

Town of Sidney Downtown Traffic Movement Evaluation Study

Final Report



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Executive Summary

The Town of Sidney has a vibrant downtown that attracts locals and visitors alike to its spectacular seaside setting. The Town identified the potential to improve downtown transportation for all users of the space, and thus has undertaken this review of traffic movements to identify potential improvement strategies. The intention of the Downtown Traffic Movement Evaluation study is to review intersection operations and safety considerations within the study area.

The study area is located in downtown Sidney, BC. The area is bordered by Sidney Avenue/James White Blvd. to the north and Bevan Avenue to the south, and includes the waterfront up to Seventh Street. This is the main commercial district of the area. Traffic includes locals driving and walking to local shops, tourists browsing and visiting the waterfront, people with mobility challenges moving around the area, people biking from the waterfront to the Lochside trail, and buses traveling to and from downtown Sidney.

The study first reviewed intersection operations. Through data collection (both previous and new traffic counts) and analysis it was found that most of the intersections are operating at an acceptable level at present (LoS C or better) and are expected to continue to do so in the future. Only one intersection, Beacon Avenue and Seventh Street was found to be operating marginally at a Level of Service D. To improve the level of service it is recommended that a split-phase signal timing be implemented to increase the capacity of the turning lanes.

A safety analysis of the intersection operations was also conducted, reviewing collisions that occurred between 2004 and 2010. Intersections were ranked in order of priority, with Beacon Avenue at Seventh Street identified as the worst intersection for collisions in the study area. The reasons for these collisions were concluded to be higher traffic volumes, as well as inattentive driving exacerbated by the shift from a highway to a more urban environment. Consequently while little can be done to reduce the higher traffic volumes or rear-end accidents caused by inattentive driving, there may be opportunities to emphasize the shift from a highway to an urban driving environment that should be considered.

A larger network operations review was completed by identifying existing stop signs and current traffic movements through the downtown. This traffic movement review examined major routes for vehicle traffic, as well as bus and bike movements. This section also discussed the potential for a pedestrian scramble signal, identifying key considerations and challenges. Finally, there was a review of planning considerations for mobility scooters.

Based on a thorough analysis of intersection operations for both current and future conditions, there were only minimal recommended improvements to operations to be made within the study area. During the study process it became apparent that the one-way section of Beacon Avenue created some discontinuity

within the network. This provided the catalyst to review the overall network and recommend potential improvements.

After conducting a high level examination of the transportation network, three concepts were developed based on the current configuration, Town policies and priorities, and the consultant's professional judgement. The network concepts were identified as Existing (Base Case), Option 1 (Existing Upgraded), Option 2 (2-way Multi-modal) and Option 3 (2-way Shared Street). After outlining the details of the options, each was evaluated based on a series of qualitative and quantitative criteria. From this evaluation, recommendations were made for the preferred network configuration.

The Base Case scenario is the existing network of the study area. This includes the current configuration of Beacon Avenue with its one-way segment, as well as the parking available on all streets within the study area. There are sidewalks on both sides of all streets within the study area, but limited facilities specifically for bicycles. Option 1 provides some enhancements to the existing configuration to increase the space for pedestrians and cyclists in the study area, and better define the entrance to the downtown area. This option provides upgrades to Beacon Avenue, including improved cycling facilities from Fifth to First using sharrows; conversion of angle to parallel parking between Second and First Street to enhance pedestrian space; and creation of an enhanced "gateway" feature at Beacon and Fifth Street.

Option 2 provides 2-way multi-modal travel throughout the study area, with changes to parking, enhanced cycling facilities and traffic calming. This option includes changing Beacon Avenue from Fifth to Second Street to 2-way operation, and providing all the enhancements to cycling and pedestrian experience outlined in Option 1. In addition, pedestrian facilities such as mid-block cross walks and additional benches for seating would be emphasized.

Option 3 is a 2-way shared street where pedestrian safety, comfort and enjoyment is prioritized throughout the study area. Similar examples may be found on Government Street in Victoria or Granville Island and Water Street in Vancouver. This option builds on all of the components of Option 2, with further enhanced pedestrian facilities and traffic calming. This includes pavement treatments, roll-over curbs, mid-block cross walks and enhanced intersection bulb outs. Significant pedestrian amenities including but not limited to benches, trees and landscaping, public washrooms and drinking fountains, and enhanced signage could also be provided.

These options were then evaluated based on the following criteria:

- Operations;
- Network connectivity;
- Vehicle safety;
- Pedestrian safety and experience;
- Cyclist safety and experience;
- Roadway geometry;

- Parking;
- Aesthetics
- Economic Development.

The results of this analysis are summarized in the Multiple Account Evaluation (MAE) table below.

Criteria	Option			
	Base Case	1	2	3
	Existing	Existing Upgraded	2-way Multi-modal	2-way Shared Street
Operations - To/From Hwy 17				
Operations - Beacon Ave.				
Operations - Network Roads				
N/S Connectivity				
Vehicle Safety				
Pedestrian Safety				
Roadway Geometry				
Parking - Beacon Ave				
Pedestrians				
Cyclists				
Aesthetics				
Economic Development				

Legend:

Benefit / Impact

- Excellent Benefit / Low Impact
- Good Benefit / Medium-Low Impact
- Average Benefit / Medium Impact
- Poor Benefit / Medium High Impact
- Very Poor Benefit / High Impact

The results demonstrate the potential improvements that Options 2 and 3 provide – reduced travel speeds, limiting vehicle turning movements, additional mid-block cross-walks, and traffic calming – should enhance both pedestrian safety and the pedestrian experience, as well as potentially increase vehicle safety due to reduced travel speeds. These options should also provide potential economic development opportunities by increasing the downtown Sidney profile as a destination; however, there may also be concerns regarding the reduction of adjacent on-street parking on local businesses.

As part of the consideration of these options, the capital costs and time frame for implementation must also be factored in. These range from Option 1, with low capital cost and a short time frame (1 to 2 years) to Option 3, which would include significant capital costs and an implementation time frame of 3 to 5 years or more.

As a result of the analysis carried out in this project, the following **recommendations** are made:

- That a split-phase signal timing be implemented at the intersection of Beacon Avenue at Seventh Street;
- That the pedestrian crossing markings and associated vehicle stop bars at the intersections of Beacon Avenue and Second, Third and Fourth Streets be relocated closer to the Beacon Avenue curb;
- That no changes are necessary to the system of stop sign priorities that are presently assigned to the roadways in the downtown study area;
- That the “primary” roadway designation of Bevan Avenue and James White Blvd./ Sidney Avenue identified in the Downtown / Downtown Waterfront Local Area Plan, be extended from Fifth Street to First Street;
- That no further consideration be given at this time for a pedestrian scramble at the intersection of Beacon Avenue and Fifth Street;
- That sharrows be placed along the Beacon Avenue lanes as well as on Fifth Street, between Lochside Drive and Beacon Avenue, in order to identify the rights of cyclists to shared road space;
- That motorized scooters continue to be considered as pedestrians, although sidewalk speed limits should be set at 8km/hour, and that further research be carried out on a variety of policy suggestions for the use of scooters in urban environments;
- That the merge lane at Beacon Avenue at Second Street be left as is with conditions monitored for operational and safety issues; and
- That the overall one-way (versus two-way) structure of the Town of Sidney’s downtown roadway network be evaluated prior to further improvements to the existing network. This would include, but not be limited to, the following:

- Undertake additional modeling and traffic counts to determine the traffic impacts of the various scenarios;
- Conduct pedestrian and cycling counts at various times of the year;
- Conduct an Origin / Destination Survey in both the summer peak and shoulder season;
- Prepare high-level (Class D) cost estimates for the various scenarios ;
- Engage and consult with stakeholders, business community and the public to obtain additional feedback on the scenarios.

1.0 Introduction

The Town of Sidney has engaged Urban Systems to undertake a review of the various downtown traffic facilities in order to identify potential strategies to improve overall transportation efficiency and effectiveness. This report provides a review of past background documents, and examines intersection operations and safety issues. In addition, the report also provides a review of the network within the study area, including the development of concept options and their evaluation, in order to provide recommendations for future transportation improvements in the downtown.

The Downtown Traffic Movement Evaluation study represents an opportunity to address existing and potential traffic management issues within the Town. The report summarizes all background information, key assumptions, operational traffic and safety analysis, as well as providing proposed network concepts, evaluations and recommendations.

The key element to a vibrant and sustainable downtown is to provide a transportation network that can accommodate vehicles, pedestrians, cyclists and transit. This study will recommend solutions that will enhance the vibrancy, safety and accessibility of the downtown core.

1.1 Study Scope

The objective of this study is to undertake a pedestrian and traffic movement study within the downtown core area for the purpose of evaluating and optimizing efficiency, safety, and access within the downtown core for both drivers and pedestrians. This review will make recommendations on changes to traffic management required to adequately address traffic operations and safety over a 10-year medium term horizon. The goals of this study are to be proactive in managing traffic within the Town, and to ensure that a business, pedestrian, resident and visitor-friendly environment is maintained and enhanced.

Overall, this study is intended to:

- Review all relevant documents, reports and studies.
- Conduct and analyze vehicle/pedestrian traffic, traffic control devices and flow pattern data at all intersections over the medium term.
- Evaluate and provide recommendations in relation to the following:
 - optimal intersection geometry and signing;
 - preferred traffic signal operations;
 - consideration for pedestrian and vehicle safety, traffic flow efficiency, parking space availability, and economic development;

- potential application and impact of a pedestrian scramble intersection at Beacon Avenue and Fifth Street to assist pedestrian movements.

This study has been expanded to examine the overall roadway network, providing possible network concepts and a high-level evaluation of network options.

The study area (see Figure 1.1) consists of a grid pattern street network, with Beacon Avenue as the primary link between Highway 17 and the waterfront. The northern boundary of the study area is defined by Sidney Avenue / James White Blvd., the eastern boundary by the waterfront, the southern boundary by Bevan Avenue and the western boundary by Seventh Street. The Town has made a substantial and successful effort to transform Beacon Avenue into a pedestrian friendly street. The wider sidewalks and outdoor cafés, as well as closing of the street each Thursday night during the summer for the Sidney Summer Market, attract visitors and locals to walk and enjoy the town. Beacon Avenue functions as a vehicular one-way street from Fifth to Second Street. With the implementation of the one-way street system, the east-west connectors north and south of Beacon Avenue (Sidney Avenue/James White Blvd. and Bevan Avenue, respectively) have seen an increase in vehicle travel. The addition of wider sidewalks and mid-block crosswalks on Beacon Avenue has helped to improve the pedestrian-oriented experience.

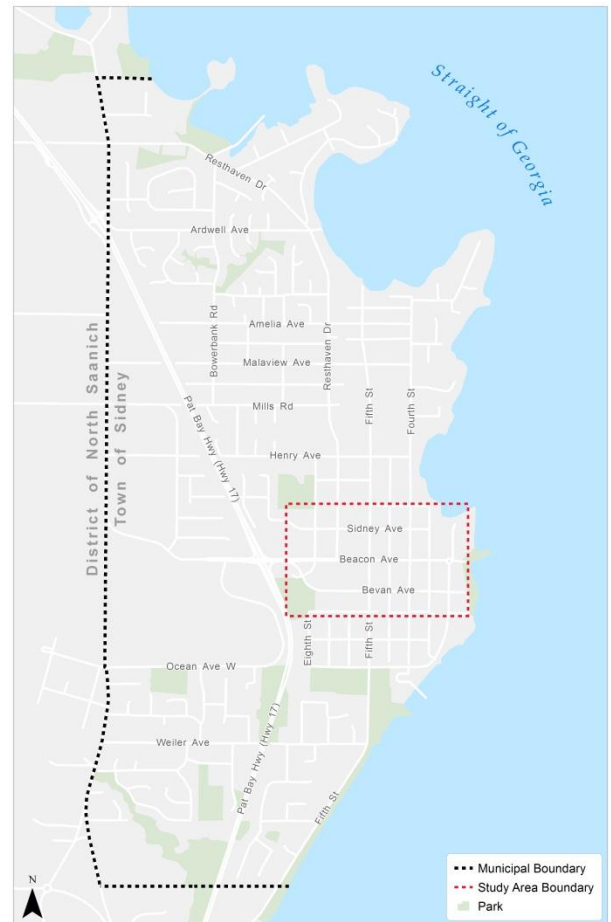


Figure 1.1 - Study Area

1.2 Background Planning Documents

This section provides a summary of applicable planning documents that have been completed at a regional and local level. This Downtown Traffic Movement Evaluation Study is intended to build on this past work and respect the goals and principles that the Town of Sidney has identified through those processes.

1.2.1 REGIONAL PLANS

Regional Growth Strategy (2003) – The Regional Growth Strategy (RGS) guides and manages growth in ways that sustain regional social, economic and environmental goals. The RGS targets two main transportation initiatives. The first initiative is to coordinate land use and transportation development resulting in compact urban settlement and complete communities. Second, the RGS committed to undertaking a regional transportation strategy to enhance regional mobility choices. The direct outcome of this initiative was the TravelChoices Strategy described above. Currently, the RGS is being updated to the *Regional Sustainability Strategy* as part of a 5-year review process.

TravelChoices Strategy (2006) – As a long-term transportation planning framework, CRD's TravelChoices Strategy aims to carry out the transportation goals and objectives identified in the 2003 Regional Growth Strategy. To increase the use of transit, walking, cycling and carpooling, the Strategy promotes transit-friendly municipal policies, design treatments for pedestrian and cycling routes, program incentives for sustainable transportation, and parking management policies.

