. During the PM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour. The 95th% queues for the southbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

Table 4: Intersection Performance Analysis – Interim Conditions (2018)

Interim Conditions (2018)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		**-**	**F**				**5.0**	**A**			
Purcells Cove Road	WB Right*	-	F	F	-	-	21.3	C	C	0.55	25.1
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	11.3	A	B	0.22	6.1	14.4	A	B	0.60	31.2
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		**-**	**F**				**11.2**	**B**			
Osborne Street	EB Left* EB Right*	-	F	F	-	-	185.7	F	F	1.08	54.0
Herring Cove Road	NB Left*	-	F	F	-	-	11.9	A	B	0.06	1.5
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		**9.5**	**A**				**14.5**	**B**			
Cowie Hill Road	EB Left EB Right	11.1	B	B	0.29	13.6	18.8	B	B	0.52	29.1
Herring Cove Road	NB Left	7.8	B	A	0.03	4.3	15.1	B	B	0.37	17.1
	NB Through	10.6		B	0.48	75.5	9.2		A	0.42	55.1
	SB Through	8.3	A	A	0.29	39.8	17.7	B	B	0.78	156.3
	SB Right	3.1		A	0.07	5.4	3.0		A	0.12	7.3
Herring Cove Road & Glenora Avenue		**3.1**	**A**				**3.4**	**A**			
Glenora Avenue	WB Left WB Right	20.3	C	C	0.37	12.9	39.5	E	E	0.53	21.3
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	8.6	A	A	0.05	1.5	8.6	A	A	0.08	2.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		**14.6**	**B**				**23.8**	**C**			
Old Sambro Road	EB Left	24.1	B	C	0.45	28.1	38.8	B	D	0.60	44.4
	EB Right	6.8		A	0.41	12.9	8.5		A	0.58	19.1
Herring Cove Road	NB Left	9.7	A	A	0.56	21.3	34.8	B	C	0.82	69.6
	NB Through	7.0		A	0.30	28.5	6.9		A	0.34	47.7
	SB Through SB Right	22.2	C	C	0.74	71.7	31.4	C	C	0.88	194.7
Herring Cove Road & Williams Lake Road/Bradford Street		**14.6**	**B**				**21.5**	**C**			
Bradford Street	EB Left	16.3	A	B	0.01	1.8	27.9	B	C	0.16	13.0
	EB Through EB Right	8.7		A	0.08	5.6	9.7		A	0.41	18.6
Williams Lake Road	WB Left WB Through WB Right	21.0	C	C	0.48	28.6	42.3	D	D	0.68	43.8
Herring Cove Road	NB Left	6.9	B	A	0.09	8.0	9.6	B	A	0.37	12.5
	NB Through NB Right	11.6		B	0.56	96.4	11.9		B	0.62	107.9
	SB Left	14.9	B	B	0.08	9.2	14.3	C	B	0.21	16.3
	SB Through SB Right	17.7		B	0.49	98.5	29.8		C	0.87	215.7
Herring Cove Road & Dentith Road		**12.8**	**B**				**26.0**	**C**			
Dentith Road	EB Left	22.0	B	C	0.43	30.8	37.1	C	D	0.63	59.9
	EB Right	5.4		A	0.43	12.7	23.5		C	0.83	65.0
Herring Cove Road	NB Left	12.6	B	B	0.57	40.7	44.0	C	D	0.89	81.4
	NB Through	10.7		B	0.43	60.8	9.1		A	0.36	52.5
	SB Through	19.6	B	B	0.49	60.7	31.5	C	C	0.83	178.7
	SB Right	5.1		A	0.24	12.3	10.7		B	0.36	34.8
Herring Cove Road & Sussex Street		**1.5**	**A**				**8.7**	**A**			
Sussex Street	EB Left	40.4	D	E	0.27	7.6	292.6	F	F	1.11	37.2
	EB Right	12.8		B	0.08	2.3	30.6		D	0.28	8.4
Herring Cove Road	NB Left	9.0	A	A	0.03	0.8	13.3	A	B	0.11	3.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		**2.2**	**A**				**3.5**	**A**			
Drysdale Road	WB Left WB Right	17.6	C	C	0.29	9.1	29.2	D	D	0.48	19.0
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	9.0	A	A	0.07	1.5	9.3	A	A	0.20	5.3
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

Table 5: Intersection Performance Analysis – Interim Conditions (2033)

Interim Conditions (2033)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				8.6	A			
Purcells Cove Road	WB Right*	-	F	F			60.2	F	F	0.87	58.5
Herring Cove Road	NB Through*	-	F	F			0.0	A	A	-	-
	NB Right*	-		F			0.0		A	-	-
	SB Left	16.6	A	C	0.35	11.4	27.6	A	D	0.80	62.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				70.2	F			
Osborne Street	EB Left*	-	F	F	-	-	1748.1	F	F	4.23	106.4
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	16.9	A	C	0.10	2.3
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		12.5	B				37.8	D			
Cowie Hill Road	EB Left	23.9	C	C	0.41	23.5	52.6	D	D	0.73	60.7
	EB Right										
Herring Cove Road	NB Left	5.3	B	A	0.03	3.7	165.1	C	F	1.10	34.7
	NB Through	14.8		B	0.76	231.9	9.2		A	0.58	107.9
	SB Through	6.5	A	A	0.36	58.9	47.5	D	D	1.03	417.0
	SB Right	1.9		A	0.06	4.3	2.8		A	0.09	8.0
Herring Cove Road & Glenora Avenue		9.3	A				48.9	E			
Glenora Avenue	WB Left	112.4	F	F	0.92	49.4	1062.6	F	F	2.87	95.0
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	10.8	A	B	0.07	1.5	10.0	A	B	0.11	3.0
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		20.8	C				109.0	F			
Old Sambro Road	EB Left	37.9	C	D	0.55	38.6	51.8	D	D	0.58	61.5
	EB Right	8.9		A	0.52	17.2	48.5		D	0.92	104.7
Herring Cove Road	NB Left	23.7	B	C	0.75	74.0	213.8	E	F	1.36	156.8
	NB Through	10.4		B	0.65	109.7	10.5		B	0.57	115.8
	SB Through	32.2	C	C	0.85	156.0	163.7	F	F	1.29	504.1
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		40.2	D				116.8	F			
Bradford Street	EB Left	29.7	B	C	0.01	2.7	40.9	C	D	0.15	17.6
	EB Through	13.8		B	0.11	8.3	18.3		B	0.44	33.1
	EB Right										
Williams Lake Road	WB Left	51.3	D	D	0.74	52.6	150.2	F	F	1.15	114.4
	WB Through										
	WB Right										
Herring Cove Road	NB Left	5.7	D	A	0.12	7.2	31.6	C	C	0.61	27.8
	NB Through	52.9		D	1.04	375.5	28.3		C	0.92	337.6
	NB Right										
	SB Left	37.2	B	D	0.44	19.7	96.8	F	F	0.88	46.4
	SB Through	16.8		B	0.61	134.2	198.5		F	1.37	564.6
	SB Right										
Herring Cove Road & Dentith Road		41.7	D				213.6	F			
Dentith Road	EB Left	32.7	B	C	0.47	43.2	42.3	F	D	0.53	76.6
	EB Right	7.5		A	0.56	18.8	229.8		F	1.43	287.2
Herring Cove Road	NB Left	77.9	D	E	1.06	173.1	389.1	F	F	1.78	230.8
	NB Through	30.6		C	0.93	280.1	19.6		B	0.74	181.8
	SB Through	53.9	D	D	0.93	165.1	324.6	F	F	1.65	588.2
	SB Right	15.3		B	0.29	27.2	18.2		B	0.37	53.4
Herring Cove Road & Sussex Street		29.2	D				395.7	F			
Sussex Street	EB Left	1480.1	F	F	3.26	57.8	19661.8	F	F	36.96	86.6
	EB Right	18.4		C	0.19	5.3	951.1		F	2.67	96.5
Herring Cove Road	NB Left	10.8	A	B	0.13	3.0	43.2	A	E	0.51	19.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		207.8	F				1799.2	F			
Drysdale Road	WB Left	1293.6	F	F	3.70	315.4	19042.0	F	F	41.30	328.3
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	15.3	A	C	0.31	9.9	25.6	A	D	0.76	53.2
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

If you have any questions or additional discussion, please feel free to contact the undersigned.

Regards,

[redacted]

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Appendix A – Synchro Reports

Appendix A

Synchro Reports

Intersection	
Int Delay, s/veh	134.2

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	835	18	150	374	0	580
Future Vol, veh/h	835	18	150	374	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	908	20	163	407	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	928	0	-	918
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	737	-	0	~ 329
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	737	-	-	~ 329
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.2	$ 450
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	329	737	-
HCM Lane V/C Ratio	-	-	1.916	0.221	-
HCM Control Delay (s)	-	-	$ 450	11.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	43.2	0.8	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	555	50	512	1175
Future Vol, veh/h	0	245	555	50	512	1175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	603	54	557	1277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	630	0	0	657	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	482	-	-	931	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	482	-	-	931	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.3	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	931	-
HCM Lane V/C Ratio	-	-	0.552	0.598	-
HCM Control Delay (s)	-	-	21.3	14.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	3.3	4.1	-

Intersection	
Int Delay, s/veh	27.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	594	340	55
Future Vol, veh/h	242	8	15	594	340	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	646	370	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	400	430	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 242	650	1129	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 237	650	1129	-	-	-
Mov Cap-2 Maneuver	~ 237	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	138.5		0.2		0	
HCM LOS	F					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	242	-	-
HCM Lane V/C Ratio	0.014	-	1.123	-	-
HCM Control Delay (s)	8.2	0	138.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	12.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	11.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	495	882	269
Future Vol, veh/h	83	22	30	495	882	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	538	959	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1709	1105	1251	0	-	0
Stage 1	1105	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	100	256	556	-	-	-
Stage 1	317	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	256	556	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	185.7	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	556	-	106	-	-
HCM Lane V/C Ratio	0.059	-	1.077	-	-
HCM Control Delay (s)	11.9	0	185.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	7.1	-	-

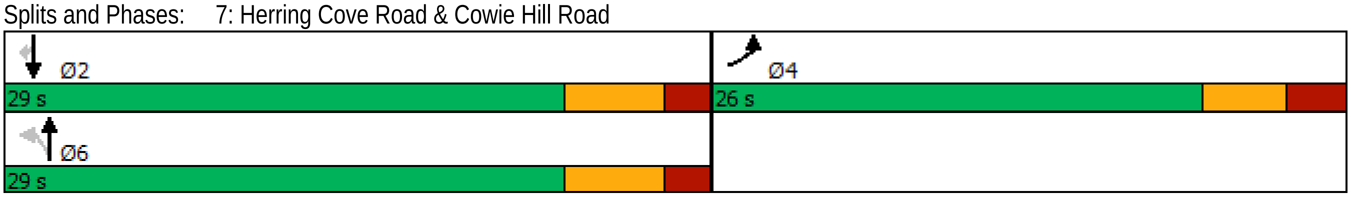
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	515	309	61
Future Volume (vph)	68	49	18	515	309	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.558			
Satd. Flow (perm)	1705	0	1047	1883	1883	1558
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	53					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	560	336	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	560	336	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		29.0	29.0	29.0	29.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	10.3		27.6	27.6	27.6	27.6
Actuated g/C Ratio	0.23		0.62	0.62	0.62	0.62
v/c Ratio	0.29		0.03	0.48	0.29	0.07
Control Delay	11.1		7.8	10.6	8.3	3.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		7.8	10.6	8.3	3.1
LOS	B		A	B	A	A
Approach Delay	11.1			10.5	7.5	
Approach LOS	B			B	A	
Stops (vph)	56		12	306	160	11
Fuel Used(l)	4		1	37	20	3
CO Emissions (g/hr)	69		24	696	379	62

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	13		5	134	73	12
VOC Emissions (g/hr)	16		6	161	87	14
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	5.0		0.6	24.7	12.6	0.0
Queue Length 95th (m)	13.6		4.3	#75.5	39.8	5.4
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	826		645	1161	1161	986
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.15		0.03	0.48	0.29	0.07

Intersection Summary

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 44.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 9.5 Intersection LOS: A
Intersection Capacity Utilization 45.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	425	779	99
Future Volume (vph)	112	80	70	425	779	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1710	0	1789	1883	1883	1601
Flt Permitted	0.972		0.188			
Satd. Flow (perm)	1701	0	354	1883	1883	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	57					90
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	462	847	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	462	847	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		39.0	39.0	39.0	39.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	12.0		33.4	33.4	33.4	33.4
Actuated g/C Ratio	0.21		0.58	0.58	0.58	0.58
v/c Ratio	0.52		0.37	0.42	0.78	0.12
Control Delay	18.8		15.1	9.2	17.7	3.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	18.8		15.1	9.2	17.7	3.0
LOS	B		B	A	B	A
Approach Delay	18.8			10.1	16.0	
Approach LOS	B			B	B	
Stops (vph)	113		45	226	524	17
Fuel Used(l)	8		5	30	60	5
CO Emissions (g/hr)	143		101	555	1110	100

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28		19	107	214	19
VOC Emissions (g/hr)	33		23	128	256	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	13.8		3.6	22.6	56.6	0.7
Queue Length 95th (m)	29.1		17.1	55.1	#156.3	7.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	633		206	1099	1099	945
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.37	0.42	0.77	0.11

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 57.6

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

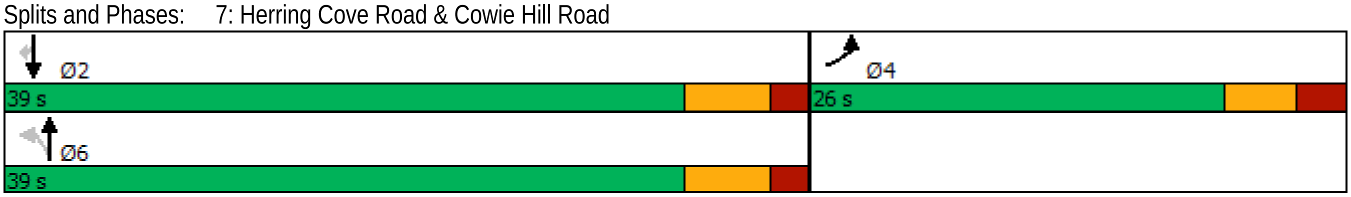
Intersection Signal Delay: 14.5 Intersection LOS: B

Intersection Capacity Utilization 73.8% ICU Level of Service D

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection						
Int Delay, s/veh	3.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	418	66	46	301
Future Vol, veh/h	68	59	418	66	46	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	454	72	50	327

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	490	0	0	526	0
Stage 1	490	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	578	-	-	1041	-
Stage 1	616	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	284	578	-	-	1041	-
Mov Cap-2 Maneuver	284	-	-	-	-	-
Stage 1	580	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.3	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	372	1041	-
HCM Lane V/C Ratio	-	-	0.371	0.048	-
HCM Control Delay (s)	-	-	20.3	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.2	-

Intersection						
Int Delay, s/veh	3.4					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	404	48	78	784
Future Vol, veh/h	45	58	404	48	78	784
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	439	52	85	852

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1487	465	0	0	491	0
Stage 1	465	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	137	597	-	-	1072	-
Stage 1	632	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	116	597	-	-	1072	-
Mov Cap-2 Maneuver	116	-	-	-	-	-
Stage 1	537	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.5	0	0.8
HCM LOS	E		

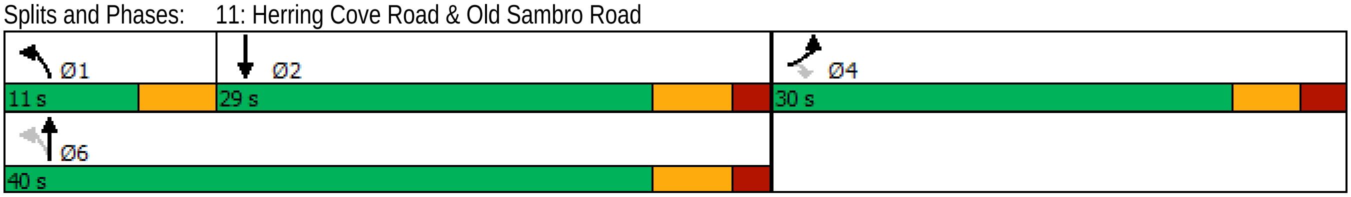
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	212	1072	-
HCM Lane V/C Ratio	-	-	0.528	0.079	-
HCM Control Delay (s)	-	-	39.5	8.6	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	2.8	0.3	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	176	245	294	357	96
Future Volume (vph)	142	176	245	294	357	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.971	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1829	0
Flt Permitted	0.950		0.262			
Satd. Flow (perm)	1789	1601	493	1883	1829	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		191			20	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	191	266	320	388	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	191	266	320	492	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.1	10.1	32.0	29.7	18.5	
Actuated g/C Ratio	0.19	0.19	0.61	0.57	0.35	
v/c Ratio	0.45	0.41	0.56	0.30	0.74	
Control Delay	24.1	6.8	9.7	7.0	22.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	6.8	9.7	7.0	22.2	
LOS	C	A	A	A	C	
Approach Delay	14.5			8.2	22.2	
Approach LOS	B			A	C	
Stops (vph)	116	29	99	134	353	
Fuel Used(l)	8	5	18	22	50	
CO Emissions (g/hr)	145	88	338	400	937	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28	17	65	77	181	
VOC Emissions (g/hr)	33	20	78	92	216	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	13.3	0.0	9.3	13.2	36.8	
Queue Length 95th (m)	28.1	12.9	21.3	28.5	71.7	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	836	850	478	1240	824	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.22	0.56	0.26	0.60	

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 52.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



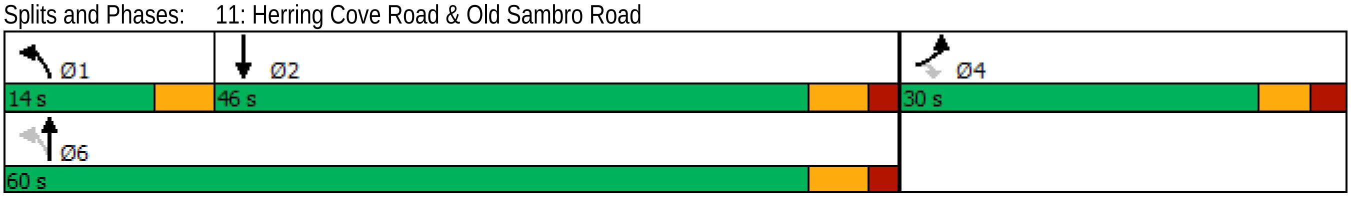
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	282	262	402	567	173
Future Volume (vph)	167	282	262	402	567	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1823	0
Flt Permitted	0.950		0.112			
Satd. Flow (perm)	1789	1601	211	1883	1823	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		307			22	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	307	285	437	616	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	307	285	437	804	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	14.0	60.0	46.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	13.4	13.4	55.3	53.1	39.0	
Actuated g/C Ratio	0.17	0.17	0.70	0.67	0.50	
v/c Ratio	0.60	0.58	0.82	0.34	0.88	
Control Delay	38.8	8.5	34.8	6.9	31.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	38.8	8.5	34.8	6.9	31.4	
LOS	D	A	C	A	C	
Approach Delay	19.8			17.9	31.4	
Approach LOS	B			B	C	
Stops (vph)	147	35	120	159	572	
Fuel Used(l)	11	8	25	29	87	
CO Emissions (g/hr)	210	143	461	536	1625	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	41	28	89	104	314	
VOC Emissions (g/hr)	48	33	106	124	375	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.6	0.0	20.9	23.3	98.2	
Queue Length 95th (m)	44.4	19.1	#69.6	47.7	#194.7	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	548	703	349	1293	936	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.33	0.44	0.82	0.34	0.86	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 78.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



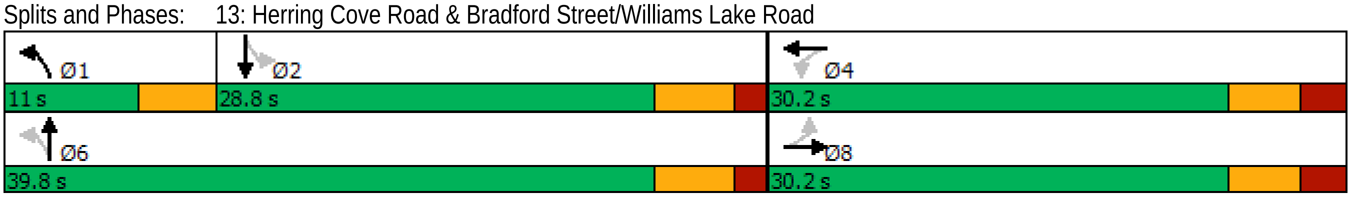
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Future Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98			0.99		1.00	0.99		0.99	1.00	
Frt		0.872			0.969			0.964			0.998	
Flt Protected	0.950				0.965		0.950			0.950		
Satd. Flow (prot)	1789	1608	0	0	1752	0	1789	1799	0	1789	1879	0
Flt Permitted	0.718				0.766		0.339			0.422		
Satd. Flow (perm)	1351	1608	0	0	1387	0	636	1799	0	790	1879	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			24			32			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	123	9	40	53	485	154	34	471	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	172	0	53	639	0	34	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	39.8		28.8	28.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	12.5	12.5			12.5		32.0	31.9		26.3	26.3	
Actuated g/C Ratio	0.24	0.24			0.24		0.62	0.62		0.51	0.51	
v/c Ratio	0.01	0.08			0.48		0.09	0.56		0.08	0.49	
Control Delay	16.3	8.7			21.0		6.9	11.6		14.9	17.7	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	16.3	8.7			21.0		6.9	11.6		14.9	17.7	
LOS	B	A			C		A	B		B	B	
Approach Delay		9.3			21.0			11.2			17.5	
Approach LOS		A			C			B			B	
Stops (vph)	3	12			107		20	345		22	294	
Fuel Used(l)	0	1			8		3	36		3	38	
CO Emissions (g/hr)	2	14			146		49	668		49	702	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	0	3			28		9	129		9	136	
VOC Emissions (g/hr)	1	3			34		11	154		11	162	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.3	0.4			13.3		1.8	34.2		2.1	38.3	
Queue Length 95th (m)	1.8	5.6			28.6		8.0	96.4		9.2	#98.5	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	690	835			719		569	1272		426	1013	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.00	0.04			0.24		0.09	0.50		0.08	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 66.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



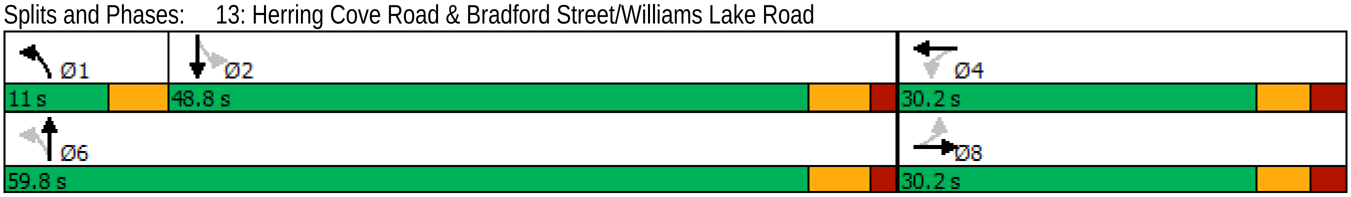
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Future Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96			0.98			0.99		1.00	1.00	
Frt		0.870			0.978			0.970			0.999	
Flt Protected	0.950				0.969		0.950			0.950		
Satd. Flow (prot)	1789	1576	0	0	1775	0	1789	1815	0	1789	1881	0
Flt Permitted	0.669				0.655		0.100			0.361		
Satd. Flow (perm)	1247	1576	0	0	1186	0	188	1815	0	677	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			11			25				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	111	33	28	103	572	142	74	850	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	172	0	103	714	0	74	854	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	59.8		48.8	48.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	15.9	15.9			15.9		50.5	48.5		40.4	40.4	
Actuated g/C Ratio	0.21	0.21			0.21		0.65	0.63		0.52	0.52	
v/c Ratio	0.16	0.41			0.68		0.37	0.62		0.21	0.87	
Control Delay	27.9	9.7			42.3		9.6	11.9		14.3	29.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	27.9	9.7			42.3		9.6	11.9		14.3	29.8	
LOS	C	A			D		A	B		B	C	
Approach Delay		12.9			42.3			11.6			28.5	
Approach LOS		B			D			B			C	
Stops (vph)	30	34			128		30	359		37	594	
Fuel Used(l)	2	3			11		5	40		5	77	
CO Emissions (g/hr)	33	64			203		94	738		102	1424	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	6	12			39		18	142		20	275	
VOC Emissions (g/hr)	8	15			47		22	170		24	328	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	5.2	3.2			23.7		4.7	53.3		5.9	110.4	
Queue Length 95th (m)	13.0	18.6			43.8		12.5	107.9		16.3	#215.7	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	408	625			395		276	1300		396	1100	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.10	0.30			0.44		0.37	0.55		0.19	0.78	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 77.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 21.5 Intersection LOS: C
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road

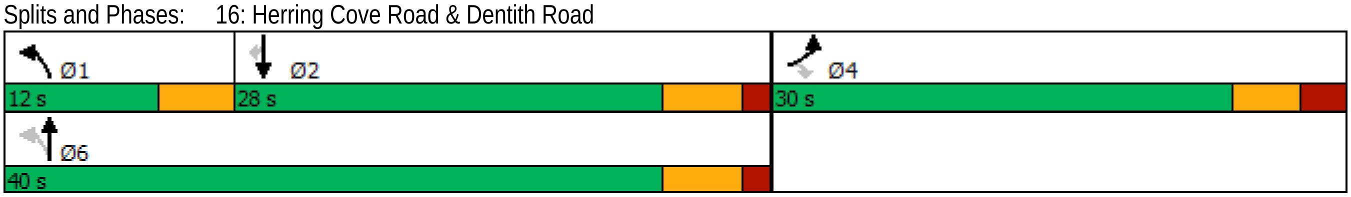


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	207	308	421	316	148
Future Volume (vph)	165	207	308	421	316	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.95	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.405			
Satd. Flow (perm)	1740	1519	757	1883	1883	1544
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225				152
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	225	335	458	343	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	225	335	458	343	161
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	12.0	40.0	28.0	28.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	14.3	14.3	36.5	34.8	22.7	22.7
Actuated g/C Ratio	0.23	0.23	0.60	0.57	0.37	0.37
v/c Ratio	0.43	0.43	0.57	0.43	0.49	0.24
Control Delay	22.0	5.4	12.6	10.7	19.6	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	5.4	12.6	10.7	19.6	5.1
LOS	C	A	B	B	B	A
Approach Delay	12.8			11.5	15.0	
Approach LOS	B			B	B	
Stops (vph)	123	25	148	233	235	25
Fuel Used(l)	10	7	10	14	22	7
CO Emissions (g/hr)	187	132	185	254	416	128

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	36	25	36	49	80	25
VOC Emissions (g/hr)	43	30	43	59	96	30
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	16.8	0.0	12.9	21.1	25.2	0.6
Queue Length 95th (m)	30.8	12.7	40.7	60.8	60.7	12.3
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	714	741	590	1074	701	670
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.30	0.57	0.43	0.49	0.24

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 61	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 63.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 16: Herring Cove Road & Dentith Road



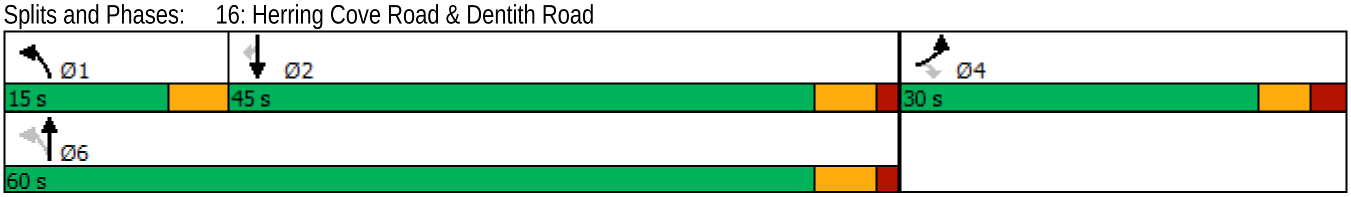
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	441	295	394	665	252
Future Volume (vph)	231	441	295	394	665	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.92				0.94
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.130			
Satd. Flow (perm)	1749	1472	245	1883	1883	1508
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		323				115
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	479	321	428	723	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	479	321	428	723	274
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	15.0	60.0	45.0	45.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	19.0	19.0	56.3	54.6	39.5	39.5
Actuated g/C Ratio	0.22	0.22	0.66	0.64	0.46	0.46
v/c Ratio	0.63	0.83	0.89	0.36	0.83	0.36
Control Delay	37.1	23.5	44.0	9.1	31.5	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	23.5	44.0	9.1	31.5	10.7
LOS	D	C	D	A	C	B
Approach Delay	28.2			24.1	25.8	
Approach LOS	C			C	C	
Stops (vph)	197	153	136	177	536	93
Fuel Used(l)	17	23	17	11	54	14
CO Emissions (g/hr)	322	436	307	212	1005	260

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	62	84	59	41	194	50
VOC Emissions (g/hr)	74	101	71	49	232	60
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	37.0	23.3	31.9	34.8	110.9	16.8
Queue Length 95th (m)	59.9	#65.0	#81.4	52.5	#178.7	34.8
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	506	647	361	1204	872	760
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.74	0.89	0.36	0.83	0.36

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 85.3	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 26.0	Intersection LOS: C
Intersection Capacity Utilization 82.0%	ICU Level of Service E
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	36	29	725	481	88
Future Vol, veh/h	35	36	29	725	481	88
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	38	39	32	788	523	96

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1434	587	630	0	-	0
Stage 1	582	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	147	510	952	-	-	-
Stage 1	559	-	-	-	-	-
Stage 2	418	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	139	502	942	-	-	-
Mov Cap-2 Maneuver	139	-	-	-	-	-
Stage 1	534	-	-	-	-	-
Stage 2	414	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.4	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	942	-	139	502	-	-
HCM Lane V/C Ratio	0.033	-	0.274	0.078	-	-
HCM Control Delay (s)	9	-	40.4	12.8	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.3	-	-

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	49	49	649	946	223
Future Vol, veh/h	51	49	49	649	946	223
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	53	53	705	1028	242

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2025	1246	1335	0	-	0
Stage 1	1214	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	63	212	517	-	-	-
Stage 1	281	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 50	193	486	-	-	-
Mov Cap-2 Maneuver	~ 50	-	-	-	-	-
Stage 1	235	-	-	-	-	-
Stage 2	411	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	164.2	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	486	-	50	193	-	-
HCM Lane V/C Ratio	0.11	-	1.109	0.276	-	-
HCM Control Delay (s)	13.3	-	292.6	30.6	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	0.4	-	4.9	1.1	-	-

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	92	557	9	60	376
Future Vol, veh/h	17	92	557	9	60	376
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	18	100	605	10	65	409

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	610	0	0	615	0
Stage 1	610	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	219	494	-	-	965	-
Stage 1	542	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	494	-	-	965	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	506	-	-	-	-	-
Stage 2	585	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.6	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	404	965	-
HCM Lane V/C Ratio	-	-	0.293	0.068	-
HCM Control Delay (s)	-	-	17.6	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.2	0.2	-

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	104	464	26	191	728
Future Vol, veh/h	20	104	464	26	191	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	22	113	504	28	208	791

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1725	518	0	0	532	0
Stage 1	518	-	-	-	-	-
Stage 2	1207	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	98	558	-	-	1036	-
Stage 1	598	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	78	558	-	-	1036	-
Mov Cap-2 Maneuver	78	-	-	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	283	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.2	0	1.9
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	280	1036	-
HCM Lane V/C Ratio	-	-	0.481	0.2	-
HCM Control Delay (s)	-	-	29.2	9.3	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.7	-

Intersection	
Int Delay, s/veh	296.1

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	1303	18	150	532	0	580
Future Vol, veh/h	1303	18	150	532	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	1416	20	163	578	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1436	0	-	1426
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	473	-	0	~ 166
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	473	-	-	~ 166
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.6	$ 1314.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	166	473	-
HCM Lane V/C Ratio	-	-	3.798	0.345	-
HCM Control Delay (s)	-	$	1314.5	16.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	61.9	1.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	867	50	512	1702
Future Vol, veh/h	0	245	867	50	512	1702
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	942	54	557	1850

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	969	0	0	996	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	308	-	-	695	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	308	-	-	695	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.2	0	6.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	695	-
HCM Lane V/C Ratio	-	-	0.865	0.801	-
HCM Control Delay (s)	-	-	60.2	27.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	7.7	8.2	-

Intersection						
Int Delay, s/veh	132.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	1062	498	55
Future Vol, veh/h	242	8	15	1062	498	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	1154	541	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1757	571	601	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	1186	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 93	520	976	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	290	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	520	976	-	-	-
Mov Cap-2 Maneuver	~ 89	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 994.3	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	976	-	91	-	-
HCM Lane V/C Ratio	0.017	-	2.986	-	-
HCM Control Delay (s)	8.8	0	$ 994.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	26.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	70.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	807	1409	269
Future Vol, veh/h	83	22	30	807	1409	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	877	1532	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2621	1678	1824	0	-	0
Stage 1	1678	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 27	117	335	-	-	-
Stage 1	166	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	117	335	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1748.1	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	335	-	27	-	-
HCM Lane V/C Ratio	0.097	-	4.227	-	-
HCM Control Delay (s)	16.9	0	$ 1748.1	-	-
HCM Lane LOS	C	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	14	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

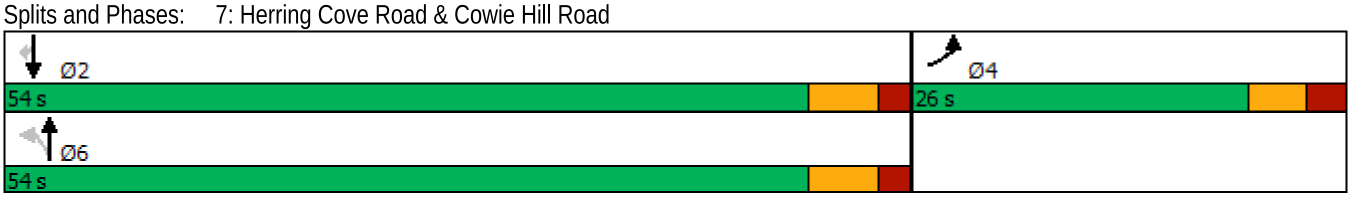
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	983	467	61
Future Volume (vph)	68	49	18	983	467	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1707	0	1789	1883	1883	1601
Flt Permitted	0.972		0.455			
Satd. Flow (perm)	1701	0	853	1883	1883	1553
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	1068	508	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	1068	508	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		54.0	54.0	54.0	54.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	11.4		53.1	53.1	53.1	53.1
Actuated g/C Ratio	0.16		0.74	0.74	0.74	0.74
v/c Ratio	0.41		0.03	0.76	0.36	0.06
Control Delay	23.9		5.3	14.8	6.5	1.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		5.3	14.8	6.5	1.9
LOS	C		A	B	A	A
Approach Delay	23.9			14.6	5.9	
Approach LOS	C			B	A	
Stops (vph)	68		7	553	175	6
Fuel Used(l)	5		1	74	29	3
CO Emissions (g/hr)	95		21	1375	532	58

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	18		4	265	103	11
VOC Emissions (g/hr)	22		5	317	123	13
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	11.2		0.7	84.7	23.9	0.0
Queue Length 95th (m)	23.5		3.7	#231.9	58.9	4.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	530		635	1403	1403	1174
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.24		0.03	0.76	0.36	0.06

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 12.5 | Intersection LOS: B
Intersection Capacity Utilization 70.3% | ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



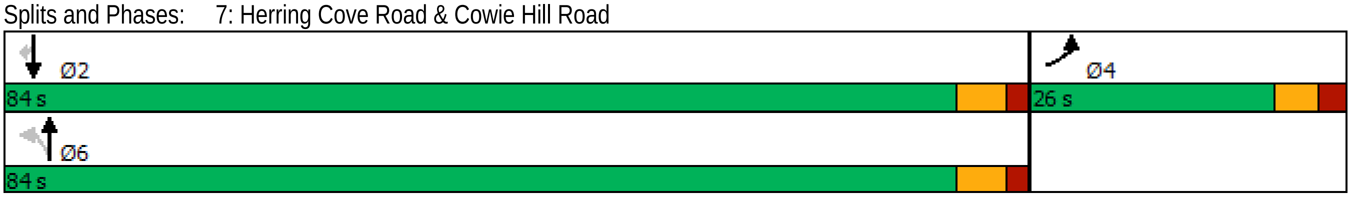
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	737	1306	99
Future Volume (vph)	112	80	70	737	1306	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.96
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1708	0	1789	1883	1883	1601
Flt Permitted	0.972		0.050			
Satd. Flow (perm)	1692	0	94	1883	1883	1543
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					53
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	801	1420	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	801	1420	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		84.0	84.0	84.0	84.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	16.7		80.4	80.4	80.4	80.4
Actuated g/C Ratio	0.15		0.74	0.74	0.74	0.74
v/c Ratio	0.73		1.10	0.58	1.03	0.09
Control Delay	52.6		165.1	9.2	47.5	2.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	52.6		165.1	9.2	47.5	2.8
LOS	D		F	A	D	A
Approach Delay	52.6			22.7	44.4	
Approach LOS	D			C	D	
Stops (vph)	155		42	329	965	16
Fuel Used(l)	14		13	50	132	5
CO Emissions (g/hr)	253		250	936	2455	99

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	49		48	181	474	19
VOC Emissions (g/hr)	58		58	216	566	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	36.0		~18.4	69.8	~323.1	2.9
Queue Length 95th (m)	60.7		#34.7	107.9	#417.0	8.0
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	336		69	1385	1385	1149
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.62		1.10	0.58	1.03	0.09

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 109.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	9.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	886	66	46	459
Future Vol, veh/h	68	59	886	66	46	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	963	72	50	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1598	999	0	0	1035	0
Stage 1	999	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	295	-	-	672	-
Stage 1	356	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	105	295	-	-	672	-
Mov Cap-2 Maneuver	105	-	-	-	-	-
Stage 1	319	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	112.4	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	150	672	-
HCM Lane V/C Ratio	-	-	0.92	0.074	-
HCM Control Delay (s)	-	-	112.4	10.8	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	6.5	0.2	-

Intersection	
Int Delay, s/veh	48.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	716	48	78	1311
Future Vol, veh/h	45	58	716	48	78	1311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	778	52	85	1425

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2399	804	0	0	830	0
Stage 1	804	-	-	-	-	-
Stage 2	1595	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 37	383	-	-	802	-
Stage 1	440	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 18	383	-	-	802	-
Mov Cap-2 Maneuver	~ 18	-	-	-	-	-
Stage 1	216	-	-	-	-	-
Stage 2	183	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1062.6	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	39	802	-
HCM Lane V/C Ratio	-	-	2.871	0.106	-
HCM Control Delay (s)	-	-	$ 1062.6	10	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	12.5	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	211	349	762	515	96
Future Volume (vph)	142	211	349	762	515	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.979	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1844	0
Flt Permitted	0.950		0.147			
Satd. Flow (perm)	1789	1601	277	1883	1844	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			12	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	229	379	828	560	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	229	379	828	664	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	20.0	60.0	40.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	11.8	11.8	53.4	51.1	31.8	
Actuated g/C Ratio	0.16	0.16	0.71	0.68	0.42	
v/c Ratio	0.55	0.52	0.75	0.65	0.85	
Control Delay	37.9	8.9	23.7	10.4	32.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.9	8.9	23.7	10.4	32.2	
LOS	D	A	C	B	C	
Approach Delay	20.5			14.6	32.2	
Approach LOS	C			B	C	
Stops (vph)	123	30	174	411	487	
Fuel Used(l)	9	6	30	59	73	
CO Emissions (g/hr)	176	110	564	1100	1355	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	34	21	109	212	262	
VOC Emissions (g/hr)	41	25	130	254	313	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	21.4	0.0	27.1	56.6	81.7	
Queue Length 95th (m)	38.6	17.2	#74.0	109.7	#156.0	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	577	671	521	1361	843	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.34	0.73	0.61	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 75.3

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

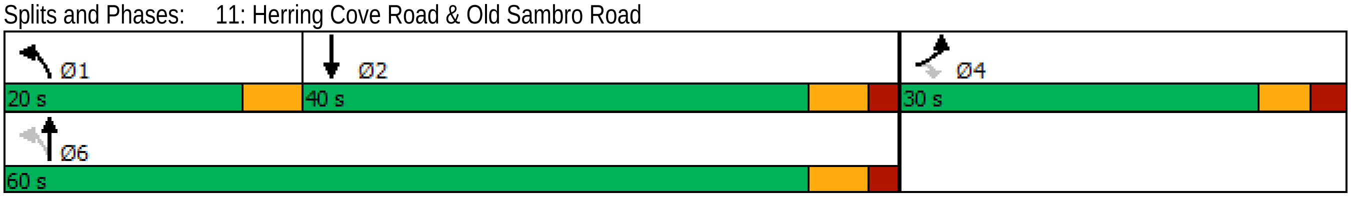
Intersection Signal Delay: 20.8 Intersection LOS: C

Intersection Capacity Utilization 73.6% ICU Level of Service D

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



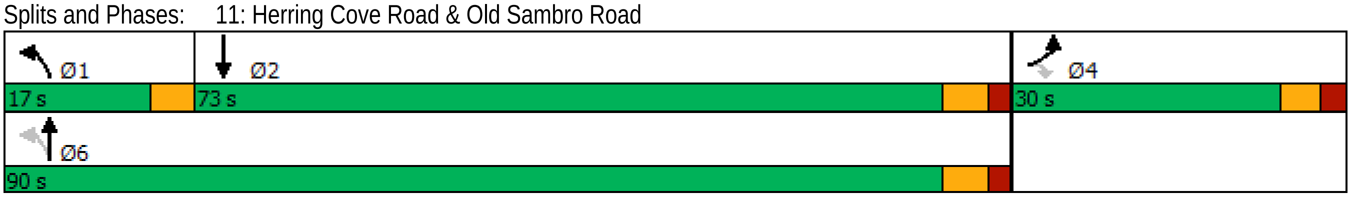
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	399	331	714	1094	173
Future Volume (vph)	167	399	331	714	1094	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.982	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1850	0
Flt Permitted	0.950		0.056			
Satd. Flow (perm)	1789	1601	105	1883	1850	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		230			11	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	434	360	776	1189	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	434	360	776	1377	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	17.0	90.0	73.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	20.4	20.4	86.2	83.9	66.9	
Actuated g/C Ratio	0.17	0.17	0.74	0.72	0.57	
v/c Ratio	0.58	0.92	1.36	0.57	1.29	
Control Delay	51.8	48.5	213.8	10.5	163.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	51.8	48.5	213.8	10.5	163.7	
LOS	D	D	F	B	F	
Approach Delay	49.4			74.9	163.7	
Approach LOS	D			E	F	
Stops (vph)	149	187	187	330	968	
Fuel Used(l)	13	26	78	54	278	
CO Emissions (g/hr)	242	488	1445	1008	5176	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	47	94	279	195	999	
VOC Emissions (g/hr)	56	113	333	233	1194	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	38.5	49.2	~97.9	84.3	~422.9	
Queue Length 95th (m)	61.5	#104.7	#156.8	115.8	#504.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	368	512	265	1355	1066	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.85	1.36	0.57	1.29	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 116.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.36	
Intersection Signal Delay: 109.0	Intersection LOS: F
Intersection Capacity Utilization 109.2%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Future Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98			0.99			0.99			1.00	
Frt		0.872			0.972			0.976			0.999	
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1606	0	0	1757	0	1789	1825	0	1789	1881	0
Flt Permitted	0.687				0.759		0.259			0.069		
Satd. Flow (perm)	1292	1606	0	0	1377	0	488	1825	0	130	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			13			19			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	142	9	40	53	1107	212	34	680	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	191	0	53	1319	0	34	685	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	69.8		58.8	58.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	17.3	17.3			17.3		68.6	66.7		57.8	57.8	
Actuated g/C Ratio	0.18	0.18			0.18		0.71	0.69		0.60	0.60	
v/c Ratio	0.01	0.11			0.74		0.12	1.04		0.44	0.61	
Control Delay	29.7	13.8			51.3		5.7	52.9		37.2	16.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	29.7	13.8			51.3		5.7	52.9		37.2	16.8	
LOS	C	B			D		A	D		D	B	
Approach Delay		15.1			51.3			51.1			17.7	
Approach LOS		B			D			D			B	
Stops (vph)	3	12			151		15	875		24	402	
Fuel Used(l)	0	1			14		2	116		3	53	
CO Emissions (g/hr)	3	16			252		46	2163		60	993	

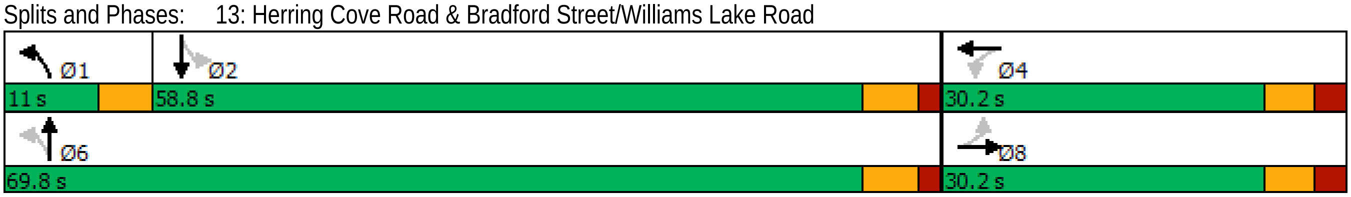
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	3			49		9	417		12	192	
VOC Emissions (g/hr)	1	4			58		11	499		14	229	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.5	0.8			30.4		2.5	~259.5		3.3	77.9	
Queue Length 95th (m)	2.7	8.3			52.6		7.2	#375.5		#19.7	134.2	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	323	423			354		443	1272		78	1131	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.01	0.08			0.54		0.12	1.04		0.44	0.61	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 96.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 40.2	Intersection LOS: D
Intersection Capacity Utilization 92.4%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



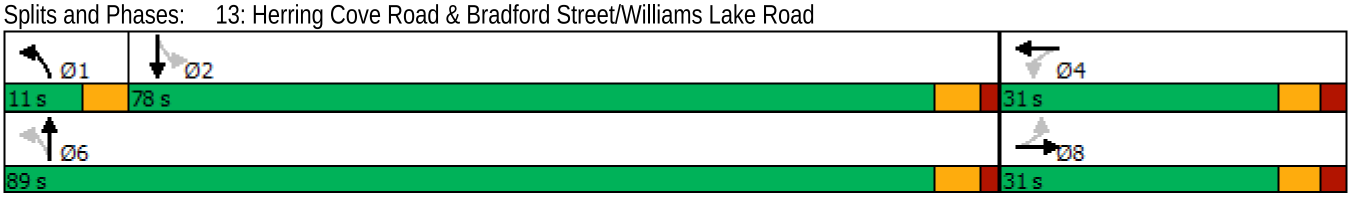
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Future Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96			0.98			0.99			1.00	
Frt		0.870			0.984			0.977				
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1565	0	0	1778	0	1789	1829	0	1789	1883	0
Flt Permitted	0.676				0.537		0.053			0.075		
Satd. Flow (perm)	1260	1565	0	0	974	0	100	1829	0	141	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		126			5			18				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	174	33	28	103	986	180	74	1550	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	235	0	103	1166	0	74	1554	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	31.0	31.0		31.0	31.0		11.0	89.0		78.0	78.0	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	24.8	24.8			24.8		85.0	83.1		72.1	72.1	
Actuated g/C Ratio	0.21	0.21			0.21		0.71	0.69		0.60	0.60	
v/c Ratio	0.15	0.44			1.15		0.61	0.92		0.88	1.37	
Control Delay	40.9	18.3			150.2		31.6	28.3		96.8	198.5	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	40.9	18.3			150.2		31.6	28.3		96.8	198.5	
LOS	D	B			F		C	C		F	F	
Approach Delay		22.3			150.2			28.6			193.9	
Approach LOS		C			F			C			F	
Stops (vph)	30	54			170		42	821		49	1074	
Fuel Used(l)	2	5			33		7	84		10	325	
CO Emissions (g/hr)	40	93			609		129	1555		187	6041	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	8	18			118		25	300		36	1166	
VOC Emissions (g/hr)	9	22			140		30	359		43	1393	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	7.8	12.0			~64.1		7.2	206.2		13.8	~484.3	
Queue Length 95th (m)	17.6	33.1			#114.4		#27.8	#337.6		#46.4	#564.6	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	260	423			205		169	1272		84	1131	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.15	0.44			1.15		0.61	0.92		0.88	1.37	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.37	
Intersection Signal Delay: 116.8	Intersection LOS: F
Intersection Capacity Utilization 122.7%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	295	569	1046	527	148
Future Volume (vph)	165	295	569	1046	527	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.94				0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.127			
Satd. Flow (perm)	1726	1504	239	1883	1883	1537
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		321				69
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	321	618	1137	573	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	321	618	1137	573	161
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	27.0	60.0	33.0	33.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	17.8	17.8	56.4	54.7	27.5	27.5
Actuated g/C Ratio	0.21	0.21	0.67	0.65	0.33	0.33
v/c Ratio	0.47	0.56	1.06	0.93	0.93	0.29
Control Delay	32.7	7.5	77.9	30.6	53.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	7.5	77.9	30.6	53.9	15.3
LOS	C	A	E	C	D	B
Approach Delay	16.5			47.2	45.5	
Approach LOS	B			D	D	
Stops (vph)	135	34	355	753	430	64
Fuel Used(l)	12	11	49	54	52	9
CO Emissions (g/hr)	217	196	907	1002	968	166

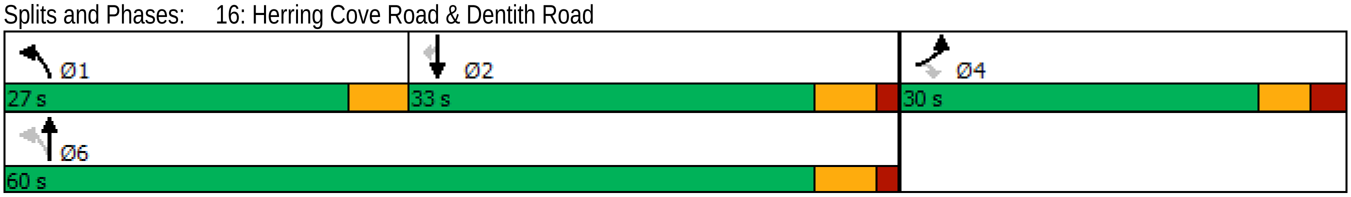
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	42	38	175	193	187	32
VOC Emissions (g/hr)	50	45	209	231	223	38
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	25.2	0.0	~109.5	~180.8	~99.2	11.7
Queue Length 95th (m)	43.2	18.8	#173.1	#280.1	#165.1	27.2
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	513	660	585	1222	614	548
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.49	1.06	0.93	0.93	0.29

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 84.3	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 41.7	Intersection LOS: D
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	734	469	810	1367	252
Future Volume (vph)	231	734	469	810	1367	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.90				0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.065			
Satd. Flow (perm)	1736	1439	122	1883	1883	1488
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		237				45
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	798	510	880	1486	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	798	510	880	1486	274
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	38.0	38.0	19.0	82.0	63.0	63.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	32.0	32.0	78.0	76.3	57.3	57.3
Actuated g/C Ratio	0.27	0.27	0.65	0.64	0.48	0.48
v/c Ratio	0.53	1.43	1.78	0.74	1.65	0.37
Control Delay	42.3	229.8	389.1	19.6	324.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	229.8	389.1	19.6	324.6	18.2
LOS	D	F	F	B	F	B
Approach Delay	185.0			155.2	276.9	
Approach LOS	F			F	F	
Stops (vph)	194	390	263	541	947	131
Fuel Used(l)	18	159	152	34	416	16
CO Emissions (g/hr)	338	2950	2825	631	7737	303

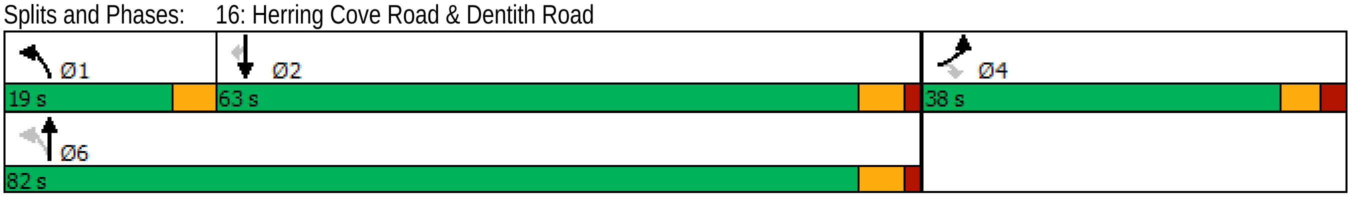
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	65	569	545	122	1493	58
VOC Emissions (g/hr)	78	680	652	146	1785	70
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	50.5	~212.4	~165.1	131.6	~507.9	33.0
Queue Length 95th (m)	76.6	#287.2	#230.8	181.8	#588.2	53.4
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	477	557	287	1197	899	734
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.43	1.78	0.74	1.65	0.37

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.78	
Intersection Signal Delay: 213.6	Intersection LOS: F
Intersection Capacity Utilization 130.1%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	29.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	56	82	1595	773	95
Future Vol, veh/h	51	56	82	1595	773	95
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	61	89	1734	840	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2815	908	954	0	-	0
Stage 1	903	-	-	-	-	-
Stage 2	1912	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 20	334	720	-	-	-
Stage 1	396	-	-	-	-	-
Stage 2	127	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 17	329	713	-	-	-
Mov Cap-2 Maneuver	~ 17	-	-	-	-	-
Stage 1	343	-	-	-	-	-
Stage 2	126	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 715.1	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	713	-	17	329	-	-
HCM Lane V/C Ratio	0.125	-	3.261	0.185	-	-
HCM Control Delay (s)	10.8		$ 1480.1	18.4	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	7.6	0.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	395.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	108	86	1222	1920	244
Future Vol, veh/h	68	108	86	1222	1920	244
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	74	117	93	1328	2087	265

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3799	2317	2417	0	-	0
Stage 1	2285	-	-	-	-	-
Stage 2	1514	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 4	~ 48	196	-	-	-
Stage 1	82	-	-	-	-	-
Stage 2	201	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 2	~ 44	184	-	-	-
Mov Cap-2 Maneuver	~ 2	-	-	-	-	-
Stage 1	~ 38	-	-	-	-	-
Stage 2	189	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 8180.2	2.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	184	-	2	44	-	-
HCM Lane V/C Ratio	0.508	-	36.957	2.668	-	-
HCM Control Delay (s)	43.2		$ 19661.8	$ 951.1	-	-
HCM Lane LOS	E	-	F	F	-	-
HCM 95th %tile Q(veh)	2.5	-	11.4	12.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	207.8					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	337	1235	18	143	605
Future Vol, veh/h	44	337	1235	18	143	605
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	48	366	1342	20	155	658

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2320	1352	0	0	1362	0
Stage 1	1352	-	-	-	-	-
Stage 2	968	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 41	~ 184	-	-	505	-
Stage 1	241	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 28	~ 184	-	-	505	-
Mov Cap-2 Maneuver	~ 28	-	-	-	-	-
Stage 1	167	-	-	-	-	-
Stage 2	368	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1293.6	0	2.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	112	505	-
HCM Lane V/C Ratio	-	-	3.698	0.308	-
HCM Control Delay (s)	-	-	$ 1293.6	15.3	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	41.5	1.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1799.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	266	912	56	463	1489
Future Vol, veh/h	38	266	912	56	463	1489
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	41	289	991	61	503	1618

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3646	1022	0	0	1052	0
Stage 1	1022	-	-	-	-	-
Stage 2	2624	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 6	~ 287	-	-	662	-
Stage 1	347	-	-	-	-	-
Stage 2	55	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 1	~ 287	-	-	662	-
Mov Cap-2 Maneuver	~ 1	-	-	-	-	-
Stage 1	83	-	-	-	-	-
Stage 2	55	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	$ 19042		0		6.1	
HCM LOS	F					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	8	662	-
HCM Lane V/C Ratio	-	-	41.304	0.76	-
HCM Control Delay (s)	-	-	$ 19042	25.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	43.2	7	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	134.2

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	835	18	150	374	0	580
Future Vol, veh/h	835	18	150	374	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	908	20	163	407	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	928	0	-	918
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	737	-	0	~ 329
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	737	-	-	~ 329
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.2	$ 450
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	329	737	-
HCM Lane V/C Ratio	-	-	1.916	0.221	-
HCM Control Delay (s)	-	-	$ 450	11.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	43.2	0.8	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	555	50	512	1175
Future Vol, veh/h	0	245	555	50	512	1175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	603	54	557	1277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	630	0	0	657	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	482	-	-	931	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	482	-	-	931	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.3	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	931	-
HCM Lane V/C Ratio	-	-	0.552	0.598	-
HCM Control Delay (s)	-	-	21.3	14.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	3.3	4.1	-

Intersection	
Int Delay, s/veh	27.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	594	340	55
Future Vol, veh/h	242	8	15	594	340	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	646	370	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	400	430	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 242	650	1129	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 237	650	1129	-	-	-
Mov Cap-2 Maneuver	~ 237	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	138.5	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	242	-	-
HCM Lane V/C Ratio	0.014	-	1.123	-	-
HCM Control Delay (s)	8.2	0	138.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	12.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	11.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	495	882	269
Future Vol, veh/h	83	22	30	495	882	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	538	959	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1709	1105	1251	0	-	0
Stage 1	1105	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	100	256	556	-	-	-
Stage 1	317	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	256	556	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	185.7	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	556	-	106	-	-
HCM Lane V/C Ratio	0.059	-	1.077	-	-
HCM Control Delay (s)	11.9	0	185.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	7.1	-	-

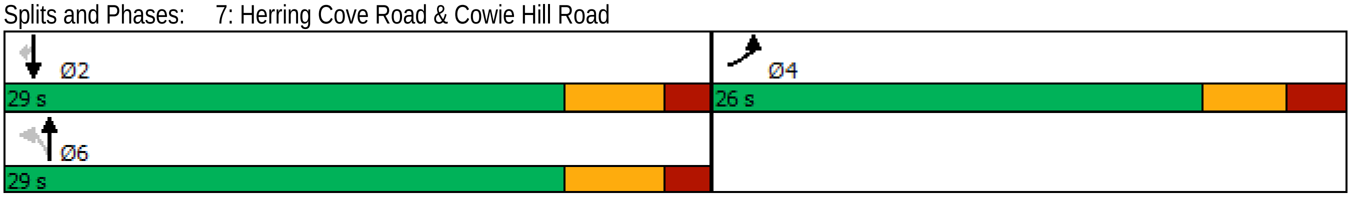
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	515	309	61
Future Volume (vph)	68	49	18	515	309	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.558			
Satd. Flow (perm)	1705	0	1047	1883	1883	1558
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	53					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	560	336	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	560	336	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		29.0	29.0	29.0	29.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	10.3		27.6	27.6	27.6	27.6
Actuated g/C Ratio	0.23		0.62	0.62	0.62	0.62
v/c Ratio	0.29		0.03	0.48	0.29	0.07
Control Delay	11.1		7.8	10.6	8.3	3.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		7.8	10.6	8.3	3.1
LOS	B		A	B	A	A
Approach Delay	11.1			10.5	7.5	
Approach LOS	B			B	A	
Stops (vph)	56		12	306	160	11
Fuel Used(l)	4		1	37	20	3
CO Emissions (g/hr)	69		24	696	379	62

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	13		5	134	73	12
VOC Emissions (g/hr)	16		6	161	87	14
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	5.0		0.6	24.7	12.6	0.0
Queue Length 95th (m)	13.6		4.3	#75.5	39.8	5.4
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	826		645	1161	1161	986
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.15		0.03	0.48	0.29	0.07

Intersection Summary	
Area Type: Other	
Cycle Length: 55	
Actuated Cycle Length: 44.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay: 9.5	Intersection LOS: A
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road

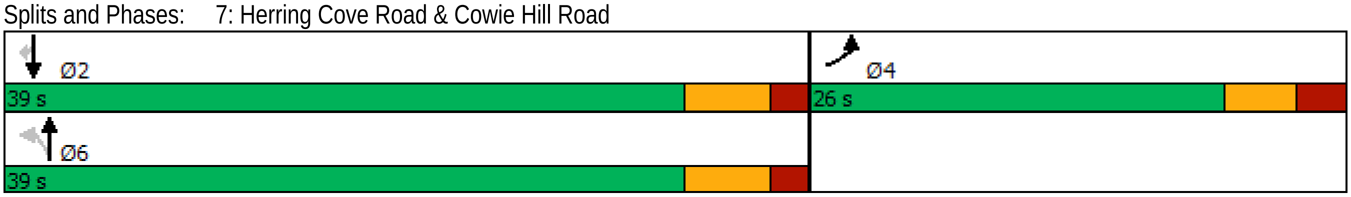


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	425	779	99
Future Volume (vph)	112	80	70	425	779	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1710	0	1789	1883	1883	1601
Flt Permitted	0.972		0.188			
Satd. Flow (perm)	1701	0	354	1883	1883	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	57					90
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	462	847	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	462	847	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		39.0	39.0	39.0	39.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	12.0		33.4	33.4	33.4	33.4
Actuated g/C Ratio	0.21		0.58	0.58	0.58	0.58
v/c Ratio	0.52		0.37	0.42	0.78	0.12
Control Delay	18.8		15.1	9.2	17.7	3.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	18.8		15.1	9.2	17.7	3.0
LOS	B		B	A	B	A
Approach Delay	18.8			10.1	16.0	
Approach LOS	B			B	B	
Stops (vph)	113		45	226	524	17
Fuel Used(l)	8		5	30	60	5
CO Emissions (g/hr)	143		101	555	1110	100

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28		19	107	214	19
VOC Emissions (g/hr)	33		23	128	256	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	13.8		3.6	22.6	56.6	0.7
Queue Length 95th (m)	29.1		17.1	55.1	#156.3	7.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	633		206	1099	1099	945
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.37	0.42	0.77	0.11

Intersection Summary	
Area Type: Other	
Cycle Length: 65	
Actuated Cycle Length: 57.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 14.5	Intersection LOS: B
Intersection Capacity Utilization 73.8%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	418	66	46	301
Future Vol, veh/h	68	59	418	66	46	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	454	72	50	327

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	490	0	0	526	0
Stage 1	490	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	578	-	-	1041	-
Stage 1	616	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	284	578	-	-	1041	-
Mov Cap-2 Maneuver	284	-	-	-	-	-
Stage 1	580	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.3	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	372	1041	-
HCM Lane V/C Ratio	-	-	0.371	0.048	-
HCM Control Delay (s)	-	-	20.3	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.2	-

Intersection						
Int Delay, s/veh	3.4					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	404	48	78	784
Future Vol, veh/h	45	58	404	48	78	784
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	439	52	85	852

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1487	465	0	0	491	0
Stage 1	465	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	137	597	-	-	1072	-
Stage 1	632	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	116	597	-	-	1072	-
Mov Cap-2 Maneuver	116	-	-	-	-	-
Stage 1	537	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.5	0	0.8
HCM LOS	E		

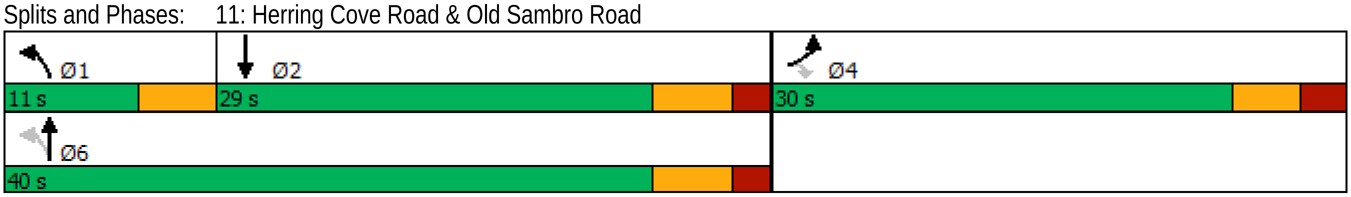
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	212	1072	-
HCM Lane V/C Ratio	-	-	0.528	0.079	-
HCM Control Delay (s)	-	-	39.5	8.6	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	2.8	0.3	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	176	245	294	357	96
Future Volume (vph)	142	176	245	294	357	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3464	0
Flt Permitted	0.950		0.351			
Satd. Flow (perm)	1789	1601	661	1883	3464	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		191			51	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	191	266	320	388	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	191	266	320	492	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	9.5	9.5	25.0	22.7	11.6	
Actuated g/C Ratio	0.21	0.21	0.56	0.51	0.26	
v/c Ratio	0.41	0.39	0.48	0.33	0.52	
Control Delay	19.4	5.9	8.6	7.9	14.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.4	5.9	8.6	7.9	14.9	
LOS	B	A	A	A	B	
Approach Delay	11.9			8.2	14.9	
Approach LOS	B			A	B	
Stops (vph)	110	31	111	152	312	
Fuel Used(l)	7	5	18	22	47	
CO Emissions (g/hr)	133	87	339	411	872	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	26	17	65	79	168	
VOC Emissions (g/hr)	31	20	78	95	201	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	10.3	0.0	8.7	12.5	14.8	
Queue Length 95th (m)	24.8	11.8	21.2	28.5	27.8	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	976	960	549	1447	1820	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.16	0.20	0.48	0.22	0.27	

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 44.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 11.4	Intersection LOS: B
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	282	262	402	567	173
Future Volume (vph)	167	282	262	402	567	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.965	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3453	0
Flt Permitted	0.950		0.215			
Satd. Flow (perm)	1789	1601	405	1883	3453	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		307			61	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	307	285	437	616	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	307	285	437	804	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	11.0	11.0	31.3	29.1	17.8	
Actuated g/C Ratio	0.21	0.21	0.60	0.55	0.34	
v/c Ratio	0.49	0.53	0.66	0.42	0.66	
Control Delay	23.7	6.6	15.9	8.8	16.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.7	6.6	15.9	8.8	16.8	
LOS	C	A	B	A	B	
Approach Delay	13.0			11.6	16.8	
Approach LOS	B			B	B	
Stops (vph)	133	39	107	209	531	
Fuel Used(l)	9	7	21	31	78	
CO Emissions (g/hr)	168	137	385	568	1453	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	32	27	74	110	280	
VOC Emissions (g/hr)	39	32	89	131	335	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	15.3	0.0	10.7	20.5	29.7	
Queue Length 95th (m)	32.3	15.7	#33.7	45.1	52.0	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	834	910	429	1236	1563	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.34	0.66	0.35	0.51	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 52.5

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

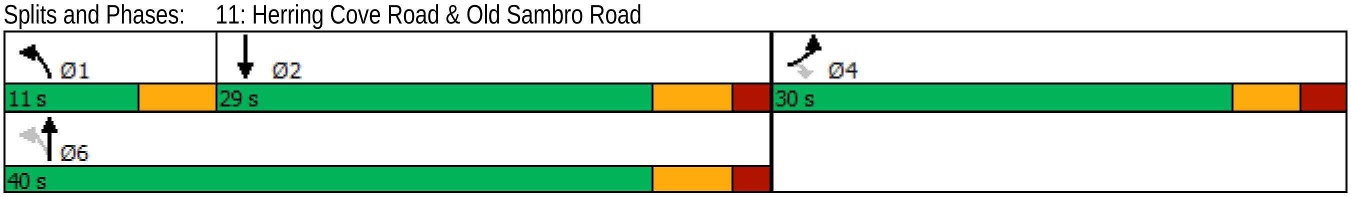
Intersection Signal Delay: 14.0 — Intersection LOS: B

Intersection Capacity Utilization 58.5% — ICU Level of Service B

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



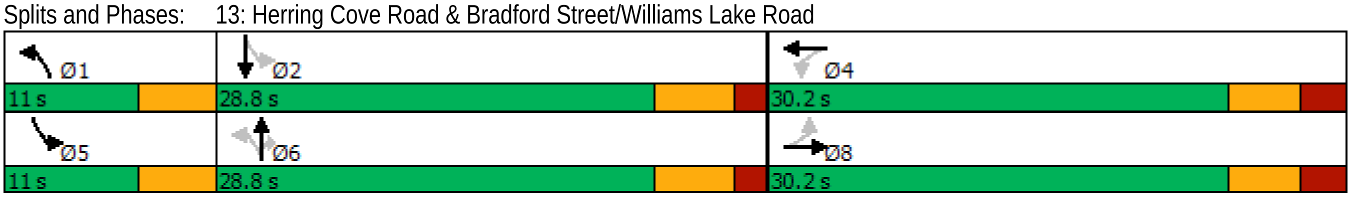
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Future Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.98		0.99		0.96	0.99	1.00	
Frt		0.872			0.878				0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1622	0	1789	1625	0	1789	1883	1601	1789	3570	0
Flt Permitted	0.725			0.735			0.480			0.397		
Satd. Flow (perm)	1364	1622	0	1381	1625	0	899	1883	1541	743	3570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			40				112		2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	123	9	40	53	485	154	34	471	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	123	49	0	53	485	154	34	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	28.8	28.8	11.0	28.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	11.6	11.6		11.6	11.6		27.3	25.0	25.0	27.3	25.0	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.58	0.53	0.53	0.58	0.53	
v/c Ratio	0.01	0.08		0.36	0.11		0.08	0.49	0.18	0.06	0.25	
Control Delay	16.0	8.6		20.0	8.3		6.9	16.1	6.1	6.9	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.0	8.6		20.0	8.3		6.9	16.1	6.1	6.9	11.5	
LOS	B	A		C	A		A	B	A	A	B	
Approach Delay		9.2			16.7			13.2			11.2	
Approach LOS		A			B			B			B	
Stops (vph)	4	12		84	15		22	288	35	15	245	
Fuel Used(l)	0	1		6	1		3	29	7	2	35	
CO Emissions (g/hr)	3	13		106	27		49	546	130	42	643	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	3		20	5		10	105	25	8	124	
VOC Emissions (g/hr)	1	3		24	6		11	126	30	10	148	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	0.2	0.3		6.9	0.5		1.6	21.4	1.4	1.0	9.4	
Queue Length 95th (m)	1.8	5.6		23.2	7.0		8.0	#101.2	15.3	5.8	36.8	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	763	920		773	927		666	1093	941	601	2073	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.00	0.04		0.16	0.05		0.08	0.44	0.16	0.06	0.23	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 47.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 12.8 Intersection LOS: B
Intersection Capacity Utilization 55.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



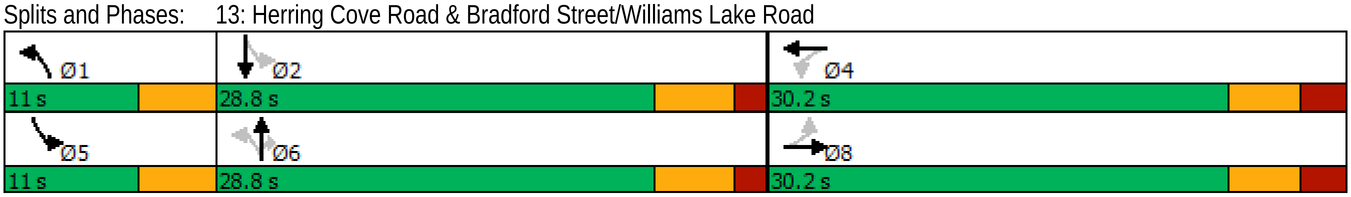
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Future Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	0.98		0.99	0.99		1.00		0.97	1.00	1.00	
Frt		0.870			0.931				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1606	0	1789	1728	0	1789	1883	1601	1789	3574	0
Flt Permitted	0.717			0.640			0.245			0.316		
Satd. Flow (perm)	1336	1606	0	1195	1728	0	460	1883	1552	593	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			28				112		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	111	33	28	103	572	142	74	850	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	111	61	0	103	572	142	74	854	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	28.8	28.8	11.0	28.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	12.0	12.0		12.0	12.0		32.3	26.5	26.5	31.4	24.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.57	0.47	0.47	0.55	0.42	
v/c Ratio	0.14	0.40		0.44	0.16		0.24	0.65	0.18	0.16	0.57	
Control Delay	18.8	7.6		25.0	12.2		7.8	21.0	5.8	7.1	16.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	18.8	7.6		25.0	12.2		7.8	21.0	5.8	7.1	16.5	
LOS	B	A		C	B		A	C	A	A	B	
Approach Delay		9.6			20.5			16.7			15.7	
Approach LOS		A			C			B			B	
Stops (vph)	29	36		79	27		41	360	30	29	575	
Fuel Used(l)	1	3		6	2		5	37	6	5	68	
CO Emissions (g/hr)	28	60		104	40		97	690	118	92	1266	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	5	12		20	8		19	133	23	18	244	
VOC Emissions (g/hr)	6	14		24	9		22	159	27	21	292	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	3.5	2.2		10.4	2.9		3.4	47.8	1.8	2.4	34.2	
Queue Length 95th (m)	9.5	14.1		21.8	9.9		13.5	#128.6	13.7	10.3	70.5	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	572	780		512	756		427	876	782	476	1571	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.07	0.24		0.22	0.08		0.24	0.65	0.18	0.16	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 56.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	207	308	421	316	148
Future Volume (vph)	165	207	308	421	316	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	1	2			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	0.95
Ped Bike Factor	0.97	0.97	0.99		0.99	
Frt		0.850			0.952	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	3471	1883	3384	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1740	1552	3444	1883	3384	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225			117	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	225	335	458	343	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	225	335	458	504	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4				
Total Split (s)	30.0	30.0	12.0	40.0	28.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	14.3	14.3	8.1	34.8	22.6	
Actuated g/C Ratio	0.23	0.23	0.13	0.57	0.37	
v/c Ratio	0.43	0.42	0.73	0.43	0.38	
Control Delay	22.0	5.3	38.6	10.7	12.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.0	5.3	38.6	10.7	12.9	
LOS	C	A	D	B	B	
Approach Delay	12.7			22.5	12.9	
Approach LOS	B			C	B	
Stops (vph)	123	25	258	233	247	
Fuel Used(l)	10	7	19	14	28	
CO Emissions (g/hr)	187	131	346	254	525	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	36	25	67	49	101	
VOC Emissions (g/hr)	43	30	80	59	121	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	16.8	0.0	17.3	21.1	13.8	
Queue Length 95th (m)	30.8	12.7	#42.7	60.8	32.5	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			
Base Capacity (vph)	714	754	461	1074	1328	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.25	0.30	0.73	0.43	0.38	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 61

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.73

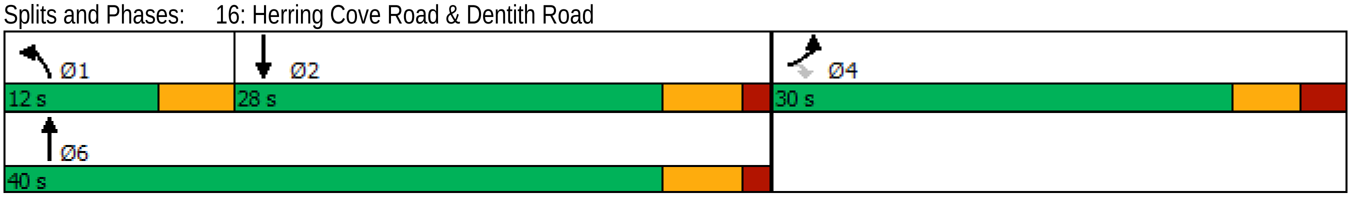
Intersection Signal Delay: 17.3 Intersection LOS: B

Intersection Capacity Utilization 55.0% ICU Level of Service A

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	441	295	394	665	252
Future Volume (vph)	231	441	295	394	665	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	1	2			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	0.95
Ped Bike Factor	0.98	0.96	0.99		0.99	
Frt		0.850			0.959	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	3471	1883	3404	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1758	1536	3445	1883	3404	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		291			84	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	479	321	428	723	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	479	321	428	997	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4				
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	17.8	17.8	7.1	34.7	23.6	
Actuated g/C Ratio	0.28	0.28	0.11	0.54	0.37	
v/c Ratio	0.51	0.76	0.84	0.42	0.77	
Control Delay	22.7	16.2	52.1	12.0	22.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	22.7	16.2	52.1	12.0	22.8	
LOS	C	B	D	B	C	
Approach Delay	18.5			29.2	22.8	
Approach LOS	B			C	C	
Stops (vph)	176	167	244	227	692	
Fuel Used(l)	14	21	21	13	67	
CO Emissions (g/hr)	266	396	387	249	1253	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	51	76	75	48	242	
VOC Emissions (g/hr)	61	91	89	57	289	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	24.7	18.1	21.9	34.8	57.6	
Queue Length 95th (m)	42.6	48.9	#43.9	55.9	#89.4	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			
Base Capacity (vph)	675	761	382	1016	1301	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.63	0.84	0.42	0.77	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 64.3

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.84

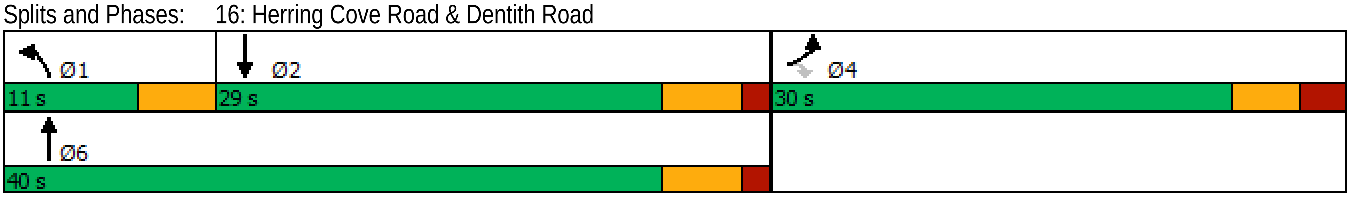
Intersection Signal Delay: 23.5   Intersection LOS: C

Intersection Capacity Utilization 66.9%   ICU Level of Service C

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection						
Int Delay, s/veh	1.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	36	29	725	481	88
Future Vol, veh/h	35	36	29	725	481	88
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	38	39	32	788	523	96

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1434	326	630	0	-	0
Stage 1	582	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	136	670	950	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	129	660	940	-	-	-
Mov Cap-2 Maneuver	129	-	-	-	-	-
Stage 1	500	-	-	-	-	-
Stage 2	413	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.3	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	940	-	129	660	-	-
HCM Lane V/C Ratio	0.034	-	0.295	0.059	-	-
HCM Control Delay (s)	9	-	44.2	10.8	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	0.2	-	-

Intersection						
Int Delay, s/veh	10.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	49	49	649	946	223
Future Vol, veh/h	51	49	49	649	946	223
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	53	53	705	1028	242

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2025	732	1335	0	-	0
Stage 1	1214	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	56	364	515	-	-	-
Stage 1	245	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 44	332	484	-	-	-
Mov Cap-2 Maneuver	~ 44	-	-	-	-	-
Stage 1	205	-	-	-	-	-
Stage 2	410	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	196.7	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	484	-	44	332	-	-
HCM Lane V/C Ratio	0.11	-	1.26	0.16	-	-
HCM Control Delay (s)	13.4	-	$ 368.5	17.9	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	5.3	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

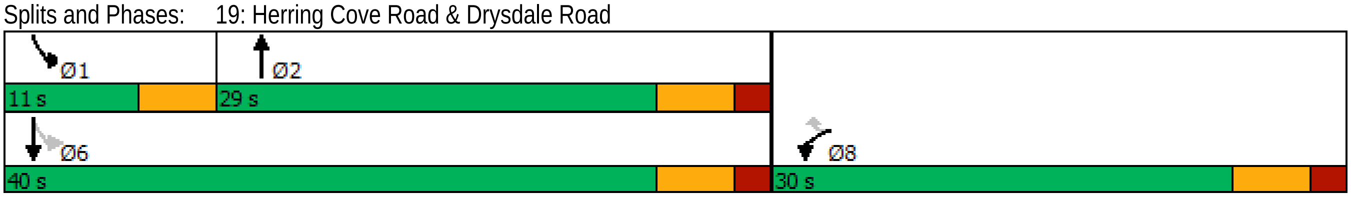
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	17	92	557	9	60	376
Future Volume (vph)	17	92	557	9	60	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1880	0	1789	3579
Flt Permitted	0.950				0.282	
Satd. Flow (perm)	1789	1601	1880	0	531	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		100	1			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	18	100	605	10	65	409
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	100	615	0	65	409
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	29.0		11.0	40.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	7.4	7.4	30.1		36.8	36.3
Actuated g/C Ratio	0.15	0.15	0.59		0.72	0.71
v/c Ratio	0.07	0.31	0.56		0.12	0.16
Control Delay	20.6	8.6	14.3		3.5	3.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.6	8.6	14.3		3.5	3.9
LOS	C	A	B		A	A
Approach Delay	10.4		14.3			3.9
Approach LOS	B		B			A
Stops (vph)	18	23	366		19	122
Fuel Used(l)	1	2	39		4	27
CO Emissions (g/hr)	16	38	723		79	497

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	3	7	140		15	96
VOC Emissions (g/hr)	4	9	167		18	115
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	1.6	0.0	46.2		1.6	6.6
Queue Length 95th (m)	6.0	10.1	#97.7		4.6	12.0
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	856	818	1108		558	2458
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.02	0.12	0.56		0.12	0.17

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 54.9% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road

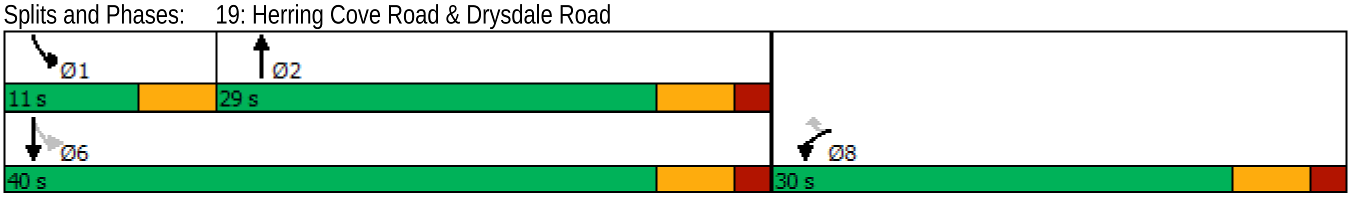


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	20	104	464	26	191	728
Future Volume (vph)	20	104	464	26	191	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.993			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1870	0	1789	3579
Flt Permitted	0.950				0.289	
Satd. Flow (perm)	1789	1601	1870	0	544	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		113	4			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	22	113	504	28	208	791
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	113	532	0	208	791
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	29.0		11.0	40.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	7.4	7.4	22.5		35.6	35.0
Actuated g/C Ratio	0.15	0.15	0.45		0.71	0.70
v/c Ratio	0.08	0.34	0.63		0.37	0.32
Control Delay	20.7	8.5	16.0		5.3	4.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.7	8.5	16.0		5.3	4.7
LOS	C	A	B		A	A
Approach Delay	10.5		16.0			4.8
Approach LOS	B		B			A
Stops (vph)	21	25	365		60	271
Fuel Used(l)	1	2	35		14	53
CO Emissions (g/hr)	18	42	657		256	986

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	4	8	127		49	190
VOC Emissions (g/hr)	4	10	152		59	227
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	1.8	0.0	37.4		5.5	14.6
Queue Length 95th (m)	6.7	10.7	68.8		12.3	24.6
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	863	831	896		561	2602
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.03	0.14	0.59		0.37	0.30

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 50.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 55.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 19: Herring Cove Road & Drysdale Road



Intersection	
Int Delay, s/veh	296.1

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	1303	18	150	532	0	580
Future Vol, veh/h	1303	18	150	532	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	1416	20	163	578	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1436	0	-	1426
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	473	-	0	~ 166
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	473	-	-	~ 166
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.6	$ 1314.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	166	473	-
HCM Lane V/C Ratio	-	-	3.798	0.345	-
HCM Control Delay (s)	-	-	$ 1314.5	16.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	61.9	1.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	867	50	512	1702
Future Vol, veh/h	0	245	867	50	512	1702
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	942	54	557	1850

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	969	0	0	996	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	308	-	-	695	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	308	-	-	695	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.2	0	6.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	695	-
HCM Lane V/C Ratio	-	-	0.865	0.801	-
HCM Control Delay (s)	-	-	60.2	27.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	7.7	8.2	-

Intersection						
Int Delay, s/veh	132.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	1062	498	55
Future Vol, veh/h	242	8	15	1062	498	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	1154	541	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1757	571	601	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	1186	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 93	520	976	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	290	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	520	976	-	-	-
Mov Cap-2 Maneuver	~ 89	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 994.3	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	976	-	91	-	-
HCM Lane V/C Ratio	0.017	-	2.986	-	-
HCM Control Delay (s)	8.8	0	$ 994.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	26.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	70.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	807	1409	269
Future Vol, veh/h	83	22	30	807	1409	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	877	1532	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2621	1678	1824	0	-	0
Stage 1	1678	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 27	117	335	-	-	-
Stage 1	166	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	117	335	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1748.1	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	335	-	27	-	-
HCM Lane V/C Ratio	0.097	-	4.227	-	-
HCM Control Delay (s)	16.9	0	$ 1748.1	-	-
HCM Lane LOS	C	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	14	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