Pedestrian and Cycling Master Plan (2010) – The Regional Pedestrian and Cycling Master Plan (PCMP) provides a framework to focus planning and investment decisions to increase opportunities for walking and cycling. It includes ambitious mode share goals and identifies a comprehensive bike way network. The PCMP identifies the important role of the Lochside Trail, which passes by Sidney along Highway 17, as well as a recommended Bikeway Corridor through the Town along Fifth Street, Beacon Avenue and on along Resthaven Drive. The identified route can be seen in Figure 1.2.

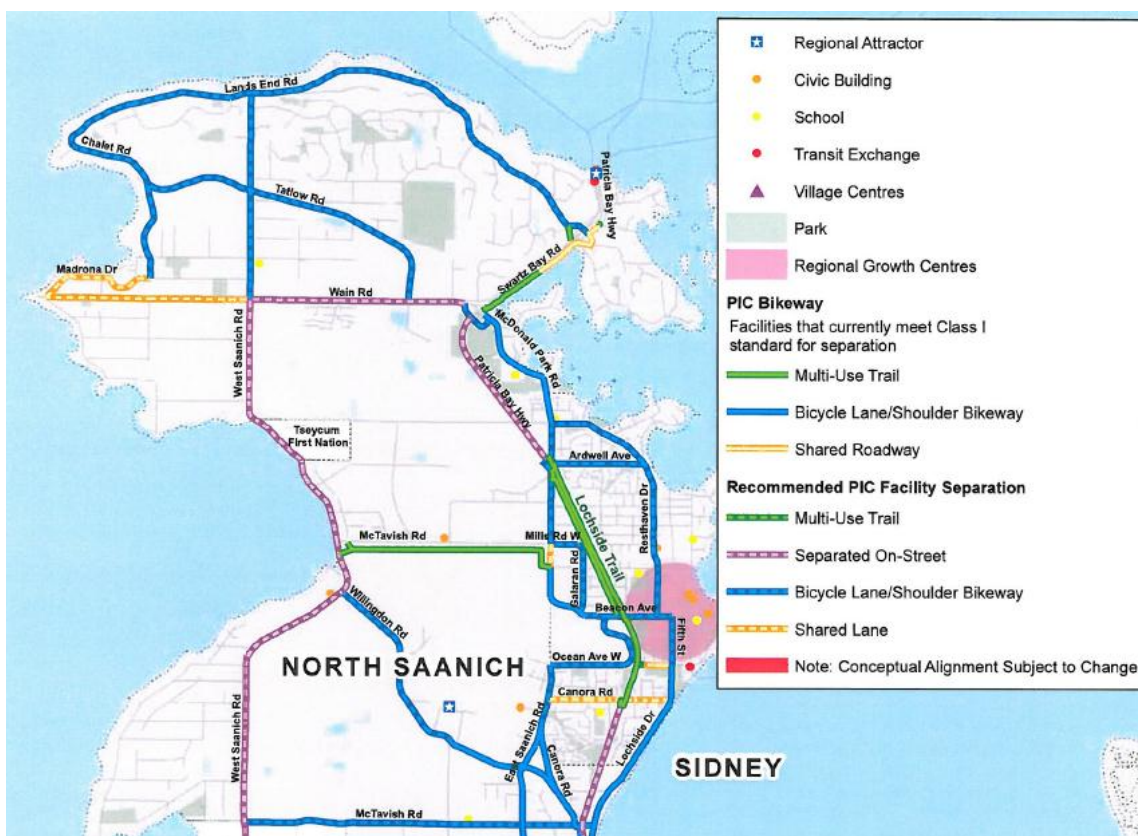


Figure 1.2: CRD Pedestrian and Cycling Master Plan

1.2.2 LOCAL PLANS

Official Community Plan (2007) – The Official Community Plan (OCP) is a comprehensive policy framework that guides future land use and servicing in ways that sustain broad community goals. This Plan outlines the overall vision of the Town being a “balanced, vibrant waterfront community with a revitalized town centre...” One of the planning principles that the Plan uses to guide land management issues is *smart growth*. This includes promoting multi-modal forms of transportation and integrating open space into daily living. The Plan also emphasizes the important role of transportation, stating that “A well-conceived and efficient transportation system is fundamental to resident and visitor mobility and is a key element to the general livability of a community.”

Downtown/Downtown Waterfront Local Area Plan (2008) – The Downtown/Downtown Waterfront Local Area Plan (LAP) identifies policies including land use, movement of people, development of public space and opportunity sites. This plan identifies the goal of creating a vibrant, sustainable and welcoming community, where people can live, work and play. In the section on movement, the LAP recognizes that

“the effective movement of people is critical to a successful downtown. Providing a downtown transportation network that accommodates pedestrians, cyclists, public transportation and vehicles is a key element to a healthy and well-functioning community.”

Vision 2020 Strategic Plan (Revised 2012) – The Vision 2020 Strategic Plan established corporate priorities to focus the planning and other decision making of Council and the Town. The Plan identified four priorities that will require effort and investment in the years ahead and include a balanced healthy community, quality community spaces, sustainable infrastructure and organizational excellence. More specifically, the quality community space is identified as “vibrant, safe, accessible and welcoming public spaces” and “pedestrian friendly.”

2.0 Intersection Operations

This section reviews the traffic operations of the intersections within the study area. It considers data collection, including traffic volumes, geometric data and land use data. This data is then utilized for the generation of future traffic volumes, followed by the analysis of traffic operations and safety at the intersections as well as a review of the existing sidewalk and parking inventory.

2.1 Data Collection

This section reviews past studies completed regarding transportation in the study area, as well as identifying sources of data.

Traffic Volumes

For this study, intersection turning volumes were obtained from several sources and then factored to existing (2012) conditions. As described below, the sources include:

- 1) *Turning Movement Counts for Sidney, BC*
- 2) *Beacon Avenue Corridor Signal Timing Review*
- 3) *Beacon Interchange Study*
- 4) *Urban Systems Data Collection*

The 2004 AM and PM peak hour intersection counts within the study area were provided by the Town of Sidney. These counts were conducted by Boulevard Transportation Group as part of the *Turning Movement Counts for Sidney, BC*. Peak hour turn movement counts were conducted for the following locations.

- | | |
|--|-------------------------------|
| ■ Beacon Avenue/Seventh Street | ■ Sidney Avenue/Fourth Street |
| ■ Beacon Avenue/Resthaven Drive | ■ Sidney Avenue/Third Street |
| ■ Beacon Avenue/Fifth Street | ■ Sidney Avenue/Second Street |
| ■ Beacon Avenue/Fourth Street | ■ Bevan Avenue/Seventh Street |
| ■ Beacon Avenue/Third Street | ■ Bevan Avenue/Fifth Street |
| ■ Beacon Avenue/Second Street | ■ Bevan Avenue/Fourth Street |
| ■ Beacon Avenue/First Street (Seaport Place) | ■ Bevan Avenue/Third Street |
| ■ James White Blvd./Seventh Street | ■ Bevan Avenue/Second Street |
| ■ James White Blvd./Resthaven Drive | ■ Bevan Avenue/First Street |
| ■ Sidney Avenue/Fifth Street | |

As part of the *Beacon Avenue Corridor Signal Timing Review* (Boulevard Transportation Group, October 25th, 2007), new intersections counts were undertaken in 2007 during the morning, midday and afternoon peak hour at the intersections of:

- Beacon Avenue/Seventh Street
- Beacon Avenue/Resthaven Drive
- Beacon Avenue/Fifth Street

As part of the *Beacon Interchange Study* (Urban Systems, 2011), an intersection count at Beacon Avenue/Fifth Street was obtained. This count was conducted in August 2011.

For the purpose of this study, Urban Systems undertook intersection counts during the morning and afternoon peak hours in October 2012 at the intersections of:

- | | |
|---------------------------------|-------------------------------------|
| ■ Beacon Avenue/Resthaven Drive | ■ James White Blvd./Resthaven Drive |
| ■ Beacon Avenue/Second Street | ■ James White Blvd./Fifth Street |
| ■ Beacon Avenue/Fifth Street | |

Geometric Data

Three sources of geometric data were used for the analysis. These were:

1. Information provided by the Town of Sidney;
2. Information extracted by high-level “on the ground” surveys, please note that these were not formal surveys adequate for design purposes but high-level surveys adequate for traffic analysis only; and
3. Information extracted from GIS and mapping applications.

Land Use Data

Land use data is utilized in general to inform the forecast for future traffic growth and in particular the access and egress between intersections in the traffic balancing process. Land use projections were reviewed and discussed with Town of Sidney staff, in order to determine future assumptions over the medium term (10 year) horizon. These discussions led to the utilization of a higher pedestrian growth rate (2%) in the future forecasts, based on the policy direction for downtown Sidney as outlined in various Town plans and policies.

2.2 Traffic Volumes

This section provides the vehicle traffic volumes in the study area. The data described in Section 3.1 was balanced geographically and chronologically in order to provide a consistent network traffic volume forecast. The geographical balancing component balances the traffic volumes exiting from upstream intersections and arriving at downstream intersections, taking into account access and egress between the two intersections. The chronological balancing deals with changes in traffic volumes overtime in terms of growth, as well as daily, weekly, monthly and seasonal differences. Chronological balancing leads to a recommendation on a traffic volume growth trend which covers the prior trend analysis period (2004 to 2012). Through the presentation of data and discussions with Town of Sidney staff, a vehicular growth rate of 1% per annum was deemed reasonable for balancing over the past period.

Differences in peak hour periods were reviewed with the PM peak hour period selected as the critical period for analysis. It was also agreed to use a medium term (10 year) horizon period for the analysis. A traffic growth forecast was also required for the expectation of growth over the future analysis period to the horizon year. The CRD Regional model and the trend analysis carried out for the traffic balancing were both considered. Again, through the presentation of data to Sidney staff and subsequent discussion a vehicular growth rate of 1% was deemed reasonable with higher growth rate of 2% allowed for in the case of pedestrians in the urban core. The resulting existing (2012) and future (2022) balanced traffic volumes are presented in Figures 2.1 *Existing Network PM Peak Hour Traffic Volumes* and Figure 2.2 *Future Network PM Peak Hour Traffic Volumes*.