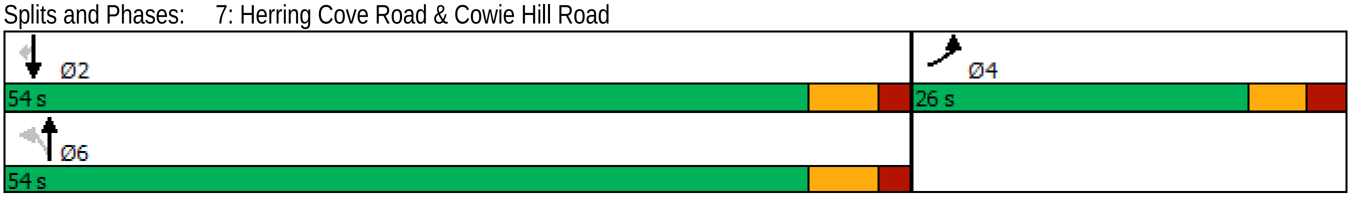
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	983	467	61
Future Volume (vph)	68	49	18	983	467	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1707	0	1789	1883	1883	1601
Flt Permitted	0.972		0.455			
Satd. Flow (perm)	1701	0	853	1883	1883	1553
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	1068	508	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	1068	508	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		54.0	54.0	54.0	54.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	11.4		53.1	53.1	53.1	53.1
Actuated g/C Ratio	0.16		0.74	0.74	0.74	0.74
v/c Ratio	0.41		0.03	0.76	0.36	0.06
Control Delay	23.9		5.3	14.8	6.5	1.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		5.3	14.8	6.5	1.9
LOS	C		A	B	A	A
Approach Delay	23.9			14.6	5.9	
Approach LOS	C			B	A	
Stops (vph)	68		7	553	175	6
Fuel Used(l)	5		1	74	29	3
CO Emissions (g/hr)	95		21	1375	532	58

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	18		4	265	103	11
VOC Emissions (g/hr)	22		5	317	123	13
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	11.2		0.7	84.7	23.9	0.0
Queue Length 95th (m)	23.5		3.7	#231.9	58.9	4.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	530		635	1403	1403	1174
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.24		0.03	0.76	0.36	0.06

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 12.5 — Intersection LOS: B
Intersection Capacity Utilization 70.3% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



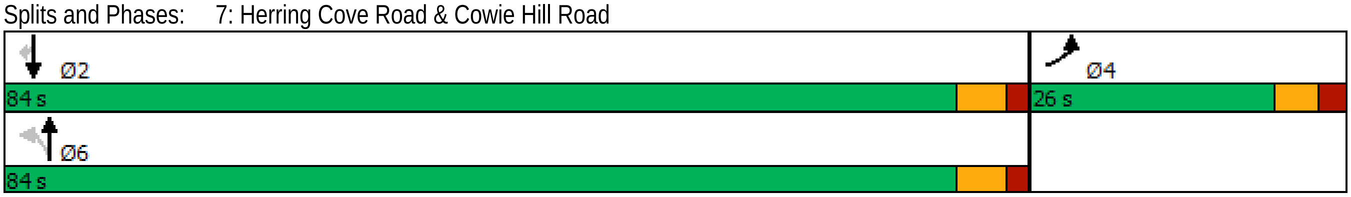
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	737	1306	99
Future Volume (vph)	112	80	70	737	1306	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.96
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1708	0	1789	1883	1883	1601
Flt Permitted	0.972		0.050			
Satd. Flow (perm)	1692	0	94	1883	1883	1543
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					53
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	801	1420	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	801	1420	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		84.0	84.0	84.0	84.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	16.7		80.4	80.4	80.4	80.4
Actuated g/C Ratio	0.15		0.74	0.74	0.74	0.74
v/c Ratio	0.73		1.10	0.58	1.03	0.09
Control Delay	52.6		165.1	9.2	47.5	2.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	52.6		165.1	9.2	47.5	2.8
LOS	D		F	A	D	A
Approach Delay	52.6			22.7	44.4	
Approach LOS	D			C	D	
Stops (vph)	155		42	329	965	16
Fuel Used(l)	14		13	50	132	5
CO Emissions (g/hr)	253		250	936	2455	99

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	49		48	181	474	19
VOC Emissions (g/hr)	58		58	216	566	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	36.0		~18.4	69.8	~323.1	2.9
Queue Length 95th (m)	60.7		#34.7	107.9	#417.0	8.0
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	336		69	1385	1385	1149
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.62		1.10	0.58	1.03	0.09

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 109.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.10	
Intersection Signal Delay: 37.8	Intersection LOS: D
Intersection Capacity Utilization 90.6%	ICU Level of Service E
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection						
Int Delay, s/veh	9.3					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	886	66	46	459
Future Vol, veh/h	68	59	886	66	46	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	74	64	963	72	50	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1598	999	0	0	1035	0
Stage 1	999	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	295	-	-	672	-
Stage 1	356	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	105	295	-	-	672	-
Mov Cap-2 Maneuver	105	-	-	-	-	-
Stage 1	319	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	112.4	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	150	672	-
HCM Lane V/C Ratio	-	-	0.92	0.074	-
HCM Control Delay (s)	-	-	112.4	10.8	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	6.5	0.2	-

Intersection						
Int Delay, s/veh	48.9					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	716	48	78	1311
Future Vol, veh/h	45	58	716	48	78	1311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	49	63	778	52	85	1425

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2399	804	0	0	830	0
Stage 1	804	-	-	-	-	-
Stage 2	1595	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 37	383	-	-	802	-
Stage 1	440	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 18	383	-	-	802	-
Mov Cap-2 Maneuver	~ 18	-	-	-	-	-
Stage 1	216	-	-	-	-	-
Stage 2	183	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1062.6	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	39	802	-
HCM Lane V/C Ratio	-	-	2.871	0.106	-
HCM Control Delay (s)	-	-	$ 1062.6	10	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	12.5	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

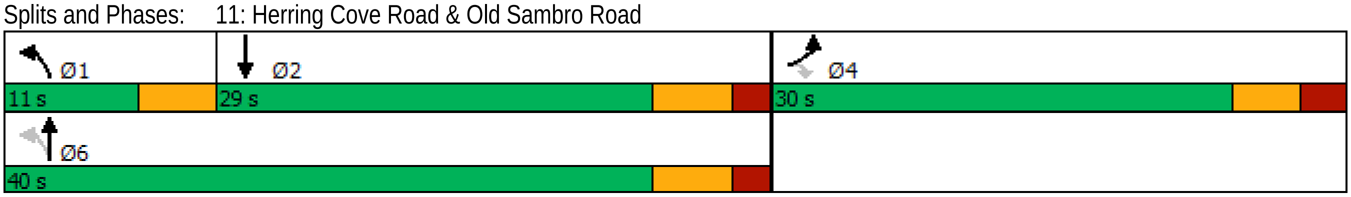
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	211	349	762	515	96
Future Volume (vph)	142	211	349	762	515	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3496	0
Flt Permitted	0.950		0.293			
Satd. Flow (perm)	1789	1601	552	1883	3496	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			32	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	229	379	828	560	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	229	379	828	664	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.1	10.1	31.5	29.2	18.0	
Actuated g/C Ratio	0.19	0.19	0.61	0.56	0.35	
v/c Ratio	0.44	0.46	0.75	0.78	0.54	
Control Delay	24.1	6.9	18.2	15.8	14.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	6.9	18.2	15.8	14.6	
LOS	C	A	B	B	B	
Approach Delay	13.8			16.6	14.6	
Approach LOS	B			B	B	
Stops (vph)	114	34	141	525	416	
Fuel Used(l)	8	6	28	65	63	
CO Emissions (g/hr)	144	106	523	1207	1171	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28	20	101	233	226	
VOC Emissions (g/hr)	33	24	121	278	270	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	13.8	0.0	14.2	50.6	23.3	
Queue Length 95th (m)	28.1	14.1	#43.6	#110.9	39.8	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	848	879	506	1257	1592	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.26	0.75	0.66	0.42	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



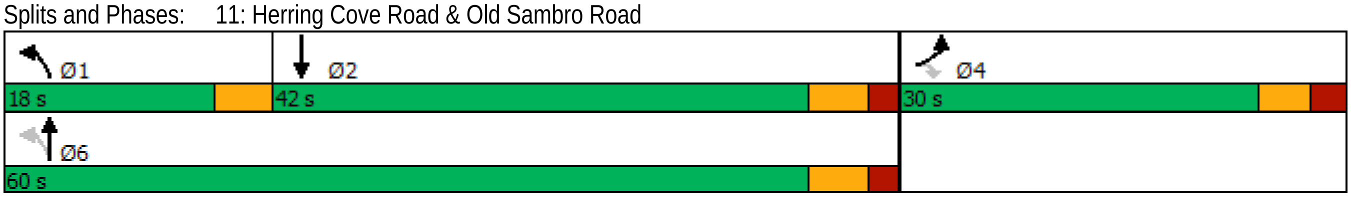
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	399	331	714	1094	173
Future Volume (vph)	167	399	331	714	1094	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.980	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3507	0
Flt Permitted	0.950		0.101			
Satd. Flow (perm)	1789	1601	190	1883	3507	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		320			23	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	434	360	776	1189	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	434	360	776	1377	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	18.0	60.0	42.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	14.4	14.4	56.0	53.8	35.7	
Actuated g/C Ratio	0.18	0.18	0.70	0.67	0.44	
v/c Ratio	0.57	0.79	0.88	0.62	0.88	
Control Delay	37.0	19.9	43.3	11.4	29.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.0	19.9	43.3	11.4	29.2	
LOS	D	B	D	B	C	
Approach Delay	25.0			21.5	29.2	
Approach LOS	C			C	C	
Stops (vph)	144	120	183	394	1014	
Fuel Used(l)	11	16	34	56	148	
CO Emissions (g/hr)	204	298	636	1044	2756	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	39	57	123	202	532	
VOC Emissions (g/hr)	47	69	147	241	636	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.6	15.6	35.3	54.3	92.4	
Queue Length 95th (m)	43.9	46.8	#99.7	124.6	#168.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	535	703	411	1264	1579	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.34	0.62	0.88	0.61	0.87	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 80.5	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 25.6	Intersection LOS: C
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



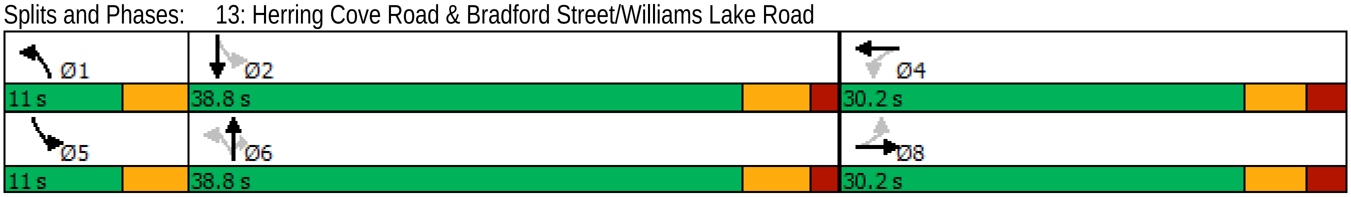
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Future Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.98		1.00		0.96		1.00	
Frt		0.872			0.878				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1621	0	1789	1624	0	1789	1883	1601	1789	3574	0
Flt Permitted	0.725			0.735			0.356			0.111		
Satd. Flow (perm)	1363	1621	0	1380	1624	0	667	1883	1538	209	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			40				98		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	142	9	40	53	1107	212	34	680	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	142	49	0	53	1107	212	34	685	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	38.8	38.8	11.0	38.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	12.9	12.9		12.9	12.9		41.8	38.9	38.9	40.9	36.5	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.66	0.61	0.61	0.65	0.58	
v/c Ratio	0.01	0.10		0.51	0.14		0.09	0.96	0.22	0.11	0.33	
Control Delay	20.3	10.5		29.4	10.2		6.2	39.4	7.1	6.7	12.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	20.3	10.5		29.4	10.2		6.2	39.4	7.1	6.7	12.0	
LOS	C	B		C	B		A	D	A	A	B	
Approach Delay		11.3			24.5			33.1			11.8	
Approach LOS		B			C			C			B	
Stops (vph)	3	12		105	15		19	595	60	14	345	
Fuel Used(l)	0	1		8	2		3	84	10	2	50	
CO Emissions (g/hr)	3	14		144	28		48	1560	186	42	926	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	0	3		28	5		9	301	36	8	179	
VOC Emissions (g/hr)	1	3		33	7		11	360	43	10	214	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	0.3	0.4		13.0	0.7		1.9	~109.7	4.8	1.2	27.5	
Queue Length 95th (m)	2.1	6.5		31.6	8.1		7.7	#301.8	24.9	5.5	53.0	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	528	645		534	653		566	1155	982	313	2194	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.01	0.05		0.27	0.08		0.09	0.96	0.22	0.11	0.31	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 63.4	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 25.4	Intersection LOS: C
Intersection Capacity Utilization 77.8%	ICU Level of Service D
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



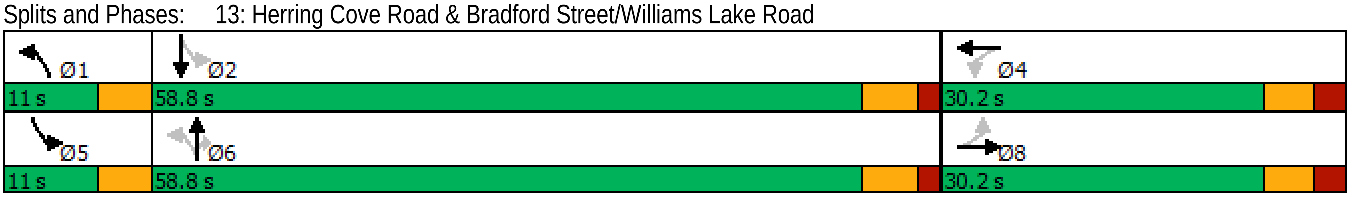
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Future Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.98	0.98		0.99	0.98				0.97		1.00	
Frt		0.870			0.931				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1599	0	1789	1724	0	1789	1883	1601	1789	3578	0
Flt Permitted	0.717			0.563			0.077			0.077		
Satd. Flow (perm)	1330	1599	0	1048	1724	0	145	1883	1545	145	3578	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		144			28				79			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	174	33	28	103	986	180	74	1550	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	174	61	0	103	986	180	74	1554	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	58.8	58.8	11.0	58.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	19.2	19.2		19.2	19.2		59.2	52.0	52.0	59.2	52.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.64	0.57	0.57	0.64	0.57	
v/c Ratio	0.14	0.42		0.79	0.16		0.47	0.92	0.20	0.33	0.77	
Control Delay	31.8	12.4		61.7	20.0		17.2	36.3	7.3	10.9	20.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	31.8	12.4		61.7	20.0		17.2	36.3	7.3	10.9	20.2	
LOS	C	B		E	C		B	D	A	B	C	
Approach Delay		15.8			50.9			30.6			19.7	
Approach LOS		B			D			C			B	
Stops (vph)	30	42		141	27		37	696	46	24	1060	
Fuel Used(l)	2	4		14	2		6	76	8	5	128	
CO Emissions (g/hr)	35	74		255	46		108	1418	157	93	2384	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	7	14		49	9		21	274	30	18	460	
VOC Emissions (g/hr)	8	17		59	11		25	327	36	22	550	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	6.1	6.5		30.8	5.0		5.9	168.5	8.8	4.2	117.6	
Queue Length 95th (m)	14.6	24.1		#60.1	15.0		18.8	#270.9	20.2	10.1	156.3	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	354	532		279	480		221	1107	941	221	2104	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.11	0.35		0.62	0.13		0.47	0.89	0.19	0.33	0.74	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 91.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 25.8 Intersection LOS: C
Intersection Capacity Utilization 95.5% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	295	569	1046	527	148
Future Volume (vph)	165	295	569	1046	527	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	1	2			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	0.95
Ped Bike Factor	0.96	0.96	0.99		0.99	
Frt		0.850			0.967	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	3471	1883	3442	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1726	1543	3446	1883	3442	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		321			41	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	321	618	1137	573	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	321	618	1137	734	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4				
Total Split (s)	30.0	30.0	27.0	60.0	33.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	17.8	17.8	19.3	54.7	31.4	
Actuated g/C Ratio	0.21	0.21	0.23	0.65	0.37	
v/c Ratio	0.47	0.56	0.78	0.93	0.56	
Control Delay	32.7	7.3	38.1	30.6	24.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.7	7.3	38.1	30.6	24.0	
LOS	C	A	D	C	C	
Approach Delay	16.4			33.2	24.0	
Approach LOS	B			C	C	
Stops (vph)	135	33	508	753	498	
Fuel Used(l)	12	10	35	54	50	
CO Emissions (g/hr)	217	194	647	1002	929	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	42	38	125	193	179	
VOC Emissions (g/hr)	50	45	149	231	214	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.2	0.0	51.5	~180.8	53.2	
Queue Length 95th (m)	43.2	18.8	67.8	#280.1	74.5	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			
Base Capacity (vph)	513	671	954	1222	1306	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.35	0.48	0.65	0.93	0.56	

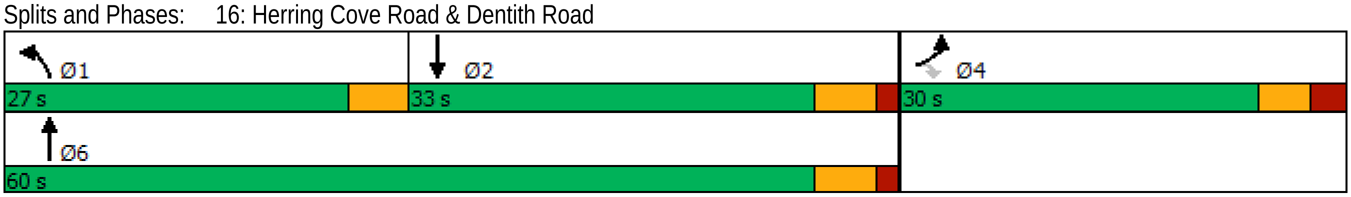
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 84.3
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 28.1 — Intersection LOS: C
Intersection Capacity Utilization 79.6% — ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



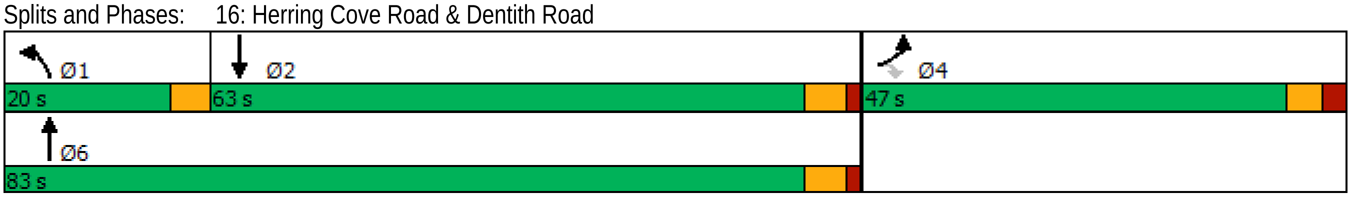
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	734	469	810	1367	252
Future Volume (vph)	231	734	469	810	1367	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	1	2			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	0.97	1.00	0.95	0.95
Ped Bike Factor	0.97	0.94	1.00		0.99	
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	3471	1883	3472	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1731	1498	3454	1883	3472	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		245			21	
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	798	510	880	1486	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	798	510	880	1760	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4				
Total Split (s)	47.0	47.0	20.0	83.0	63.0	
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	
Act Effct Green (s)	41.0	41.0	16.0	77.3	57.3	
Actuated g/C Ratio	0.32	0.32	0.12	0.59	0.44	
v/c Ratio	0.45	1.25	1.19	0.79	1.14	
Control Delay	38.5	151.0	156.4	26.5	105.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	38.5	151.0	156.4	26.5	105.9	
LOS	D	F	F	C	F	
Approach Delay	124.1			74.1	105.9	
Approach LOS	F			E	F	
Stops (vph)	181	435	386	608	1372	
Fuel Used(l)	17	115	71	40	226	
CO Emissions (g/hr)	320	2141	1314	738	4201	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	62	413	254	143	811	
VOC Emissions (g/hr)	74	494	303	170	969	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	51.2	~209.6	~81.3	163.0	~276.2	
Queue Length 95th (m)	76.0	#285.9	#115.6	221.1	#319.2	
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			
Base Capacity (vph)	564	640	427	1119	1542	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.45	1.25	1.19	0.79	1.14	

Intersection Summary	
Area Type: Other	
Cycle Length: 130	
Actuated Cycle Length: 130	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.25	
Intersection Signal Delay: 99.9	Intersection LOS: F
Intersection Capacity Utilization 104.2%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	33.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	56	82	1595	773	95
Future Vol, veh/h	51	56	82	1595	773	95
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	61	89	1734	840	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2815	488	954	0	-	0
Stage 1	903	-	-	-	-	-
Stage 2	1912	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	~ 17	526	718	-	-	-
Stage 1	357	-	-	-	-	-
Stage 2	126	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 15	518	711	-	-	-
Mov Cap-2 Maneuver	~ 15	-	-	-	-	-
Stage 1	309	-	-	-	-	-
Stage 2	125	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 830	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	711	-	15	518	-	-
HCM Lane V/C Ratio	0.125	-	3.696	0.118	-	-
HCM Control Delay (s)	10.8		$ 1727.3	12.9	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	7.7	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	370.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	108	86	1222	1920	244
Future Vol, veh/h	68	108	86	1222	1920	244
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	74	117	93	1328	2087	265

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3799	1273	2417	0	-	0
Stage 1	2285	-	-	-	-	-
Stage 2	1514	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	~ 4	159	195	-	-	-
Stage 1	~ 63	-	-	-	-	-
Stage 2	200	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 2	145	183	-	-	-
Mov Cap-2 Maneuver	~ 2	-	-	-	-	-
Stage 1	~ 29	-	-	-	-	-
Stage 2	188	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 7652.6	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	183	-	2	145	-	-
HCM Lane V/C Ratio	0.511	-	36.957	0.81	-	-
HCM Control Delay (s)	43.6	-	$ 19661.8	91.3	-	-
HCM Lane LOS	E	-	F	F	-	-
HCM 95th %tile Q(veh)	2.6	-	11.4	5.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

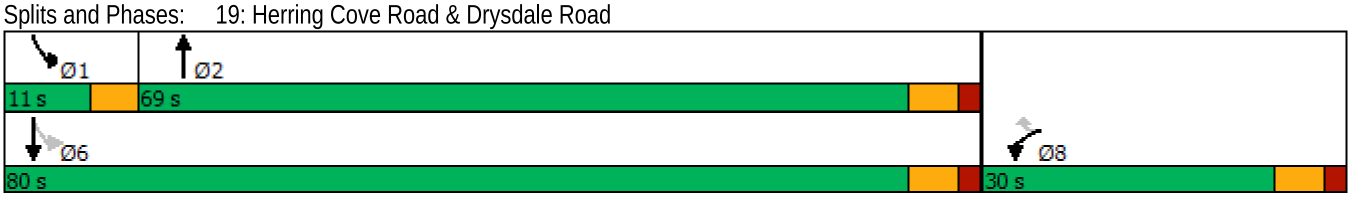
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	337	1235	18	143	605
Future Volume (vph)	44	337	1235	18	143	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1880	0	1789	3579
Flt Permitted	0.950				0.060	
Satd. Flow (perm)	1789	1601	1880	0	113	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		151	1			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	48	366	1342	20	155	658
Shared Lane Traffic (%)						
Lane Group Flow (vph)	48	366	1362	0	155	658
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	69.0		11.0	80.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	19.4	19.4	63.2		76.2	74.2
Actuated g/C Ratio	0.18	0.18	0.60		0.72	0.70
v/c Ratio	0.15	0.88	1.21		0.81	0.26
Control Delay	36.4	46.7	126.8		50.4	6.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	36.4	46.7	126.8		50.4	6.5
LOS	D	D	F		D	A
Approach Delay	45.5		126.8			14.9
Approach LOS	D		F			B
Stops (vph)	36	192	962		64	208
Fuel Used(l)	2	20	198		16	45
CO Emissions (g/hr)	46	368	3680		292	828

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	9	71	710		56	160
VOC Emissions (g/hr)	11	85	849		67	191
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	8.3	44.7	~357.8		15.9	24.8
Queue Length 95th (m)	18.3	#88.0	#451.3		#52.4	34.9
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	407	481	1125		192	2514
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.12	0.76	1.21		0.81	0.26

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 105.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 78.6 — Intersection LOS: E
Intersection Capacity Utilization 97.0% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road



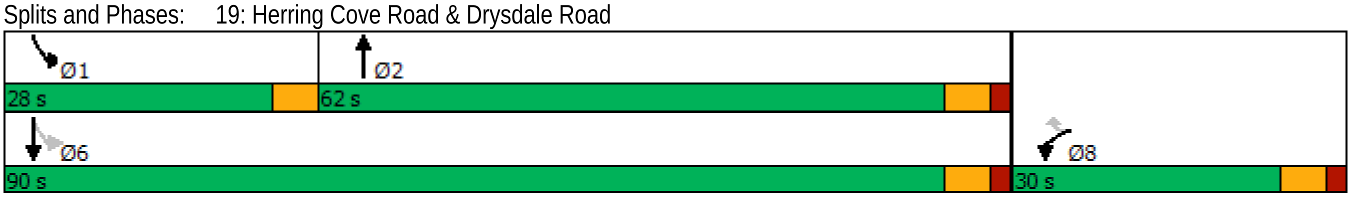
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	38	266	912	56	463	1489
Future Volume (vph)	38	266	912	56	463	1489
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.992			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1868	0	1789	3579
Flt Permitted	0.950				0.067	
Satd. Flow (perm)	1789	1601	1868	0	126	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		289	3			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	41	289	991	61	503	1618
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	289	1052	0	503	1618
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	62.0		28.0	90.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	9.2	9.2	56.1		86.1	84.1
Actuated g/C Ratio	0.09	0.09	0.53		0.82	0.80
v/c Ratio	0.26	0.72	1.06		1.04	0.57
Control Delay	48.6	16.0	70.6		85.0	5.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.6	16.0	70.6		85.0	5.1
LOS	D	B	E		F	A
Approach Delay	20.1		70.6			24.0
Approach LOS	C		E			C
Stops (vph)	35	34	792		320	497
Fuel Used(l)	3	7	112		66	108
CO Emissions (g/hr)	48	124	2086		1220	2002

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	9	24	403		236	386
VOC Emissions (g/hr)	11	29	481		281	462
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	8.0	0.0	~230.8		~92.6	45.4
Queue Length 95th (m)	18.2	24.1	#341.6		#172.7	85.2
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	407	588	995		482	2858
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.10	0.49	1.06		1.04	0.57

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 105.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 37.7 Intersection LOS: D
Intersection Capacity Utilization 96.2% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road



Attachment B:

Herring Cove Road Functional Plan Final Report

45 Spencer Street, Unit 101
Ottawa, ON K1Y 2P5
(613) 319-0336
www.altaplanning.com

Memorandum

Date: August 30th, 2019

To: Harrison McGrath, Halifax Regional Municipality

From: Kate Whitfield, Alta Planning + Design

Cc: Florence Allaire, Harbourside Transportation

Matt Pinder, Alta Planning + Design

Re: **Herring Cove Road Functional Plan – Functional Design Report**

Introduction

Purpose of this Document

This report is a supplement to the functional design proposed for Herring Cove Road within the Herring Cove Road Functional Plan study area. The proposed functional design has been developed based on the existing conditions assessment, concept development and evaluation, stakeholder and public engagement, and traffic assessment. This report is intended to be complementary to the Existing Conditions Report (March 2019) and Conceptual Design Report (March 2019), and to serve as a supplement for the implementation of the functional design.

The functional design includes both scenarios identified in the Conceptual Design Report, **Scenario 1: Interim**, and **Scenario 2: Ultimate**.

This memorandum contains the following appendices:

- Appendix I: Functional Design Drawings
- Appendix II: Cost Estimate
- Appendix III: LOS/MMLOS Report
- Appendix IV: Index of Bus Stops and Preferred Design Treatments
- Appendix V: LOS Reports for Dismissed Concepts

Overview of Scenarios

The interim and ultimate scenarios are presented as an evolution of the corridor over time. The **interim** scenario delivers benefits at a lower cost with easier implementation, while planning for existing traffic volumes. The **ultimate** scenario is designed to be implemented in the long-term as part of road reconstruction projects and delivers higher-order solutions while planning for future projected traffic volumes along the corridor.

The **interim** scenario can be summarized as:

- More easily undertaken through road resurfacing projects
- Designed to accommodate current traffic volumes (2018)
- Less cost as the amount of curb reconstruction or civil works is limited
- Less cost/impact as the configuration does not necessarily require expanding the right-of-way or moving utility poles
- Intended to address community connectivity issues while accommodating current and near-future traffic demands
- Solutions that can be rolled out in phases

The **ultimate** scenario can be summarized as:

- Requiring larger road reconstruction projects
- Designed to accommodate current volumes and future projected traffic growth (2033) as new developments are constructed along the corridor. The growth assumptions applied are discussed in Appendix III: LOS/MMLOS Report
- Road widening and/or property acquisition where necessary to support walking, cycling, and/or transit

In developing the geometric alignment of these designs, both scenarios focused on applying Complete Streets principles with the following primary constraints:

- The interim design prioritizes maintaining existing curb and roadway widths as much as possible
- The ultimate design prioritizes minimizing property acquisition impacts

Where the interim scenario requires construction of new curbs, the ultimate scenario is generally coordinated such that its implementation does not require another curb reconstruction or realignment.

Guiding Principles from Integrated Mobility Plan

This project fits within the bigger picture of the Integrated Mobility Plan (IMP) adopted in 2017. The IMP includes the identification of Strategic Transportation Corridors. Herring Cove Road is one such corridor, considered key to regional traffic flow, transit, goods movement and active transportation.

The Complete Streets modal hierarchy, as identified in the IMP, was used to determine the prioritization of modes for the functional design. The hierarchy places the highest emphasis on accommodating pedestrians, followed by cyclists, transit users and then motor vehicle users.

The concept plans were developed based on the priorities and project goals as presented by the IMP:

- **Pedestrians:** improve pedestrian connectivity and experience (for example, closing gaps where sidewalks are located is a high priority)
- **Cyclists: c**ontinuous active transportation facilities and improved level of service for bicycles are desired (as per the Active Transportation Priorities Plan)
- **Transit:** improve transit stop accessibility and implement Transit Priority Measures (note: Cowie Hill to Armdale Roundabout is a Transit Priority Corridor under the IMP)

Based on the above, two overarching themes can be seen in the development of the concepts:

- **Moving people**
  - Pedestrian connectivity by adding sidewalks, improving crossings and enhancing the pedestrian experience
  - The inclusion of a protected bikeway
  - Improving transit over time
- **Responding to feedback from the public**
  - Addressing road safety and speed issues
  - Managing traffic
  - Supporting changing land use and increasing population over time
  - A desire for beautification

Design Criteria

As part of the development of the functional design, the project team consulted HRM staff to develop design criteria for dimensions of the key facility types including vehicle lanes and active transportation infrastructure. The design seeks to implement the "target" dimensions for each facility type, and where physical constraints exist, widths are lowered to the "acceptable" or "minimum" levels. Where the "minimum" width is applied, an explanation and justification is provided in the **Segment-Specific Notes** section of this report.

Table 1: Lane Width by Facility Type

	Target	Acceptable	Minimum
Curb traffic lane	3.5m		3.3m
Inside traffic lane	3.3m		
Two-way left-turn lane	3.5m		3.3m
Transit lane	3.5m		
Sidewalk	1.8m + 1.2m boulevard	2.0m (no boulevard)*	1.8m (no boulevard)*
Multi-use pathway	3.0m		2.4m
On-street protected bicycle lane	2.0m + 1.0m buffer with physical separation	1.8m + 0.7m buffer with physical separation	
Raised cycle track	2.0m + 0.5m buffer	1.8m + 0.5m buffer	1.5m + 0.5m buffer

**These values are recommended. Width will be further refined at detailed design and may be reduced to 1.5m at the narrowest points, where required.*

Discussion of Functional Design

Pedestrians

The functional design prioritizes the safety and comfort of pedestrians by:

- Closing gaps in the sidewalk network by ensuring sufficiently-wide sidewalks are present along the entire corridor
- Improving comfort and separation of pedestrians from traffic by adding cycling facilities and boulevards between sidewalks and the roadway
- Reducing crossing distances for pedestrians at intersections by reducing the number of motor vehicle lanes, adding refuge islands where appropriate and reducing curve radii
- Adding additional RA-5 pedestrian crossings at midblock locations along the corridor to provide crossing opportunities at intervals of roughly 200-300 metres, closing many existing pedestrian crossing gaps that exceed 500 metres

The **Segment-Specific Notes** section details areas where minimum widths for pedestrian infrastructure are proposed.

Cycling

Highlights of the cycling infrastructure proposed for the corridor consists of:

- A mutli-use pathway through segments 1 and 2 in the interim and ultimate scenarios, as well as near the proposed roundabout at Dentith in the ultimate scenario
- Physically separated bicycle lanes for segments 3 to 6 in the interim scenario, and raised cycle tracks in the ultimate scenario
- Raised cycle tracks for segments 7 and 8 in the ultimate scenario (there is no interim scenario for these segments)

The Concept Design Report (March 2019) provided further discussion on the selection of these cycling facility types. The functional design proposes the implementation of cycle tracks along segments 7 and 8, where the conceptual design proposed physically separated bicycle lanes. This section of the roadway (segments 7 and 8) is expected to be reconstructed in 2019 with new sidewalks and curbs, and as such, it is proposed that the roadway be rebuilt to match the ultimate configuration for segments 3 to 6. The right-of-way through this section provides space for a boulevard between the cycle tracks and the roadway.

Mitigating Turning Conflicts

One of the most common conflicts between bicycles and motor vehicles is "right-hook" collisions, where a right-turning motorist collides with a through-bound cyclist. The proposed design includes several measures intended to mitigate and reduce this safety risk:

- Stop bars for on-road protected bicycle lanes are proposed to be staggered 2.0 metres ahead of vehicle lane stop bars to provide more visibility of cyclists waiting at signalized intersections
- Physical barriers for on-road protected bicycle lanes are maintained as close to intersections as possible to prevent motorists from using the bicycle lanes as right-turn lanes
- "Bend-out configurations" are proposed at the Dentith Road and Purcells Cove Road intersections, where a high volume of right-turns occur. This treatment makes cyclists more visible to motorists and slows down the turning speed of motorists
- High-visibility paint treatments are proposed where bicycle lanes and cycle tracks cross roadways and driveways
- At the proposed roundabout at Dentith Road, a multi-use path is provided for cyclists to travel across the roundabout without mixing with motor vehicles
- A multi-use pathway is proposed for the west side of Herring Cove Road between the Armdale Roundabout and Cowie Hill Road, where there are significantly fewer driveways and side streets to cross

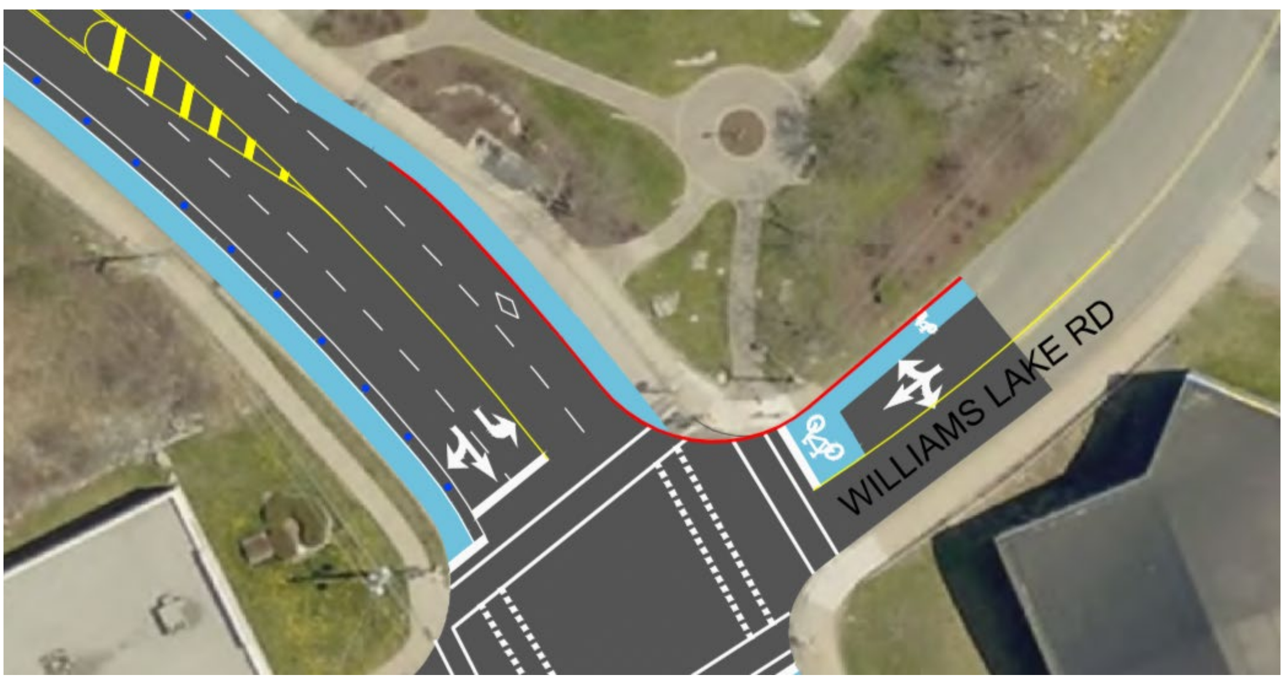


Figure 1 - Proposed intersection design at Herring Cove Road and Williams Lake Road to support cycling, showing a staggered stop bar, pavement markings through intersection crossing and a bike box

In addition, it is recommended that:

- Leading green intervals be considered at major intersections for bicycles and pedestrians
- Separate signal phasing be considered at intersections where the peak hour volume of right-turning vehicles across the bikeway exceeds 150 (the threshold recommended by the MassDOT Separated Bike Lane Planning & Design Guide), separating signal phasing for through-bound cyclists and right-turning motorists. Signalized intersections that meet this threshold in both current and future traffic conditions include Old Sambro Road and Dentith Road

Bicycle Network Connectivity

In addition to the existing painted bicycle lanes on Purcells Cove Road, HRM's Active Transportation Priorities Plan proposes the implementation of bicycle infrastructure on:

- **Glenora Avenue:** proposed local street bikeway
- **Old Sambro Road:** bikeway desired, type to be determined
- **Williams Lake Road:** proposed bike lane / paved shoulder

The proposed functional design considers connectivity to these cycling routes from Herring Cove Road, through:

- Bike boxes on Old Sambro Road at Williams Lake Road, that provide a highly-visible, dedicated area at intersections where cyclists can queue ahead of traffic
- Two-stage left-turn boxes at Williams Lake Road and a jug handle at Old Sambro Road (shown below), which allow cyclists travelling on Herring Cove Road to complete left turns onto side streets without crossing live traffic lanes
- Pedestrian crosswalk (RA-5) at Glenora Avenue which allows cyclists to cross Herring Cove Road by dismounting and walking their bicycles

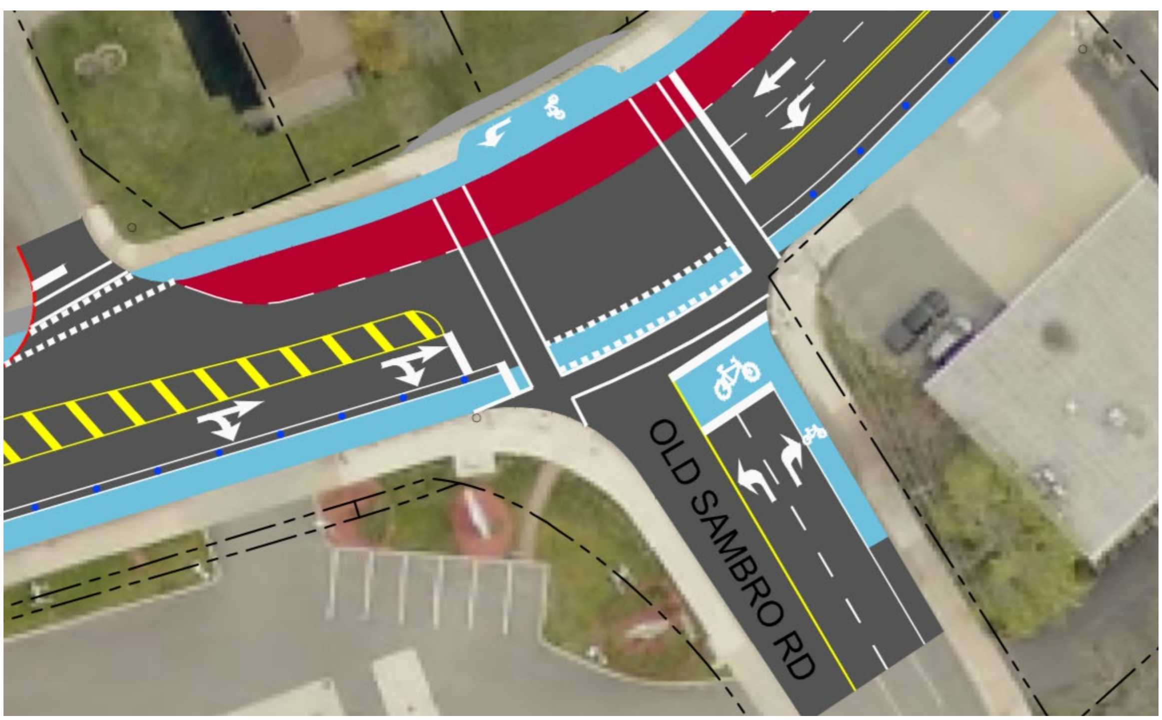


Figure 2 - Example of jug handle and bike box at intersection of Herring Cove and Old Sambro Road

In addition, the alignment of the multi-use pathway on the east side of Herring Cove Road at Purcells Cove Road simplifies access for cyclists turning between these roads in both directions. These connectivity measures are expected to significantly improve the measured bicycle level of service (BLOS) at signalized intersections.

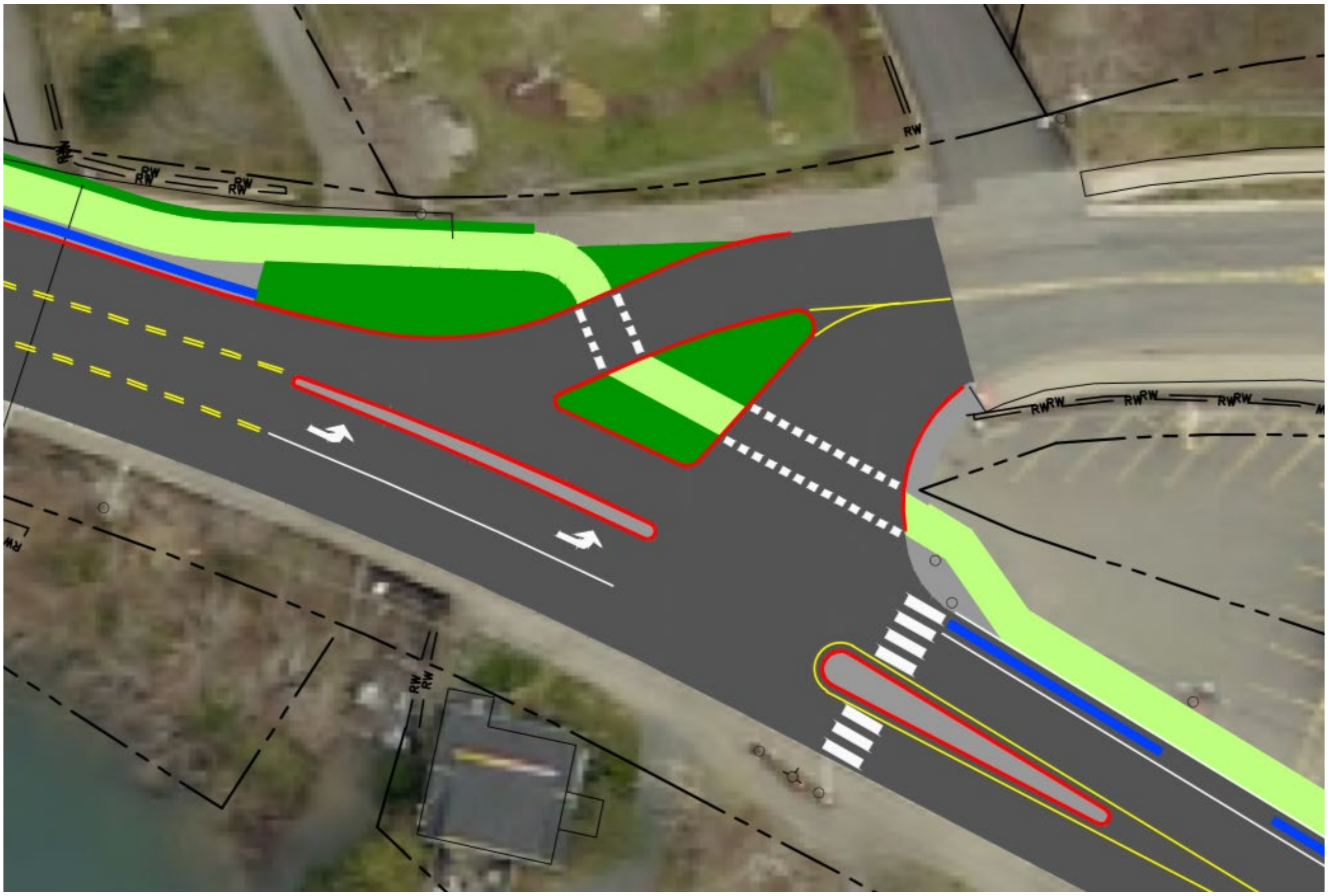


Figure 3 - Alignment of multi-use pathway at Purcells Cove intersection improves access to and from existing cycling facilities on Purcells Cove Road

Driveways
Driveways are frequent along most of the Herring Cove Road corridor (study area).

On-street protected bicycle lanes require breaks in the separation treatment for each driveway crossing to provide motor vehicle access. There are many extended driveways at locations such as the fire station, where physical separation will need to be interrupted for a longer stretch of roadway. Where wider driveway widths are required and cannot be narrowed, it is recommended that high-visibility pavement treatments be applied. The functional design drawings do not show breaks in the physical separation at driveways; this is a consideration for detailed design.

Figure 4 - Example of wider than standard driveway entrance on Herring Cove Road

Figure 5 - Example of high-visibility paint markings used to denote a conflict area at a driveway in Ottawa, ON (from Google Maps)

Raised cycle tracks are recommended in the ultimate condition because they provide significantly improved protection and continuity when frequent driveways are present. A minimum buffer of 0.5 metres should be provided between the cycle track and the curb. At driveways, this buffer space becomes a driveway apron for vehicles (see illustration and examples below), allowing cycle tracks and sidewalks to remain at the same grade at crossings. This treatment also encourages motorists to slow down before making turns, creating safer conditions for cyclists and pedestrians.

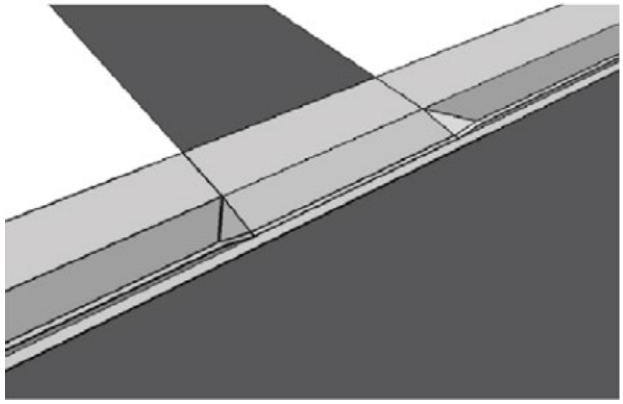


Figure 6 - Visual of a driveway apron that allows continuity of sidewalks (from TAC GDGCR Figure 6.4.9). The same treatment style can be applied to cycle track separation.

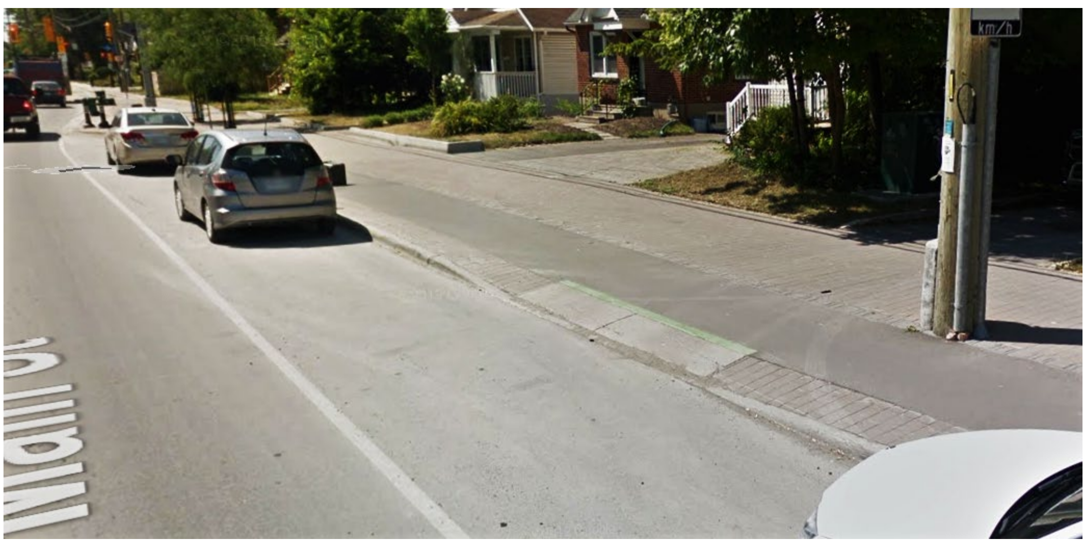


Figure 7 - Example of driveway apron with sidewalk and cycle track in Ottawa, ON (from Google Maps)

Figure 8 - Example of a continuous driveway apron treatment in Ottawa, ON (from Google Maps)

Separation Techniques

The proposed separation technique for on-street bicycle lanes is precast concrete curbs, consistent with HRM's approach to similar bicycle infrastructure. The buffer width to accommodate physical separation varies along the corridor between 0.7 and 1.0 metres. Where possible, a wider buffer is generally more desirable to allow space for snow storage and increased comfort for road users. Barriers should be clearly demarcated to reduce the risk of damage by snowplows.

Figure 9 - An example of precast concrete curbs separating an on-road protected bicycle facility in Ottawa, ON

Raised cycle tracks are separated from vehicle traffic by a barrier curb, plus a minimum setback of 0.5 metres. This provides extra comfort, improves separation from the curb drop-off and allows for driveway aprons so that the cycle tracks do not dip at driveways.

Clearance from Fixed Objects

Maintaining appropriate clearance from fixed objects or "shy distance" is necessary to minimize collision risk for people riding bicycles. Vertical objects, such as signs and poles, should generally be located a minimum of 0.5 metres from the edge of bicycle facilities. If this space separation cannot be achieved, it is preferable to narrow the width of cycle tracks to the minimum width of 1.5 metres to provide extra width for clearance.

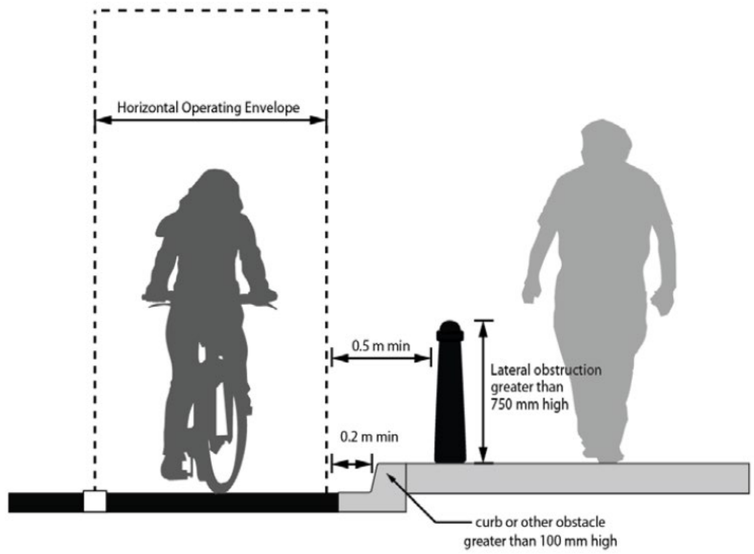


Figure 10 - Illustration of appropriate setbacks of bicycle facilities from fixed objects (from TAC GDGCR Figure 5.5.2)

Transit

Transit Priority Measures

The functional design proposes several measures to prioritize the movement of transit vehicles along Herring Cove Road. This includes:

- A northbound transit lane from Cowie Hill Road to the Armdale Roundabout in the ultimate condition, allowing buses to bypass the significant queues that form in this area during the higher volume morning peak period
- Bus queue jumps in both the interim and ultimate conditions, allowing buses to save travel time by bypassing motor vehicle queues at signalized intersections. The design proposes queue jumps at the following locations:
    - Interim:
        - Southbound at Dentith Road (shared with right-turn lane)
        - Northbound at Old Sambro (dedicated queue jump lane)
    - Ultimate:
        - Southbound at Cowie Hill Road (shared with right-turn lane)
        - Northbound at Cowie Hill Road (dedicated queue jump lane)
        - Northbound at Williams Lake Road (shared with right-turn lane)
        - Northbound at Old Sambro (dedicated queue jump lane)

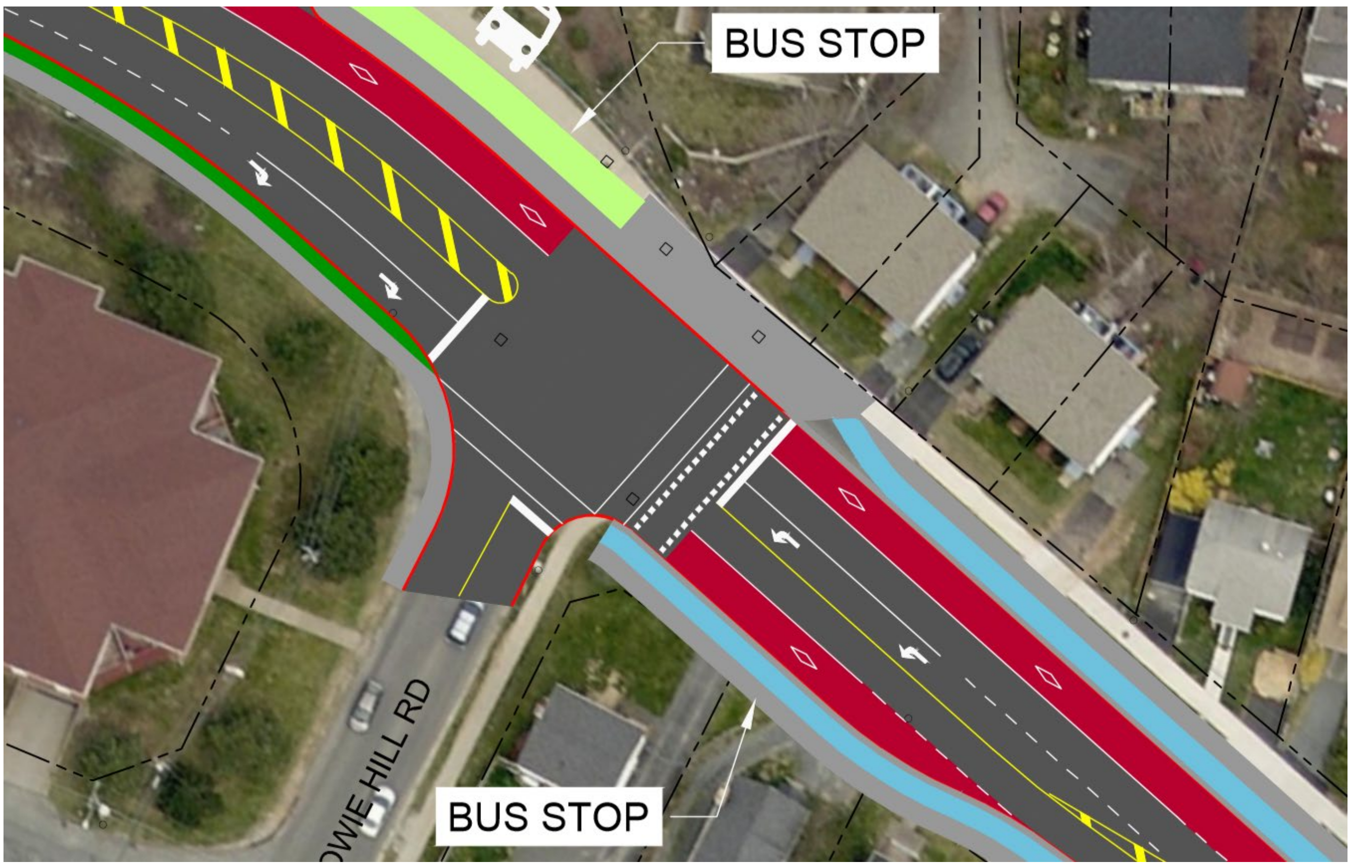


Figure 11 – Excerpt from functional plan showing queue jumps proposed in the ultimate scenario at Cowie Hill Road

Redesign of Bus Lay-bys

The majority of transit stops along Herring Cove Road (23 of 29 total transit stops) currently include lay-bys, where buses pull out of traffic lanes to receive passengers. This design prioritizes vehicle traffic by accommodating stopped buses outside of the travel lane and adds travel delay to transit vehicles while they wait for a gap to merge back into traffic.

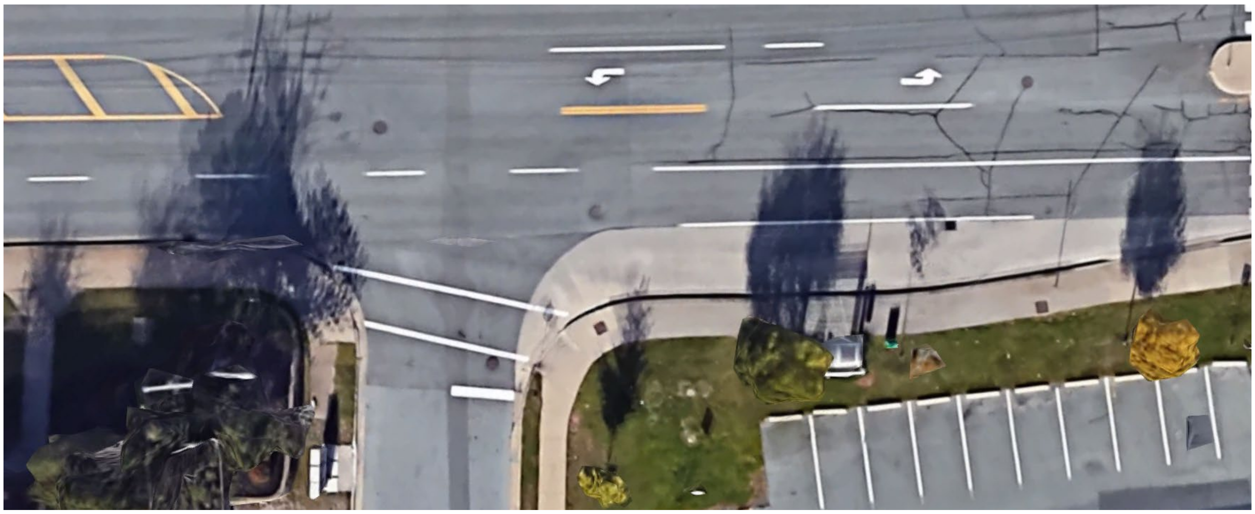


Figure 12 - Example of an existing bus lay-by on Herring Cove Road

According to the *Transit Capacity and Quality of Service Manual, Third Edition (TCQSM)*, allowing buses to stop in the roadway rather than pulling out of traffic improves transit travel times and boarding times, because vehicles no longer need to wait for a gap in traffic to rejoin the roadway. A streamlined route also improves transit passenger comfort, when buses stop in-lane, bicycle facilities can be designed so that buses do not cross the paths of bicycles.

Standard sketches have been produced to communicate bus stop design details, and are located in Appendix I. Each bus stop on the functional design drawings is labelled with the corresponding bus stop design. An interim and ultimate scenario example of each bus stop design is shown in Figure 14 and Figure 15 below.

A full set of transit stop illustrations can be found in Appendix I, and a list of recommended configurations for each transit stop is located in Appendix IV.

Figure 13 - Physically separated bicycle lane with bus islands in London, ON

Where there is sufficient available space, the proposed approach for transit stops along Herring Cove Road is the conversion of the majority of lay-bys into side boarding island transit stops, with dedicated passenger waiting areas (see illustrations in Figure 14 and Figure 15 below). Modifying the road design so that buses do not have to pull out of traffic lanes is considered a "bus preferential treatment" in the TCQSM.

For bus stops that currently function as lay-bys, the design approach is to:

- Add a concrete boarding island adjacent to the roadway which functions as a passenger waiting area
- Maintain the existing sidewalk alignment
- Channel the cycling facility between the concrete boarding island and the sidewalk, with a designated crossing point

The advantages of this design approach, according to the TCQSM, are:

- Faster transit boarding and alighting times
- Transit travel time savings from buses not having to wait for a gap in traffic to pull back into the roadway
- Dedicated waiting space for transit passengers
- Potential space for pedestrian amenities such as planters, benches, shelters or trees
- Passengers boarding and alighting from transit vehicles reduces conflicts with bicycles and vehicle

Important considerations when implementing this approach include:

- Ensuring that stopped transit vehicles do not cause traffic queues that back into signalized intersections
- Ensuring that curve radii on side streets are still large enough to accommodate design vehicles

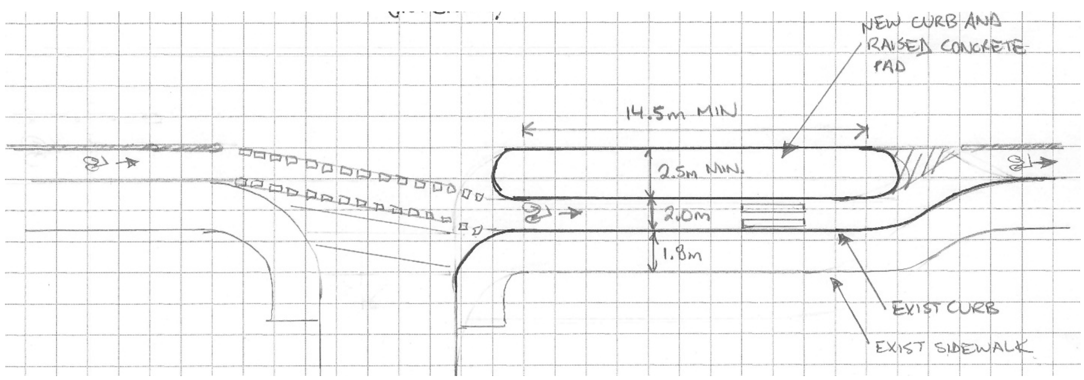


Figure 14 – Interim recongiguration of a far-side lay-by with protected on-street bicycle lanes

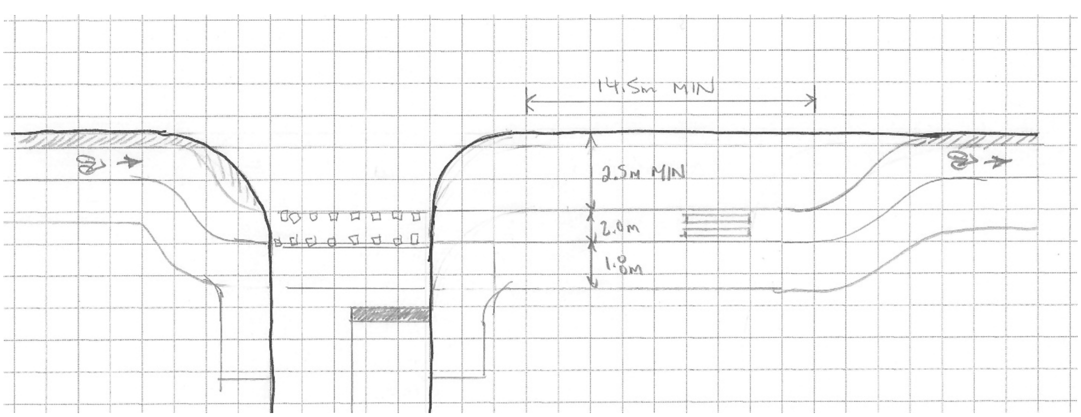


Figure 15 – Ultimate reconfiguration of a far-side lay-by with raised bicycle tracks

Figure 16 shows an example of a side boarding island transit stop with a cycle track design in Ottawa.

Figure 16 - Curb-side bus stop with cycle track running behind in Ottawa, ON (from Google Maps)

Where space is limited, the proposed design is to place the bus stop adjacent to a raised cycle track, known as a shared cycle track transit stop and is illustrated in the Toronto example in Figure 17. This configuration creates an accessible boarding condition without creating a conflict between buses and bicycles. In this situation, cyclists are required to stop and yield to pedestrians when a bus stops to pick up and drop off passengers.

Figure 17 - Transit stop adjacent to a raised cycle track, where cyclists must stop for transit passengers in Toronto, ON (from The Urban Country)

Lay-bys to be Preserved

In certain instances, it is recommended to preserve space for a bus to pull out of live traffic lanes. Lay-by transit stops should be preserved if:

- The transit stop is used as a time-point
- The transit stop is on the far side of a signalized intersection with only one through traffic lane (to prevent vehicle queues forming back into the intersection)
- The transit stop is part of a queue jump, in which case a dedicated space is needed for transit vehicles on the far side of the intersection

These criteria result in preservation of nine lay-bys: four as queue jumps, four as time-points, and one due to configuration of a signalized intersection. These stops are listed in the **Transit Stop Inventory** in Appendix IV.

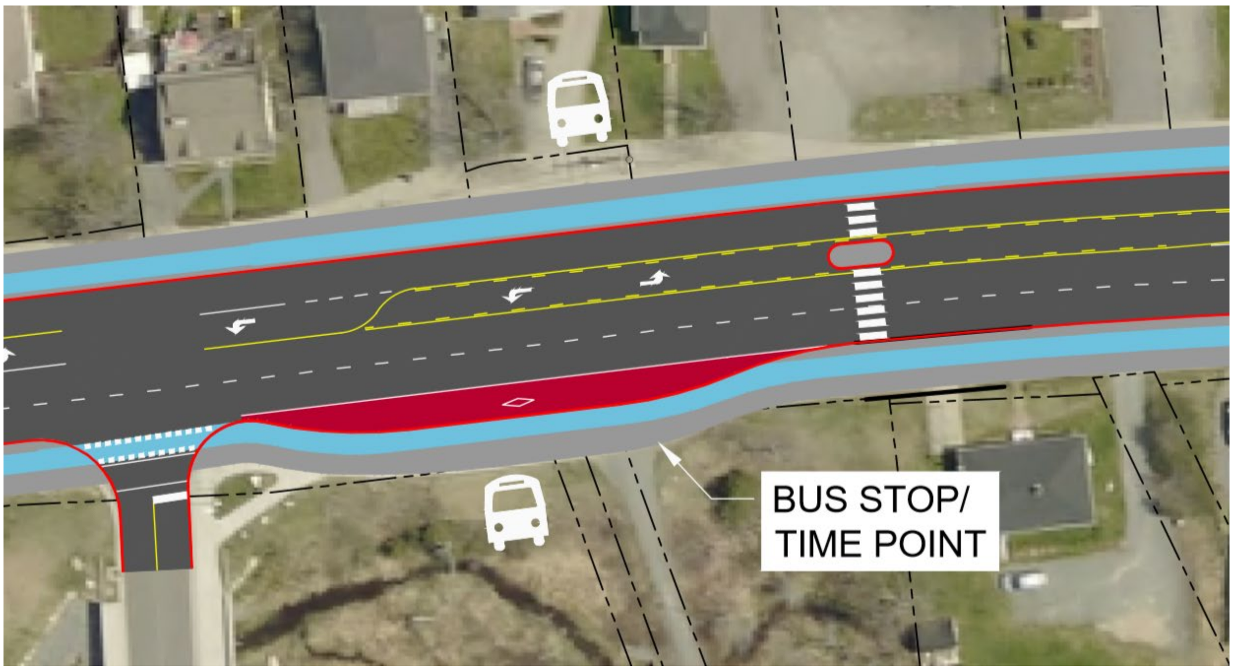


Figure 18 - Example of a lay-by preserved in the design to be used as a time-point at the south entrance to the Captain William Spry Centre

Time Points

While the proposed design does not change the number of time-points, minor changes are proposed to the stops that are intended to function as time-points. The proposed points are as follows:

- Outbound before Mont Street (Stop #6871): maintained in same location
- Outbound after Dentith Road (Stop #6857): maintained in interim, relocated south to Civic 427 in ultimate to avoid conflict with roundabout
- Inbound before Dentith Road (Stop #6866): maintained in interim, relocated south to after Levis Street in ultimate to avoid conflict with roundabout
- Inbound before Cowie Hill Road (currently at Stop #6872): relocated south in interim and ultimate to before Circle drive

Motor Vehicles

Design considerations and assessment for motor vehicles has been evaluated in detail in the **Vehicle Level of Service (LOS)** section.

Multimodal Level of Service (MMLOS) Analysis

A Multimodal Level of Service (MMLOS) analysis was conducted on the proposed design in order to quantify the benefits and impacts on all modes of transportation. The full MMLOS report is provided in Appendix III.

At the time of this study, HRM was developing but had not yet finalized its own MMLOS analysis methodology. As a result, the decision was made to use the City of Ottawa's methodology. The MMLOS approach follows the "weakest link" methodology, where the portion of a segment scoring a weaker value pulls the score of the segment down. For example, while the multi-use pathway on the east side of the roadway in segments 1 and 2 scores a PLOS D, the lack of a sidewalk on the west side results in an overall segment score of F.

Finally, the MMLOS is not calculated for the Dentith Road roundabout in the ultimate scenario because the chosen MMLOS methodology does not include roundabouts.

Pedestrian Level of Service (PLOS)

The target Pedestrian Level of Service (PLOS) of B is not met for any of the segments. Though significant improvements to pedestrian safety and connectivity are made through the proposed design, including completion of sidewalks and the presence of bicycle infrastructure as an extra separation between pedestrians and traffic, the methodology served as a limiting factor for the improvement of PLOS scores. Through segments 1 and 2, where pedestrian movement is accommodated with an multi-use pathway on the east side of the roadway, the PLOS is F due to the lack of a sidewalk on the west side of the roadway. Based on the chosen sidewalk and boulevard design widths (1.8 metres and 1.2 metres), and the operating speed and volumes of Herring Cove Road, the highest attainable PLOS is C, a limitation of the methodology. Again, while this configuration represents best practice for HRM, the scoring is based on the City of Ottawa's methodology, which uses different standard cross sections for roadways.

The target PLOS of B is mostly not attained for signalized intersections, although in all but one instance the level of service is improved compared to existing conditions due to the shortening of crossing distances. Scores are lower than target due to the need for longer signal cycles to accommodate traffic volumes in the PM peak period.

Bicycle Level of Service (BLOS)

The target Bicycle Level of Service (BLOS) of B is consistently met for all road segments in both scenarios because of the consistent application of physically separated cycling facilities.

The target is not met at all intersections. The target BLOS of B is met at Cowie Hill Road and Old Sambro Road with the provision of bike boxes and left turn queues to accommodate turning movements to and from cross-streets. The target BLOS is not met at Williams Lake Road and Dentith Road due to a lack of bicycle accommodations on the retail entrance opposite Williams Lake Road and on Dentith Road.

Transit Level of Service (TLOS)

The target TLOS of B and C are not met for any of the segments, and the TLOS is not improved as a result of the proposed design for any of the scenarios. The segment TLOS is tied only to the level of separation of transit vehicles from traffic as well as the amount of driveway friction. While the dedicated northbound transit lane in segments 1 and 2 scores a TLOS B, the lack of a dedicated lane on the opposite side of the roadway results in a lower overall score. The TLOS does not improve for other segments because the design does not reduce the number of driveways along the corridor.

At signalized intersections, the target TLOS of B and C is not met and generally worsens in the interim and ultimate scenarios due to increased travel time delays in the PM peak period. Where queue jumps are implemented, the TLOS for the respective leg of the intersection is improved (with some legs meeting the TLOS target), but the overall intersection score defaults to the lower score between the two approaches.

Truck Level of Service (TkLOS)

The target TkLOS of D is consistently met or exceeded for all segments due to the use of curb lanes that are greater than or equal to 3.3 metres in the design. At signalized intersections, the target TkLOS of D is generally not met due to the reduction of curb radii, removal of right turn channels and increased travel time delay in the PM peak period.

Vehicle Level of Service (LOS)

In addition to the multimodal level of service assessment, vehicle level of service (LOS) was assessed for eight intersections along the corridor identified by HRM:

- Purcells Cove Road (unsignalized)
- Osborne Street (unsignalized)
- Cowie Hill Road (signalized)
- Glenora Avenue (unsignalized)
- Old Sambro Road (signalized)
- Williams Lake Road (signalized)
- Dentith Road (signalized)
- Sussex Street (unsignalized)
- Drysdale Road (unsignalized)

Summary of Results

In general, the proposed signal timings, combined with the geometry of the proposed design, yield the target LOS D or better for most legs of most intersections. There are, however, the following exceptions:

- The performance of intersections is generally acceptable in the interim condition in existing conditions (2018), but unacceptable in future conditions (2033). This indicates that the interim condition is a cost-effective and acceptable short-term solution, but in the long-term, as new developments are constructed on the corridor, the ultimate configuration will be required to achieve acceptable traffic performance. The study did not consider a sensitivity analysis to determine the threshold of new development that will trigger the need for the ultimate configuration
- The performance of through movements at intersections near the Armdale Roundabout in the AM peak (Purcells Cove Road, Osborne Street) continue to operate at LOS F. This is a result of traffic capacity issues at the roundabout, which the functional design did not seek to alleviate
- The performance of movements at the unsignalized intersections of Sussex Street and Glenora Avenue is unacceptable in the ultimate configuration, with the following discussion provided:
    - Sussex Street is not a candidate for a signalized intersection because of its close proximity to the Dentith Road signalized intersection (and roundabout in the ultimate scenario). As a result, there is little opportunity for improvement of LOS at this intersection. The delay may in turn improve as traffic shifts to parallel routes with more capacity (such as Dentith)
    - The traffic signal warrant analysis conducted as part of the Existing Conditions Report stated that although Glenora Avenue met the minimum points threshold for a traffic signal, the calculations are based on expanding the projected AM and PM peak hour traffic volume forecasts proportionally to the six hours observed in existing traffic counts. Given that the intersection only scores the minimum threshold, it cannot be concluded that traffic signals will be warranted

The full LOS Report is located in Appendix III.

Traffic Configuration Changes

As a result of more detailed modeling and analysis of the interim and ultimate scenarios, the functional design includes the following recommended traffic changes:

- **Multi-lane roundabout at Herring Cove Road and Dentith Road in the ultimate configuration:** the significant projected traffic growth from new developments, combined with the high frequency of turning movements at the Dentith intersection means that no feasible signalized intersection layout would produce a performance better than LOS F at this intersection. A multi-lane roundabout produces a LOS A performance in the AM peak period, and a LOS B performance in the PM peak period. A single-lane roundabout was also tested at this intersection and found to have a performance of LOS F under future conditions (see Appendix V for a report of these results)
- **Second southbound traffic lane from Mont Street to after Drysdale Road in ultimate scenario:** the concept design (March 2019) proposed a single southbound traffic lane complete with a dedicated transit lane through this section. Traffic modelling found that providing a single southbound lane through the commercial centre in the ultimate scenario would result in significant undesirable traffic queues through this area during the PM peak period. Widening for a second southbound lane mitigates the anticipated vehicle congestion while supporting transit movement through the corridor. The second southbound lane is required to maintain an acceptable level of service at the Drysdale signalized intersection
- **Drysdale Road in the ultimate scenario:** the traffic analysis found that while traffic signals are not warranted at Drysdale Road under existing conditions (2018), they will likely be warranted to accommodate the future projected traffic volumes (2033) (Figure 19)
- **No signalized intersection at Osborne Street:** the concept design (March 2019) considered the signalization of the Osborne Street intersection. Traffic modelling found that installing a traffic signal at Osborne Street would result in significant traffic queues on the southbound approach in the PM peak period, with potential to extend to the Purcells Cove Road intersection causing conflicts with the operation of the Armdale Roundabout. The modeling results for this configuration are located in Appendix V

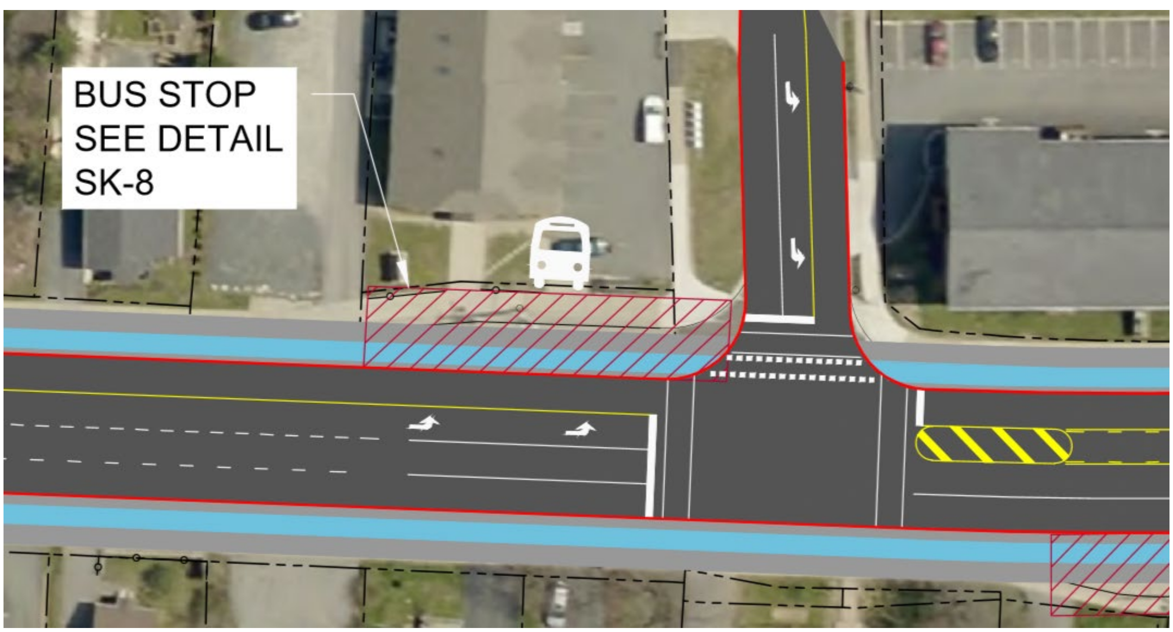


Figure 19 - Illustration of new signalized intersection at Drysdale Avenue in the ultimate scenario

Assumptions

The following assumptions apply to the LOS report:

- The report is based on a fixed route assignment, which was sourced from a traffic impact study for a major development in the area. The LOS analysis does not account for any changes in route choice that result from the redesign of the roadway
- The report assumes that the proposed design will yield the target mode choice split set out for inner suburban areas specified in the IMP. The actual modal splits that result from this design may be different
- The report assumes that all approved developments will be completed by the future horizon of the study (2033)
- The interim condition has been designed to accommodate existing (2018) and near-future traffic volumes, while the ultimate scenario is designed for the future (2033) conditions and beyond

Cost Estimates

Appendix II contains Class D planning level cost estimates for the interim and ultimate scenarios for each segment, along with high-level assumptions and exclusions. The cost estimates for the functional design are summarized in Table 2. Note that only an ultimate scenario was designed for segments 7 and 8, so there are no interim cost estimates for these segments.

Table 2 - Summary of cost estimates for functional design

Segment	Interim	Ultimate
1	$190,000	$2,200,000
2a	$130,000	$900,000
2b	$460,000	$3,900,000
3	$480,000	$1,800,000
4	$570,000	$1,700,000
5	$270,000	$6,500,000
6	$310,000	$4,100,000
7		$730,000
8		$1,900,000
TOTAL	$2,210,000	$21,500,000

Land Use Considerations

Property Acquisition

The land parcel dataset for the corridor was provided by HRM.

In general, the proposed design attempts to minimize property acquisition requirements in both the interim and ultimate scenarios while meeting the objectives of the design. Parcels where property acquisition is required are indicated with yellow hatching on the Functional Design Drawings (Appendix I).

The most substantial requirement for property acquisition is at the intersection of Herring Cove Road and Dentith Road, where a roundabout is proposed in the ultimate scenario. Property acquisition is required from the commercial centre on the south-west corner of the intersection, the office on the north-west corner and the YWCA and coffee shop on the east side of the intersection.

Figure 20 - Property acquisition required for the roundabout at Dentith Road in the ultimate configuration

Adjacent Land Use Conflicts

There are instances of private businesses occupying the public right-of-way along Herring Cove Road for uses including customer parking. The proposed design conflicts with many of these existing uses. Potential impacts to the businesses and land owners will need to be addressed through the preliminary/detailed design process.

Where residents are using the public right-of-way as driveway space and no other options exist for on-site parking, the design is laid out to mitigate the anticipated impacts (i.e., maintain these driveways where possible).

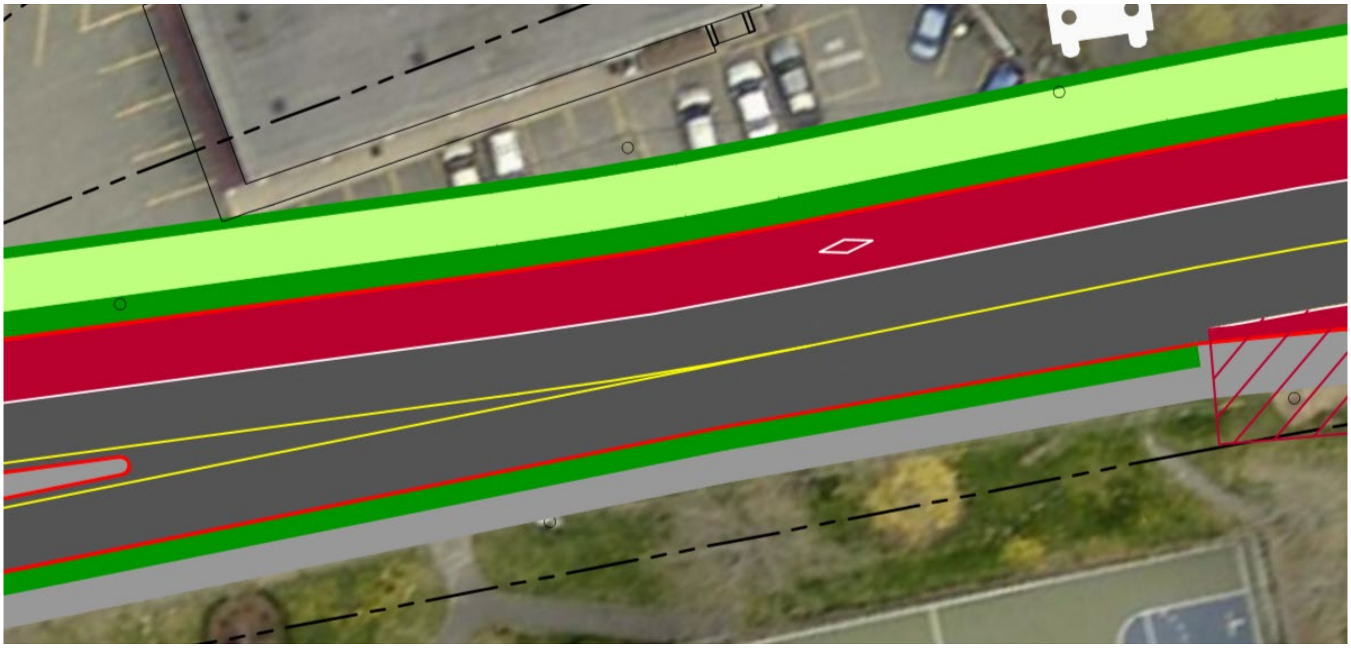


Figure 21 - Example of the proposed design conflicting with parking for an adjacent private business at Purcells Cove Road, within the public right-of-way (property line indicated by the dashed black lines)

Notes for Implementation

This section provides additional considerations for HRM during the preliminary/detailed design phase and implementing the functional design for Herring Cove Road.

Prioritization of Segments

From a functional standpoint, there are certain segments of the roadway and elements of the design that deliver more immediate and essential value compared to others. By viewing prioritization through the Complete Streets modal hierarchy established in HRM's Integrated Mobility Plan (2017), which prioritizes road users in the order of pedestrians, cyclists, transit users, and motorists, the following priorities emerge:

- Providing continuous sidewalks, on at least one side of the roadway, as soon as possible
- Providing midblock pedestrian crossings in areas where strong desire lines are exhibited
- Improving the safety and comfort of the roadway for pedestrians and cyclists, with physically separated cycling facilities to separate both users from vehicle traffic
- Implementing transit priority measures to improve the quality of transit service in the near-term, which will reduce demand for roadway space in the long-term
- Creating a "main street" feel for the Spryfield commercial area, with treed boulevards that improve the quality of the pedestrian environment

Based on the above identified priorities, it is recommended that the implementation of the functional plan be prioritized in the following order:

- **Segments 7 & 8:** these segments are currently lacking sidewalks despite being a focal point of new developments and existing apartment communities. The implementation of the ultimate scenario for these segments will dramatically improve the pedestrian environment with complete, separated sidewalks and more frequent crossing opportunities for people to access transit
- **Segments 1 & 2:** these segments contain another significant gap in the pedestrian network, along a stretch of Herring Cove Road where traffic flows unimpeded outside of peak hour. The proposed multi-use pathway on the east side through this segment creates a physically separated space for pedestrians and cyclists to travel through this segment without exposure to traffic. Implementing the ultimate scenario on these segments would also significantly improve travel times for the dozens of transit vehicles that travel along this stretch during peak periods
- **Segments 5 & 6:** the implementation of the interim scenario on these segments can be seen as a "quick win" for Herring Cove Road, with the opportunity for a low-cost implementation of protected bikeways, which would act as a traffic calming measure by reducing the number of vehicle lanes and improve pedestrian comfort by separating them from vehicles. There are several popular pedestrian destinations along these segments including retail, churches, schools and a community centre. The proposed lane reallocations can be achieved without significantly deteriorating the traffic performance along these segments. Implementing the ultimate scenario along these segments will further improve pedestrian conditions by adding treed boulevards

Maintaining Curbs and Alignments

The proposed design attempts to avoid the need for constructing new curbs twice in the interim and ultimate scenarios as much as possible. For example, in Segment 4, a new sidewalk and curb is proposed on the east side of the roadway in the interim scenario. To avoid reconstruction of this segment in the ultimate scenario, the same curb line is maintained in both scenarios and the raised cycle track is constructed on the east side in the interim scenario.