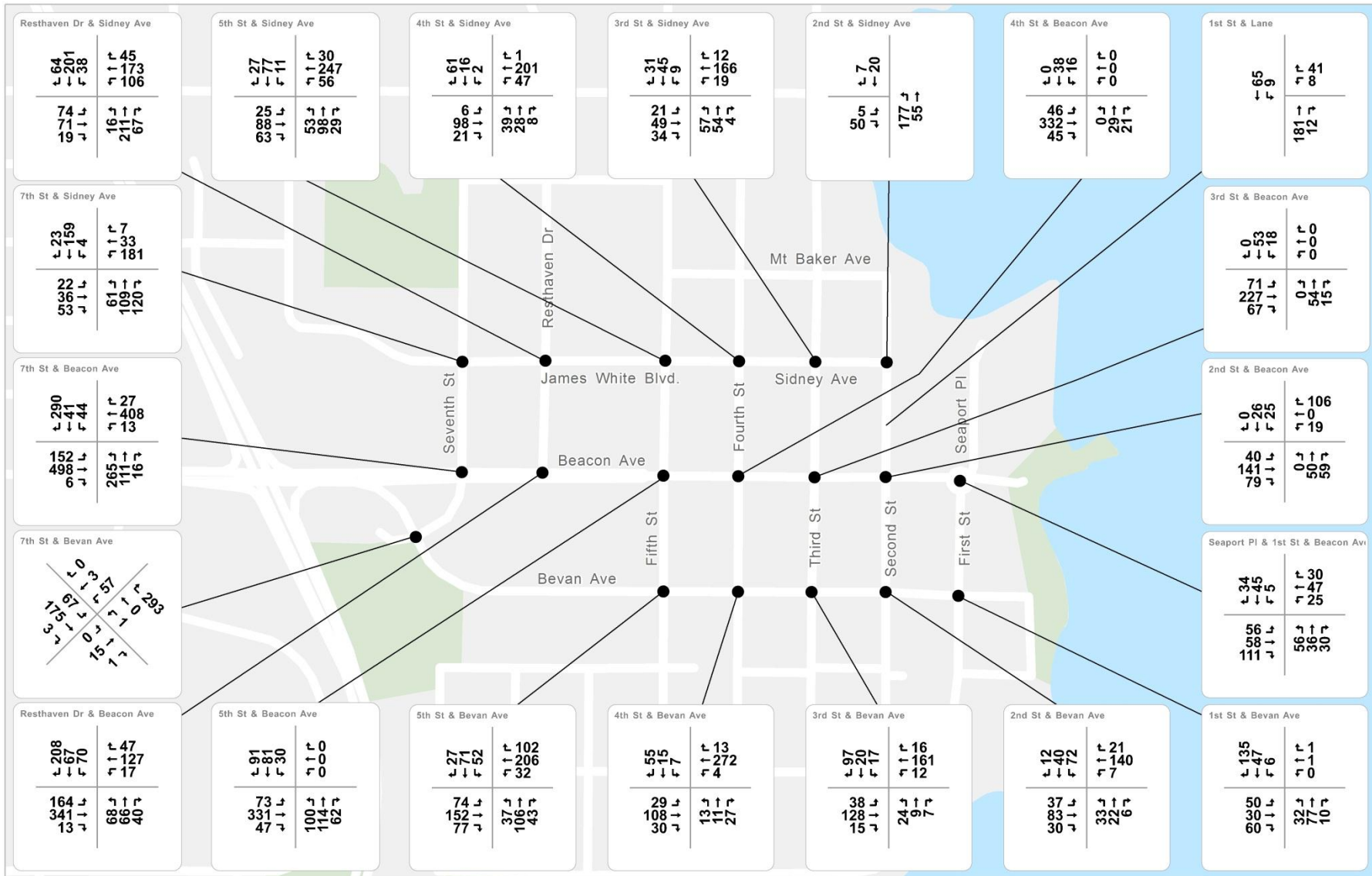


Figure 2.1: Existing Network PM Peak Hour Traffic Volumes

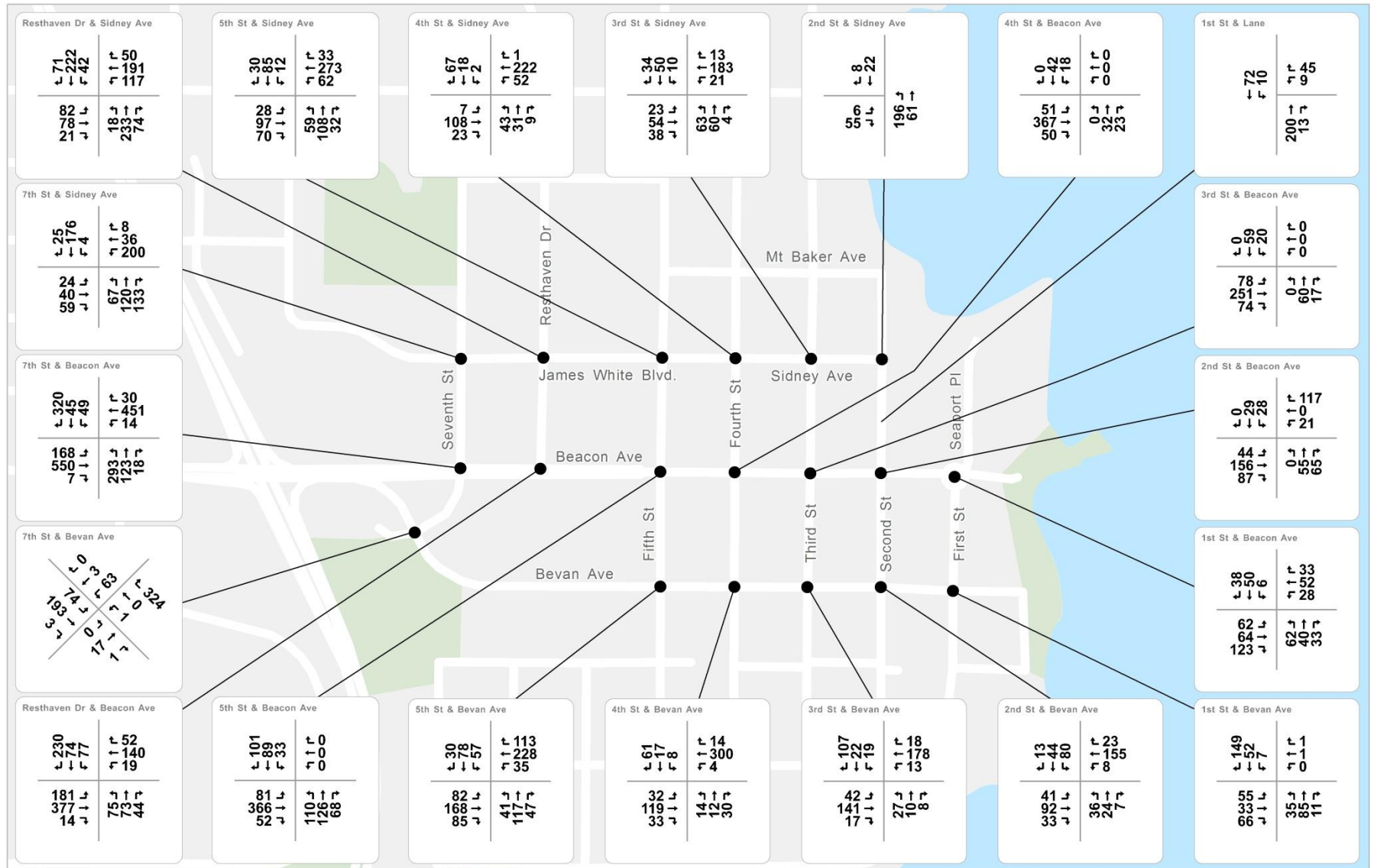


Figure 2.2: Future (10 year) Network PM Peak Hour Traffic Volumes

2.3 Operational Analysis

Within the study area, there are 20 intersections, three of which are signalized, with the remaining intersections being stop-controlled. The intersection control locations are summarized in Table 2.1 and depicted in Figure 2.3 along with the present traffic operations.

INTERSECTION	INTERSECTION CONTROL TYPE
Beacon Avenue/Seventh Street	Signalized
Beacon Avenue/Resthaven Drive	Signalized
Beacon Avenue/Fifth Street	Signalized
Beacon Avenue/Fourth Street	2-Way Stop, Priority East/West
Beacon Avenue/Third Street	2-Way Stop, Priority East/West
Beacon Avenue/Second Street	4-Way Stop
Beacon Avenue/First Street	Roundabout
Seaport Place lane/Second Street	1-Way Stop, Priority North/South
James White Blvd./Seventh Street	4-Way Stop
James White Blvd./Resthaven Drive	4-Way Stop
Sidney Avenue/Fifth Street	4-Way Stop
Sidney Avenue/Fourth Street	2-Way Stop, Priority East/West
Sidney Avenue/Third Street	2-Way Stop, Priority East/West
Sidney Avenue/Second Street	3-Way Stop
Bevan Avenue/Seventh Street	2-Way Stop, Priority East/West
Bevan Avenue/Fifth Street	4-Way Stop
Bevan Avenue/Fourth Street	2-Way Stop, Priority East/West
Bevan Avenue/Third Street	2-Way Stop, Priority East/West
Bevan Avenue/Second Street	2-Way Stop, Priority East/West
Bevan Avenue/First Street	2-Way Stop, Priority North/South

Table 2.1: Summary of Existing Intersection Control

To understand the present and future operations at each of the intersections, traffic models were developed for the PM peak hour using the Synchro / SimTraffic software suite. The Synchro portion of the software provides methods for optimization of roadway facilities as well as the standard set of performance measures based on Level of Service as defined in the Transportation Research Board's Highway Capacity Manual (HCM)¹. The SimTraffic portion of the software suite is based on the "translation" of the Synchro input data into a traffic simulation using a complex set of algorithms of vehicle

¹ "Highway Capacity Manual", Transportation Research Board, Washington DC, 2000.

interactions within the software. The SimTraffic simulations provide important insights into the traffic operational characteristics of the network, particularly the interaction of various transportation system elements, such as adjacent traffic signals, and other interactions that are not wholly considered within the existing HCM methodologies.

The Level of Service (LoS) performance scale is “a quality measure describing operational conditions within a traffic stream, generally in terms of speed and travel time, freedom to manoeuvre, traffic interruptions, and comfort and convenience” (HCM). The scale utilizes the letters A through F to categorize the operating conditions of a facility from highest (Level of Service A) to lowest (Level of Service F). It is commonly used in the industry to describe traffic operations and is based on the average delay per vehicle measured in seconds. The LoS legend is presented below in Table 2.2 for the intersection types analyzed within this report. As a rule Level of Service E and F indicate congested operations. It should be emphasized that the delays quoted are average delays and as a result there would be variations around these over the hour, with some vehicles having no delay at all and others having longer delays than the average.

Traffic Signals		Stop Control	
LoS	Delay (sec/veh)	LoS	Delay (sec/veh)
A	0 - 10	A	0 - 10
B	> 10 - 20	B	> 10 - 15
C	> 20 - 35	C	> 15 - 25
D	> 35 - 55	D	> 25 - 35
E	> 55 - 80	E	> 35 - 50
F	> 80	F	> 50

Table 2.2: Level of Service Criteria

The details of the Synchro and the SimTraffic analyses for both Present and Future periods are presented in Appendix A. The overall intersection results presented in Figures 2.3 and 2.4 are for the present and future periods respectively. While the results of the Synchro and SimTraffic analysis types generally match, they occasionally do not. Where they do not match, we feel that the SimTraffic analyses are the more reliable of the two analyses although some investigation into the cause of the difference is also important. As a result, Figure 2.3 and 2.4 present the SimTraffic-based results presented in terms of 1) the intersection level of service (LOS), 2) the intersection vehicular delay (seconds/vehicle), 3) any movements with a LoS D or worse and 4) the existing configuration. As a general guide, LoS E and F are typically considered deficient operations, with LoS D being marginal and LoS A – C acceptable.



Figure 2.3: Summary of Existing Intersection Operations



Figure 2.4: Summary of Future Intersection Operations

Based on the analyses carried out and presented in Figures 2.3 and 2.4, most of the intersections are operating under acceptable levels of service (LOS C or better) at present and are expected to continue to do so into the future. The only intersections where traffic operations reached the marginal LoS D level were the intersections of Beacon Avenue and Seventh Street (present and future), and Bevan Avenue and Seventh Street in the future. While not typically seen as a deficiency, these locations would be the worst locations in terms of traffic operations within the Town of Sidney and consequently options to alleviate these were explored in case they worsened.

Options to address the deficiencies identified were considered, with the technical results presented in Table 3.3 below:

- **Beacon Avenue at Seventh Street:** SimTraffic shows the northbound left turn operating at a LoS D for both existing and future conditions. This higher LoS is partially caused by the weave into the left turn lane from the right turn from Bevan Avenue which initially ends up in the northbound curb lane. The short distance between Bevan Avenue and Beacon Avenue on Seventh Street causes some weaving and storage problems. As there are two receiving lanes available on the west leg of this intersection conversion of the signal timing to a split-phase format would allow the curb lane to be used as a left / through and right turn lane. As can be seen from the table while this alleviates the northbound left turn problem at the same time it increases the delay for the southbound left turn. This may be a good trade-off however, as the future southbound left turn volumes at 49 vehicles per hour are considerably lower than the future northbound left turn at 293 vehicles per hour.
- **Bevan Avenue at Seventh Street:** The LoS D at this intersection is related to the difficulties described at Beacon Avenue and Seventh Street. The difficulty with the weave between Bevan and Beacon and the short distance between these intersections causes some queuing through the Bevan Avenue / Seventh Street intersection. As a result, alleviating the weave and queues at Beacon Avenue as outlined above would also alleviate the difficulties found at this intersection.

Intersection	Intersection Level of	Measures by Movement	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Beacon Avenue/7 th Street Existing	23 / C	Volume (veh/hr)	265	110	15	45	40	290	150	500	10	15	410	30
		Delay (s)	41.7	16.8	11.4	33.5	20.5	18.4	21.6	15.6	10.3	32.5	23.8	22.6
		Level of Service	D	B	B	C	C	B	C	B	B	C	C	C
		I/S LoS		33.5 / B			20.4 / C			16.9 / B			24 / C	
Beacon Avenue/7 th Street Split Phase	21 / C	Volume (veh/hr)	265	110	15	45	40	290	150	500	10	15	410	30
		Delay (s)	28.4	33.5	26.0	36.8	21.0	12.0	21.4	15.9	15.9	29	24.1	17.3
		Level of Service	C	C	C	D	C	B	C	B	B	C	C	B
		I/S LoS		29.7 / C			15.9 / C			17.2 / B			23.8 / C	

Do Not Exist

Traffic Signals

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Stop Control

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

Table 2.3: Intersection Options – Effects on Operations

2.4 Safety Analysis

In addition to identifying the operational constraints at each intersection within the study area, a safety review was also conducted. For the purpose of this study, collisions occurring between 2004 and 2010 were obtained from the Town of Sidney. As the dataset for 2011 was not complete at the time this study was undertaken, 2011 safety data has not been included in this analysis. In order to remove the collisions occurring in the parking lots and avoid over representing the collisions at the intersections, the ICBC dataset was further refined.

The details of the safety analysis are presented in Appendix B with a summary presented in Figure 2.5 below.

Comments on the various intersections in order of decreasing priority are as follows:

- **Beacon Avenue at Seventh Street:** This signalized intersection has by far the worst safety record in the community with 64 collisions over the 7-year period between 2004 and 2011. This amounts to an average of about 9 collisions per year. This intersection is also the busiest intersection in the community being the gateway to Highway 17. The prominent collision type is Rear End (47%) in the eastbound direction (30%), typically occurring in the PM peak hour. This type of collision at a traffic signal is generally caused by driver inattentiveness. This may also be exacerbated by the proximity of this signal to the Highway 17 signal at Beacon Avenue as well as the 'transition' from highway speeds to the lower speeds required in the urban environment. Although there is a permanent speed reader located in this vicinity, generally there is little that can be done to alleviate driver inattentiveness; however, anything that can be done to emphasize the shift from highway to urban environment would help (e.g. signage, pavement markings).
- **Beacon Avenue at Resthaven Drive:** This intersection, also signalized, has a considerably lower safety record than Beacon Avenue at Seventh Street, but still significant at 19 collisions over the seven year period between 2004 and 2011, or 2.7 collisions per year. This intersection is also the next busiest intersection in the community with again, the prominent collision type being Rear End (44%) in the eastbound direction (30%), typically occurring in the PM peak hour. Similarly to the signal at Seventh Street, this type of collision at a traffic signal is generally caused by inattentiveness with little recourse available
- **Bevan Avenue at Fifth Street:** This intersection, which is a 4-way Stop, has a similar safety record to that at Beacon and Resthaven also with 19 collisions over the seven year period between 2004 and 2011, or 2.7 collisions per year. The prominent collision type is again Rear End (56%) although this occurs in the westbound direction (43%). These collisions are again generally caused by inattentiveness possibly exacerbated by some confusion as to the roadway priorities. Roadway continuity and classification are addressed in the following section.

- James White Blvd. at Resthaven Drive.: This intersection, which is also a 4-way Stop, has a slightly lower safety record to the previous intersections mentioned at 16 collisions over the seven year period between 2004 and 2011, or 2.3 collisions per year. The prominent collision type is Side Impact (36%) with this occurring mainly in the southbound direction (60%) . These collisions may be caused by some confusion as to the roadway priorities. Roadway continuity and classification are addressed in the following section.
- Beacon Avenue at Third Street: This intersection, which is a 2-Way Stop, has a slightly lower safety record to the previous intersections mentioned at 12 collisions over the seven year period between 2004 and 2011, or 1.7 collisions per year. The prominent collision type is again Side Impact (46%) although this occurs in the eastbound direction (55%). These collisions may be caused by a number of factors including: confusion as to the roadway priorities; confusion as to the type of signing (4-Way vs. 2-Way Stop); and poor sight lines. Roadway priority, continuity and classification are addressed in the following section. The confusion as to the type of signing (4-Way vs. 2-Way Stop) could possibly be caused by the signs behind the “Do Not Enter” signs being misconstrued as stop signs, leading north/south traffic to believe that the intersection is a 4-Way stop (see Photo 2.1). Thus issue could be alleviated under a two-way traffic operations scenario (rather than the current one-way traffic). Poor sight lines are caused by the location of the pedestrian cross-walk and the Stop bars fairly far back from the actual intersection. This is described in more detail with a possible repositioning of the pedestrian crossing and the stop bar considered in Section 2.8.



Photo 2.1: Third Street at Beacon is a 2-way stop with poor sight lines to oncoming traffic

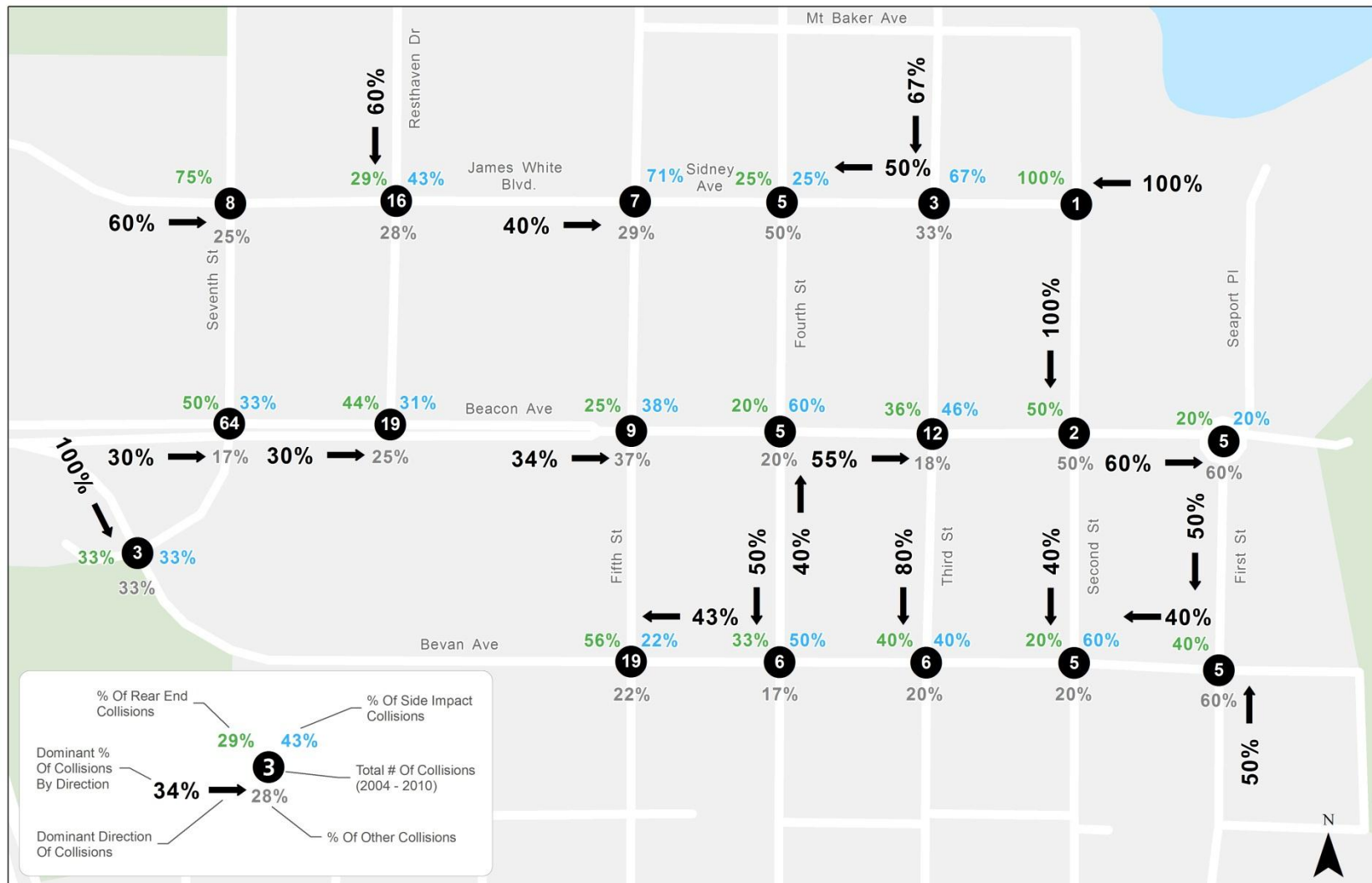


Figure 2.5: Intersection Safety Summary

2.5 Parking

Currently parking within the downtown core is provided by on-street parking and several off-street parking lots. The time restriction for the on-street parking varies anywhere between 5 minutes to 3 hours. As shown in Figure 3.6, the time restriction for most of the on-street parking is 2 hours.

The *Town of Sidney Parking and Parkade Study* (Boulevard Transportation Group, May 2007) found that in 2007, parking occupancy reached a peak of 75% between 1:00-2:00pm on the parking stalls located on Beacon Avenue, Bevan Avenue and Sidney Avenue. This rate was expected to increase to 85% by 2011. The threshold where drivers perceive the parking supply as full is 85%. This is often referred to as “practical capacity.” Details regarding average occupancy rate, peak hour of occupancy, average turnover rate and average duration can be found in Table 3.4.

Parking is often subject to the competing objectives of managing transportation demand and promoting alternate modes (parking supply reduction) and supporting local economic development (ensuring adequate parking supply). As a result, it will be important to continue to manage the parking supply and carefully endeavour to replace any on-street parking loss with off-street parking or parking along adjacent roadways.

Corridor	Land Served	Use	Average Occupancy Rate	Peak Hour of Occupancy	Average Turnover Rate (vehicles/stall)	Average Duration (hr)
Beacon Avenue	Commercial		80%	3 – 4pm	6	1.1
Bevan Avenue	Commercial		76%	2 – 3pm	4.5	1.4
Sidney Avenue/James White Blvd	Commercial		87%	11:00am – 12:00pm	1.75	3.5
First Street/Seaport Place	Commercial		79%	11:00am – 12:00pm	2.1	3.0
Second Street					2.6	2.0
Third Street					4.0	1.2
Fourth Street			81%	1 – 3pm	4.0	1.7
Fifth Street						
Resthaven Drive/Sixth Street						
Seventh Street						

Table 2.4: Summary of On-street Parking Findings from the 2006 Parking Study

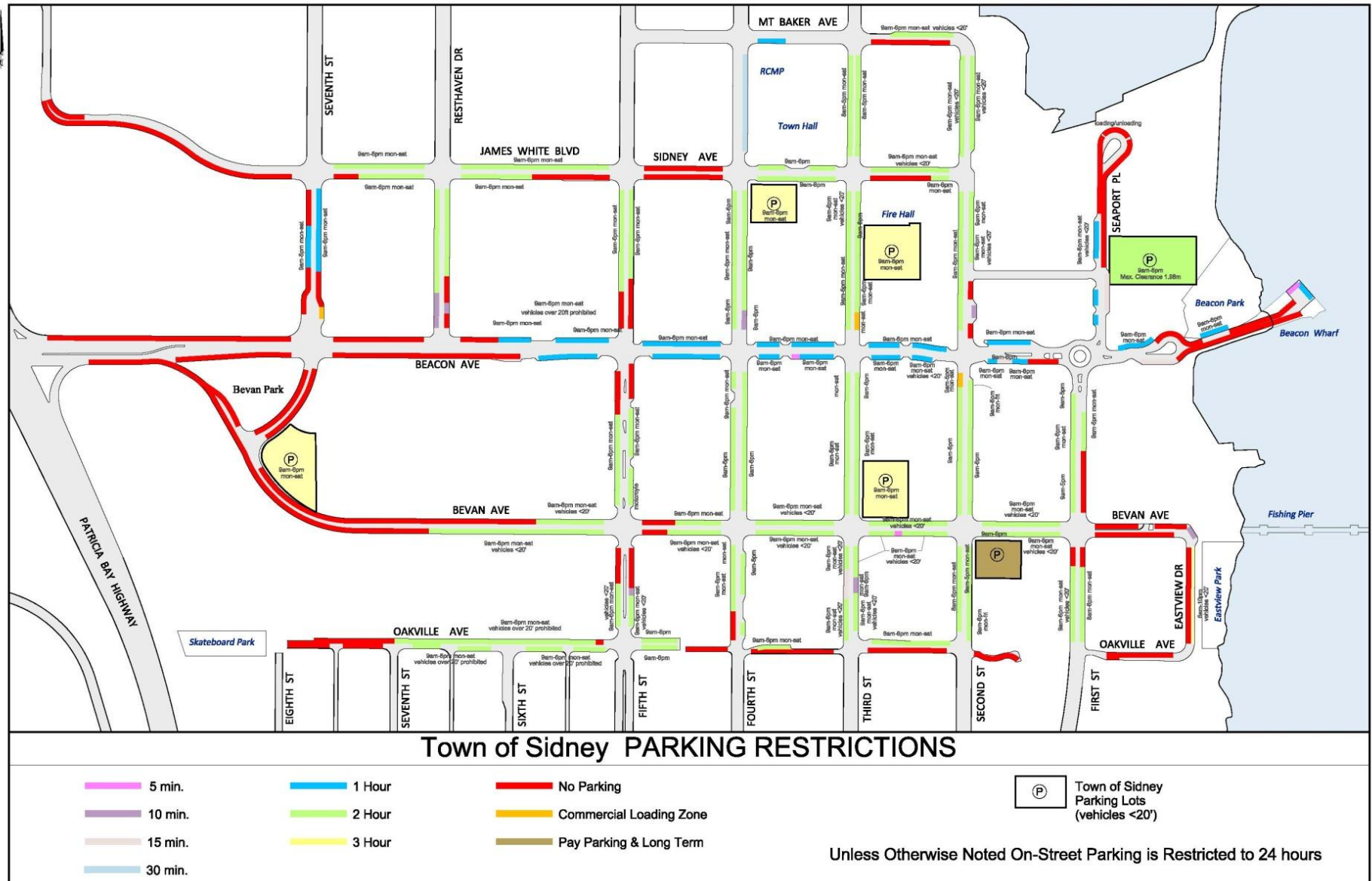


Figure 2.6: Downtown Parking Restrictions

2.6 Traffic Movements and Roadway Classification

Town of Sidney staff also expressed a desire for a review the organization of the stop signs priorities along Sidney Avenue/James White Blvd. and Bevan Avenue. This section reviews the common desire lines and traffic movements within the study area, identifying preferred routes used by drivers to travel through the town centre.

A strong basis for the allocation of roadway priorities and consequent to the roadway classifications is the desire lines created by various important traffic movements. Figure 2.7 presents the information necessary to formulate this decision. Three types of traffic movements have been identified as important users of the downtown roadway network and are shown on the figure, namely:

- Community interaction between the areas of the community to the north and south of the downtown core;
- Travel from the residential areas north and south of the downtown core to and from Highway 17; and
- Travel from the downtown core to and from Highway 17.

Travel between the residential areas to the north and those to the south of the downtown core occur via Resthaven Drive to and from the north, and Fifth Street to and from the south. A “jog” over is required typically using either Beacon Avenue or James White Blvd., although residential streets in the northern residential areas such as Malaview Avenue can also be used.

Travel between the residential areas to the north of the core and Highway 17 mainly occur along Resthaven Drive and Seventh Street to Beacon Avenue and then along Beacon to the highway. Travel between the residential areas to the south of the core and Highway 17 mainly occur via Fifth Street or Bevan Avenue to Beacon Avenue Resthaven Drive and Seventh Street to Beacon Avenue and then along Beacon to the highway.