Transitioning Between Interim and Ultimate Scenarios

As the proposed design is implemented in phases, consideration should be given to transition points between designs along the roadway (ex. on-street protected bicycle lane transitioning to a raised cycle track). From a traffic operations perspective, the interim scenario delivers acceptable performance in existing traffic conditions. As new developments are completed along the corridor, this will eventually “trigger” the need for the ultimate configuration to be implemented. Depending on the rate of development along the corridor, this point could occur before or after the future year analyzed for the purposes of the study (2033).

Segment Specific Notes

Segment 1

- Reconstruction of the curb on the east side of Herring Cove Road is required in the interim between the roundabout and Purcells Cove Road to accommodate the multi-use pathway
- The multi-use pathway is designed to the minimum width of 2.4 metres in the interim scenario to minimize the need for widening in this segment. This is the smallest width to allow two cyclists to pass each other. In the ultimate scenario, the design width is 3.0 metres with a 1.5 metre boulevard separating the pathway from the roadway
- Utility pole relocations may be required for the minor utility line on the east side of the roadway to accommodate the multi-use pathway
- On the west side of the roadway through this section, the design retains the existing narrow asphalt sidewalk/shoulder in the interim and ultimate conditions, which is narrower than the minimum sidewalk width of 1.8 metres. This is justified as a cost-saving strategy to avoid further widening through this section
- Property acquisition may be required in order to construct the retaining walls for the ultimate scenario along this segment
- Existing driveways on the east side of Herring Cove may need to be relocated to side streets in the ultimate scenario
- Overhead gantry relocation will not be required for interim or ultimate scenarios. In the ultimate scenario, Transit-Only Lane signage will be required on the gantry

Segment 2

- The existing guard rail along the east side of the roadway north of Cowie Hill Road is too short to be considered a safe barrier for cyclists. For the interim condition, the guard rail should be retrofitted or replaced to create a fence that is at minimum 1.37 metres high (the minimum height specified by TAC)
- Consider providing intermittent breaks in the multi-use pathway barrier to provide access to side streets and stairs
- The multi-use pathway is built to the minimum width of 2.4 metres in the interim scenario to avoid the need for widening in this segment and to make use of the existing roadway. In the ultimate scenario, the design width is 3.0 metres with a 1.5 metre boulevard separating the pathway from the roadway
- On the west side of the roadway through segment 2A, the design retains the existing asphalt sidewalk in the interim, which is narrower than the minimum sidewalk width of 1.8 metres. Pedestrians and cyclists are accommodated by the new multi-use pathway on the east side of the roadway. In the ultimate condition, the sidewalk is constructed to 2.0 metres
- Property acquisition may be required in order to construct the retaining walls for the ultimate scenario along this segment

Segment 3

- The frontage of houses and grades of front yards varies along this segment and the functional design shows a minimum width cross section to avoid property and grading conflicts. Strategic opportunities exist to incorporate treed boulevards adjacent to the roadway along parts of this segment. This should be explored during the detailed design phase

Segment 4

- The frontage of houses and grades of front yards varies along this segment and the functional design shows a minimum width cross section to avoid property and grading conflicts. Strategic opportunities exist to incorporate treed boulevards adjacent to the roadway along parts of this segment. This should be explored during the detailed design phase

Segment 5

- No notes for this segment

Segment 6

- The bridge near the south entrance to the Captain William Spry Community Centre is a constrained right-of-way section of the segment. The proposed cross section is expected to fit within the bridge width, but if reductions are required during the detailed design phase, the cycle tracks can be reduced to as narrow as 1.5 metres across the bridge
- In the ultimate scenario, the second southbound travel lane is discontinued after Drysdale Road to address major community concerns regarding speeding along this segment and to provide more space for landscaping. A vehicle level of service analysis was not completed at any intersections south of Drysdale to validate the impact of this change (in the existing configuration, a five-lane cross section is maintained to Greystone). It is anticipated that Herring Cove Road south of Drysdale will function well with a three-lane cross section, although some congestion is likely during peak hours.

Segment 7

- Minor utility poles on east side will likely need to be relocated to accommodate the cycle tracks

Segment 8

- Minor utility poles on east side will likely need to be relocated to accommodate the cycle tracks

Traffic Signal Operations

The LOS Report (located in Appendix III) includes a traffic signal timing scheme that optimizes vehicle level of service performance at the signalized intersections along the corridor.

In addition to these recommendations, opportunities exist to modify traffic signal operations to further support the project goals. The following signaling changes should be considered:

- Leading pedestrian intervals (LPIs), which provide a walk phase for pedestrians for 3-7 seconds in advance of the vehicle green phase, and are shown to significantly reduce vehicle collisions with pedestrians at intersections. These can also be expanded to include bicycles
- Separated signal phasing for right-turning vehicles at major intersections such as Dentith Road, where bicycles receive a green phase that is separate from the right turn phase for motorists
- Where bike boxes and left-turn queue boxes are implemented, it is required that right-turns on red also be banned at the corresponding minor intersection legs to provide a conflict-free waiting area for people riding bicycles. This requires right-turn-on-red restrictions on:
    - Old Sambro Road
    - Williams Lake Road
    - Retail entrance opposite Williams Lake Road
- Provision of off-peak signal timing plans for the corridor with shorter cycle times. This will significantly reduce pedestrian delay and improve the pedestrian level of service
- Where a jug-handle is proposed for northbound cyclists turning left at Old Sambro road, the addition of bicycle signals should be considered. Alternatively, signs may be posted indicating that cyclists should obey the pedestrian signals

Dentith Road Roundabout

The proposed roundabout at Dentith Road should be further considered at or prior to the detailed design phase, as the design and implementation of roundabouts in Canada continues to evolve.

Specific design parameters that should be considered include:

- **Entry geometry:** while tangential approaches are the current default approach style for North American roundabouts, radial approaches reduce entry speed and improve safety, especially for pedestrians and cyclists
- **Number of entry and exit lanes on each approach:** reducing the number of entry and exit lanes from two to one shortens crossing distances and reduces property acquisition requirements, but has a negative effect on the capacity of the roundabout
- **Crossing treatments for pedestrians and bicycles:** the functional design reflects current practice and merges pedestrians and cyclists into a shared multi-use pathway for the Dentith Road crossings, and requires cyclists to cross Dentith Road as pedestrians. As roundabout design evolves, treatments may emerge that are more preferential towards cyclists. Controlled crossings with crossrides may also be considered, such as RA-5 or traffic signals, which allow cyclists to cross without dismounting.
- **Accessibility features:** roundabout design is a challenge from an accessibility perspective, as pedestrian crossings are not signalized. As roundabout design evolves, new treatment and design options to accommodate accessible crossings may become available

Grading / Sloping Challenges

There are significant changes in grade along the path of the roadway as well as adjacent to the roadway, presenting challenges to the development of the design. Grading challenges in particular are expected along the east side of segments 1 and 2, where steep grades currently exist adjacent to the roadway. In addition, the grading of front yards of many houses is expected to cause site-specific challenges along segments 3 and 4. During detailed design, the cross section may need to be narrowed at specific points to avoid conflicts with private driveways and buildings.

Given the lack of a detailed survey for most of the roadway, the proposed functional design does not consider mitigation of grading challenges associated with widening. Survey and geotechnical analysis are required to understand the feasibility and cost of road widening.

Impacts to Municipal Infrastructure and Utilities

The utility pole location dataset for the corridor was provided by HRM and contains only representative pole locations in many instances. While the cross-sections of the proposed design attempt to account for actual pole locations, it is likely that alignment adjustments will be required in the detailed design stage to mitigate conflicts with utilities and other in-boulevard infrastructure. Poles in conflict with the proposed designs are indicated on the functional plan drawings in Appendix I. The approximate number of relocations required is summarized in Table 3.

Table 3 - Approximate number of utility pole relocations required per segment

Segment No.	Approximate Utility Pole Relocations*
1	9
2a	7
2b	7
3	11
4	15
5a	12
5b	18
6a	18
6b	6
7	4
8	7
Total	**114**
* Pole relocations based on GIS information and aerial photography; detailed survey information required to confirm.	

Detailed design should attempt to avoid relocations to the main utility line on the west side of the roadway as much as possible by modifying the alignment and width of sidewalks and cycle tracks. Some traffic signal poles will need to be relocated to accommodate addition of cycle tracks at intersections.

The existing underground utilities along this corridor (such as a major fibre-optic line) are to be addressed during the detailed design process.

There are two bridges on Herring Cove Road within the study area: near Purcells Cove Road and near the Captain William Spry Centre. The functional design cross sections are anticipated to fit within the existing width of these structures without requiring widening.

Bicycle Facility Grading and Drainage

As cycle tracks are constructed separate from the roadway, a focus is required on grading during the detailed design phase to ensure adequate user comfort and drainage. In general, the existing drainage configuration is anticipated to be sufficient for the interim scenario. Local adjustments may be required at transit stops where new concrete islands are installed.

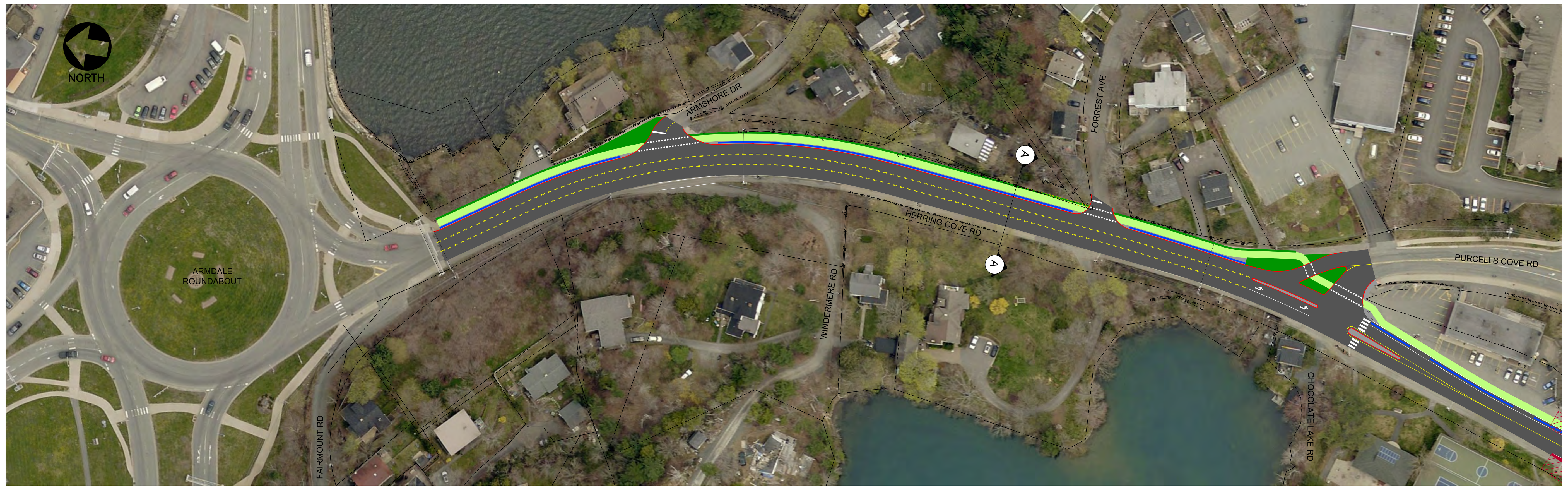
SEGMENT 1 - HERRING COVE ROAD
ARMDALE ROUNDABOUT TO PURCELLS COVE ROAD

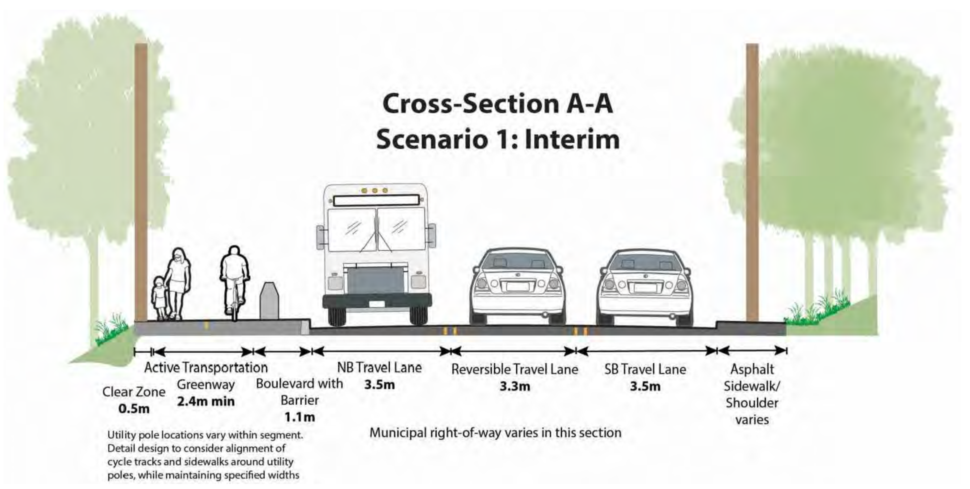
EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN





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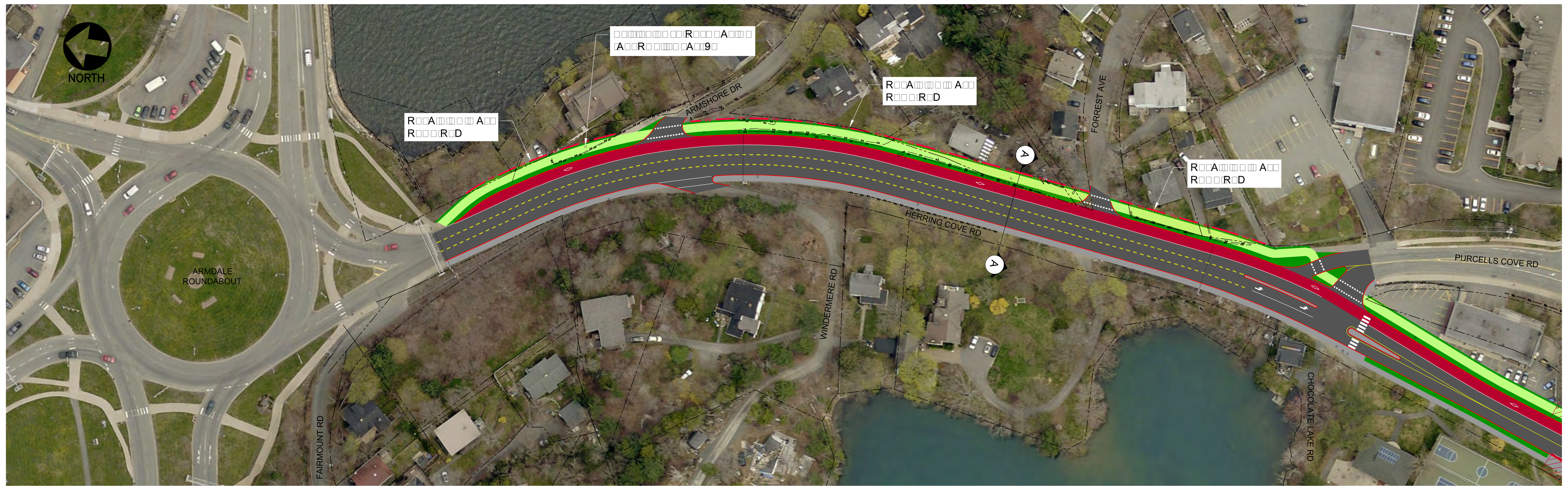

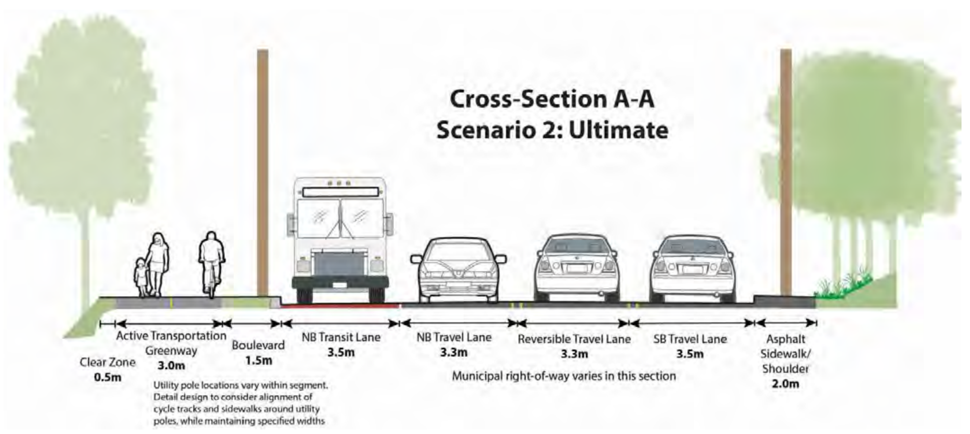

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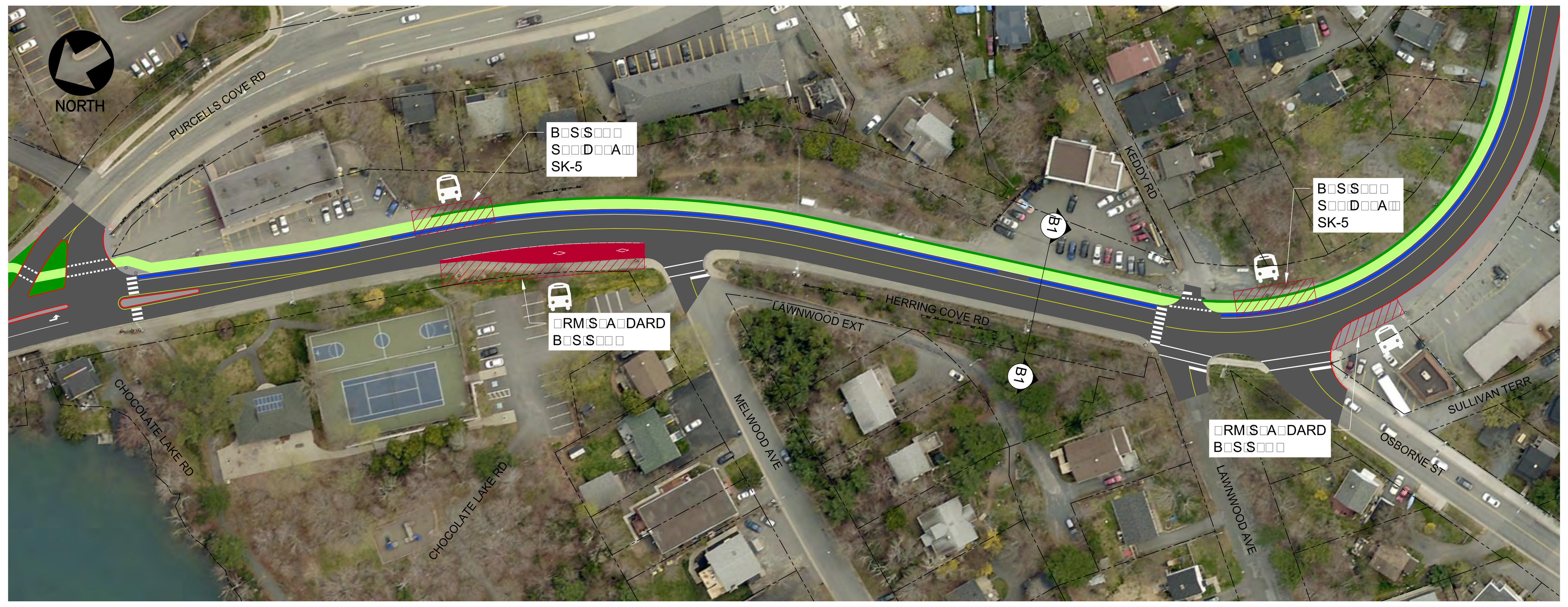
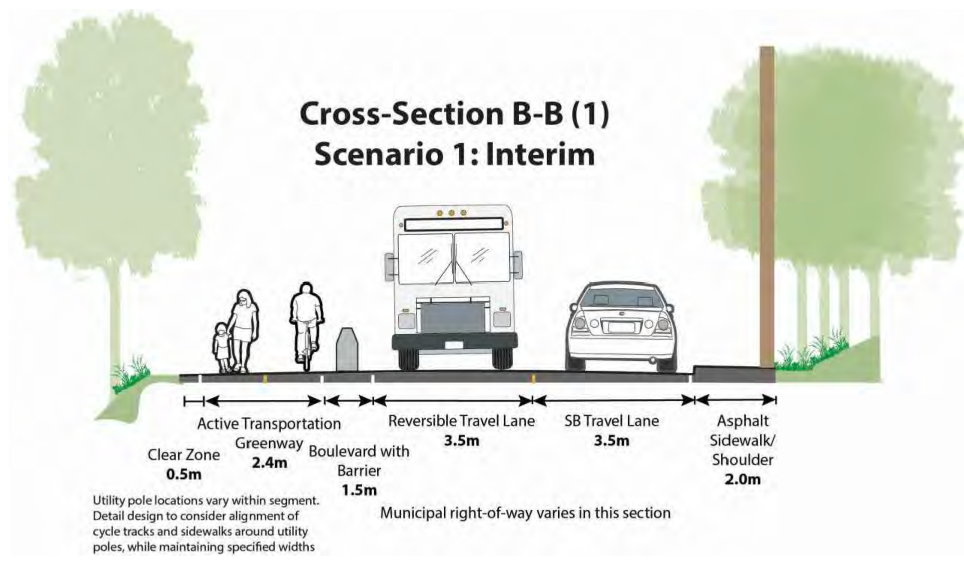
SEGMENT 2a - HERRING COVE ROAD
PURCELLS COVE ROAD TO COWIE HILL ROAD

EXISTING CONDITIONS

OPTION 1 - INTERIM DESIGN





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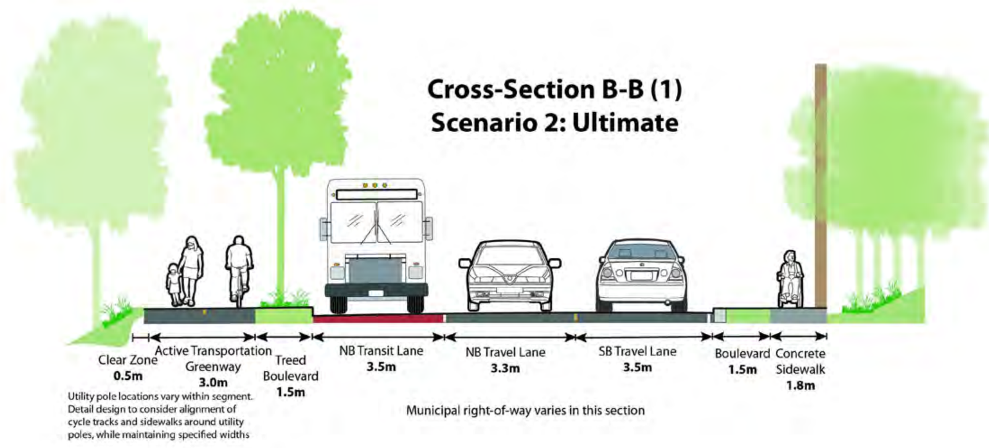

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

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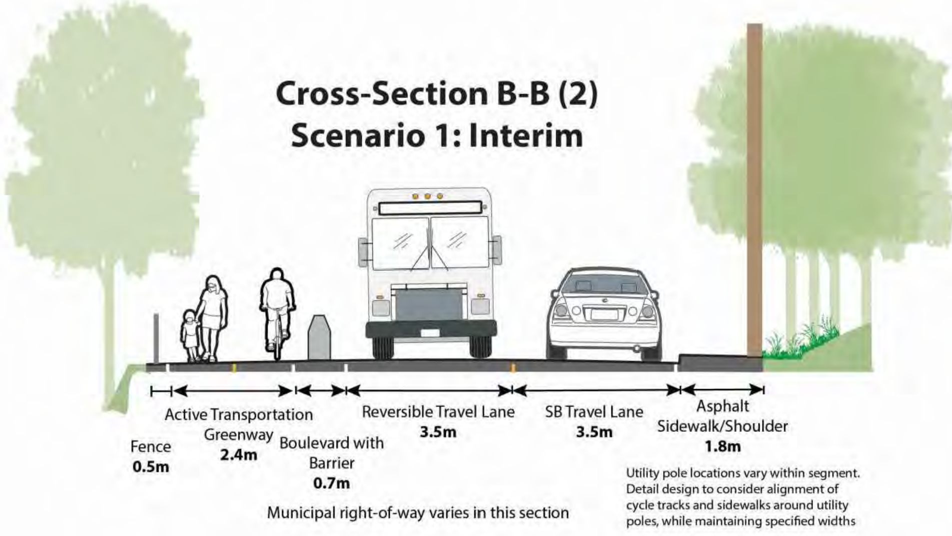
SEGMENT 2b - HERRING COVE ROAD
PURCELLS COVE ROAD TO COWIE HILL ROAD

EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN



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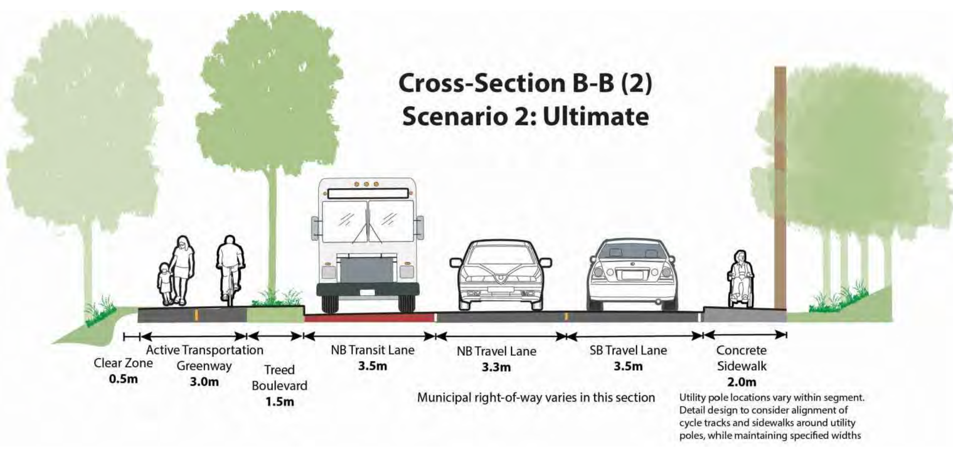

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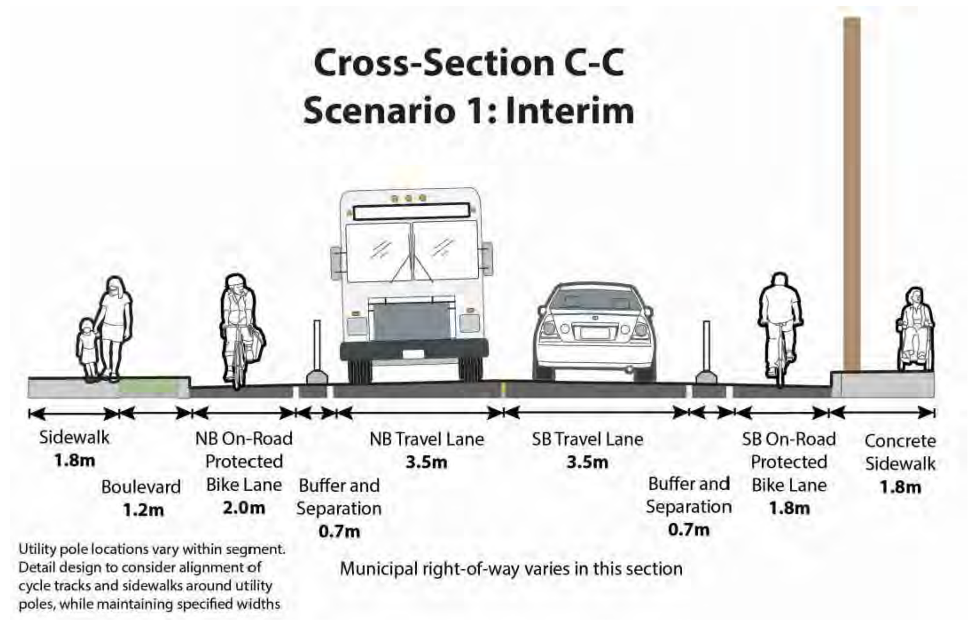
SEGMENT 3 - HERRING COVE ROAD
COWIE HILL ROAD TO HIGHFIELD STREET

EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN



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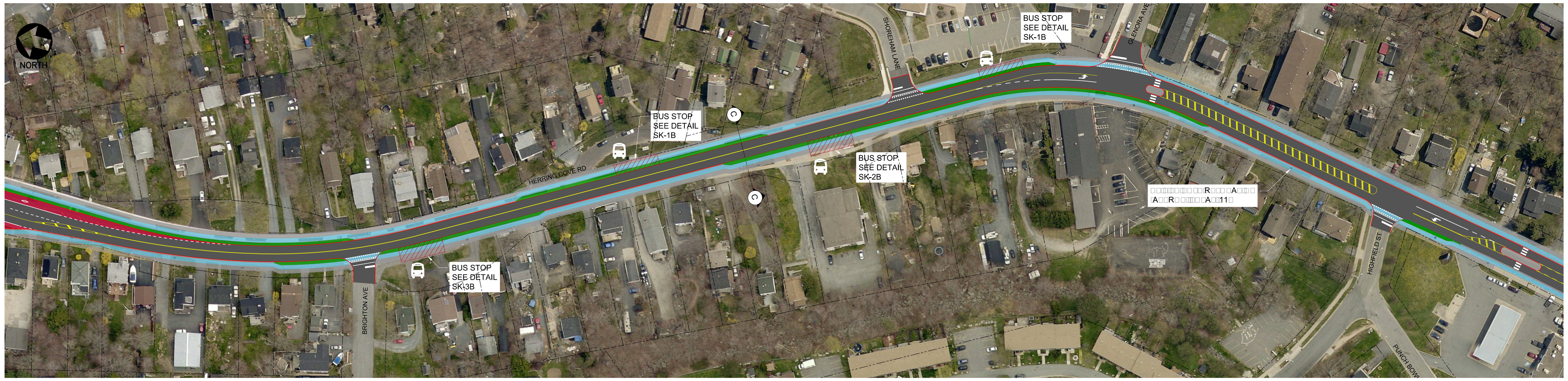

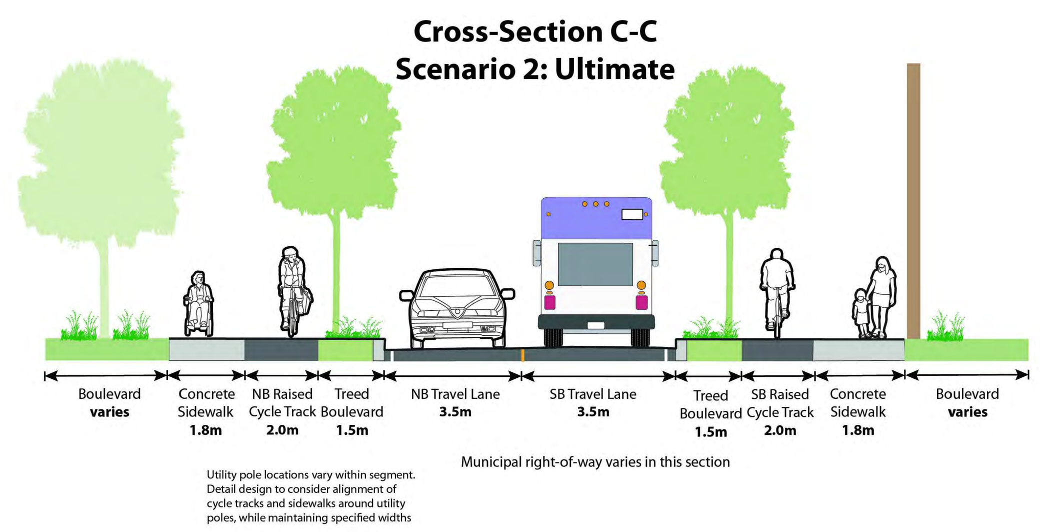

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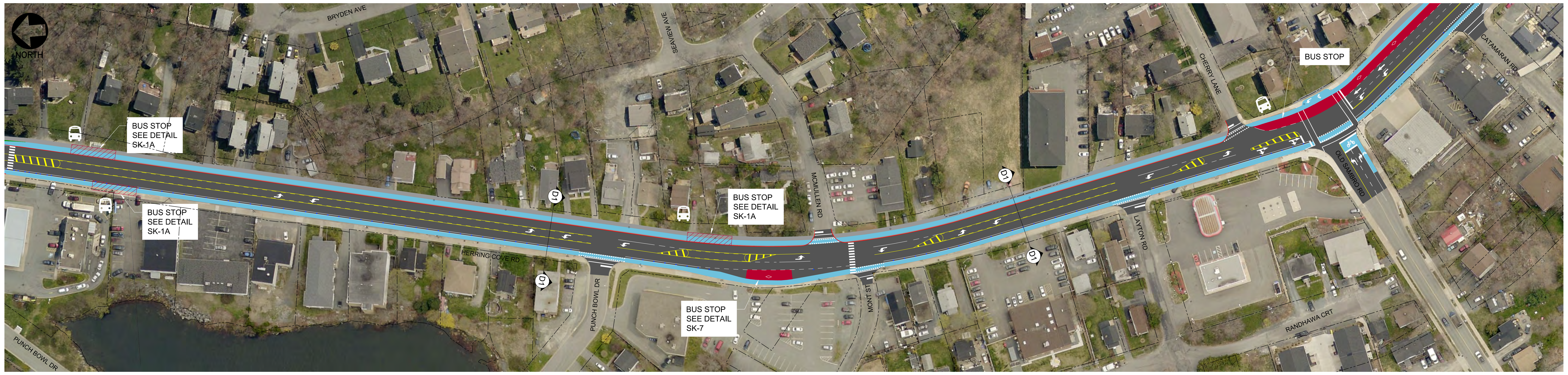
SEGMENT 4 - HERRING COVE ROAD
HIGHFIELD STREET TO OLD SAMBRO ROAD

EXISTING CONDITIONS

OPTION 1 - INTERIM DESIGN



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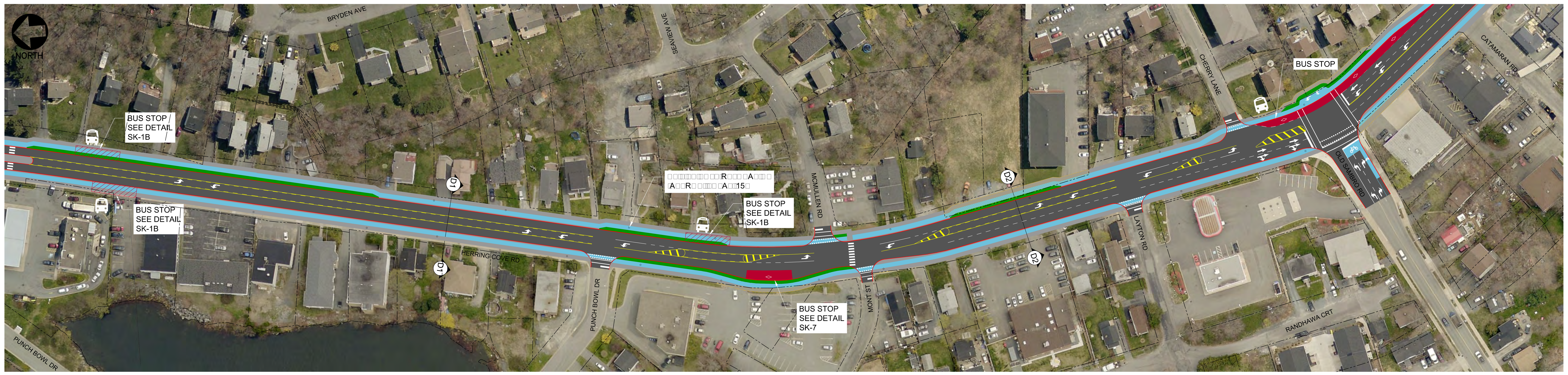
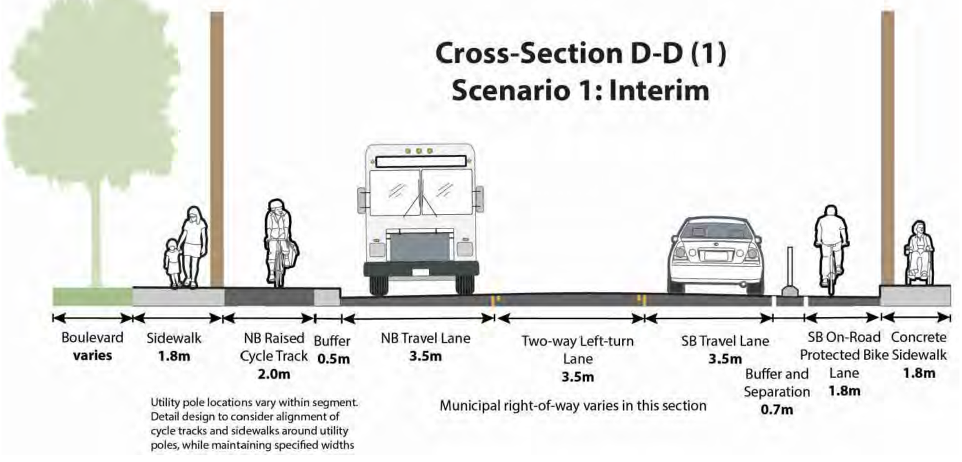
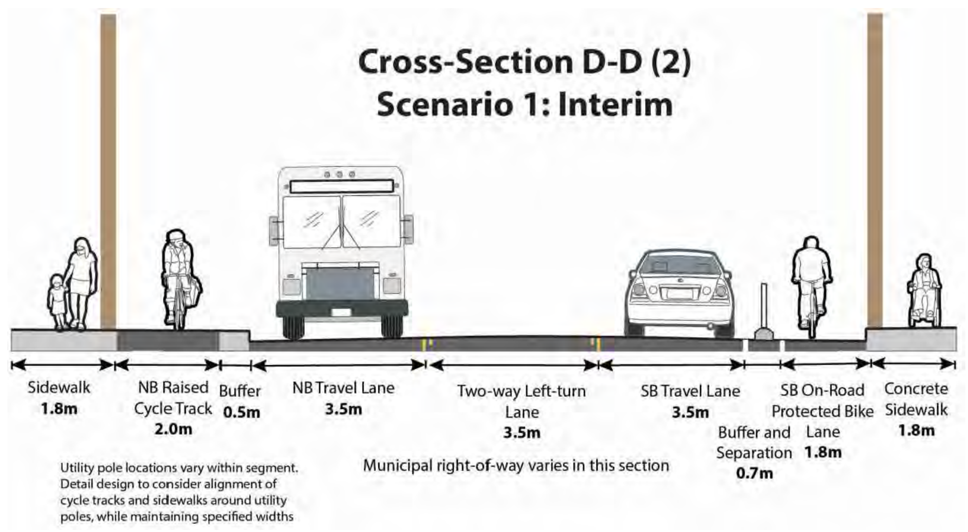
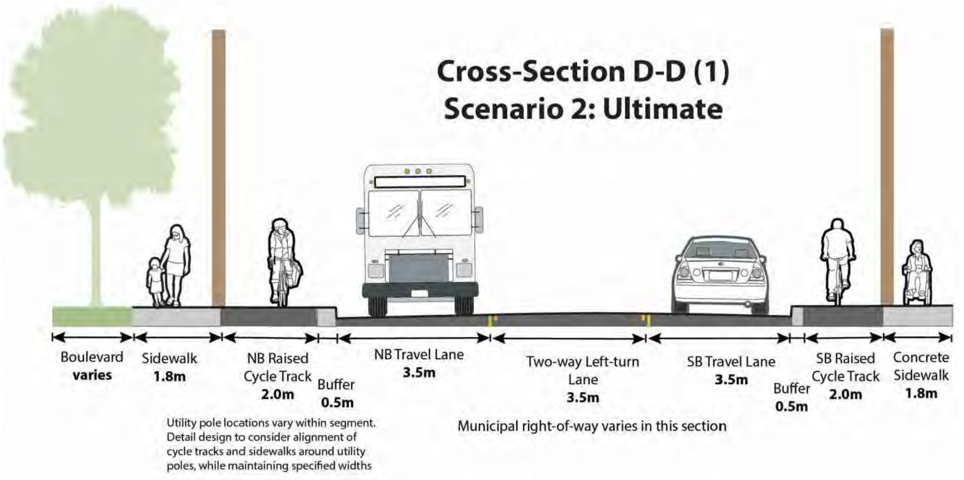


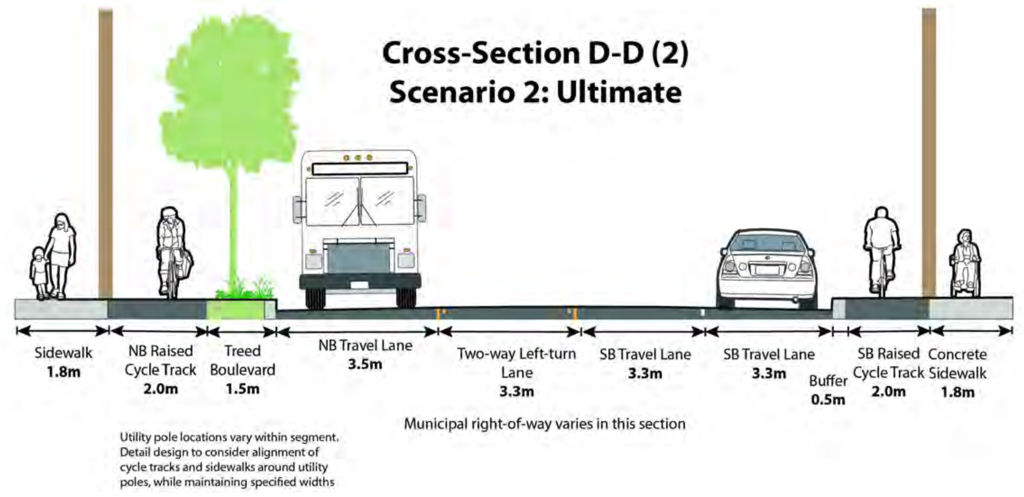
LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5









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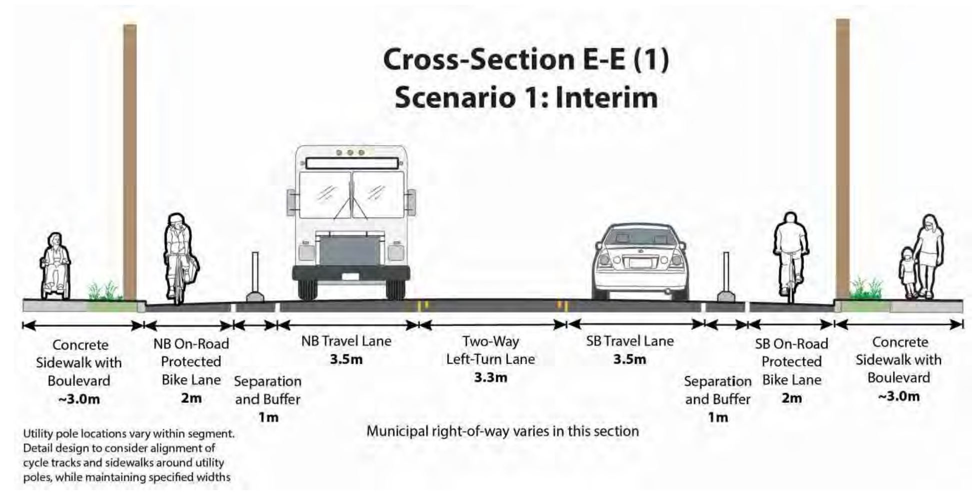
SEGMENT 5a - HERRING COVE ROAD
OLD SAMBRO ROAD TO SUSSEX STREET

EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN



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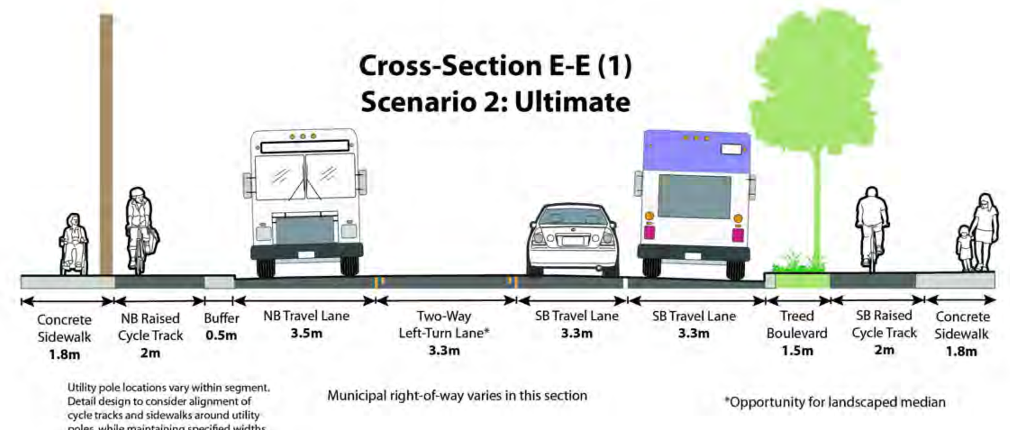

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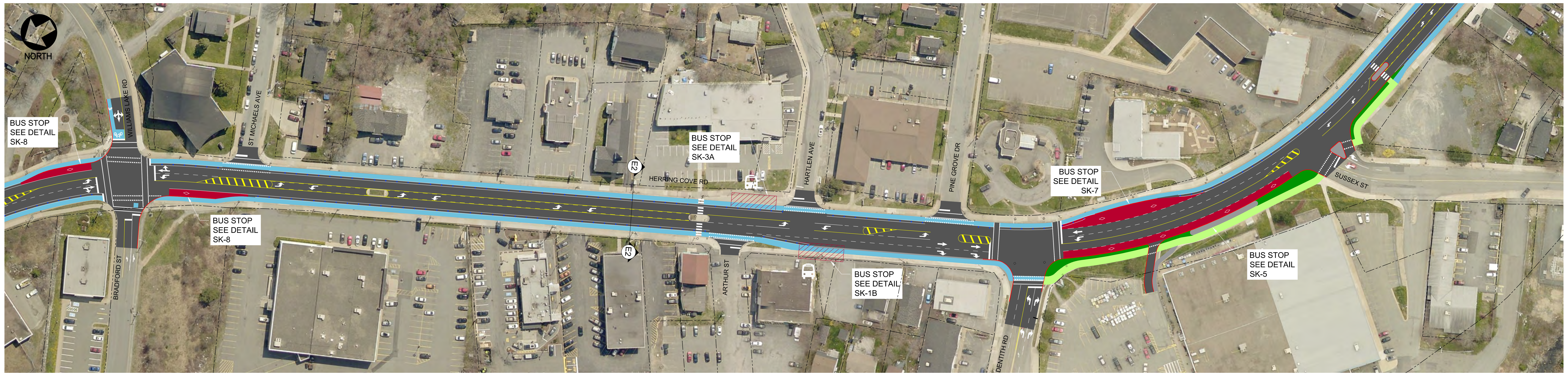
SEGMENT 5b - HERRING COVE ROAD
OLD SAMBRO ROAD TO SUSSEX STREET

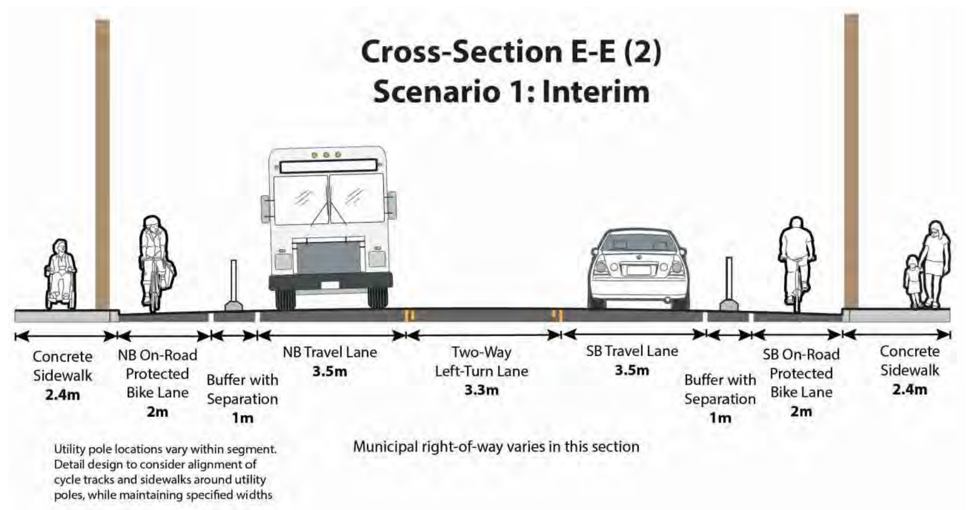
EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN





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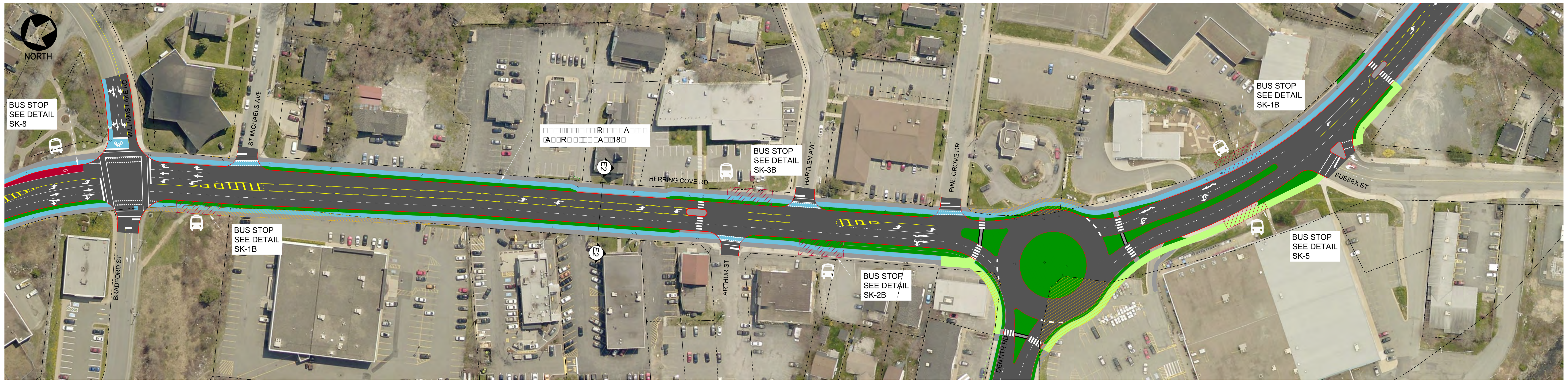

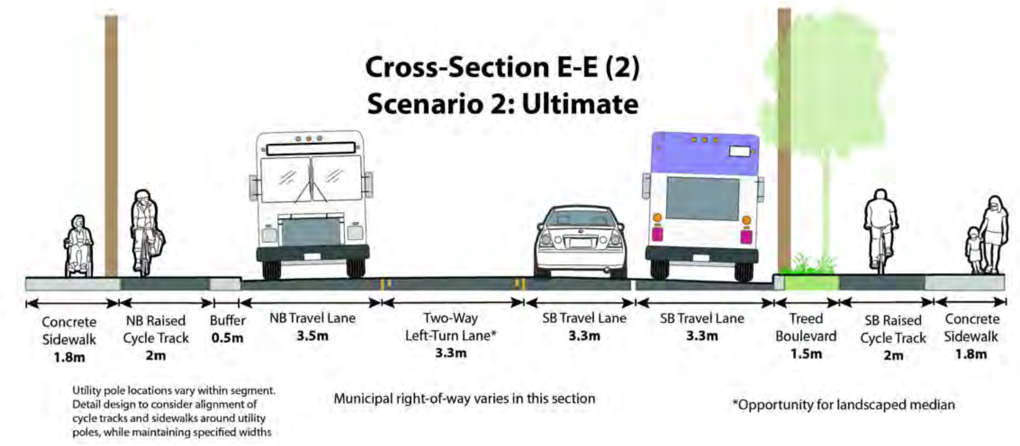

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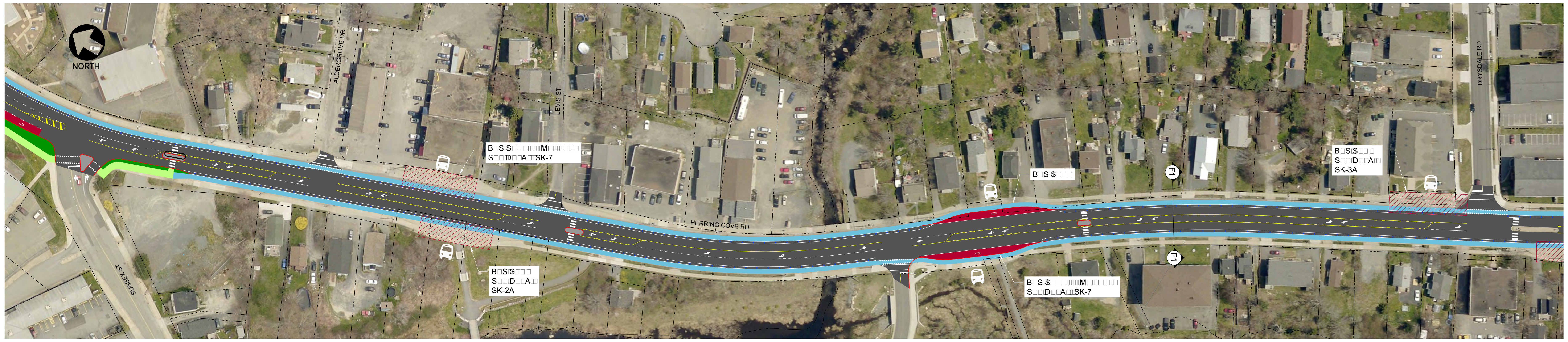
SEGMENT 6a - HERRING COVE ROAD
SUSSEX STREET TO GREYSTONE DRIVE

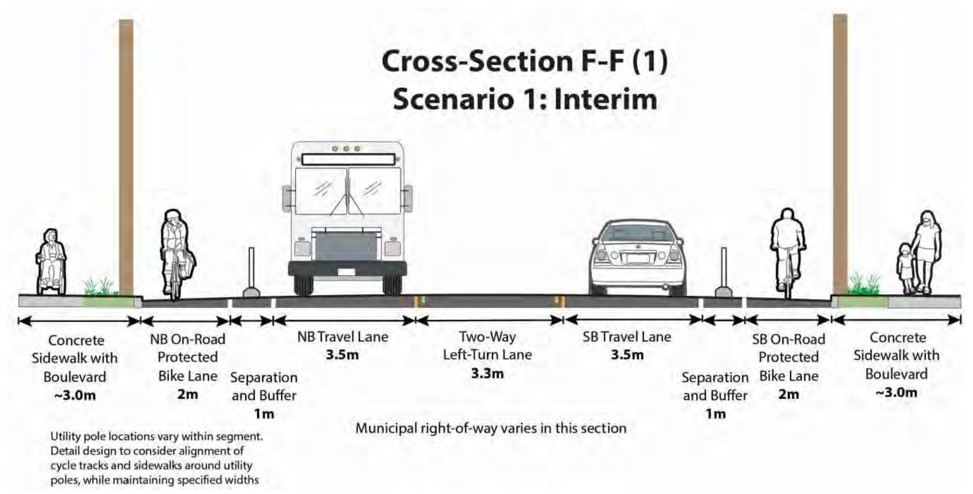
EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN





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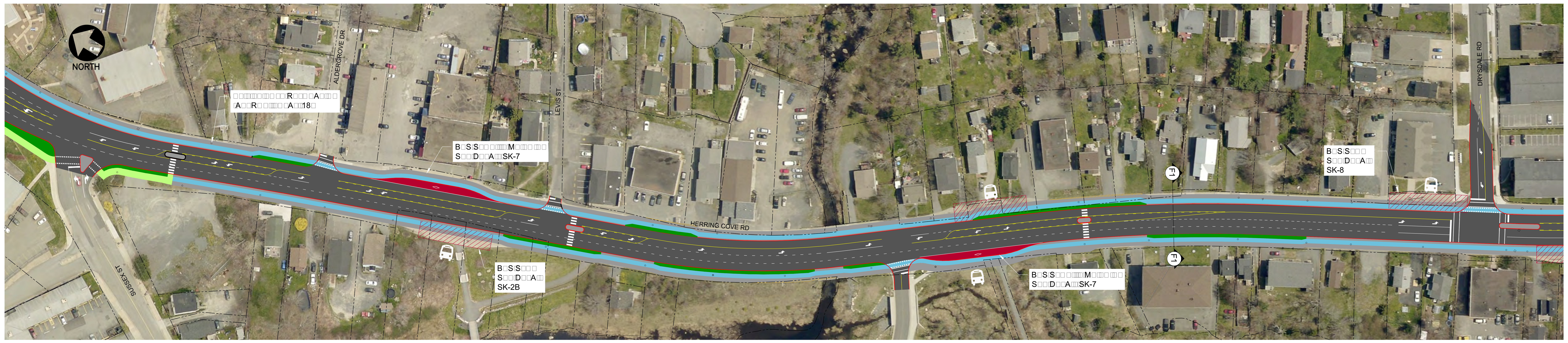

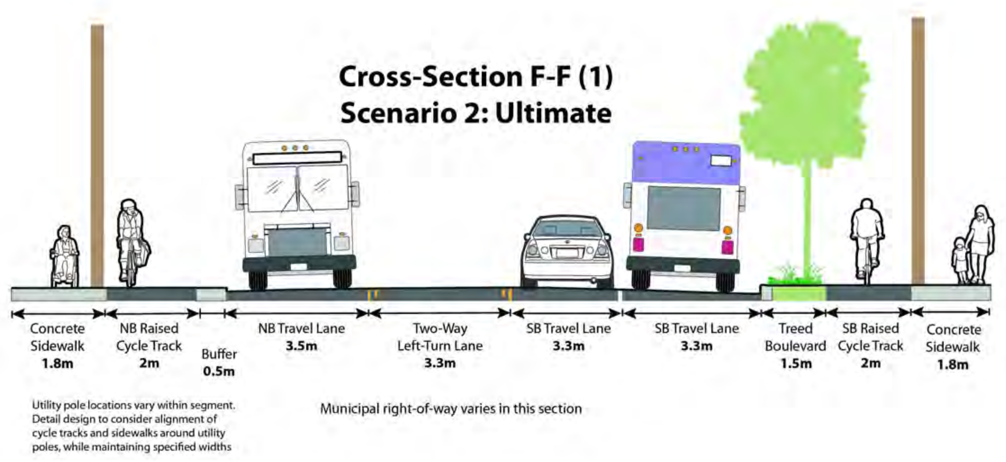

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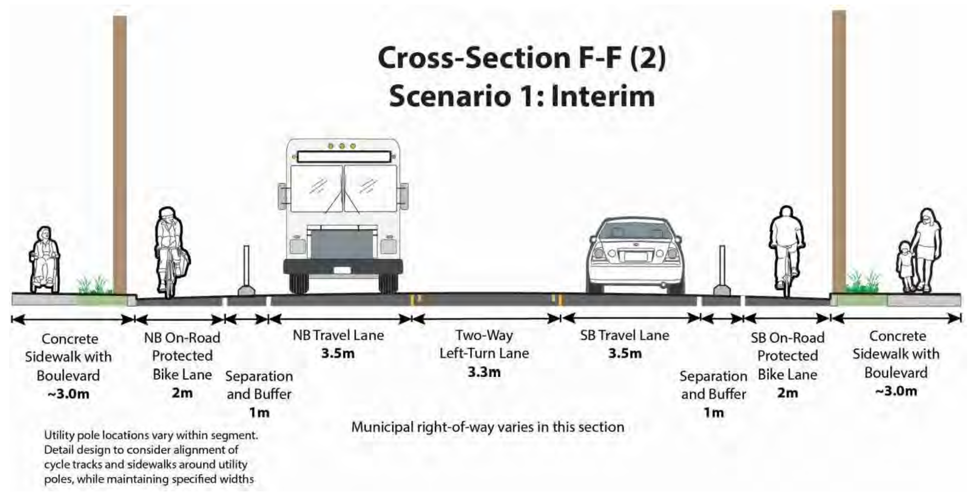
SEGMENT 6b - HERRING COVE ROAD
SUSSEX STREET TO GREYSTONE DRIVE

EXISTING CONDITIONS

LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

OPTION 1 - INTERIM DESIGN



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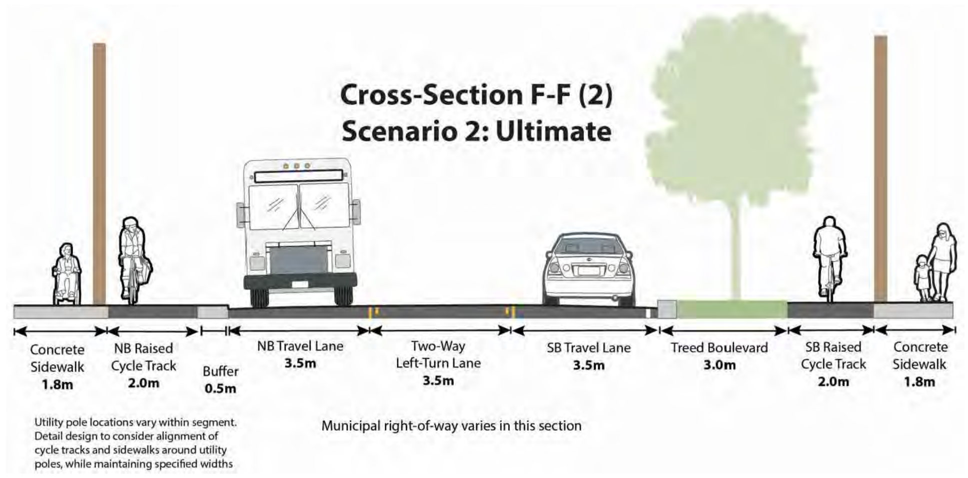

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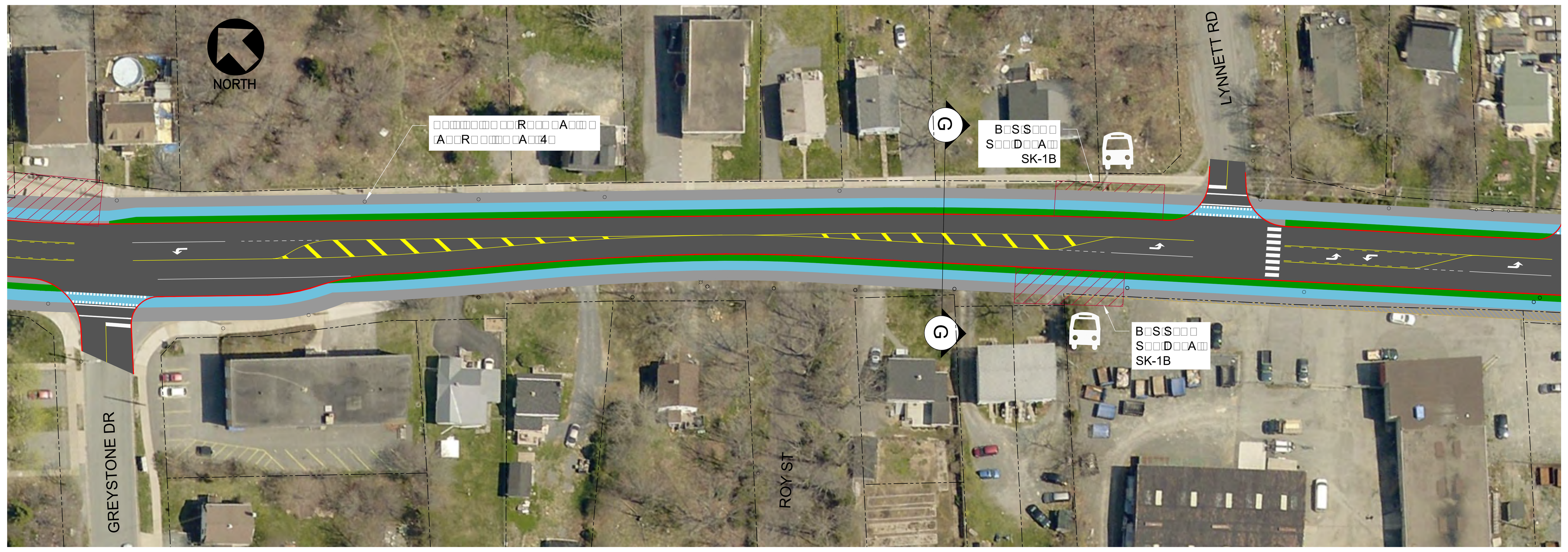
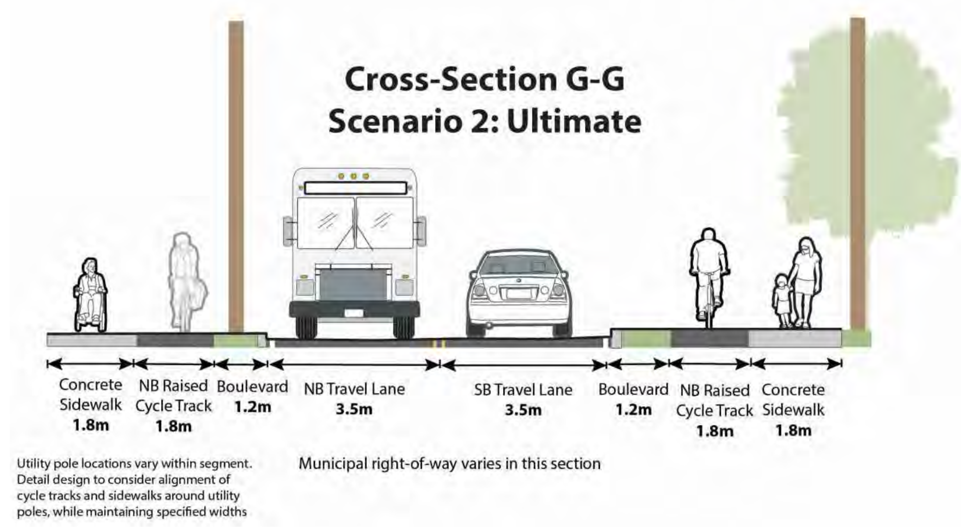
SEGMENT 7 - HERRING COVE ROAD
GREYSTONE DRIVE TO LYNNETT ROAD (500 BLOCK)

EXISTING CONDITIONS

OPTION 2 - ULTIMATE DESIGN





LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

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HALIFAX

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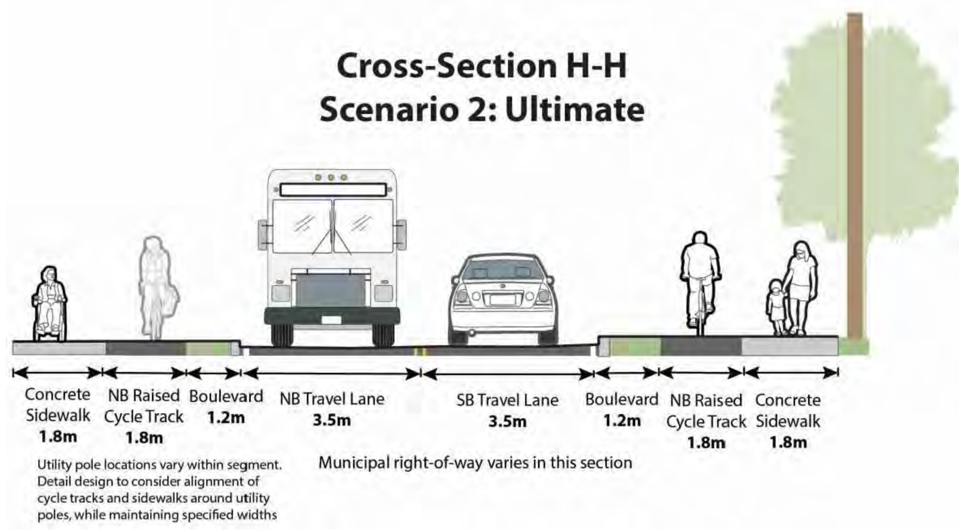
SEGMENT 8 - HERRING COVE ROAD
PAST LYNNETT ROAD (500 BLOCK)

EXISTING CONDITIONS

OPTION 2 - ULTIMATE DESIGN



LEGEND

- CURB
- ASPHALT
- BIKE LANE / CYCLE TRACK
- LANDSCAPING
- CONCRETE JERSEY BARRIER
- BOLLARDS
- MULTI-USE PATHWAY
- CONCRETE / SIDEWALK
- TRANSIT LANE / LAY-BY
- BUS STOP
- PROPERTY IMPACT
- CROSSWALK
- CROSSWALK WITH RA-5

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HERRING COVE ROAD FUNCTIONAL PLAN
APPENDIX II: COST ESTIMATE

Line Items and Assumptions

Line Item	Notes
Curb Removal	
Sidewalk Removal	
Asphalt Removal	
New Asphalt	Includes select gravel replacement
New Curb	Includes base gravels
New sidewalk	Includes base gravels
Treed Boulevard	
Raised Cycle track	Includes green thermoplast
Jersey Barrier	
Protected Bike Track	Includes bollards
AT Greenway	Also known as multi-use path. Includes green thermoplast
Pavement Markings and Signage	
Bus Stops	Assumes 10 m^3 of concrete required for one transit island
RA-5	Same price assumed for new and relocated

SUMMARY OF COST ESTIMATES		
Seg.	**Interim**	**Ultimate**
1	$ 190,625	$ 2,231,688
2a	$ 129,563	$ 900,063
2b	$ 460,738	$ 3,858,688
3	$ 479,500	$ 1,838,594
4	$ 567,281	$ 1,691,219
5	$ 269,313	$ 6,542,563
6	$ 305,250	$ 4,078,375
7		$ 731,681
8		$ 1,891,688
TOTAL	**$ 2,211,644**	**$ 21,532,869**

Exclusions (includes, but not limited to):

Any costs incurred for the relocation of utilities including poles and underground utilities.
Cost of fencing retrofit or replacement along edge of multi-use pathway
Traffic signal modification costs to add bicycle signals
Traffic signal pole relocations
Property acquisition costs
Structure rehabilitation / modification costs

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28 August 2019

Project: 182072

Alta Planning + Design
987-A Wellington Street West, Suite 201
Ottawa, ON, Canada K1Y 1Y2

Attention: Kate Whitfield, P.Eng., MCIP, RPP
T: 613.319.0335
E: katewhitfield@altaplanning.com

Re: Herring Cove Road Functional Plan – Functional Design Report

Ms. Whitfield,

Harbourside Transportation Consultants has completed the intersection performance analysis and the multi-modal level of service analysis to support the functional design report for the Herring Cove Road Functional Plan. The methodology and results of the analyses are documented in the following sections.

Intersection Performance Analysis: The performance of an intersection can be evaluated using a number of measures of effectiveness (MOEs), including level of service (LOS), delay, volume-to-capacity ratio (v/c) and vehicle queuing are the primary measures of effectiveness used in traffic analyses.

Level of service is a qualitative measure used to describe the level of performance of an intersection in terms of traffic movement. Level of service for intersections is defined in terms of delay, which is a measure of driver discomfort, frustration and increased travel time. The quality of traffic movement is divided into six levels ranging from A to F, where level of service A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level of service F represents the worst quality of traffic where the level of congestion is considered unacceptable to most drivers. The level of service criteria for intersections (Table 1) are stated in terms of average control delay per vehicle.

The volume-to-capacity (v/c) ratio is a measure of how the peak hour traffic volume on an approach to an intersection compares to the theoretical maximum volume that could be accommodated on that intersection approach. As the v/c ratio approaches 1.0, the movement has reduced ability to accommodate any additional volume of traffic.

The 95th percentile queue (95th% queue) is the estimated length in metres of a queue of vehicles stopped on an intersection approach which is only exceeded five percent of the time. Since a stopped vehicle occupies approximately seven metres of queue length, a 95th% queue of 14 metres indicates that less than five times of out 100 the queue may exceed two vehicles on the approach. The 95th% queue is typically used to determine if sufficient vehicle storage is available to maintain efficient traffic flow.

Synchro Studio 10 and ARCADY 8 software were used to complete the intersection performance analysis. The study intersections were evaluated with the existing and projected AM and PM peak hour traffic volumes. The detailed Synchro and ARCADY reports for the analysis are included in Appendix A.

Table 1: Level of Service Criteria for Intersections

Level of Service	Description	Signalized Intersection Control Delay	Unsignalized Intersection Control Delay
A	No congestion; most vehicles do not stop. **(Excellent)**	≤ 10 sec/veh	≤ 10 sec/veh
B	Very light congestion; some vehicles stop. **(Very Good)**	10-20 sec/veh	10-15 sec/veh
C	Light congestion; most vehicles stop. **(Good)**	20-35 sec/veh	15-25 sec/veh
D	Noticeable congestion; vehicles must sometimes wait through more than one red light. No long-standing queues are formed. **(Satisfactory)**	35-55 sec/veh	25-35 sec/veh
E	Congestion; vehicles must sometimes wait through more than one red light. Long-standing queues are formed. **(Unsatisfactory)**	55-80 sec/veh	35-50 sec/veh
F	Severe congestion; demand exceeds the capacity of the intersection. **(Unacceptable)**	≥ 80 sec/veh	≥ 50 sec/veh

Ultimate Conditions: The Ultimate Conditions scenario includes providing one northbound lane (inbound) and one southbound lane (outbound) from the Armdale Roundabout to south of Glenora and one northbound lane (inbound) and two southbound lanes (outbound) from Old Sambro Road to south of Drysdale Road. Changes at each study intersection are described below:

- **Herring Cove Road & Purcells Cove Road:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Osborne Street:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Cowie Hill Road:** Geometric changes to remove channelization for the southbound right turn. Minor changes to pedestrian timings and removal of the pedestrian crossing on the southbound approach.
- **Herring Cove Road & Glenora Avenue:** Lane reconfiguration on Herring Cove Road to provide a southbound left turn storage lane with approximately 25 metres of storage. No changes to intersection control.
- **Herring Cove Road & Old Sambro Road:** Lane reconfiguration on Herring Cove Road to convert the northbound left turn lane from a continuous lane to a storage lane with approximately 100 metres of storage. The two southbound through lanes on Herring Cove Road are maintained.
- **Herring Cove Road & Williams Lake Road/Bradford Street:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane and to provide a northbound right turn storage lane with approximately 25 metres of storage. Lane reconfiguration on Williams Lake Road to provide a westbound left turn storage lane with approximately 25 metres of storage. The two southbound through lanes on Herring Cove Road are maintained. Traffic signal modifications to provide a protected + permitted phase for the southbound left turn on Herring Cove Road and changes to pedestrian timings.

- **Herring Cove Road & Dentith Road:** New multi lane roundabout.
- **Herring Cove Road & Sussex Street:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane; the northbound left turn lane and the two southbound through lanes on Herring Cove Road are maintained. No changes to intersection control.
- **Herring Cove Road & Drysdale Road:** Lane reconfiguration on Herring Cove Road to remove one northbound through lane and extend the existing southbound left turn storage lane to provide approximately 100 metres of storage. The two southbound through lanes on Herring Cove Road are maintained. Lane reconfiguration on Drysdale Road to provide a westbound left turn storage lane with approximately 25 metres of storage. New traffic signal with a protected + permitted phase for the southbound left turn on Herring Cove Road.

Ultimate Conditions – Existing Traffic Volumes (2018): The Ultimate Conditions scenario is intended to apply to the future conditions of the roadway only; performance of this scenario under existing conditions is shown for comparison purposes only. The existing conditions scenario provides an assessment of operations based on current traffic volumes. It should be noted that the AM peak hour operations at the Armdale roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were supplemented by field observations.

The results for the intersection performance analysis for ultimate conditions using existing traffic volumes are summarized in Table 2. The operations at each study intersection under ultimate conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.

- **Herring Cove Road & Glenora Avenue:** The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Dentith Road:** The overall performance of the roundabout will be acceptable during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour the eastbound left movement (Sussex Street) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.

Ultimate Conditions – Future Traffic Volumes (2033): The future conditions scenario provides an assessment of operations based future development projections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were modified to reflect the queues from the Armdale roundabout.

The results for the intersection performance analysis for ultimate conditions using future traffic volumes are summarized in Table 3. The operations at each study intersection under future ultimate conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will continue to operate at LOS F. During the PM peak hour, the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will continue to operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will continue to operate at LOS F and over capacity. The overall performance of the intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The southbound through movement (Herring Cove Road) will also be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Glenora Avenue:** During the AM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during the both peak hours. The 95th% queues for the eastbound right movement (Old Sambro Road) will exceed the storage capacity of the right turn lane during the PM peak hour.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound left movement (Williams Lake Road) will operate at LOS E. The 95th% queues for the westbound left movement (Old Sambro Road) will exceed the storage capacity of the left turn lane during both peak hours and the 95th% queues for the northbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.
- **Herring Cove Road & Dentith Road:** The overall performance of the roundabout will be acceptable during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left and right movements (Sussex Street) will operate at LOS F; the left movement will be over capacity. The northbound left movement (Herring Cove Road) will operate at LOS E. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** During the AM peak hour, the northbound movements (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be nearing unacceptable (LOS E) during the AM peak hour. During the PM peak hour, the northbound movements will operate at LOS E and be over capacity. The southbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour. The 95th% queues for the southbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

Table 2: Intersection Performance Analysis – Ultimate Conditions (2018)

Ultimate Conditions (2018)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		**-**	**F**				**5.0**	**A**			
Purcells Cove Road	WB Right*	-	F	F	-	-	21.3	C	C	0.55	25.1
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	11.3	A	B	0.22	6.1	14.4	A	B	0.60	31.2
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		**-**	**F**				**11.2**	**B**			
Osborne Street	EB Left*	-	F	F	-	-	185.7	F	F	1.08	54.0
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	11.9	A	B	0.06	1.5
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		**9.5**	**A**				**14.5**	**B**			
Cowie Hill Road	EB Left	11.1	B	B	0.29	13.6	18.8	B	B	0.52	29.1
	EB Right										
Herring Cove Road	NB Left	7.8	B	A	0.03	4.3	15.1	B	B	0.37	17.1
	NB Through	10.6		B	0.48	75.5	9.2		A	0.42	55.1
	SB Through	8.3	A	A	0.29	39.8	17.7	B	B	0.78	156.3
	SB Right	3.1		A	0.07	5.4	3.0		A	0.12	7.3
Herring Cove Road & Glenora Avenue		**3.0**	**A**				**3.1**	**A**			
Glenora Avenue	WB Left	20.0	C	C	0.37	12.2	35.4	E	E	0.49	19.0
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	8.6	A	A	0.05	1.5	8.6	A	A	0.08	2.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		**11.4**	**B**				**14.0**	**B**			
Old Sambro Road	EB Left	19.4	B	B	0.41	24.8	23.7	B	C	0.49	32.3
	EB Right	5.9		A	0.39	11.8	6.6		A	0.53	15.7
Herring Cove Road	NB Left	8.6	A	A	0.48	21.2	15.9	B	B	0.66	33.7
	NB Through	7.9		A	0.33	28.5	8.8		A	0.42	45.1
	SB Through	14.9	B	B	0.52	27.8	16.8	B	B	0.66	52.0
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		**12.8**	**B**				**15.8**	**B**			
Bradford Street	EB Left	16.0	A	B	0.01	1.8	18.8	A	B	0.14	9.5
	EB Through	8.6		A	0.08	5.6	7.6		A	0.40	14.1
	EB Right										
Williams Lake Road	WB Left	20.0	B	C	0.36	23.2	25.0	C	C	0.44	21.8
	WB Through	8.3		A	0.11	7.0	12.2		B	0.16	9.9
	WB Right										
Herring Cove Road	NB Left	6.9	B	A	0.08	8.0	7.8	B	A	0.24	13.5
	NB Through	16.1		B	0.49	101.2	21.0		C	0.65	128.6
	NB Right	6.1		A	0.18	15.3	5.8		A	0.18	13.7
	SB Left	6.9	B	A	0.06	5.8	7.1	B	A	0.16	10.3
	SB Through	11.5		B	0.25	36.8	16.5		B	0.57	70.5
	SB Right										
Herring Cove Road & Dentith Road		**2.2**	**A**				**2.9**	**A**			
Dentith Road	EB Left	2.0	A	A	0.19	7.0	3.1	A	A	0.39	7.0
	EB Right										
Herring Cove Road	NB Left	2.4	A	A	0.35	7.0	2.4	A	A	0.34	7.0
	NB Through										
	SB Through	2.2	A	A	0.23	7.0	3.0	A	A	0.46	7.0
	SB Right										
Herring Cove Road & Sussex Street		**1.6**	**A**				**10.3**	**B**			
Sussex Street	EB Left	44.2	D	E	0.30	8.4	368.5	F	F	1.26	40.3
	EB Right	10.8		B	0.06	1.5	17.9		C	0.16	4.6
Herring Cove Road	NB Left	9.0	A	A	0.03	0.8	13.4	A	B	0.11	3.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		**9.8**	**A**				**8.8**	**A**			
Drysdale Road	WB Left	20.6	B	C	0.07	6.0	20.7	B	C	0.08	6.7
	WB Right	8.6		A	0.31	10.1	8.5		A	0.34	10.7
Herring Cove Road	NB Through	14.3	B	B	0.56	97.7	16.0	B	B	0.63	68.8
	NB Right										
	SB Left	3.5	A	A	0.12	4.6	5.3	A	A	0.37	12.3
	SB Through	3.9		A	0.16	12.0	4.7		A	0.32	24.6

* Synchro results supplemented by field observations.

Table 3: Intersection Performance Analysis – Ultimate Conditions (2033)

Ultimate Conditions (2033)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				8.6	A			
Purcells Cove Road	WB Right*	-	F	F	-	-	60.2	F	F	0.87	58.5
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	16.6	A	B	0.35	11.4	27.6	A	D	0.80	57.4
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				70.2	F			
Osborne Street	EB Left*	-	F	F	-	-	1748.1	F	F	4.23	106.4
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	16.9	A	C	0.10	2.3
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		12.5	B				37.8	D			
Cowie Hill Road	EB Left	23.9	C	C	0.41	23.5	52.6	D	D	0.73	60.7
	EB Right										
Herring Cove Road	NB Left	5.3	B	A	0.03	3.7	165.1	C	F	1.10	34.7
	NB Through	14.8		B	0.76	231.9	9.2		A	0.58	107.9
	SB Through	6.5	A	A	0.36	58.9	47.5	D	D	1.03	417.0
	SB Right	1.9		A	0.06	4.3	2.8		A	0.09	8.0
Herring Cove Road & Glenora Avenue		8.9	A				20.9	C			
Glenora Avenue	WB Left	106.7	F	F	0.90	47.9	449.1	F	F	1.65	74.5
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	10.8	A	B	0.07	1.5	10.0	A	B	0.11	3.0
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		15.5	B				25.6	C			
Old Sambro Road	EB Left	24.1	B	C	0.44	28.1	37.0	C	D	0.57	43.9
	EB Right	6.9		A	0.46	14.1	19.9		B	0.79	46.8
Herring Cove Road	NB Left	18.2	B	B	0.75	43.6	43.3	C	D	0.88	99.7
	NB Through	15.8		B	0.78	110.9	11.4		B	0.62	124.6
	SB Through	14.6	B	B	0.54	39.8	29.2	C	C	0.88	168.1
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		25.4	C				25.8	C			
Bradford Street	EB Left	20.3	B	C	0.01	2.1	31.8	B	C	0.14	14.6
	EB Through	10.5		B	0.10	6.5	12.4		B	0.42	24.1
	EB Right										
Williams Lake Road	WB Left	29.4	C	C	0.51	31.6	61.7	D	E	0.79	60.1
	WB Through	10.2		B	0.14	8.1	20.0		C	0.16	15.0
	WB Right										
Herring Cove Road	NB Left	6.2	C	A	0.09	7.7	17.2	C	B	0.47	18.8
	NB Through	39.4		D	0.96	301.8	36.3		D	0.92	270.9
	NB Right	7.1		A	0.22	24.9	7.3		A	0.20	20.2
	SB Left	6.7	B	A	0.11	5.5	10.9	B	B	0.33	10.1
	SB Through	12.0		B	0.33	53.0	20.2		C	0.77	156.3
	SB Right										
Herring Cove Road & Dentith Road		5.1	A				10.5	B			
Dentith Road	EB Left	2.4	A	A	0.25	7.0	14.5	B	B	0.81	84.0
	EB Right										
Herring Cove Road	NB Left	6.8	A	A	0.77	35.0	4.3	A	A	0.63	14.0
	NB Through										
	SB Through	2.9	A	A	0.38	7.0	13.1	B	B	0.87	147.0
	SB Right										
Herring Cove Road & Sussex Street		33.8	D				370.2	F			
Sussex Street	EB Left	1727.3	F	F	3.70	58.5	19661.8	F	F	36.96	86.6
	EB Right	12.9		B	0.12	3.0	91.3		F	0.81	38.8
Herring Cove Road	NB Left	10.8	A	B	0.13	3.0	43.6	A	E	0.51	19.8
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		78.6	E				37.7	D			
Drysdale Road	WB Left	36.4	D	D	0.15	18.3	48.6	C	D	0.26	18.2
	WB Right	46.7		D	0.88	88.0	16.0		B	0.72	24.1
Herring Cove Road	NB Through	126.8	F	F	1.21	451.3	70.6	E	E	1.06	341.6
	NB Right										
	SB Left	50.4	B	D	0.81	52.4	85.0	C	F	1.04	172.7
	SB Through	6.5		A	0.26	34.9	5.1		A	0.57	85.2

* Synchro results supplemented by field observations.