Travel between the downtown core and Highway 17 mainly occurs using Beacon Avenue eastbound, but either Sidney Avenue / James White Blvd. or Bevan Avenue westbound, as Beacon Avenue is closed to westbound traffic between Fifth and Second Streets (i.e. one-way street eastbound). This also then requires a “jog” over typically using Fifth Street, Resthaven Drive, or Seventh Street to get back to Beacon Avenue

Comparing these main traffic movements with the system of stop signs along Bevan Avenue and Sidney Avenue / James White Blvd. yields the fact that the system of stop signs in place does have a strong technical basis with stops control generally provided whenever a main crossing movement is encountered. 4-way stop controls are found on James White Blvd. at Seventh Street, Resthaven Street and at Fifth Street; as well as on Bevan Avenue at Fifth Street. Referring to Figure 3.7, major movements in both directions can be seen at all of these intersections. The remaining intersections can be seen to have one major movement only with side street stop signs protecting the priority of these movements, As a result of the above, it is recommended that the current stop control system be left as is with no changes made.

As far as the roadway classification is concerned, comparing these main traffic movements to the Street Hierarchy Map from the Local Area Plan (see Figure 2.8), there also appears to be a good correlation between the main traffic movements and the roadway hierarchy desired. The lone exception to this is the use of Beacon Avenue from First to Seventh Street where at present there is high use of this roadway for eastbound traffic movements, as opposed to its designation as a Pedestrian-Priority Secondary Street within the Local Area Plan. In addition, the lack of westbound movements along Beacon Avenue places a greater emphasis on Sidney and Bevan Avenues for travel between the downtown core and the highway. Both of these factors cause a consequent redirection in traffic volumes to Bevan and Sidney Avenue. As a result, it may be necessary to continue with the designation of these roads as primary roadways east of Fifth Street to First Street.



Figure 2.7: Desire Lines and Traffic Movements

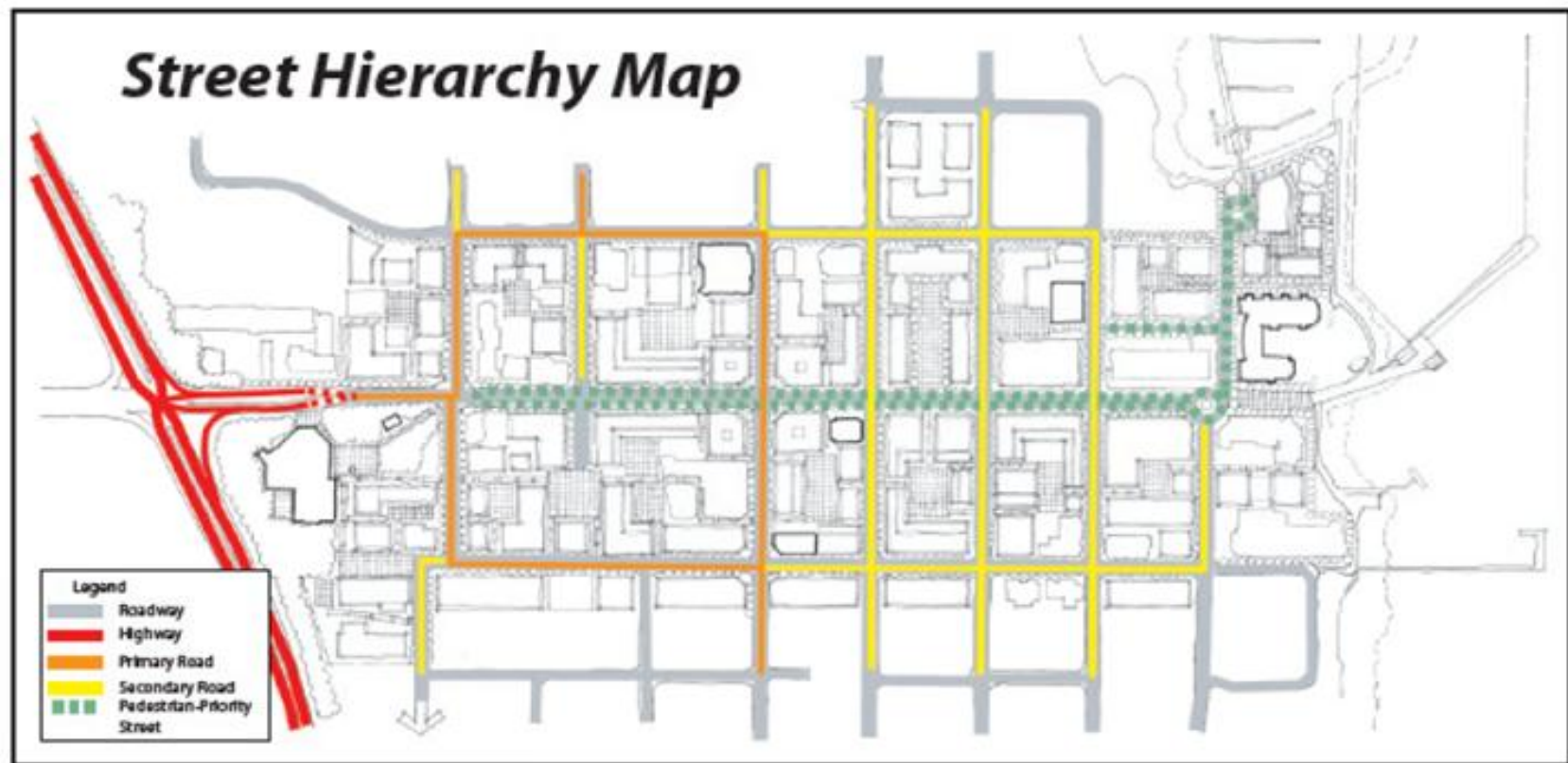


Figure 2.8: Downtown/Downtown Waterfront Local Area Plan (2008) Street Hierarchy Map

2.7 Alternate Modes

Many people travel to downtown Sidney and through the town by modes other than the vehicle. This includes travel by modes such as transit, cycling and motorized scooter.

2.7.1 TRANSIT BUS

BC Transit provides bus service to and through Sidney. A major emphasis is service to/from neighbourhoods to the north and south of downtown and delivery to downtown. Figure 2.9 outlines the major route transit buses take as they travel to and from the ferry and the rest of the Capital Region. The buses do not travel further east than Fifth Street, due to the strong pedestrian orientation along Beacon Avenue.

2.7.2 PEDESTRIAN SCRAMBLE

A pedestrian scramble is an exclusive pedestrian phase at a signalized intersection where vehicular movements are prohibited at all approaches while pedestrians are permitted to cross diagonally and longitudinally (see Photo 2.2). The separation of vehicular and pedestrian movements is intended to reduce conflicts between the two modes.

Pedestrian scrambles appear to offer the greatest safety benefits at intersections with large volumes of both vehicles and pedestrians. Where pedestrian volumes are low, vehicles may violate the pedestrian-only phase. Where vehicle volumes are low, pedestrians are more likely to cross during gaps in traffic rather than wait for the signal. Pedestrian traffic signal compliance is another important consideration, as large numbers of pedestrians who illegally cross during the pedestrian red phase diminish the safety benefit of this treatment.



Photo 2.2: Pedestrian Scramble at Yonge and Dundas, Toronto

The Town requested a review of the possibility of implementing a pedestrian scramble at the intersection of Beacon Avenue and Fifth Street. An operational analysis of the implementation of a scramble was carried out with the results presented in Table 2.5 below. The reduction in green time available for vehicles causes the level of service to drop from LoS C to LoS D for a number of movements. As a result of this, and including the points raised in the previous paragraph, a pedestrian scramble intersection at this location was deemed to be not suitable. The installation of a scramble intersection would overly impact vehicle delay with no real benefit for pedestrians.

Intersection	Intersection Level of	Measures by Movement	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Beacon Avenue/5th Street	22 / C	Volume (veh/hr)	100	114	62	30	81	91	73	331	47			
		Delay (s)	26.2	26.7	8.2	21.4	23.4	6.6	31.7	24.2	14.2			
		Level of Service	C	C	A	C	C	A	C	C	B			
		I/S LoS		22.4 / C			15.5 / C			24.4 / C				
Beacon Avenue/5th Street Pedestrian Scramble	40 / D	Volume (veh/hr)	100	114	62	30	81	91	73	331	47			
		Delay (s)	51.6	49.7	52.9	34.7	35.9	39.8	38.7	34.2	32.3			
		Level of Service	D	D	D	C	D	D	D	C	C			
		I/S LoS		51.1 / D			37.5 / D			34.7 / C				

Do Not Exist

Traffic Signals

Stop Control

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

LoS	Delay (sec/veh)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

Table 2.5: Pedestrian Scramble Intersection Options – Effects on Operations

In addition, recently the City of Vancouver chose not to install a scramble intersection on Robson Street even though there was sufficient pedestrian and vehicle traffic to warrant such a facility. The City identified that concern about the ability of people with visual impairments to navigate the intersection safely using auditory senses and seeing-eye dogs for assistance.

2.7.3 CYCLISTS

Many people cycle through and near Sidney's downtown. The town enjoys close proximity to the Lochside Trail, a major off-road commuting and recreational cycling route. Therefore, the major emphasis is north/south for regional travel. As identified in the Regional Pedestrian and Cycling Master Plan, cyclists who are on longer and higher speed trips use the route from Lochside Drive via Ocean Avenue to join the Lochside Trail along the Pat Bay Highway. In the future there may also be an opportunity for cyclists to travel to the west side of the Pat Bay Highway via a pedestrian/multi-use pathway overpass of the highway.

The minor emphasis for cycling planning is in the east/west directions for distribution into and out of downtown. In this case, slower and recreational cyclists may travel along Fifth Street from Lochside Drive or Ocean Avenue to visit the downtown area in an east/west direction. In a shared roadway concept, the cycling experience is enhanced with facilities such as sharrows (see Photo 2.3), low posted speed limits, and a dense urban environment. Downtown Sidney presently has these characteristics except for painted sharrows, which specifically identify the rights of cyclists to share the road space. It is recommended that sharrow be placed within the eastbound travel lane on Beacon Avenue at Seventh Street, as well as on Fifth Street between Lochside Drive and Beacon Avenue.



Photo 2.3: Shared vehicle and cycling lane through the use of "sharrows"

2.7.4 MOBILITY SCOOTERS

With an aging population, mobility scooters are increasingly popular device for people with limited mobility. It is important that any planning exercise considers the role of mobility scooters and powered wheelchairs ensuring that facilities are accessible to all users. Such facilities include sidewalks, multi-use pathways, and existing and future pedestrian overpasses over Highway 17.

Though there is consensus that mobility scooters maintain and enhance users' quality of life, there is still uncertainty as to how they should be accommodated in the public realm. A study in the Fraser Valley found that a majority of mobility scooter users would like to maintain current status as a pedestrian.² Still, scooters can go faster, up to 20km/hour, and that has raised concerns regarding safety and the need for speed limits on sidewalk (see Photo 2.4). The report recommends that scooters continue to be considered as pedestrians and that sidewalk speed limits are set at 8km/hour. The report also identifies that further research is needed on a variety of policy suggestions.



Photo 2.4: Mobility Scooter on Second Street sidewalk

² Steyn, Pieter V. and Adrienne S. Chan. *Mobility Scooter Research Report*. University of the Fraser Valley, 2008.
<http://www.ufv.ca/Assets/Aging+-+Centre+for+Education+and+Research/Scooter+report.pdf>

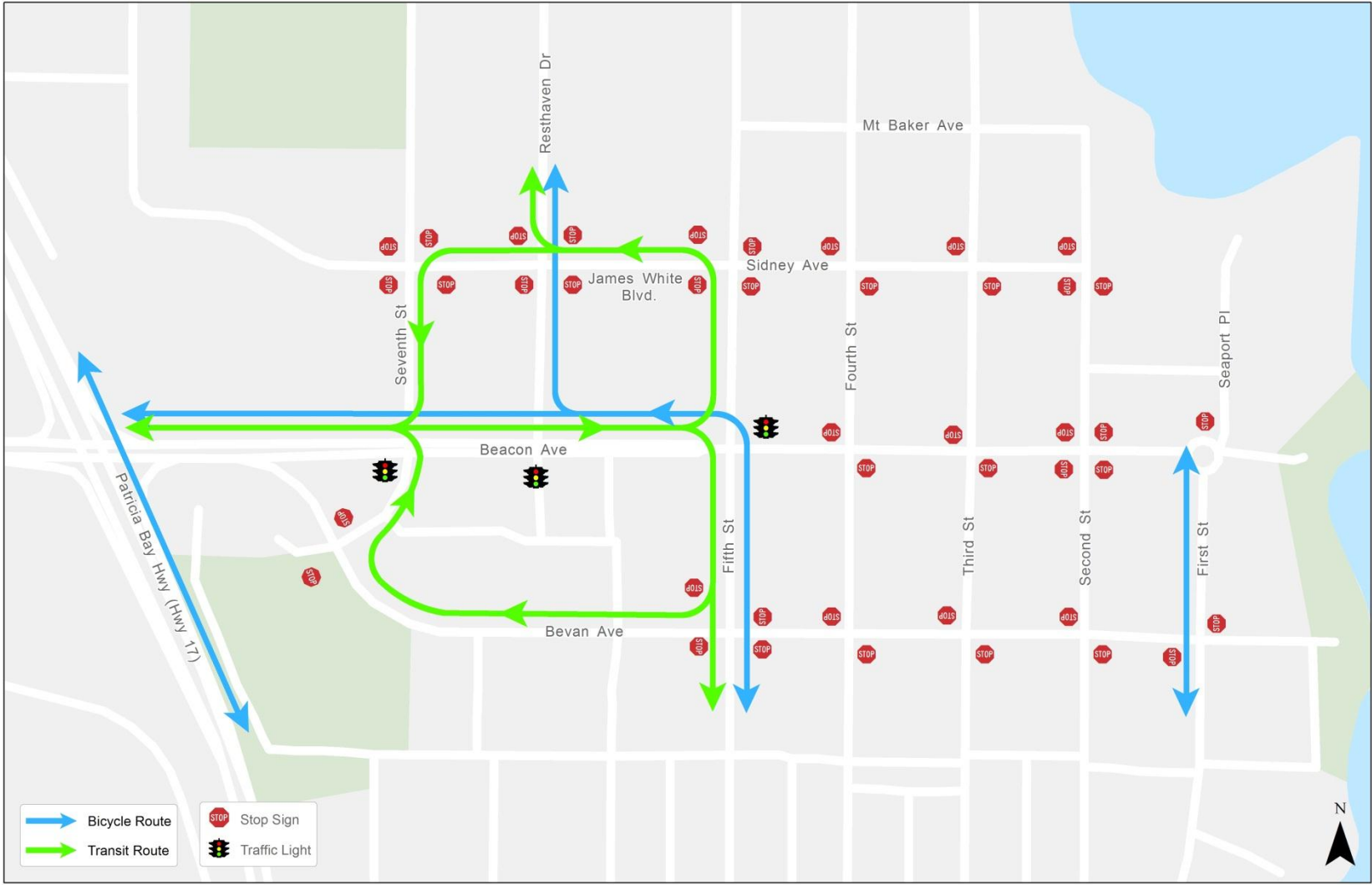


Figure 2.9: Alternate Mode Transportation Facilities

2.8 Additional Geometric Upgrades

A number of observations can also be made based on our review of the existing geometry at a number of locations. This review is based on neither the traffic operations analysis nor the safety analysis but rather on direct observations made during on-site visits.