Interim Conditions: The Interim Conditions scenario includes a typical road diet on the Herring Cove Road to provide one northbound lane (inbound) and one southbound lane (outbound) throughout the entire corridor. Changes at each study intersection are described below:

- **Herring Cove Road & Purcells Cove Road:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Osborne Street:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Cowie Hill Road:** Geometric changes to remove channelization for the southbound right turn. Minor changes to pedestrian timings and removal of the pedestrian crossing on the southbound approach.
- **Herring Cove Road & Glenora Avenue:** Lane reconfiguration on Herring Cove Road to provide a southbound left turn storage lane with approximately 25 metres of storage. No changes to intersection control.
- **Herring Cove Road & Old Sambro Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and to convert the northbound left turn lane from a continuous lane to a storage lane with approximately 100 metres of storage.
- **Herring Cove Road & Williams Lake Road/Bradford Street:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane. Minor changes to pedestrian timings.
- **Herring Cove Road & Dentith Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane and provide one southbound right turn storage lane with approximately 35 metres of storage and one northbound left turn storage lane with approximately 100 metres of storage. Geometric changes to remove channelization for southbound and eastbound right turns. Minor changes to pedestrian timings.
- **Herring Cove Road & Sussex Street:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane No changes to intersection control.
- **Herring Cove Road & Drysdale Road:** Lane reconfiguration on Herring Cove Road to remove one southbound through lane and one northbound through lane. No changes to intersection control.

Interim Conditions – Existing Traffic Volumes (2018): The existing conditions scenario provides an assessment of operations based on current traffic volumes. It should be noted that the AM peak hour operations at the Armdale roundabout results in significant queues on the Herring Cove Road approach. The queues can extend from the roundabout to as far as the Cowie Hill Road intersection. Since the queues from the Armdale roundabout are not factored into the Synchro analysis, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were supplemented by field observations.

The results for the intersection performance analysis for interim conditions using existing traffic volumes are summarized in Table 4. The operations at each study intersection under interim conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.

- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will operate at LOS F and are over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Glenora Avenue:** The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Williams Lake Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Dentith Road:** The overall performance of the signalized intersection will be acceptable during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS E. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** The overall performance of the unsignalized intersection will be acceptable during both peak hours.

Interim Conditions – Future Traffic Volumes (2033): The Interim Conditions scenario is intended to apply to existing and near-future conditions of the roadway only; performance of this scenario under future conditions is shown for comparison purposes only. The future conditions scenario provides an assessment of operations based future development projections. Similar to the existing conditions scenario, the Synchro results for the intersections of Herring Cove Road & Purcells Cove Road and Herring Cove Road & Osborne Street were modified to reflect the queues from the Armdale roundabout.

The results for the intersection performance analysis for interim conditions using future traffic volumes are summarized in Table 5. The operations at each study intersection under future interim conditions are discussed below:

- **Herring Cove Road & Purcells Cove Road:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the westbound right movement (Purcells Cove Road) will continue to operate at LOS F. During the PM peak hour, the westbound right movement (Purcells Cove Road) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Osborne Street:** The overall performance of the unsignalized intersection will continue to be unacceptable (LOS F) during the AM peak hour due to queue spillbacks from the Armdale roundabout. The northbound movements (Herring Cove Road) and the eastbound movements (Osborne Street) will continue to operate at LOS F. During the PM peak hour, the eastbound movements (Osborne Street) will continue to operate at LOS F and over capacity. The overall performance of the intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Cowie Hill Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) will operate at LOS F and be over capacity. The southbound through movement (Herring Cove Road) will also be over capacity. The overall performance of the signalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Glenora Avenue:** During the AM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the westbound movements (Glenora Avenue) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the PM peak hour.
- **Herring Cove Road & Old Sambro Road:** The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road) and the southbound through and right movements (Herring Cove Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be unacceptable (LOS F) during the PM peak hour. The 95th% queues for the northbound left movement (Herring Cove Road) and the eastbound right movement (Old Sambro Road) will exceed the storage capacity of the turning turn lanes during the PM peak hour.
- **Herring Cove Road & Williams Lake Road:** During the AM peak hour the northbound movements (Herring Cove Road) will be over capacity. The overall performance of the signalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the southbound through and right movements (Herring Cove Road) and the westbound movements (Williams Lake Road) will operate at LOS F and be over capacity. The southbound left movement (Herring Cove Road) will also operate at LOS F. The overall performance of the signalized intersection will be unacceptable (LOS F) during PM peak hour. The 95th% queues for the northbound and southbound left movements (Herring Cove Road) will exceed the storage capacity of the left turn lanes during PM peak hour.

- **Herring Cove Road & Dentith Road:** During the AM peak hour, the northbound left movement will operate at LOS E and be over capacity. The overall performance of the signalized intersection will be acceptable during AM peak hour. During the PM peak hour, the northbound left movement (Herring Cove Road), southbound through movement (Herring Cove Road) and eastbound right movement (Dentith Road) will operate at LOS F and be over capacity. The overall performance of the signalized intersection will be unacceptable (LOS F) during PM peak hour. The 95th% queues for the northbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during both peak hours.
- **Herring Cove Road & Sussex Street:** During the AM peak hour, the eastbound left movement (Sussex Street) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be acceptable during the AM peak hour. During the PM peak hour, the eastbound left and right movements (Sussex Street) will operate at LOS F and be over capacity. The northbound left movement (Herring Cove Road) will operate at LOS E. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour.
- **Herring Cove Road & Drysdale Road:** During the AM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the AM peak hour. During the PM peak hour, the westbound movements (Drysdale Road) will operate at LOS F and be over capacity. The overall performance of the unsignalized intersection will be unacceptable (LOS F) during the PM peak hour. The 95th% queues for the southbound left movement (Herring Cove Road) will exceed the storage capacity of the left turn lane during the PM peak hour.

Table 4: Intersection Performance Analysis – Interim Conditions (2018)

Interim Conditions (2018)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				5.0	A			
Purcells Cove Road	WB Right*	-	F	F	-	-	21.3	C	C	0.55	25.1
Herring Cove Road	NB Through*	-	F	F	-	-	0.0	A	A	-	-
	NB Right*	-		F	-	-	0.0		A	-	-
	SB Left	11.3	A	B	0.22	6.1	14.4	A	B	0.60	31.2
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				11.2	B			
Osborne Street	EB Left*	-	F	F	-	-	185.7	F	F	1.08	54.0
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	11.9	A	B	0.06	1.5
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		9.5	A				14.5	B			
Cowie Hill Road	EB Left	11.1	B	B	0.29	13.6	18.8	B	B	0.52	29.1
	EB Right										
Herring Cove Road	NB Left	7.8	B	A	0.03	4.3	15.1	B	B	0.37	17.1
	NB Through	10.6		B	0.48	75.5	9.2		A	0.42	55.1
	SB Through	8.3	A	A	0.29	39.8	17.7	B	B	0.78	156.3
	SB Right	3.1		A	0.07	5.4	3.0		A	0.12	7.3
Herring Cove Road & Glenora Avenue		3.0	A				3.1	A			
Glenora Avenue	WB Left	20.0	C	C	0.37	12.2	35.4	E	E	0.49	19.0
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	8.6	A	A	0.05	1.5	8.6	A	A	0.08	2.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		14.6	B				23.8	C			
Old Sambro Road	EB Left	24.1	B	C	0.45	28.1	38.8	B	D	0.60	44.4
	EB Right	6.8		A	0.41	12.9	8.5		A	0.58	19.1
Herring Cove Road	NB Left	9.7	A	A	0.56	21.3	34.8	B	C	0.82	69.6
	NB Through	7.0		A	0.30	28.5	6.9		A	0.34	47.7
	SB Through	22.2	C	C	0.74	71.7	31.4	C	C	0.88	194.7
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		14.6	B				21.5	C			
Bradford Street	EB Left	16.3	A	B	0.01	1.8	27.9	B	C	0.16	13.0
	EB Through	8.7		A	0.08	5.6	9.7		A	0.41	18.6
	EB Right										
Williams Lake Road	WB Left	21.0	C	C	0.48	28.6	42.3	D	D	0.68	43.8
	WB Through										
	WB Right										
Herring Cove Road	NB Left	6.9	B	A	0.09	8.0	9.6	B	A	0.37	12.5
	NB Through	11.6		B	0.56	96.4	11.9		B	0.62	107.9
	NB Right										
	SB Left	14.9	B	B	0.08	9.2	14.3	C	B	0.21	16.3
	SB Through	17.7		B	0.49	98.5	29.8		C	0.87	215.7
	SB Right										
Herring Cove Road & Dentith Road		12.8	B				26.0	C			
Dentith Road	EB Left	22.0	B	C	0.43	30.8	37.1	C	D	0.63	59.9
	EB Right	5.4		A	0.43	12.7	23.5		C	0.83	65.0
Herring Cove Road	NB Left	12.6	B	B	0.57	40.7	44.0	C	D	0.89	81.4
	NB Through	10.7		B	0.43	60.8	9.1		A	0.36	52.5
	SB Through	19.6	B	B	0.49	60.7	31.5	C	C	0.83	178.7
	SB Right	5.1		A	0.24	12.3	10.7		B	0.36	34.8
Herring Cove Road & Sussex Street		1.5	A				8.7	A			
Sussex Street	EB Left	40.4	D	E	0.27	7.6	292.6	F	F	1.11	37.2
	EB Right	12.8		B	0.08	2.3	30.6		D	0.28	8.4
Herring Cove Road	NB Left	9.0	A	A	0.03	0.8	13.3	A	B	0.11	3.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		2.2	A				3.5	A			
Drysdale Road	WB Left	17.6	C	C	0.29	9.1	29.2	D	D	0.48	19.0
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	9.0	A	A	0.07	1.5	9.3	A	A	0.20	5.3
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

Table 5: Intersection Performance Analysis – Interim Conditions (2033)

Interim Conditions (2033)		Weekday AM Peak Hour					Weekday PM Peak Hour				
Intersection		Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)	Delay (s/veh)	APP LOS	LOS	v/c	95th% Queue (m)
Herring Cove Road & Purcells Cove Road		-	F				8.6	A			
Purcells Cove Road	WB Right*	-	F	F			60.2	F	F	0.87	58.5
Herring Cove Road	NB Through*	-	F	F			0.0	A	A	-	-
	NB Right*	-		F			0.0		A	-	-
	SB Left	16.6	A	C	0.35	11.4	27.6	A	D	0.80	62.3
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Osborne Street		-	F				70.2	F			
Osborne Street	EB Left*	-	F	F	-	-	1748.1	F	F	4.23	106.4
	EB Right*										
Herring Cove Road	NB Left*	-	F	F	-	-	16.9	A	C	0.10	2.3
	NB Through*	-		F	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Cowie Hill Road		12.5	B				37.8	D			
Cowie Hill Road	EB Left	23.9	C	C	0.41	23.5	52.6	D	D	0.73	60.7
	EB Right										
Herring Cove Road	NB Left	5.3	B	A	0.03	3.7	165.1	C	F	1.10	34.7
	NB Through	14.8		B	0.76	231.9	9.2		A	0.58	107.9
	SB Through	6.5	A	A	0.36	58.9	47.5	D	D	1.03	417.0
	SB Right	1.9		A	0.06	4.3	2.8		A	0.09	8.0
Herring Cove Road & Glenora Avenue		8.9	A				20.9	C			
Glenora Avenue	WB Left	106.7	F	F	0.90	47.9	449.1	F	F	1.65	74.5
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	10.8	A	B	0.07	1.5	10.0	A	B	0.11	3.0
	SB Through	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Old Sambro Road		20.8	C				109.0	F			
Old Sambro Road	EB Left	37.9	C	D	0.55	38.6	51.8	D	D	0.58	61.5
	EB Right	8.9		A	0.52	17.2	48.5		D	0.92	104.7
Herring Cove Road	NB Left	23.7	B	C	0.75	74.0	213.8	E	F	1.36	156.8
	NB Through	10.4		B	0.65	109.7	10.5		B	0.57	115.8
	SB Through	32.2	C	C	0.85	156.0	163.7	F	F	1.29	504.1
	SB Right										
Herring Cove Road & Williams Lake Road/Bradford Street		40.2	D				116.8	F			
Bradford Street	EB Left	29.7	B	C	0.01	2.7	40.9	C	D	0.15	17.6
	EB Through	13.8		B	0.11	8.3	18.3		B	0.44	33.1
	EB Right										
Williams Lake Road	WB Left										
	WB Through	51.3	D	D	0.74	52.6	150.2	F	F	1.15	114.4
	WB Right										
Herring Cove Road	NB Left	5.7	D	A	0.12	7.2	31.6	C	C	0.61	27.8
	NB Through	52.9		D	1.04	375.5	28.3		C	0.92	337.6
	NB Right										
	SB Left	37.2	B	D	0.44	19.7	96.8	F	F	0.88	46.4
	SB Through	16.8		B	0.61	134.2	198.5		F	1.37	564.6
	SB Right										
Herring Cove Road & Dentith Road		41.7	D				213.6	F			
Dentith Road	EB Left	32.7	B	C	0.47	43.2	42.3	F	D	0.53	76.6
	EB Right	7.5		A	0.56	18.8	229.8		F	1.43	287.2
Herring Cove Road	NB Left	77.9	D	E	1.06	173.1	389.1	F	F	1.78	230.8
	NB Through	30.6		C	0.93	280.1	19.6		B	0.74	181.8
	SB Through	53.9	D	D	0.93	165.1	324.6	F	F	1.65	588.2
	SB Right	15.3		B	0.29	27.2	18.2		B	0.37	53.4
Herring Cove Road & Sussex Street		29.2	D				395.7	F			
Sussex Street	EB Left	1480.1	F	F	3.26	57.8	19661.8	F	F	36.96	86.6
	EB Right	18.4		C	0.19	5.3	951.1		F	2.67	96.5
Herring Cove Road	NB Left	10.8	A	B	0.13	3.0	43.2	A	E	0.51	19.0
	NB Through	0.0		A	-	-	0.0		A	-	-
	SB Through	0.0	A	A	-	-	0.0	A	A	-	-
	SB Right	0.0		A	-	-	0.0		A	-	-
Herring Cove Road & Drysdale Road		207.8	F				1799.2	F			
Drysdale Road	WB Left	1293.6	F	F	3.70	315.4	19042.0	F	F	41.30	328.3
	WB Right										
Herring Cove Road	NB Through	0.0	A	A	-	-	0.0	A	A	-	-
	NB Right	0.0		A	-	-	0.0		A	-	-
	SB Left	15.3	A	C	0.31	9.9	25.6	A	D	0.76	53.2
	SB Through	0.0		A	-	-	0.0		A	-	-

* Synchro results supplemented by field observations.

Multi-Modal Level of Service Analysis: A multi-modal level of service (MMLOS) analysis was undertaken along the corridor to better understand the impacts of the interim and ultimate functional design on all modes along Herring Cove Road. The level of service was evaluated for the following modes:

- Pedestrian;
- Bicycle;
- Transit;
- Truck; and
- Auto.

The methodology for the analysis is based on the City of Ottawa's *MMLOS Guidelines* (September 2015). The methodology includes the evaluation of level of service for roadway segments and signalized intersections, with the exception of the auto mode for which level of service is only evaluated at signalized intersections.

Pedestrian Level of Service (PLOS): PLOS is used to evaluate pedestrian comfort, safety and convenience. The segment analysis evaluates the quality of pedestrian facilities and the impact of adjacent traffic while the signalized intersection analysis evaluates pedestrian delay and pedestrian exposure to traffic at signalized intersections. The PLOS methodology follows a weakest link approach, meaning that the segment is scored using the worst section and the signalized intersection is scored using the worst approach.

The methodology for the evaluation of segment PLOS uses an evaluation table approach based on facility type (sidewalk width and boulevard width) and roadway characteristics (motor vehicle traffic volume, presence of on-street parking and operating speed).

The methodology for the evaluation of signalized intersection PLOS includes two methods: Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) and pedestrian delay. The PETSI method assigns points to the intersection approach based on a number of crossing characteristics (crossing distance, presence of a median and/or crossing refuge), signal phasing and timing features (left turn conflicts, right turn conflicts, right turns on red and pedestrian intervals), curb radii and crosswalk treatments. The pedestrian delay at a signalized intersection is calculated using the *Highway Capacity Manual* (HCM) equation to calculate average delay to pedestrians based on the signal timing plan.

Bicycle Level of Service (BLOS): BLOS is used to evaluate the level of traffic stress experienced by cyclists. The segment analysis evaluates the quality and type of bicycle facilities and the impact of adjacent traffic as well as unsignalized lane crossings along the corridor, while the signalized intersection analysis evaluates the type of bicycle facilities and crossing conditions. The BLOS methodology follows a weakest link approach, meaning that the segment is scored using the worst section and the signalized intersection is scored using the worst approach.

The methodology for the evaluation of segment BLOS uses an evaluation table approach and includes two components: facility type and unsignalized crossing. The facility type (physically separated bikeway, bike lanes adjacent to parking lane, bike lanes not adjacent to parking lane and mixed traffic) is evaluated based on roadway characteristics (bike lane width, parking lane width, number of travel lanes, operating speed, frequency of bike lane blockage). The unsignalized lane crossing is evaluated based on the characteristics of the side street being crossed (presence of median refuge, number of travel lanes, operating speed).

The methodology for the evaluation of signalized intersection BLOS uses an evaluation table approach and includes two components: right turns and left turns. Right turns are evaluated based on facility type (bike lanes or higher order facility, pocket bike lanes and mixed traffic) and roadway characteristics (right turn lane configuration, storage lane length, turning speed based on curb radii). Left turns are evaluated based on facility type (bike lanes or higher order facility, pocket bike lanes and mixed traffic, presence of left turn bike boxes) and roadway characteristics (left turn lane configuration, number of lanes crossed, operating speed).

Transit Level of Service (TLOS): TLOS is used to evaluate the relative attractiveness of transit and travel time. The segment analysis evaluates the type of transit facility and transit travel time, while the signalized intersection analysis evaluates average signal delay and transit priority.

The methodology for the evaluation of segment TLOS uses an evaluation table approach based on facility type (segregated right-of-way, bus lane, mixed traffic) and the level of exposure to delay (exposure to congestion, parking and driveway friction, incident potential).

The methodology for the evaluation of signalized intersection TLOS evaluates transit delay at a signalized intersection, which is the travel time from the end of a queue to entering the signalized intersection.

Truck Level of Service (TkLOS): TkLOS is used to evaluate the physical space available for trucks to operate safely within travel lanes and negotiate turning maneuvers at signalized intersections. The segment analysis evaluates the roadway geometry, while the signalized intersection analysis evaluates the intersection geometry.

The methodology for the evaluation of segment TkLOS uses an evaluation table approach based on lane width and the number of travel lanes in each direction. The methodology for the evaluation of signalized intersection TkLOS uses an evaluation table approach based on corner radii and the number of receiving lanes upon departure from the intersection.

Auto Level of Service (LOS): Signalized intersection LOS is based on the results of intersections performance analysis. LOS is not evaluated for segments.

The following segments of Herring Cove Road were included in the MMLOS analysis:

- Segment 1. Armdale Roundabout to Purcells Cove Road,
- Segment 2. Purcells Cove Road to Cowie Hill Road,
- Segment 3. Cowie Hill Road to Highfield Street,
- Segment 4. Highfield Street to Old Sambro Road,
- Segment 5. Old Sambro Road to Sussex Street,
- Segment 6. Sussex Street to Greystone Drive,
- Segment 7. Greystone Drive to Lynnett Road, and
- Segment 8. Past Lynnett Road.

The Herring Cove Road corridor includes four signalized intersections which were included in the MMLOS analysis: Herring Cove Road & Cowie Hill Road, Herring Cove Road & Old Sambro Road, Herring Cove Road & Williams Lake Road, and Herring Cove Road & Dentith.

A number of assumptions were made for the MMLOS evaluation including:

- LOS: The LOS results for the Interim Conditions – Existing Traffic Volumes (2018) were applied for the Interim Conditions scenario and the LOS results for the Ultimate Conditions – Future Traffic Volumes (2033) were applied for the Ultimate Conditions scenario.
- Average Annual Daily Traffic (AADT): AADT counts were not available for each segment. Based on the counts provided, an AADT > 3000 vehicles per day was assumed for all segments.
- Operating speed: Operating speed measurements were not available for each segment. The operating speed in segment 8 was measured to be >60 km/h in the rural two-lane cross section. Based on this count, an operating >50-60 km/h was assumed for the other segments.
- Side street operating speed: A side street operating speed of 50 km/h was assumed for all segments.
- Boulevard Width: For the PLOS, on-street bicycle lanes and cycle tracks were included in the boulevard width between the sidewalk and the roadway.

Segment MMLOS: The results of the segment MMLOS analysis are summarized in Table 6. The detailed MMLOS analysis data entry forms can be found in Appendix B. The results at each segment are discussed below:

Segment 1. Armdale Roundabout to Purcells Cove Road:

- The segment will score an overall PLOS F in the interim and ultimate scenarios due to the sidewalk along the west side of a roadway. However, the AT greenway on the east side will score a PLOS D. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C. The PLOS score is limited by the traffic volumes and operating speed of the segment.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The segment will continue to score TLOS D in the ultimate scenario due to mixed traffic in the southbound direction. It should be noted that the dedicated bus lane in the northbound direction in the ultimate scenario will score the TLOS B target.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 2. Purcells Cove Road to Cowie Hill Road:

- The segment will score an overall PLOS F in the interim and ultimate scenarios due to the sidewalk along the west side of a roadway, where the constrained right of way limits the ability to provide a buffer to separate pedestrians from traffic. However, the AT greenway on the east side will score a PLOS D. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.

- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenario.
- The segment will continue to score TLOS E in the ultimate scenario due to mixed traffic in the southbound direction. It should be noted that the dedicated bus lane in the northbound direction scores the TLOS B target.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 3. Cowie Hill Road to Highfield Street:

- The PLOS for the segment will improve in both the interim and ultimate scenarios with the new pedestrian facilities. The segment will score an overall PLOS D in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The segment will continue to score TLOS F in both the interim and ultimate scenarios since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 4. Highfield Street to Old Sambro Road:

- The PLOS for the segment will improve in both the interim and ultimate scenarios with the new pedestrian facilities. The segment will score an overall PLOS D in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The segment will continue to score TLOS F in both the interim and ultimate scenarios since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 5. Old Sambro Road to Sussex Street:

- The PLOS for the segment will improve in the ultimate scenario with the new pedestrian facilities. The segment will score an overall PLOS D in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The segment will continue to score TLOS F in both the interim and ultimate scenarios since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 6. Sussex Street to Greystone Drive:

- The PLOS for the segment will improve in the ultimate scenario with the new pedestrian facilities (new sidewalk and increased buffer). The segment will score an overall PLOS D in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The segment will continue to score TLOS F in both the interim and ultimate scenarios since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in both the interim and ultimate scenarios.

Segment 7. Greystone Drive to Lynnett Road:

- The PLOS for the segment will improve in the ultimate scenario with the new pedestrian facilities. The segment will score an overall PLOS D in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS C.
- The BLOS B target will be met with the new cycling facilities in the ultimate scenario.
- The segment will continue to score TLOS F in the ultimate scenario since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in the ultimate scenario.

Segment 8. Past Lynnett Road:

- The PLOS for the segment will improve in the ultimate scenario with the new pedestrian facilities. The segment will score an overall PLOS E in the ultimate scenario. It should be noted that based on the methodology, the highest PLOS that could be achieved for this segment is PLOS D. The PLOS score is limited by the traffic volumes and operating speed of the segment.
- The BLOS B target will be met with the new cycling facilities in the ultimate scenario.
- The segment will continue to score TLOS F in the ultimate scenario since there will be no dedicated bus lanes in this segment.
- The TkLOS will remain above the TkLOS D target in the ultimate scenario.

Table 6: Segment MMMLOS Analysis

Segment MMLOS				
1. Armdale Roundabout to Purcells Cove Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	B	D
Existing Conditions	F	D	D	A
Interim Conditions	F	B	D	A
Ultimate Conditions	F	B	D	C
2. Purcells Cove Road to Cowie Hill Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	**B**	B	B	D
Existing Conditions	F	D	E	B
Interim Conditions	F	B	E	C
Ultimate Conditions	F	B	E	C
3. Cowie Hill Road to Highfield Street	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	F	D	F	B
Interim Conditions	E	B	F	C
Ultimate Conditions	D	B	F	C
4. Highfield Street to Old Sambro Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	F	D	F	D
Interim Conditions	E	B	F	C
Ultimate Conditions	D	B	F	C
5. Old Sambro Road to Sussex Street	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	E	E	F	C
Interim Conditions	E	B	F	C
Ultimate Conditions	D	B	F	C
6. Sussex Street to Greystone Drive	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	E	E	F	C
Interim Conditions	E	B	F	C
Ultimate Conditions	D	B	F	C
7. Greystone Drive to Lynnett Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	F	D	F	A
Interim Conditions	-	-	-	-
Ultimate Conditions	D	B	F	C
8. Past Lynnett Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**
Target	B	B	C	D
Existing Conditions	F	F	F	D
Interim Conditions	-	-	-	-
Ultimate Conditions	E	B	F	C

Signalized Intersection MMLOS: The results of the signalized intersection MMLOS analysis are summarized in Table 7. The detailed MMLOS analysis data entry forms can be found in Appendix B. The results at each signalized intersection are discussed below:

Herring Cove Road & Cowie Hill Road:

- The PLOS B target will be met in the interim scenario. In the ultimate scenario, the intersection deteriorates to PLOS D due to longer cycle lengths in the PM peak hour. However, it should be noted that the intersection will score PLOS B based on the pedestrian exposure method.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenarios.
- The TLOS will improve to TLOS C in the interim scenario but deteriorate to TLOS F in the ultimate scenario. The TLOS F is due to longer delays on Herring Cove Road in the southbound direction and on the Cowie Hill Road approach in the PM peak hour. It should be noted that the northbound direction where a queue jump and dedicated bus lane will be provided will score TLOS C.
- The TkLOS continue to score TkLOS E in the interim scenario. In the ultimate scenario, the TkLOS will score above the TkLOS D target.
- The LOS will remain above or meet the LOS D target in both the interim and ultimate scenarios.

Herring Cove Road & Old Sambro Road:

- The PLOS for the intersection will improve in both the interim and ultimate scenarios with the new pedestrian facilities which will reduce crossing distances and provide adequate pedestrian crossing times at the intersection. The intersection will score an overall PLOS C in both scenarios.
- The BLOS B target will be met with the new cycling facilities in both the interim and ultimate scenario.
- The TLOS will deteriorate to TLOS E in the interim scenario due to longer delays on Herring Cove Road in the southbound direction. It should be noted that the northbound direction where a queue jump will be provided will meet the TLOS C target. The overall TLOS will improve to TLOS D in the ultimate scenario.
- The TkLOS will continue to score TkLOS E in both the interim and ultimate scenarios.
- The LOS will remain above the LOS D target in both the interim and ultimate scenarios.

Herring Cove Road & Williams Lake Road:

- The PLOS will improve to PLOS C in the interim scenario. In the ultimate scenario, the intersection will deteriorate to PLOS E due to longer crossing distances and longer cycle lengths in the PM peak hour. However, it should be noted that PLOS E remains an improvement to existing conditions.
- The BLOS will improve to BLOS D with the new cycling facilities in both the interim and ultimate scenarios. The intersection will score BLOS D due to mixed traffic on the Bradford Street approach; all other approaches score BLOS C or better.
- The TLOS will deteriorate in both the interim and ultimate scenarios. The TLOS F in the ultimate scenario is caused by longer delays on the Williams Lake Road approach. The Herring Cove Road northbound approach where a queue jump will be provided will meet the TLOS C target.

- The intersection will continue to score TkLOS F in both the interim and ultimate scenarios due to the small curb radii at the intersection.
- The LOS will remain above the LOS D target in both the interim and ultimate scenarios.

Herring Cove Road & Dentith Road:

- The PLOS for the intersection will improve in the interim scenario with the new pedestrian facilities. The intersection will score an overall PLOS D in the interim scenario.
- The intersection will score an overall BLOS F in the interim scenario due to mixed traffic on the Dentith Road approach. It should be noted that the Herring Cove Road approaches will meet the BLOS B target.
- The intersection will continue to score TLOS D in the interim scenario.
- The TkLOS will deteriorate to TkLOS F in the interim scenario due to reduced effective curb radii and the removal of the channelized right turns.
- The LOS will remain above the LOS D target in the interim scenario.
- The methodology only includes the evaluation of signalized intersection, therefore, MMLOS was not evaluated for the intersection in the ultimate scenario since it will be converted to a multilane roundabout.

Table 7: Signalized Intersection MMLOS Analysis

Signalized Intersection MMLOS					
Herring Cove Road & Cowie Hill Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Target	B	B	B	D	D
Existing Conditions	C	E	D	E	B
Interim Conditions	B	B	C	E	B
Ultimate Conditions	D	B	F	C	D
Herring Cove Road & Old Sambro Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Target	B	B	C	D	D
Existing Conditions	D	D	C	E	B
Interim Conditions	C	B	E	E	C
Ultimate Conditions	C	B	D	E	C
Herring Cove Road & Williams Lake Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Target	B	B	C	D	D
Existing Conditions	F	F	C	F	B
Interim Conditions	C	D	D	F	C
Ultimate Conditions	E	D	F	F	C
Herring Cove Road & Dentith Road	**PLOS**	**BLOS**	**TLOS**	**TkLOS**	**LOS**
Target	B	B	C	D	D
Existing Conditions	E	F	D	B	C
Interim Conditions	D	F	D	F	C
Ultimate Conditions	-	-	-	-	-

If you have any questions or additional discussion, please feel free to contact the undersigned.

Regards,

[redacted]

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Appendix A – Synchro Reports
Appendix B – MMLOS Analysis

Appendix A

Synchro & ARCADY Reports

Intersection						
Int Delay, s/veh	134.2					

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	835	18	150	374	0	580
Future Vol, veh/h	835	18	150	374	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	908	20	163	407	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	928	0	-	918
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	737	-	0	~ 329
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	737	-	-	~ 329
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.2	$ 450
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	329	737	-
HCM Lane V/C Ratio	-	-	1.916	0.221	-
HCM Control Delay (s)	-	-	$ 450	11.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	43.2	0.8	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	555	50	512	1175
Future Vol, veh/h	0	245	555	50	512	1175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	603	54	557	1277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	630	0	0	657	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	482	-	-	931	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	482	-	-	931	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.3	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	931	-
HCM Lane V/C Ratio	-	-	0.552	0.598	-
HCM Control Delay (s)	-	-	21.3	14.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	3.3	4.1	-

Intersection	
Int Delay, s/veh	27.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	594	340	55
Future Vol, veh/h	242	8	15	594	340	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	646	370	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	400	430	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 242	650	1129	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 237	650	1129	-	-	-
Mov Cap-2 Maneuver	~ 237	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	138.5		0.2		0	
HCM LOS	F					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	242	-	-
HCM Lane V/C Ratio	0.014	-	1.123	-	-
HCM Control Delay (s)	8.2	0	138.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	12.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	11.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	495	882	269
Future Vol, veh/h	83	22	30	495	882	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	538	959	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1709	1105	1251	0	-	0
Stage 1	1105	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	100	256	556	-	-	-
Stage 1	317	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	256	556	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	185.7	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	556	-	106	-	-
HCM Lane V/C Ratio	0.059	-	1.077	-	-
HCM Control Delay (s)	11.9	0	185.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	7.1	-	-

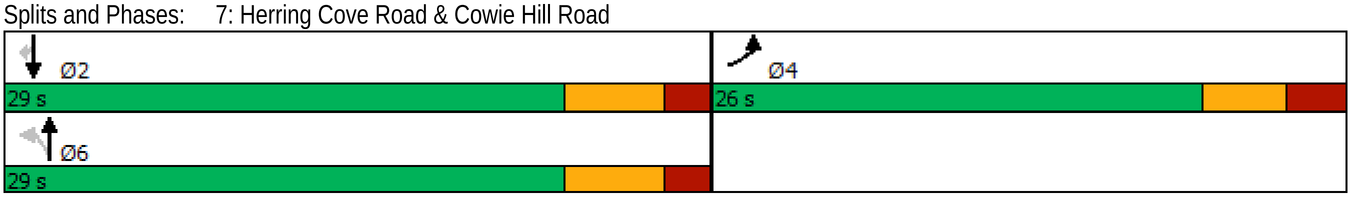
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	515	309	61
Future Volume (vph)	68	49	18	515	309	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.558			
Satd. Flow (perm)	1705	0	1047	1883	1883	1558
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	53					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	560	336	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	560	336	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		29.0	29.0	29.0	29.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	10.3		27.6	27.6	27.6	27.6
Actuated g/C Ratio	0.23		0.62	0.62	0.62	0.62
v/c Ratio	0.29		0.03	0.48	0.29	0.07
Control Delay	11.1		7.8	10.6	8.3	3.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		7.8	10.6	8.3	3.1
LOS	B		A	B	A	A
Approach Delay	11.1			10.5	7.5	
Approach LOS	B			B	A	
Stops (vph)	56		12	306	160	11
Fuel Used(l)	4		1	37	20	3
CO Emissions (g/hr)	69		24	696	379	62

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	13		5	134	73	12
VOC Emissions (g/hr)	16		6	161	87	14
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	5.0		0.6	24.7	12.6	0.0
Queue Length 95th (m)	13.6		4.3	#75.5	39.8	5.4
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	826		645	1161	1161	986
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.15		0.03	0.48	0.29	0.07

Intersection Summary

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 44.7
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 9.5 — Intersection LOS: A
Intersection Capacity Utilization 45.7% — ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



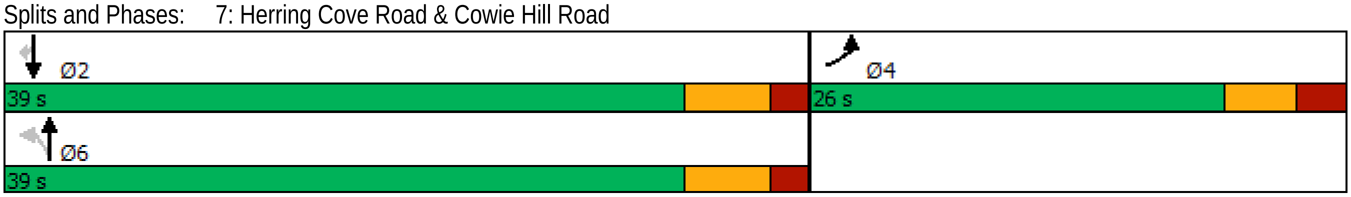
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	425	779	99
Future Volume (vph)	112	80	70	425	779	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1710	0	1789	1883	1883	1601
Flt Permitted	0.972		0.188			
Satd. Flow (perm)	1701	0	354	1883	1883	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	57					90
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	462	847	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	462	847	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		39.0	39.0	39.0	39.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	12.0		33.4	33.4	33.4	33.4
Actuated g/C Ratio	0.21		0.58	0.58	0.58	0.58
v/c Ratio	0.52		0.37	0.42	0.78	0.12
Control Delay	18.8		15.1	9.2	17.7	3.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	18.8		15.1	9.2	17.7	3.0
LOS	B		B	A	B	A
Approach Delay	18.8			10.1	16.0	
Approach LOS	B			B	B	
Stops (vph)	113		45	226	524	17
Fuel Used(l)	8		5	30	60	5
CO Emissions (g/hr)	143		101	555	1110	100

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28		19	107	214	19
VOC Emissions (g/hr)	33		23	128	256	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	13.8		3.6	22.6	56.6	0.7
Queue Length 95th (m)	29.1		17.1	55.1	#156.3	7.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	633		206	1099	1099	945
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.37	0.42	0.77	0.11

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 57.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	418	66	46	301
Future Vol, veh/h	68	59	418	66	46	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	74	64	454	72	50	327

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	490	0	0	526	0
Stage 1	490	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	578	-	-	1041	-
Stage 1	616	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	288	578	-	-	1041	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	376	1041	-
HCM Lane V/C Ratio	-	-	0.367	0.048	-
HCM Control Delay (s)	-	-	20	8.6	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.6	0.2	-

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	404	48	78	784
Future Vol, veh/h	45	58	404	48	78	784
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	49	63	439	52	85	852

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1487	465	0	0	491	0
Stage 1	465	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	137	597	-	-	1072	-
Stage 1	632	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	126	597	-	-	1072	-
Mov Cap-2 Maneuver	126	-	-	-	-	-
Stage 1	582	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	35.4	0	0.8
HCM LOS	E		

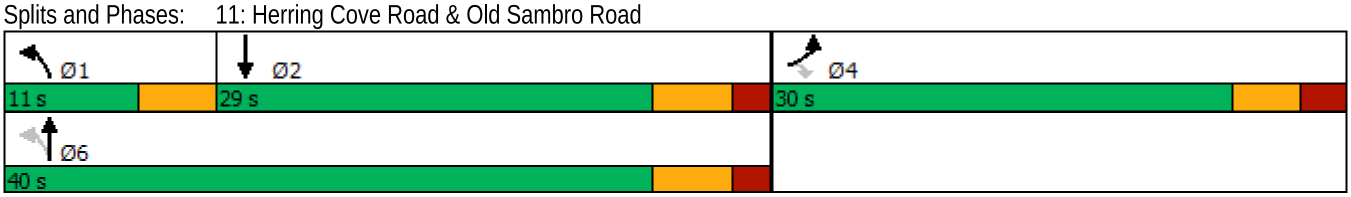
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	227	1072	-
HCM Lane V/C Ratio	-	-	0.493	0.079	-
HCM Control Delay (s)	-	-	35.4	8.6	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.3	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	176	245	294	357	96
Future Volume (vph)	142	176	245	294	357	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.971	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1829	0
Flt Permitted	0.950		0.262			
Satd. Flow (perm)	1789	1601	493	1883	1829	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		191			20	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	191	266	320	388	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	191	266	320	492	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.1	10.1	32.0	29.7	18.5	
Actuated g/C Ratio	0.19	0.19	0.61	0.57	0.35	
v/c Ratio	0.45	0.41	0.56	0.30	0.74	
Control Delay	24.1	6.8	9.7	7.0	22.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	6.8	9.7	7.0	22.2	
LOS	C	A	A	A	C	
Approach Delay	14.5			8.2	22.2	
Approach LOS	B			A	C	
Stops (vph)	116	29	99	134	353	
Fuel Used(l)	8	5	18	22	50	
CO Emissions (g/hr)	145	88	338	400	937	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28	17	65	77	181	
VOC Emissions (g/hr)	33	20	78	92	216	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	13.3	0.0	9.3	13.2	36.8	
Queue Length 95th (m)	28.1	12.9	21.3	28.5	71.7	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	836	850	478	1240	824	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.22	0.56	0.26	0.60	

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 52.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 59.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



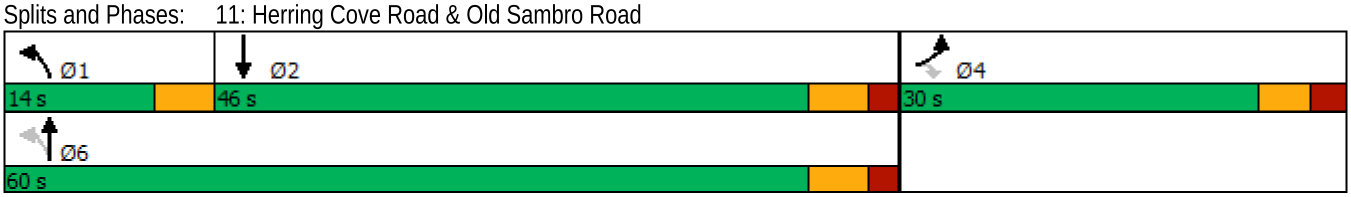
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	282	262	402	567	173
Future Volume (vph)	167	282	262	402	567	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1823	0
Flt Permitted	0.950		0.112			
Satd. Flow (perm)	1789	1601	211	1883	1823	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		307			22	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	307	285	437	616	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	307	285	437	804	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	14.0	60.0	46.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	13.4	13.4	55.3	53.1	39.0	
Actuated g/C Ratio	0.17	0.17	0.70	0.67	0.50	
v/c Ratio	0.60	0.58	0.82	0.34	0.88	
Control Delay	38.8	8.5	34.8	6.9	31.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	38.8	8.5	34.8	6.9	31.4	
LOS	D	A	C	A	C	
Approach Delay	19.8			17.9	31.4	
Approach LOS	B			B	C	
Stops (vph)	147	35	120	159	572	
Fuel Used(l)	11	8	25	29	87	
CO Emissions (g/hr)	210	143	461	536	1625	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	41	28	89	104	314	
VOC Emissions (g/hr)	48	33	106	124	375	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.6	0.0	20.9	23.3	98.2	
Queue Length 95th (m)	44.4	19.1	#69.6	47.7	#194.7	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	548	703	349	1293	936	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.33	0.44	0.82	0.34	0.86	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 78.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 23.8	Intersection LOS: C
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



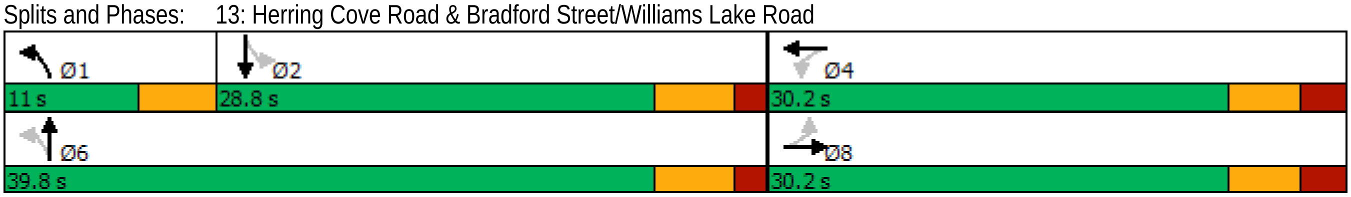
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Future Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98			0.99		1.00	0.99		0.99	1.00	
Frt		0.872			0.969			0.964			0.998	
Flt Protected	0.950				0.965		0.950			0.950		
Satd. Flow (prot)	1789	1608	0	0	1752	0	1789	1799	0	1789	1879	0
Flt Permitted	0.718				0.766		0.339			0.422		
Satd. Flow (perm)	1351	1608	0	0	1387	0	636	1799	0	790	1879	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			24			32			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	123	9	40	53	485	154	34	471	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	172	0	53	639	0	34	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	39.8		28.8	28.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	12.5	12.5			12.5		32.0	31.9		26.3	26.3	
Actuated g/C Ratio	0.24	0.24			0.24		0.62	0.62		0.51	0.51	
v/c Ratio	0.01	0.08			0.48		0.09	0.56		0.08	0.49	
Control Delay	16.3	8.7			21.0		6.9	11.6		14.9	17.7	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	16.3	8.7			21.0		6.9	11.6		14.9	17.7	
LOS	B	A			C		A	B		B	B	
Approach Delay		9.3			21.0			11.2			17.5	
Approach LOS		A			C			B			B	
Stops (vph)	3	12			107		20	345		22	294	
Fuel Used(l)	0	1			8		3	36		3	38	
CO Emissions (g/hr)	2	14			146		49	668		49	702	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	0	3			28		9	129		9	136	
VOC Emissions (g/hr)	1	3			34		11	154		11	162	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.3	0.4			13.3		1.8	34.2		2.1	38.3	
Queue Length 95th (m)	1.8	5.6			28.6		8.0	96.4		9.2	#98.5	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	690	835			719		569	1272		426	1013	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.00	0.04			0.24		0.09	0.50		0.08	0.47	

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 51.2	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 14.6	Intersection LOS: B
Intersection Capacity Utilization 66.6%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Future Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96			0.98			0.99		1.00	1.00	
Frt		0.870			0.978			0.970			0.999	
Flt Protected	0.950				0.969		0.950			0.950		
Satd. Flow (prot)	1789	1576	0	0	1775	0	1789	1815	0	1789	1881	0
Flt Permitted	0.669				0.655		0.100			0.361		
Satd. Flow (perm)	1247	1576	0	0	1186	0	188	1815	0	677	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			11			25				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	111	33	28	103	572	142	74	850	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	172	0	103	714	0	74	854	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	59.8		48.8	48.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	15.9	15.9			15.9		50.5	48.5		40.4	40.4	
Actuated g/C Ratio	0.21	0.21			0.21		0.65	0.63		0.52	0.52	
v/c Ratio	0.16	0.41			0.68		0.37	0.62		0.21	0.87	
Control Delay	27.9	9.7			42.3		9.6	11.9		14.3	29.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	27.9	9.7			42.3		9.6	11.9		14.3	29.8	
LOS	C	A			D		A	B		B	C	
Approach Delay		12.9			42.3			11.6			28.5	
Approach LOS		B			D			B			C	
Stops (vph)	30	34			128		30	359		37	594	
Fuel Used(l)	2	3			11		5	40		5	77	
CO Emissions (g/hr)	33	64			203		94	738		102	1424	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	6	12			39		18	142		20	275	
VOC Emissions (g/hr)	8	15			47		22	170		24	328	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	5.2	3.2			23.7		4.7	53.3		5.9	110.4	
Queue Length 95th (m)	13.0	18.6			43.8		12.5	107.9		16.3	#215.7	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	408	625			395		276	1300		396	1100	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.10	0.30			0.44		0.37	0.55		0.19	0.78	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 77.1

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

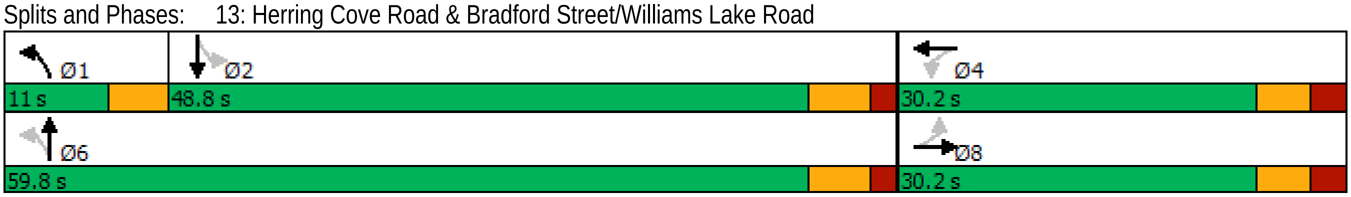
Intersection Signal Delay: 21.5 Intersection LOS: C

Intersection Capacity Utilization 91.9% ICU Level of Service F

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road

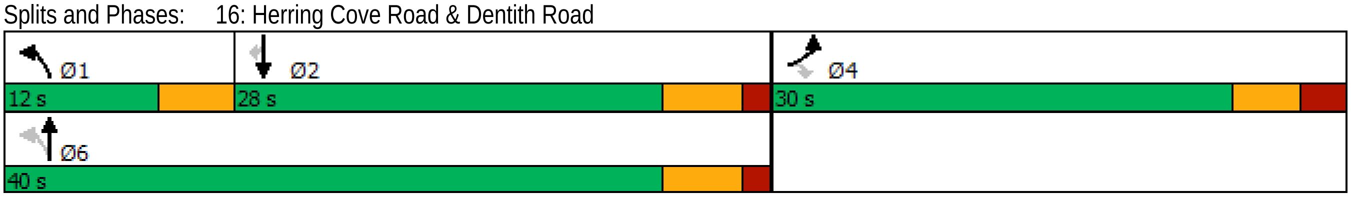


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	207	308	421	316	148
Future Volume (vph)	165	207	308	421	316	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.95	0.99			0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.405			
Satd. Flow (perm)	1740	1519	757	1883	1883	1544
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		225				152
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	225	335	458	343	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	225	335	458	343	161
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	12.0	40.0	28.0	28.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	14.3	14.3	36.5	34.8	22.7	22.7
Actuated g/C Ratio	0.23	0.23	0.60	0.57	0.37	0.37
v/c Ratio	0.43	0.43	0.57	0.43	0.49	0.24
Control Delay	22.0	5.4	12.6	10.7	19.6	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	5.4	12.6	10.7	19.6	5.1
LOS	C	A	B	B	B	A
Approach Delay	12.8			11.5	15.0	
Approach LOS	B			B	B	
Stops (vph)	123	25	148	233	235	25
Fuel Used(l)	10	7	10	14	22	7
CO Emissions (g/hr)	187	132	185	254	416	128

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	36	25	36	49	80	25
VOC Emissions (g/hr)	43	30	43	59	96	30
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	16.8	0.0	12.9	21.1	25.2	0.6
Queue Length 95th (m)	30.8	12.7	40.7	60.8	60.7	12.3
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	714	741	590	1074	701	670
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.30	0.57	0.43	0.49	0.24

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 61	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 63.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 16: Herring Cove Road & Dentith Road



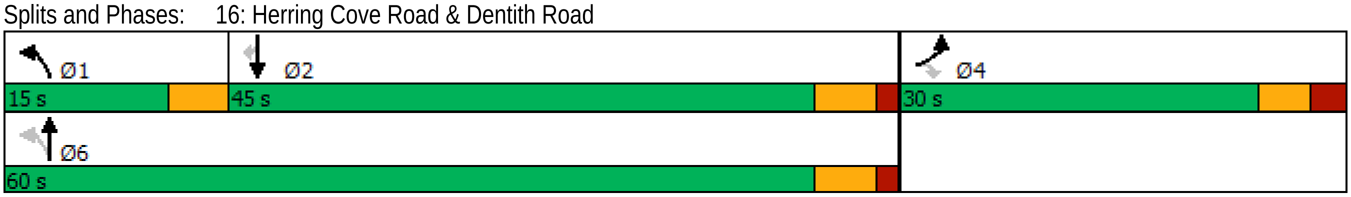
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	441	295	394	665	252
Future Volume (vph)	231	441	295	394	665	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.92				0.94
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.130			
Satd. Flow (perm)	1749	1472	245	1883	1883	1508
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		323				115
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	479	321	428	723	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	479	321	428	723	274
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	15.0	60.0	45.0	45.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	19.0	19.0	56.3	54.6	39.5	39.5
Actuated g/C Ratio	0.22	0.22	0.66	0.64	0.46	0.46
v/c Ratio	0.63	0.83	0.89	0.36	0.83	0.36
Control Delay	37.1	23.5	44.0	9.1	31.5	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.1	23.5	44.0	9.1	31.5	10.7
LOS	D	C	D	A	C	B
Approach Delay	28.2			24.1	25.8	
Approach LOS	C			C	C	
Stops (vph)	197	153	136	177	536	93
Fuel Used(l)	17	23	17	11	54	14
CO Emissions (g/hr)	322	436	307	212	1005	260

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	62	84	59	41	194	50
VOC Emissions (g/hr)	74	101	71	49	232	60
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	37.0	23.3	31.9	34.8	110.9	16.8
Queue Length 95th (m)	59.9	#65.0	#81.4	52.5	#178.7	34.8
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	506	647	361	1204	872	760
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.74	0.89	0.36	0.83	0.36

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 85.3	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 26.0	Intersection LOS: C
Intersection Capacity Utilization 82.0%	ICU Level of Service E
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	36	29	725	481	88
Future Vol, veh/h	35	36	29	725	481	88
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	38	39	32	788	523	96

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1434	587	630	0	-	0
Stage 1	582	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	147	510	952	-	-	-
Stage 1	559	-	-	-	-	-
Stage 2	418	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	139	502	942	-	-	-
Mov Cap-2 Maneuver	139	-	-	-	-	-
Stage 1	534	-	-	-	-	-
Stage 2	414	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.4	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	942	-	139	502	-	-
HCM Lane V/C Ratio	0.033	-	0.274	0.078	-	-
HCM Control Delay (s)	9	-	40.4	12.8	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	0.3	-	-

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	49	49	649	946	223
Future Vol, veh/h	51	49	49	649	946	223
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	53	53	705	1028	242

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2025	1246	1335	0	-	0
Stage 1	1214	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	63	212	517	-	-	-
Stage 1	281	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 50	193	486	-	-	-
Mov Cap-2 Maneuver	~ 50	-	-	-	-	-
Stage 1	235	-	-	-	-	-
Stage 2	411	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	164.2	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	486	-	50	193	-	-
HCM Lane V/C Ratio	0.11	-	1.109	0.276	-	-
HCM Control Delay (s)	13.3	-	292.6	30.6	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	0.4	-	4.9	1.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	92	557	9	60	376
Future Vol, veh/h	17	92	557	9	60	376
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	18	100	605	10	65	409

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	610	0	0	615	0
Stage 1	610	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	219	494	-	-	965	-
Stage 1	542	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	204	494	-	-	965	-
Mov Cap-2 Maneuver	204	-	-	-	-	-
Stage 1	506	-	-	-	-	-
Stage 2	585	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay, s	17.6		0		1.2	
HCM LOS	C					

Minor Lane/Major Mvmt		NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	404	965	-
HCM Lane V/C Ratio		-	-	0.293	0.068	-
HCM Control Delay (s)		-	-	17.6	9	-
HCM Lane LOS		-	-	C	A	-
HCM 95th %tile Q(veh)		-	-	1.2	0.2	-

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	104	464	26	191	728
Future Vol, veh/h	20	104	464	26	191	728
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	22	113	504	28	208	791

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1725	518	0	0	532	0
Stage 1	518	-	-	-	-	-
Stage 2	1207	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	98	558	-	-	1036	-
Stage 1	598	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	78	558	-	-	1036	-
Mov Cap-2 Maneuver	78	-	-	-	-	-
Stage 1	478	-	-	-	-	-
Stage 2	283	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.2	0	1.9
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	280	1036	-
HCM Lane V/C Ratio	-	-	0.481	0.2	-
HCM Control Delay (s)	-	-	29.2	9.3	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.7	-

Intersection	
Int Delay, s/veh	296.1

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	1303	18	150	532	0	580
Future Vol, veh/h	1303	18	150	532	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	1416	20	163	578	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1436	0	-	1426
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	473	-	0	~ 166
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	473	-	-	~ 166
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.6	$ 1314.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	166	473	-
HCM Lane V/C Ratio	-	-	3.798	0.345	-
HCM Control Delay (s)	-	-	$ 1314.5	16.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	61.9	1.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	867	50	512	1702
Future Vol, veh/h	0	245	867	50	512	1702
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	942	54	557	1850

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	969	0	0	996	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	308	-	-	695	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	308	-	-	695	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.2	0	6.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	695	-
HCM Lane V/C Ratio	-	-	0.865	0.801	-
HCM Control Delay (s)	-	-	60.2	27.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	7.7	8.2	-

Intersection						
Int Delay, s/veh	132.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	1062	498	55
Future Vol, veh/h	242	8	15	1062	498	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	1154	541	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1757	571	601	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	1186	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 93	520	976	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	290	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	520	976	-	-	-
Mov Cap-2 Maneuver	~ 89	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 994.3	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	976	-	91	-	-
HCM Lane V/C Ratio	0.017	-	2.986	-	-
HCM Control Delay (s)	8.8	0	$ 994.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	26.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	70.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	807	1409	269
Future Vol, veh/h	83	22	30	807	1409	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	877	1532	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2621	1678	1824	0	-	0
Stage 1	1678	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 27	117	335	-	-	-
Stage 1	166	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	117	335	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1748.1	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	335	-	27	-	-
HCM Lane V/C Ratio	0.097	-	4.227	-	-
HCM Control Delay (s)	16.9	0	$ 1748.1	-	-
HCM Lane LOS	C	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	14	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

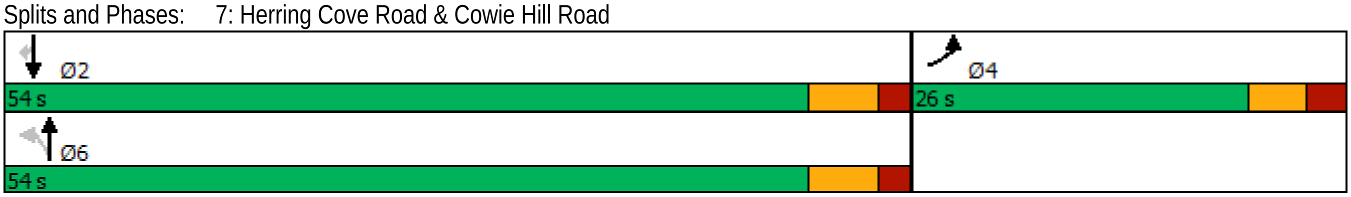
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	983	467	61
Future Volume (vph)	68	49	18	983	467	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1707	0	1789	1883	1883	1601
Flt Permitted	0.972		0.455			
Satd. Flow (perm)	1701	0	853	1883	1883	1553
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	1068	508	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	1068	508	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		54.0	54.0	54.0	54.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	11.4		53.1	53.1	53.1	53.1
Actuated g/C Ratio	0.16		0.74	0.74	0.74	0.74
v/c Ratio	0.41		0.03	0.76	0.36	0.06
Control Delay	23.9		5.3	14.8	6.5	1.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		5.3	14.8	6.5	1.9
LOS	C		A	B	A	A
Approach Delay	23.9			14.6	5.9	
Approach LOS	C			B	A	
Stops (vph)	68		7	553	175	6
Fuel Used(l)	5		1	74	29	3
CO Emissions (g/hr)	95		21	1375	532	58

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	18		4	265	103	11
VOC Emissions (g/hr)	22		5	317	123	13
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	11.2		0.7	84.7	23.9	0.0
Queue Length 95th (m)	23.5		3.7	#231.9	58.9	4.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	530		635	1403	1403	1174
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.24		0.03	0.76	0.36	0.06

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 12.5 Intersection LOS: B
Intersection Capacity Utilization 70.3% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



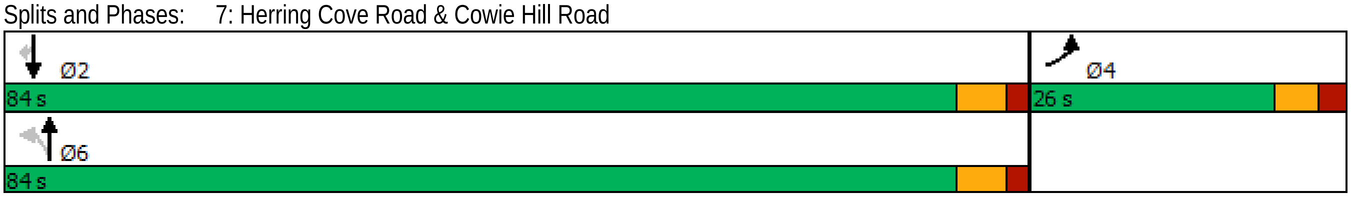
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	737	1306	99
Future Volume (vph)	112	80	70	737	1306	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.96
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1708	0	1789	1883	1883	1601
Flt Permitted	0.972		0.050			
Satd. Flow (perm)	1692	0	94	1883	1883	1543
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					53
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	801	1420	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	801	1420	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		84.0	84.0	84.0	84.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	16.7		80.4	80.4	80.4	80.4
Actuated g/C Ratio	0.15		0.74	0.74	0.74	0.74
v/c Ratio	0.73		1.10	0.58	1.03	0.09
Control Delay	52.6		165.1	9.2	47.5	2.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	52.6		165.1	9.2	47.5	2.8
LOS	D		F	A	D	A
Approach Delay	52.6			22.7	44.4	
Approach LOS	D			C	D	
Stops (vph)	155		42	329	965	16
Fuel Used(l)	14		13	50	132	5
CO Emissions (g/hr)	253		250	936	2455	99

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	49		48	181	474	19
VOC Emissions (g/hr)	58		58	216	566	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	36.0		~18.4	69.8	~323.1	2.9
Queue Length 95th (m)	60.7		#34.7	107.9	#417.0	8.0
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	336		69	1385	1385	1149
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.62		1.10	0.58	1.03	0.09

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 109.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	8.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	886	66	46	459
Future Vol, veh/h	68	59	886	66	46	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	74	64	963	72	50	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1598	999	0	0	1035	0
Stage 1	999	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	295	-	-	672	-
Stage 1	356	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	108	295	-	-	672	-
Mov Cap-2 Maneuver	108	-	-	-	-	-
Stage 1	330	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	106.7	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	153	672	-
HCM Lane V/C Ratio	-	-	0.902	0.074	-
HCM Control Delay (s)	-	-	106.7	10.8	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	6.3	0.2	-

Intersection	
Int Delay, s/veh	20.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	716	48	78	1311
Future Vol, veh/h	45	58	716	48	78	1311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	49	63	778	52	85	1425

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2399	804	0	0	830	0
Stage 1	804	-	-	-	-	-
Stage 2	1595	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 37	383	-	-	802	-
Stage 1	440	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 33	383	-	-	802	-
Mov Cap-2 Maneuver	~ 33	-	-	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	183	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 449.1	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	68	802	-
HCM Lane V/C Ratio	-	-	1.646	0.106	-
HCM Control Delay (s)	-	-	$ 449.1	10	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	9.8	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

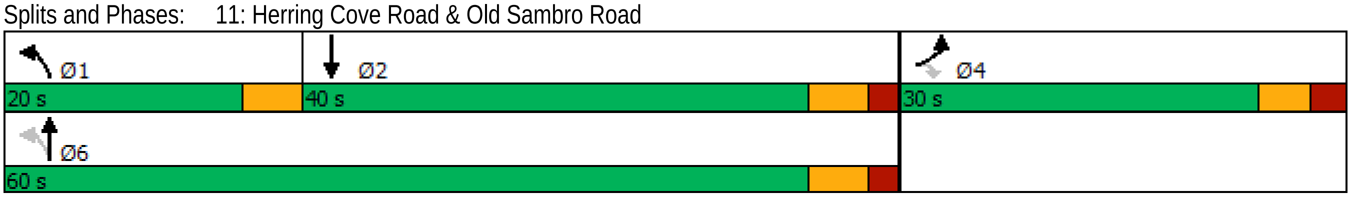
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	211	349	762	515	96
Future Volume (vph)	142	211	349	762	515	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.979	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1844	0
Flt Permitted	0.950		0.147			
Satd. Flow (perm)	1789	1601	277	1883	1844	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			12	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	229	379	828	560	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	229	379	828	664	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	20.0	60.0	40.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	11.8	11.8	53.4	51.1	31.8	
Actuated g/C Ratio	0.16	0.16	0.71	0.68	0.42	
v/c Ratio	0.55	0.52	0.75	0.65	0.85	
Control Delay	37.9	8.9	23.7	10.4	32.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.9	8.9	23.7	10.4	32.2	
LOS	D	A	C	B	C	
Approach Delay	20.5			14.6	32.2	
Approach LOS	C			B	C	
Stops (vph)	123	30	174	411	487	
Fuel Used(l)	9	6	30	59	73	
CO Emissions (g/hr)	176	110	564	1100	1355	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	34	21	109	212	262	
VOC Emissions (g/hr)	41	25	130	254	313	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	21.4	0.0	27.1	56.6	81.7	
Queue Length 95th (m)	38.6	17.2	#74.0	109.7	#156.0	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	577	671	521	1361	843	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.34	0.73	0.61	0.79	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 75.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 20.8	Intersection LOS: C
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



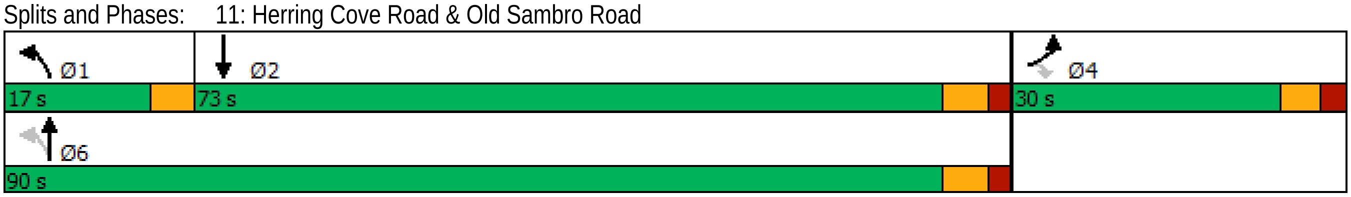
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	399	331	714	1094	173
Future Volume (vph)	167	399	331	714	1094	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.982	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1850	0
Flt Permitted	0.950		0.056			
Satd. Flow (perm)	1789	1601	105	1883	1850	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		230			11	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	434	360	776	1189	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	434	360	776	1377	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	17.0	90.0	73.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	20.4	20.4	86.2	83.9	66.9	
Actuated g/C Ratio	0.17	0.17	0.74	0.72	0.57	
v/c Ratio	0.58	0.92	1.36	0.57	1.29	
Control Delay	51.8	48.5	213.8	10.5	163.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	51.8	48.5	213.8	10.5	163.7	
LOS	D	D	F	B	F	
Approach Delay	49.4			74.9	163.7	
Approach LOS	D			E	F	
Stops (vph)	149	187	187	330	968	
Fuel Used(l)	13	26	78	54	278	
CO Emissions (g/hr)	242	488	1445	1008	5176	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	47	94	279	195	999	
VOC Emissions (g/hr)	56	113	333	233	1194	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	38.5	49.2	~97.9	84.3	~422.9	
Queue Length 95th (m)	61.5	#104.7	#156.8	115.8	#504.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	368	512	265	1355	1066	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.49	0.85	1.36	0.57	1.29	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 116.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.36	
Intersection Signal Delay: 109.0	Intersection LOS: F
Intersection Capacity Utilization 109.2%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



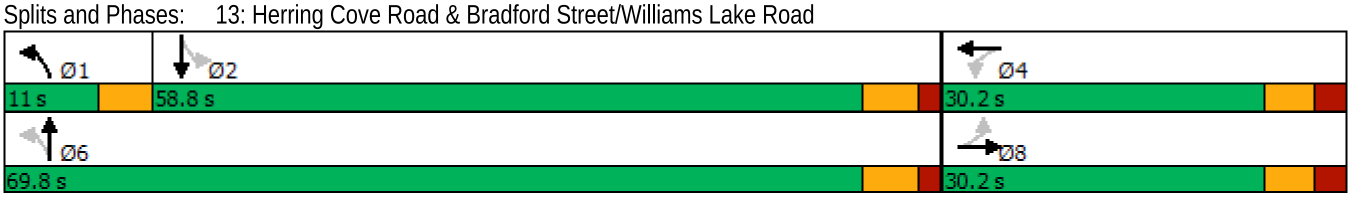
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Future Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.98			0.99			0.99			1.00	
Frt		0.872			0.972			0.976			0.999	
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1606	0	0	1757	0	1789	1825	0	1789	1881	0
Flt Permitted	0.687				0.759		0.259			0.069		
Satd. Flow (perm)	1292	1606	0	0	1377	0	488	1825	0	130	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			13			19			1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	142	9	40	53	1107	212	34	680	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	0	191	0	53	1319	0	34	685	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	69.8		58.8	58.8	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	17.3	17.3			17.3		68.6	66.7		57.8	57.8	
Actuated g/C Ratio	0.18	0.18			0.18		0.71	0.69		0.60	0.60	
v/c Ratio	0.01	0.11			0.74		0.12	1.04		0.44	0.61	
Control Delay	29.7	13.8			51.3		5.7	52.9		37.2	16.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	29.7	13.8			51.3		5.7	52.9		37.2	16.8	
LOS	C	B			D		A	D		D	B	
Approach Delay		15.1			51.3			51.1			17.7	
Approach LOS		B			D			D			B	
Stops (vph)	3	12			151		15	875		24	402	
Fuel Used(l)	0	1			14		2	116		3	53	
CO Emissions (g/hr)	3	16			252		46	2163		60	993	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	3			49		9	417		12	192	
VOC Emissions (g/hr)	1	4			58		11	499		14	229	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	0.5	0.8			30.4		2.5	~259.5		3.3	77.9	
Queue Length 95th (m)	2.7	8.3			52.6		7.2	#375.5		#19.7	134.2	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	323	423			354		443	1272		78	1131	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.01	0.08			0.54		0.12	1.04		0.44	0.61	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 96.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 40.2 Intersection LOS: D
Intersection Capacity Utilization 92.4% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



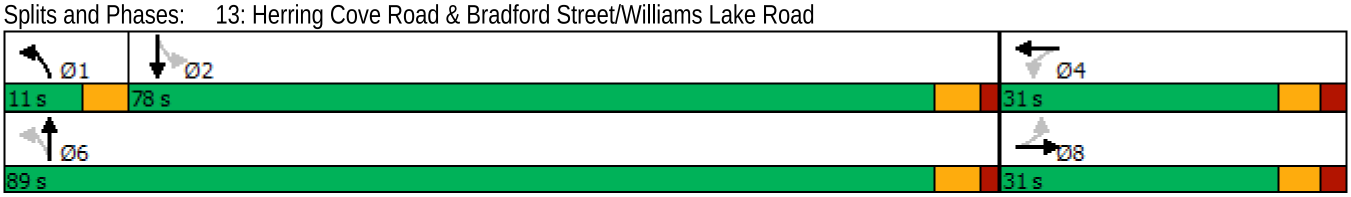
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Future Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	0.0		0.0	15.0		0.0	25.0		0.0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.96			0.98			0.99			1.00	
Frt		0.870			0.984			0.977				
Flt Protected	0.950				0.964		0.950			0.950		
Satd. Flow (prot)	1789	1565	0	0	1778	0	1789	1829	0	1789	1883	0
Flt Permitted	0.676				0.537		0.053			0.075		
Satd. Flow (perm)	1260	1565	0	0	974	0	100	1829	0	141	1883	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		126			5			18				
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	174	33	28	103	986	180	74	1550	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	0	235	0	103	1166	0	74	1554	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		8			4		1	6			2	
Permitted Phases	8			4			6			2		
Total Split (s)	31.0	31.0		31.0	31.0		11.0	89.0		78.0	78.0	
Total Lost Time (s)	6.2	6.2			6.2		4.0	5.9		5.9	5.9	
Act Effct Green (s)	24.8	24.8			24.8		85.0	83.1		72.1	72.1	
Actuated g/C Ratio	0.21	0.21			0.21		0.71	0.69		0.60	0.60	
v/c Ratio	0.15	0.44			1.15		0.61	0.92		0.88	1.37	
Control Delay	40.9	18.3			150.2		31.6	28.3		96.8	198.5	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	40.9	18.3			150.2		31.6	28.3		96.8	198.5	
LOS	D	B			F		C	C		F	F	
Approach Delay		22.3			150.2			28.6			193.9	
Approach LOS		C			F			C			F	
Stops (vph)	30	54			170		42	821		49	1074	
Fuel Used(l)	2	5			33		7	84		10	325	
CO Emissions (g/hr)	40	93			609		129	1555		187	6041	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	8	18			118		25	300		36	1166	
VOC Emissions (g/hr)	9	22			140		30	359		43	1393	
Dilemma Vehicles (#)	0	0			0		0	0		0	0	
Queue Length 50th (m)	7.8	12.0			~64.1		7.2	206.2		13.8	~484.3	
Queue Length 95th (m)	17.6	33.1			#114.4		#27.8	#337.6		#46.4	#564.6	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0						15.0			25.0		
Base Capacity (vph)	260	423			205		169	1272		84	1131	
Starvation Cap Reductn	0	0			0		0	0		0	0	
Spillback Cap Reductn	0	0			0		0	0		0	0	
Storage Cap Reductn	0	0			0		0	0		0	0	
Reduced v/c Ratio	0.15	0.44			1.15		0.61	0.92		0.88	1.37	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.37	
Intersection Signal Delay: 116.8	Intersection LOS: F
Intersection Capacity Utilization 122.7%	ICU Level of Service H
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



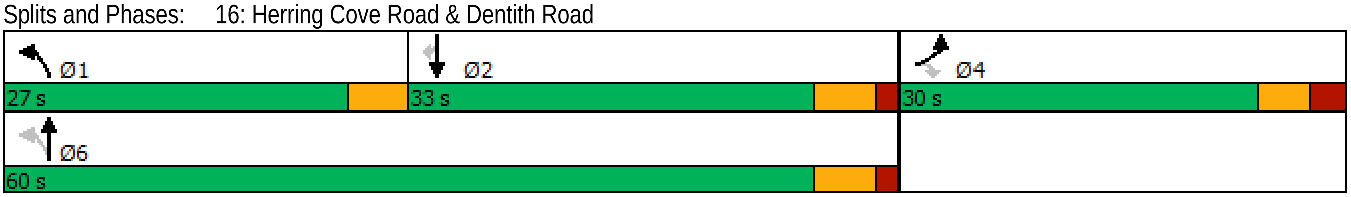
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	295	569	1046	527	148
Future Volume (vph)	165	295	569	1046	527	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.94				0.96
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.127			
Satd. Flow (perm)	1726	1504	239	1883	1883	1537
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		321				69
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	19	22	10			10
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	179	321	618	1137	573	161
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	321	618	1137	573	161
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	30.0	30.0	27.0	60.0	33.0	33.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	17.8	17.8	56.4	54.7	27.5	27.5
Actuated g/C Ratio	0.21	0.21	0.67	0.65	0.33	0.33
v/c Ratio	0.47	0.56	1.06	0.93	0.93	0.29
Control Delay	32.7	7.5	77.9	30.6	53.9	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	7.5	77.9	30.6	53.9	15.3
LOS	C	A	E	C	D	B
Approach Delay	16.5			47.2	45.5	
Approach LOS	B			D	D	
Stops (vph)	135	34	355	753	430	64
Fuel Used(l)	12	11	49	54	52	9
CO Emissions (g/hr)	217	196	907	1002	968	166

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	42	38	175	193	187	32
VOC Emissions (g/hr)	50	45	209	231	223	38
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	25.2	0.0	~109.5	~180.8	~99.2	11.7
Queue Length 95th (m)	43.2	18.8	#173.1	#280.1	#165.1	27.2
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	513	660	585	1222	614	548
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.49	1.06	0.93	0.93	0.29

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 84.3
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 41.7 Intersection LOS: D
Intersection Capacity Utilization 87.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



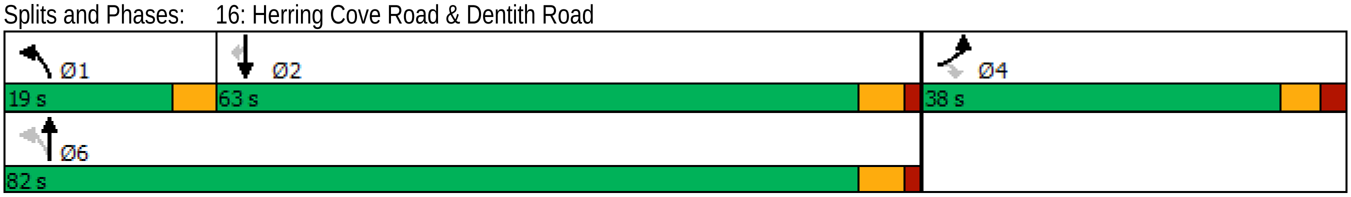
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	231	734	469	810	1367	252
Future Volume (vph)	231	734	469	810	1367	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	100.0			25.0
Storage Lanes	1	1	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.97	0.90				0.93
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	1883	1601
Flt Permitted	0.950		0.065			
Satd. Flow (perm)	1736	1439	122	1883	1883	1488
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		237				45
Link Speed (k/h)	50			50	50	
Link Distance (m)	287.6			124.5	410.2	
Travel Time (s)	20.7			9.0	29.5	
Confl. Peds. (#/hr)	12	33	19			19
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	251	798	510	880	1486	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	251	798	510	880	1486	274
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	4		1	6	2	
Permitted Phases		4	6			2
Total Split (s)	38.0	38.0	19.0	82.0	63.0	63.0
Total Lost Time (s)	6.0	6.0	4.0	5.7	5.7	5.7
Act Effct Green (s)	32.0	32.0	78.0	76.3	57.3	57.3
Actuated g/C Ratio	0.27	0.27	0.65	0.64	0.48	0.48
v/c Ratio	0.53	1.43	1.78	0.74	1.65	0.37
Control Delay	42.3	229.8	389.1	19.6	324.6	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	229.8	389.1	19.6	324.6	18.2
LOS	D	F	F	B	F	B
Approach Delay	185.0			155.2	276.9	
Approach LOS	F			F	F	
Stops (vph)	194	390	263	541	947	131
Fuel Used(l)	18	159	152	34	416	16
CO Emissions (g/hr)	338	2950	2825	631	7737	303

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	65	569	545	122	1493	58
VOC Emissions (g/hr)	78	680	652	146	1785	70
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (m)	50.5	~212.4	~165.1	131.6	~507.9	33.0
Queue Length 95th (m)	76.6	#287.2	#230.8	181.8	#588.2	53.4
Internal Link Dist (m)	263.6			100.5	386.2	
Turn Bay Length (m)			100.0			25.0
Base Capacity (vph)	477	557	287	1197	899	734
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.43	1.78	0.74	1.65	0.37

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.78
Intersection Signal Delay: 213.6 Intersection LOS: F
Intersection Capacity Utilization 130.1% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 16: Herring Cove Road & Dentith Road



Intersection	
Int Delay, s/veh	29.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	56	82	1595	773	95
Future Vol, veh/h	51	56	82	1595	773	95
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	61	89	1734	840	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2815	908	954	0	-	0
Stage 1	903	-	-	-	-	-
Stage 2	1912	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 20	334	720	-	-	-
Stage 1	396	-	-	-	-	-
Stage 2	127	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 17	329	713	-	-	-
Mov Cap-2 Maneuver	~ 17	-	-	-	-	-
Stage 1	343	-	-	-	-	-
Stage 2	126	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 715.1	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	713	-	17	329	-	-
HCM Lane V/C Ratio	0.125	-	3.261	0.185	-	-
HCM Control Delay (s)	10.8		$ 1480.1	18.4	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	7.6	0.7	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	395.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	108	86	1222	1920	244
Future Vol, veh/h	68	108	86	1222	1920	244
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	74	117	93	1328	2087	265

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3799	2317	2417	0	-	0
Stage 1	2285	-	-	-	-	-
Stage 2	1514	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 4	~ 48	196	-	-	-
Stage 1	82	-	-	-	-	-
Stage 2	201	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 2	~ 44	184	-	-	-
Mov Cap-2 Maneuver	~ 2	-	-	-	-	-
Stage 1	~ 38	-	-	-	-	-
Stage 2	189	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 8180.2	2.8	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	184	-	2	44	-	-
HCM Lane V/C Ratio	0.508	-	36.957	2.668	-	-
HCM Control Delay (s)	43.2	-	$ 19661.8	$ 951.1	-	-
HCM Lane LOS	E	-	F	F	-	-
HCM 95th %tile Q(veh)	2.5	-	11.4	12.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	207.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	337	1235	18	143	605
Future Vol, veh/h	44	337	1235	18	143	605
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	48	366	1342	20	155	658

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2320	1352	0	0	1362	0
Stage 1	1352	-	-	-	-	-
Stage 2	968	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 41	~ 184	-	-	505	-
Stage 1	241	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 28	~ 184	-	-	505	-
Mov Cap-2 Maneuver	~ 28	-	-	-	-	-
Stage 1	167	-	-	-	-	-
Stage 2	368	-	-	-	-	-

Approach	WB		NB		SB	
HCM Control Delay,	$ 1293.6		0		2.9	
HCM LOS	F					

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	112	505	-
HCM Lane V/C Ratio	-	-	3.698	0.308	-
HCM Control Delay (s)	-	-	$ 1293.6	15.3	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	41.5	1.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1799.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	266	912	56	463	1489
Future Vol, veh/h	38	266	912	56	463	1489
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	300	-
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	41	289	991	61	503	1618

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3646	1022	0	0	1052	0
Stage 1	1022	-	-	-	-	-
Stage 2	2624	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 6	~ 287	-	-	662	-
Stage 1	347	-	-	-	-	-
Stage 2	55	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 1	~ 287	-	-	662	-
Mov Cap-2 Maneuver	~ 1	-	-	-	-	-
Stage 1	83	-	-	-	-	-
Stage 2	55	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 19042	0	6.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	8	662	-
HCM Lane V/C Ratio	-	-	41.304	0.76	-
HCM Control Delay (s)	-		$ 19042	25.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	43.2	7	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	134.2

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	835	18	150	374	0	580
Future Vol, veh/h	835	18	150	374	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	908	20	163	407	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	928	0	-	918
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	737	-	0	~ 329
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	737	-	-	~ 329
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.2	$ 450
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	329	737	-
HCM Lane V/C Ratio	-	-	1.916	0.221	-
HCM Control Delay (s)	-	-	$ 450	11.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	43.2	0.8	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	245	555	50	512	1175
Future Vol, veh/h	0	245	555	50	512	1175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	603	54	557	1277

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	630	0	0	657	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	482	-	-	931	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	482	-	-	931	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.3	0	4.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	931	-
HCM Lane V/C Ratio	-	-	0.552	0.598	-
HCM Control Delay (s)	-	-	21.3	14.4	-
HCM Lane LOS	-	-	C	B	-
HCM 95th %tile Q(veh)	-	-	3.3	4.1	-

Intersection						
Int Delay, s/veh	27.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	594	340	55
Future Vol, veh/h	242	8	15	594	340	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	646	370	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	400	430	0	-	0
Stage 1	400	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 242	650	1129	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 237	650	1129	-	-	-
Mov Cap-2 Maneuver	~ 237	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	138.5	0.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	242	-	-
HCM Lane V/C Ratio	0.014	-	1.123	-	-
HCM Control Delay (s)	8.2	0	138.5	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0	-	12.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	11.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	495	882	269
Future Vol, veh/h	83	22	30	495	882	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	538	959	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1709	1105	1251	0	-	0
Stage 1	1105	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	100	256	556	-	-	-
Stage 1	317	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	92	256	556	-	-	-
Mov Cap-2 Maneuver	92	-	-	-	-	-
Stage 1	290	-	-	-	-	-
Stage 2	546	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	185.7	0.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	556	-	106	-	-
HCM Lane V/C Ratio	0.059	-	1.077	-	-
HCM Control Delay (s)	11.9	0	185.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.2	-	7.1	-	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	515	309	61
Future Volume (vph)	68	49	18	515	309	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.558			
Satd. Flow (perm)	1705	0	1047	1883	1883	1558
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	53					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	560	336	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	560	336	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		29.0	29.0	29.0	29.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	10.3		27.6	27.6	27.6	27.6
Actuated g/C Ratio	0.23		0.62	0.62	0.62	0.62
v/c Ratio	0.29		0.03	0.48	0.29	0.07
Control Delay	11.1		7.8	10.6	8.3	3.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	11.1		7.8	10.6	8.3	3.1
LOS	B		A	B	A	A
Approach Delay	11.1			10.5	7.5	
Approach LOS	B			B	A	
Stops (vph)	56		12	306	160	11
Fuel Used(l)	4		1	37	20	3
CO Emissions (g/hr)	69		24	696	379	62

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	13		5	134	73	12
VOC Emissions (g/hr)	16		6	161	87	14
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	5.0		0.6	24.7	12.6	0.0
Queue Length 95th (m)	13.6		4.3	#75.5	39.8	5.4
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	826		645	1161	1161	986
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.15		0.03	0.48	0.29	0.07

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 44.7

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 9.5 Intersection LOS: A

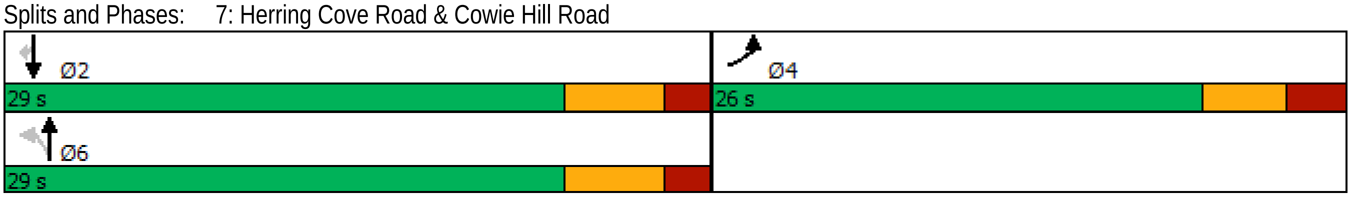
Intersection Capacity Utilization 45.7% ICU Level of Service A

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



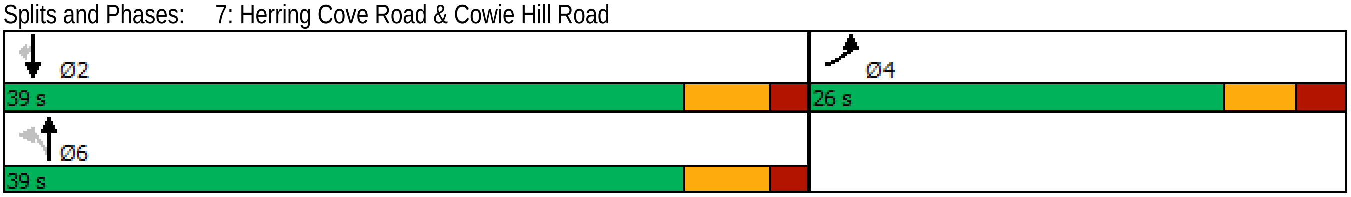
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	425	779	99
Future Volume (vph)	112	80	70	425	779	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1710	0	1789	1883	1883	1601
Flt Permitted	0.972		0.188			
Satd. Flow (perm)	1701	0	354	1883	1883	1554
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	57					90
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	462	847	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	462	847	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		39.0	39.0	39.0	39.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	12.0		33.4	33.4	33.4	33.4
Actuated g/C Ratio	0.21		0.58	0.58	0.58	0.58
v/c Ratio	0.52		0.37	0.42	0.78	0.12
Control Delay	18.8		15.1	9.2	17.7	3.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	18.8		15.1	9.2	17.7	3.0
LOS	B		B	A	B	A
Approach Delay	18.8			10.1	16.0	
Approach LOS	B			B	B	
Stops (vph)	113		45	226	524	17
Fuel Used(l)	8		5	30	60	5
CO Emissions (g/hr)	143		101	555	1110	100

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28		19	107	214	19
VOC Emissions (g/hr)	33		23	128	256	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	13.8		3.6	22.6	56.6	0.7
Queue Length 95th (m)	29.1		17.1	55.1	#156.3	7.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	633		206	1099	1099	945
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.33		0.37	0.42	0.77	0.11

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 57.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 14.5 Intersection LOS: B
Intersection Capacity Utilization 73.8% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	418	66	46	301
Future Vol, veh/h	68	59	418	66	46	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	74	64	454	72	50	327

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	917	490	0	0	526	0
Stage 1	490	-	-	-	-	-
Stage 2	427	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	578	-	-	1041	-
Stage 1	616	-	-	-	-	-
Stage 2	658	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	288	578	-	-	1041	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	376	1041	-
HCM Lane V/C Ratio	-	-	0.367	0.048	-
HCM Control Delay (s)	-	-	20	8.6	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	1.6	0.2	-

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	404	48	78	784
Future Vol, veh/h	45	58	404	48	78	784
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	49	63	439	52	85	852

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1487	465	0	0	491	0
Stage 1	465	-	-	-	-	-
Stage 2	1022	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	137	597	-	-	1072	-
Stage 1	632	-	-	-	-	-
Stage 2	347	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	126	597	-	-	1072	-
Mov Cap-2 Maneuver	126	-	-	-	-	-
Stage 1	582	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	35.4	0	0.8
HCM LOS	E		

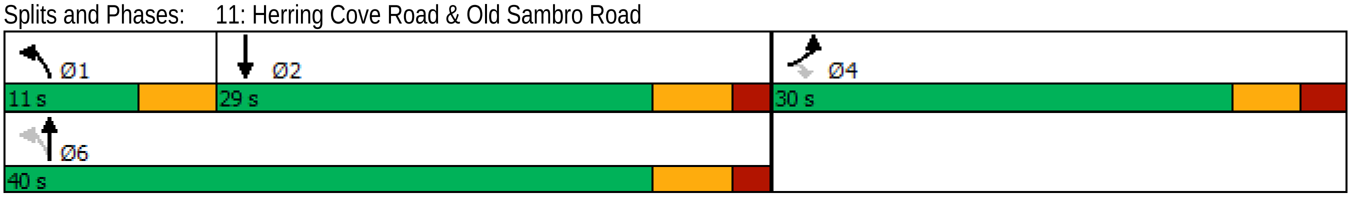
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	227	1072	-
HCM Lane V/C Ratio	-	-	0.493	0.079	-
HCM Control Delay (s)	-	-	35.4	8.6	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.3	-

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	176	245	294	357	96
Future Volume (vph)	142	176	245	294	357	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3464	0
Flt Permitted	0.950		0.351			
Satd. Flow (perm)	1789	1601	661	1883	3464	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		191			51	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	191	266	320	388	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	191	266	320	492	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	9.5	9.5	25.0	22.7	11.6	
Actuated g/C Ratio	0.21	0.21	0.56	0.51	0.26	
v/c Ratio	0.41	0.39	0.48	0.33	0.52	
Control Delay	19.4	5.9	8.6	7.9	14.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	19.4	5.9	8.6	7.9	14.9	
LOS	B	A	A	A	B	
Approach Delay	11.9			8.2	14.9	
Approach LOS	B			A	B	
Stops (vph)	110	31	111	152	312	
Fuel Used(l)	7	5	18	22	47	
CO Emissions (g/hr)	133	87	339	411	872	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	26	17	65	79	168	
VOC Emissions (g/hr)	31	20	78	95	201	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	10.3	0.0	8.7	12.5	14.8	
Queue Length 95th (m)	24.8	11.8	21.2	28.5	27.8	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	976	960	549	1447	1820	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.16	0.20	0.48	0.22	0.27	

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 44.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 11.4	Intersection LOS: B
Intersection Capacity Utilization 47.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



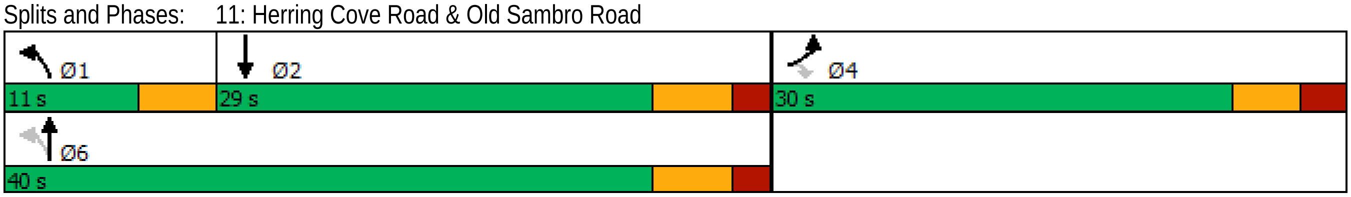
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	282	262	402	567	173
Future Volume (vph)	167	282	262	402	567	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.965	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3453	0
Flt Permitted	0.950		0.215			
Satd. Flow (perm)	1789	1601	405	1883	3453	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		307			61	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	307	285	437	616	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	307	285	437	804	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	11.0	11.0	31.3	29.1	17.8	
Actuated g/C Ratio	0.21	0.21	0.60	0.55	0.34	
v/c Ratio	0.49	0.53	0.66	0.42	0.66	
Control Delay	23.7	6.6	15.9	8.8	16.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.7	6.6	15.9	8.8	16.8	
LOS	C	A	B	A	B	
Approach Delay	13.0			11.6	16.8	
Approach LOS	B			B	B	
Stops (vph)	133	39	107	209	531	
Fuel Used(l)	9	7	21	31	78	
CO Emissions (g/hr)	168	137	385	568	1453	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	32	27	74	110	280	
VOC Emissions (g/hr)	39	32	89	131	335	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	15.3	0.0	10.7	20.5	29.7	
Queue Length 95th (m)	32.3	15.7	#33.7	45.1	52.0	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	834	910	429	1236	1563	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.34	0.66	0.35	0.51	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 52.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 14.0 — Intersection LOS: B
Intersection Capacity Utilization 58.5% — ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



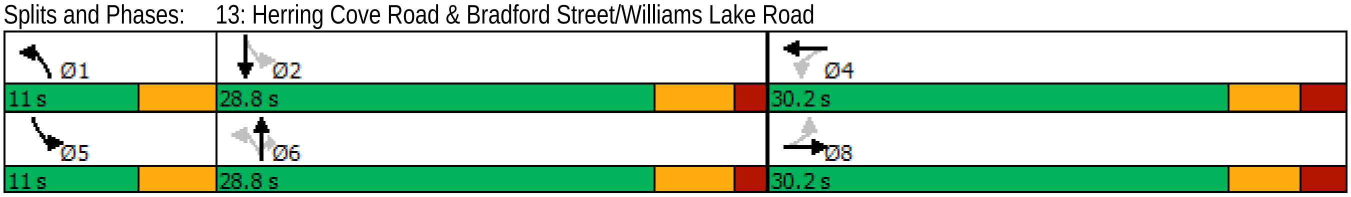
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Future Volume (vph)	3	5	27	113	8	37	49	446	142	31	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.98		0.99		0.96	0.99	1.00	
Frt		0.872			0.878				0.850		0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1622	0	1789	1625	0	1789	1883	1601	1789	3570	0
Flt Permitted	0.725			0.735			0.480			0.397		
Satd. Flow (perm)	1364	1622	0	1381	1625	0	899	1883	1541	743	3570	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			40				112		2	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	123	9	40	53	485	154	34	471	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	123	49	0	53	485	154	34	476	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	28.8	28.8	11.0	28.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	11.6	11.6		11.6	11.6		27.3	25.0	25.0	27.3	25.0	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.58	0.53	0.53	0.58	0.53	
v/c Ratio	0.01	0.08		0.36	0.11		0.08	0.49	0.18	0.06	0.25	
Control Delay	16.0	8.6		20.0	8.3		6.9	16.1	6.1	6.9	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.0	8.6		20.0	8.3		6.9	16.1	6.1	6.9	11.5	
LOS	B	A		C	A		A	B	A	A	B	
Approach Delay		9.2			16.7			13.2			11.2	
Approach LOS		A			B			B			B	
Stops (vph)	4	12		84	15		22	288	35	15	245	
Fuel Used(l)	0	1		6	1		3	29	7	2	35	
CO Emissions (g/hr)	3	13		106	27		49	546	130	42	643	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	3		20	5		10	105	25	8	124	
VOC Emissions (g/hr)	1	3		24	6		11	126	30	10	148	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	0.2	0.3		6.9	0.5		1.6	21.4	1.4	1.0	9.4	
Queue Length 95th (m)	1.8	5.6		23.2	7.0		8.0	#101.2	15.3	5.8	36.8	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	763	920		773	927		666	1093	941	601	2073	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.00	0.04		0.16	0.05		0.08	0.44	0.16	0.06	0.23	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 47.1
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 12.8 Intersection LOS: B
Intersection Capacity Utilization 55.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



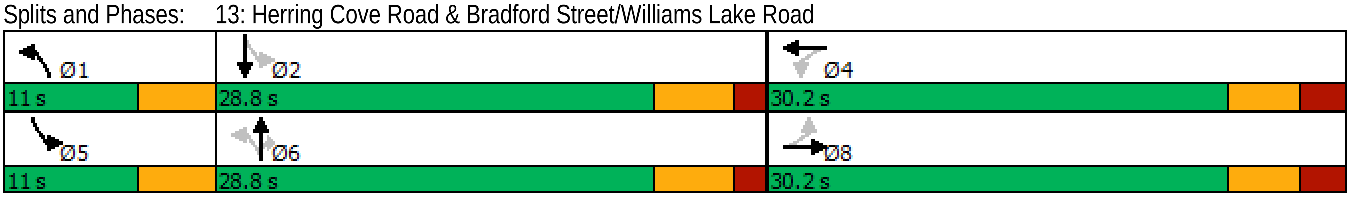
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Future Volume (vph)	37	23	149	102	30	26	95	526	131	68	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.99	0.98		0.99	0.99		1.00		0.97	1.00	1.00	
Frt		0.870			0.931				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1606	0	1789	1728	0	1789	1883	1601	1789	3574	0
Flt Permitted	0.717			0.640			0.245			0.316		
Satd. Flow (perm)	1336	1606	0	1195	1728	0	460	1883	1552	593	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		162			28				112		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	111	33	28	103	572	142	74	850	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	111	61	0	103	572	142	74	854	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	28.8	28.8	11.0	28.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	12.0	12.0		12.0	12.0		32.3	26.5	26.5	31.4	24.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.57	0.47	0.47	0.55	0.42	
v/c Ratio	0.14	0.40		0.44	0.16		0.24	0.65	0.18	0.16	0.57	
Control Delay	18.8	7.6		25.0	12.2		7.8	21.0	5.8	7.1	16.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	18.8	7.6		25.0	12.2		7.8	21.0	5.8	7.1	16.5	
LOS	B	A		C	B		A	C	A	A	B	
Approach Delay		9.6			20.5			16.7			15.7	
Approach LOS		A			C			B			B	
Stops (vph)	29	36		79	27		41	360	30	29	575	
Fuel Used(l)	1	3		6	2		5	37	6	5	68	
CO Emissions (g/hr)	28	60		104	40		97	690	118	92	1266	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	5	12		20	8		19	133	23	18	244	
VOC Emissions (g/hr)	6	14		24	9		22	159	27	21	292	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	3.5	2.2		10.4	2.9		3.4	47.8	1.8	2.4	34.2	
Queue Length 95th (m)	9.5	14.1		21.8	9.9		13.5	#128.6	13.7	10.3	70.5	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	572	780		512	756		427	876	782	476	1571	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.07	0.24		0.22	0.08		0.24	0.65	0.18	0.16	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 56.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 72.5% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	36	29	725	481	88
Future Vol, veh/h	35	36	29	725	481	88
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	38	39	32	788	523	96

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1434	326	630	0	-	0
Stage 1	582	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	136	670	950	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	129	660	940	-	-	-
Mov Cap-2 Maneuver	129	-	-	-	-	-
Stage 1	500	-	-	-	-	-
Stage 2	413	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.3	0.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	940	-	129	660	-	-
HCM Lane V/C Ratio	0.034	-	0.295	0.059	-	-
HCM Control Delay (s)	9	-	44.2	10.8	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	0.2	-	-

Intersection	
Int Delay, s/veh	10.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	49	49	649	946	223
Future Vol, veh/h	51	49	49	649	946	223
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	53	53	705	1028	242

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2025	732	1335	0	-	0
Stage 1	1214	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	56	364	515	-	-	-
Stage 1	245	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 44	332	484	-	-	-
Mov Cap-2 Maneuver	~ 44	-	-	-	-	-
Stage 1	205	-	-	-	-	-
Stage 2	410	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	196.7	0.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	484	-	44	332	-	-
HCM Lane V/C Ratio	0.11	-	1.26	0.16	-	-
HCM Control Delay (s)	13.4	-	$ 368.5	17.9	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	0.4	-	5.3	0.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	17	92	557	9	60	376
Future Volume (vph)	17	92	557	9	60	376
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1880	0	1789	3579
Flt Permitted	0.950				0.282	
Satd. Flow (perm)	1789	1601	1880	0	531	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		100	1			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	18	100	605	10	65	409
Shared Lane Traffic (%)						
Lane Group Flow (vph)	18	100	615	0	65	409
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	29.0		11.0	40.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	7.4	7.4	30.1		36.8	36.3
Actuated g/C Ratio	0.15	0.15	0.59		0.72	0.71
v/c Ratio	0.07	0.31	0.56		0.12	0.16
Control Delay	20.6	8.6	14.3		3.5	3.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.6	8.6	14.3		3.5	3.9
LOS	C	A	B		A	A
Approach Delay	10.4		14.3			3.9
Approach LOS	B		B			A
Stops (vph)	18	23	366		19	122
Fuel Used(l)	1	2	39		4	27
CO Emissions (g/hr)	16	38	723		79	497

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	3	7	140		15	96
VOC Emissions (g/hr)	4	9	167		18	115
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	1.6	0.0	46.2		1.6	6.6
Queue Length 95th (m)	6.0	10.1	#97.7		4.6	12.0
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	856	818	1108		558	2458
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.02	0.12	0.56		0.12	0.17

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 51

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.56

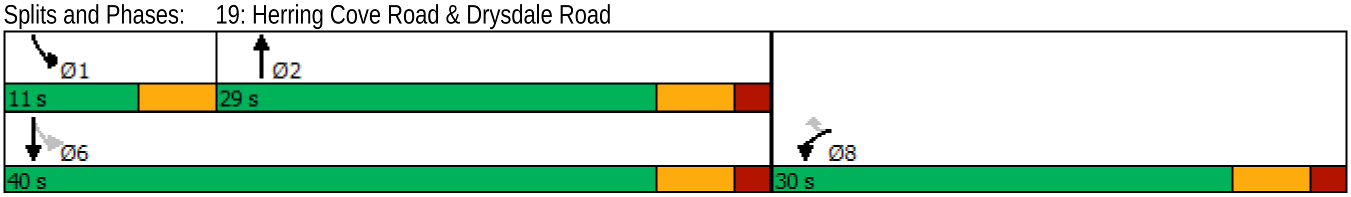
Intersection Signal Delay: 9.8 Intersection LOS: A

Intersection Capacity Utilization 54.9% ICU Level of Service A

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road

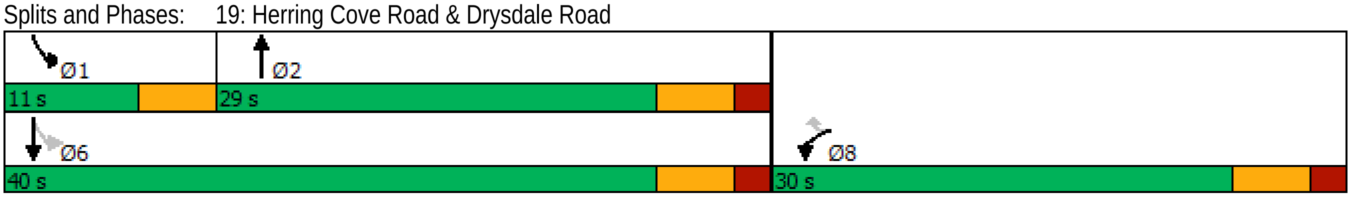


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	20	104	464	26	191	728
Future Volume (vph)	20	104	464	26	191	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.993			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1870	0	1789	3579
Flt Permitted	0.950				0.289	
Satd. Flow (perm)	1789	1601	1870	0	544	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		113	4			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	22	113	504	28	208	791
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	113	532	0	208	791
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	29.0		11.0	40.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	7.4	7.4	22.5		35.6	35.0
Actuated g/C Ratio	0.15	0.15	0.45		0.71	0.70
v/c Ratio	0.08	0.34	0.63		0.37	0.32
Control Delay	20.7	8.5	16.0		5.3	4.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	20.7	8.5	16.0		5.3	4.7
LOS	C	A	B		A	A
Approach Delay	10.5		16.0			4.8
Approach LOS	B		B			A
Stops (vph)	21	25	365		60	271
Fuel Used(l)	1	2	35		14	53
CO Emissions (g/hr)	18	42	657		256	986

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	4	8	127		49	190
VOC Emissions (g/hr)	4	10	152		59	227
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	1.8	0.0	37.4		5.5	14.6
Queue Length 95th (m)	6.7	10.7	68.8		12.3	24.6
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	863	831	896		561	2602
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.03	0.14	0.59		0.37	0.30

Intersection Summary	
Area Type: Other	
Cycle Length: 70	
Actuated Cycle Length: 50.1	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 55.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 19: Herring Cove Road & Drysdale Road



Intersection	
Int Delay, s/veh	296.1

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	1303	18	150	532	0	580
Future Vol, veh/h	1303	18	150	532	0	580
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	200	-	-	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	1416	20	163	578	0	630

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1436	0	-	1426
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.218	-	-	3.318
Pot Cap-1 Maneuver	-	-	473	-	0	~ 166
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	473	-	-	~ 166
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s	0	3.6	$ 1314.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	SBL	SBT
Capacity (veh/h)	-	-	166	473	-
HCM Lane V/C Ratio	-	-	3.798	0.345	-
HCM Control Delay (s)	-	-	$ 1314.5	16.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	61.9	1.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	8.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↱	↳		↰	↑
Traffic Vol, veh/h	0	245	867	50	512	1702
Future Vol, veh/h	0	245	867	50	512	1702
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	0	-	-	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	266	942	54	557	1850

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	969	0	0	996	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	308	-	-	695	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	308	-	-	695	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.2	0	6.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	308	695	-
HCM Lane V/C Ratio	-	-	0.865	0.801	-
HCM Control Delay (s)	-	-	60.2	27.6	-
HCM Lane LOS	-	-	F	D	-
HCM 95th %tile Q(veh)	-	-	7.7	8.2	-

Intersection	
Int Delay, s/veh	132.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	242	8	15	1062	498	55
Future Vol, veh/h	242	8	15	1062	498	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	263	9	16	1154	541	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1757	571	601	0	-	0
Stage 1	571	-	-	-	-	-
Stage 2	1186	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 93	520	976	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	290	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 89	520	976	-	-	-
Mov Cap-2 Maneuver	~ 89	-	-	-	-	-
Stage 1	539	-	-	-	-	-
Stage 2	290	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 994.3	0.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	976	-	91	-	-
HCM Lane V/C Ratio	0.017	-	2.986	-	-
HCM Control Delay (s)	8.8	0	$ 994.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	26.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	70.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	83	22	30	807	1409	269
Future Vol, veh/h	83	22	30	807	1409	269
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
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	90	24	33	877	1532	292

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2621	1678	1824	0	-	0
Stage 1	1678	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 27	117	335	-	-	-
Stage 1	166	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	117	335	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	134	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1748.1	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	335	-	27	-	-
HCM Lane V/C Ratio	0.097	-	4.227	-	-
HCM Control Delay (s)	16.9	0	$ 1748.1	-	-
HCM Lane LOS	C	A	F	-	-
HCM 95th %tile Q(veh)	0.3	-	14	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

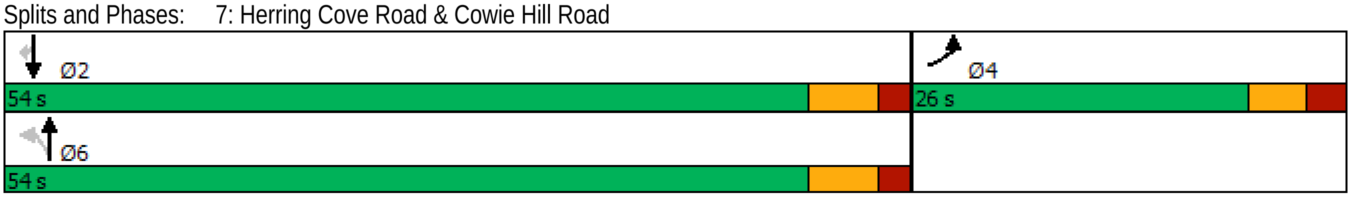
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	68	49	18	983	467	61
Future Volume (vph)	68	49	18	983	467	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		1.00			0.97
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1707	0	1789	1883	1883	1601
Flt Permitted	0.972		0.455			
Satd. Flow (perm)	1701	0	853	1883	1883	1553
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	43					66
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	3	5	5			5
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	74	53	20	1068	508	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	0	20	1068	508	66
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		54.0	54.0	54.0	54.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	11.4		53.1	53.1	53.1	53.1
Actuated g/C Ratio	0.16		0.74	0.74	0.74	0.74
v/c Ratio	0.41		0.03	0.76	0.36	0.06
Control Delay	23.9		5.3	14.8	6.5	1.9
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		5.3	14.8	6.5	1.9
LOS	C		A	B	A	A
Approach Delay	23.9			14.6	5.9	
Approach LOS	C			B	A	
Stops (vph)	68		7	553	175	6
Fuel Used(l)	5		1	74	29	3
CO Emissions (g/hr)	95		21	1375	532	58

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	18		4	265	103	11
VOC Emissions (g/hr)	22		5	317	123	13
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	11.2		0.7	84.7	23.9	0.0
Queue Length 95th (m)	23.5		3.7	#231.9	58.9	4.3
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	530		635	1403	1403	1174
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.24		0.03	0.76	0.36	0.06

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 71.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



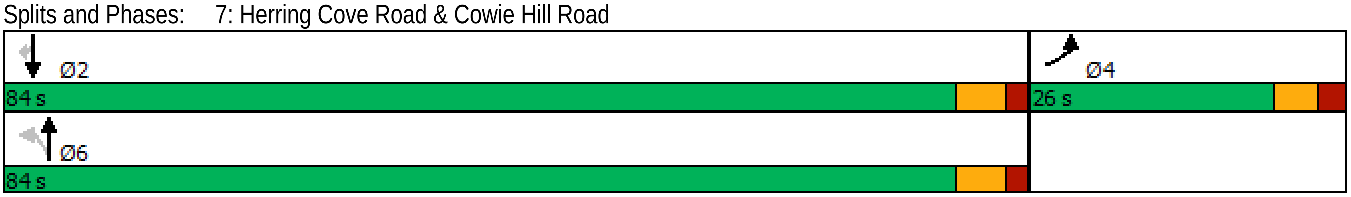
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	112	80	70	737	1306	99
Future Volume (vph)	112	80	70	737	1306	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	30.0			40.0
Storage Lanes	1	0	1			1
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98					0.96
Frt	0.944					0.850
Flt Protected	0.972		0.950			
Satd. Flow (prot)	1708	0	1789	1883	1883	1601
Flt Permitted	0.972		0.050			
Satd. Flow (perm)	1692	0	94	1883	1883	1543
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	29					53
Link Speed (k/h)	50			50	50	
Link Distance (m)	129.3			539.1	504.2	
Travel Time (s)	9.3			38.8	36.3	
Confl. Peds. (#/hr)	6	3	6			6
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	122	87	76	801	1420	108
Shared Lane Traffic (%)						
Lane Group Flow (vph)	209	0	76	801	1420	108
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		84.0	84.0	84.0	84.0
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	16.7		80.4	80.4	80.4	80.4
Actuated g/C Ratio	0.15		0.74	0.74	0.74	0.74
v/c Ratio	0.73		1.10	0.58	1.03	0.09
Control Delay	52.6		165.1	9.2	47.5	2.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	52.6		165.1	9.2	47.5	2.8
LOS	D		F	A	D	A
Approach Delay	52.6			22.7	44.4	
Approach LOS	D			C	D	
Stops (vph)	155		42	329	965	16
Fuel Used(l)	14		13	50	132	5
CO Emissions (g/hr)	253		250	936	2455	99

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	49		48	181	474	19
VOC Emissions (g/hr)	58		58	216	566	23
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (m)	36.0		~18.4	69.8	~323.1	2.9
Queue Length 95th (m)	60.7		#34.7	107.9	#417.0	8.0
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	336		69	1385	1385	1149
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.62		1.10	0.58	1.03	0.09

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 109.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Intersection	
Int Delay, s/veh	8.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	59	886	66	46	459
Future Vol, veh/h	68	59	886	66	46	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	74	64	963	72	50	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1598	999	0	0	1035	0
Stage 1	999	-	-	-	-	-
Stage 2	599	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	295	-	-	672	-
Stage 1	356	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	108	295	-	-	672	-
Mov Cap-2 Maneuver	108	-	-	-	-	-
Stage 1	330	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	106.7	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	153	672	-
HCM Lane V/C Ratio	-	-	0.902	0.074	-
HCM Control Delay (s)	-	-	106.7	10.8	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	6.3	0.2	-

Intersection	
Int Delay, s/veh	20.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	45	58	716	48	78	1311
Future Vol, veh/h	45	58	716	48	78	1311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
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	49	63	778	52	85	1425

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2399	804	0	0	830	0
Stage 1	804	-	-	-	-	-
Stage 2	1595	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 37	383	-	-	802	-
Stage 1	440	-	-	-	-	-
Stage 2	183	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 33	383	-	-	802	-
Mov Cap-2 Maneuver	~ 33	-	-	-	-	-
Stage 1	393	-	-	-	-	-
Stage 2	183	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 449.1	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	68	802	-
HCM Lane V/C Ratio	-	-	1.646	0.106	-
HCM Control Delay (s)	-	-	$ 449.1	10	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	9.8	0.4	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

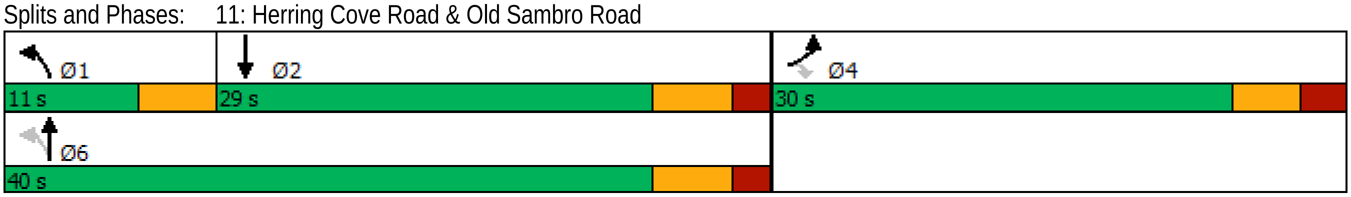
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	142	211	349	762	515	96
Future Volume (vph)	142	211	349	762	515	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.977	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3496	0
Flt Permitted	0.950		0.293			
Satd. Flow (perm)	1789	1601	552	1883	3496	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		229			32	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	154	229	379	828	560	104
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	229	379	828	664	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	11.0	40.0	29.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	10.1	10.1	31.5	29.2	18.0	
Actuated g/C Ratio	0.19	0.19	0.61	0.56	0.35	
v/c Ratio	0.44	0.46	0.75	0.78	0.54	
Control Delay	24.1	6.9	18.2	15.8	14.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	6.9	18.2	15.8	14.6	
LOS	C	A	B	B	B	
Approach Delay	13.8			16.6	14.6	
Approach LOS	B			B	B	
Stops (vph)	114	34	141	525	416	
Fuel Used(l)	8	6	28	65	63	
CO Emissions (g/hr)	144	106	523	1207	1171	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	28	20	101	233	226	
VOC Emissions (g/hr)	33	24	121	278	270	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	13.8	0.0	14.2	50.6	23.3	
Queue Length 95th (m)	28.1	14.1	#43.6	#110.9	39.8	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	848	879	506	1257	1592	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.18	0.26	0.75	0.66	0.42	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 51.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 15.5 Intersection LOS: B
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



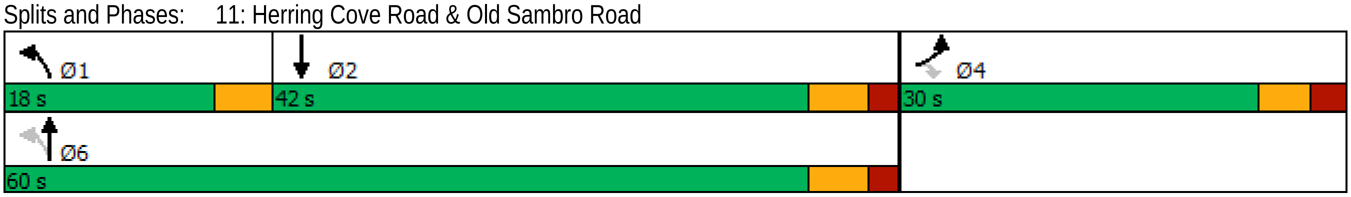
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	167	399	331	714	1094	173
Future Volume (vph)	167	399	331	714	1094	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	25.0	100.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor						
Frt		0.850			0.980	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1789	1601	1789	1883	3507	0
Flt Permitted	0.950		0.101			
Satd. Flow (perm)	1789	1601	190	1883	3507	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		320			23	
Link Speed (k/h)	50			50	50	
Link Distance (m)	189.5			605.5	669.9	
Travel Time (s)	13.6			43.6	48.2	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	182	434	360	776	1189	188
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	434	360	776	1377	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Total Split (s)	30.0	30.0	18.0	60.0	42.0	
Total Lost Time (s)	6.0	6.0	4.0	6.2	6.2	
Act Effct Green (s)	14.4	14.4	56.0	53.8	35.7	
Actuated g/C Ratio	0.18	0.18	0.70	0.67	0.44	
v/c Ratio	0.57	0.79	0.88	0.62	0.88	
Control Delay	37.0	19.9	43.3	11.4	29.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	37.0	19.9	43.3	11.4	29.2	
LOS	D	B	D	B	C	
Approach Delay	25.0			21.5	29.2	
Approach LOS	C			C	C	
Stops (vph)	144	120	183	394	1014	
Fuel Used(l)	11	16	34	56	148	
CO Emissions (g/hr)	204	298	636	1044	2756	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	39	57	123	202	532	
VOC Emissions (g/hr)	47	69	147	241	636	
Dilemma Vehicles (#)	0	0	0	0	0	
Queue Length 50th (m)	25.6	15.6	35.3	54.3	92.4	
Queue Length 95th (m)	43.9	46.8	#99.7	124.6	#168.1	
Internal Link Dist (m)	165.5			581.5	645.9	
Turn Bay Length (m)		25.0	100.0			
Base Capacity (vph)	535	703	411	1264	1579	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.34	0.62	0.88	0.61	0.87	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 80.5
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 76.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Herring Cove Road & Old Sambro Road



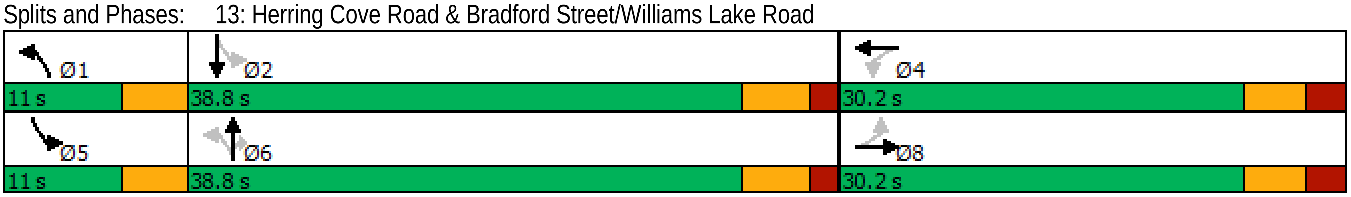
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Future Volume (vph)	3	5	27	131	8	37	49	1018	195	31	626	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.99		1.00	0.98		1.00		0.96		1.00	
Frt		0.872			0.878				0.850		0.999	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1621	0	1789	1624	0	1789	1883	1601	1789	3574	0
Flt Permitted	0.725			0.735			0.356			0.111		
Satd. Flow (perm)	1363	1621	0	1380	1624	0	667	1883	1538	209	3574	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			40				98		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	1		3	3		1	7		10	10		7
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	5	29	142	9	40	53	1107	212	34	680	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	34	0	142	49	0	53	1107	212	34	685	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	38.8	38.8	11.0	38.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	12.9	12.9		12.9	12.9		41.8	38.9	38.9	40.9	36.5	
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.66	0.61	0.61	0.65	0.58	
v/c Ratio	0.01	0.10		0.51	0.14		0.09	0.96	0.22	0.11	0.33	
Control Delay	20.3	10.5		29.4	10.2		6.2	39.4	7.1	6.7	12.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	20.3	10.5		29.4	10.2		6.2	39.4	7.1	6.7	12.0	
LOS	C	B		C	B		A	D	A	A	B	
Approach Delay		11.3			24.5			33.1			11.8	
Approach LOS		B			C			C			B	
Stops (vph)	3	12		105	15		19	595	60	14	345	
Fuel Used(l)	0	1		8	2		3	84	10	2	50	
CO Emissions (g/hr)	3	14		144	28		48	1560	186	42	926	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	0	3		28	5		9	301	36	8	179	
VOC Emissions (g/hr)	1	3		33	7		11	360	43	10	214	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	0.3	0.4		13.0	0.7		1.9	~109.7	4.8	1.2	27.5	
Queue Length 95th (m)	2.1	6.5		31.6	8.1		7.7	#301.8	24.9	5.5	53.0	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	528	645		534	653		566	1155	982	313	2194	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.01	0.05		0.27	0.08		0.09	0.96	0.22	0.11	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 63.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



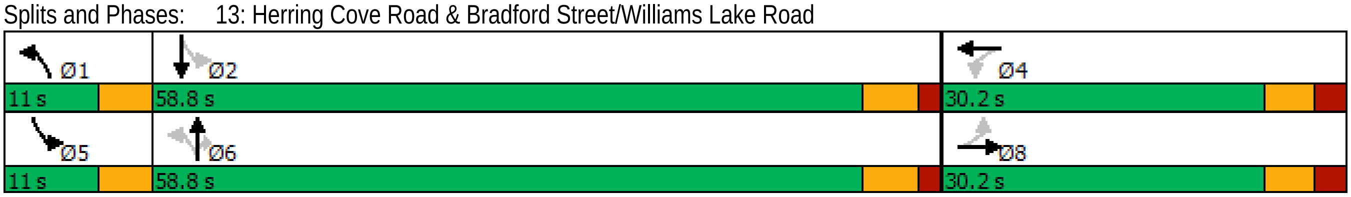
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Future Volume (vph)	37	23	149	160	30	26	95	907	166	68	1426	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	25.0		0.0	25.0		0.0	15.0		25.0	25.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Ped Bike Factor	0.98	0.98		0.99	0.98				0.97		1.00	
Frt		0.870			0.931				0.850			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1599	0	1789	1724	0	1789	1883	1601	1789	3578	0
Flt Permitted	0.717			0.563			0.077			0.077		
Satd. Flow (perm)	1330	1599	0	1048	1724	0	145	1883	1545	145	3578	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		144			28				79			
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		85.4			193.6			410.2			605.5	
Travel Time (s)		6.1			13.9			29.5			43.6	
Confl. Peds. (#/hr)	8		13	13		8	9		6	6		9
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	40	25	162	174	33	28	103	986	180	74	1550	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	187	0	174	61	0	103	986	180	74	1554	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6		6	2		
Total Split (s)	30.2	30.2		30.2	30.2		11.0	58.8	58.8	11.0	58.8	
Total Lost Time (s)	6.2	6.2		6.2	6.2		4.0	5.9	5.9	4.0	5.9	
Act Effct Green (s)	19.2	19.2		19.2	19.2		59.2	52.0	52.0	59.2	52.0	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.64	0.57	0.57	0.64	0.57	
v/c Ratio	0.14	0.42		0.79	0.16		0.47	0.92	0.20	0.33	0.77	
Control Delay	31.8	12.4		61.7	20.0		17.2	36.3	7.3	10.9	20.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	31.8	12.4		61.7	20.0		17.2	36.3	7.3	10.9	20.2	
LOS	C	B		E	C		B	D	A	B	C	
Approach Delay		15.8			50.9			30.6			19.7	
Approach LOS		B			D			C			B	
Stops (vph)	30	42		141	27		37	696	46	24	1060	
Fuel Used(l)	2	4		14	2		6	76	8	5	128	
CO Emissions (g/hr)	35	74		255	46		108	1418	157	93	2384	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	7	14		49	9		21	274	30	18	460	
VOC Emissions (g/hr)	8	17		59	11		25	327	36	22	550	
Dilemma Vehicles (#)	0	0		0	0		0	0	0	0	0	
Queue Length 50th (m)	6.1	6.5		30.8	5.0		5.9	168.5	8.8	4.2	117.6	
Queue Length 95th (m)	14.6	24.1		#60.1	15.0		18.8	#270.9	20.2	10.1	156.3	
Internal Link Dist (m)		61.4			169.6			386.2			581.5	
Turn Bay Length (m)	25.0			25.0			15.0		25.0	25.0		
Base Capacity (vph)	354	532		279	480		221	1107	941	221	2104	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.11	0.35		0.62	0.13		0.47	0.89	0.19	0.33	0.74	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 91.8
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 25.8 Intersection LOS: C
Intersection Capacity Utilization 95.5% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Herring Cove Road & Bradford Street/Williams Lake Road



Intersection	
Int Delay, s/veh	33.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	56	82	1595	773	95
Future Vol, veh/h	51	56	82	1595	773	95
Conflicting Peds, #/hr	0	5	11	0	0	11
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	55	61	89	1734	840	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2815	488	954	0	-	0
Stage 1	903	-	-	-	-	-
Stage 2	1912	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	~ 17	526	718	-	-	-
Stage 1	357	-	-	-	-	-
Stage 2	126	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 15	518	711	-	-	-
Mov Cap-2 Maneuver	~ 15	-	-	-	-	-
Stage 1	309	-	-	-	-	-
Stage 2	125	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 830	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	711	-	15	518	-	-
HCM Lane V/C Ratio	0.125	-	3.696	0.118	-	-
HCM Control Delay (s)	10.8		$ 1727.3	12.9	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	0.4	-	7.7	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection						
Int Delay, s/veh	370.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	68	108	86	1222	1920	244
Future Vol, veh/h	68	108	86	1222	1920	244
Conflicting Peds, #/hr	0	32	65	0	0	65
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	400	450	-	-	-
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	74	117	93	1328	2087	265

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	3799	1273	2417	0	-	0
Stage 1	2285	-	-	-	-	-
Stage 2	1514	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	~ 4	159	195	-	-	-
Stage 1	~ 63	-	-	-	-	-
Stage 2	200	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 2	145	183	-	-	-
Mov Cap-2 Maneuver	~ 2	-	-	-	-	-
Stage 1	~ 29	-	-	-	-	-
Stage 2	188	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 7652.6	2.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	183	-	2	145	-	-
HCM Lane V/C Ratio	0.511	-	36.957	0.81	-	-
HCM Control Delay (s)	43.6	-	$ 19661.8	91.3	-	-
HCM Lane LOS	E	-	F	F	-	-
HCM 95th %tile Q(veh)	2.6	-	11.4	5.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

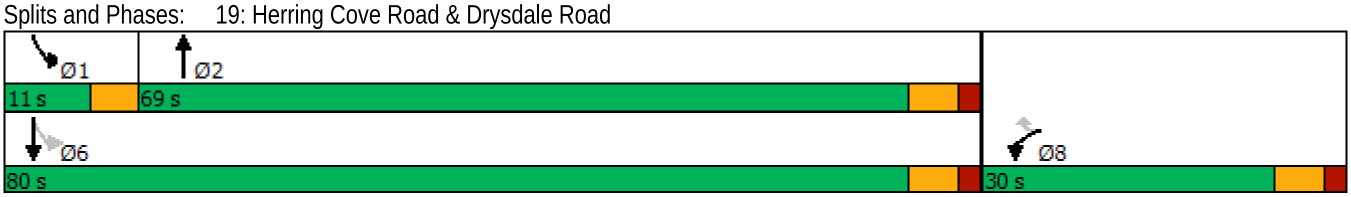
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	337	1235	18	143	605
Future Volume (vph)	44	337	1235	18	143	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.998			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1880	0	1789	3579
Flt Permitted	0.950				0.060	
Satd. Flow (perm)	1789	1601	1880	0	113	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		151	1			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	48	366	1342	20	155	658
Shared Lane Traffic (%)						
Lane Group Flow (vph)	48	366	1362	0	155	658
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	69.0		11.0	80.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	19.4	19.4	63.2		76.2	74.2
Actuated g/C Ratio	0.18	0.18	0.60		0.72	0.70
v/c Ratio	0.15	0.88	1.21		0.81	0.26
Control Delay	36.4	46.7	126.8		50.4	6.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	36.4	46.7	126.8		50.4	6.5
LOS	D	D	F		D	A
Approach Delay	45.5		126.8			14.9
Approach LOS	D		F			B
Stops (vph)	36	192	962		64	208
Fuel Used(l)	2	20	198		16	45
CO Emissions (g/hr)	46	368	3680		292	828

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	9	71	710		56	160
VOC Emissions (g/hr)	11	85	849		67	191
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	8.3	44.7	~357.8		15.9	24.8
Queue Length 95th (m)	18.3	#88.0	#451.3		#52.4	34.9
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	407	481	1125		192	2514
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.12	0.76	1.21		0.81	0.26

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 105.6
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Intersection Signal Delay: 78.6 Intersection LOS: E
Intersection Capacity Utilization 97.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road



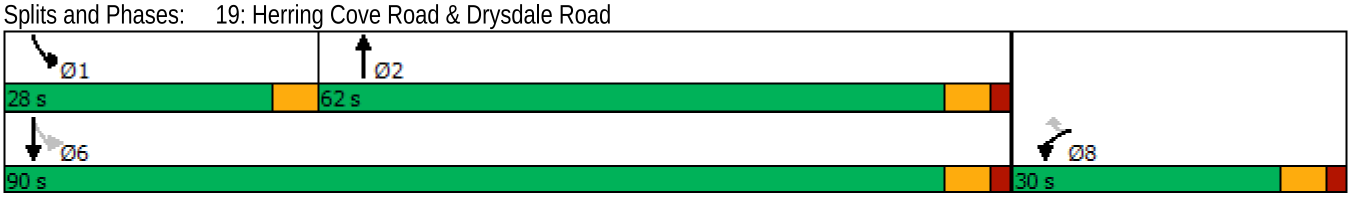
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	38	266	912	56	463	1489
Future Volume (vph)	38	266	912	56	463	1489
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%		0%			0%
Storage Length (m)	25.0	0.0		0.0	100.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	2.5				2.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.992			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1789	1601	1868	0	1789	3579
Flt Permitted	0.950				0.067	
Satd. Flow (perm)	1789	1601	1868	0	126	3579
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		289	3			
Link Speed (k/h)	50		50			50
Link Distance (m)	104.1		454.4			640.5
Travel Time (s)	7.5		32.7			46.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	41	289	991	61	503	1618
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	289	1052	0	503	1618
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Total Split (s)	30.0	30.0	62.0		28.0	90.0
Total Lost Time (s)	6.0	6.0	6.0		4.0	6.0
Act Effct Green (s)	9.2	9.2	56.1		86.1	84.1
Actuated g/C Ratio	0.09	0.09	0.53		0.82	0.80
v/c Ratio	0.26	0.72	1.06		1.04	0.57
Control Delay	48.6	16.0	70.6		85.0	5.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.6	16.0	70.6		85.0	5.1
LOS	D	B	E		F	A
Approach Delay	20.1		70.6			24.0
Approach LOS	C		E			C
Stops (vph)	35	34	792		320	497
Fuel Used(l)	3	7	112		66	108
CO Emissions (g/hr)	48	124	2086		1220	2002

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
NOx Emissions (g/hr)	9	24	403		236	386
VOC Emissions (g/hr)	11	29	481		281	462
Dilemma Vehicles (#)	0	0	0		0	0
Queue Length 50th (m)	8.0	0.0	~230.8		~92.6	45.4
Queue Length 95th (m)	18.2	24.1	#341.6		#172.7	85.2
Internal Link Dist (m)	80.1		430.4			616.5
Turn Bay Length (m)	25.0				100.0	
Base Capacity (vph)	407	588	995		482	2858
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.10	0.49	1.06		1.04	0.57

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 105.3
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 37.7 — Intersection LOS: D
Intersection Capacity Utilization 96.2% — ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: Herring Cove Road & Drysdale Road



Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.4.487 [15039,24/03/2014]

Filename: 182072-Herring Cove Rd-Dentith.arc8
Path: Z:\Harbourside Transportation Consultants\Projects\182072 Herring Cove Road Functional Plan\Project Files\02 Analysis
Report generation date: 25/02/2019 8:55:20 AM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	Herring Cove Rd - Dentith Rd - Existing 2018													
Dentith Road	0.23	~1	2.03	0.19	A	2.24	A	0.64	1.00	3.13	0.39	A	2.87	A
Herring Cove Road (South Leg)	0.53	1.00	2.39	0.35	A			0.51	1.00	2.41	0.34	A		
Herring Cove Rd (North Leg)	0.30	~1	2.15	0.23	A			0.85	~1	3.03	0.46	A		

	Herring Cove Rd - Dentith Rd - Future 2033													
Dentith Road	0.34	~1	2.40	0.25	A			4.11	12.00	14.45	0.81	B		
Herring Cove Road (South Leg)	3.32	5.00	6.82	0.77	A	5.13	A	1.66	2.00	4.27	0.63	A	10.52	B
Herring Cove Rd (North Leg)	0.60	1.00	2.93	0.38	A			6.25	21.00	13.11	0.87	B		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing 2018, AM " model duration: 8:00 AM - 9:30 AM
"D2 - Existing 2018, PM" model duration: 5:00 PM - 6:30 PM
"D3 - Future 2033, AM" model duration: 8:00 AM - 9:30 AM
"D4 - Future 2033, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 25/02/2019 8:55:18 AM

File summary

Title	Herring Cove Rd - Dentith Rd
Location	Halifax, Nova Scotia
Site Number	
Date	21/02/2019
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	hec45
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Herring Cove Rd - Dentith Rd - Existing 2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Herring Cove Rd - Dentith Rd	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Existing 2018, AM	Existing 2018	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Herring Cove Rd - Dentith Rd	Roundabout	1,2,3			2.24	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Dentith Road	1	Dentith Road	
Herring Cove Road (South Leg)	2	Herring Cove Road (South Leg)	
Herring Cove Rd (North Leg)	3	Herring Cove Rd (North Leg)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Dentith Road	0.00	99999.00
Herring Cove Road (South Leg)	0.00	99999.00
Herring Cove Rd (North Leg)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Dentith Road	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Road (South Leg)	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Rd (North Leg)	7.50	8.00	10.00	30.00	50.00	30.00	

Pedestrian Crossings

Name	Crossing Type
Dentith Road	Unsignalled Pedestrian Crossing
Herring Cove Road (South Leg)	Unsignalled Pedestrian Crossing
Herring Cove Rd (North Leg)	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Name	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
Dentith Road	0.00	0.00		Distance	0.00	0.00				
Herring Cove Road (South Leg)	0.00	0.00		Distance	0.00	0.00				
Herring Cove Rd (North Leg)	0.00	0.00		Distance	0.00	0.00				

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Dentith Road		(calculated)	(calculated)	0.754	2442.274
Herring Cove Road (South Leg)		(calculated)	(calculated)	0.754	2442.274
Herring Cove Rd (North Leg)		(calculated)	(calculated)	0.754	2442.274

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Dentith Road	ONE HOUR	✓	372.00	100.000
Herring Cove Road (South Leg)	ONE HOUR	✓	729.00	100.000
Herring Cove Rd (North Leg)	ONE HOUR	✓	464.00	100.000

Pedestrian Flows

General Flows Data

Name	Profile Type	Average Pedestrian Flow (Ped/hr)
Dentith Road	ONE HOUR	0.00
Herring Cove Road (South Leg)	ONE HOUR	0.00
Herring Cove Rd (North Leg)	ONE HOUR	0.00

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.000	207.000	165.000
	Herring Cove Road (South Leg)	308.000	0.000	421.000
	Herring Cove Rd (North Leg)	148.000	316.000	0.000

Turning Proportions (PCE) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.00	0.56	0.44
	Herring Cove Road (South Leg)	0.42	0.00	0.58
	Herring Cove Rd (North Leg)	0.32	0.68	0.00

Vehicle Mix

Average PCE Per Vehicle - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	1.000	1.000	1.000

	Herring Cove Road (South Leg)	1.000	1.000	1.000
	Herring Cove Rd (North Leg)	1.000	1.000	1.000

Truck Percentages - Herring Cove Rd - Dentith Rd (for whole period)

		To		
		Dentith Road	**Herring Cove Road (South Leg)**	**Herring Cove Rd (North Leg)**
From	**Dentith Road**	0.0	0.0	0.0
	Herring Cove Road (South Leg)	0.0	0.0	0.0
	Herring Cove Rd (North Leg)	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Dentith Road	0.19	2.03	0.23	~1	A
Herring Cove Road (South Leg)	0.35	2.39	0.53	1.00	A
Herring Cove Rd (North Leg)	0.23	2.15	0.30	~1	A

Herring Cove Rd - Dentith Rd - Existing 2018, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Herring Cove Rd - Dentith Rd	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Existing 2018, PM	Existing 2018	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Herring Cove Rd - Dentith Rd	Roundabout	1,2,3			2.87	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Dentith Road	1	Dentith Road	
Herring Cove Road (South Leg)	2	Herring Cove Road (South Leg)	
Herring Cove Rd (North Leg)	3	Herring Cove Rd (North Leg)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Dentith Road	0.00	99999.00
Herring Cove Road (South Leg)	0.00	99999.00

Herring Cove Rd (North Leg)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Dentith Road	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Road (South Leg)	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Rd (North Leg)	7.50	8.00	10.00	30.00	50.00	30.00	

Pedestrian Crossings

Name	Crossing Type
Dentith Road	Unsignalled Pedestrian Crossing
Herring Cove Road (South Leg)	Unsignalled Pedestrian Crossing
Herring Cove Rd (North Leg)	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Name	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
Dentith Road	0.00	0.00		Distance	0.00	0.00				
Herring Cove Road (South Leg)	0.00	0.00		Distance	0.00	0.00				

Herring Cove Rd (North Leg)	0.00	0.00		Distance	0.00	0.00				

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Dentith Road		(calculated)	(calculated)	0.754	2442.274
Herring Cove Road (South Leg)		(calculated)	(calculated)	0.754	2442.274
Herring Cove Rd (North Leg)		(calculated)	(calculated)	0.754	2442.274

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Dentith Road	ONE HOUR	✓	672.00	100.000

Herring Cove Road (South Leg)	ONE HOUR	✓	689.00	100.000
Herring Cove Rd (North Leg)	ONE HOUR	✓	917.00	100.000

Pedestrian Flows

General Flows Data

Name	Profile Type	Average Pedestrian Flow (Ped/hr)
Dentith Road	ONE HOUR	0.00
Herring Cove Road (South Leg)	ONE HOUR	0.00
Herring Cove Rd (North Leg)	ONE HOUR	0.00

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
		Dentith Road	**Herring Cove Road (South Leg)**	**Herring Cove Rd (North Leg)**
From	**Dentith Road**	0.000	441.000	231.000
	Herring Cove Road (South Leg)	295.000	0.000	394.000
	Herring Cove Rd (North Leg)	252.000	665.000	0.000

Turning Proportions (PCE) - Herring Cove Rd - Dentith Rd (for whole period)

	To

		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	0.00	0.66	0.34
	Herring Cove Road (South Leg)	0.43	0.00	0.57
	Herring Cove Rd (North Leg)	0.27	0.73	0.00

Vehicle Mix

Average PCE Per Vehicle - Herring Cove Rd - Dentith Rd (for whole period)

	To			
		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	1.000	1.000	1.000
	Herring Cove Road (South Leg)	1.000	1.000	1.000
	Herring Cove Rd (North Leg)	1.000	1.000	1.000

Truck Percentages - Herring Cove Rd - Dentith Rd (for whole period)

	To			
		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	0.0	0.0	0.0
	Herring Cove Road (South Leg)	0.0	0.0	0.0
	Herring Cove Rd (North Leg)	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Dentith Road	0.39	3.13	0.64	1.00	A
Herring Cove Road (South Leg)	0.34	2.41	0.51	1.00	A
Herring Cove Rd (North Leg)	0.46	3.03	0.85	~1	A

Herring Cove Rd - Dentith Rd - Future 2033, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?

Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Herring Cove Rd - Dentith Rd	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Future 2033, AM	Future 2033	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Herring Cove Rd - Dentith Rd	Roundabout	1,2,3			5.13	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Dentith Road	1	Dentith Road	
Herring Cove Road (South Leg)	2	Herring Cove Road (South Leg)	
Herring Cove Rd (North Leg)	3	Herring Cove Rd (North Leg)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Dentith Road	0.00	99999.00
Herring Cove Road (South Leg)	0.00	99999.00
Herring Cove Rd (North Leg)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Dentith Road	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Road (South Leg)	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Rd (North Leg)	7.50	8.00	10.00	30.00	50.00	30.00	

Pedestrian Crossings

Name	Crossing Type
Dentith Road	Unsignalled Pedestrian Crossing

Herring Cove Road (South Leg)	Unsignalled Pedestrian Crossing
Herring Cove Rd (North Leg)	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Name	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
Dentith Road	0.00	0.00		Distance	0.00	0.00				
Herring Cove Road (South Leg)	0.00	0.00		Distance	0.00	0.00				
Herring Cove Rd (North Leg)	0.00	0.00		Distance	0.00	0.00				

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Dentith Road		(calculated)	(calculated)	0.754	2442.274
Herring Cove Road (South Leg)		(calculated)	(calculated)	0.754	2442.274
Herring Cove Rd (North Leg)		(calculated)	(calculated)	0.754	2442.274

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Dentith Road	ONE HOUR	✓	460.00	100.000
Herring Cove Road (South Leg)	ONE HOUR	✓	1615.00	100.000
Herring Cove Rd (North Leg)	ONE HOUR	✓	675.00	100.000

Pedestrian Flows

General Flows Data

Name	Profile Type	Average Pedestrian Flow (Ped/hr)
Dentith Road	ONE HOUR	0.00
Herring Cove Road (South Leg)	ONE HOUR	0.00
Herring Cove Rd (North Leg)	ONE HOUR	0.00

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Herring Cove Rd - Dentith Rd (for whole period)

	To			
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.000	295.000	165.000
	Herring Cove Road (South Leg)	569.000	0.000	1046.000
	Herring Cove Rd (North Leg)	148.000	527.000	0.000

Turning Proportions (PCE) - Herring Cove Rd - Dentith Rd (for whole period)

	To			
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.00	0.64	0.36
	Herring Cove Road (South Leg)	0.35	0.00	0.65
	Herring Cove Rd (North Leg)	0.22	0.78	0.00

Vehicle Mix

Average PCE Per Vehicle - Herring Cove Rd - Dentith Rd (for whole period)

	To			
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	1.000	1.000	1.000
	Herring Cove Road (South Leg)	1.000	1.000	1.000
	Herring Cove Rd (North Leg)	1.000	1.000	1.000

Truck Percentages - Herring Cove Rd - Dentith Rd (for whole period)

		To		
		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	0.0	0.0	0.0
	Herring Cove Road (South Leg)	0.0	0.0	0.0
	Herring Cove Rd (North Leg)	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Dentith Road	0.25	2.40	0.34	~1	A
Herring Cove Road (South Leg)	0.77	6.82	3.32	5.00	A
Herring Cove Rd (North Leg)	0.38	2.93	0.60	1.00	A

Herring Cove Rd - Dentith Rd - Future 2033, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Herring Cove Rd - Dentith Rd	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Future 2033, PM	Future 2033	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Herring Cove Rd - Dentith Rd	Roundabout	1,2,3			10.52	B

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Dentith Road	1	Dentith Road	
Herring Cove Road (South Leg)	2	Herring Cove Road (South Leg)	
Herring Cove Rd (North Leg)	3	Herring Cove Rd (North Leg)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Dentith Road	0.00	99999.00
Herring Cove Road (South Leg)	0.00	99999.00
Herring Cove Rd (North Leg)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Dentith Road	7.50	8.00	10.00	30.00	50.00	30.00	

Herring Cove Road (South Leg)	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Rd (North Leg)	7.50	8.00	10.00	30.00	50.00	30.00	

Pedestrian Crossings

Name	Crossing Type
Dentith Road	Unsignalled Pedestrian Crossing
Herring Cove Road (South Leg)	Unsignalled Pedestrian Crossing
Herring Cove Rd (North Leg)	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Name	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
Dentith Road	0.00	0.00		Distance	0.00	0.00				
Herring Cove Road (South Leg)	0.00	0.00		Distance	0.00	0.00				
Herring Cove Rd (North Leg)	0.00	0.00		Distance	0.00	0.00				

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Dentith Road		(calculated)	(calculated)	0.754	2442.274

Herring Cove Road (South Leg)		(calculated)	(calculated)	0.754	2442.274
Herring Cove Rd (North Leg)		(calculated)	(calculated)	0.754	2442.274

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Dentith Road	ONE HOUR	✓	965.00	100.000
Herring Cove Road (South Leg)	ONE HOUR	✓	1279.00	100.000
Herring Cove Rd (North Leg)	ONE HOUR	✓	1619.00	100.000

Pedestrian Flows

General Flows Data

Name	Profile Type	Average Pedestrian Flow (Ped/hr)

Dentith Road	ONE HOUR	0.00
Herring Cove Road (South Leg)	ONE HOUR	0.00
Herring Cove Rd (North Leg)	ONE HOUR	0.00

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		**Dentith Road**	**Herring Cove Road (South Leg)**	**Herring Cove Rd (North Leg)**
	Dentith Road	0.000	734.000	231.000
	Herring Cove Road (South Leg)	469.000	0.000	810.000
	Herring Cove Rd (North Leg)	252.000	1367.000	0.000

Turning Proportions (PCE) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		**Dentith Road**	**Herring Cove Road (South Leg)**	**Herring Cove Rd (North Leg)**
	Dentith Road	0.00	0.76	0.24
	Herring Cove Road (South Leg)	0.37	0.00	0.63
	Herring Cove Rd (North Leg)	0.16	0.84	0.00

Vehicle Mix

Average PCE Per Vehicle - Herring Cove Rd - Dentith Rd (for whole period)

		To		
		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	1.000	1.000	1.000
	Herring Cove Road (South Leg)	1.000	1.000	1.000
	Herring Cove Rd (North Leg)	1.000	1.000	1.000

Truck Percentages - Herring Cove Rd - Dentith Rd (for whole period)

		To		
		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
From	Dentith Road	0.0	0.0	0.0
	Herring Cove Road (South Leg)	0.0	0.0	0.0
	Herring Cove Rd (North Leg)	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Dentith Road	0.81	14.45	4.11	12.00	B
Herring Cove Road (South Leg)	0.63	4.27	1.66	2.00	A
Herring Cove Rd (North Leg)	0.87	13.11	6.25	21.00	B

Appendix B

MMLOS Analysis

Segment MMLOS Analysis - Interim Conditions (2018)

Segment		1. Armdale Roundabout to Purcells Cove Road		2. Purcells Cove Road to Cowie Hill Road		3. Cowie Hill Road to Highfield Street		4. Highfield Street to Old Sambro Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	≥ 2.0m	1.5m	≥ 2.0m	1.5m	1.8m	1.5m	1.5m	1.8m
	Boulevard Width	0.5 - 2.0m	0m	0.5 - 2.0m	0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Direction PLOS	D	F	D	F	D	E	E	D
	Segment PLOS	**F**		**F**		**E**		**E**	
Cyclist	Travel Lanes	3		2		2		3	
	Type of Bikeway	Physically Separated Bikeway		Physically Separated Bikeway		Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway
	Bike Lane Width	N/A		N/A		≥ 1.8m	≥ 1.8m	N/A	N/A
	Bike Lane and Parking Lane Width	N/A		N/A		N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h		> 50 to 60 km/h		> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Bike Lane Blockages	N/A		N/A		N/A	N/A	N/A	N/A
	Facility BLOS	A		A		A	A	A	A
	Unsignalized Lane Crossings (no median)	≤ 3 lanes		≤ 3 lanes		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A		N/A		N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h		50 km/h		50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B		B		B	B	B	B
	Direction BLOS	B		B		B	B	B	B
	Segment BLOS	**B**		**B**		**B**		**B**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	Low	Low	Medium	Medium	High	High	High	High
	Direction TLOS	D	D	E	E	F	F	F	F
	Segment TLOS	**D**		**E**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	A	A	C	C	C	C	C	C
	Segment TkLOS	**A**		**C**		**C**		**C**	

Segment MMLOS Analysis - Interim Conditions (2018)									
Segment		5. Old Sambro Road to Sussex Street		6. Sussex Street to Greystone Drive		7. Greystone Drive to Lynnett Road		8. Past the Lynnett Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	1.5m	1.5m	1.5m	1.5m	1.5m	1.8m	1.8m	1.8m
	Boulevard Width	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Direction PLOS	E	E	E	E	E	D	E	E
	Segment PLOS	E		E		E		E	
Cyclist	Travel Lanes	3		3		2		2	
	Type of Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	A	A	A	A	A	A	A	A
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	B	B	B	B	B	B	B	B
	Segment BLOS	B		B		B		B	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	High	High	High	High	High	High	High	High
	Direction TLOS	F	F	F	F	F	F	F	F
	Segment TLOS	F		F		F		F	
Truck	Curb Lane Width	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m
	Travel Lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	C	C	C	C	C	C	C	C
	Segment TkLOS	C		C		C		C	

Segment MMLOS Analysis - Ultimate Conditions (2033)									
Segment		1. Armdale Roundabout to Purcells Cove Road		2. Purcells Cove Road to Cowie Hill Road		3. Cowie Hill Road to Highfield Street		4. Highfield Street to Old Sambro Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	≥ 2.0m	1.5m	≥ 2.0m	1.8m	1.8m	1.8m	1.8m	1.8m
	Boulevard Width	0.5 - 2.0m	0m	0.5 - 2.0m	0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Direction PLOS	D	F	D	F	D	D	D	D
	Segment PLOS	**F**		**F**		**D**		**D**	
Cyclist	Travel Lanes	4		2		2		3	
	Type of Bikeway	Physically Separated Bikeway		Physically Separated Bikeway		Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway
	Bike Lane Width	N/A		N/A		N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A		N/A		N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h		> 50 to 60 km/h		> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h
	Bike Lane Blockages	N/A		N/A		N/A	N/A	N/A	N/A
	Facility BLOS	A		A		A	A	A	A
	Unsignalized Lane Crossings (no median)	≤ 3 lanes		≤ 3 lanes		≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A		N/A		N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h		50 km/h		50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B		B		B	B	B	B
	Direction BLOS	B		B		B	B	B	B
	Segment BLOS	**B**		**B**		**B**		**B**	
Transit	Facility Type	Bus Lane	Mixed Traffic	Bus Lane	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	Friction	Low	Low	Low	Medium	High	High	High	High
	Direction TLOS	B	D	B	E	F	F	F	F
	Segment TLOS	**D**		**E**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.3m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	C	A	C	C	C	C	C	C
	Segment TkLOS	**C**		**C**		**C**		**C**	

Segment MMLOS Analysis - Ultimate Conditions (2033)									
Segment		5. Old Sambro Road to Sussex Street		6. Sussex Street to Greystone Drive		7. Greystone Drive to Lynnett Road		8. Past the Lynnett Road	
		Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Pedestrian	Sidewalk Width	1.8m	1.8m	1.8m	1.8m	1.8m	1.8m	1.8m	1.8m
	Boulevard Width	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m	> 2.0m
	AADT	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd	> 3000 vpd
	On-Street Parking	No	No	No	No	No	No	No	No
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Direction PLOS	D	D	D	D	D	D	E	E
	Segment PLOS	**D**		**D**		**D**		**E**	
Cyclist	Travel Lanes	4		4		2		2	
	Type of Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Physically Separated Bikeway	Mixed Traffic	Physically Separated Bikeway
	Bike Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bike Lane and Parking Lane Width	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Operating Speed	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 50 to 60 km/h	> 60 km/h	> 60 km/h
	Bike Lane Blockages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Facility BLOS	A	A	A	A	A	A	A	A
	Unsignalized Lane Crossings (no median)	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes	≤ 3 lanes
	Unsignalized Lane Crossings (median ≥ 1.8m)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Side Street Operating Speed	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h	50 km/h
	Unsignalized Crossings BLOS	B	B	B	B	B	B	B	B
	Direction BLOS	B	B	B	B	B	B	B	B
	Segment BLOS	**B**		**B**		**B**		**B**	
Transit	Facility Type	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic	Mixed Traffic
	Congestion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Friction	High	High	High	High	High	High	High	High
	Direction TLOS	F	F	F	F	F	F	F	F
	Segment TLOS	**F**		**F**		**F**		**F**	
Truck	Curb Lane Width	≤ 3.5m	≤ 3.3m	≤ 3.5m	≤ 3.3m	≤ 3.5m	≤ 3.5m	≤ 3.5m	≤ 3.5m
	Travel Lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≥ 3 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes	≤ 2 lanes
	Direction TkLOS	A	C	A	C	C	C	C	C
	Segment TkLOS	**C**		**C**		**C**		**C**	

Signalized Intersection MMLOS Analysis - Interim Conditions (2018)							
Intersection		Herring Cove Road & Cowie Hill Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Cowie Hill Road	Points
Pedestrian	Travel Lanes Crossed			3	105	3	105
	Median (>2.4 m)			No		No	
	Island Refuge			No	-4	Yes	0
	Left Turn Conflict			No left turn/prohibited	0	Permissive	-8
	Right Turn Conflict			Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red			N/A	0	RTOR allowed	-3
	Leading Pedestrian Interval			No	-2	No	-2
	Corner Radius			No right turn	0	> 5m to 10m	-5
	Channelization			No right turn	0	None	0
	Crosswalk Treatment			Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score			87		75	
	PETSI PLOS	-		B		B	
	Cycle Length	65					
	Pedestrian Green Time (Walk Time)	-		20		20	
	Average Pedestrian Crossing Delay (s)	-		16		16	
	Delay PLOS	-		B		B	
	Approach PLOS	-		B		B	
	Overall Intersection PLOS	**B**					
Cyclist	Type of Bikeway			Bike lanes		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	> 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	25 to 50m		N/A		N/A	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	No		N/A		Yes	
	Right-Turns BLOS	-		-		-	
	Two-Stage Left Turn Bike Box	N/A		No		No	
	Number of Lanes Crossed for Left Turns	N/A		No lanes		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		B		B	
	Approach BLOS	-		B		B	
	Overall Intersection BLOS	**B**					
Transit	AM Average Signal Delay	≤ 10 sec		≤ 20 sec		≤ 20 sec	
	AM Approach TLOS	B		C		C	
	PM Average Signal Delay	≤ 20 sec		≤ 20 sec		≤ 20 sec	
	PM Approach TLOS	C		C		C	
	Overall Intersection TLOS	**C**					
Truck	Effective Corner Radius	> 15m		N/A		10 - 15m	
	Number of Receiving Lanes	1 lane		N/A		1 lane	
	Approach TkLOS	C		-		E	
	Overall Intersection TkLOS	**E**					
Auto	AM Approach LOS	A		B		B	
	AM Intersection LOS	A					
	PM Approach LOS	B		B		B	
	PM Intersection LOS	B					
	Overall Intersection LOS	**B**					

Signalized Intersection MMLOS Analysis - Interim Conditions (2018)							
Intersection		**Herring Cove Road & Old Sambro Road**					
Approach		**North (SB)**		**South (NB)**		**West (EB)**	
		Herring Cove Road	**Points**	**Herring Cove Road**	**Points**	**Old Sambro Road**	**Points**
Pedestrian	Travel Lanes Crossed	3	105	4	88	3	105
	Median (>2.4 m)	No		No		No	
	Island Refuge	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	No right turn/prohibited	0	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	N/A	0	RTOR prohibited	0
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 5m to 10m	-5
	Channelization	None	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	75		70		74	
	PETSI PLOS	B		C		C	
	Cycle Length			90			
	Pedestrian Green Time (Walk Time)	22		22		24	
	Average Pedestrian Crossing Delay (s)	26		26		24	
	Delay PLOS	C		C		C	
	Approach PLOS	C		C		C	
	Overall Intersection PLOS			**C**			
Cyclist	Type of Bikeway	Bike lanes		Bike lanes		Bike lanes	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		25 to 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		-	
	Two-Stage Left Turn Bike Box	N/A		Yes		No	
	Number of Lanes Crossed for Left Turns	N/A		No lanes		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		A		B	
	Approach BLOS			A		B	
	Overall Intersection BLOS			**B**			
Transit	AM Average Signal Delay	≤ 30 sec		≤ 10 sec		N/A	
	AM Approach TLOS	D		B		-	
	PM Average Signal Delay	≤ 40 sec		≤ 20 sec		N/A	
	PM Approach TLOS	E		C		-	
	Overall Intersection TLOS			**E**			
Truck	Effective Corner Radius	10 - 15m		N/A		10 - 15m	
	Number of Receiving Lanes	1 lane		N/A		1 lane	
	Approach TkLOS	E		-		E	
	Overall Intersection TkLOS			**E**			
Auto	AM Approach LOS	C		A		B	
	AM Intersection LOS			B			
	PM Approach LOS	C		B		B	
	PM Intersection LOS			C			
	Overall Intersection LOS			**C**			

Signalized Intersection MMLOS Analysis - Interim Conditions (2018)										
Intersection		Herring Cove Road & Willams Lake Road								
Approach		North (SB)		South (NB)		East (WB)		West (EB)		
		Herring Cove Road	Points	Herring Cove Road	Points	Williams Lake Road	Points	Bradford Street	Points
Pedestrian	Travel Lanes Crossed	3	105	3	105	2	120	3	105
	Median (>2.4 m)	No		No		No		No	
	Island Refuge	No	-4	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR prohibited	0	RTOR prohibited	0
	Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
	Corner Radius	> 5m to 10m	-5	> 5m to 10m	-5	> 10m to 15m	-6	> 10m to 15m	-6
	Channelization	None	0	None	0	None	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	71		71		88		73	
	PETSI PLOS	C		C		B		C	
	Cycle Length	90							
	Pedestrian Green Time (Walk Time)	20		20		24		24	
	Average Pedestrian Crossing Delay (s)	27		27		24		24	
	Delay PLOS	C		C		C		C	
	Approach PLOS	C		C		C		C	
	Overall Intersection PLOS	**C**							
Cyclist	Type of Bikeway	Bike lanes		Bike lanes		Bike lanes		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		N/A		N/A	
	Dual Right Turn	No		No		No		No	
	Shared Through-Right	Yes		Yes		Yes		Yes	
	Right-Turns BLOS	-		-		-		-	
	Two-Stage Left Turn Bike Box	Yes		No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		No lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h		50 km/h	
	Dual Left Turn	No		No		No		No	
	Left-Turns BLOS	A		C		B		D	
	Approach BLOS	A		C		B		D	
	Overall Intersection BLOS	**D**							
Transit	AM Average Signal Delay	≤ 20 sec		≤ 20 sec		N/A		N/A	
	AM Approach TLOS	C		C		-		-	
	PM Average Signal Delay	≤ 30 sec		≤ 20 sec		N/A		N/A	
	PM Approach TLOS	D		C		-		-	
	Overall Intersection TLOS	**D**							
Truck	Effective Corner Radius	10 - 15m		< 10m		> 15m		> 15m	
	Number of Receiving Lanes	1 lane		1 lane		1 lane		1 lane	
	Approach TkLOS	E		F		C		C	
	Overall Intersection TkLOS	**F**							
Auto	AM Approach LOS	B		B		C		A	
	AM Intersection LOS	B							
	PM Approach LOS	C		B		D		B	
	PM Intersection LOS	C							
	Overall Intersection LOS	**C**							

Signalized Intersection MMLOS Analysis - Interim Conditions (2018)							
Intersection		Herring Cove Road & Dentith Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Dentith Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	88	4	88
	Median (>2.4 m)	Yes		No		No	
	Island Refuge	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR prohibited	0
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 5m to 10m	-5	No right turn	0	> 5m to 10m	-5
	Channelization	None	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	71		67		57	
	PETSI PLOS	C		C		D	
	Cycle Length			90			
	Pedestrian Green Time (Walk Time)	22		22		24	
	Average Pedestrian Crossing Delay (s)	26		26		24	
	Delay PLOS	C		C		C	
	Approach PLOS	C		C		D	
	Overall Intersection PLOS			**D**			
Cyclist	Type of Bikeway	Bike lanes		Bike lanes		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	25 to 50m		N/A		> 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	No		N/A		No	
	Right-Turns BLOS	-		-		F	
	Two-Stage Left Turn Bike Box	No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		No lanes		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		B		B	
	Approach BLOS	-		B		F	
	Overall Intersection BLOS			**F**			
Transit	AM Average Signal Delay	≤ 20 sec		≤ 20 sec		≤ 20 sec	
	AM Approach TLOS	C		C		C	
	PM Average Signal Delay	≤ 30 sec		≤ 30 sec		≤ 30 sec	
	PM Approach TLOS	D		D		D	
	Overall Intersection TLOS			**D**			
Truck	Effective Corner Radius	< 10m		N/A		< 10m	
	Number of Receiving Lanes	≥ 2 lanes		N/A		1 lane	
	Approach TkLOS	D		-		F	
	Overall Intersection TkLOS			**F**			
Auto	AM Approach LOS	B		B		B	
	AM Intersection LOS			B			
	PM Approach LOS	C		C		C	
	PM Intersection LOS			C			
	Overall Intersection LOS			**C**			

Signalized Intersection MMLOS Analysis - Ultimate Conditions (2033)							
Intersection		**Herring Cove Road & Cowie Hill Road**					
Approach		**North (SB)**		**South (NB)**		**West (EB)**	
		Herring Cove Road	**Points**	**Herring Cove Road**	**Points**	**Cowie Hill Road**	**Points**
Pedestrian	Travel Lanes Crossed			3	105	2	120
	Median (>2.4 m)			No		No	
	Island Refuge			No	-4	No	-4
	Left Turn Conflict			No left turn/prohibited	0	Permissive	-8
	Right Turn Conflict			Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red			N/A	0	RTOR allowed	-3
	Leading Pedestrian Interval			No	-2	No	-2
	Corner Radius			No right turn	0	> 3m to 5m	-4
	Channelization			No right turn	0	None	0
	Crosswalk Treatment			Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score			87		87	
	PETSI PLOS	-		B		B	
	Cycle Length	110					
	Pedestrian Green Time (Walk Time)	-		20		20	
	Average Pedestrian Crossing Delay (s)	-		37		37	
	Delay PLOS	-		D		D	
	Approach PLOS	-		D		D	
	Overall Intersection PLOS	**D**					
Cyclist	Type of Bikeway			Bike lanes		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		N/A	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	No		N/A		Yes	
	Right-Turns BLOS	-		-		-	
	Two-Stage Left Turn Bike Box	N/A		No		No	
	Number of Lanes Crossed for Left Turns	N/A		No lanes		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		B		B	
	Approach BLOS	-		B		B	
	Overall Intersection BLOS	**B**					
Transit	AM Average Signal Delay	≤ 10 sec		≤ 20 sec		≤ 30 sec	
	AM Approach TLOS	B		C		D	
	PM Average Signal Delay	≤ 10 sec		> 40 sec		> 40 sec	
	PM Approach TLOS	B		F		F	
	Overall Intersection TLOS	**F**					
Truck	Effective Corner Radius	> 15m		N/A		10 - 15m	
	Number of Receiving Lanes	1 lane		N/A		≥ 2 lanes	
	Approach TkLOS	C		-		B	
	Overall Intersection TkLOS	**C**					
Auto	AM Approach LOS	A		B		C	
	AM Intersection LOS	B					
	PM Approach LOS	D		C		D	
	PM Intersection LOS	D					
	Overall Intersection LOS	**D**					

Signalized Intersection MMLOS Analysis - Ultimate Conditions (2033)							
Intersection		Herring Cove Road & Old Sambro Road					
Approach		North (SB)		South (NB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Old Sambro Road	Points
Pedestrian	Travel Lanes Crossed	3	105	4	88	3	105
	Median (>2.4 m)	No		No		No	
	Island Refuge	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	No left turn/prohibited	0	Protected/permissive	-8
	Right Turn Conflict	No right turn/prohibited	0	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	N/A	0	RTOR prohibited	0
	Leading Pedestrian Interval	No	-2	No	-2	No	-2
	Corner Radius	> 10m to 15m	-6	No right turn	0	> 10m to 15m	-6
	Channelization	None	0	No right turn	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	75		70		73	
	PETSI PLOS	B		C		C	
	Cycle Length			90			
	Pedestrian Green Time (Walk Time)	22		22		24	
	Average Pedestrian Crossing Delay (s)	26		26		24	
	Delay PLOS	C		C		C	
	Approach PLOS	C		C		C	
	Overall Intersection PLOS			**C**			
Cyclist	Type of Bikeway	Bike lanes		Bike lanes		Bike lanes	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		N/A		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		25 to 50m	
	Dual Right Turn	No		N/A		No	
	Shared Through-Right	Yes		N/A		No	
	Right-Turns BLOS	-		-		-	
	Two-Stage Left Turn Bike Box	N/A		Yes		No	
	Number of Lanes Crossed for Left Turns	N/A		N/A		No lanes	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h	
	Dual Left Turn	N/A		No		No	
	Left-Turns BLOS	-		A		B	
	Approach BLOS	-		A		B	
	Overall Intersection BLOS			**B**			
Transit	AM Average Signal Delay	≤ 20 sec		≤ 20 sec		N/A	
	AM Approach TLOS	C		C		-	
	PM Average Signal Delay	≤ 30 sec		≤ 30 sec		N/A	
	PM Approach TLOS	D		D		-	
	Overall Intersection TLOS			**D**			
Truck	Effective Corner Radius	10 - 15m		N/A		> 15m	
	Number of Receiving Lanes	1 lane		N/A		≥ 2 lanes	
	Approach TkLOS	E		-		A	
	Overall Intersection TkLOS			**E**			
Auto	AM Approach LOS	B		B		B	
	AM Intersection LOS			B			
	PM Approach LOS	C		C		C	
	PM Intersection LOS			C			
	Overall Intersection LOS			**C**			

Signalized Intersection MMLOS Analysis - Ultimate Conditions (2033)									
Intersection		Herring Cove Road & Willams Lake Road							
Approach		North (SB)		South (NB)		East (WB)		West (EB)	
		Herring Cove Road	Points	Herring Cove Road	Points	Williams Lake Road	Points	Bradford Street	Points
Pedestrian	Travel Lanes Crossed	4	88	5	72	3	105	3	105
	Median (>2.4 m)	No		No		No		No	
	Island Refuge	No	-4	No	-4	No	-4	No	-4
	Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Protected/permissive	-8
	Right Turn Conflict	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5	Permissive or yield control	-5
	Right Turn on Red	RTOR allowed	-3	RTOR allowed	-3	RTOR prohibited	0	RTOR prohibited	0
	Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
	Corner Radius	> 5m to 10m	-5	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6
	Channelization	None	0	None	0	None	0	None	0
	Crosswalk Treatment	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7	Standard transverse markings	-7
	PETSI Score	54		37		73		73	
	PETSI PLOS	D		E		C		C	
	Cycle Length	100							
	Pedestrian Green Time (Walk Time)	20		20		24		24	
	Average Pedestrian Crossing Delay (s)	32		32		29		29	
	Delay PLOS	D		D		C		C	
	Approach PLOS	D		E		C		C	
	Overall Intersection PLOS	E							
Cyclist	Type of Bikeway	Bike lanes		Bike lanes		Bike lanes		Mixed traffic	
	Turning Speed of Right-Turning Vehicles	≤ 25 km/h		≤ 25 km/h		≤ 25 km/h		≤ 25 km/h	
	Right Turn Storage Length	N/A		N/A		N/A		N/A	
	Dual Right Turn	No		No		No		No	
	Shared Through-Right	Yes		Yes		Yes		Yes	
	Right-Turns BLOS	-		-		-		-	
	Two-Stage Left Turn Bike Box	Yes		No		No		No	
	Number of Lanes Crossed for Left Turns	N/A		1 lane		No lanes		1 lane	
	Operating Speed on Approach	50 km/h		50 km/h		50 km/h		50 km/h	
	Dual Left Turn	No		No		No		No	
	Left-Turns BLOS	A		C		B		D	
	Approach BLOS	A		C		B		D	
	Overall Intersection BLOS	D							
Transit	AM Average Signal Delay	≤ 20 sec		≤ 40 sec		≤ 30 sec		N/A	
	AM Approach TLOS	C		E		D		-	
	PM Average Signal Delay	≤ 20 sec		≤ 40 sec		> 40 sec		N/A	
	PM Approach TLOS	C		E		F		-	
	Overall Intersection TLOS	F							
Truck	Effective Corner Radius	< 10m		10 - 15m		10 - 15m		10 - 15m	
	Number of Receiving Lanes	1 lane		1 lane		1 lane		≥ 2 lanes	
	Approach TkLOS	F		E		E		B	
	Overall Intersection TkLOS	F							
Auto	AM Approach LOS	B		C		C		B	
	AM Intersection LOS	C							
	PM Approach LOS	B		C		D		B	
	PM Intersection LOS	C							
	Overall Intersection LOS	C							

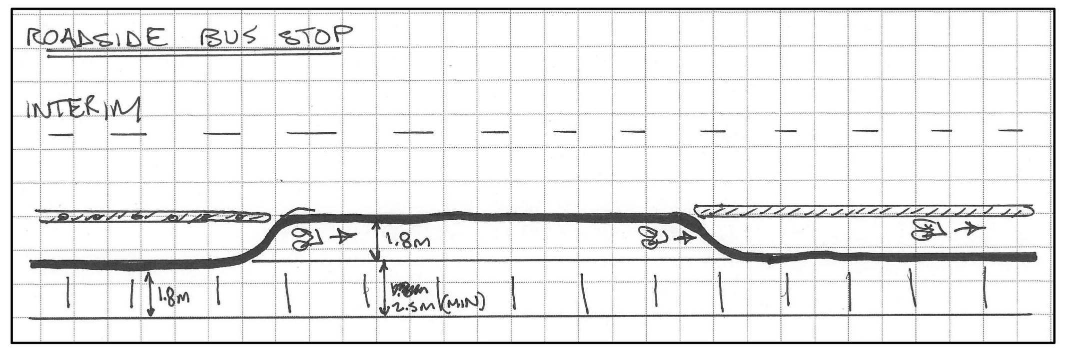
Bus Stops Detail Drawing list	
SK-1A	Mid-block bus stop, interim
SK-1B	Mid-block bus stop, ultimate
SK-2A	Mid-block bus stop, former lay-by, interim
SK-2B	Mid-block bus stop, former lay-by, ultimate
SK-3A	Far-side bus stop, former lay-by, interim (unsignalized)
SK-3B	Far-side bus stop, former lay-by, ultimate (unsignalized)
SK-4A	Near-side bus stop, former lay-by, interim
SK-4B	Near-side bus stop, former lay-by, ultimate
SK-5	Mid-block bus stop, multi-use pathway
SK-7	Mid-block lay-by, interim
SK-8	Far-side lay-by, interim (signalized)
SK-9	Near-side lay-by, ultimate
HRM STD	Standard HRM bus stop adjacent to sidewalk

Criteria for providing a lay-by (any of the following):
- used as a timepoint
- part of a queue jump
- far-side bus stop at signalized intersection with single travel lane