Pedestrian Crossings at Bump-outs: The current design of the pedestrian bump-outs at the crossings of Beacon Avenue has the crossings occurring back from the crossing curb edge in order to stay in line with the sidewalks along the block face (Photo 2.5). This has the effect of placing the Stop bar for crossing vehicles behind the pedestrian crossing and at a significant distance from the Beacon Avenue curb edge. It has been observed that this causes sight lines to be inhibited resulting in vehicles requiring an additional movement to the curb edge and a stop there prior to proceeding. Vehicles may occasionally proceed without stopping and without the necessary sight lines may collide with eastbound vehicles on Beacon Avenue. A possible improvement may be to move the pedestrian crossings forward to the Beacon Avenue curb edge. This would require a jog of the pedestrian movement, following the bump out towards the curb edge. The positive effect of this would be to allow vehicles to stop farther into the intersection providing improved sight lines. The negative effect would be to require the pedestrians to take a slightly longer route, towards the end of the bump-out. Pedestrians may choose the straighter route across the road thus not using the shifted cross-walk and putting their safety at risk. Bollards, ropes, or landscape planters could be used to avoid this but may prove to be cumbersome. On balance, however, it is felt that this would be an improvement and, as a result, it is recommended that the pedestrian crossings and the associated vehicle stop bar be relocated at the intersections of Beacon Avenue and Second, Third and Fourth Streets.



Photo 2.5: Location of Stop bar is challenging for sight lines on Third Street at Beacon

Lane drop on Beacon Avenue at Second Street: Another observation that was made was the short merge from two lanes to one lane on Beacon Avenue east of Second Street (see Photo 2.6). The merge is not only very short but also merges from left to right rather than the more typical right to left merge. Both of these factors may cause some confusion and difficulty for drivers leading to safety concerns. In addition, the use of the centre merge lane as a stopping zone for delivery trucks has been observed. This unexpected use could also present some safety difficulties. An alternate way of dropping the second lane through the intersection would be to have the left lane be a forced left turn with the curb lane going through and right. This would have the positive effect of: (a) addressing the above concerns, and (b) the existing median to the east could be extended to the intersection providing shorter pedestrian crossing lengths and a pedestrian refuge area. On the other hand, however, the through and right turn configuration of the curb lane on Beacon Avenue would cause some additional delays to through vehicles behind right turning vehicles who would often have to wait for crossing pedestrians.

Given the following factors:

- the left turn volumes are small in comparison to the through and right turn volumes;
- pedestrian movements are significant; and
- there is not a significant record of collisions in the short merge section

it is recommended that this feature be left as is, with conditions monitored for operational and safety issues.



Photo 2.6: Beacon Avenue and Second Street left-to-right merge lane

3.0 Network Development

Based on a thorough analysis of intersection operations for both current and future conditions, there were only minimal recommended improvements to operations to be made within the study area. During the study process, however, it became apparent that the network discontinuity created by the one-way section of Beacon Avenue created some potential opportunities for improvements to the overall network.

This section provides a description of the three concepts that were developed based on the current configuration, Town priorities and aspirations, and professional judgement. These concepts are then evaluated using a range of quantitative and qualitative indicators. This evaluation is carried out at a very high level largely for the purpose of illustrating some of the benefits that might come from consideration of alternate network configurations. It is not intended to definitively guide Sidney in the selection of a preferred network, as this would require evaluation at a greater level of detail than the scope of this assignment.

3.1 Network Concepts

Based on the operational research of the study area and transportation expertise, three network concepts were developed. This section provides a description of the three concepts, with some photo examples to illustrate the potential options. Appendix C provides additional information and notes regarding each of the concepts.

3.1.1 BASE CASE

The base case scenario is the existing network of the study area. This base case is the following configuration of Beacon Avenue:

- 4 lanes, 2-way, West of Resthaven Drive (no parking);
- 3 lanes, 2-way, between Resthaven Drive and Fifth Street (parallel parking on both sides);
- 2 lanes, 1-way, between Fifth and Second Street (parallel parking on both sides); and,
- 2 lanes, 2-way, between Second and First Street (angle/parallel parking).

The current configuration of Bevan Avenue and Sidney Avenue are 2 lanes, 2-way with parallel parking.

3.1.2 OPTION 1: EXISTING UPGRADED

This option provides some enhancements to the existing configuration to increase the space for pedestrians and cyclists in the study area, and better define the entrance to the downtown area.

This option provides upgrades to the existing network in relation to parking, cycling facilities and gateway features. This option provides the following upgrades to Beacon Avenue:

- no changes to configuration between Seventh and Fifth Street;
- remains 2 lanes, 1-way, between Fifth and Second Street (parallel parking on both sides);
- Improve cycling facilities from Fifth to First using sharrows;
- Remains 2 lanes, 2-way, between Second and First Street but convert angle to parallel parking to enhance pedestrian space;
- Add additional mid-block cross-walk on Beacon Avenue between Fourth and Fifth Street;
- Enhanced “gateway” feature at Fifth Street (Entry signage, lane narrowing, pavers, bump outs, raised crosswalks, and/or roundabout).

Option 1 would include sharrows on Bevan Avenue and/or Sidney Avenue, as well as bike facilities, for example signage, to connect Lochside Drive to Beacon Avenue along Fifth Street.



Photo 3.1: Peachland – Beach Avenue “sharrows”
(Source: Google StreetView)



Photo 3.2: Example of neighbourhood gateway rendering
(Source: DCI Architects)

3.1.3 OPTION 2: 2-WAY MULTI-MODAL

From analysis of the network, it was identified that the one-way section of Beacon between Fifth and Second Street was counter-intuitive and did not appear to enhance the mobility of the area. Option 2 provides 2-way multi-modal travel throughout the study area, with changes to parking, enhanced cycling facilities and traffic calming. This option includes the following changes to Beacon Avenue:

- No changes between Seventh and Fifth Street;
- Change Fifth to Second Street to 2-way operation; – consider removal of centre turning lanes and banning left turns on Beacon Avenue, and accommodate those movements on the Bevan and Sidney Avenue/James White Boulevard parallel corridors;
- Cycling – sharrows added;
- Second to First Street – increase pedestrian space by converting angle parking to parallel, if necessary;
- Traffic calming – pavers / bump-outs / pavement colour;
- Minor reduction in the number of parking spaces;
- Emphasize mid-block cross-walks and benches; and,
- Enhanced “gateway” feature at Fifth (Entry signage, lane narrowing, pavers, bump outs, raised crosswalks, and/or roundabout).

Option 2 would include sharrows on Bevan Avenue and/or Sidney Avenue, as well as bike facilities, for example signage, to connect Lochside Drive to Beacon Avenue along Fifth Street.



Photo 3.3: Victoria – Cook Street 2-way multi-modal
(Source: Google StreetView)



Photo 3.4: Kelowna – Bernard Avenue 2-way multi-modal
rendering (Source: City of Kelowna)

3.1.4 OPTION 3: 2-WAY SHARED STREET

In consideration of past Town plans, including the *Official Community Plan* and the *Downtown/Downtown Waterfront Local Area Plan*, there is a great interest in elevating the safety and experience of the pedestrian within the study area. This option provides a multi-modal network that prioritizes the needs and comforts of pedestrians. Vehicles are not entirely excluded from this configuration, but take a secondary role to pedestrian movement. Examples of this approach can be found on Granville Island and Water Street (Gastown) in Vancouver, and along Government Street in Victoria.



Photo 3.5: Victoria – Government Street shared street
(Source: Google StreetView)



Photo 3.6: Vancouver – Water Street (Gastown) shared street
(Source: Google StreetView)

Option 3 provides 2-way multi-modal travel along Beacon Avenue and enhancements to create a shared street. This option includes changes to parking, enhanced cycling facilities and traffic calming. This includes the following changes to Beacon Avenue:

- No changes between Seventh and Fifth Street;
- Change Fifth to Second Street to 2-way operation;
- No centre turning lanes with left turns banned, with those movements to be carried out along the Bevan and Sidney Avenue/James White Boulevard parallel corridors;
- Enhance pedestrian facilities- pavement treatment, wide sidewalks, street furniture;
- Enhance mid-block cross-walks by adding texture and/or colour;
- Traffic calming – pavers / bump-outs / pavement colour;
- Emphasize the pedestrian environment using unique roadway surface texture, such as stamped concrete pavers pavement texture and roll-over curbs
- Cycling – sharrows;

- Parking – parallel parking from Fifth to Second Street but limited due to greater emphasis on pedestrian and traffic calming facilities;
- Enhanced “gateway” feature at Fifth (Entry signage, lane narrowing, pavers, bump outs, raised crosswalks, and/or roundabout); and,

Option 3 would include sharrows on Bevan Avenue and/or Sidney Avenue, as well as bike facilities, for example signage, to connect Lochside Drive to Beacon Avenue along Fifth Street.

3.2 Concept Evaluation

After the development of the three concepts, a qualitative and quantitative evaluation and comparison was undertaken using traffic model results and best practices. This evaluation also considers a variety of multi-modal user experience criteria. The evaluation of the concepts paid particular attention to:

- ▶ **Traffic Operations** – Within the study area, there are 20 intersections including three signalized intersections and one roundabout. To contribute to a sustainable and livable community, it is important that the traffic operations in the study area provide a safe and efficient movement of people and vehicles. A balance of good traffic operations and safety must be achieved while preserving the desired aesthetic character of an intersection.
- ▶ **Overall network accessibility and connectivity** - As the central core of Sidney, the downtown is an integral and important part of the Town's overall network. Traffic operations must allow for connectivity between the various areas of the Town in order to enhance community interaction and allow for vibrant use of facilities, as well as facilitate access to the surrounding commercial uses. Connections to the surrounding road network and transportation facilities such as the future Beacon Interchange must be carefully considered based on desirable traffic patterns. The accessibility and connectivity in the downtown core is an important component of the evaluation.
- ▶ **Pedestrian Safety and Experience** – Pedestrian safety is particularly important with the aging population and the strong emphasis on tourism in the downtown core. To maintain a vibrant and walkable downtown core, it is important that pedestrians are provided with facilities that are safe and accessible. Treatments above and beyond the provisions of sidewalks may be considered to improve pedestrian safety and enjoyment. There are also pedestrian amenities, including benches and other street furniture and beautification that would improve the pedestrian experience.
- ▶ **Parking** – As the downtown area is a popular tourist attraction, it is important to provide sufficient and accessible parking. The majority of vehicle parking within the study is on-street and is provided at no cost; however, there are parking time restrictions in specific areas. On street parking may be viewed as part of valuable traffic calming or seen as a hindrance to the flow of traffic. It also, however, may not provide the aesthetic character desirable in keeping with the Town's vision for the downtown.

More specifically, the base case and three options are evaluated based on the following criteria:

- Operations to and from Highway 17 from the neighbourhoods;
- Operations on Beacon Avenue;
- Operations of network roads in general;
- North / South connectivity between the neighbourhoods;

- Vehicle Safety- collision risk involving motor vehicles;
- Pedestrian Safety- risk involving pedestrians;
- Cyclists- safety, efficiency, ease and comfort;
- Roadway geometry- Understanding and intuitive ease of use of roadway;
- Parking- number of on-street parking spaces available on Beacon Avenue;
- Pedestrians- safety, efficiency, ease and comfort;
- Aesthetics; and,
- Economic development- impact on local business interests.

3.2.1 EVALUATION BY CRITERIA

Table 5.1 provides a summary evaluation of the base case and three concepts based on the criteria identified above, with a brief discussion of each following in this section. The evaluation is based on a combination of quantitative analysis (e.g. traffic model analysis, ICBC crash data), qualitative analysis (e.g. research, anecdotal information), and professional judgment. The ratings are based on a scale range which measures relative benefits (from very poor to excellent) or relative impacts (from high to low). The evaluation criteria are not weighted, and are presented to assist the decision-makers by acknowledging that each option has a series of trade-offs, hence the need for a multiple account evaluation. With additional analysis, research, and dialogue, the evaluation can be refined to more closely match the goals and objectives of the Town of Sidney.

Criteria	Option			
	Base Case	1	2	3
	Existing	Existing Upgraded	2-way Multi-modal	2-way Shared Street
Operations - To/From Hwy 17				
Operations - Beacon Ave.				
Operations - Network Roads				
N/S Connectivity				
Vehicle Safety				
Pedestrian Safety				
Roadway Geometry				
Parking - Beacon Ave				
Pedestrians				
Cyclists				
Aesthetics				
Economic Development				

Legend:

Benefit / Impact

- Excellent Benefit / Low Impact
- Good Benefit / Medium-Low Impact
- Average Benefit / Medium Impact
- Poor Benefit / Medium High Impact
- Very Poor Benefit / High Impact

Table 3.1 Multiple Account Evaluation

Operations - To/From Highway – The existing configuration and existing upgraded provides good north/south access to and from the highway north of Fifth Street but poorer access south because of the lack of westbound movements. The 2-way multi-modal and shared street would provide better north/south access to and from Highway 17.

Operations - Beacon Avenue – The existing configuration is non-intuitive with confusing circulation on Beacon Avenue due to the transition to one-way movements and back again. This situation would continue with the existing upgraded (Option 1). Option 2, two-way multi-modal, would provide the best operations as it would be intuitive although left turns would likely need to be banned and moved to Bevan and Sidney Avenues. The shared street would also be intuitive as it would also be two-way, with left turns likely banned though and it is also expected that the speed of the road would be reduced significantly.

Operations - Network Roads – The existing configuration is non-intuitive with confusing circulation on the network roads as well again due to the transition to one-way movements and back again. This situation would continue with the existing upgraded (Option 1). Option 2, two-way multi-modal, would provide the intuitive network operations with less circulation required. The shared street would also be intuitive with less circulation required.

North/South Connectivity – Both the existing configuration and upgraded option provide adequate north/south access across the three east/west streets although there does exist a disjoint between the main access roads in the south (Fifth Street) and those in the north (Resthaven Drive) requiring a “jog over” for continuity. The two-way multi-modal options (Option 2 and 3) provide slightly better north/south access across the three east/west streets because the jog over can also be accommodated on Beacon Avenue

Vehicle Safety – The existing configuration and upgraded option with the one-way segment both cause confusion which increases the risk of vehicle collisions although because of low volumes and speeds collisions generally aren't a problem. The 2-way multi-modal option (Option 2) and the shared street option (Option 3) would both increase vehicle safety by creating an environment that leads to slow vehicle traffic.

Pedestrian Safety – The existing configuration and upgraded option with the one-way segment both cause confusion for drivers, therefore increasing the risk of collisions with pedestrians. The upgraded option includes an additional pedestrian crossing which will increase pedestrian safety. The 2-way multi-modal option (Option 2) and the shared street option (Option 3) would both increase pedestrian safety by creating an environment that leads to slow vehicle traffic.

Roadway Geometry – The existing configuration and upgraded option with the one-way transitions leads to confusing geometry. The 2-way multi-modal option (Option 2) is the more standard design application more readily understandable to all users. Use and priority within the shared street option (Option 3) may be misunderstood by some users.

Parking – The existing configuration provides 59 on-street stalls of parking on Beacon Avenue. The existing upgraded option (Option 1) would reduce the number of parking stalls in order to provide an additional pedestrian crossing and amenities and changing angle parking to parallel parking to provide

wider sidewalks and safer road conditions for cyclists. The 2-way multi-modal option (Option 2) would further reduce the number of parking stalls, by changing angle parking to parallel parking to provide wider sidewalks, as well as providing an additional mid-block pedestrian crossings and other pedestrian amenities (e.g. benches, urban plazas). The shared street would see the greatest reduction in parking to accommodate enhanced pedestrian facilities. Regardless of the parking lost on Beacon Avenue, the Town should consider a “no net loss” policy within the study area, with replacement parking being made available within walking distance (400 to 800 metres) of the lost parking.

Pedestrians – The existing configuration has generous sidewalks along all roads within the study area, though on Beacon Avenue there are narrower sidewalks between First and Second Street and there is no mid-block crosswalk between Fourth and Fifth Street. The existing upgraded option (Option 1) would enhance Beacon Avenue with wider sidewalks between First and Second Street (requiring the angle parking to be changed to parallel) and a mid-block crosswalk installed between Fourth and Fifth Street. The 2-way multi-modal option (Option 2) would provide an opportunity to narrow the lanes along Beacon Avenue and enhance the pedestrian experience with wider sidewalks. The shared street (Option 3) would be the most beneficial to pedestrians with wide sidewalks, corner and mid-block bulges and crosswalks, as well as street furniture along Beacon Avenue

Cyclists – There are currently limited facilities within the study area that are specifically for cyclists. As well, the existing configuration provides no westbound cycling on Beacon Avenue between Fifth and Second Street. The current provision of angle parking between First and Second Street on Beacon is not ideal for cyclists as drivers have limited visibility as they are backing out; however, due to the low volumes and speeds as well as shallower parking angle, this has not been a problem to date. To improve the safety and comfort of cyclists, the Existing Upgraded option (Option 1) would mark the travel lanes on Beacon with “sharrows” directing vehicle traffic to share the lanes with cyclists, although no westbound cycling on Beacon would remain. The 2-way multi-modal and shared street options would provide sharrows on Beacon Avenue and bike travel could now occur in both directions. Sharrows on both sides of the street on Sidney or Bevan Avenue would also be provided. Options 2 and 3 would also have these cycling amenities and the slower vehicle speeds in these latter two options would be beneficial to cyclists.

Aesthetics – As this is Sidney's downtown core, the aesthetics of the options is also a very important consideration. It is generally recognized that creating a pedestrian environment complete with associated pedestrian amenities such as benches, planters and textured surfaces provides a comfortable and visually pleasing environment in comparison to a vehicular environment. A significant effort has already been made by the Town in this regard and the core is recognized as a relatively comfortable, pedestrian-friendly and visually pleasing environment. The options would expand this further. As a result the options have been rated from average to excellent as additional pedestrian amenities are added from Option 1 to Option 3,

Economic Development – There does exist a conflict between the possible impacts of parking reductions on local business versus the beneficial effects of a safer and more comfortable pedestrian experience on these same businesses. A more comfortable pedestrian experience can be a significant draw for both tourists during the summer season, and for local area residents year round. Studies have shown that there are often significant economic development benefits to the pedestrianization of commercial areas.

This needs to be balanced with concerns regarding potential negative impacts of parking reductions on local business. Beacon Avenue is not a “through” route as compared to other “commercial strip” roadways. As a result, the businesses adjacent to Beacon Avenue are not generally dependent on drive-by business, but are rather destination-type businesses. In fact the Sidney downtown core on the whole is generally seen as a destination area. Parking directly adjacent to businesses is far more important to drive-by type businesses than to destination-type businesses. While parking is also very important for destination businesses, it is the provision of an adequate amount of parking within a reasonable distance which is important rather than the immediate location of the parking. As a result, a basic assumption of all options is that where parking on Beacon Avenue is removed it would be replaced within the study area under a “no net loss” concept. Given that downtown Sidney is already a pedestrian friendly destination area, and the improvements included under scenarios 1 and 2 are relatively modest, the benefits from Options 1 and 2 have been rated as average with the more significant changes under Option 3 being rated as having a good benefit.

3.3 Evaluation Summary

In reviewing the network concepts, there are potential benefits to Option 2 (short to medium term improvements) and Option 3 (medium to long term improvements) based on the criteria evaluated in this report. This high level analysis provides an introduction to the potential network options and considerations. However, the network options would require more detailed evaluation and refinement, including high-order cost estimates, in order to evaluate and select a preferred network concept that would meet the needs and goals of the Town. In addition, public consultation with the residents, business owners and visitors would be essential in this process. As a result, it is recommended that the Town of Sidney consider a more detailed assessment of the network options (including potential timing and costs), prior to refining the existing network.

4.0 Conclusions and Recommendations

The Town of Sidney has, and will continue to, invest in its downtown core as a vibrant pedestrian-priority area to work, shop, live, and visit. The Town has commissioned this evaluation of the traffic movements in and through the downtown, in order to evaluate potential refinements to the street network to accommodate multiple modes of transportation (vehicles, pedestrians, cyclists, and transit). A number of options for potential improvements to the network were provided, including a multiple account evaluation of both quantitative and qualitative factors. While the scope of this assignment did not permit detailed modeling nor cost estimates of all of the options, a number of conclusions and recommendations have been provided for discussion and consideration by Town staff and elected officials.

4.1 Conclusions

Traffic Operations

Based on the analyses carried out, most of the intersections within the study area are operating under acceptable levels of service (LOS C or better) at present and are expected to continue to do so into the future. Two intersections within the study area – Beacon Avenue/Seventh Street and Bevan Avenue/Seventh Street – reached a marginal LoS D in the medium term. While not typically seen as a deficiency, these locations would be the worst locations in terms of traffic operations within the study area, and consequently options to alleviate these were explored. Difficulties identified at the intersections of Beacon Avenue / Seventh Street and Bevan Avenue / Seventh Street are related as the difficulties at Bevan at Seventh are generally caused by queuing back on Seventh Street from Beacon Avenue.

The difficulties at Beacon and Seventh are caused by traffic weaving to access the northbound left turn lane aggravated by the short distance between Bevan and Beacon Avenues. This can potentially be addressed by implementation of a split-phase type signal timing at Beacon Avenue at Seventh Street allowing the south leg curb lane to be used for the northbound left turn as well as the dedicated left turn lane. No geometric upgrades would be needed for this. This also serves to alleviate the difficulties at Bevan Avenue and Seventh Street.

Traffic Safety

Based on the analyses carried out, the worst intersection in Sidney is the high-volume signalized intersection at Beacon Avenue and Seventh Street with 64 collisions (9.1 collisions per year). As the prominent collision type is rear-end (47%), generally caused by driver inattentiveness, there is little that can be done. Anything that can be done to emphasize the shift from highway to urban environment may help, such as signage.

The next worst intersection in Sidney is the signalized intersection at Beacon Avenue at Resthaven Drive with about one-third as many collisions as the intersection at Seventh Street (19 collisions - 2.7 collisions per year). Again, as the prominent collision type is rear-end (47%) generally caused by driver inattentiveness, there is little that can be done to improve this. The two 4-way stop intersections at Bevan

Avenue and Fifth Street and James White Blvd. at Resthaven Drive have a similar number of collisions as the signal at Beacon Avenue and Resthaven Drive (19 collisions – 2.7 per year at Bevan Avenue and Fifth Street and 16 collisions – 2.3 collisions per year at James White Blvd. at Resthaven Drive). The prominent collision type is side impact, possibly caused by some confusion around roadway priorities. A review of the roadway classification and priorities for the downtown roads has confirmed that 4-way stop control is warranted at these locations and no changes are recommended.

The final intersection of interest in Sidney is the 2-way Stop at Beacon Ave at Third St. with 12 collisions - 1.7 collisions per year. The prominent collision type here is Side Impact (46%) possibly caused by confusion as to the signing (4-Way vs. 2-Way Stop) and sight lines. The possibility of moving the pedestrian crossing and vehicle stop bar farther into the intersection was considered and it is felt that that this would be an improvement. As a result, it is recommended that the pedestrian crossings and the associated vehicle stop bar be relocated closer to the Beacon Avenue curb.

Roadway Classification

Roadway classification within the study area, as well as the system of stop signs along the collector and local roads, were reviewed to determine whether any changes were required. The review confirmed that there is a strong technical basis for the system of stop signs along Bevan Avenue and Sidney Avenue / James White Blvd. The 2-way stop control is provided whenever one main movement is encountered and 4-way stop control where major crossing movements are encountered. As such, no changes to the existing system of stop signs are recommended.

A comparison was performed of the main traffic movements and desire lines with the Street Hierarchy Map from the Local Area Plan (Figure 3.8). There appears to be a good correlation between the main traffic movements and the roadway hierarchy desired. The lone exception to this is the use of Beacon Avenue from First to Seventh Street, where at present there is high use of this roadway for eastbound traffic movements as opposed to its designation as a pedestrian-priority secondary street within the Local Area Plan. As a result, it is recommended that the “primary” roadway designation of Bevan Avenue and Sidney Avenue / James White Blvd. be extended between Seventh Street and First Street, in order to allow Beacon Avenue to develop as a pedestrian-priority secondary street.

Alternate Modes

A pedestrian scramble intersection was investigated for the intersection of Beacon Avenue and Fifth Street. As a result of rather low pedestrian and vehicle volumes a pedestrian scramble intersection at this location was deemed to be not suitable. The installation of a scramble intersection would overly impact vehicle delay with no real benefit for pedestrians.

Downtown Sidney presently has a cycling experience aided by low posted speed limits. It is recommended that sharrows be placed along the Beacon Avenue lanes as well as on Fifth Street on the approach to Beacon for Lochside Drive, in order to identify the rights of cyclists to shared road space.

The use of scooters by Sidney's growing population of seniors was also considered. Although motorized scooters should continue to be considered as pedestrians, although sidewalk speed limits should be set at 8km/hour. Further research is needed on a variety of policy suggestions for the use of scooters in urban environments.