TRANSIT STOP DETAILS		EXISTING		INTERIM				ULTIMATE				
Outbound from downtown Halifax	**Type**	**Time-Point**	**Lay-by**	**Type**	**Time-Point**	**Lay-by**	**Queue jump**	**Type**	**Time-Point**	**Lay-by**	**Queue jump**	**Notes**
Herring Cove Rd Before Melwood Ave (6901)	Mid-block			HRM STD				HRM STD				
Herring Cove Rd After Withrod Dr (6868)	Mid-block			HRM STD				HRM STD				
Herring Cove Rd Before Winchester Ave (6844)	Mid-block			HRM STD				HRM STD				
Herring Cove Rd After Cowie Hill Rd (6856)	Far-side lay-by signalized (non-standard)		YES	SK-8		YES	YES	SK-8		YES	YES	Cowie Hill intersection reconfigured for queue jumps
Herring Cove Rd After Brighton Ave (6850)	Far-side lay-by unsignalized (non-standard)		YES	SK-1A				SK-3B				
Herring Cove Rd Before Shoreham Ln (6869)	Mid-block lay-by		YES	SK-2A				SK-2B				
Herring Cove Rd After Highfield St (6848)	Mid-block			SK-1A				SK-1B				
Herring Cove Rd Before Mont St (6871)	Mid-block lay-by	YES	YES	SK-7	YES	YES		SK-7	YES	YES		Lay-by maintained to be used as time-point
Herring Cove Rd After Catamaran Rd (6852)	Far-side lay-by unsignalized		YES	SK-3A				SK-3B				
Herring Cove Rd After Spry Ave (6845)	Far-side lay-by unsignalized		YES	SK-3A				SK-3B				
Herring Cove Rd After Williams Lake Rd (6905)	Far-side lay-by signalized		YES	SK-8		YES		SK-1B				Lay-by maintained in interim to avoid blocking intersection. Lay-by removed in ultimate for second southbound lane
Herring Cove Rd Before Dentith Rd (6853)	Mid-block			SK-1B				SK-2B				Relocated slightly south in ultimate
Herring Cove Rd After Dentith Rd (6857)	Mid-block lay-by	YES	YES	SK-5		YES	YES	SK-5				Stretch between Dentith and Sussex preserved in interim for time-point and queue jump.
Herring Cove Rd Before Levis St (6907)	Mid-block lay-by		YES	SK-2A				SK-2B				
Herring Cove Rd Before Civic 427 (6892)	Mid-block lay-by		YES	SK-7	YES	YES		SK-7	YES	YES		In ultimate, time-point from Dentith shifts to this stop
Herring Cove Rd After Drysdale Rd (6874)	Mid-block lay-by		YES	SK-2A				SK-2B				
Herring Cove Rd Before Greystone Dr (6897)	Mid-block			SK-1A				SK-1B				
Herring Cove Rd Before Lynnett Rd (6898)	Mid-block							SK-1B				No interim design for this segment
Herring Cove Rd After McIntosh St (6915)	Mid-block							SK-1B				No interim design for this segment

TRANSIT STOP DETAILS		EXISTING		INTERIM				ULTIMATE				
Inbound to downtown Halifax	**Type**	**Time-Point**	**Lay-by**	**Type**	**Time-Point**	**Lay-by**	**Queue jump**	**Type**	**Time-Point**	**Lay-by**	**Queue jump**	
Herring Cove Rd Before McIntosh St (6899)	Mid-block lay-by (non-standard)		YES					SK-1B				No interim design for this segment
Herring Cove Rd After Lynnett Rd (6849)	Mid-block							SK-1B				No interim design for this segment
Herring Cove Rd Before Sylvia Ave (6904)	Near-side lay-by unsignalized		YES	SK-4A				SK-4B				
Herring Cove Rd After Auburn Ave (6875)	Mid-block			SK-1A				SK-1B				
Herring Cove Rd After Drysdale Rd (6858)	Far-side lay-by unsignalized		YES	SK-3A				SK-8		YES		Lay-by in ultimate so that bus does not block signalized intersection
Herring Cove Rd At Civic 412 (6873)	Mid-block lay-by		YES	SK-2A				SK-2B				
Herring Cove Rd After Levis St (6864)	Mid-block lay-by		YES	SK-7	YES	YES		SK-7	YES	YES		In ultimate, with roundabout, time-point at Dentith shifts to this location
Herring Cove Rd Before Dentith Rd (6866)	Mid-block lay-by	YES	YES	SK-7		YES		SK-1B				Time-point maintained in interim, but moved in ultimate because of roundabout
Herring Cove Rd After Hartlen Ave (6863)	Far-side lay-by unsignalized		YES	SK-3A				SK-3B				
Herring Cove Rd After Williams Lake Rd (6867)	Far-side lay-by signalized		YES	SK-8		YES		SK-8		YES	YES	Lay-by in interim so that bus does not block signalized intersection. Lay-by in ultimate to accommodate queue jump
Herring Cove Rd Before Circle Dr (6890)	Near-side lay-by unsignalized		YES	SK-9	YES	YES		SK-9	YES	YES		Time-point before Old Sambro moved to this stop to accommodate queue jump at Old Sambro
Herring Cove Rd At Civic 236 (6872)	Mid-block lay-by	YES	YES	*		YES	YES	*		YES	YES	Intersection reconfigured with queue jump and farside bus stop
Herring Cove Rd After McMullen Rd (6870)	Mid-block lay-by (non-standard)		YES	SK-1A				SK-1B				
Herring Cove Rd Before Highfield St (6891)	Mid-block lay-by (non-standard)			SK-1A				SK-1B				
Herring Cove Rd After Glenora Ave (6860)	Mid-block			SK-1A				SK-1B				
Herring Cove Rd After Shoreham Ln (6909)	Mid-block			SK-1A				SK-1B				
Herring Cove Rd At Winchester Ave (6906)	Far-side lay-by signalized		YES	SK-5		YES		SK-5		YES	YES	Lay-by provided in interim to avoid blocking signalized intersection. In ultimate, intersection reconfigured with queue jump
Herring Cove Rd Opposite Maplewood Dr (6910)	Mid-block			SK-5				SK-5				
Herring Cove Rd Before Melwood Ave (6900)	Mid-block			SK-5				SK-5				
Herring Cove Rd Before Purcells Cove Rd (6903)	Mid-block			SK-5				SK-5				

unique design, dependent on intersection configuration



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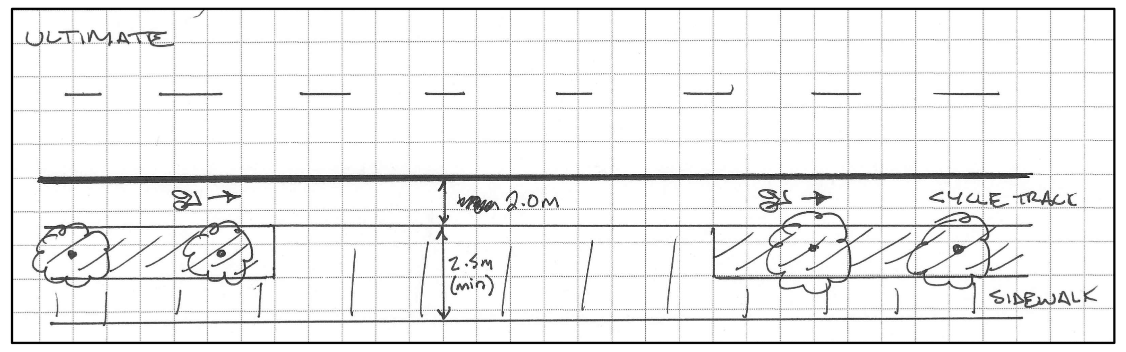

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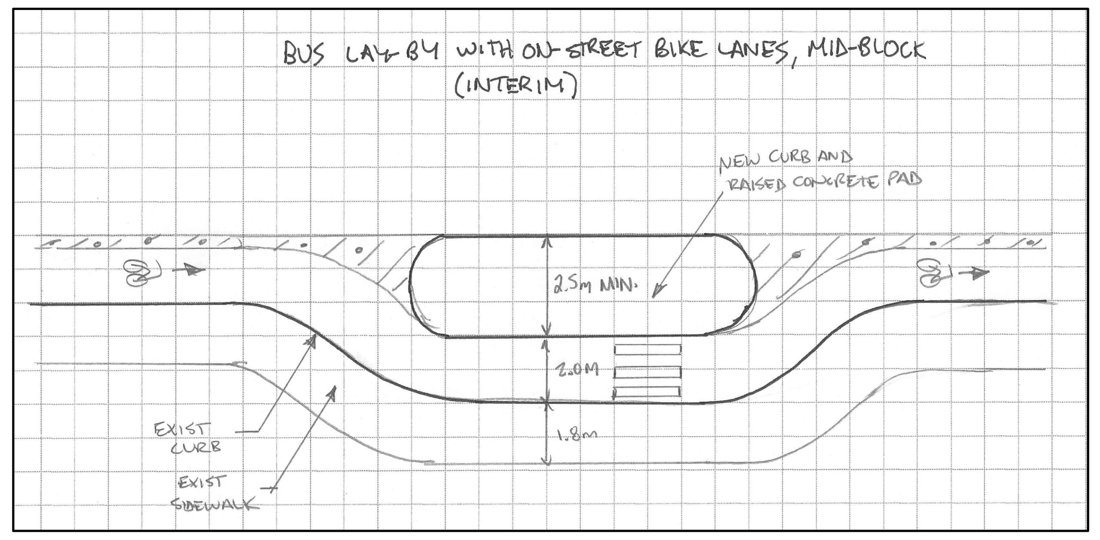

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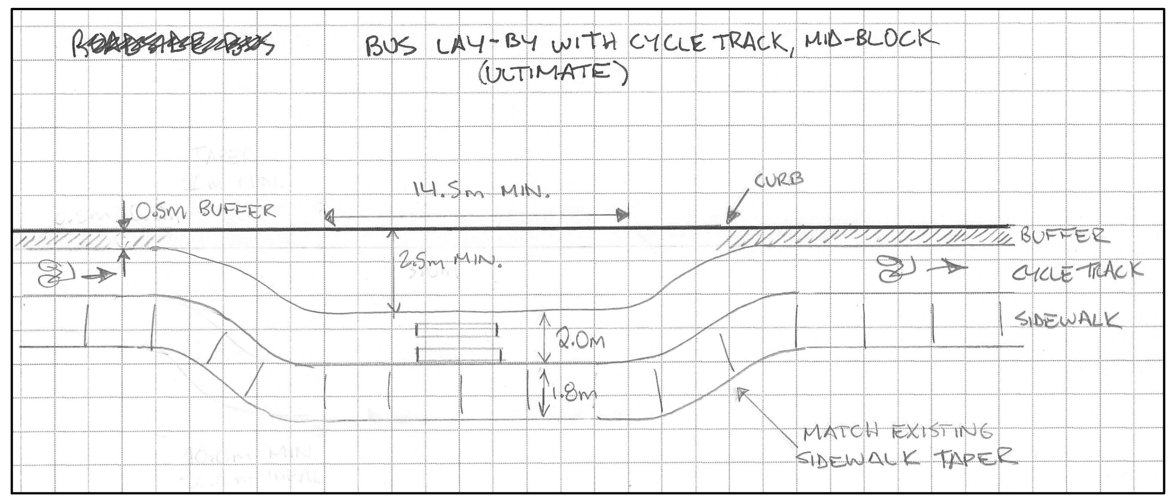

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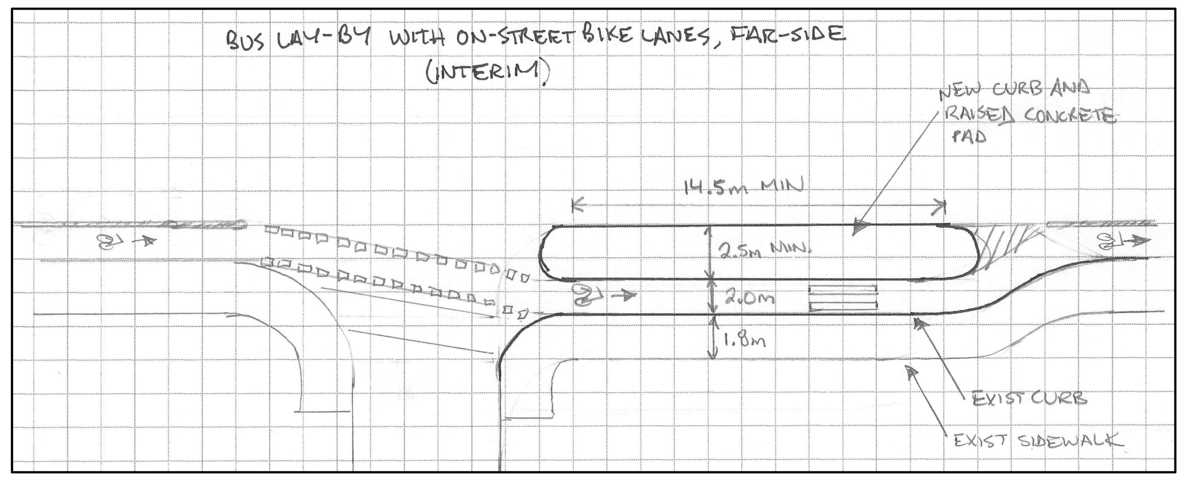

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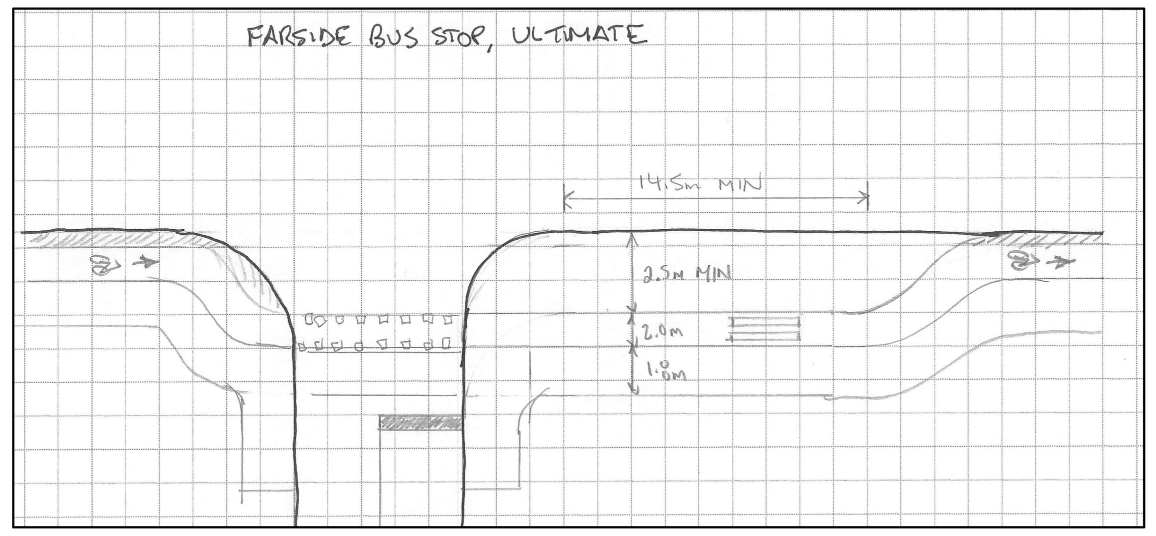

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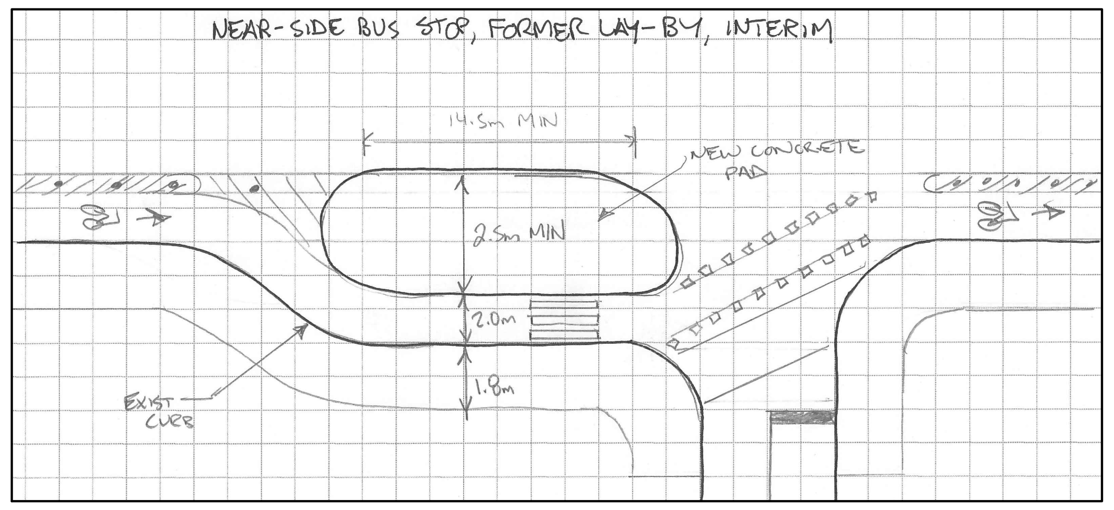

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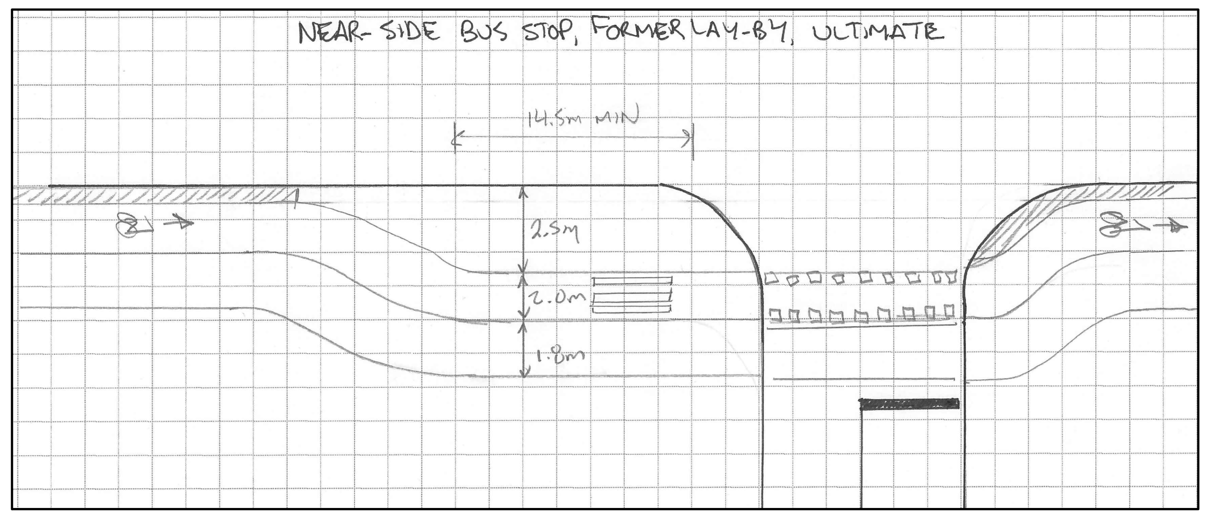

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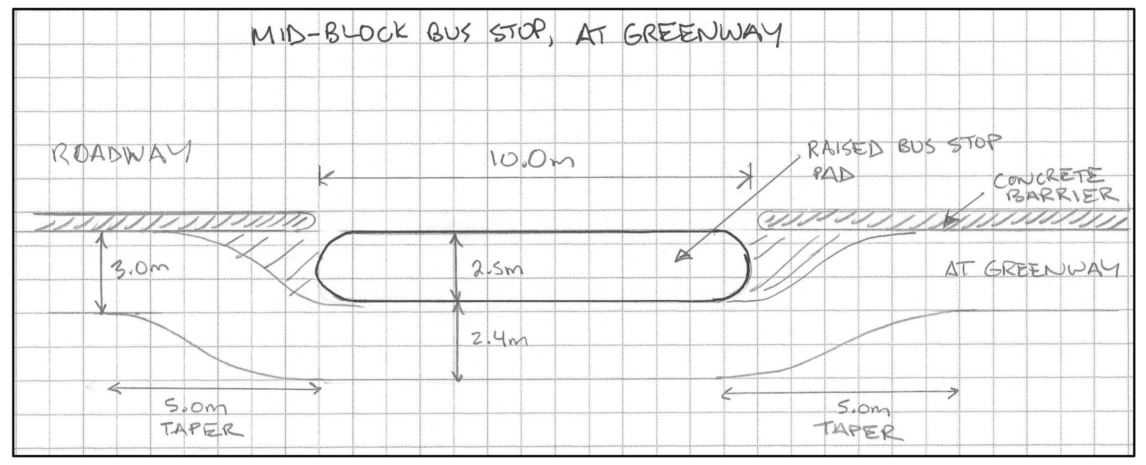

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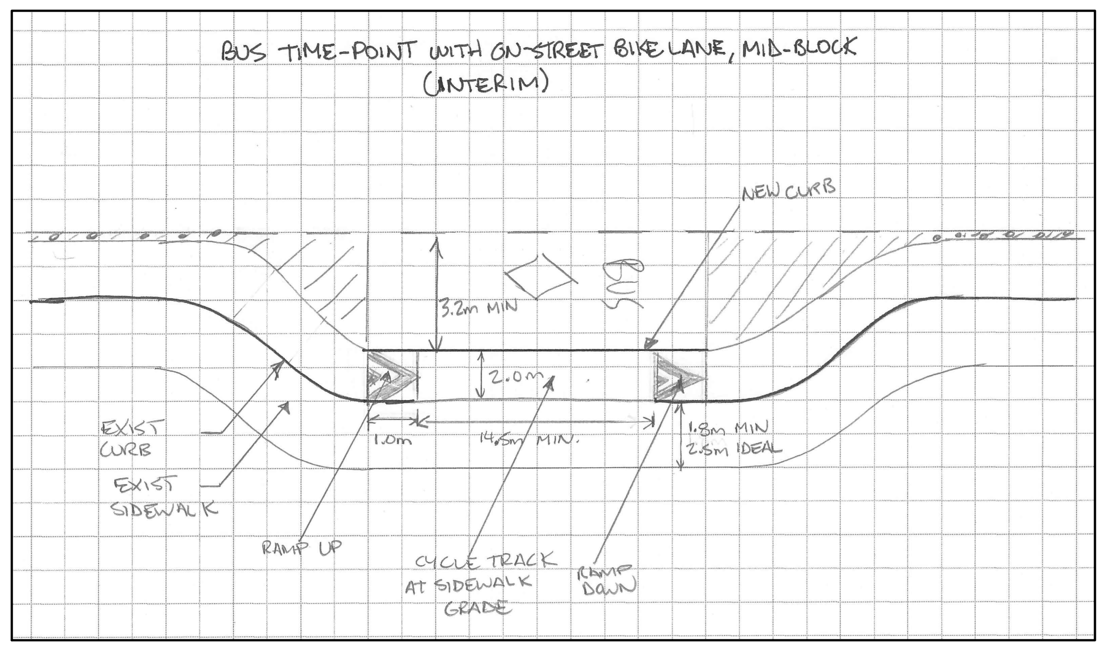

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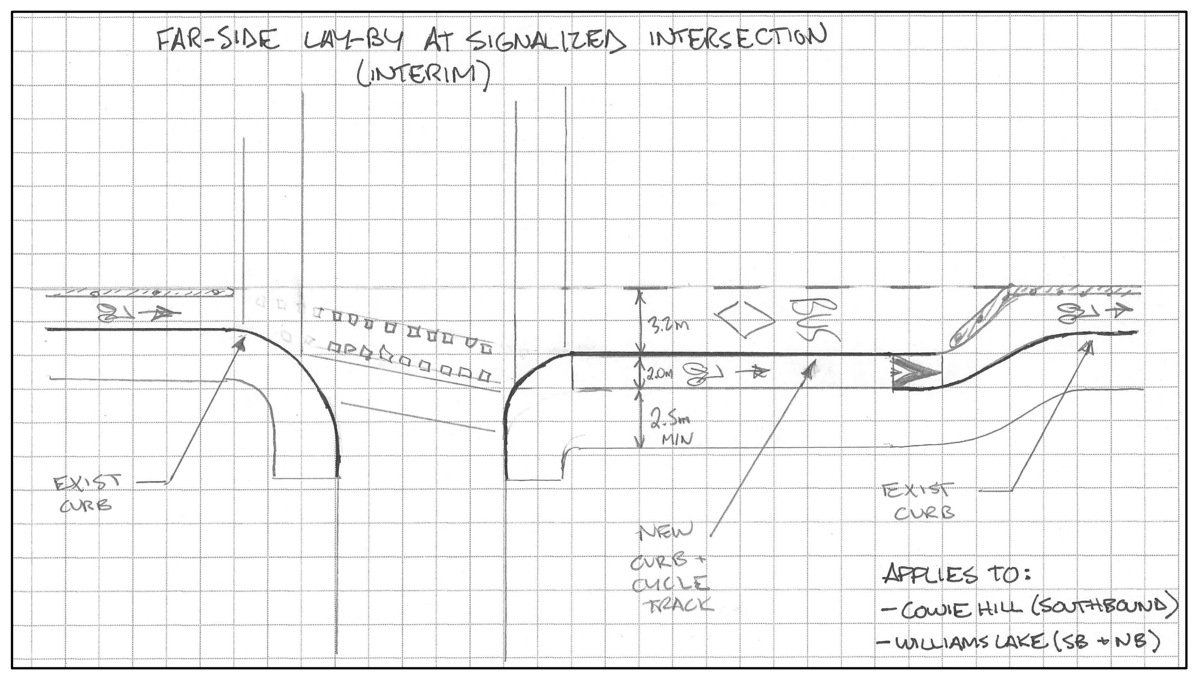

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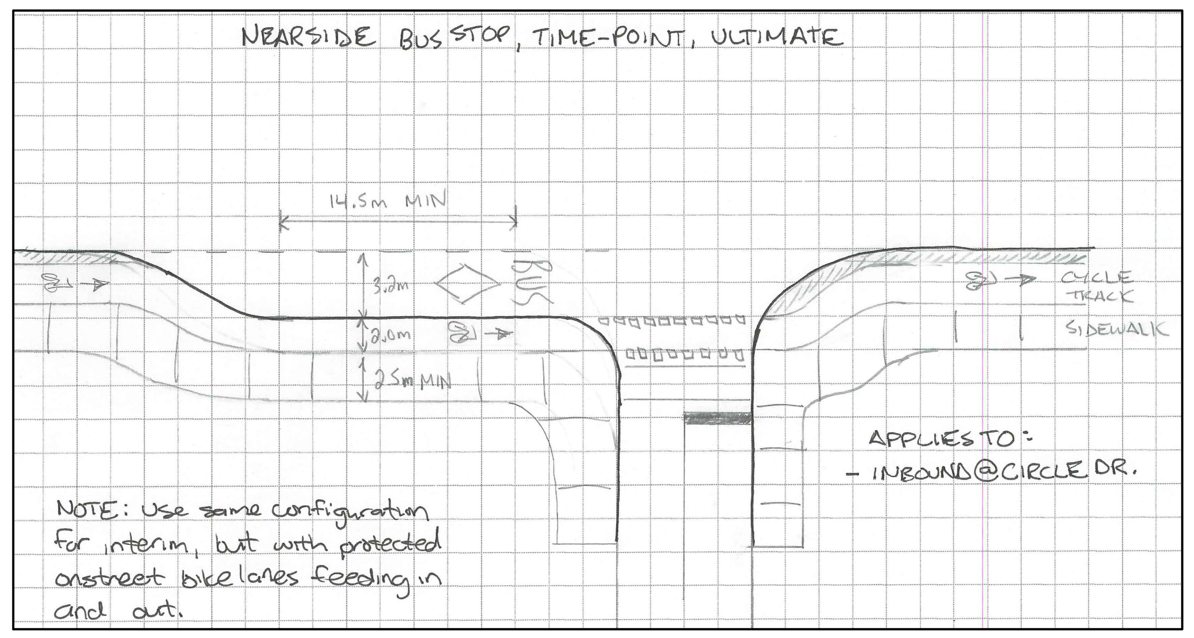
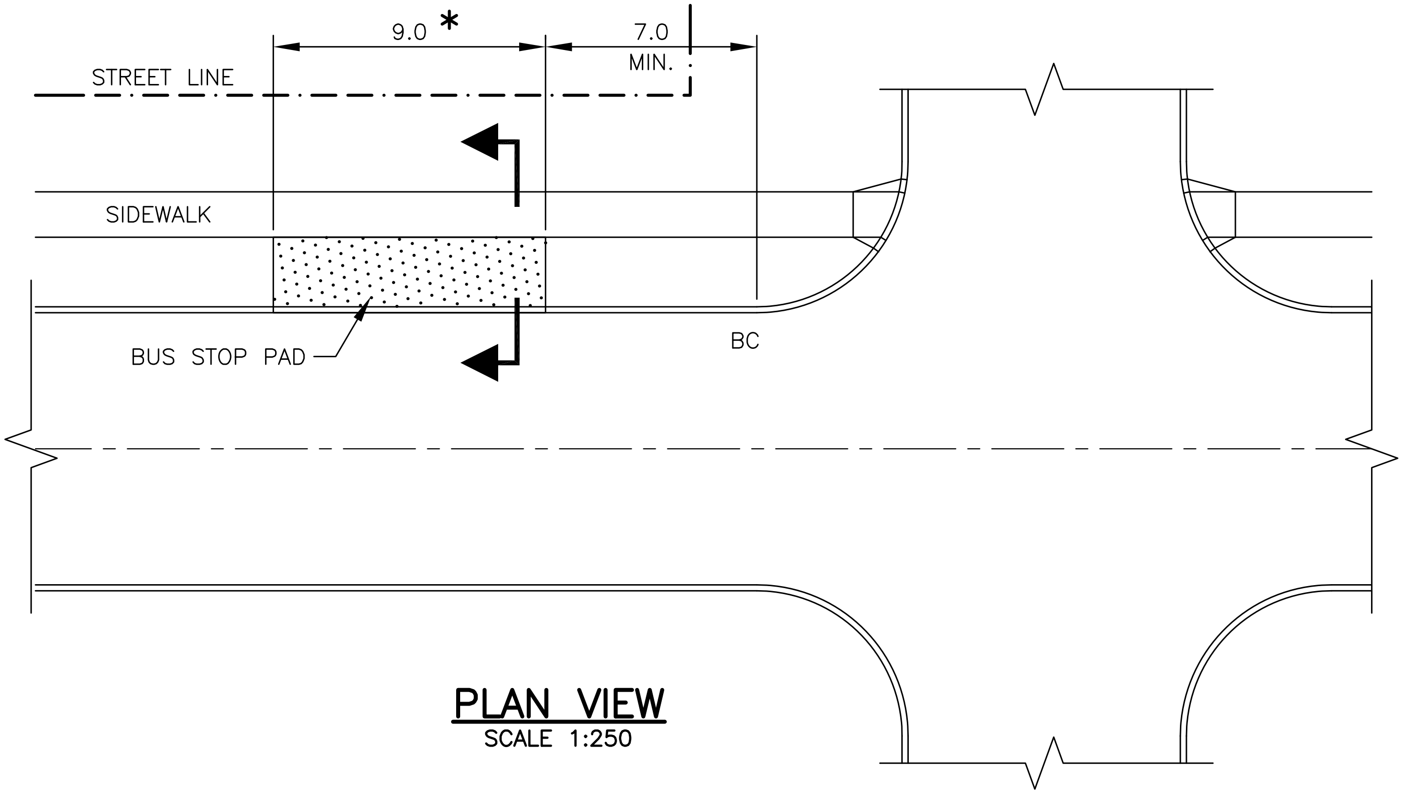


SK-9

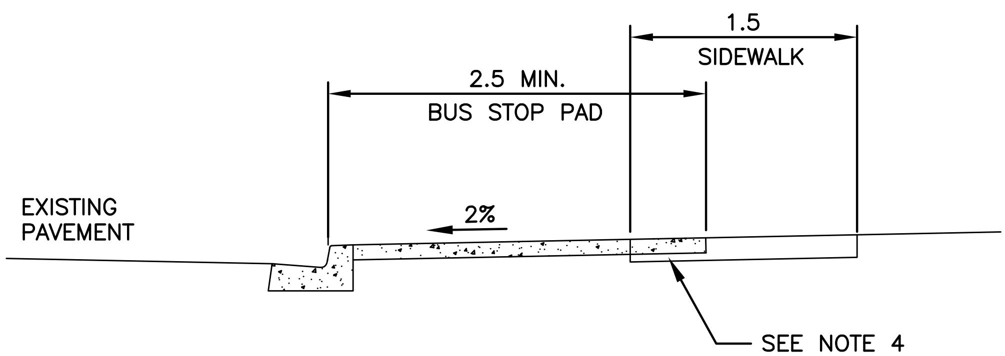
HALIFAX

alta PLANNING + DESIGN

HARBOURSIDE Transportation Consultants



PLAN VIEW
SCALE 1:250



CROSS SECTION
SCALE 1:50

HRM STD

NOTES:

* 1. FOR LOW VOLUME BUS ROUTES
   –DECREASE PAD LENGTH TO 4.0m.

* 2. FOR ARTICULATED BUS ROUTES
   –INCREASE PAD LENGTH TO 14.5m.

3. SHELTER PAD SHALL BE 4.0m LONG BY 2.0m WIDE. (IF REQUIRED)
4. THE 2.5m WIDE BUS STOP LANDING PAD MAY INCLUDE A PORTION OF THE SIDEWALK.

HALIFAX

STANDARD DETAIL

CONCRETE BUS STOP LANDING PAD (WITH SIDEWALK)

DATE: 2015	REFERENCE	APPROVED
SCALE: AS NOTED	NEW	FIG No.: HRM 56

Appendix V: LOS Reports for Dismissed Concepts

This appendix contains LOS reports for two measures which were considered during the conceptual design stage, but omitted from the final design due to unacceptable levels of performance:

- Traffic signal at Herring Cove Road and Osborne Street (Synchro output)
- Single lane roundabout at Dentith Road (ARCADY 8 output)

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	242	8	15	594	340	55
Future Volume (vph)	242	8	15	594	340	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.996				0.981	
Flt Protected	0.954			0.999		
Satd. Flow (prot)	1790	0	0	1882	1848	0
Flt Permitted	0.954			0.986		
Satd. Flow (perm)	1790	0	0	1857	1848	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	3				18	
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.6			504.2	298.1	
Travel Time (s)	10.1			36.3	21.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	263	9	16	646	370	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	272	0	0	662	430	0
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Total Split (s)	26.0		34.0	34.0	34.0	
Total Lost Time (s)	6.0			6.0	6.0	
Act Effct Green (s)	12.7			23.8	23.8	
Actuated g/C Ratio	0.26			0.49	0.49	
v/c Ratio	0.58			0.73	0.47	
Control Delay	21.3			16.9	10.7	
Queue Delay	0.0			0.0	0.0	
Total Delay	21.3			16.9	10.7	
LOS	C			B	B	
Approach Delay	21.3			16.9	10.7	
Approach LOS	C			B	B	
Stops (vph)	194			442	232	
Fuel Used(l)	12			47	20	
CO Emissions (g/hr)	219			875	366	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	42			169	71	
VOC Emissions (g/hr)	51			202	84	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (m)	19.6			40.9	21.1	
Queue Length 95th (m)	41.0			#93.7	48.2	
Internal Link Dist (m)	116.6			480.2	274.1	
Turn Bay Length (m)						
Base Capacity (vph)	751			1089	1091	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.36			0.61	0.39	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 48.8

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

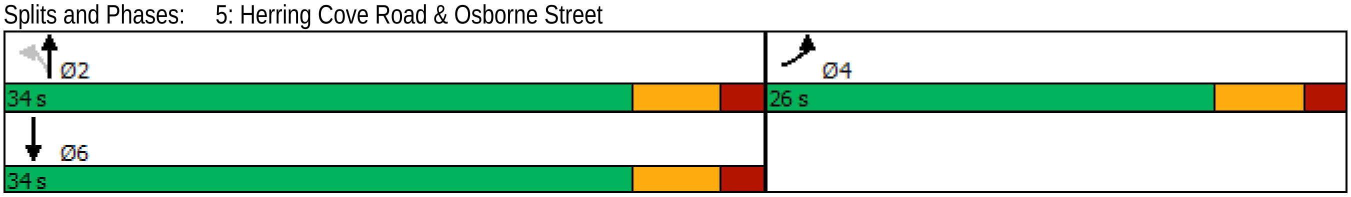
Intersection Signal Delay: 15.8 Intersection LOS: B

Intersection Capacity Utilization 67.2% ICU Level of Service C

Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Herring Cove Road & Osborne Street



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	83	22	30	495	882	269
Future Volume (vph)	83	22	30	495	882	269
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972				0.968	
Flt Protected	0.962			0.997		
Satd. Flow (prot)	1761	0	0	1878	1823	0
Flt Permitted	0.962			0.682		
Satd. Flow (perm)	1761	0	0	1285	1823	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	12				34	
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.6			504.2	298.1	
Travel Time (s)	10.1			36.3	21.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	90	24	33	538	959	292
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	0	0	571	1251	0
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Total Split (s)	26.0		74.0	74.0	74.0	
Total Lost Time (s)	6.0			6.0	6.0	
Act Effct Green (s)	11.2			76.2	76.2	
Actuated g/C Ratio	0.11			0.77	0.77	
v/c Ratio	0.55			0.58	0.89	
Control Delay	45.9			8.4	19.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	45.9			8.4	19.5	
LOS	D			A	B	
Approach Delay	45.9			8.4	19.5	
Approach LOS	D			A	B	
Stops (vph)	88			223	737	
Fuel Used(l)	7			34	66	
CO Emissions (g/hr)	132			624	1235	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	25			120	238	
VOC Emissions (g/hr)	30			144	285	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (m)	18.8			37.2	139.2	
Queue Length 95th (m)	33.0			75.8	#303.8	
Internal Link Dist (m)	116.6			480.2	274.1	
Turn Bay Length (m)						
Base Capacity (vph)	364			985	1405	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.31			0.58	0.89	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 99.4
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 78.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Herring Cove Road & Osborne Street

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	242	8	15	1062	498	55
Future Volume (vph)	242	8	15	1062	498	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.996				0.987	
Flt Protected	0.954			0.999		
Satd. Flow (prot)	1790	0	0	1882	1859	0
Flt Permitted	0.954			0.990		
Satd. Flow (perm)	1790	0	0	1865	1859	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2				12	
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.6			504.2	298.1	
Travel Time (s)	10.1			36.3	21.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	263	9	16	1154	541	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	272	0	0	1170	601	0
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Total Split (s)	26.0		64.0	64.0	64.0	
Total Lost Time (s)	6.0			6.0	6.0	
Act Effct Green (s)	17.0			56.7	56.7	
Actuated g/C Ratio	0.20			0.66	0.66	
v/c Ratio	0.77			0.95	0.49	
Control Delay	47.5			31.7	9.1	
Queue Delay	0.0			0.0	0.0	
Total Delay	47.5			31.7	9.1	
LOS	D			C	A	
Approach Delay	47.5			31.7	9.1	
Approach LOS	D			C	A	
Stops (vph)	224			801	255	
Fuel Used(l)	17			96	25	
CO Emissions (g/hr)	325			1780	470	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	63			344	91	
VOC Emissions (g/hr)	75			411	108	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (m)	43.0			161.9	44.7	
Queue Length 95th (m)	#69.5			#280.5	70.8	
Internal Link Dist (m)	116.6			480.2	274.1	
Turn Bay Length (m)						
Base Capacity (vph)	421			1268	1267	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.65			0.92	0.47	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 85.7	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 27.1	Intersection LOS: C
Intersection Capacity Utilization 91.8%	ICU Level of Service F
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Herring Cove Road & Osborne Street

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	83	22	30	807	1409	269
Future Volume (vph)	83	22	30	807	1409	269
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	0.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972				0.978	
Flt Protected	0.962			0.998		
Satd. Flow (prot)	1761	0	0	1880	1842	0
Flt Permitted	0.962			0.341		
Satd. Flow (perm)	1761	0	0	642	1842	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	10				20	
Link Speed (k/h)	50			50	50	
Link Distance (m)	140.6			504.2	298.1	
Travel Time (s)	10.1			36.3	21.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	90	24	33	877	1532	292
Shared Lane Traffic (%)						
Lane Group Flow (vph)	114	0	0	910	1824	0
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Total Split (s)	28.0		92.0	92.0	92.0	
Total Lost Time (s)	6.0			6.0	6.0	
Act Effct Green (s)	12.3			93.6	93.6	
Actuated g/C Ratio	0.10			0.79	0.79	
v/c Ratio	0.59			1.79	1.24	
Control Delay	57.5			380.6	133.1	
Queue Delay	0.0			0.0	0.0	
Total Delay	57.5			380.6	133.1	
LOS	E			F	F	
Approach Delay	57.5			380.6	133.1	
Approach LOS	E			F	F	
Stops (vph)	90			529	1233	
Fuel Used(l)	8			297	247	
CO Emissions (g/hr)	150			5526	4594	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
NOx Emissions (g/hr)	29			1067	887	
VOC Emissions (g/hr)	35			1275	1060	
Dilemma Vehicles (#)	0			0	0	
Queue Length 50th (m)	23.4			~197.9	~529.4	
Queue Length 95th (m)	39.3			#281.9	#614.3	
Internal Link Dist (m)	116.6			480.2	274.1	
Turn Bay Length (m)						
Base Capacity (vph)	337			509	1466	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.34			1.79	1.24	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 117.9
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.79
Intersection Signal Delay: 209.1 Intersection LOS: F
Intersection Capacity Utilization 106.4% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Herring Cove Road & Osborne Street

Junctions 8

ARCADY 8 - Roundabout Module

Filename: 182072-Herring Cove Rd-Dentith-Single Lane Roundabout.arc8
Path: Z:\Harbourside Transportation Consultants\Projects\182072 Herring Cove Road Functional Plan\Project Files\02 Analysis
Report generation date: 28/08/2019 12:07:58 PM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	Herring Cove Rd - Dentith Rd - Existing 2018													
Dentith Road	0.23	~1	2.03	0.19	A	6.93	A	0.64	1.00	3.12	0.39	A	18.86	C
Herring Cove Road (South Leg)	2.16	3.00	9.85	0.69	A			2.02	2.00	9.71	0.67	A		
Herring Cove Rd (North Leg)	0.89	200.00	6.28	0.47	A			9.77	39.00	37.27	0.92	E		

	Herring Cove Rd - Dentith Rd - Future 2033													
Dentith Road	0.34	~1	2.40	0.25	A	818.68	F	1.48	1.00	5.03	0.60	A	1093.82	F
Herring Cove Road (South Leg)	463.03	?	1388.39	1.52	F			157.17	200.00	492.01	1.25	F		
Herring Cove Rd (North Leg)	2.40	5.00	11.87	0.71	B			660.74	?	2218.21	1.71	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.
"D1 - Existing 2018, AM " model duration: 8:00 AM - 9:30 AM
"D2 - Existing 2018, PM" model duration: 5:00 PM - 6:30 PM
"D3 - Future 2033, AM" model duration: 8:00 AM - 9:30 AM
"D4 - Future 2033, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 28/08/2019 12:07:57 PM

File summary

Title	Herring Cove Rd - Dentith Rd
Location	Halifax, Nova Scotia
Site Number	
Date	21/02/2019
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	hec45
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Herring Cove Rd - Dentith Rd - Existing 2018, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Dentith Road - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Road (South Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default settings only. Is this correct?
Warning	Pedestrian Crossing	Herring Cove Rd (North Leg) - Unsignalled Pedestrian Crossing Details	Pedestrian crossing uses default flow of 0. Is this correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
Herring Cove Rd - Dentith Rd	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Existing 2018, AM	Existing 2018	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Herring Cove Rd - Dentith Rd	Roundabout	1,2,3			6.93	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Dentith Road	1	Dentith Road	
Herring Cove Road (South Leg)	2	Herring Cove Road (South Leg)	
Herring Cove Rd (North Leg)	3	Herring Cove Rd (North Leg)	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Dentith Road	0.00	99999.00
Herring Cove Road (South Leg)	0.00	99999.00
Herring Cove Rd (North Leg)	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Dentith Road	7.50	8.00	10.00	30.00	50.00	30.00	
Herring Cove Road (South Leg)	3.50	4.25	10.00	30.00	50.00	30.00	
Herring Cove Rd (North Leg)	3.50	4.25	10.00	30.00	50.00	30.00	

Pedestrian Crossings

Name	Crossing Type
Dentith Road	Unsignalled Pedestrian Crossing
Herring Cove Road (South Leg)	Unsignalled Pedestrian Crossing
Herring Cove Rd (North Leg)	Unsignalled Pedestrian Crossing

Unsignalled Pedestrian Crossing Crossings

Name	Space between crossing and intersection entry (PCE)	Vehicles queueing on exit (PCE)	Central Refuge	Crossing Data Type	Crossing length (m)	Crossing time (s)	Crossing length (entry side) (m)	Crossing time (entry side) (s)	Crossing length (exit side) (m)	Crossing time (exit side) (s)
Dentith Road	0.00	0.00		Distance	0.00	0.00				
Herring Cove Road (South Leg)	0.00	0.00		Distance	0.00	0.00				
Herring Cove Rd (North Leg)	0.00	0.00		Distance	0.00	0.00				

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Dentith Road		(calculated)	(calculated)	0.754	2442.274
Herring Cove Road (South Leg)		(calculated)	(calculated)	0.531	1264.040
Herring Cove Rd (North Leg)		(calculated)	(calculated)	0.531	1264.040

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Dentith Road	ONE HOUR	✓	372.00	100.000
Herring Cove Road (South Leg)	ONE HOUR	✓	729.00	100.000
Herring Cove Rd (North Leg)	ONE HOUR	✓	464.00	100.000

Pedestrian Flows

General Flows Data

Name	Profile Type	Average Pedestrian Flow (Ped/hr)
Dentith Road	ONE HOUR	0.00
Herring Cove Road (South Leg)	ONE HOUR	0.00
Herring Cove Rd (North Leg)	ONE HOUR	0.00

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.000	207.000	165.000
	Herring Cove Road (South Leg)	308.000	0.000	421.000
	Herring Cove Rd (North Leg)	148.000	316.000	0.000

Turning Proportions (PCE) - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.00	0.56	0.44
	Herring Cove Road (South Leg)	0.42	0.00	0.58
	Herring Cove Rd (North Leg)	0.32	0.68	0.00

Vehicle Mix

Average PCE Per Vehicle - Herring Cove Rd - Dentith Rd (for whole period)

		To		
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	1.000	1.000	1.000

	Herring Cove Road (South Leg)	1.000	1.000	1.000
	Herring Cove Rd (North Leg)	1.000	1.000	1.000

Truck Percentages - Herring Cove Rd - Dentith Rd (for whole period)

	To			
From		Dentith Road	Herring Cove Road (South Leg)	Herring Cove Rd (North Leg)
	Dentith Road	0.0	0.0	0.0
	Herring Cove Road (South Leg)	0.0	0.0	0.0
	Herring Cove Rd (North Leg)	0.0	0.0	0.0

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Dentith Road	0.19	2.03	0.23	~1	A
Herring Cove Road (South Leg)	0.69	9.85	2.16	3.00	A
Herring Cove Rd (North Leg)	0.47	6.28	0.89	200.00	A

Attachment C:

Herring Cove Road 60% Design Final Report

Herring Cove Road 60% Design Project

Design Report

Prepared for:

Halifax Regional Municipality

Prepared by:

Crandall, a Division of Englobe Corporation
133 Prince William Street
Saint John, NB
E2L 2B5

July 28, 2020
Project No. 18104-06

Crandall Project No.:	18104.06
Project Name:	**Herring Cove Road 60% Design Project**
Document Name	**60% Design Report**
Client:	**Halifax Regional Municipality**
Issue Status:	**FINAL**
Revision No.:	1.0
Prepared By:	Peter Allaby, P.Eng. Crandall, a Division of Englobe Corp

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1.0 Introduction

1.1 Project Background

Herring Cove Road is a north-south arterial roadway and a key commuter route from Spryfield and Purcells Cove areas to the Halifax Peninsula, carrying up to 34,000 vehicles per day near the Armdale Roundabout. Development around Herring Cove Road includes residential, commercial, institutional, and recreational use. The corridor is served by five transit routes; however, the corridor lacks transit priority, cycling facilities, and does not provide continuous, high quality pedestrian facilities.

The Integrated Mobility Plan (IMP) adopted by HRM in 2007, provides a new paradigm for the future of strategic transportation links. Adopted by the Council in 2017 after extensive community consultation, the IMP sets a new approach for how people move throughout the region, aimed at improving travel choices and creating Complete Communities. It recognizes that some streets can be destinations and travel links at the same time. The design idea of a "Complete Street" is recognized as a key direction for the City's future. Complete Streets are planned, designed, and maintained to make travel safe, convenient, and comfortable for people of all ages and abilities and using all transportation modes. The IMP identifies Herring Cove Road as a candidate complete street corridor.

The Herring Cove Road corridor has seen significant development growth over the years. This development growth continues today with more than 2,000 residential units still approved to be built south of Old Sambro Road. Previous plans to widen Herring Cove Road to four vehicle lanes have been abandoned in favour of a more multi-modal approach. Due to capacity constraints at the Armdale Roundabout, adding more vehicle lanes along Herring Cove Road will not solve the corridor's main congestion issues. Instead, a significant mode shift to transit, walking, and cycling is needed to move people along the corridor and accommodate the future development planned. To support and encourage this mode shift, HRM wishes to undertake a significant upgrade to Herring Cove Road that would include dedicated transit lanes, a multi-use pathway (MUP), and sidewalk improvements. The transit lanes and transit priority improvements would also coincide with HRM's Bus Rapid Transit (BRT) plans for Herring Cove Road.

1.2 Project Objectives and Scope

In 2019, Alta Planning and Design completed a 30% Functional Plan for Herring Cove Road from Armdale Roundabout to 554 Herring Cove Road (5km). The functional plan presented interim and ultimate concept plans to improve the corridor that included an active transportation greenway, cycle tracks, and transit lanes. Following up on this work, HRM engaged Crandall to prepare 60% designs for the 1.7km section from Armdale Roundabout to Glenora Avenue.

The project limits of the 60% design are shown in **Figure 1**. The scope of the 60% design involved reviewing and validating the 30% plans, identifying modifications to those plans, identifying constraints and impacts, and preparing 60% design drawings for two corridor options. HRM defined the two corridor options from Armdale Roundabout to Glenora Avenue as follows:

- Option 1 (as shown in **Figure 2**) includes a continuous inbound transit lane, a raised multi-use pathway on the east side, continuous sidewalk on the west side, and outbound transit priority measures at the Cowie Hill Road intersection.

- Option 2 (as shown in **Figure 3**) includes the same features as Option 1 but adds an outbound transit lane from south of Purcells Cove Road to Glenora Avenue.

These configurations are similar to the Ultimate Configuration recommended in the 2019 Functional Plan, but with some differences. A comparison of the 60% options with the 2019 functional design recommendations are listed in **Table 1**.

Table 1: Comparison of 60% Design Options to 2019 Functional Plan

Road Segment	2019 Functional Plan "Ultimate Option"	2020 60% Design Option 1	2020 60% Design Option 2
Armdale Roundabout to Purcells Cove Road (350m)	MUP on east side Sidewalk on west side 1 inbound transit lane 3 vehicle lanes (reversible)	Same as 2019 Plan	Same as Option 1
Purcells Cove Rd to Cowie Hill Rd (800m)	MUP on east side Sidewalk on west side 1 inbound transit lane 2 vehicle lanes	Same as 2019 Plan	Same as Option 1, but with an outbound transit lane added.
Cowie Hill Rd to Glenora Ave (550m)	Sidewalk on both sides Raised Cycle track on both sides Two vehicle lanes	MUP on east side Sidewalk on west side 1 inbound transit lane 2 vehicle lanes	Same as Option 1, but with an outbound transit lane added.
South of Glenora Avenue (to 500 block)	Sidewalk on both sides Raised Cycle track on both sides Two to four vehicle lanes Various transit priority improvements	Not in scope Transit lanes and MUP may continue through this section subject to further review.	

The changes to the 2019 functional plan configuration between Purcell's Cove Road and Glenora Avenue were made for the following reasons:

- With the recent adoption of the Rapid Transit Strategy, there is a greater emphasis and desire for transit improvements on Herring Cove Road. Therefore the 60% includes a more aggressive approach of extending dedicated transit lanes all the way to Glenora Avenue, considering both inbound and outbound lanes.

- With transit lanes extended south of Cowie Hill Road, there is not adequate space to accommodate cycle tracks on both sides. Therefore, the multi-use path was extended to Glenora Avenue instead.

Figure 1: Project Location and Project Limits

Project Location

Project Limits

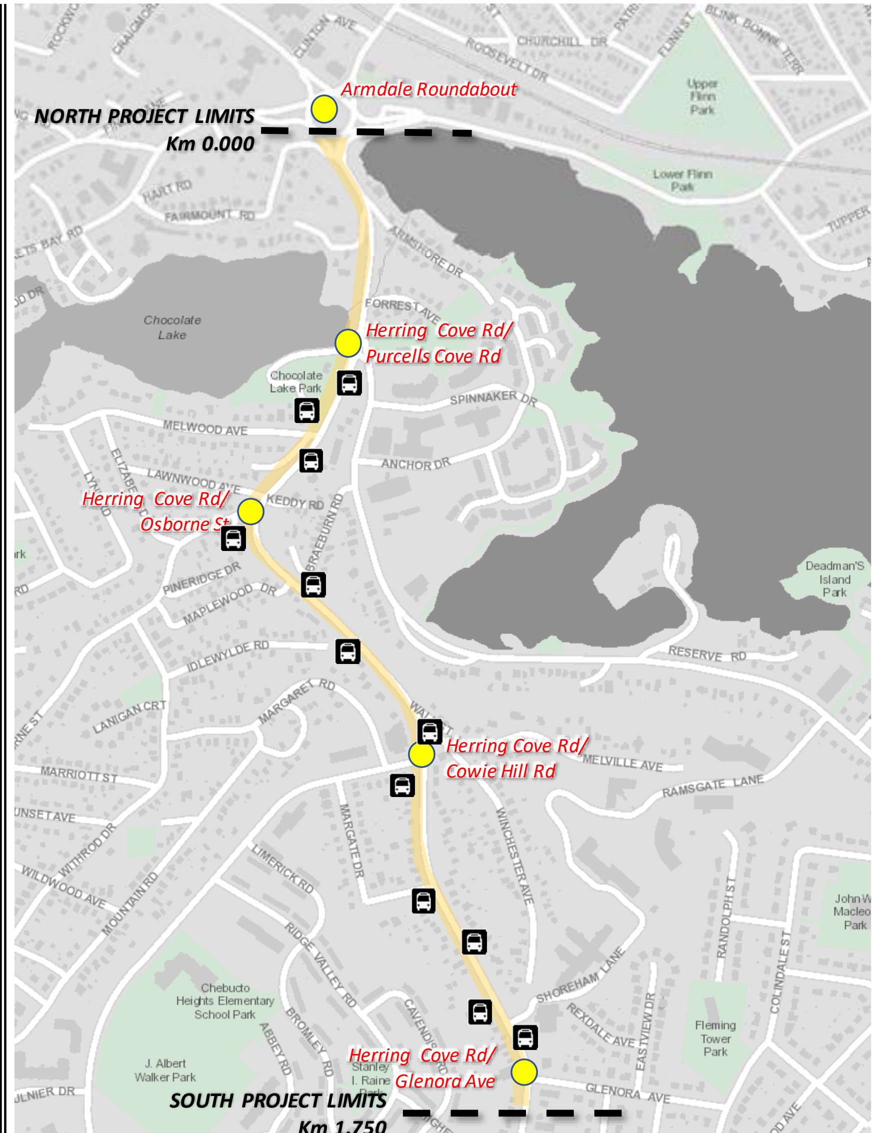


Figure 2: 60% Design Corridor Option 1

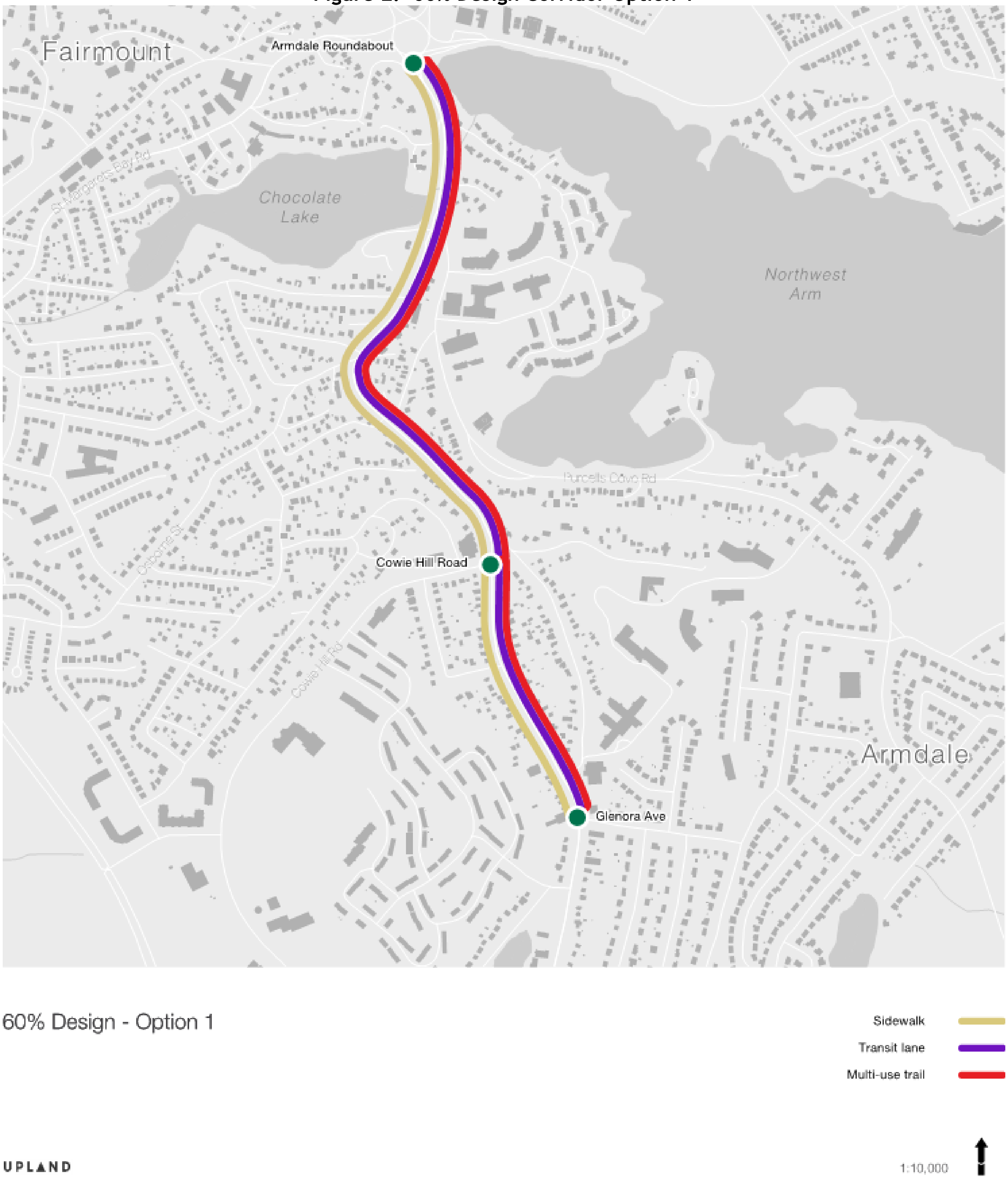
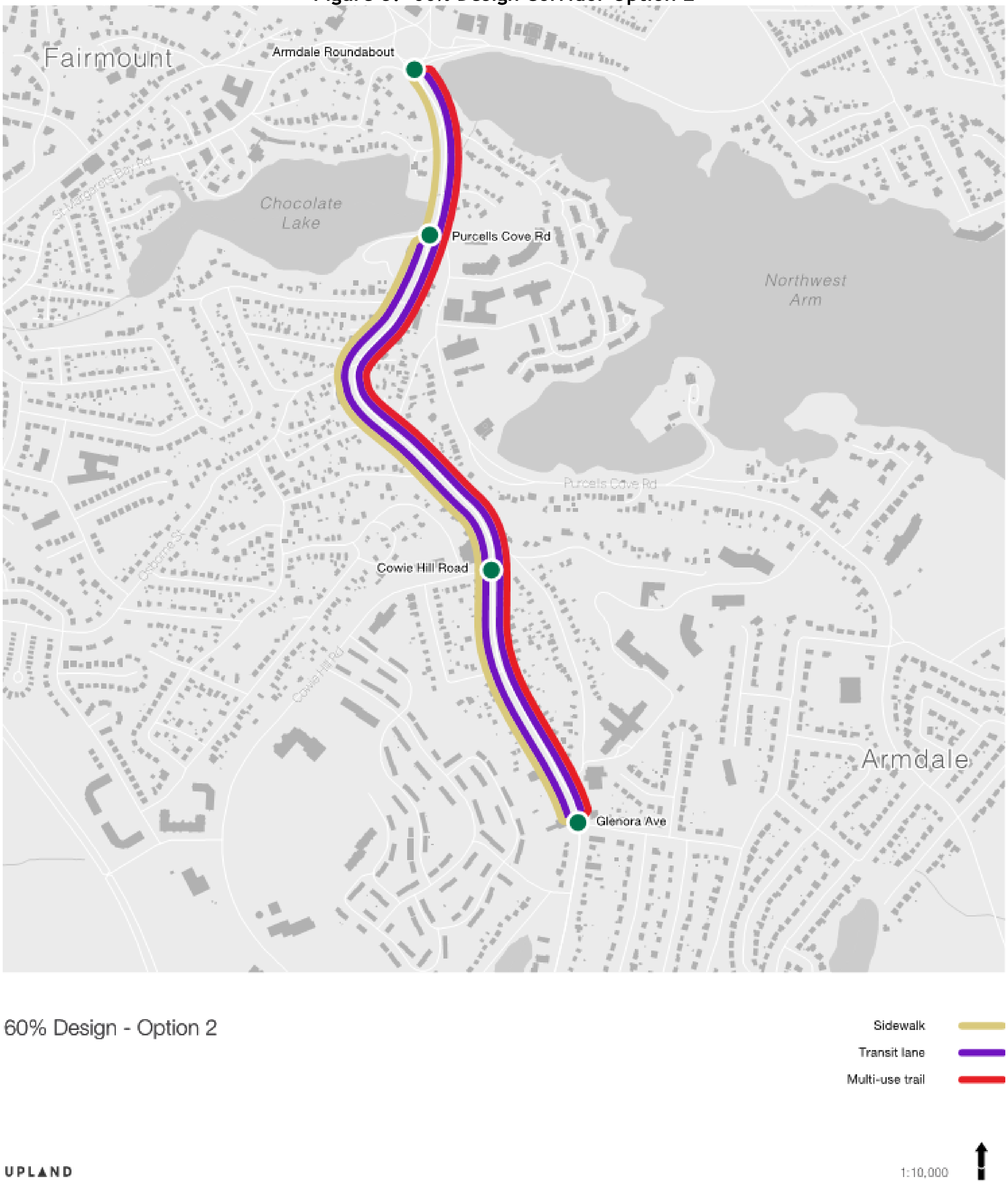


Figure 3: 60% Design Corridor Option 2



2.0 Information Gathering

2.1 Mapping and Field Surveys

GIS data were provided by HRM and were used to generate Study Area mapping, including aerial photography, lidar, property boundaries, and underground municipal services.

Additional field data gathering activities included:

- A topographic survey of the corridor was completed in November 2019 that picked up centerline, curb lines, edge of roadway, sidewalks, catch basins, manholes, utility poles, trees, signs, bus stops, intersections, guide rail, top and bottom of slope (where accessible), driveways, and other roadside features that may be impacted. Locations of underground structures within the travelled way were not picked up at this time, nor were an intrusive survey or utility locates completed.
- A field visit was completed by our geotechnical engineer in December 2019 to review existing conditions and sensitive areas where retaining walls may be required.

2.2 Traffic Data

HRM provided peak hour traffic volume data for all signalized and several unsignalized intersections within the Study Area which were used to derive peak hour traffic volumes.

2.3 Previous Plans and Studies

A number of plans and studies have been completed that are relevant to Herring Cove Road. A high-level summary of the most relevant plans and initiatives are documented in this section as background to this project.

Active Transportation Priorities Plan (2014)

HRM's Active Transportation Priorities Plan provided a review and update to HRM's 2006 Active Transportation Functional Plan and proposed priority initiatives for the next five years. The purpose of the plan was to identify the means by which HRM will work to double the number of residents who chose to walk or bicycle for trips to work, school, shopping, and services. This objective is tied to overarching objectives in the Regional Municipal Planning Strategy to increase the number of walking and cycling trips and to develop complete communities. The AT Plan identifies Herring Cove Road as a candidate bicycle route, but the facility type is to be determined.

Herring Cove Road/Purcells Cove Road Intersection Options Analysis (2015)

In 2015, SNC Lavalin competed an options analysis to improve peak hour functionality of the Herring Cove Road/Purcells Cove Road intersection. Four options were evaluated including intersection signalization, lane control changes, and adding a fourth lane to Herring Cove Road. The recommended option was to shorten the southbound left turn lane on Herring Cove Road so that northbound through traffic could move into the reversible lane sooner during the AM peak, thus allowing entering vehicles from Purcells Cove Road to enter more easily.

Integrated Mobility Plan (2017)

The Integrated Mobility Plan (IMP), adopted unanimously by HRM Council in 2017 after extensive community consultation, sets a new approach for how people move throughout the region by improving travel choices and creating Complete Communities. The IMP is Halifax's first comprehensive transportation master plan. It sets targets to increase the number of trips made by walking, bicycling or transit, and recognizes the inter-relationship of transportation and land use. It includes policies and actions intended to achieve the mode share targets of HRM's Regional Plan, such as 30% of trip made by active transportation and transit modes by 2031.

Complete Streets is one of the foundational policies of the IMP. As defined in the IMP, complete streets "are planned, designed, and maintained to make travel safe, convenient, and comfortable for people of all ages and abilities and using all transportation modes." This is achieved through a holistic, flexible and context-sensitive approach to designing new streets or changes to existing streets. Complete Streets are planned, designed, and maintained to make travel safe, convenient, and comfortable for people of all ages and abilities and using all transportation modes. The IMP identifies Herring Cove Road for the future following projects:

- a strategic sidewalk project;
- a transit priority corridor project; and
- a complete street project.

Bus Rapid Transit (BRT) Study (2018)

A BRT Study was completed for HRM in 2018 (Dillon Consulting). The objectives of this study were to evaluate and prioritize candidate BRT routes and develop a BRT Plan that included the recommended route network, station types and locations, service levels, vehicle types, resource requirements, capital and operating costs, and an implementation plan.

Herring Cove Road was identified as a medium priority BRT route. Features of this route included:

- Two BRT stops were recommended for Herring Cove Road: in both directions at Winchester Avenue and at Melwood Avenue;
- BRT stops were recommended to be "Enhanced On-Street Stops" which include a 30m long concrete platform, heated shelter, digital information display, and signage and branding.
- It was assumed that the BRT would operate in mixed traffic on Herring Cove Road due to the limited right-of-way. The functional plan for Herring Cove Road had not yet been completed at the time of the BRT study.
- A portion of Transit Route 9 would be removed and replaced with the BRT route.

The Rapid Transit Strategy recommends that the proposed BRT line on Herring Cove Road end at Greystone.

Herring Cove Functional Plan (2019)

The Herring Cove Road Functional Plan was completed in August 2019 by Alta Planning and Design. The scope of the plan was to develop a 30% design for a complete street upgrade of Herring Cove Road that prioritized people walking, people on bikes, and transit. The limits of the plan encompassed 5km from Armdale Roundabout to the 500 block near Green Acres Road.

The Functional Plan recommended an interim and ultimate scenario for Herring Cove Road. The interim scenario aimed to deliver benefits at a lower cost with easier implementation, while planning for existing traffic volumes. The ultimate scenario was designed to be implemented in the long-term as part of road reconstruction projects with higher order solutions while planning for future projected traffic volumes along the corridor.

The roadway configurations recommended in the Ultimate Scenario for Herring Cove Road from Armdale Roundabout to Highfield Street (just south of Glenora Avenue) are shown in **Figure 4**.

The 2019 Functional Plan also included intersection recommendations based on an analysis of existing (2018) and future (2033) traffic conditions. Intersection recommendations for the Ultimate Scenario under 2033 traffic conditions were as follows:

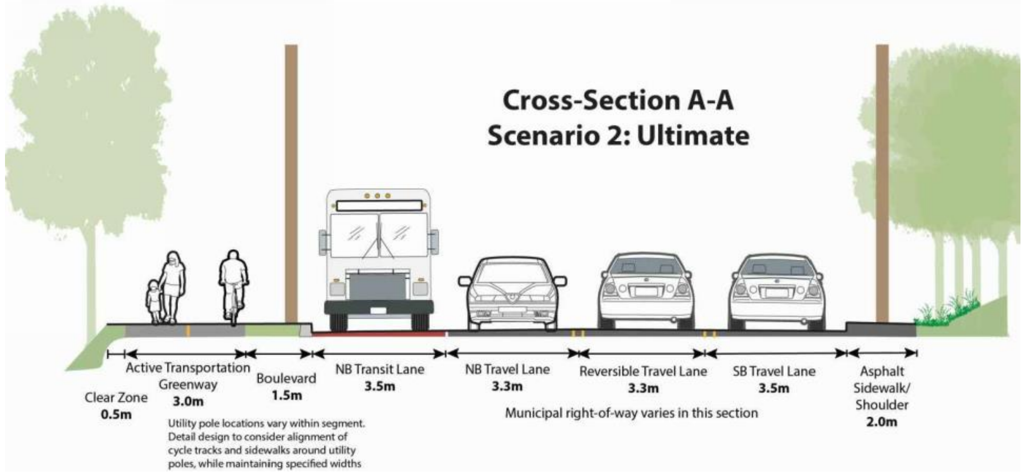
- **Herring Cove Road & Purcells Cove Road:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Osborne Street:** No changes to intersection control or lane configuration.
- **Herring Cove Road & Cowie Hill Road:** Geometric changes to remove channelization for the southbound right turn. Minor changes to pedestrian timings and removal of the pedestrian crossing on the north leg. A southbound transit queue jump lane was also recommended.
- **Herring Cove Road & Glenora Avenue:** Lane reconfiguration on Herring Cove Road to provide a southbound left turn storage lane with approximately 25 metres of storage. No changes to intersection control.

It was noted in the Functional Plan that northbound queuing during the morning commuter peak currently extends from Armdale Roundabout as far back as Cowie Hill Road at times. This causes high delays at the Purcells Cove Road and Osborne Street intersections. Because this congestion originates due to capacity constraints at Armdale Roundabout, improvements to the Herring Cove Road/Purcells Cove Road or Herring Cove Road/Osborne Street intersection would have little impact.

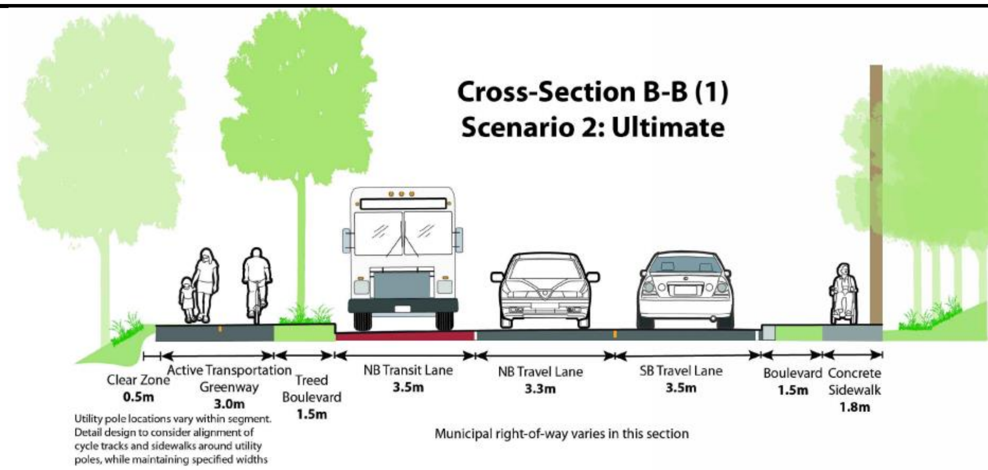
The Ultimate Scenario in the Functional Plan focuses on improving conditions for pedestrians, cyclists and transit, with minimal improvements for vehicle traffic between Armdale Roundabout and Highfield Street. The proposed inbound transit lane from Cowie Hill Road to Armdale Roundabout is intended to allow buses to bypass the long morning peak queues.

Figure 4: Recommended Configurations from 2019 Functional Plan (*Alta Planning and Design*)

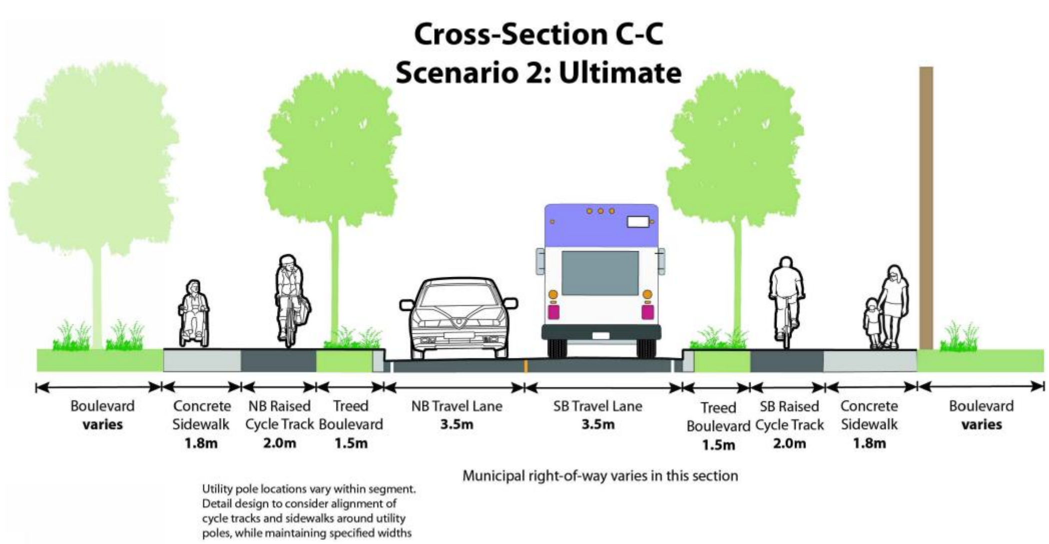
Armdale Roundabout to Purcells Cove Rd



Purcells Cove Rd to Cowie Hill Rd



Cowie Hill Rd to Highfield St



2.4 Stakeholder Consultation

Internal HRM Stakeholder Meeting

An Internal Stakeholder meeting was held on March 17, 2020 via a teleconference call by the Study Team with representatives from HRM Strategic Transportation Planning, Traffic, Transit, Active Transportation, Design, and Right-of-Way. The project scope and objectives of the design project as well as the existing conditions along Herring Cove Road were presented. The presentation also included the typical cross-sections applied for the two options for Herring Cove Road. The following topics were discussed:

- Future transit plans for Herring Cove Road include BRT with all day 10-minute service in both directions. Ridership volumes are expected to increase. Halifax Transit supplied ridership data and projections that should be considered in the design analysis.
- Herring Cove Road is only a desirable cyclist corridor, not labeled an AT priority at this time. The preferred option is to have a separate bike and pedestrian facilities, but there are understandably constraints through much of the corridor.
- The width of snow clearing equipment (1.7m) will be considered when selecting sidewalk widths.
- A minimum width of 3.5m would be preferable as opposed to the narrow 3.0m pathway width noted on the proposed cross-sections.
- TAC guidelines for minimum dimensions are to be applied. Curb lane widths should be greater than or equal to 3.3m (plus gutter = 0.37m) according to TAC where bus or truck traffic is frequent.
- A variance request may be justified for Herring Cove Rd, subject to the impacts of the wider lanes. A request will have to be submitted and approved by the committee before further planning.
- Consider a guiderail for safety between the MUP and traffic lanes for locations with no boulevards or where boulevards have limited space.
- In Option 1, there was concern with removing the sidewalk from the Armdale roundabout up to Windemere as well as the accessibility of a staircase proposed from Windemere down to Herring Cove Rd. It would be preferable to maintain the sidewalk down to at least Windemere if not all the way to the roundabout.
- Neither side of Herring Cove Road ROW boundary line is a priority for preservation. ROW boundaries should be held as best as possible and impacts will be decided on a case by case basis.
- A recent retaining wall was constructed along Herring Cove Rd, near Purcells Cove Rd, that will need to be pushed back. The new wall was installed to address urgent repairs on the old wall. HRM is aware that the wall will likely need to be moved as part of this project.
- A major redevelopment is planned near the southeast corner of Purcells Cove Rd and Herring Cove Rd. Future access to the development will be off Purcells Cove Rd.
- There was discussion on the potential for realigning Purcells Cove Rd and providing signalization or a roundabout and safer AT access. A previous study on Purcells Cove Rd at Herring Cove Rd was performed by SNC Lavalin in 2015. The study evaluated various improvements that included traffic signalization and an improved AT crossing at the intersection. The findings were inconclusive, and it was found a traffic signal contributed to high delays on Herring Cove Road. Other suggestions to help pedestrians through this intersection would be beneficial.

- HRM would like to see connectivity between the proposed pathway on Herring Cove Road and bike facilities on Purcells Cove Road.
- The inbound bus stop south of Purcells Cove Road should be located as close as possible to the RA-5. Currently, a plan is in place to downgrade the existing RA-5 at Purcells Cove Rd to an RRFB crosswalk.
- The relocated bus shelter proposed across from Osborne Street is located further away from the existing staircase into the neighborhood. Rider impact should be considered here. The location of the existing staircase should be optimized between the neighborhood and the bus shelter.
- The sight distance to the RA-5 near Osborne Street is of concern due to the horizontal curve in the road. HRM standards dictate that stopping sight distance used at crosswalks are measured from the side flashing beacons of the RA-5s. Buses at a bus stop here may impede view of the flashers and should be taken into consideration during 60% design.
- Two options are being considered for the Cowie Hill Road intersection – one with a channelized right turn island and one without. The need for a southbound right turn lane on Herring Cove Road was questioned given the low volume.
- The RA-5 crosswalk at Glenora Avenue should remove on the north side of the intersection. Although this side has three lanes to cross, the RA-5 would stay lined up with the existing sidewalk along Glenora Avenue.
- A phased improvement approach is not ideal. There are many improvements required on Herring Cove Road that also align with the transit priority measures and BRT. The section closest to the roundabout is a priority for improvements. If a major construction project were to be undertaken, it makes more sense to do all improvements at the same time.
- There are a number of retaining walls along Herring Cove Road. These should be reflected in the plans.
- Where possible, keep the transit laybys in the sections where there is no dedicated transit lane. There is legislation that requires drivers to yield to buses to re-enter traffic, so these would not have a significant increase to bus delays.

3.0 Existing Corridor Characteristics

3.1 General Roadway Elements

This project focuses on a 1.7km section of Herring Cove Road, between Armdale Roundabout and Glenora Avenue, serving mostly commercial and residential land uses. The right-of-way is approximately 20-25m wide. Sidewalks vary on Herring Cove Road from concrete to asphalt and are not continuous through the corridor. Sidewalks are generally narrow near the Armdale Roundabout with obstructions such as utility poles within the dedicated space. Lane widths vary from 3.5m to 4.5m. No cycling facilities are provided so cyclists must share lanes with motor vehicle traffic. The speed limit is 50 km/h throughout the study corridor.

At the northern limit, Herring Cove Road is constrained by the Armdale Roundabout which currently supports 2 entrance lanes and has 2 exit lanes onto Herring Cove Road. Just south of Armdale Roundabout, Herring Cove Road consists of a 300m long reversable lane down the center which terminates at Purcells Cove Road. The reversible lane is controlled by a series of lane control signals on overhead gantries. The next 1.4km of Herring Cove Road provides a 2-lane roadway with a number of T-intersections, RA-5 pedestrian crosswalks, and a full traffic signal at Cowie Hill Road. The corridor is situated on the side of a hill where there is a steep rise on the west side with retaining walls, driveways and utility poles while on the east side there is a steep drop with retaining walls and guide rail.

The 1.7km Project Corridor can be divided into 4 distinct sections, each with its own unique features. **Table 2** describes each segment in terms of its existing features.

Table 2: Corridor Segments and Existing Features

Corridor Segment	Existing Features
1: Armdale Roundabout to Purcells Cove Road (300m)	3-lane section Reversible Lane System Narrow sidewalks on both sides Rock faces, retaining walls and guide rail on one or both sides of the street.
2: Purcells Cove Road to Osborne Street (300m)	2-lane section Asphalt sidewalk on west side only Poor connectivity to transit stops Rural setting
3: Osborne Street to Cowie Hill Road (500m)	2-lane section Asphalt sidewalk on west side only Retaining walls, driveways and utility poles on the west side. Guide rail and steep slope on the east side. Poor connectivity to transit stops Rural setting
4: Cowie Hill Road to Glenora Avenue (550m)	2-lane section New curb, sidewalk and boulevard on the east side Sections of asphalt and concrete sidewalk on the west side. Residential setting.

3.2 Active Transportation

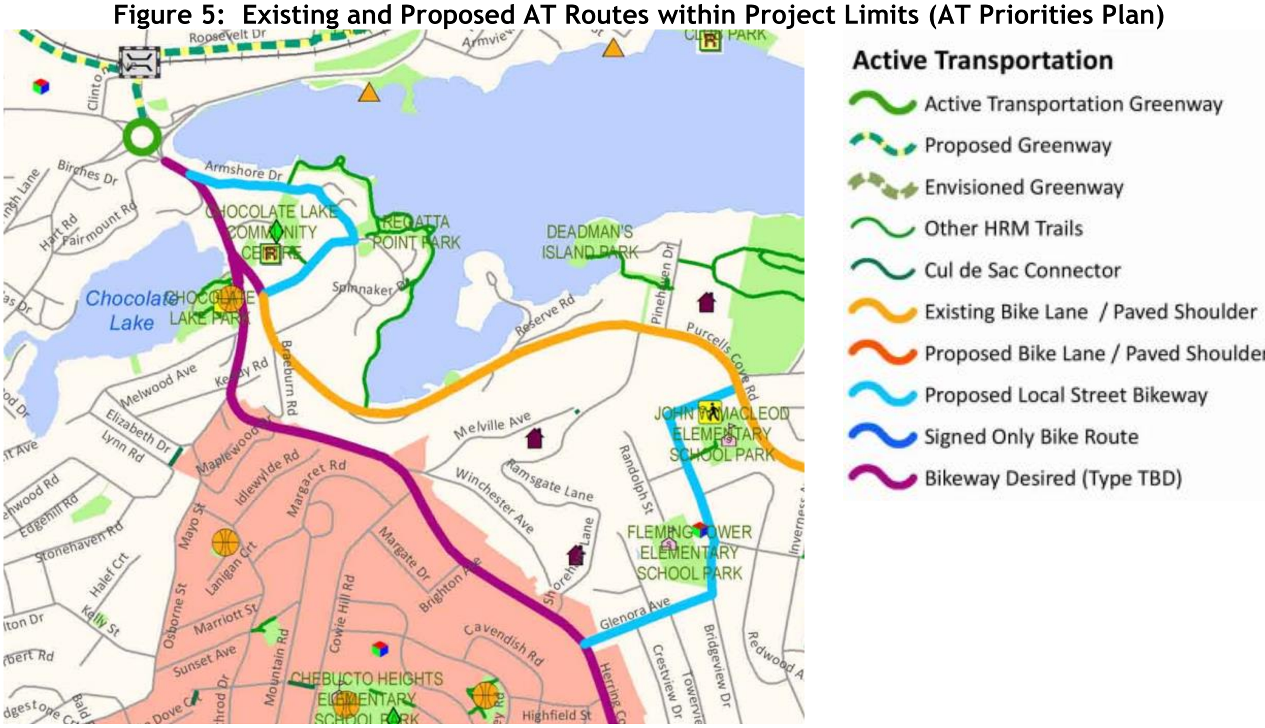
The Study Area streets currently have sidewalks on both sides of the street, but some sidewalks range from 1.25-1.50m wide, while others range from 1.8-2.0m wide. There are significant sections in disrepair with deteriorated asphalt and patchwork that does not create a smooth or attractive surface. Additionally, there are numerous curb cuts in very poor conditions. Accessibility features are lacking throughout the project limits.

There are no bicycle facilities along Herring Cove Road within the project limits. As shown in **Figure 5**, the AT Priorities Plan identifies Herring Cove Road as a corridor where a bikeway is desirable. An AT facility on Herring Cove Road would connect to the north to a future extension of the Halifax Urban Greenway. Existing and proposed connecting cycling routes include the following:

- Purcells Cove Road, which has existing striped bike lanes that end at Spinnaker Drive, just short of Herring Cove Road. Making a connection to Herring Cove Road would be desirable;
- Armhore Drive/Spinnaker Drive, a proposed local street bikeway; and
- Glenora Avenue a proposed local street bikeway.

Pedestrian and cyclist volumes were collected by HRM at two intersections along Herring Cove Road; Purcells Cove Road and Cowie Hill Road. No pedestrians were recorded crossing at Purcells Cove Road during the AM and PM peak hours. At Cowie Hill Road, 38 pedestrians crossed the intersection in the AM peak hour and 23 pedestrians crossed in the PM peak hour. As shown in **Figure 7**, cyclist volumes show up to 21 bikers in the AM peak hour just south of Purcells Cove Rd intersection, and 5 in the PM peak hour. Just south of Cowie Hill Road, 7 bikers were recorded in the AM peak hour, and 6 in the PM peak hour. Generally, cyclist and pedestrian volumes on Herring Cove Road are low, but users may be deterred by the lack of quality facilities.

Figure 5: Existing and Proposed AT Routes within Project Limits (AT Priorities Plan)



3.3 Transit Service and Ridership

Existing Transit Routes

Herring Cove Road is currently serviced by five (5) transit routes. These transit routes are, as follows:

- Route 9A/B: Herring Cove Road;
- Route 14: Leiblin Park;
- Route 25: Governors Brook;
- Route 32: Cowie Hill Express; and
- Route 415: Purcells Cove.

A map of these routes is provided in **Figure 6** below. A brief description of each transit route and the portion of Herring Cove Road on which it travels is provided below. Note that "Inbound" refers to buses travelling northbound along Herring Cove Road towards the downtown core, while "outbound" refers to buses travelling in the southbound direction. **Table 3** summarizes the existing transit coverage and service frequencies on Herring Cove Road.

- **Route 9A/B: Herring Cove Road** - Route 9A/B travels from Scotia Square Terminal in the south end of Halifax peninsula to the Armdale Roundabout. From the roundabout, Route 9A travels along Herring Cove Road to Fotherby Avenue, and for Route 9B it travels along Herring Cove Road to Lancaster Drive in Herring Cove from Monday to Sunday. For the majority of the weekday service, buses for each route operate on 30-minute headways in both directions, but offer 10-15 minute headways in the peak period. For weekend service, buses operate on 60-minute headways, which provide a combined service of 30 minute headways.
- **Route 14: Leiblin Park** - Route 14 travels from Scotia Square Terminal in the south end of Halifax peninsula to the Armdale Roundabout. From the roundabout, Route 14 travels along Herring Cove Road to Osborne Street where it exits. It enters Herring Cove Road again at Highfield St and leaves at Dentith Rd where it exits toward Leiblin Drive to the end of the line. For the majority of the weekday service, buses operate on a 30-minute headway in both directions. For weekend service, buses predominately operate on 60-minute headways. Route 14 is noted as a Thru-Route for Route 61. Once Route 61 reaches the end of its line it continues as a Route 14.
- **Route 25: Governors Brook** - Route 25 travels from Mumford Terminal in Halifax to the Armdale Roundabout. From the roundabout, Route 25 travels along Herring Cove Road to Purcells Cove Road where it exits. It enters Herring Cove Road again at Williams Lake Road until it exits at Pine Grove Road and continues to the end of the line at Titanium Circle. On weekdays, service frequency is 30 minutes in the AM and PM peak, outside of the peaks it runs every hour. For weekend service, buses predominately operate on 60-minute headways.
- **Route 32: Cowie Hill Express** - Route 32 is an urban express route that travels from Dentith Road to Scotia Square Terminal via Herring Cove Road. It departs Herring Cove Road for a short distance, travelling along Highfield Street and Ridge Valley Road until it reenters Herring Cove Road from Cowie Hill Road. Route 32 heads inbound in the AM peak and outbound in the PM peak with 15-minute headways on Monday through Friday only.
- **Route 415: Purcells Cove Road** - Route 415 travels from Mumford Terminal in Halifax to the Armdale Roundabout. From the roundabout, it travels along Herring Cove Road to Purcells Cove

Road and ends at Fergusons Cove Road in Fergusons Cove. Service is provided Monday to Friday. The buses operate in the AM and PM peak only on 60-minute headways.

Planned Transit Route Changes

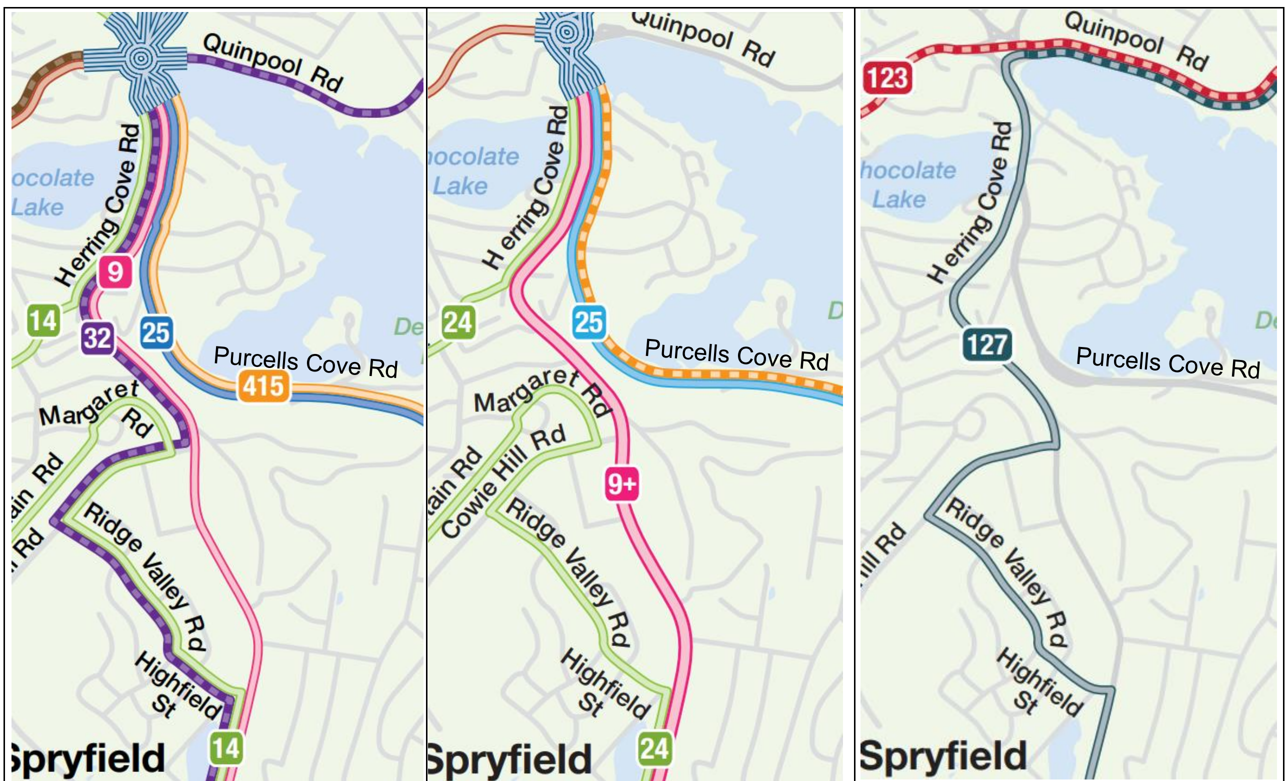
Halifax Transit has identified Herring Cove Road as a “Corridor Route” as stated in the Moving Forward Together Plan. Corridor Routes provide sustained services throughout the day, late evenings, and weekends to support increase residential and commercial density and connect users to regional centers.

Halifax Transit has plans to implement several route changes over the next year or two as part of the “Moving Forward Together Plan”. These additional changes are noted in the following list and presented in **Figure 6**:

- Route 24 replaces Route 14;
- Route 9A/B, 25 and 415 will remain as existing; and
- Route 127 replaces Route 32.

Should the proposed BRT route be implemented on Herring Cove Road, it is intended to replace a portion of Route 9.

Figure 6: Herring Cove Road Transit Routes



Existing (2019)	Moving Forward Together Plan Corridor Routes	Moving Forward Together Plan Express Routes

Table 3: Existing Transit Service on Herring Cove Road

Route	Extent of Travel in Study Area	Direction	Number of Buses per Hour		Weekday Frequency (Every X mins)		*Comments*
			AM Peak	PM Peak	AM Peak	PM Peak	
9A/B	Armdale Roundabout to Glenora Avenue	SB	4	6	15	10	
	Glenora Avenue to Armdale Roundabout	NB	6	6	10	10	
14	Armdale Roundabout to Osborne Street	SB	2	2	30	30	
	Osborne Street to Armdale Roundabout	NB	2	2	30	30	
25	Armdale Roundabout to Purcells Cove Road	SB	2	2	30	30	
	Purcells Cove Road to Armdale Roundabout	NB	2	2	30	30	
32	Armdale Roundabout to Cowie Hill Road	SB	--	5	--	10-20	*Peak Service Only*
	Cowie Hill Road to Armdale Roundabout	NB	5	--	5-20	--	
415	Armdale Roundabout to Purcells Cove Road	SB	1	1	60	60	*Weekday Service Only*
	Purcells Cove Road to Armdale Roundabout	NB	1	1	60	60	
		Total Buses	**25**	**27**			

Transit Stops

There are 12 transit stops along Herring Cove Road as listed in **Table 4**. Five of the stops have shelters while the other seven are signed only. Three stops have lay-bys, all in the outbound direction. Stops that are signed-only typically lack bus pads also. None of the stops listed in **Table 4** are timing points. Also, Halifax Transit did not identify any stops requiring lay-bys in the future.

Halifax Transit has identified 6 stops as future BRT stops (3 inbound, 3 outbound). These were reviewed in the 60% design for opportunity to incorporate 30m long concrete pads and upgraded shelters.

Table 4: Existing Transit Stops on Herring Cove Road

Stop Name	Existing Bus Stop Features	Future BRT Stop?*
INBOUND		
Herring Cove Rd Before Purcells Cove Rd (6903)	Signed only	
Herring Cove Rd Before Melwood Ave (6900)	Shelter	Yes - Merged into one stop
Herring Cove Rd Opposite Maplewood Dr (6910)	Signed only	
Herring Cove Rd At Winchester Ave (6906)	Shelter	Yes
Herring Cove Rd After Shoreham Ln (6909)	Shelter	
Herring Cove Rd After Glenora Ave (6860)	Shelter	Yes
OUTBOUND		
Herring Cove Rd Before Melwood Ave (6901)	Layby, Signed only	Yes
Herring Cove Rd After Withrod Dr (6868)	Signed only	
Herring Cove Rd Before Winchester Ave (6844)	Signed only	
Herring Cove Rd After Cowie Hill Rd (6856)	Signed only	Yes
Herring Cove Rd After Brighton Ave (6850)	Layby, Signed only	
Herring Cove Rd Before Shoreham Ln (6869)	Layby, Shelter	Yes

*as indicated by Halifax Transit

Boarding/Alighting Data

Halifax Transit provided boarding and alighting data for Route 9A/B, 14, and 32 along Herring Cove Road. The data were collected throughout October 2019 as part of the BRT Study. Results are summarized in **Table 5** for daily, AM Peak, and PM Peak average boarding and alighting volumes. The following observations can be made from these results:

- The bus stops at the Cowie Hill Road intersection are the most heavily used in both directions, with 100 daily boardings inbound and 65 daily alightings outbound.
- The next most frequently used stops are near Glenora Avenue (6860 and 6869) and between Purcells Cove Road and Osborne Street (stops 6903, 6900, 6901, and 6868);
- Stops 6910 and 6844 between Maplewood Drive and Cowie Hill Road have low usage as do stops 6909 and 6850 between Brighton Avenue and Shoreham Lane.
- The above supports the case for BRT stops at Glenora Avenue, Cowie Hill Road, and Melwood Ave/Purcells Cove Road.

Table 5: Herring Cove Road Boardings and Alightings (Route 9A/B, 14 & 32)

Direction	Stop	Boardings			Alightings		
		All Day	AM Peak	PM Peak	All Day	AM Peak	PM Peak
Inbound	6903 – Before Purcells Cove Rd	60	16	11	8	2	2
	6900 – Before Melwood Ave	53	17	7	9	4	2
	6910 – Opposite Maplewood Dr	14	4	2	7	3	1
	6906 – At Winchester Ave	100	27	14	20	5	3
	6909 – After Shoreham Ln	15	5	5	5	2	2
	6860 – After Glenora Ave	73	21	15	21	6	5
Outbound	6901 – Before Melwood Ave	12	1	7	54	4	23
	6868 – After Withrod Dr	8	1	3	35	2	11
	6844 – Before Winchester Ave	1	1	0	6	1	4
	6856 – After Cowie Hill Rd	12	3	3	65	4	23
	6850 – After Brighton Ave	2	2	1	14	1	8
	6869 – Before Shoreham Ln	17	4	4	64	7	24

Transit Travel Times

Halifax Transit provided the results of travel time analyses for various transit routes throughout HRM including Herring Cove Road. The following observations can be made from the results for Route 9:

Inbound:

- From Spryfield to Cowie Hill Road, inbound travel times are approximately 25 minutes in the AM peak compared to approximately 10 minutes during off-peak hours. The majority of the AM peak delay is incurred at the Cowie Hill Road intersection.
- From Cowie Hill Road to Mumford Terminal, inbound travel times are approximately 18 minutes in the AM peak compared to approximately 5 minutes during off-peak hours. It is likely that the majority of this delay in incurred approaching the Armdale Roundabout on Herring Cove Road.
- Based on the above there is significant potential for improvement in inbound transit travel times by the introduction of an inbound transit lane on Herring Cove Road.

Outbound

- From Mumford Terminal to Cowie Hill Road, outbound travel times are approximately 17 minutes in the PM peak compared to approximately 9 minutes during off-peak hours. It is assumed that much of this delay occurs approaching the roundabout from the north, but some delay likely occurs at the southbound approach to the Cowie Hill Road intersection.
- From Cowie Hill Road to Spryfield, outbound travel times are approximately 10 minutes throughout the day and there is no indication of higher delays during peak hours.
- Based on the above there is some potential for improvement in outbound transit travel times by the introduction of transit priority measures, but most of the delay likely occurs north of the Armdale Roundabout, outside of the Herring Cove Road corridor. Delays at Cowie Hill Road cvould potentially be addressed through a queue jump lane.

In summary, inbound transit priority measures on Herring Cove Road have a significantly higher potential to improve transit performance compared to outbound transit priority measures, based on existing travel time data.

3.4 Traffic Volumes

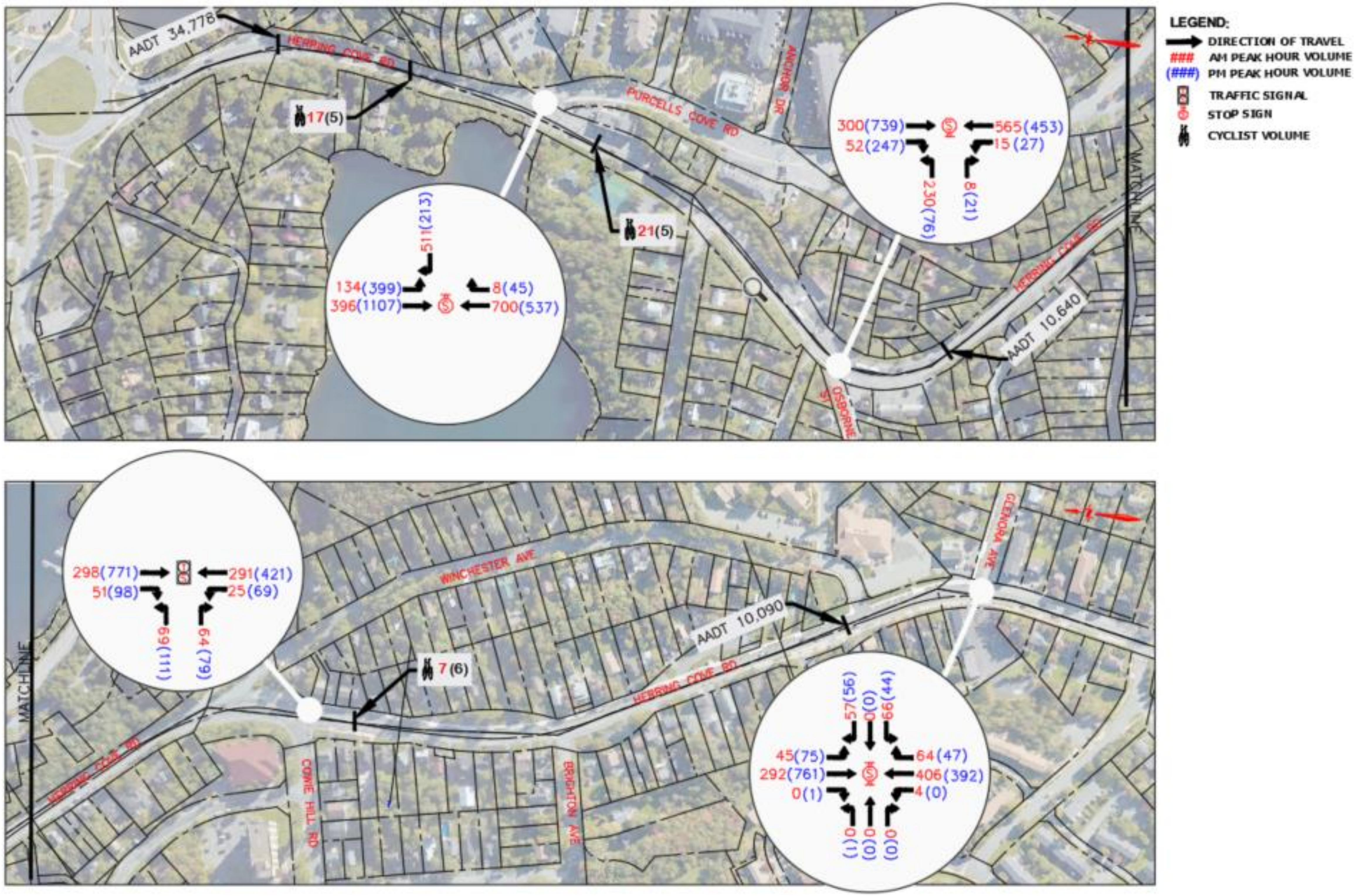
The AM and PM peak hour and daily traffic volumes along Herring Cove Road are shown in **Table 6** and in **Figure 7**. Traffic flows can be characterized as follows:

- Daily traffic volumes range from 10,000 to 35,000 vehicles per day in this stretch of the corridor.
- Volumes are heaviest near the Armdale Roundabout, a key access to the peninsula, and a pinch point along the corridor.
- The highest volumes along the corridor are observed during the PM peak hour;
- Directional traffic volumes along Herring Cove Road are highly influenced by commuter patterns in the morning and evening peak hours, particularly north of Osborne Street. In the morning peak, approximately 65-70% traffic is inbound and in the evening peak approximately 65-70% of traffic is outbound. South of Osborne Street, directional peaks are still evident but to a lesser extent; and
- Volumes increase significantly north of Purcells Cove Road. Purcells Cove Road contributes more than 600 veh/hr to the Herring Cove Road corridor in the AM and PM peak hours.

Table 6: Herring Cove Road Peak and Daily Two-Way Traffic Volumes

Link	AM Peak Hour Traffic Volume		PM Peak Hour Traffic Volume		AADT
	Inbound	Outbound	Inbound	Outbound	2-Way
Armdale Roundabout to Purcells Cove Road (3 lanes - Reversible) (300m)	1,211	530	750	1,506	34,780
Purcells Cove Road to Osborne Street (2-lanes) (300m)	752	374	556	1,047	13,310
Osborne Street to Cowie Hill Road (2-lanes) (500m)	470	306	506	815	10,640
Cowie Hill Road to Glenora Avenue (2-lanes) (550m)	390	350	469	844	10,090

Figure 7: Herring Cove Road Traffic Volumes



4.0 Existing Operational Conditions

4.1 Vehicle Level of Service

Traffic Modelling

Traffic conditions were modelled using Synchro 10, which is a traffic analysis software that uses the Highway Capacity Manual and Intersection Capacity Utilization procedures.

The intersection performance was evaluated mainly in terms of the level of service (LOS), which is a common performance measurement of an intersection. The LOS is determined based on vehicle delay and is expressed on a scale of A through F, where LOS A represents very short delay (<10 seconds per vehicle) and LOS F represents very long delay (>50 seconds per vehicle at a stop controlled intersection and >80 seconds per vehicle at a signalized intersection). A LOS D is often considered acceptable in urban locations; however, some communities will accept a LOS E. The LOS criteria for both signalized and stop control intersections are shown in **Table 7**.

Table 7: Intersection Level of Service Criteria

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop (**Excellent**)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (**Very Good**)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (**Good**)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (**Satisfactory**)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of **acceptable** delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (**Unacceptable**)	greater than 80.0	greater than 50.0

In addition to the LOS criteria described above, the volume to capacity (v/c) ratio was reported for each turning movement. The model reflects traffic signal timings and coordination parameters provided by HRM and the 30% design analysis used.

Intersection turning movement counts were received from HRM at each study intersection. Traffic data dated from 2016 to 2019. It was determined that growth has increased over the past 3 years near the Armdale roundabout, however the full corridor has been relatively flat. The corridor had been anticipating large development growth that would have contributed significantly to the area however, these plans have been postponed for future development. Therefore, no growth adjustment was applied to the older traffic data dated prior to 2019 and all traffic volumes are considered to represent 2019 existing conditions.

HRM advised that morning inbound queues on Herring Cove Road should be taken into consideration during the analysis. Five cameras were setup by HRM throughout the corridor and captured traffic flow from the Armdale Roundabout to Cowie Hill Road. Timelapse photos captured queueing in the AM from 7:00-9:00AM, and in the PM from 4:00-6:00PM over 4 days at 5-minute intervals. Though queues were observed as far back as Cowie Hill Road, the 95th percentile queue extended back to Purcells Cove Road during the AM peak hour. Delays were applied within the AM peak hour Synchro analysis to better reflect real life conditions on Herring Cove Road.

The resulting intersection LOS for the existing conditions for the AM and PM peak hours are shown in **Table 8.** The results indicate that all intersections operate overall at a satisfactory LOS D or better. Most delays occur along the minor approaches at T-intersections where Herring Cove Road traffic is free flowing. The LOS results are discussed below for the most congested intersections. Full Synchro reports can be found in **Appendix A**.

Herring Cove Road at Purcells Cove Road

- <u>AM Peak Hour</u>
    - This intersection operates at an overall LOS F in the AM peak hour with 62.6 seconds of delay per vehicle.
    - The westbound right movement from Purcells Cove Road is the source of the highest delays, operating at LOS F with 211.7 seconds of delay/vehicle and a V/C ratio of 1.38. The 95th percentile queue length is 204m. This is a result of the queueing from the Armdale Roundabout further north on Herring Cove Road. Traffic queues were observed to pass Purcells Cove Road 95% of the time in the AM peak hour.
- <u>PM Peak Hour</u>
    - This intersection operates at an overall LOS A in the PM peak hour. No operational issues were identified.

Herring Cove Road at Osborne Street

- <u>AM Peak Hour</u>
    - This intersection operates at an overall LOS C in the AM peak hour with 17.3 seconds of delay per vehicle.
    - The eastbound shared left/right movement from Osborne Street is the source of the highest delays, operating at LOS F with 84.1 seconds of delay/vehicle and a V/C ratio of 0.95. The 95th percentile queue length is 69m. Queues on Herring Cove Road often reached Osborne Street in the AM peak hour. Osborne Street is also situated on a curve that limits the sight distance to the south for left turning vehicles.
- <u>PM Peak Hour</u>
    - This intersection operates at an overall LOS A in the PM peak hour with 4.9 seconds of delay per vehicle.
    - The eastbound shared left/right movement from Osborne Street is the source of the highest delays, operating at LOS F with 72.4 seconds of delay/vehicle and a V/C ratio of 0.71. The 95th percentile queue length is 31m.

Herring Cove Road at Cowie Hill Road

- AM Peak Hour
    - This intersection operates at an overall LOS A in the AM peak hour with 8.8 seconds of delay per vehicle. No operational issues were identified in the modelling;
    - Field observations indicate that queuing from Armdale Roundabout occasionally extend to Cowie Hill Road, which would result in increased delays that are not reflected in the Synchro model.
- PM Peak Hour
    - This intersection operates at an overall LOS B in the PM peak hour with 13.1 seconds of delay per vehicle. No operational issues were identified.

Herring Cove Road at Glenora Avenue

- AM Peak Hour
    - This intersection operates at an overall LOS A in the AM peak hour with 4.5 seconds of delay per vehicle. No operational issues were identified.
- PM Peak Hour
    - This intersection operates at an overall LOS A in the PM peak hour with 4.5 seconds of delay per vehicle.
    - The westbound approach operates at LOS E with 45.3 seconds of delay/vehicle, but a V/C ratio of 0.56, indicating the approach is well under capacity.

Table 8: Peak Hour LOS Results for Existing (2019) Conditions

Intersection			Turning Movement LOS Average Delay (seconds per vehicle) [Volume to Capacity Ratio (v/c)] 95^{th} Percentile Queue (m)											
			Eastbound			Westbound			Northbound			Southbound		
Major Street @ Minor Street	Traffic Control	Overall LOS & Delay (sec/veh)	L ↰	T ↑	R ↱	L ↰	T ↑	R ↱	L ↰	T ↑	R ↱	L ↰	T ↑	R ↱
AM PEAK														
Herring Cove Road @ Purcells Cove Road	STOP	F 62.6	-	-	-	-	-	F 211.7 [1.38] 204	-	Free Flow [0.45]	Shared	B 11.1 [0.17] 5	Free Flow [0.25]	-
Herring Cove Road @ Osborne Street	STOP	C 17.3	F 84.1 [0.95] 69	-	F 84.1 [0.95] 69	-	-	-	Shared	A 0.4 [0.01] <1	-	-	Free Flow [0.23]	Shared
Herring Cove Road @ Cowie Hill Road		A 8.8	A 8.9 [0.30] 14	-	A 8.9 [0.30] 14	-	-	-	A 8.5 [0.5] 5	A 9.2 [0.31] 37	-	-	A 9.3 [0.31] 38	A 3.6 [0.06] 5
Herring Cove Road @ Glenora Avenue	STOP	A 3.6	-	-	-	Shared	C 22.2 [0.39] 14	Shared	-	A 0.1 [0.0] <1	Shared	Shared	A 1.6 [0.05] 1	-
PM PEAK														
Herring Cove Road @ Purcells Cove Road	STOP	A 3.8	-	-	-	-	-	C 18.5 [0.47] 19	-	Free Flow [0.37]	Shared	B 11.9 [0.46] 19	Free Flow [0.71]	-
Herring Cove Road @ Osborne Street	STOP	A 4.9	F 72.4 [0.71] 31	-	F 72.4 [0.71] 31	-	-	-	Shared	A 1.2 [0.04] 1	-	-	Free Flow [0.63]	Shared
Herring Cove Road @ Cowie Hill Road		B 13.1	C 28.2 [0.56] 48	-	C 28.2 [0.56] 48	-	-	-	B 10.6 [0.31] 13	A 8.0 [0.40] 50	-	-	B 13.8 [0.73] 124	A 2.2 [0.11] 6
Herring Cove Road @ Glenora Avenue	STOP	A 4.5	-	-	-	Shared	E 45.3 [0.56] 23	Shared	-	A 0.0 [0.0] <1	Shared	Shared	A 1.9 [0.08] 2	-

4.2 Multi-Modal Level of Service

Multi-modal level of service (MMLOS) is an emerging tool to assess existing conditions and evaluate potential future improvements along roadways for all modes of travel. MMLOS can assist in identifying the impacts and trade-offs for each mode as a result of design decisions. MMLOS can be defined as:

> *A set of discrete quantitative measures used to describe the convenience and comfort experienced by all roadway users over a particular roadway segment or at a particular intersection.*

HRM's 2019 MMLOS framework establishes a guide for conducting MMLOS analysis for both segment analysis and intersection analysis. An overview of the HRM's MMLOS parameters by mode for intersection and segment analysis is presented in **Table 9**.

Table 9: MMLOS Parameters by Area Type

Area	Realm	Pedestrian	Bicycle	Transit	Goods Movement	Automobile
INTERSECTIONS	Space	# of Uncontrolled Conflicts	# of Uncontrolled Conflicts	% Transit Priority Measures (of Ideal)	Average Curb Lane Width	% Movements with Exclusive Turning Lanes
	Environment	Average Crossing Width	Priority Treatments	Transit Movement V/C Ratio	Average Curb Radius	Turn Prohibitions
	Time	Cycle Length	Cycle Length	Transit Movement Delay	Truck Intersection Delay	Car Intersection Delay
SEGMENTS	Space	Pedestrian Facility Width	Driveway Density	Transit Facility Type	Width Of Curb Lane	Midblock V/C Ratio
	Environment	Pedestrian Zone Width	Speed x Volume	% of Stops with Bus Lay-bys	% No Stopping/ No Loading	On-Street Parking Availability
	Time	Distance Between Marked Crossings	Block Length	Travel Speed / Ideal Speed	Travel Speed / Ideal Speed	Travel Speed / Ideal Speed

Source: HRM Multi-Modal Level of Service Framework

HRM's multi-modal level of service evaluation tool was applied to assess existing conditions on Herring Cove Road. The methodology uses a look-up table approach to evaluate the following characteristics for each mode at the segment (refer to **Table 10**) and intersection level (refer to **Table 11**).

Table 10: Criteria for Segment MMLOS

	Mode	Realm	Weight	Measure	A	B	C	D	E	F
SEGMENTS	Pedestrians	Space	33.4%	Pedestrian Facility Width (m)	>=2.00	1.80 - 1.99	1.64 - 1.79	1.50 - 1.64	1.25 - 1.49	<1.25
		Environment	33.3%	Pedestrian Zone Width (m)	>= 3.50	3.00 - 3.49	2.74 - 2.99	2.50 - 2.75	2.00 - 2.49	<2.00
		Time	33.3%	Distance Between Marked Crossings (m)	< 100	100-149	150-199	200-249	249-300	> 300
	Cyclists	Space	20.0%	Driveway Density	0 - 8	>8 - 16	>16 - 24	>24 - 32	>32 - 40	> 40
		Environment	60.0%	Speed x Volume	A	B	C	D	E	F
		Time	20.0%	Block Length	< 100	100 - 149	150 - 199	200 - 249	249 - 300	> 300
	Transit	Space	50.0%	Transit Facility Type	24 Hour Lanes / Dedicated Facility	Daytime Transit Lanes	Peak Period Transit Lanes	Mixed Traffic with >1 lane	Mixed traffic with 1 lane	Mixed Traffic + Parking
		Environment	25.0%	% of Stops with Bus Lay-bys	0%	1% - 20%	21% - 40%	41% - 60%	61% - 80%	> 80%
		Time	25.0%	Travel Speed / Ideal Speed	0.91 - 1.00	0.81 - 0.90	0.71 - 0.80	0.61 - 0.70	0.60 - 0.50	<0.50
	Goods Movement	Space	33.4%	Width of Curb Lane (m)	>= 4.00	3.80 - 3.99	3.60 - 3.79	3.40 - 3.59		<3.40
		Environment	33.3%	% No Stopping / No Loading	< 10%	11% - 19%	20% - 39%	40% - 49%	50% - 59%	> 60%
		Time	33.3%	Travel Speed / Ideal Speed	0.91 - 1.00	0.81 - 0.90	0.71 - 0.80	0.61 - 0.70	0.60 - 0.50	<0.50
	Automobiles	Space	33.4%	Midblock V/C Ratio	< 0.60	0.60 - 0.69	0.70 - 0.79	0.80 - 0.89	0.90 - 0.99	>= 1.00
		Environment	33.3%	On-street Parking Availablity (%)	100%	80% - 99%	60% - 79%	40% - 59%	20% - 39%	0% - 19%
		Time	33.3%	Travel Speed / Ideal Speed	0.91 - 1.00	0.81 - 0.90	0.71 - 0.80	0.61 - 0.70	0.60 - 0.50	< 0.50

Table 11: Criteria for Intersection MMLOS

	Mode	Realm	Weight	Measure	A	B	C	D	E	F
INTERSECTIONS	Pedestrians	Space	33.4%	Number of Uncontrolled Conflicts	< 6	6-7	8-10	11-13		> 13
		Environment	33.3%	Avg. Crossing Width (m)	< 7	7 - 10.5	10.5 - 14	14 - 17.5	17.5 - 21	> 21
		Time	33.3%	Cycle Length (sec)	< 60	61 - 75	76 - 90	91 - 105	106 - 120	> 120
	Cyclists	Space	25.0%	Number of Uncontrolled Conflicts	< 6	6-7	8-10	11-13		> 13
		Environment	50.0%	Priority Treatments	90 - 100%	80 - 89%	70 - 79%	50 - 69%	30 - 49%	< 30%
		Time	25.0%	Cycle Length (sec)	< 60	61 - 75	76 - 90	91 - 105	106 - 120	> 120
	Transit	Space	50.0%	% of Transit Priority Measures (of Ideal)	90 - 100%	80 - 89%	70 - 79%	50 - 69%	30 - 49%	< 30%
		Environment	25.0%	Transit Movement V/C Ratio	< 0.60	0.60 - 0.69	0.70 - 0.79	0.80 - 0.89	0.90 - 0.99	> 1.0
		Time	25.0%	Transit Movement Delay (sec)	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80
	Goods Movement	Space	40.0%	Avg. Curb Lane Width (m)	>= 4.00	3.80 - 3.99	3.60 - 3.79	3.40 - 3.59		< 3.40
		Environment	20.0%	Avg. Effective Curb Radius (m)	> 18	16 - 18	15 - 16	13 - 14	11 - 12	< 11
		Time	40.0%	Truck Intersection Delay (sec)	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80
	Automobiles	Space	33.4%	% of movements with turn lanes	85 - 100%	60 - 85%	35 - 60%	10 - 35%		< 10%
		Environment	33.3%	Turn prohibitions	0	1	2	3	4	>= 5
		Time	33.3%	Car Intersection Delay (sec)	0 - 10	11 - 20	21 - 35	36 - 55	56 - 80	> 80

Several modifications to the methodology were applied for missing data within certain segments.

Key modifications to the original methodology are summarized below:

- **Transit Level of Service (TLOS)** – For the segment evaluation, the methodology identifies the environment realm as measured by % of stops with bus lay-bys. The Armdale roundabout to Purcells Cove Rd segment showed no bus stops with lay-bys. For this reason, this measure was omitted from this segment's analysis as suggested by the HRM MMLOS guideline. Likewise, the time realm is measured by the travel speed and ideal speed. However, the HRM MMLOS guide does not recommend the use of this analysis for segments less than 700m. Each segment within the study corridor is less than 700m and therefore, this step was omitted.

- **Goods Movement Level of Service (GLOS) -** For the segment evaluation, the methodology identifies the time realm as measured by the travel speed and ideal speed. However, the HRM MMLOS guide does not recommend the use of this analysis for segments less than 700m. As previously explained, each segment within the study corridor is less than 700m and therefore, this step was omitted. Likewise, the environment realm is measured by the % No Stopping/No Loading signage identified per segment. The southern three segments had no loading limitations, and therefore this step was omitted in the analysis.

- **Automobile Level of Service (ALOS) -** For the segment evaluation, the methodology identifies the time realm as measured by the travel speed and ideal speed. Once again, the HRM MMLOS guide does not recommend the use of this analysis for segments less than 700m, therefore, this step was omitted.

The following section provides a summary of the MMLOS evaluation results by mode.

4.3 Existing MMLOS Summary

Performance targets for each mode are defined in the HRM MMLOS guideline. The performance targets are first identified by their location within HRM (regional center, suburban, rural). Herring Cove Road falls within the region classified as Suburban. Performance targets are then selected for a basic corridor or priority corridor for a specific mode analysis. A basic corridor is selected for the mode if the expectations are that the mode should operate at acceptable level-of-service. A priority corridor is selected for the mode if a higher targeted level-of-service is desired. For example, given that Herring Cove Road is identified in the IMP as a transit priority corridor, transit is considered to be a priority mode, making its target level-of-service a higher value than a basic corridor. The results of the MMLOS analysis are summarized for all modes by segment in **Table 12** and by each of four intersections in **Table 13**. The following observations can be made from the results:

Pedestrians

- Road segments have a Pedestrian LOS D or E except the east side of Herring Cove Road from Cowie Hill Road to Glenora Avenue where recent sidewalk upgrades and addition of boulevard results in LOS C.
- Seven of the eight directional segments do not meet the pedestrian target of LOS C;
- The pedestrian LOS is poorest from Armdale Roundabout to Purcells Cove Rd segment (west side) and Purcells Cove Rd to Osborne St segment (east side) due to the poor quality of or lack of dedicated pedestrian facilities.
- Two of the four intersections meet the performance target of LOS C for pedestrians while the other two have an LOS D;
- The results indicate the pedestrian experience along the project corridor is generally fair to poor and below the performance target.

Cyclists

- All directional segments fail to meet the performance target of LOS C, with the majority of segments at LOS E;
- Three of the four intersections meet the performance target LOS C;
- Generally, the results indicate that cyclist experience along the study corridor is fair to poor and below the performance target.

Transit

- According to HRM's IMP, Armdale Roundabout to Cowie Hill Road is a transit priority corridor and thus has a performance target of LOS B;

- Three of the eight directional segments perform at LOS E while the remaining segments perform at LOS D;
- Intersections perform at LOS C or D;
- The poor levels of service within the segment and intersection evaluation are due to the lack of transit priority and existing lay-bys for buses; and
- Generally, the results indicate that the transit experience along the study corridor is fair to poor and below the performance target. Poor inbound transit travel times are not explicitly accounted for in the MMLOS analysis but would further degrade the performance level.

Trucks

- The Armdale Roundabout to Purcells Cove Rd segment (southbound) performs at a LOS F, while all other segments perform at LOS D or C, exceeding the performance target of LOS E;
- All intersections exceed the performance target of LOS E and perform at LOS C or B;
- The truck LOS performs moderately well south of Purcells Cove Rd due to the lane widths and large curb radii at the intersections; and
- Generally, the results indicate that the truck experience along Herring Cove Rd is good to fair and meets or exceeds performance targets south of Purcells Cove Road.

Autos

- Directional segments range from LOS C to LOS F. Poor levels of service are due to high v/c ratios during peak periods. Two directional segments do not meet the LOS target of LOS E. This includes the northbound direction approaching Armdale Roundabout (during AM peak hour) and the southbound direction from Purcells Cove Road to Osborne Street (during PM peak hour);
- Generally, the results indicate that the auto experience along the corridor is fair to poor due to peak hour congestion.

Table 12: MMLOS Summary by Road Segments (Existing)

2019 Existing Conditions

Segment Analysis Results — *Area Type: Suburban*

DIR	MODE						Herring Cove Road						MODE	DIR
	Armdale Roundabout							Armdale Roundabout						
SB	Target	C	C	B	E	E		E	E	B	C	C	Target	NB
SB	Actual	E	D	D	F	E		F	D	D	E	D	Actual	NB
	Purcells Cove Road							Purcells Cove Road						
SB	Target	C	C	B	E	E		E	E	B	C	C	Target	NB
SB	Actual	D	D	E	C	F		E	C	D	E	E	Actual	NB
	Osborne Street							Osborne Street						
SB	Target	C	C	B	E	E		E	E	B	C	C	Target	NB
SB	Actual	D	E	D	C	D		C	C	E	D	D	Actual	NB
	Cowie Hill Road							Cowie Hill Road						
SB	Target	C	C	C	E	E		E	E	C	C	C	Target	NB
SB	Actual	D	E	E	C	E		C	C	D	E	C	Actual	NB
	Glenora Avenue							Glenora Avenue						

Table 13: MMLOS Summary by Intersection (Existing)

2019 Existing Conditions					
Intersection Analysis Results					
Area Type:	*Suburban*				
MODE					
Purcells Cove Road/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	C	D	D	C	C
Osborne Street/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	D	C	D	B	C
Cowie Hill Road/Herring Cove Road - T-intersection (signalized)					
Target	C	C	B	E	E
Actual	C	C	C	B	B
Glenora Avenue/Herring Cove Road - 4-way minor controlled (unsignalizec					
Target	C	C	C	E	E
Actual	D	C	C	B	C

5.0 Future Development Growth

5.1 Planned Developments

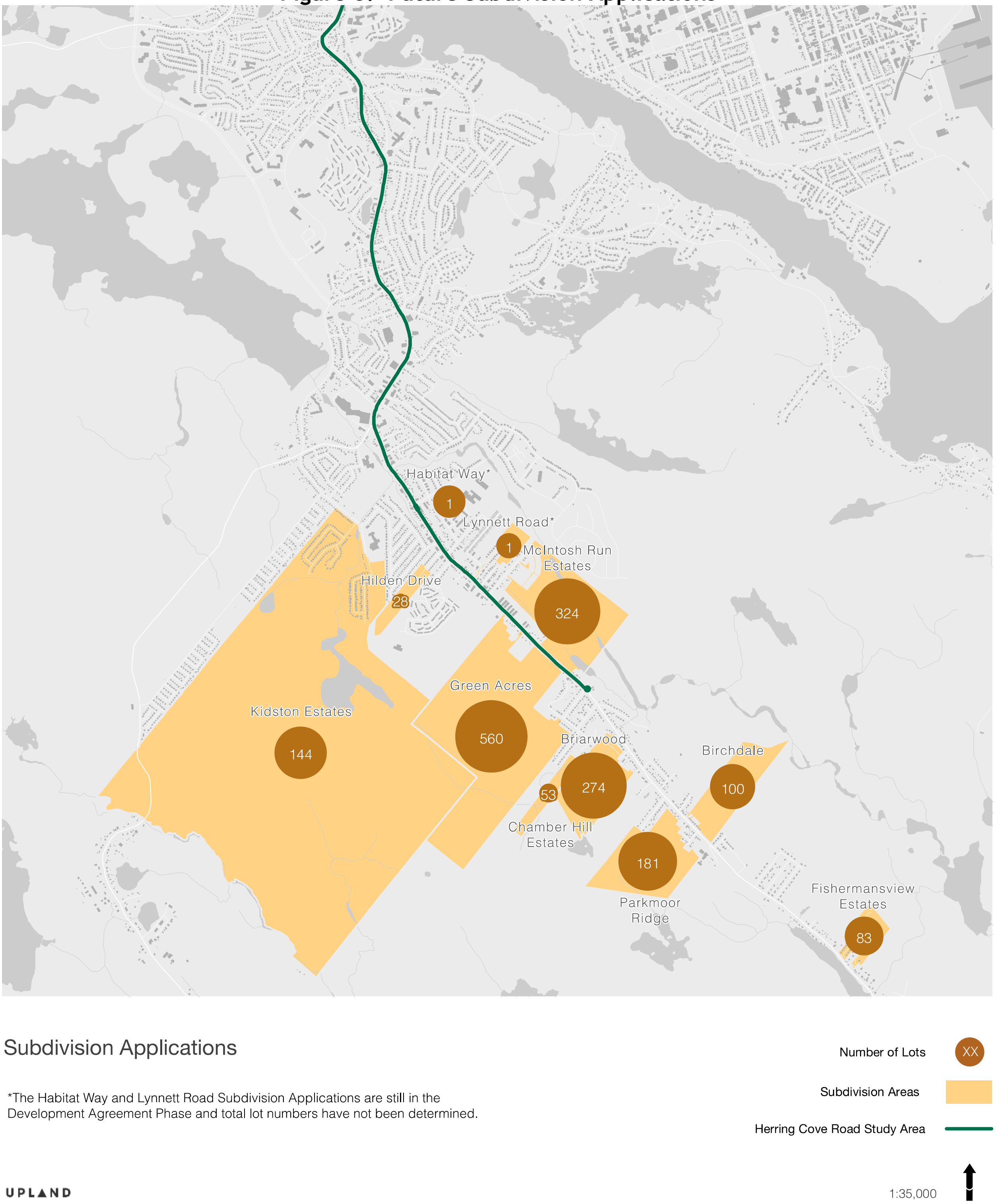
A significant amount of new development, mostly low density residential, is expected in the Herring Cove Road area in coming years. Developments shown in **Figure 8** reflect both developments permitted under existing zoning through an as-of-right subdivision process and through discretionary planning applications. These developments total 2,276 new residential units and include:

- In the Kidston Lake area, **Kidston Estates** may allow for up to approximately 144 lots, of which 125 have received final approval;
- An extension of **Hilden Drive** for 28 new lots;
- In the Drysdale Road area, a Habitat for Humanity development called **Habitat Way** is in the development agreement process, proposed to include 78 dwelling units including townhouses, condominium townhouses and a four-storey multiple-family residential building;
- At the end of **Lynnett Road**, a development agreement has been approved for six townhouse units and a 40-unit apartment building, and a second phase which includes for another 27 units behind Autumn Drive in a mix of single, semi-detached and townhouse dwellings (for a total of 73 units);
- **McIntosh Run Estates**, located just south of McIntosh Street on the east side of Herring Cove Road, will accommodate single-unit dwellings on 324 lots;
- On the west side of Herring Cove Road, the **Green Acres** subdivision is expected to accommodate 917 new units on 560 lots;
- South of Woodcrest Avenue and north of the Briarwood Golf Course, **Chamber Hill Estates** was approved for 53 lots of single-unit dwellings in 2014;
- The former **Briarwood** Golf Course is proposed for redevelopment for 274 lots;
- On the east side of Herring Cove Road between Barclay Avenue and Sarah Drive, the **Birchdale** subdivision is expected to accommodate up to 100 lots of single-unit dwellings; and
- An application has been submitted to create 181 lots at **Parkmoor Ridge**, with a total of 202 units; and
- To the south of the Study Area **Fishermansview Estates** has proposed 83 lots of single-unit dwellings.

Table 14: Summary of Future Residential Development and Number of Units

Future Development Area	# of Residential Units
Kidston Estates	144
Hilden Drive	28
Habitat Way	78
Lynette Road	73
McIntosh Run Estates	324
Green Acres Subdivision	917
Chamber Hill Estates	53
Briarwood Golf Course	274
Birchdale Subdivision	100
Parkmoor Ridge	202
Fishermansview Estates	83
Total Units	**2,276**

Figure 8: Future Subdivision Applications



5.2 Future Transportation Demands

The above development areas are expected to build out in the next 10-20 years and will place significant additional transportation pressure on Herring Cove Road. Without a notable shift towards non-auto modes, it is estimated that the 2,276 new residential units would generate more than 20,000 new vehicle trips per day. Although it is expected that some portion of the traffic would exit Herring Cove Road at Dentith Road, there will still be significant demand continuing north on Herring Cove Road toward Armdale Roundabout.

Traffic impact studies completed for most of the above developments were made available for review. Trip generation and assignment estimates were summarized to determine the level of motor vehicle traffic estimated to continue north on Herring Cove Road to Armdale Roundabout. The total AM and PM peak hour trips are summarized as follows:

- AM Northbound: 1,141 vehicle trips (commuter peak direction)
- AM Southbound: 400 vehicle trips
- PM Northbound: 716 vehicle Trips
- PM Southbound: 1,237 vehicle Trips (commuter peak direction)

Given that Herring Cove Road is already operating at capacity in the northbound direction during the AM peak (approaching Armdale Roundabout), there is no reserve capacity to accommodate these new vehicle trips for the inbound commuter peak. In the PM peak, although existing conditions operate at a good LOS, adding 1200 new vehicle trips in the southbound direction would result in a total demand of 2,000+ veh/hour. This exceeds the capacity that can be accommodated in a single traffic lane.

The 2019 Functional Plan analyses 2033 traffic conditions by adding 400-500 vehicles/hr in the northbound and southbound directions during peak hours. This resulted in LOS F conditions at Purcells Cove Road and Osborne Street along with some operational issues at Cowie Hill Road and Glenora Avenue. The estimated volumes above are double these growth estimates, so far worse conditions would be expected. It is not realistic to assume that this level of traffic growth would be realized on Herring Cove Road.

The accommodation of future transportation demands from the proposed developments on Herring Cove Road will rely on a significant shift toward non-auto modes since there are no plans to add motor vehicle capacity to the Herring Cove Road corridor. This emphasizes the need for high quality transit and active transportation facilities as proposed in the Option 1 and Option 2 designs for Herring Cove Road. It will also be important to extend these facilities south to serve the new development areas complete with AT connections that provide convenient walking and cycling access to Herring Cove Road, particularly at transit stops.

6.0 Corridor Options for 60% Design

6.1 Option Descriptions

HRM identified the two corridor options for the 60% design from Armdale Roundabout to Glenora Avenue. These options are described as follows:

- **Option 1** includes a continuous inbound transit lane, a raised multi-use pathway on the east side, continuous sidewalk on the west side, and outbound transit priority measures at the Cowie Hill Road intersection. No additional vehicle lanes are added.

- **Option 2** includes the same features as Option 1 but adds an outbound transit lane from south of Purcells Cove Road to Glenora Avenue. No additional vehicle lanes are added.

Additional localized improvements are as follows:

<u>**Option 1:**</u>

- The inbound transit lane would terminate as a general-purpose right-turn lane at the Armdale Roundabout which provides some increase for motor vehicle capacity;
- A multi-use path would be extended down the north side of Purcells Cove Road to Spinnaker Avenue, connecting the proposed Herring Cove Road pathway with the existing bike lanes on Purcells Cove Road and proposed local street bikeway on Spinnaker Avenue.
- The Herring Cove Road/Purcells Cove Road would be reconfigured to improve approach alignment and pedestrian crossings while accommodating truck turning movements.
- The radius of the horizontal curve at Osborne Street would be improved from an existing radius of 75m to a new radius of 90m. This improves driver comfort and sight distance to Osborne Street and the RA-5 crosswalk. It is proposed to relocate the crosswalk to the south side of Osborne Street for improved visibility and connectivity with the Osborne Street sidewalk.
- The Cowie Hill Road intersection would be improved with a complete replacement of traffic signals to improve traffic signal head positioning and allow for transit signals. The southbound channelized right turn island would be removed and a southbound transit queue jump lane installed. The pedestrian crossing on the north leg would be removed.
- A southbound left turn lane would be added at Glenora Avenue.
- All transit stops would be upgraded with bus shelters and concrete pads. Additional improvements for BRT stops may be considered where space permits.

<u>**Option 2:**</u>

- All localized improvements in Option 1 apply to Option 2, except at Cowie Hill Road, where the southbound queue jump lane becomes part of the continuous southbound transit lane.

The 60% design package for each option, submitted separately, includes plan and profile drawings, 20m design cross-sections, and driveway profiles.

6.2 Deviations from 2019 Functional Plan

Upon discussions with HRM, several changes to the corridor options were made that represented deviations from the 2019 Functional Plan. These are described as follows:

<u>Option 1:</u>
The Ultimate Scenario from the 2019 Functional Plan ended the transit lane and multi-use pathway at Cowie Hill Road. South of Cowie Hill Road, the Functional Plan recommended one-way cycle tracks and sidewalks on both sides of the street in combination with a 7.0m wide roadway (curb-to-curb). During discussions of design criteria for the 60% design, it was agreed with HRM that 7.0m would be too narrow for this class of roadway. A minimum lane width of 3.7m (to face of curb) was agreed upon, resulting in a minimum road width of 7.4m. Additionally, HRM was interested in extended the inbound transit lane all the way to Glenora Avenue. These two changes made it problematic to fit the one-way cycle tracks without widespread property impacts. Therefore, it was agreed to continue a multi-use pathway to Glenora Avenue instead of cycle tracks. It was noted that the pathway would cross many residential driveways, but HRM was comfortable with the facility selection.

<u>Option 2:</u>
The Ultimate Scenario from the 2019 Functional Plan did not contemplate an outbound transit lane. This was added as an option during the 60% design due to an increasing focus on higher order transit in the south end of Halifax. HRM was interested in what the costs, benefits, and impacts of adding the outbound transit lane would be. Due to significant constraints between Armdale Roundabout and Purcells Cove Road, it was agreed to begin the outbound transit lane south of Purcells Cove Road.

6.3 MMLOS Results for Option 1 and 2

The MMLOS analysis was repeated for Option 1 and 2 corridor conditions, using 2019 existing traffic volumes. The Option 1 and 2 results for segment MMLOS and intersection MMLOS are shown in Figure 9 and Figure 10, respectively. Key observations from these results are as follows:

<u>Option 1:</u>
- Pedestrian LOS improves in both directions, particularly in the northbound direction (or east side) due to the multi-use trail. All segments but one would meet the pedestrian LOS C target. The segment between the Armdale Roundabout and Purcells Cove Road would be at LOS D due to the lack of boulevard and high traffic volumes.
- Cyclist LOS ranges from LOS A to C for segments and intersections, all meeting the target LOS C. Note that northbound and southbound cyclist movements were assumed to occur on the multi-use pathway.
- Transit LOS improves to LOS A for the northbound direction due to the inbound transit lane but remains at LOS D for the outbound direction.
- Truck LOS drops to LOS D to LOS F due to the narrowing of traffic lanes. Where traffic lanes are narrower than 3.4m, truck LOS falls to LOS F, which is below the target of LOS E.
- Auto LOS remains similar to existing conditions.

<u>Option 2:</u>

- Pedestrian LOS is similar to Option 1, but between Cowie Hill road and Osborne Street, LOS drops to LOS D since the boulevard is eliminated next to the outbound transit lane.
- Cyclist LOS is the same as Option 1;
- Transit LOS improves to LOS A in the southbound direction due to the outbound transit lane. The exception from Armdale Roundabout to Purcells Cove Road, where southbound transit LOS remains at D since no outbound lane was added in this segment.
- Southbound truck LOS drops to LOS F since trucks will be travelling in a 3.3m wide lane.
- Auto LOS remains the same as Option 1.

In summary:

- Target LOS is achieved for pedestrians and cyclists for nearly all segments and intersections in Option 1 and 2;
- Transit LOS exceeds the target of LOS B in Option 1 for the southbound direction only, but in both directions for Option 2;
- Truck LOS falls below the target LOS E for most segments;
- Auto LOS remains below target LOS E for most segments, similar to existing conditions.

MMLOS under future traffic volume conditions would reduce for some modes given increased traffic volumes. Auto LOS would become worse and transit performance would degrade where dedicated lanes or transit priority are not provided. Pedestrian LOS would also decrease on some segments due to increased traffic volumes.

Figure 9: Segment MMLOS Results for Option 1 and 2 (existing volumes)

Option 1 Conditions

Segment Analysis Results — *Area Type: Suburban*

Herring Cove Road

DIR: SB

MODE					
Armdale Roundabout					
Target	C	C	B	E	E
Actual	D	B	D	D	E
Purcells Cove Road					
Target	C	C	B	E	E
Actual	C	B	D	D	F
Osborne Street					
Target	C	C	B	E	E
Actual	C	B	D	D	D
Cowie Hill Road					
Target	C	C	C	E	E
Actual	C	C	D	D	D
Glenora Avenue					

DIR: NB

					MODE
					Armdale Roundabout
E	E	B	C	C	Target
F	F	A	C	C	Actual
					Purcells Cove Road
E	E	B	C	C	Target
E	F	A	C	B	Actual
					Osborne Street
E	E	B	C	C	Target
C	F	A	A	C	Actual
					Cowie Hill Road
E	E	C	C	C	Target
C	F	A	B	B	Actual
					Glenora Avenue

Option 2 Conditions

Segment Analysis Results — *Area Type: Suburban*

Herring Cove Road

DIR: SB

MODE					
Armdale Roundabout					
Target	C	C	B	E	E
Actual	D	B	D	D	E
Purcells Cove Road					
Target	C	C	B	E	E
Actual	C	B	A	F	F
Osborne Street					
Target	C	C	B	E	E
Actual	C	B	A	F	D
Cowie Hill Road					
Target	C	C	C	E	E
Actual	D	C	A	F	D
Glenora Avenue					

DIR: NB

					MODE
					Armdale Roundabout
E	E	B	C	C	Target
F	F	A	C	C	Actual
					Purcells Cove Road
E	E	B	C	C	Target
E	F	A	C	B	Actual
					Osborne Street
E	E	B	C	C	Target
C	F	A	A	C	Actual
					Cowie Hill Road
E	E	C	C	C	Target
C	F	A	B	B	Actual
					Glenora Avenue

Figure 10: Intersection MMLOS Results for Option 1 and 2 (existing volumes)

Option 1 Conditions					
Intersection Analysis Results					
Area Type:	Suburban				
MODE	Pedestrian	Bicycle	Transit	Truck	Auto
Purcells Cove Road/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	C	B	B	B	B
Osborne Street/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	C	C	C	C	C
Cowie Hill Road/Herring Cove Road - T-intersection (signalized)					
Target	C	C	B	E	E
Actual	D	B	C	B	B
Glenora Avenue/Herring Cove Road - 4-way minor controlled (unsigr					
Target	C	C	C	E	E
Actual	D	B	B	B	B

Option 2 Conditions					
Intersection Analysis Results					
Area Type:	Suburban				
MODE	Pedestrian	Bicycle	Transit	Truck	Auto
Purcells Cove Road/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	C	B	A	B	C
Osborne Street/Herring Cove Road - T-intersection (unsignalized)					
Target	C	C	B	E	E
Actual	D	D	A	C	C
Cowie Hill Road/Herring Cove Road - T-intersection (signalized)					
Target	C	C	B	E	E
Actual	D	B	A	B	B
Glenora Avenue/Herring Cove Road - 4-way minor controlled (unsigr					
Target	C	C	C	E	E
Actual	C	B	A	B	B

7.0 Design Considerations and Constraints

7.1 Design Limits and Chainage

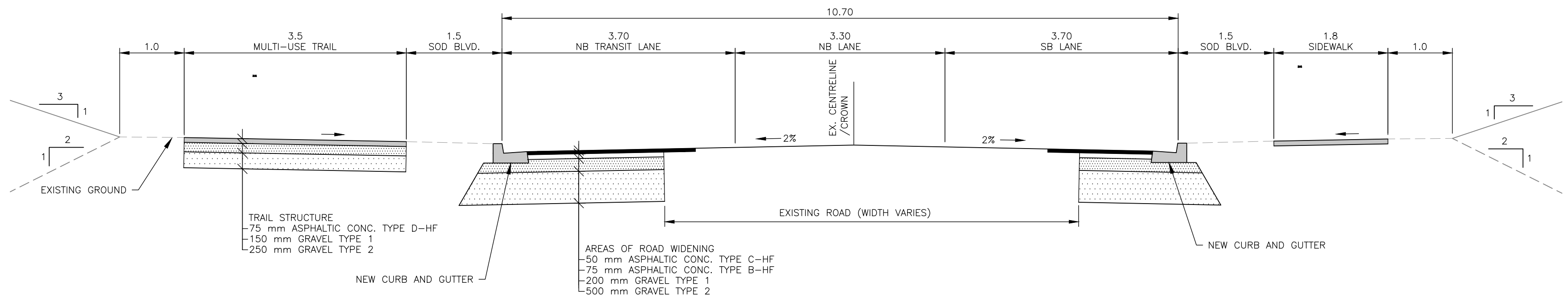
The limits of the 60% design begin on the south side of the Armdale Roundabout and extend just south of Glenora Avenue. Station 0+000 is located at the centre of the Armdale Roundabout and increases in southerly direction. The south project limit is at station 1+750 (Glenora Avenue is at 1+700).

7.2 Design Criteria

HRM was consulted on the design dimensions to be applied to the cross-sectional elements of the corridor upgrade. Key values are listed below in **Table 15**, including target dimensions as well as dimensions for application in highly constrained locations. Typical design cross-sections for Option 1 and Option 2 are shown in **Figure 11** and **Figure 12**. Although the constrained and target values meet TAC guidelines, the lane widths are less than those prescribed in the HRM Red Book and sidewalk without boulevard is also not a typical standard in the Red Book. Values that do not meet the current Red Book standards may require a design variance request.

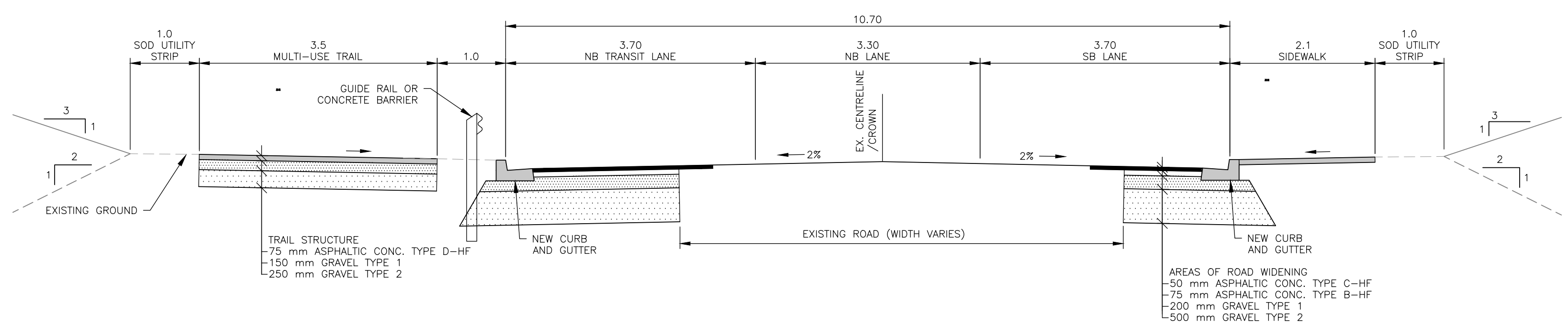
Table 15: Cross-Section Design Criteria

Cross-Section Feature	Target Value	Constrained Value
Curb Traffic Lane/Transit Lane	3.7m to curb face	---
Inside Traffic Lane	3.3 m	---
Sidewalk	1.8m with 1.5m blvd	2.1m (from face of curb), no blvd
Multi-Use Pathway	3.5m with 1.5m blvd	3.5m with 1.0m blvd and barrier in blvd Pathway may reduce to 2.4m for very short distance.



TYPICAL 3-LANE CROSS SECTION WITH INBOUND TRANSIT LANE

0.5m 0 1m
(1:50 FULL SCALE)



CONSTRAINED 3-LANE CROSS SECTION WITH INBOUND TRANSIT LANE

0.5m 0 1m
(1:50 FULL SCALE)

KEY PLAN
SCALE 1:10 000

PLAN LEGEND

EXISTING — PROPOSED

- SURVEY CONTROL POINT
- WATERVALVE
- FIRE HYDRANT
- UTILITY POLE AND GUY WIRE
- SIGN POST/BASE
- FENCE
- RETAINING WALL
- CONCRETE CURB
- PROPERTY LINE
- BASELINE
- SEWER MANHOLES
- CATCHBASIN
- GAS MAIN
- CONCRETE SURFACE
- ASPHALT SURFACE
- EDGE OF GRAVEL SURFACE
- WATERMAIN
- TREE
- DETECTOR LOOP
- PEDESTRIAN RAMP
- BUS STOP AND/OR SHELTER

NOTES

1. ALL WORK IS TO BE DONE IN ACCORDANCE WITH HRM CONTRACT DOCUMENTS.
2. GRADES SHOWN ARE APPROXIMATE. FINISHED GRADE IS TO BE APPROVED IN THE FIELD BY THE ENGINEER.
3. UTILITY INFORMATION IS APPROXIMATE ONLY. CONTRACTOR IS RESPONSIBLE TO ARRANGE FOR ON SITE LOCATES WITH ALL UTILITIES PRIOR TO START OF WORK.
4. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS REQUIRED TO PERFORM WORK AND TO COMPLY WITH ALL APPLICABLE ENVIRONMENTAL REGULATIONS.
5. WHERE EXISTING CONDITIONS ARE SHOWN THEY ARE NOT NECESSARILY ACCURATE OR COMPLETE. THE CONTRACTOR SHALL CONFIRM ALL EXISTING DIMENSIONS AND LOCATIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
6. THE CONTRACTOR SHALL CHECK AND VERIFY ALL PROPOSED DIMENSIONS BEFORE PROCEEDING WITH CONSTRUCTION. ANY ADJUSTMENTS WILL BE MADE BY THE ENGINEER AS NECESSARY.
7. CONTRACTOR IS RESPONSIBLE FOR SETTING GRADES AND LAYOUT CONTROL.
8. TRAFFIC SIGNS ARE NOT TO BE REMOVED OR REPLACED WITHOUT AUTHORIZATION FROM THE TRAFFIC AUTHORITY AND THE ENGINEER.
9. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF TREES. TREES ARE NOT TO BE REMOVED WITHOUT PERMISSION FROM THE ENGINEER.
10. WORK IN THE IMMEDIATE AREA OF A NOVA SCOTIA COORDINATE MONUMENT MUST BE CARRIED OUT BY HAND. THE CONTRACTOR IS RESPONSIBLE FOR ANY COSTS IF MONUMENTS ARE DISTURBED.
11. AT COMPLETION OF WORK REINSTATE ALL DISTURBED SURFACES TO THE SATISFACTION OF THE ENGINEER.
12. WATER VALVE BOX EXTENSIONS – THE MINIMUM INSIDE DIAMETER OF A VALVE BOX EXTENSION SHALL BE 125 mm AND THE MINIMUM LENGTH OF A VALVE BOX EXTENSION SHALL BE 300 mm. CONTRACTOR TO CONFIRM APPROPRIATE PRODUCT TO BE USED WITH HALIFAX WATER OPERATIONS DEPARTMENT STAFF.
13. ALL NEW PEDESTRIAN RAMPS TO INCLUDE TACTILE WALKING SURFACE INDICATOR PLATES AS PER HRM DETAILS 131 AND 132.

REVIEWED AND APPROVED FOR TRAFFIC SIGNALS AND PAVEMENT MARKINGS

Appr'd ____________ Date ________
for TRAFFIC AUTHORITY

No.	Date	Revision Description	Appr'd
1	MAY 28/20	ISSUED FOR 60% DESIGN SUBMISSION	

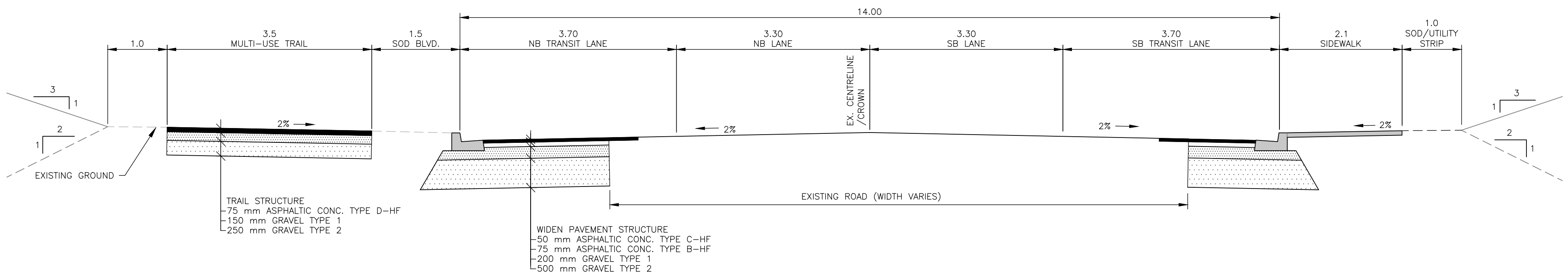
PRELIMINARY

HALIFAX

HERRING COVE ROAD
ARMDALE ROUNDABOUT TO GLENORA AVENUE
HALIFAX

DESIGN CONCEPT OPTION 1
TYPICAL SECTIONS

Date 20–04–28	Drawn TJ	Tender No. 19–000
Scale Horz. 1:500 Vert. 1:50	Survey No. SU18xxxx	Sheet 1 Of 1
Reference	DATUM HORZ: NAD83(CSRS) EPOCH 2010.0 3° MTM PROJECTION ZONE 5 VERT: CGVD2013	Drawing No. FIGURE 9
Checked		



TYPICAL 4-LANE CROSS SECTION WITH INBOUND AND OUTBOUND TRANSIT LANES
(PURCELLS COVE ROAD TO GLENORA AVENUE)

0.5m 0 1m
(1:50 FULL SCALE)

KEY PLAN
SCALE 1:10 000

PLAN LEGEND

EXISTING | PROPOSED

- SURVEY CONTROL POINT (PT NO)
- WATERVALVE
- FIRE HYDRANT
- UTILITY POLE AND GUY WIRE
- SIGN POST/BASE
- FENCE
- RETAINING WALL
- CONCRETE CURB
- PROPERTY LINE
- BASELINE
- SEWER MANHOLES
- CATCHBASIN
- GAS MAIN
- CONCRETE SURFACE
- ASPHALT SURFACE
- EDGE OF GRAVEL SURFACE
- WATERMAIN
- TREE
- DETECTOR LOOP
- PEDESTRIAN RAMP
- BUS STOP AND/OR SHELTER

NOTES

1. ALL WORK IS TO BE DONE IN ACCORDANCE WITH HRM CONTRACT DOCUMENTS.
2. GRADES SHOWN ARE APPROXIMATE. FINISHED GRADE IS TO BE APPROVED IN THE FIELD BY THE ENGINEER.
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13. ALL NEW PEDESTRIAN RAMPS TO INCLUDE TACTILE WALKING SURFACE INDICATOR PLATES AS PER HRM DETAILS 131 AND 132.

REVIEWED AND APPROVED FOR TRAFFIC SIGNALS AND PAVEMENT MARKINGS

Appr'd ____________ Date ________
for TRAFFIC AUTHORITY

No.	Date	Revision Description	Appr'd
1	MAY 28/20	ISSUED FOR 60% DESIGN SUBMISSION	

PRELIMINARY

HALIFAX

HERRING COVE ROAD
ARMDALE ROUNDABOUT TO GLENORA AVENUE
HALIFAX

DESIGN CONCEPT OPTION 2
TYPICAL SECTIONS

Date 20-04-28	Drawn TJ	Tender No. 19-000	
Scale Horz. 1:50 Vert. 1:50	Survey No. SU18xxxx	Sheet 1 Of 1	
Reference	DATUM HORZ: NAD83(CSRS) EPOCH 2010.0 3° MTM PROJECTION ZONE 5 VERT: CGVD2013	Drawing No. FIGURE 10	
Checked			

7.3 Option 1 Design Considerations

Design Elements and Challenges

Comfort of Multi-Use Pathway

A key element of the Herring Cove Road upgrade is a continuous multi-use path on the east side of the corridor from Armdale Roundabout to Glenora Avenue. The pathway is proposed to be 3.5m wide with a 1.0-1.5m boulevard separation from the transit lane. General comments about the comfort of the facility within the context of the corridor conditions are as follows:

- Grades on Herring Cove Road are steep and will be a challenge for riders. The longest and steepest grades are as follows:
  - 400m long grade from Armdale Roundabout to Purcells Cove Road with average grade of 6% and a maximum grade of 8-9%.
  - 450m long grade from Maplewood Drive to Brighton Avenue with average grade of 6.6% and maximum grade of 7-8%.
- Many driveways are located on the southern portion of the corridor from Cowie Hill Road to Glenora Avenue. The multi-use pathway would cross 22 residential driveways over this 840m stretch. This is not ideal although sight distance at most driveways appears good.
- The boulevard width of 1.0-1.5m is less than desirable, but the presence of the adjacent bus lane provides an added buffer from vehicle traffic, mitigating some discomfort. Where the boulevard width is 1.0m which is limited to the first section from Armdale Roundabout to Purcells Cove Road, a barrier is proposed to be placed in the boulevard. A guide rail is shown in the 60% design but a raised concrete barrier may also be considered as long as it does not block sight lines at driveways and street entrances.

Pedestrian Crossings

Existing pedestrian crossings and their locations are listed in **Table 16** along with the proposed crossings in the 60% design. No new crosswalks are proposed to be added, but two of the five crosswalks are proposed to be relocated.

Table 16: Existing and Proposed Crosswalks Locations

Existing Crosswalk Locations	Proposed Crosswalk Locations	Comments
0+370 (RA-5)	0+373 (RA-5)	Median island refuge would be widened
0+630 (RA-5)	0+670 (RA-5)	Relocated for improved connectivity and visibility
1+150 (Signalized)	1+150 (Signalized)	Part of Cowie Hill Road signal
1+352 (Signed and Marked)	1+353 (RA-5)	Intersection corner would be bumped out so that this crossing can remain in its current location
1+695 (RA-5)	1+695 (RA-5)	Location maintained, but crossing would be widened to three lanes due to addition of southbound left turn lane.

Bus Stop Locations and Treatments

Table 17 lists the twelve existing bus stops along Herring Cove Road, their existing and proposed locations, and whether Halifax Transit has identified them as Enhanced Bust Stops for BRT. Most bus stops would be maintained in their existing location in the proposed design. The following changes are proposed:

- Inbound bus stops 6903 and 6900 would be consolidated to a single stop;
- Inbound bus stop 6910 would be relocated to be opposite Osborne Street to be more centrally located to Osborne Street, Lawnwood Avenue, and Keddy Road. This location also offers favourable topography for a shelter installation. The existing location is at the end of Braeburn Road and is accessible from Braeburn by a set of stairs. Maintaining this stop location would be problematic and costly if a shelter is desired given the steep sideslopes and retaining wall requirements.
- The existing bus laybys at stops 6901, 6850, and 6869 would be eliminated.

All bus stops are proposed to be upgraded with concrete pads and bus shelters per HRM design standards as a minimum. Halifax Transit has identified six stops as candidates for BRT Enhanced Bus Stops, which would include a longer platform, heated shelter, signage and displays and other amenities. The 60% design drawings currently only show standard bus stop treatments, but most BRT stops could be adapted to enhanced stops during detailed design – the exceptions being stop 6900/6903 and stop 6856 where physical constraints or proximity of driveways presents challenges for lengthening platforms and installing larger shelters. Comments on these stop locations are as follows:

- At inbound station 6900/6903, a larger shelter (2.5m x 6m) could be accommodated but a 2m wide concrete platform, separate from the multi-use path, would require widening that would increase retaining wall requirements due to the topography; however, a 1.5m wide concrete pad between the multi-use path and the curb could be accommodated along the length of the BRT platform.

- At outbound station 6856, driveways on either side of the bus stop would limit the length of the concrete platform. A platform 2.0m wide x 20m long could be accommodated (combined with the sidewalk). Also, a larger shelter would require additional property acquisition. To achieve a longer platform, a near side stop, north of Cowie Hill Road might be considered, but this would not be as desirable for transit priority at the intersection and southbound sight distance is somewhat limited for vehicles approaching the bus stop.

Table 17: Existing and Proposed Bus Stops

Stop Name	Existing Bus Stop Location	Proposed Bus Stop Location	BRT Stop?
INBOUND			
Herring Cove Rd Before Purcells Cove Rd (6903)	0+400	0+450 Consolidate stops	Yes
Herring Cove Rd Before Melwood Ave (6900)	0+540		
Herring Cove Rd Opposite Maplewood Dr (6910)	0+800	0+650	
Herring Cove Rd At Winchester Ave (6906)	1+130	1+130	Yes
Herring Cove Rd After Shoreham Ln (6909)	1+490	1+490	
Herring Cove Rd After Glenora Ave (6860)	1+650	1+650	Yes
OUTBOUND			
Herring Cove Rd Before Melwood Ave (6901)	0+490	0+490	Yes
Herring Cove Rd After Withrod Dr (6868)	0+690	0+690	
Herring Cove Rd Before Winchester Ave (6844)	0+940	0+940	
Herring Cove Rd After Cowie Hill Rd (6856)	1+200	1+200	Yes
Herring Cove Rd After Brighton Ave (6850)	1+380	1+380	
Herring Cove Rd Before Shoreham Ln (6869)	1+580	1+580	Yes

Reversible Lanes

A 3-lane reversible lane configuration is located on Herring Cove Road from Armdale Roundabout to Purcells Cove Road. The centre reversible lane provides northbound flow in the AM and southbound flow in the PM. Lane control signals are mounted on three overhead gantries, which are positioned at Station 0+050, 0+150, and 0+315. These gantries will need to be replaced with a longer span to accommodate the fourth lane (inbound transit lane).

Windemere Road

Windemere Road is a private lane on the west side of Herring Cove Road that provides shared access to seven residences. Existing conditions of Windemere Road are as following:

- Windemere Road intersects Herring Cove Road 130m south of the Armdale Roundabout;
- The intersection angle is severely acute at 17 degrees.
- Windemere Road has a width of 3-5m and a steep downgrade of approximately 18% approaching Herring Cove Road.

Although the inbound transit lane and multi-use path are proposed to be added to the east side of Herring Cove Road, it is proposed to shift the street by a small amount to the west to mitigate residential property impacts along the east side. The shift to the west impacts the entrance of Windemere Road and requires reconstruction to manage the change in grades. This is shown in **Figure 13**. Due to the steep upgrade on Windemere Road, the grade transition is very challenging and significant reconstruction is required.

Two preliminary design options were prepared for reconstructing Windemere Road, as shown in **Figure 13**. Each option has a 17% grade, which is steeper than the maximum grade of 15% for residential driveways prescribed in the HRM Red Book.

- Option A would lower Windemere Road along its existing alignment by an average of approximately 2.5m below existing grade. The length of reconstruction is approximately 97m. The maximum grade is 17% over a distance of approximately 60m. The estimated construction cost for Option 1 is $370,000 + tax.
- Option B would realign Windemere Road such that it intersects Herring Cove Road at a right angle. The finished grade would be as much as 3.5m below existing ground. The length of reconstruction is approximately 75. The maximum grade is 17% over a distance of approximately 50m. The estimated construction cost for Option 2 is $310,000 + tax.

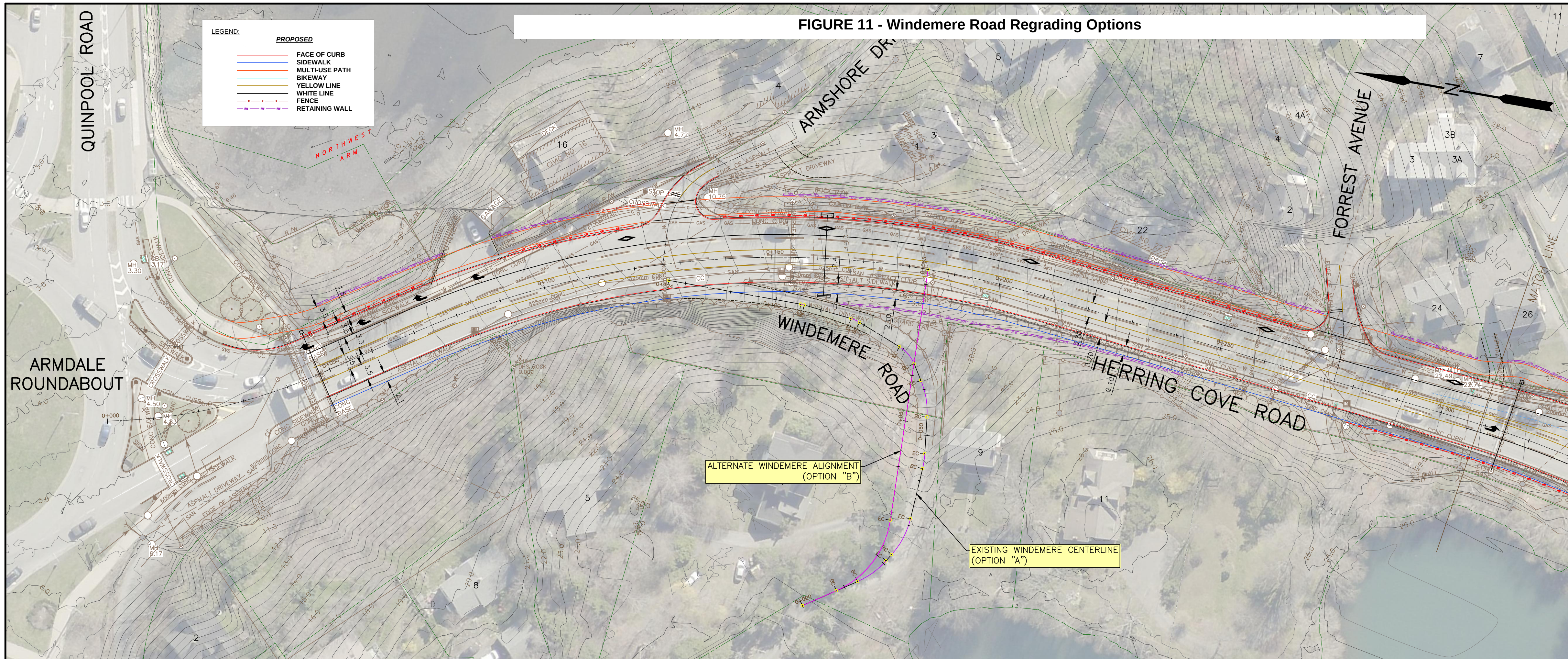
The following alternatives were considered to either achieve a 15% grade on Windemere Road or avoid impacts to Windemere Road altogether.

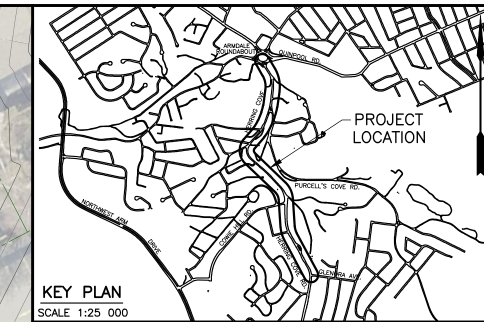
- Maintain the existing Herring Cove Road centreline and widen entirely on the east side to avoid any impacts to Windemere Road. This would have significant impacts to the access to Civic #22 and require demolition of a building structure and possibly outright purchase of the property.
- Chase the regrading of Windemere Road back further to allow for a 15% maximum grade. This drives the finished grade deeper which raises concerns regarding excavation near the edge of the lake and near the house on Civic #9 Windemere Road.
- Realign Windemere Road to the south, through the Civic #9 property, which would achieve a grade of 15% or less. It was preferred to avoid acquisition of an active residential property if possible.

Although the proposed 17% grade is steeper than the maximum driveway grade of 15%, as prescribed in the HRM Red Book, it is a slight improvement over the existing situation both in terms of the steepness and length of the grade. The Option B alignment also improves the angle of intersection, resulting in improved safety over the existing condition. It is recommended to proceed with Option B, for the following reasons:

- The length of grade is shorter;
- The straight alignment provides better sight distance;
- The square approach to Herring Cove Road is an improvement over the existing alignment;
- The Option B alignment is moved away from Civic #9 to mitigate excavation impacts;
- Excavation quantities and cost for Option B are expected to be lower than Option A.
- The constructability of either Option is subject to further analysis of soil conditions.

FIGURE 11 - Windemere Road Regrading Options





PLAN LEGEND

EXISTING		PROPOSED
	SURVEY CONTROL POINT	
	WATERVALVE	
	FIRE HYDRANT	
	UTILITY POLE AND GUY WIRE	
	SIGN POST/BASE	
	FENCE	
	GUIDERAIL	
	RETAINING WALL	
	CONCRETE CURB	
	PROPERTY LINE	
	BASELINE	
	SEWER MANHOLES	
	CATCHBASIN	
	GAS MAIN	
	CONCRETE SURFACE	
	ASPHALT SURFACE	
	EDGE OF GRAVEL SURFACE	
	WATERMAIN	
	TREE	
	DETECTOR LOOP	
	PEDESTRIAN RAMP	
	BUS STOP AND/OR SHELTER	
	HEDGE	

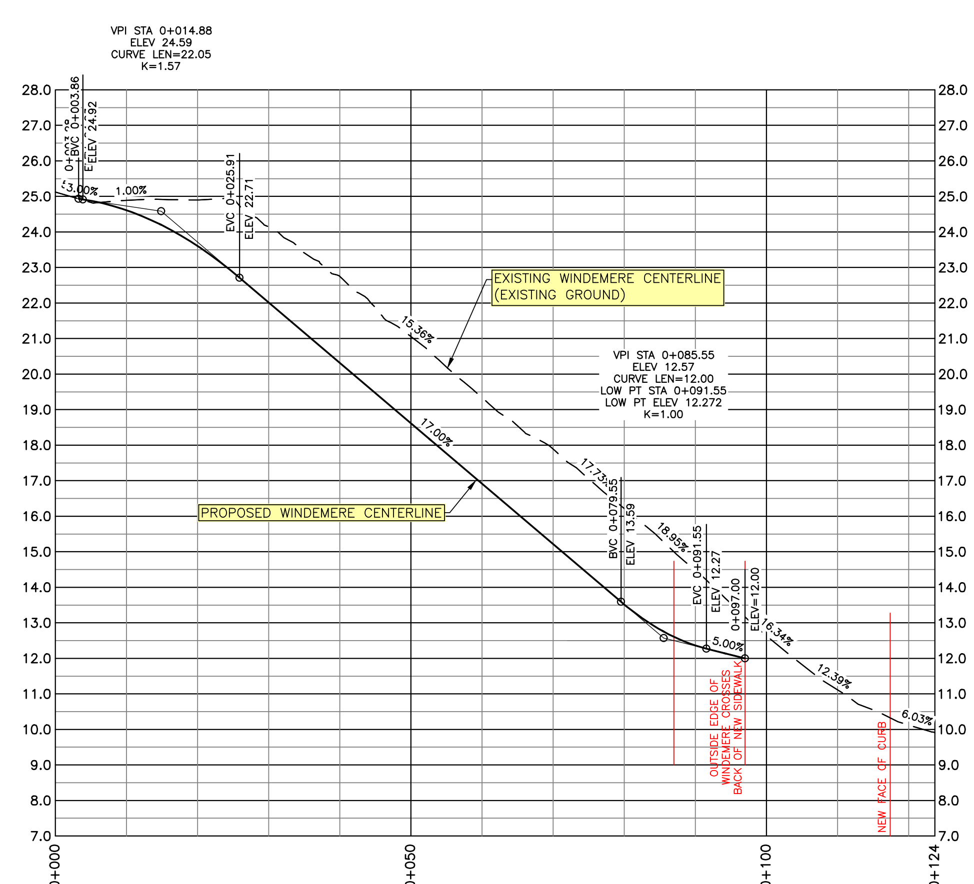
NOTES

1. PLAN VALUES ARE BASED ON THE NOVA SCOTIA COORDINATE REFERENCING SYSTEM.
2. ALL WORK IS TO BE DONE IN ACCORDANCE WITH HRM CONTRACT DOCUMENTS.
3. GRADES SHOWN ARE APPROXIMATE. FINISHED GRADE IS TO BE APPROVED IN THE FIELD BY THE ENGINEER.
4. UTILITY INFORMATION IS APPROXIMATE ONLY. CONTRACTOR IS RESPONSIBLE TO ARRANGE FOR ON SITE LOCATES WITH ALL UTILITIES PRIOR TO START OF WORK. CONTACT www.info-ex.com AND OTHERS AS REQUIRED.
5. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS REQUIRED TO PERFORM WORK AND TO COMPLY WITH ALL APPLICABLE ENVIRONMENTAL REGULATIONS.
6. WHERE EXISTING CONDITIONS ARE SHOWN THEY ARE NOT NECESSARILY ACCURATE OR COMPLETE. THE CONTRACTOR SHALL CONFIRM ALL EXISTING DIMENSIONS AND LOCATIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
7. THE CONTRACTOR SHALL CHECK AND VERIFY ALL PROPOSED DIMENSIONS BEFORE PROCEEDING WITH CONSTRUCTION. ANY ADJUSTMENTS WILL BE MADE BY THE ENGINEER AS NECESSARY.
8. CONTRACTOR IS RESPONSIBLE FOR SETTING GRADES AND LAYOUT CONTROL.
9. TRAFFIC SIGNS ARE NOT TO BE REMOVED OR REPLACED WITHOUT AUTHORIZATION FROM THE TRAFFIC AUTHORITY AND THE ENGINEER.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF TREES. TREES ARE NOT TO BE REMOVED WITHOUT PERMISSION FROM THE ENGINEER.
11. WORK IN THE IMMEDIATE AREA OF A NOVA SCOTIA COORDINATE MONUMENT MUST BE CARRIED OUT BY HAND. THE CONTRACTOR IS RESPONSIBLE FOR ANY COSTS IF MONUMENTS ARE DISTURBED.
12. AT COMPLETION OF WORK REINSTATE ALL DISTURBED SURFACES TO THE SATISFACTION OF THE ENGINEER.
13. WATER VALVE BOX EXTENSIONS – THE MINIMUM INSIDE DIAMETER OF A VALVE BOX EXTENSION SHALL BE 125 mm AND THE MINIMUM LENGTH OF A VALVE BOX EXTENSION SHALL BE 300 mm. CONTRACTOR TO CONFIRM APPROPRIATE PRODUCT TO BE USED WITH HALIFAX WATER OPERATIONS DEPARTMENT STAFF.
14. ALL NEW PEDESTRIAN RAMPS TO INCLUDE TACTILE WALKING SURFACE INDICATOR PLATES AS PER HRM DETAIL 131 UNLESS OTHERWISE NOTED.

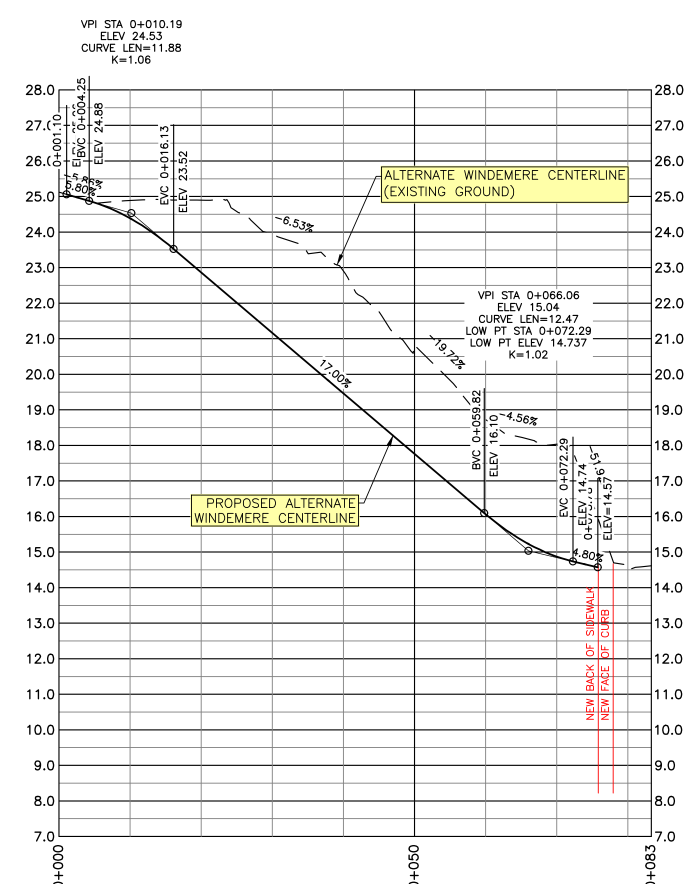
REVIEWED AND APPROVED FOR TRAFFIC SIGNALS AND PAVEMENT MARKINGS

Appr'd for TRAFFIC AUTHORITY ____________ Date ____________

No.	Date	Revision Description	Appr'd
1	APR 29/20	ISSUED FOR PRE-TENDER DESIGN REVIEW	



OPTION "A" – LOWER EXISTING ALIGNMENT



OPTION "B" – ALTERNATE ALIGNMENT

PRELIMINARY
PRE-TENDER REVIEW

HALIFAX

HERRING COVE ROAD
ARMDALE ROUNDABOUT TO GLENORA AVENUE
HALIFAX

DESIGN CONCEPT OPTION #1
WINDEMERE ROAD ISSUE

Date 20-04-28	Drawn JTGB	Tender No. 19-000	
Scale Horz. 1:500 Vert. 1:100	Survey No. SU18xxxx	Sheet 1 OF 1	
Reference	DATUM HORZ: NAD83(CSRS) EPOCH 2010.0 3° MTM PROJECTION ZONE 5 VERT: CGVD2013	Drawing No. P13	
Checked			

Purcells Cove Intersection

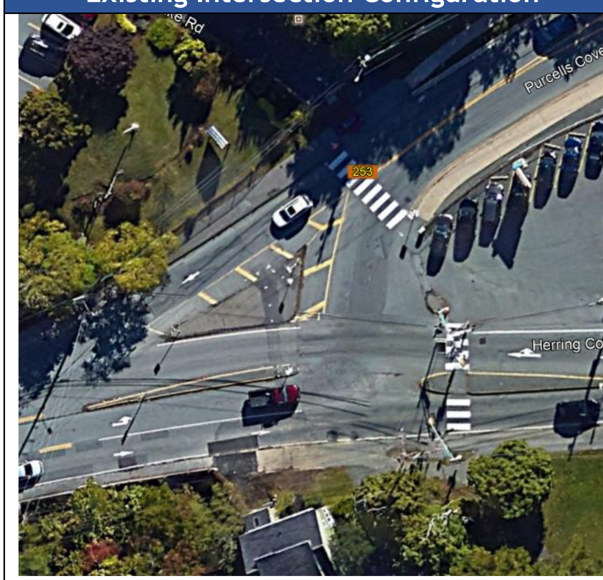
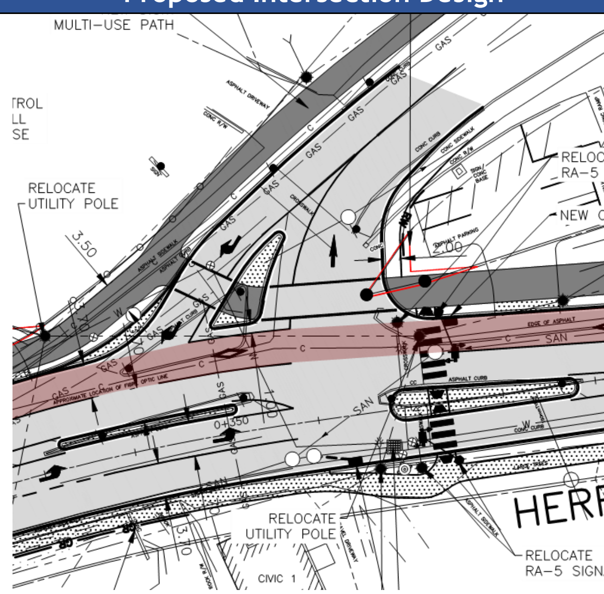
The Purcells Cove Road intersection is a T-intersection with stop control on the Purcells Cove Road approach. The Purcells Cove Road approach features a channelized right turn lane, but left turns onto Herring Cove Road are not permitted. A southbound left turn lane is provided on Herring Cove Road. Existing pedestrian features include an RA-5 crossing on the south leg of Herring Cove Road and a signed and marked crossing on the Purcells Cove Road leg, but situated 15m back from the intersection. **Figure 14** shows the existing configuration and proposed design.

The proposed design reconfigures this intersection to accommodate the inbound transit lane as well as the multi-use path. Other subtle changes are as follows:

- The median islands are maintained, but the north island extends across the right-turn channel to prevent improper left turns;
- The angle of the right lane channel is improved to slow entering speeds and improve visibility of the crosswalk;
- The pedestrian crossings are repositioned to align with the multi-use pathway; and
- Curb lanes have been positioned to allow for the turning movement of a WB-20 design vehicle in and out of Purcells Cove Road given it is a designated truck route.

Options for further upgrades were explored at a high-level including signalization, a roundabout, and turbo-T configuration with the intent of permitting the left turn movement from Purcells Cove. As in previous studies, it was determined that signalization would result in significant delays on Herring Cove Road and would not provide a net improvement to operations. It was further determined that property constraints and proximity of Chocolate Lake would make a larger intersection such as a roundabout or Turbo-T intersection problematic.

Figure 14: Purcells Cove Road Reconfiguration

Existing Intersection Configuration	Proposed Intersection Design
	

Horizontal Curve at Osborne Street

The existing horizontal curve near Osborne Street (Station 0+600 to 0+750) has a radius of approximately 75-80m. This is less than the recommended minimum for a 50km design speed. The sharp curvature also creates sight distance issues for intersections, driveways, and a pedestrian crossing throughout the curve.

The proposed design includes improvements to the curve radius in conjunction with the road widening, shifting the centerline of the road east and utilizing lands owned by HRM. The curve radius would be increased to 90m with a 3.0% superelevation. The lanes have been widened from the minimum designs to account for vehicle off-tracking through the curb. Refer to **Figure 15** for the proposed design.

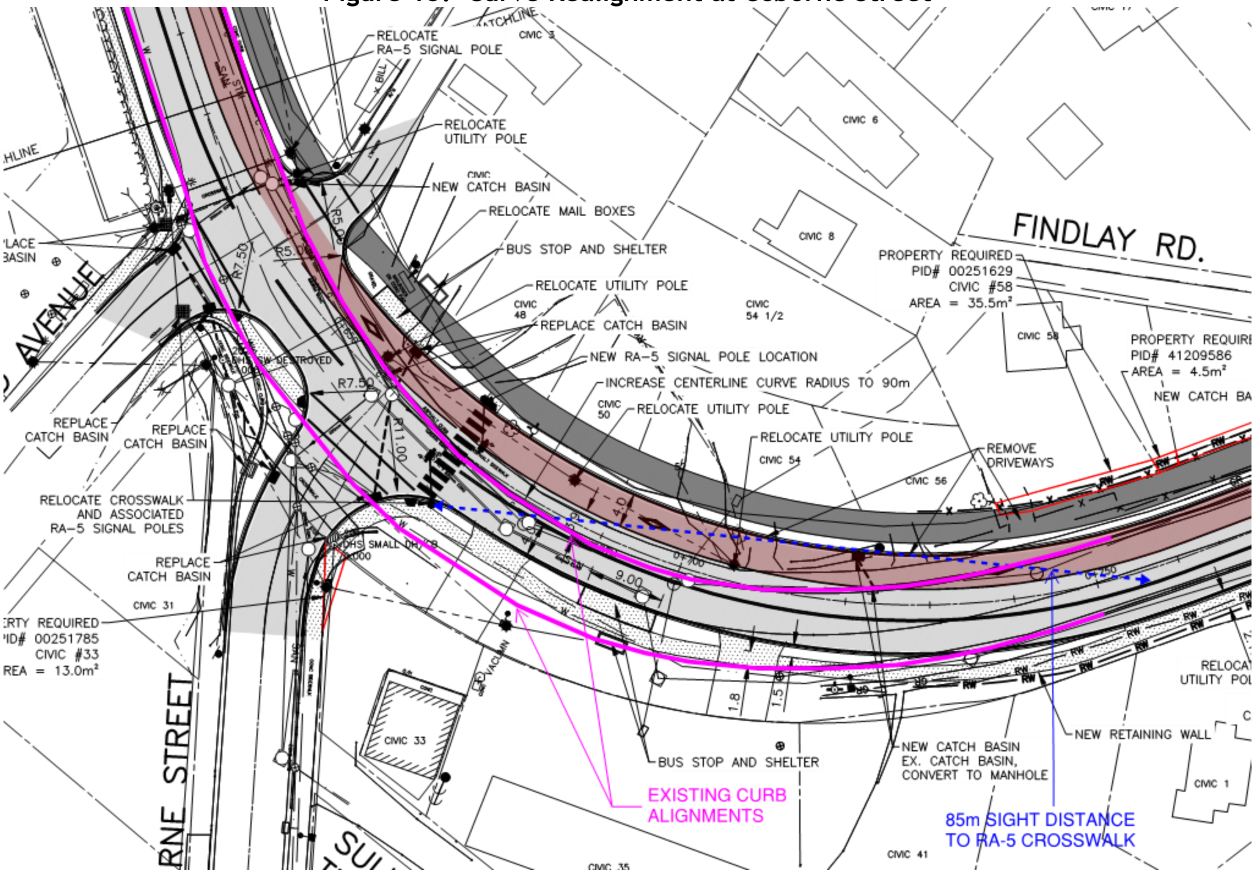
Based on the new design alignment, the road widening and superelevation would result in a cut condition on the east side. Elevations of buried utilities and services should be confirmed in the next stage of design to verify that minimum cover requirements are not violated. No issues were identified in blending grades with adjacent driveways or intersections as a result of the alignment shift and superelevation.

Other design elements within the horizontal curve area are as follows:

- **RA-5 Crosswalk** - It is proposed to relocate the existing RA-5 crosswalk at Lawnwood Avenue to Osborne Street. This would align the crossing with the existing sidewalk on Osborne Street and improve sight distance. With the new crossing location and the improve curve radius, a sight distance of 85m is achievable to the side-mounted RA-5 beacon in the northbound direction. This satisfies stopping sight distance for a 60km/h speed.

- **Bus Stops** - It is proposed to establish individual driveways into Civil 33 and Civic 35 and locate the southbound bus stop between the driveways at Station 0+695. The northbound bus stop is shown relocated from Station 0+800 to Station 0+650. The new location is more centrally located to Osborne Street, Lawnwood Avenue, Keddy Road, is close to the crosswalk, and grades are more favourable for adding a bus stop pad and shelter than the current location. Also note that location options for the new bus stop were limited by the desire to keep a clear line of sight to the crosswalk at Osborne Street. Should there be a plan to signalize Osborne Street in the future, the bus stop could be moved to a near-side stop on the south side of the controlled intersection.

Figure 15: Curve Realignment at Osborne Street



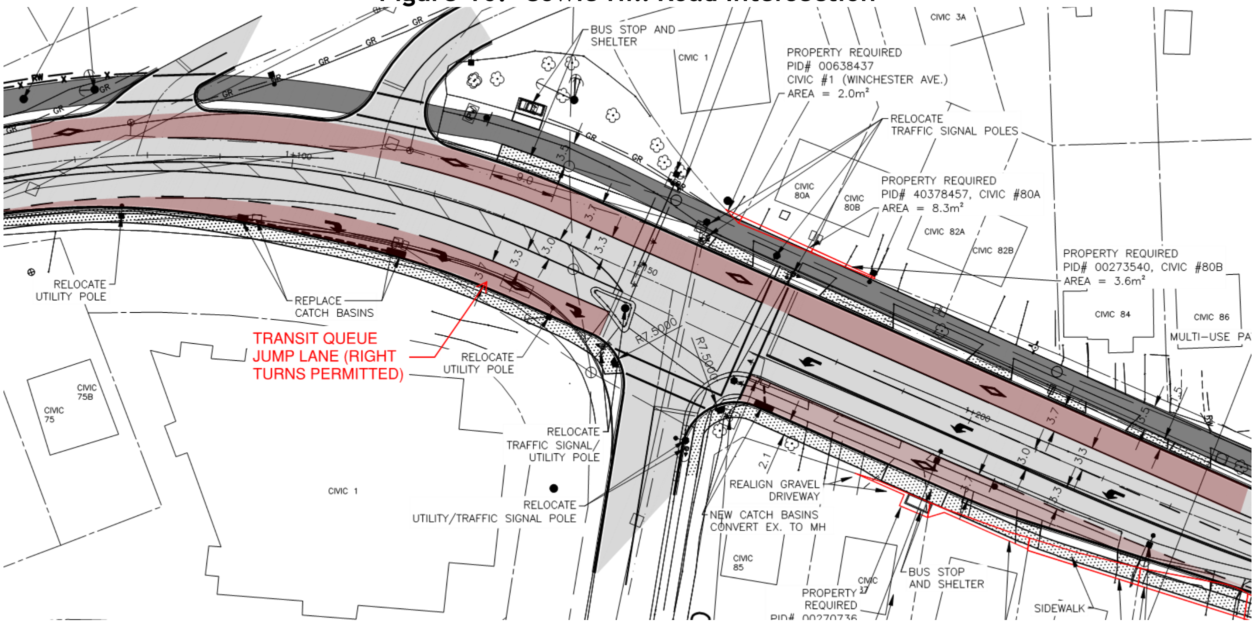
Cowie Hill Road Intersection Upgrade

The existing Cowie Hill Road intersection is a signalized t-intersection with a northbound left turn lane and southbound channelized right turn lane on Herring Cove Road. The Cowie Hill Road approach is a single lane approach with no turning lanes.

The proposed upgrade of this intersection (**Figure 16**) includes widening for the northbound transit lane and a southbound transit queue jump lane (with right turns permitted). The existing channelized island north leg of the intersection would be removed but the pedestrian crossing would be maintained. The design assumes a complete replacement of the existing traffic signal infrastructure. It is proposed to use steel pole and arms for the northbound and southbound traffic signal displays due to the placement of pole bases and span required. This would also allow for transit signal displays to be mounted over each transit lane.

Bus stops would be located on the far side of the intersection in each direction. Halifax Transit has identified these stops as candidates for BRT stops. The northbound bus stop has adequate space for a longer platform and larger shelter, but the size of the southbound stop is limited by adjacent driveways.

Figure 16: Cowie Hill Road Intersection



Steep Slopes

Herring Cove Road is situated on the side of a large hill with an incline on the west side and a drop-off on the east side. This creates a challenge for widening the corridor considering the proximity of adjacent properties. This issue is most prevalent in two areas:

Station 0+060 to 0+260

Between Armdale Roundabout and Purcells Cove Road, the steep rise to the west and drop-off to the east will require rock cuts and retaining walls. On the west side a 6-7m high rock cut is required at Station 0+100 (refer to **Figure 17**). Assuming good quality rock, this cut would not impact property lines, but blasting would require temporary closure of the roadway and careful protection of adjacent properties from blast fragments.

Further up the hill on the west side a new 3-4m high retaining will be required from 0+160 to 0+240. This replaces an existing retaining wall.

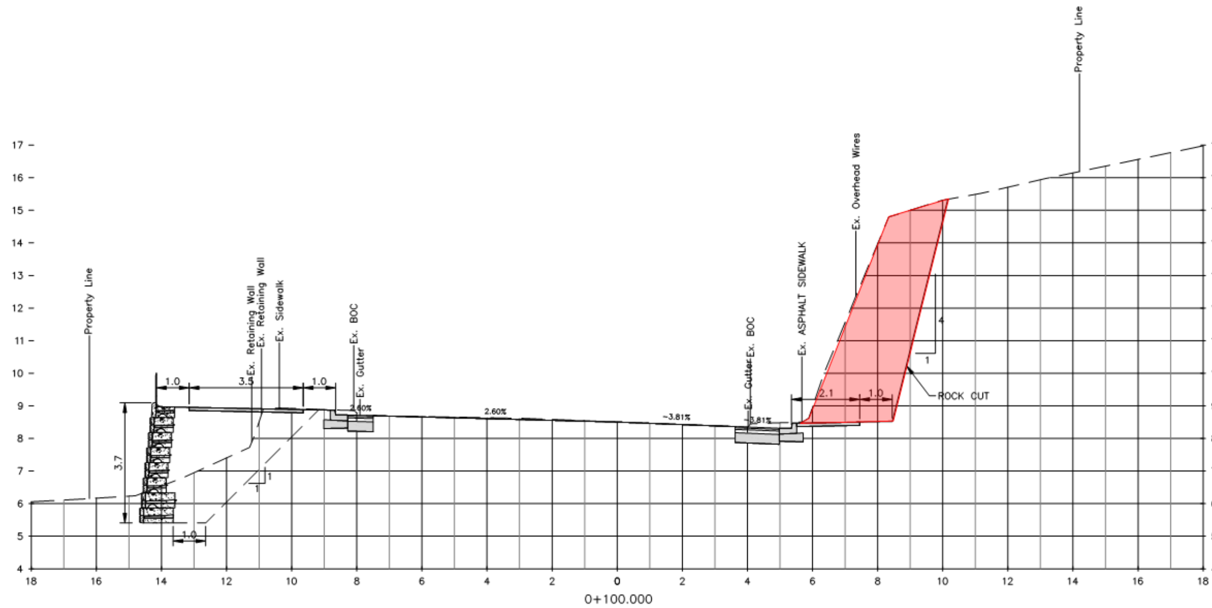
On the east side, a retaining wall is required for most 0+050 to 0+270 to transition the drop-off and protect properties from impact where possible. Retaining wall height is as much as 4m.

Station 0+760 to 1+040

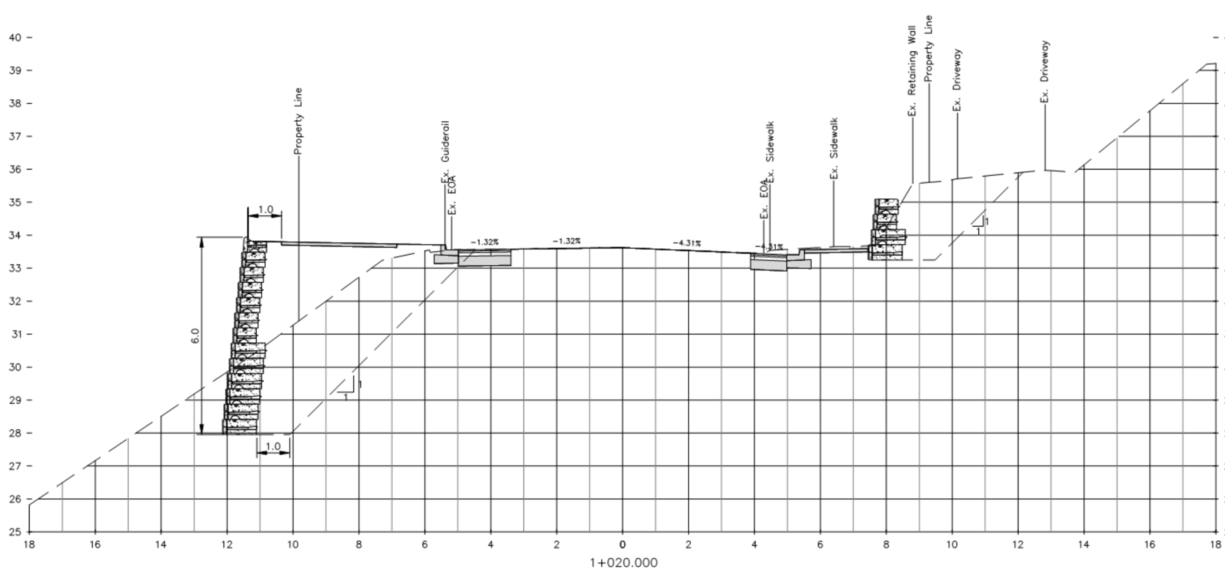
The long steep drop-off to the east presents one of the most significant challenges on this project. The existing sideslope is as much as 20m high with a steepness of 1H:1V to 1.5H:1V. Residences on Purcells Cove Road are situated at the toe of the slope (refer to photos in **Figure 18**). It is estimated that retaining walls of up to 6m in height will be required to facilitate the widening. More information on the retaining walls along this slope and potential challenges is provided in the following section.

On the east side from 0+760 to 1+040, there are several residential properties elevated above Herring Cove Road. New or replaced retaining walls would be required to accommodate the widening. The widening also impacts driveways to some of these properties. The cross-sections indicate that maintaining driveway access to Civic 63A/63B would not be possible and access to Civic 55/57 and Civic 55 is questionable. These impacts are discussed in more detail in the following section.

Figure 17: Example Cross-Sections in Steep Slope Areas



Retaining Wall and Rock Cut at Station 0+100



Retaining Walls at Station 1+020

Figure 18: Photos of Steep Slope from 0+760 to 1+040

Retaining Walls

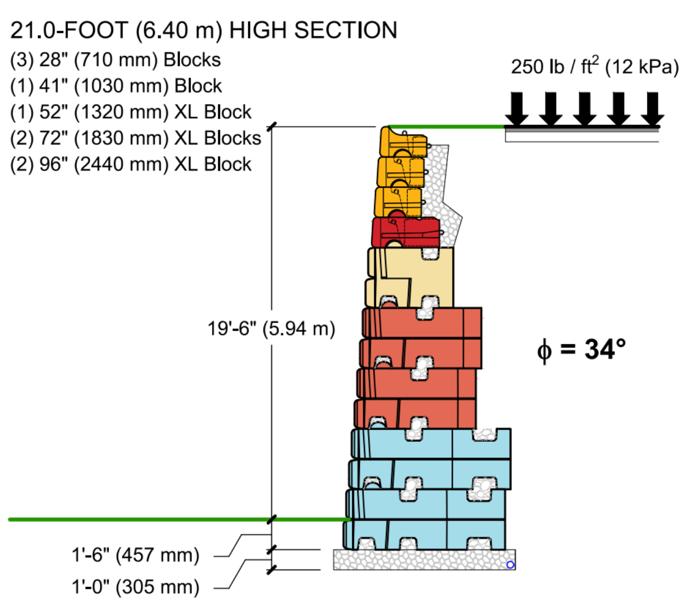
There are a number of areas along the Herring Cove Road corridor that require new retaining walls or replacement of existing retaining walls as a result of the proposed widening. Retaining wall start and end locations were determined based on a review of the 20m cross-sections generated for the length of the corridor. **Table 18** lists the start and end of each retaining wall, the length, and average height. In total, it is estimated that 595m of retaining walls would be requiring along the east side of the corridor and 245m of retaining walls would be required along the west side for the Option 1 design.

Table 18: Option 1 Retaining Wall Locations

West Side				East Side			
Start	End	Length (m)	Avg Height (m)	Start	End	Length (m)	Avg Height (m)
0+160	0+250	90	2.3	0+050	0+080	30	3.6
0+285	0+345	60	2	0+090	0+110	20	3.7
0+730	0+780	50	1.75	0+150	0+260	110	2.8
0+975	0+980	5	2	0+280	0+325	45	1.5
1+010	1+050	40	1.25	0+460	0+520	60	2.4
				0+750	1+080	330	4.2
Total Length (m)		**245**		**Total Length (m)**		**595**	

Generally, based on a review of site conditions, cross-sections, and retaining wall requirements, a large gravity block retaining wall system (e.g. Redi-Rock system) would be appropriate for most applications with heights up to 6m. A typical large block retaining wall section is shown in **Figure 19** below. A 1.4m high handrail would need to be mounted along the top edge of the retaining wall to provide protection for multi-use pathway users.

Figure 19: Typical Large Block Retaining System (Source: Redi-Rock.com)



On the 20m design sections, we have shown an excavation envelope that extends at a 1H:1V excavation beyond the leveling pad. On the east side of the corridor, the 1H:1V excavation limit would extend into the paved shoulder in most cases. Two-way traffic should be able to be maintained during construction; however, the extent of the excavation and stability of a 1H:1V excavation slope would need to be confirmed based on a geotechnical investigation to confirm soil conditions. Given the age of the street, the use of questionable fill material for deep fill areas may be anticipated, and subexcavation and reinstatement of areas of subgrade may be required. In cut sections, a 1H:1V excavation slope may need to be exceeded in order to daylight or to avoid properties. In these cases, contractors would need to develop a working plan to ensure a safe worksite.

Additional considerations for the retaining wall design and installations are as follows:

- Excavations along Herring Cove Road from 0+750 to 1+080 would be very difficult. It would be prudent to complete a geotechnical investigation to determine subsurface conditions at the top of the slope. Drilling along the slope at proposed wall locations would not be possible, so inference would have to be made from results of boreholes at the top of the slope.
- Subject to determination of soil conditions and detailed design of the retaining wall system, an MSE wall system may be considered for the high fill areas between 0+750 and 1+080.
- Timber cribbing may also be considered as a cost-effective type of retaining system underneath the pathway from 0+750 to 1+080 as it can more easily conform to the existing slope conditions. Soil or rock anchors may be employed for stability. Applicability would be subject to minimized live loads (light trail loads only) and confirmation of soil conditions. A timber crib system would have a shorter design life than other options due to eventual wood deterioration.
- Rockfall fencing, or other rockfall containment system would be recommended for excavations/construction along the high slopes, particularly where houses are located at the toe of the slope.
- Drainage should be specified to drain to existing HRM storm system, or if not possible, the drainage should be distributed as best as possible to minimize localized erosion, and drainage points should include some type of erosion control.
- Access to the work zone on the steep slope and establishing a working platform for equipment will require special planning, safety plans and other precautionary measures that exceed normal working conditions.
- Underground services located within the zone of disturbance will need to be protected during excavation and retaining wall installation. Utilities likely to require protection include catch basins and storm piping, the buried fibre line, and buried gas main. Additionally, temporary overhead lines will need to be established until permanent pole relocations can be completed.

Due to the above complications with the retaining wall installations, we expect a premium on the per sq.m. cost of installation. HRM's average unit price for redi-rock retaining walls is \$650/m2. It would be advisable to budget for \$1000/m^2 to account for this premium.

Property Impacts

The estimated property acquisition requirements for Option 1 are listed in **Table 19**. These are also shown on the drawings. ROW would be required from twenty properties. There are also seven properties where driveway access cannot be maintained or maintaining driveway access is questionable. These are listed under “full property area” in the event the entire properties need to be purchased. The most significant property impacts listed above as well as other notable impacts are discussed below in **Table 20**.

Table 19: Estimated Property Acquisition Requirements for Option 1

PID	Civic #	ROW Required (m^2)	Full Property Area (m^2)
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	
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[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOTAL		**848.2**	**3260.5**

*Acquisition would be driven by loss of property access.

[redacted]

[redacted]	[redacted]
[redacted]	[redacted] 
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[redacted]	

[redacted]	[redacted]
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[redacted]

Drainage Impacts

Storm System

The 60% design drawings show proposed changes to the storm system including removal and replacement of catch basins, converting existing catch basins to manholes, and addition of new PVC storm piping. It is estimated that 19 catch basins would be removed, 35 new catch basins installed and 260m of new storm pipe installed to facilitate the roadway changes.

Box Culvert

A 1525x1600mm x 35m long concrete box culvert is located at Station 0+275, just south of Forrest Avenue. The culvert is on a 35-degree skew and drains a watercourse from Chocolate Lake, outletting to the rear of Civic 22. To facilitate the proposed corridor upgrade, the culvert inlet would need to be lengthened by approximately 6m. The outlet would not need to be lengthened but would need to be integrated with a new retaining wall. It is recommended that the condition and remaining life of the culvert be evaluated to determine if replacement would be appropriate in coordination with the street upgrades.

Roadside Watercourse

A watercourse from Chocolate Lake runs along the west side of Herring Cove Road from Station 0+345 to the concrete box culvert inlet at Station 0+285. A ditch carrying the watercourse has a small retaining wall structure along the back of the asphalt sidewalk, complete with double beam guide rail. This ditch will need to be narrowed by approximately 1.5m as a result of the street widening. A new retaining wall (e.g. a cast-in-place concrete wall) with a height of 2-2.5m will be required for a distance of 60m, complete with handrail. A crash rated barrier with handrail should be considered.

Utility Impacts

Natural Gas

A buried natural gas line runs along under Herring Cove Road from Adrmdale Roundabout to Purcells Cove Road and again from Cowie Hill Road to Glenora Avenua. The location of the line varies from one side of the street to the other. There are no apparent conflicts between the gas line and the proposed location of buried structures; however, where widening would occur over the gas line, minimum cover requirements would need to be verified.

Communications (Fibre) Duct

A communications (fibre) duct runs along the east edge of Herring Cove Road throughout the project limits. Potential conflicts and constraints with the fibre line are as follows:

- From Armdale Roundabout to Purcells Cove Road, the fibre line runs under the existing east sidewalk. The proposed design, this duct would run under the east boulevard between the street and pathway. Depending on the depth of the fibre duct, it may preclude the use of guide rail as a barrier between the street and the multi-use pathway, due to embedment of the guide rail posts. A barrier with a shallower anchoring system, such as a concrete barrier may be required, but the utility would need to be consulted on the type of permanent infrastructure over the fibre duct with consideration to maintenance access.

- Where the horizontal curve is proposed to be improved at Osborne Street, the change in alignment would place the new roadway centerline over the fibre line. Changes to the profile and superelevation would lower the grade by 0.4-0.5m in places. Depth of the fibre duct needs to be confirmed to verity that minimum cover requirements are not violated.
- In other areas where widening occurs near the fibre duct, minimum cover would need to be verified.
- Attempts have been made to locate buried structures to avoid conflicts with the fibre duct, but this would need to be reviewed more closely during detailed design in consultation with the utility.

Overhead Lines

Overhead power and communications lines run along both sides of Herring Cove Road with the main line being on the west side. The Option 1 corridor upgrade will result in 52 utility pole relocations – 29 on the east side and 24 on the west side. Relocation of utility poles on the east side could be challenge if they have guys and need to be placed on the outside of pathway, particularly where retaining walls are required. **Table 21** lists the utility poles identified for relocation.

Table 21: Option 1 Utility Pole Relocations

Utility Poles to be Relocated			
West Side		East Side	
0+107	1+142	0+104	0+706
0+159	1+197	0+142	0+797
0+215	1+229	0+159	0+834
0+277	1+276	0+180	0+857
0+367	1+306	0+207	0+904
0+408	1+353	0+243	0+938
0+451	1+406	0+270	0+974
0+770	1+495	0+305	1+035
0+817	1+540	0+332	1+063
0+856	1+635	0+372	1+073
0+930		0+472	1+550
0+990		0+631	1+601
1+038		0+657	1+630
1+077		0+683	1+653
Total Relocations = 24 poles		**Total Relocations = 28 poles**	

Note: One additional pole on Purcells Cove Road would need to be relocated.

7.4 Option 2 Impacts and Constraints

Geometric Considerations

Corridor Design Option 2 is very similar to Option 1, except that an outbound transit lane is added from Station 0+400 (just after Purcells Cove Road) to Station 1+650 (just before Glenora Avenue). It was agreed with HRM to begin the outbound transit lane after Purcells Cove Road given the significant physical constraints from Armdale Roundabout to Purcells Cove Road.

The design centerline has held constant from Option 1 and all widening occurs on the west side of Herring Cove Road. Most geometric considerations and challenges described above for Option 1 are also applicable to Option 2; however, the additional 3.3m of widening on the west side of Herring Cove Road results in additional retaining wall requirements, property impacts, and utility impacts, as outlined below.

Retaining Walls

Compared to Option 1, there are three additional locations that would require a retaining wall plus some minor extensions to the Option 1 retaining walls on the west side. Overall, this results in an extra 110m of retaining walls on the west side in Option 2. There is no change to the east side. **Table 22** shows a list of retaining wall locations in Option 2.

The three additional retaining wall locations are described below:

- 0+520 to 0+640: This area features a steep incline on the west side of Herring Cove Road up to Lawnwood Extension. The slope will need to be excavated due to the lane widening and held back with a large retaining wall if not in a rock cut. The retaining wall installation will require an excavation slope steeper than 1H:1V to limit impacts to Lawnwood extension and adjacent properties. The Contractor would need to develop a working plan to ensure a safe worksite.

- 0+830 to 0+850: This retaining wall would replace the existing decorative and stone walls in front of Civic 53 and Civic 55. The new wall would encroach on the driveway at Civic 55, which will have driveway access issues as discussed in the next section.

- 0+890 to 0+930: This retaining wall is located near Civic 61. The 1:1 excavation slope for installation would extend close to the house. Therefore an excavation slope steeper than 1:1 may be required. The Contractor would need to develop a working plan to ensure a safe worksite.

Table 22: Option 2 Retaining Wall Locations

West Side				East Side			
Start	End	Length (m)	Avg Height (m)	Start	End	Length (m)	Avg Height (m)
0+160	0+250	90	2.3	0+160	0+250	90	2.3
0+285	0+345	60	2	0+285	0+345	60	2
0+520	0+640	120	3	0+520	0+640	120	3
0+730	0+790	60	1.6	0+730	0+790	60	1.6
0+830	0+850	20	3.5	0+830	0+850	20	3.5
0+890	0+930	40	3.5	0+890	0+930	40	3.5
0+975	0+980	5	2				
1+000	1+050	50	2.5				
Total Length (m)		**355**		**Total Length (m)**		**595**	

Property Impacts

The estimated property acquisition requirements for Option 2 are listed in **Table 23**. These are also shown on the drawings. ROW would be required from forty properties. There are also ten residential properties where houses are being impacted or driveway access cannot be maintained. These are listed under "full property area" in the event the entire properties need to be purchased.

All major property impacts described for Option 1 are also applicable to Option 2; however, the driveway impacts to Civic 55, 57, 63A/B, and 65 become worse. Maintaining access to these properties does not appear to be feasible. The strategy of raising the grade of Herring Cove Road to mitigate these property impacts, as noted for Option 1, is more challenging in Option 2. The grade would need to be raised by approximately 1m, which has a much higher cost and there would be implications for buried structures and additional retaining wall height on the east side. Also, at Civic 63A/B and Civic 65, driveways would be shortened to a degree they are no longer useable.

A further alternative strategy to mitigate the property access impacts would be to shift the alignment of Herring Cove Road 3-4m to the east from 0+750 to 1+050. The impacts of this would be that both northbound lanes would be constructed on a new fill and there would be a significant increase in retaining wall requirements to the east and requirements for an MSE wall system. It is estimated this scenario would result in extra 1000m^2 of retaining wall area, resulting an additional $1 million plus additional road reconstruction costs. The impacts of this option are illustrated in the design section at Civic 63A/B in **Figure 20**.

Other major property impacts in Option 2 that are additional to Option 1 are described in **Table 24**.

Figure 20: Impacts of Shifting Herring Cove Road Alignment to the East (Station 0+944)

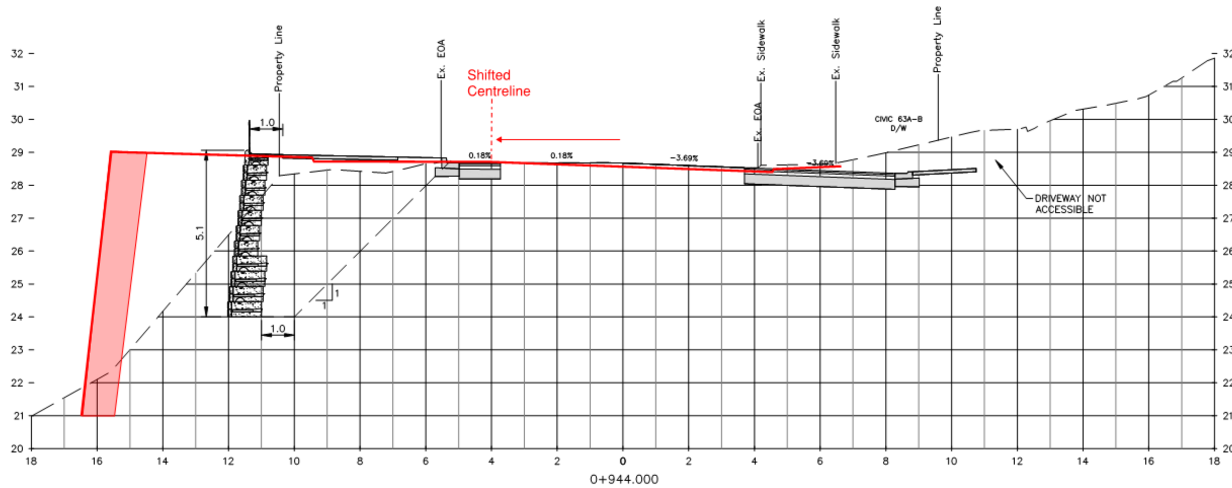

Table 23: Estimated Property Acquisition Requirements for Option 2

PID	Civic #	ROW Required (m^2)	Full Property Area (m^2)
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
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[redacted]	[redacted]	[redacted]	
	TOTAL	**1550.7**	**5429.5**

*Acquisition would be driven by loss of property access.

Table 24: Additional Major Property Impacts resulting from Option 2

Property	Image from Design Drawings
[redacted]	[redacted]
[redacted]	
[redacted]	

[redacted]	[redacted]
[redacted]	

.

Utility Impacts

Overhead Lines

The Option 2 corridor upgrade will result in 59 utility pole relocations – 29 on the east side and 30 on the west side. The additional poles what would require relocation in Option 2 are listed in **Table 25**.

Table 25: Option 2 Utility Pole Relocations (additional to Option 1)

Utility Poles to be Relocated	
West Side	**East Side**
0+536	
0+598	
1+165	
1+364	
1+447	
1+587	
Total Additional = 6	**Total Additional 0**

8.0 Cost Estimate

Class C cost estimates were prepared for each of the two functional design options based on the 60% design drawings, expected impacts to utilities and underground services, and historical unit pricing in HRM. The cost estimates include a 25% contingency but do not include engineering or the cost of property acquisition. The total cost estimates for Option 1 and 2 (excluding tax) are as follows:

- **Option 1: $9.829 million**
- **Option 2: $11.631 million**

A breakdown of cost estimates by corridor segment (corresponding to design drawing sheets) is provided in **Table 26**. Detailed breakdowns of estimates are provided in **Appendix C**.

Assumptions made in the preparation of the cost estimates are as follows:

- It was assumed that the full width of Herring Cove Road would be resurfaced with 50mm of Type C asphalt;
- Road widening was designed assuming the existing cross-slope would be followed, and the road would not be reconstructed or re-crowned throughout. The only area of full reconstruction is through the curve realignment near Osborne Street;
- Costing does not include renewal of underground municipal services, only modifications to the storm system and manhole elevation adjustments to accommodate the design;
- Historical bid pricing was used as contained in HRM's costing template;
- Retaining wall cost per square metre was increased from the historical price of $650/m2 to $1000/m2 to account for the complex installation conditions along Herring Cove Road.
- Utility pole relocation costs was assumed to be $5000 per pole relocation.
- No costs were carried at this time for changes to the fibre duct bank.

The cost estimate for Option 2 is approximately 20% higher than Option 1; however, property impacts are more expensive in Option 2 and more difficult to mitigate than in Option 1. Therefore, the true costs of Option 2, including right-of-way acquisition, would be considerably higher given the potential need to acquire 10 additional properties compared to Option 1.

Table 26: Cost Breakdown by Corridor Segment (excluding tax)

Segment (Drawing Sheet)	Option 1	Option 2
0+000 to 0+300 (Sheet 1)	$2.610 million	$2.610 million
0+300 to 0+600 (Sheet 2)	$1.367 million	$2.229 million
0+600 to 0+950 (Sheet 3)	$2.111 million	$2.492 million
0+950 to 1+250 (Sheet 4)	$2.550 million	$2.922 million
1+250 to 1+550 (Sheet 5)	$0.738 million	$0.889 million
1+550 to 1+750 (Sheet 6)	$0.454 million	$0.489 million
Total	**$9.829 million**	**$11.631 million**

9.0 Recommendations for Next Steps in Design

9.1 Design Option Recommendation

Following review of this submission, it is recommended that HRM select a preferred option to advance to detailed design. The following are suggested for consideration in this decision:

- There is potential for significant travel time savings for inbound transit service on Herring Cove Road with the introduction of a continuous transit lane from Armdale Roundabout to Glenora Avenue;
- There is less potential for outbound transit travel time savings. Considering the higher costs and property impacts associated with Option 2, the benefit/cost of Option 2 is less than Option 1.
- Based on the above, Option 1 is recommended as the more cost effective option. The queue jump at Cowie Hill Road proposed in Option 1 will address the primary source of delay for outbound transit vehicles. Consideration should also be given to a future queue jump at Osborne Street should the intersection become signalized in the future. The Option 2 geometry at Osborne Street could be applied, which demonstrates that an outbound queue jump lane could be added without property impacts or significant additional costs. Infrastructure should be relocated with this potential future expansion in mind.

9.2 Next Steps

The following are recommended as next steps in detailed design:

- Complete a geotechnical investigation where retaining walls are required to determine soil conditions and refine retaining wall details and recommendations;
- Meet with utilities to review the proposed design and impacts and required relocations. Verify depth and location of the fibre line and gas line.
- Further develop design options for Windemere Road to identify a preferred alignment to take to detailed design. Meet with adjacent landowners to discuss changes given Windemere Road is a private lane.
- Meet with the following landowners to discuss impacts to their properties:
    - Civic 16: Changes to driveway and stairs;
    - Civic 3 Armshore Drive: Driveway relocation to Armshore Drive;
    - Civic 22: Acquisition of Property;
    - Civil 24: Options for relocation of driveway access or additional topo survey to confirm if regrading is feasible without impacting houses;
    - Civic 1027: Purcells Cove Road: Impacts to parking and access and possible mitigation measures, including a new public parking lot on the west side of Herring Cove Road;
    - Civic 44: Consolidation of driveway to a single access on Herring Cove Road;

  - Civic 33: Consolidation of driveway to a single access on Herring Cove Road;
  - Civic 35: Consolidation of driveway to a single access on Herring Cove Road;
  - Civic 87: Driveway realignment to allow location for new bus stop shelter;
  - Other land owners where right-of-way acquisition is expected

- Prior to meeting with impacted landowners from Maplewood Drive to Cowie Hill Road, investigate the option of raising the grade on Herring Cove Road by 0.25m and improving cross-slope to a typical 2%. This should address driveway impacts and avoid full property acquisitions (applicable to Option 1);
- Verify depths of municipal services and complete CAD pipe networks to further develop storm system modifications and identify underground conflicts;
- Confirm barrier type for the boulevard between Armdale Roundabout and Forrest Avenue, considering location and depth of the buried fibre line;
- If Civic 22 is to be acquired, consider widening the cross-section from Armshore Drive to Forrest Avenue to provide a wider boulevard that would eliminate the need for a barrier between the street and multi-use path.
- Confirm transit stop locations and advance details where BRT enhancements are desirable and feasible;
- Advance detailed design to accommodate any changes resulting from the above actions and the following:
  - Design changes to reversible lane system gantries including foundations;
  - Design traffic signal replacement at Cowie Hill Road;
  - Place infrastructure to allow for possible future signalization of Osborne Street and southbound queue jump lane (refer to Option 2 design);
  - Develop signage and pavement marking plans;
  - Prepare grading refinements and construction layout plan;
  - Prepare drawings for each retaining wall area;
  - Prepare standard details;

APPENDIX

APPENDIX A
Synchro LOS Reports for Existing Condtions

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	700	8	134	396	0	511
Future Volume (Veh/h)	700	8	134	396	0	511
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	761	9	146	430	0	555
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			770		1488	766
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			770		1488	766
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		100	0
cM capacity (veh/h)			844		113	403

Direction, Lane #	NB 1	SB 1	SB 2	NW 1
Volume Total	770	146	430	555
Volume Left	0	146	0	0
Volume Right	9	0	0	555
cSH	1700	844	1700	403
Volume to Capacity	0.45	0.17	0.25	1.38
Queue Length 95th (m)	0.0	4.7	0.0	203.5
Control Delay (s)	0.0	10.2	0.0	211.7
Lane LOS		B		F
Approach Delay (s)	0.0	2.6		211.7
Approach LOS				F

Intersection Summary			
Average Delay	62.6		
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	230	8	15	565	300	52
Future Volume (Veh/h)	230	8	15	565	300	52
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	9	16	614	326	57
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1000	354	383			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1000	354	383			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	6	99	99			
cM capacity (veh/h)	266	689	1175			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	259	630	383
Volume Left	250	16	0
Volume Right	9	0	57
cSH	271	1175	1700
Volume to Capacity	0.95	0.01	0.23
Queue Length 95th (m)	69.2	0.3	0.0
Control Delay (s)	84.1	0.4	0.0
Lane LOS	F	A	
Approach Delay (s)	84.1	0.4	0.0
Approach LOS	F		

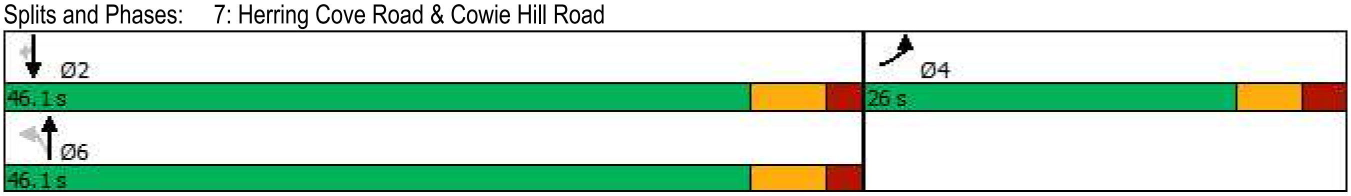
Intersection Summary			
Average Delay	17.3		
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	69	64	25	291	298	51
Future Volume (vph)	69	64	25	291	298	51
Satd. Flow (prot)	1693	0	1789	1883	1883	1601
Flt Permitted	0.975		0.564			
Satd. Flow (perm)	1688	0	1056	1883	1883	1554
Satd. Flow (RTOR)	64					55
Lane Group Flow (vph)	145	0	27	316	324	55
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		46.1	46.1	46.1	46.1
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	9.8		21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.26		0.55	0.55	0.55	0.55
v/c Ratio	0.30		0.05	0.31	0.31	0.06
Control Delay	8.9		8.5	9.2	9.3	3.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	8.9		8.5	9.2	9.3	3.6
LOS	A		A	A	A	A
Approach Delay	8.9			9.2	8.5	
Approach LOS	A			A	A	
Queue Length 50th (m)	3.8		0.8	11.4	11.7	0.0
Queue Length 95th (m)	13.8		5.2	36.5	37.7	4.8
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	948		1005	1793	1793	1482
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.15		0.03	0.18	0.18	0.04

Intersection Summary

Cycle Length: 72.1
Actuated Cycle Length: 38.2
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.31
Intersection Signal Delay: 8.8 | Intersection LOS: A
Intersection Capacity Utilization 40.1% | ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	66	0	57	4	406	64	45	292	0
Future Volume (Veh/h)	0	0	0	66	0	57	4	406	64	45	292	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	0	0	0	72	0	62	4	441	70	49	317	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	961	934	317	899	899	476	317			511		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	961	934	317	899	899	476	317			511		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	71	100	89	100			95		
cM capacity (veh/h)	203	253	724	250	265	589	1243			1054		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	134	515	366
Volume Left	0	72	4	49
Volume Right	0	62	70	0
cSH	1700	341	1243	1054
Volume to Capacity	0.00	0.39	0.00	0.05
Queue Length 95th (m)	0.0	13.8	0.1	1.1
Control Delay (s)	0.0	22.3	0.1	1.6
Lane LOS	A	C	A	A
Approach Delay (s)	0.0	22.3	0.1	1.6
Approach LOS	A	C		

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	213	537	45	399	1107
Future Volume (Veh/h)	0	213	537	45	399	1107
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	232	584	49	434	1203
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2680	608			633	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2680	608			633	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	53			54	
cM capacity (veh/h)	13	495			950	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	232	633	434	1203
Volume Left	0	0	434	0
Volume Right	232	49	0	0
cSH	495	1700	950	1700
Volume to Capacity	0.47	0.37	0.46	0.71
Queue Length 95th (m)	18.7	0.0	18.5	0.0
Control Delay (s)	18.5	0.0	11.9	0.0
Lane LOS	C		B	
Approach Delay (s)	18.5	0.0	3.2	
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	76	21	27	453	739	247
Future Volume (Veh/h)	76	21	27	453	739	247
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	23	29	492	803	268
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1487	937	1071			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1487	937	1071			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	37	93	96			
cM capacity (veh/h)	131	321	651			

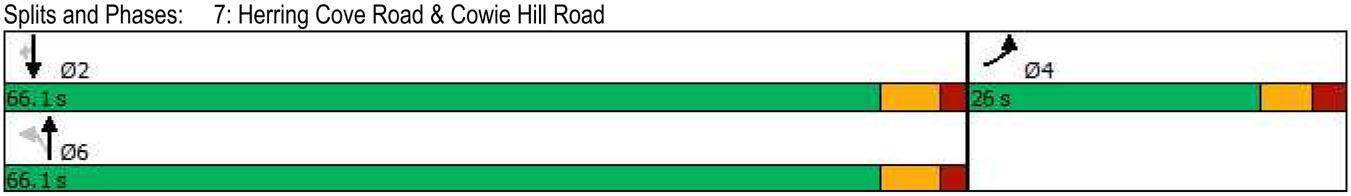
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	106	521	1071
Volume Left	83	29	0
Volume Right	23	0	268
cSH	150	651	1700
Volume to Capacity	0.71	0.04	0.63
Queue Length 95th (m)	31.4	1.1	0.0
Control Delay (s)	72.4	1.2	0.0
Lane LOS	F	A	
Approach Delay (s)	72.4	1.2	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	111	79	69	421	771	98
Future Volume (vph)	111	79	69	421	771	98
Satd. Flow (prot)	1709	0	1789	1883	1883	1601
Flt Permitted	0.972		0.213			
Satd. Flow (perm)	1694	0	401	1883	1883	1546
Satd. Flow (RTOR)	35					90
Lane Group Flow (vph)	207	0	75	458	838	107
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases			6			2
Total Split (s)	26.0		66.1	66.1	66.1	66.1
Total Lost Time (s)	6.0		6.1	6.1	6.1	6.1
Act Effct Green (s)	13.3		40.9	40.9	40.9	40.9
Actuated g/C Ratio	0.20		0.61	0.61	0.61	0.61
v/c Ratio	0.56		0.31	0.40	0.73	0.11
Control Delay	28.2		10.6	8.0	13.8	2.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	28.2		10.6	8.0	13.8	2.2
LOS	C		B	A	B	A
Approach Delay	28.2			8.4	12.5	
Approach LOS	C			A	B	
Queue Length 50th (m)	17.1		3.7	24.0	59.9	0.7
Queue Length 95th (m)	48.3		12.9	49.8	123.5	6.0
Internal Link Dist (m)	105.3			515.1	480.2	
Turn Bay Length (m)			30.0			40.0
Base Capacity (vph)	559		356	1673	1673	1384
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.37		0.21	0.27	0.50	0.08

Intersection Summary	
Cycle Length: 92.1	
Actuated Cycle Length: 66.8	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 13.1	Intersection LOS: B
Intersection Capacity Utilization 73.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Herring Cove Road & Cowie Hill Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	0	44	0	56	0	392	47	75	761	1
Future Volume (Veh/h)	1	0	0	44	0	56	0	392	47	75	761	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	1	0	0	48	0	61	0	426	51	82	827	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1504	1468	828	1443	1444	452	828			477		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1504	1468	828	1443	1444	452	828			477		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	54	100	90	100			92		
cM capacity (veh/h)	85	118	371	104	122	608	803			1085		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	109	477	910
Volume Left	1	48	0	82
Volume Right	0	61	51	1
cSH	85	193	803	1085
Volume to Capacity	0.01	0.56	0.00	0.08
Queue Length 95th (m)	0.3	22.9	0.0	1.9
Control Delay (s)	48.1	45.3	0.0	1.9
Lane LOS	E	E		A
Approach Delay (s)	48.1	45.3	0.0	1.9
Approach LOS	E	E		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

APPENDIX B
Cost Estimate Breakdowns

HALIFAX

Halifax Regional Municipality

Project Cost Estimation Based on 2018 Prices

Street:	Herring Cove Road	**Prepared By:**	P. Allaby
Limits:	Armdale Roundabout to Glenora Drive (OPTION 1)	**Date:**	June 5, 2020
Category:		**Checked By:**	
Tender #		**Date:**	
		Class Estimation:	C

Item No.	Description	Unit of Measurement	Quantity	Unit Price	Total Price
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted].00

Subtotal:		$7,863,215.40
Contingency	25%	$1,965,803.85
Net HST:	4.286%	$421,271.77
Budget Total:		**$10,250,291.02**

Halifax Regional Municipality

Project Cost Estimation Based on 2018 Prices

Street:	Herring Cove Road	**Prepared By:**	P. Allaby
Limits:	Armdale Roundabout to Glenora Drive (OPTION 2)	**Date:**	June 8, 2020
Category:		**Checked By:**	
Tender #		**Date:**	
		Class Estimation:	C

Item No.	Description	Unit of Measurement	Quantity	Unit Price	Total Price
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Subtotal:		$9,305,263.40
Contingency	25%	$2,326,315.85
Net HST:	4.286%	$498,529.49
Budget Total:		**$12,130,108.74**

Attachment D:

Herring Cove Road Functional Plan Community Engagement

Herring Cove Road Functional Plan
Round 1 Engagement – As We Heard It Report

About the Project

Herring Cove Road is a key arterial roadway that links the Spryfield and Purcells Cove areas (and points beyond) to the Regional Centre via the Armdale Roundabout. It currently accommodates more than 15,000 vehicles per day, and is served by three Halifax Transit routes. A key commuter route, Herring Cove Road is subject to heavy volumes and congestion during weekday morning and afternoon peak periods. It also functions as Spryfield's 'main street', with a concentration of mixed-use development that includes residential, commercial, institutional, and recreational.

Despite its significance in the regional transportation network and importance to the local community, Herring Cove Road lacks a consistent vision in terms of how it should look and function. It has an inconsistent cross section that ranges from two to four lanes, and disconnected pedestrian and bicycle facilities that limit the potential for active transportation uses. Peak period traffic congestion and the lack of transit priority measures forces buses to sit in traffic, increasing delays and impacting service reliability.

This project will develop a Functional Plan for Herring Cove Road that will provide a connected vision for the full corridor. The plan will result in design drawings that show how the entire length of the roadway should look, feel and function to support the movement of people within and through the corridor. This plan will guide future investments and land use planning decisions over the next several years.

Figure 1 - Herring Cove Road near Dentith Road

(Source: Spryfield Community Association)

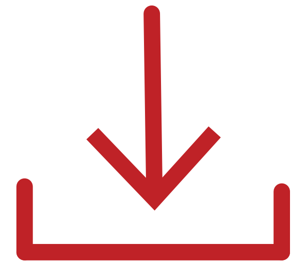
How We Listened

The goal of the first phase of the Herring Cove Road Functional Plan engagement was to better understand the needs and challenges of the residents who use Herring Cove Road today, and to gather ideas and suggestions for improving the road.

The project team reached out to the community in several ways:

- **A page and online survey on the Shape Your City Halifax website:** residents could view information about the project (2,200 visits), participate in an online survey (855 completions), and download public meeting maps and boards (116 downloads total)
- **A public meeting:** residents were invited to a two-hour evening event (over 100 attendees) where they could view and comment on boards and maps, and share their thoughts and concerns with the project team directly
- **A community leaders meeting:** leaders from the local community (13 attendees) were invited to meet with the project team to participate in a discussion about the needs of the community

885 survey completions



116 downloaded the maps and boards

100+ public meeting attendees

13 local community leaders

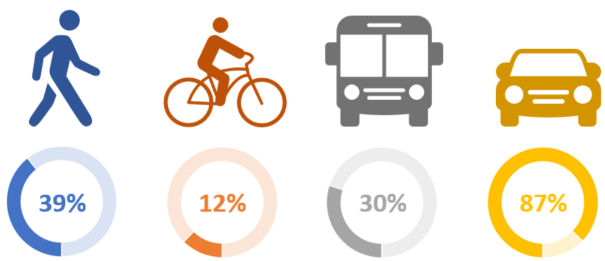
Shape Your City Online Survey

An online survey was posted on the Shape Your City website from January 10, 2019 to January 24, 2019 to collect additional information on how people use Herring Cove Road today. The survey asked people what their transportation priorities are for the roadway, and asked how willing people are to make certain trade-offs for roadway improvements. Over two weeks, 865 surveys were completed by residents.

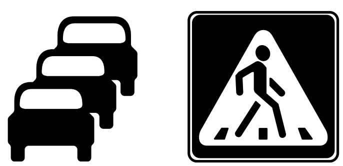
The key findings from the survey can be summarized as follows:

In its current state, Herring Cove Road is well-used by many transportation modes: Though most road users travel by car, roughly 1 in 3 respondents also occasionally or frequently walk and/or take transit along Herring Cove Road and 1 in 8 cycle.[1]

How do you commute along Herring Cove Road? (frequently or occasionally)



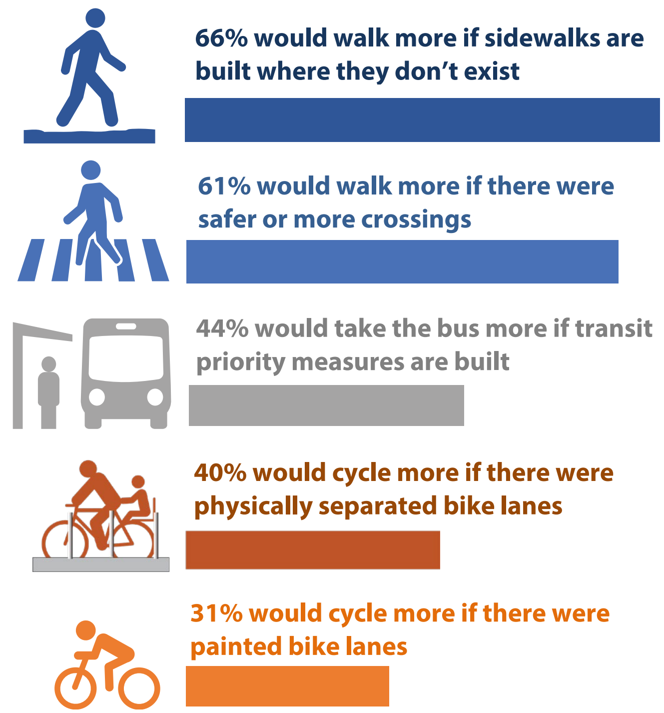
Improving traffic congestion and pedestrian safety are top priorities for residents: The most popular priorities for improvement were reducing traffic congestion and improving pedestrian comfort and safety.[2]



People are willing to add travel time to improve safety: Residents showed a strong willingness to add traffic delays in exchange for safety improvements to the corridor, such as more frequent traffic signals and/or pedestrian crossing.[3]

Would you trade Increased delay for traffic to improve safety? (such as more frequent traffic signals or pedestrian crossings)

People are interested in walking, biking, and taking transit more on Herring Cove Road: Many people said that they would walk, bike, and take transit more with improvements such as adding more sidewalks, improving crossing safety, transit priority measures, and protected bike lanes.[4]



[1] Q1: How often do you use Herring Cove Road as a commuter (travelling to work or school)?
[2] Q3: Please select your TOP 3 priorities for your travel along the Herring Cove Road.
[3] Q4: Improving the quality of transportation for all users may require trade-offs. How acceptable are the following trade-offs to you?
[4] Q5: To what extent would these infrastructure improvements increase the likelihood that you would travel by the transportation option?

Open-ended Survey Comments

There were 376 general comments and suggestions submitted as part of the survey.

Many people highlighted the need to lower speeds and improved pedestrian and cycling conditions along the roadway. Comments included concerns about traffic flow to suggestions for major infrastructure projects, such as a bridge or ferry service across the Northwest Arm, significant upgrades to the Armdale Roundabout, and major transit service improvements. We also heard about the need to accommodate the growth of the community, and make Spryfield more of a complete community with a more attractive streetscape.

Many comments identified specific locations for improvements. These included:

- Improvements to the intersection at Herring Cove Road and Purcells Cove Road
- New signalized intersection at Herring Cove Road and Osborne Street
- Improvements to the intersection at Herring Cove Road and Glenora Avenue
- New signalized intersection at Herring Cove Road and Drysdale Road
- Improvements for pedestrians and left-turns onto Dentith Avenue from Herring Cove Road
- New sidewalks and lighting along Herring Cove Road in the area south of Greystone Drive

"Lights at the corner of Herring Cove Rd and Drysdale would totally help traffic and yes bike lanes would be a huge improvement."

"Need to widen to 3 lanes, one reversable all the way up past Cowie Hill.   Also, limit the access from side streets making left hand turns with the inbound traffic in the mornings-- too many entry points cause unrealistic congestion."

"Safer 500 block crosswalk and sidewalks/lighting are necessary. As a driver I am terrified driving through there as you often can't see pedestrians."

"I most often drive but am wholly willing to give up car-centric road designs to increase Active Transportation usage. Much of Herring cove road is a speedway that, while exciting to drive, does not encourage me to stop and shop."

"I am concerned about the traffic congestion on Herring Cove Rd in the morning rush hour. However, I am not in favour of widening the road as I don't believe that will help. I would like to see improved sidewalks. I live close to the road and am concerned about traffic noise."

Public Meeting

A public meeting was held on Thursday January 10, 2019 at the Spryfield Community Centre. Over 100 residents attended the meeting. Attendees viewed display boards that communicated the background and purpose of the project, as well as a series of maps Herring Cove Road. People were given post-it notes and pens, and were able to leave comments on the maps and boards.

Figure 2 – Even with the crowds, people had ample room for discussion

In general, residents at the meeting expressed a desire for Herring Cove Road to be safer and friendlier towards pedestrians and cyclists. We heard many comments about the need for complete and continuous sidewalks along the entire roadway, and intersections and crosswalks that have safety challenges. Residents also suggested locations where pedestrian crossings or traffic signals should be added.

Congestion and traffic were frequently-mentioned concerns, specifically near the Armdale Roundabout. We heard a desire by some residents for a road-widening to four lanes near the roundabout, as well as keeping the existing four lane configuration in Spryfield.

The intersection of Herring Cove Road and Dentith Road was frequently mentioned as having safety issues, including conflicts between pedestrians and turning vehicles, and inadequate lighting conditions. Many concerns were heard about speeding, especially along the wider sections of Herring Cove Road near Dentith Road, and near the Armdale Roundabout. Poor lighting, walking, and crossing conditions were mentioned as issues in the area south of Greystone Drive.

Residents also expressed concern about the large parking lots through the Spryfield commercial area, and the lack of “walkable” street design and land uses, such as stores with entrances from the street, rather than set back behind a parking lot. Suggestions were also made to make the road more attractive by adding things like streetscaping and trees.

A dedicated bus lane was suggested approaching the roundabout to allow buses to bypass some of the congestion.

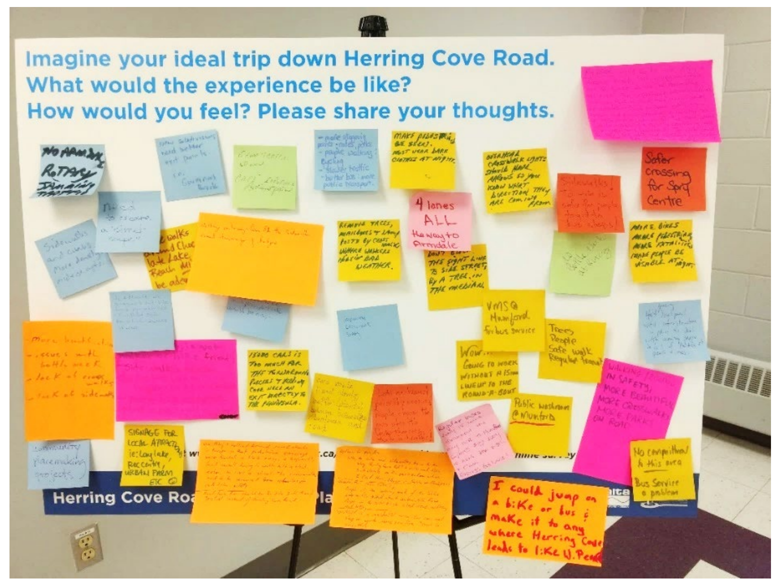


Figure 3 – People were invited to leave their ideas on their ideal trip down Herring Cove Road

Figure 4 – People left comments and suggestions on the poster-sized maps of the corridor

Community Leaders Meeting

The presentation included:

- A background on Herring Cove Road and what the study is trying to accomplish
- Timelines for the Functional Plan study
- An overview of Halifax Regional Municipality's Integrated Mobility Plan (IMP)
- A summary of the existing conditions along Herring Cove Road

The group discussed personal experiences along Herring Cove Road, challenges, and how people would ideally like to travel along the corridor. Common themes included:

- Serious concern about the safety of the road for pedestrians currently, especially for elderly people and children. People shared stories of pedestrians being hit while crossing the street along Herring Cove Road, and others are concerned for the safety of their children walking on the road. Crossings are often not located in the best places or are poorly marked/lit, and people will often jaywalk
- A strong and unanimous desire for sidewalks along the full length of the road: the lack of sidewalks creates dangerous and unpleasant conditions for people walking along the shoulder of Herring Cove Road, including those walking to and from bus stops
- Concerns about the current conditions for bicycling along Herring Cove Road: heavy traffic volumes, high speeds, and lack of space for bikes leads to unsafe conditions. The hill climb just after the roundabout is particularly dangerous, and people tend to bike on the sidewalk there. Many people avoid cycling on Herring Cove Road
- Concerns about new developments at the edge of the study area creating more traffic along Herring Cove Road, especially at the current pinch-point near the Armdale Roundabout
- Frustrations about heavy traffic delays during peak hours along Herring Cove Road near the Armdale Roundabout, and a desire to see this roadway section widened to four lanes. Concerns were raised that the scope of this study will not consider any road widening
- Discussions over whether the current four-lane configuration of Herring Cove Road through the commercial areas is justified: some people think this is overbuilt, while others say it's needed to accommodate future vehicle traffic growth
- Concerns that the Functional Plan is being developed separately from land-use planning along the corridor

Figure 5 – Presentation at the community leaders meeting

For more information please visit
www.shapeyourcityhalifax.ca

Herring Cove Road Functional Plan

Round 2 Engagement – What We Heard

About the Project

Herring Cove Road is a key arterial roadway that links the Spryfield and Purcells Cove areas (and points beyond) to the Regional Centre via the Armdale Roundabout. It currently accommodates more than 15,000 vehicles per day, and is served by three Halifax Transit routes. A key commuter route, Herring Cove Road is subject to heavy volumes and congestion during weekday morning and afternoon peak periods. It also functions as Spryfield's 'main street', with a concentration of mixed-use development that includes residential, commercial, institutional, and recreational.

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This project will develop a Functional Plan for Herring Cove Road that will provide a connected vision for the full corridor. The plan will result in drawings that show how the entire length of the roadway should look, feel and function to support the movement of people within and through the corridor. This plan will guide future investments and land use planning decisions over the next several years.

Figure 1 – Herring Cove Road near Dentith Road

(Source: Spryfield Community Association)

How We Listened

In January 2019, we held the first round of engagement for the Herring Cove Road Functional Plan. The goal of the first phase of engagement was to better understand the needs and challenges of the residents who use Herring Cove Road today, and to gather ideas and suggestions for improving the road.

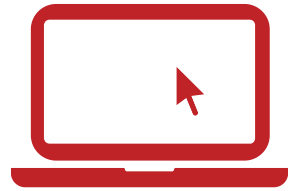
The feedback from the first round of engagement, along with the project goals, operational data, traffic analysis, and best practice, was used to develop design concepts for how Herring Cove Road could operate in the future. The concepts show how the road can be built out over time, with an interim condition (lower effort) and an ultimate condition (higher effort).

The second phase of engagement was held in February and March 2019, with the goal of getting feedback on the concepts, specifically:

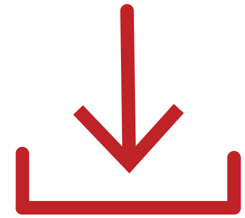
- Comments on how well the plan supports all modes (walking, cycling, transit, and driving)
- Feedback on the concepts and ideas shown on the maps
- Anything that is missing from the concepts

The project team reached out to the community in several ways:

- **Shape Your City Community Engagement Portal:** residents viewed project information (1,330 visits), participated in the online survey (130 completions), and downloaded public meeting maps and boards (299 downloads)
- **Open House:** residents were invited to drop into the evening session that ran from 6-8 pm (55 attendees signed in). They viewed and commented on boards and maps, and shared their thoughts and concerns with the project team
- **Community Leaders Meeting:** leaders from the local community (9 attendees) met with the project team and participated in a discussion about the needs of the community



1,330 project website visits



299 maps and boards downloads

130 survey completions

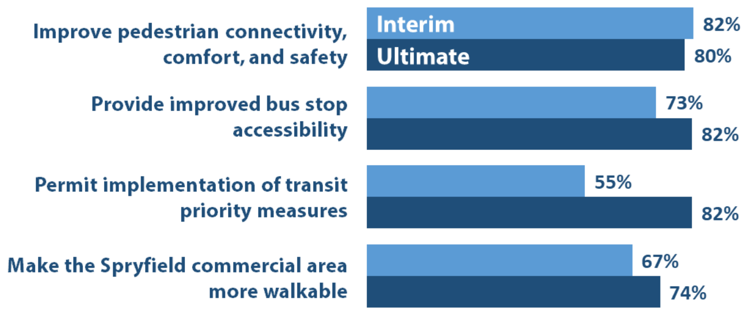
9 local community leaders

55+ Open House attendees

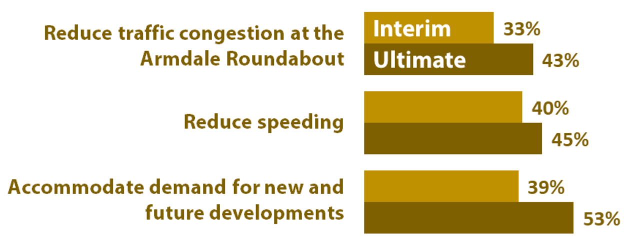
Shape Your City Online Survey

An online survey was posted on the Shape Your City website from February 28, 2019 to March 14, 2019 to collect feedback from people on the design concepts. The survey was completed by 130 people. The survey asked people whether they thought the proposed improvements met the project goals, and how likely people would be to try other transportation modes if the changes were implemented.

For both the interim and ultimate scenarios, the majority of survey respondents agree that the plan will:

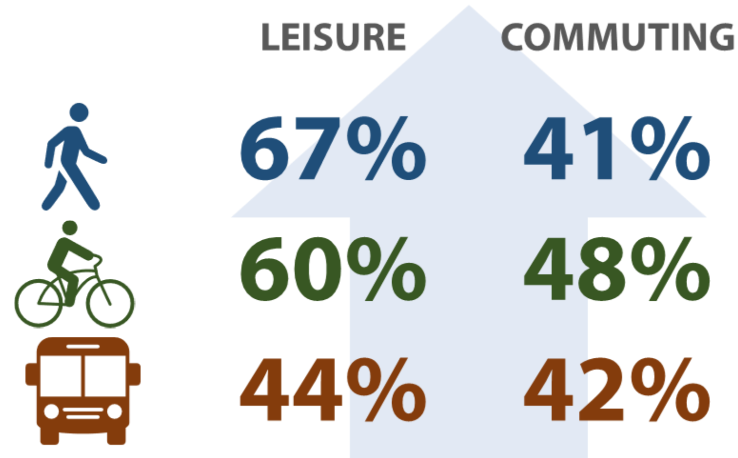


Respondents were less decided on whether the plan will:

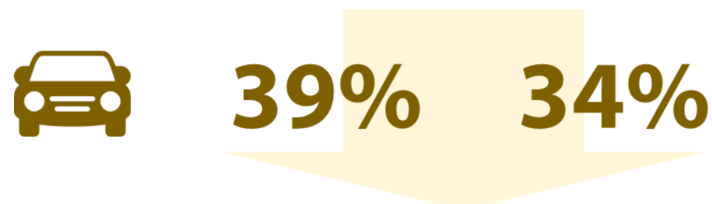


Respondents showed a strong interest in changing the way they move along Herring Cove Road if the plan is implemented.

In both the interim and ultimate scenarios, many respondents said that they would walk, bike, and take the bus more, for their leisure and commuting trips[1]:



Many respondents also reported that they would drive less for both leisure and commuting trips[2]:



[1] *Percentage of respondents who would use each mode more if the ultimate option were implemented*

[2] *Percentage of respondents who would drive less if the ultimate option were implemented*

Open-ended Survey Comments

Sixty-two respondents included a general comment or suggestion as part of the survey. The comments were wide ranging from site specific questions or ideas, to larger scale ideas related to the growth and development of Spryfield and Halifax Regional Municipality as a whole. Over 20 of the comments were very positive about the concept plans, expressing support for the new sidewalks and protected bike lanes, and the attention to helping people get around using all transportation modes. Thirteen comments were negative about the plan, many of which involved concerns about the proposed bike lanes taking away from motorists. Other comments included:

- There should be more greenery along the road
- Request to see more details about certain locations such as the Purcells Cove Road and Herring Cove Road intersection
- Preference for unidirectional bike lanes between the roundabout to Cowie Hill Road, and concerns about the AT greenway not being wide enough
- Desire for more crosswalks and more traffic calming and lane reductions
- Questions why the ultimate option is not being built immediately

“I love the prioritizing of sidewalks on both sides of Herring Cove, safe and protected bike lanes, and making busing more user-friendly so that driving is much less necessary. Thank you!”

“I think this is a very positive step. My thinking is, however, if we are going to do this, why not do it all the way and implement the ultimate option now?”

“Your war on cars is despicable. The very people whose fees and taxes pay for the roads are the people you are screwing over. No one is going to change their mode of transportation based on you ill-conceived notions. There are many considerations you are ignoring here. Commerce being the main one.”

“This looks like a fantastic plan to help extend active transportation into Spryfield and Armdale - really excited about the potential for the biking areas, and the plan just makes a lot of common sense, and will make the community better for all. Thanks for all involved for their work on this.”

“These plans appear to have taken the community's suggestions into account (I am particularly pleased to see a proposed set of lights at the corner of Osborne).”

Open House

A public open house was held on Thursday, February 28, 2019 at the Captain William Spry Community Centre from 6-8PM. The event was advertised through social media, on posters, and in the Chebucto News. Over 55 people attended the session. Attendees viewed display boards that communicated the design project goals and the concepts being considered, as well as maps of the corridor showing details on the concepts along each segment of the road. People were encouraged to use post-it notes to leave comments the boards and maps.

Through conversations with the project team, attendees expressed general support for the improvements to walking and cycling along the corridor, and the removal of vehicle lanes through the commercial area. There was strong support for the Active Transportation (AT) Greenway connecting to the roundabout, but concern about how it would tie into the roundabout and connectivity beyond the roundabout. Attendees were also supportive of improved crossings and the proposed signalized intersections, such as Osborne Street and Herring Cove Road.

Attendees continued to express concern about the traffic delays leading into the roundabout on Herring Cove Road. Traffic engineers were present to discuss the results of the traffic assessment completed for the project.

The comments left on the map boards were positive towards the concepts shown. Some comments asked for clarification about site specific locations or asked for additional improvements such as better streetlighting, more trees, additional crosswalks, and park-and-ride facilities. Photos of the boards with all post-it comments left during the meeting can be found in Appendix A.

Figure 2 – Open House attendees reviewing the map boards

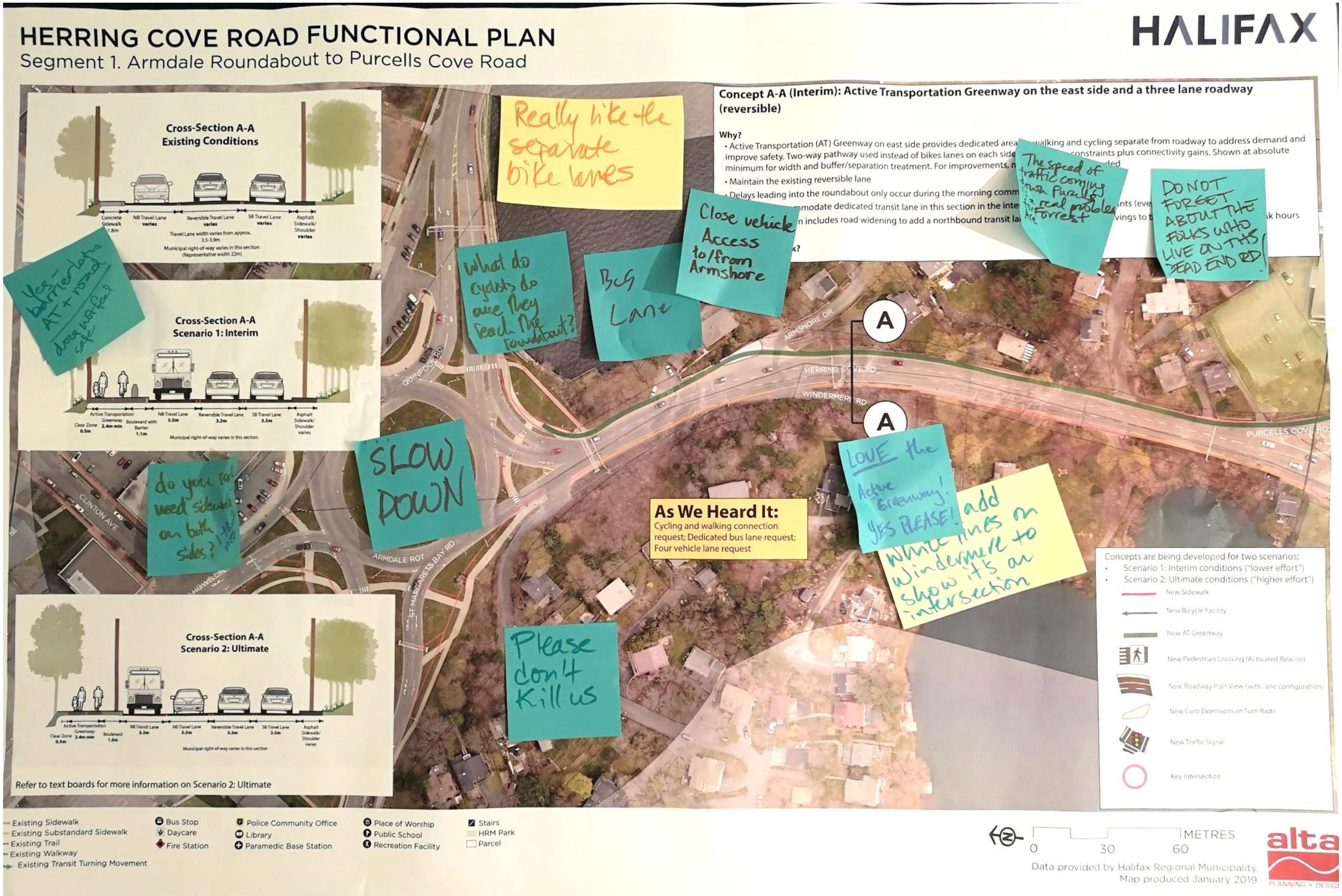


Figure 3 – People left comments and suggestions on the poster-sized maps of the corridor

Community Leaders Meeting

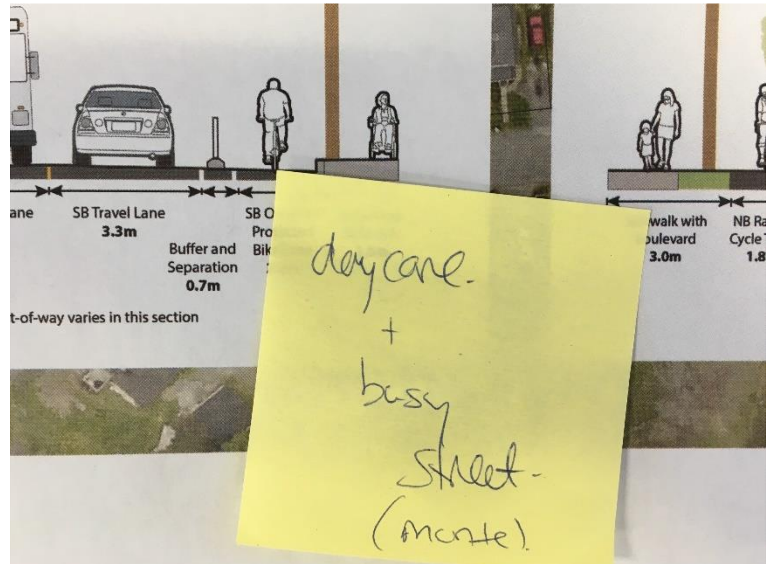
The organizations and community representatives that were invited to the Community Leaders meeting during the first round of engagement were invited again to review and discuss the developed concepts. Nine representatives from community organizations and interests were invited to attend a meeting to discuss the concept design. The representatives were invited to view the conceptual design text and map boards and leave comments.

The meeting included a presentation that covered:

- A reminder of the goals and the themes of the project
- A summary of the results of the first round of engagement, and how they were incorporated into the design
- Overview of the proposed conceptual design and scenarios

Comments made during the discussion included:

- Agreement that the plan addressed the need for more pedestrian infrastructure
- Concerns that the proposed design would not improve peak-hour congestion near the roundabout, and a desire for more vehicle lanes from Glenora Avenue to the roundabout
- Support for separated bicycle lanes in the interim scenario, and a request that the separation technique used be visually appealing
- Discussion of whether the proposed Active Transportation (AT) greenway is the best solution for accommodating cycling near the roundabout, compared to on-street protected bicycle lanes
- Concerns over the aesthetics of the proposed concrete barrier separation for the AT Greenway in the interim design
- Concerns that the roundabout will continue to be a pinch point for traffic into the future
- Attendees showed a degree of comfort with the proposed vehicle lane reduction through Spryfield commercial centre
- Speculation over whether there is demand for cycling on Herring Cove Road



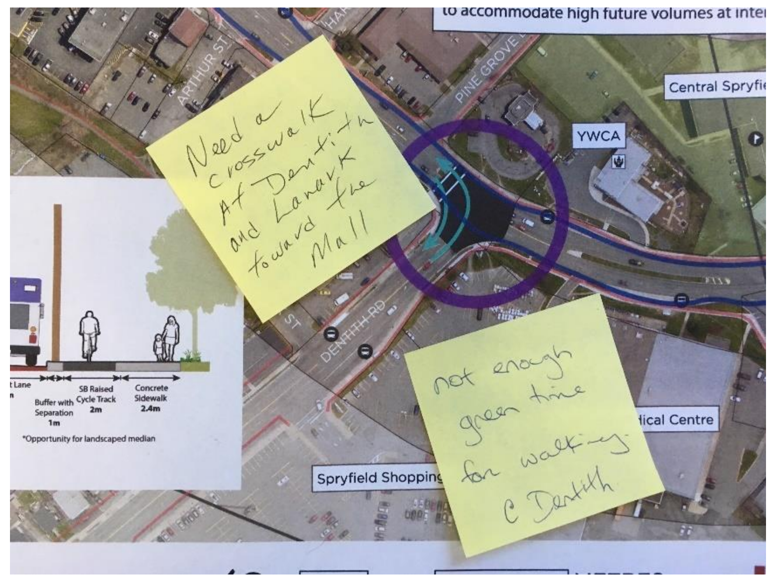


Figure 4 – Photos of comments left on the maps at the Community Leaders meeting

For more information please visit www.shapeyourcityhalifax.ca/herringcoveroad