Additional Geometric Upgrades

The design of the pedestrian crossings at the intersection bump-outs was also considered. This involved investigating the possibility of moving the pedestrian crossing and vehicle stop bar farther into the intersection. On balance, it is felt that this would be an improvement and, as a result, it is recommended that the pedestrian crossings and the associated vehicle stop bar be relocated towards the Beacon Avenue curb, at the intersections of Second, Third and Fourth Streets.

The design of the lane drop on Beacon Avenue at Second Street was also considered. The merge is not only very short but also merges from left to right rather than the more typical right to left merge. An alternate way of dropping the second lane through the intersection based on a forced left turn with the curb lane going through and right was also considered. Based on the following criteria:

- 1) the left turn volumes are small in comparison to the through and right turn volumes;
- 2) pedestrian movements are significant; and
- 3) there is not a significant record of collisions in the short merge section.

It is recommended that this feature be left as is. However, given that commercial vehicles have been observed using the merge lane for temporary deliveries, the situation should be monitored for operational and safety issues.

Network Considerations

As a result of the discontinuity in the present downtown network caused by the introduction of a one-way only roadway for a distance of three blocks with no equivalent return movement alternate network options were explored. Three alternate concepts were developed and evaluated at a very high level largely for the purpose of illustrating some of the benefits that might come from consideration of alternate network configurations. Options considered were:

- Option 1 – Existing Upgraded;
- Option 2 – 2-Way Multi-Modal; and
- Option 3 – 2-Way Shared Street.

In reviewing the network concepts, there appear to be significant benefits to Options 2 and 3 based on the criteria evaluated. While this high level analysis provides an introduction to the potential network options and considerations the network options would require substantially more detailed evaluation and refinement in order to definitively identify a preferred network concept that would meet the needs and goals of the Town. As well, public consultation with the residents, business owners and visitors would be essential in this process. As a result it is recommended that the Town of Sidney consider a more detailed assessment of the network options prior to refining the existing network.

4.2 Recommendations

The results demonstrate the potential improvements that Options 2 and 3 provide enhanced pedestrian safety and experience, as well as increased vehicle safety due to reduced travel speeds. These options provide potential economic development opportunities by increasing the downtown Sidney profile as a destination; however, there may also be concerns regarding the reduction of adjacent on-street parking on local businesses. As part of the consideration of these options, the capital costs and time frame for implementation must also be factored in. These range from Option 1, with low capital cost and a short time frame (1 to 2 years) to Option 3, which would include significant capital costs and an implementation time frame of 3 to 5 years or more. As a result of the analysis carried out in this project, the following **recommendations** are made:

- That a split-phase signal timing be implemented at the intersection of Beacon Avenue at Seventh Street;
- That the pedestrian crossing markings and associated vehicle stop bars at the intersections of Beacon Avenue and Second, Third and Fourth Streets be relocated closer to the Beacon Avenue curb;
- That no changes are necessary to the system of stop sign priorities that are presently assigned to the roadways in the downtown study area;
- That the “primary” roadway designation of Bevan Avenue and James White Blvd./ Sidney Avenue identified in the Downtown / Downtown Waterfront Local Area Plan, be extended from Fifth Street to First Street;
- That no further consideration be given at this time for a pedestrian scramble at the intersection of Beacon Avenue and Fifth Street;
- That sharrows be placed along the Beacon Avenue lanes as well as on Fifth Street, between Lochside Drive and Beacon Avenue, in order to identify the rights of cyclists to shared road space;
- That motorized scooters continue to be considered as pedestrians, although sidewalk speed limits should be set at 8km/hour, and that further research be carried out on a variety of policy suggestions for the use of scooters in urban environments;
- That the merge lane at Beacon Avenue at Second Street be left as is with conditions monitored for operational and safety issues; and

That the overall one-way (versus two-way) structure of the Town of Sidney’s downtown roadway network be evaluated prior to further improvements to the existing network. This would include, but not be limited to, the following:

- Undertake additional modeling and traffic counts to determine the traffic impacts of the various scenarios;
- Conduct pedestrian and cycling counts at various times of the year;
- Conduct an Origin / Destination Survey in both the summer peak and shoulder season;
- Prepare high-level (Class D) cost estimates for the various scenarios ;
- Engage and consult with stakeholders, business community and the public to obtain additional feedback on the scenarios.

Appendix A

Traffic Operations Analysis Details

Exising PM Peak Hour Intersection Measures - SimTraffic

Intersection	Intersection LOS/Delay	Measures by Movement	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Beacon Avenue/7 th Street	19 / B	Volume (veh/hr)	265	110	15	45	40	290	150	500	10	15	410	30
		Delay (s)	48.0	23.8	12.3	29.6	23.1	14.1	15.2	10.9	6.0	20	14.3	11.9
		Level of Service	D	C	B	C	C	B	B	B	A	B	B	B
Beacon Avenue/Resthaven Drive	13 / B	Volume (veh/hr)	68	66.0	40	70	67	208	164	341	13	17	127	47
		Delay (s)	28.1	22.7	3.6	29.1	25.8	7.8	15.6	8.6	6.4	13	5.8	4.6
		Level of Service	C	C	A	C	C	A	B	A	A	B	A	A
Beacon Avenue/5th Street	22 / C	Volume (veh/hr)	100	114	62	30	81	91	73	331	47			
		Delay (s)	26.3	25.3	8.3	23.6	26.2	6.6	33.6	24.0	12.1			
		Level of Service	C	C	A	C	C	A	C	C	B			
Beacon Avenue/4th Street	5 / A	Volume (veh/hr)		29	21	16	38		46	332	45			
		Delay (s)		12.8	9.2	14.2	9.8		4.7	3.0	2.5			
		Level of Service		B	A	B	A		A	A	A			
Beacon Avenue/3rd Street	5 / A	Volume (veh/hr)		54	15	18	53		71	227	67			
		Delay (s)		14.0	10.4	12.4	11.8		5.4	1.8	1.4			
		Level of Service		B	B	B	B		A	A	A			
Beacon Avenue/2nd Street	8 / A	Volume (veh/hr)		50	59	25	26		40	141	79	19		106
		Delay (s)		11.5	7.6	7.2	5.2		10.1	10.8	5.9	6.7		5.7
		Level of Service		B	A	A	A		B	B	A	A		A
Beacon Avenue/1st Street	3 / A	Volume (veh/hr)	56	36	30	5	45	34	56	58	111	25	47	30
		Delay (s)	3.4	3.6	3.5	0.8	0.8	0.9	2.6	3.2	2.6	3.1	3.5	3.1
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/7th Street	7 / A	Volume (veh/hr)	61	109	120	4	159	23	22	36	53	181	33	7
		Delay (s)	8.4	9.5	6.0	5.6	7.2	4.4	4.6	5.6	4.3	7.7	5.7	6
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/Resthaven Drive	11 / B	Volume (veh/hr)	16	211	67	38	201	64	74	71	19	106	173	45
		Delay (s)	11.4	13.1	9.8	10.7	10.9	8.0	8.0	9.6	6.1	12.4	12.8	9.9
		Level of Service	B	B	A	B	B	A	A	A	A	B	B	A
Sidney Avenue/5th Street	9 / A	Volume (veh/hr)	58	98	29	11	77	27	25	88	63	56	247	30
		Delay (s)	9.4	10.6	7.3	6.5	7.5	4.8	8.7	9.5	6.2	9.5	10.1	7.5
		Level of Service	A	B	A	A	A	A	A	A	A	A	B	A
Sidney Avenue/4th Street	3 / A	Volume (veh/hr)	39	28	8	2	16	61	6	98	21	47	201	1
		Delay (s)	9.0	8.9	4.2	7.0	7.7	4.4	3.8	2.3	2.0	2.8	0.9	0.5
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/3rd Street	4 / A	Volume (veh/hr)	57	54	4	9	45	31	21	49	34	19	166	12
		Delay (s)	9.2	8.8	4.4	5.7	7.0	4.0	2.7	0.6	0.3	2.6	1.0	0.7
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/2nd Street	5 / A	Volume (veh/hr)	177	55			20	7	5		50			
		Delay (s)	4.9	6.2			5.4	2.7	4.5		2.9			
		Level of Service	A	A			A	A	A		A			
Bevan Avenue/7th Street	5 / A	Volume (veh/hr)	1		293	67	175	3		15	1	57	3	
		Delay (s)	3.5		7.4	4.9	0.7	5		3.8	1.5	7.3	3.1	
		Level of Service	A		A	A	A	A		A	A	A	A	
Bevan Avenue/5th Street	8 / A	Volume (veh/hr)	37	106	43	52	71	27	74	152	77	32	206	102
		Delay (s)	6.5	7.9	5.2	8.8	9.9	6.7	7.8	9.5	6.9	7.4	8.7	5
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/4th Street	2 / A	Volume (veh/hr)	13	11	27	7	15	55	29	108	30	4	272	13
		Delay (s)	7.1	7.9	3.7	9.0	6.2	6.1	5.3	2.2	1.9	2.4	0.6	0.5
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/3rd Street	3 / A	Volume (veh/hr)	24	9	7	17	20	97	38	128	15	12	161	16
		Delay (s)	5.4	6.4	3.6	8.2	9.2	5.1	2.8	0.9	0.9	2.6	0.8	0.4
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/2nd Street	3 / A	Volume (veh/hr)	33	22	6	72	40	12	37	83	30	7	140	21
		Delay (s)	5.9	6.9	3.8	7.5	8.5	4.1	2.9	0.9	0.4	2.0	0.5	0.3
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/1st Street	2 / A	Volume (veh/hr)	32	77	10	6	47	135	50	30	60	0	1	1
		Delay (s)	2.8	0.5	0.3	2.7	1.4	0.9	6.4	5.0	4.6	0.0	0.0	3.3
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
N of Beacon/2nd Street	2 / A	Volume (veh/hr)		180	10	10	65					10		40
		Delay (s)		1.4	1.0	2.9	0.9					4.9		2.9
		Level of Service		A	A	A	A					A		A

Forecast (10yr) PM Peak Hour Intersection Measures - SimTraffic

Intersection	Intersection LOS/Delay	Measures by Movement	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Beacon Avenue/7 th Street	23 / C	Volume (veh/hr)	293	123	18	49	45	320	168	550	7	14	451	30
		Delay (s)	41.7	16.8	11.4	33.5	20.5	18.4	21.6	15.6	10.3	32.5	23.8	22.6
		Level of Service	D	B	B	C	C	B	C	B	B	C	C	C
Beacon Avenue/Resthaven Drive	12 / B	Volume (veh/hr)	75	73.0	44	77	74	230	181	377	14	19	140	52
		Delay (s)	27.8	22.7	3.9	28.0	23.1	7.9	15.0	8.1	4.6	10.9	5.7	3.2
		Level of Service	C	C	A	C	C	A	B	A	A	B	A	A
Beacon Avenue/5th Street	23 / C	Volume (veh/hr)	110	126	68	33	89	101	81	366	52			
		Delay (s)	26.5	26.3	9.9	23.5	24.2	6.7	33.2	26.5	15.7			
		Level of Service	C	C	A	C	C	A	C	C	B			
Beacon Avenue/4th Street	5 / A	Volume (veh/hr)		32	23	18	42		51	367	50			
		Delay (s)		14.5	9.1	11.5	8.9		6.0	3.5	2.8			
		Level of Service		B	A	B	A		A	A	A			
Beacon Avenue/3rd Street	6 / A	Volume (veh/hr)		60	17	20	59		78	251	74			
		Delay (s)		16.6	8.0	16.1	12.7		5.3	2.4	1.5			
		Level of Service		B	A	B	B		A	A	A			
Beacon Avenue/2nd Street	8 / A	Volume (veh/hr)		55	65	28	29		44	156	87	21		117
		Delay (s)		12.8	8.9	8.2	7.2		11.1	12.2	6.4	8.4		1.3
		Level of Service		B	A	A	A		B	B	A	A		A
Beacon Avenue/1st Street	3 / A	Volume (veh/hr)	62	40	33	6	50	38	62	64	123	28	52	33
		Delay (s)	3.7	3.5	3.8	1.3	1.3	1.4	2.9	3.6	3.0	2.6	3.5	3
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/7th Street	8 / A	Volume (veh/hr)	67	120	133	4	176	25	24	40	59	200	36	8
		Delay (s)	9.3	10.1	6.5	4.9	7.9	4.5	4.9	6.1	4.4	8	6.2	6.9
		Level of Service	A	B	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/Resthaven Drive	14 / B	Volume (veh/hr)	18	233	74	42	222	71	82	78	21	117	191	50
		Delay (s)	13.8	15.9	12.0	12.5	13.3	9.9	9.5	10.4	8.0	17.3	17.8	15.9
		Level of Service	B	B	B	B	B	A	A	B	A	B	B	B
Sidney Avenue/5th Street	11 / B	Volume (veh/hr)	59	108	32	12	85	30	28	97	70	62	273	33
		Delay (s)	10.9	12.0	8.6	7.2	8.6	6.2	8.5	10.7	6.6	11.2	13.1	9.6
		Level of Service	B	B	A	A	A	A	A	B	A	B	B	A
Sidney Avenue/4th Street	3 / A	Volume (veh/hr)	43	31	9	2	18	67	7	108	23	52	222	1
		Delay (s)	9.8	9.4	4.3	17.2	7.2	4.9	5.2	2.4	2.1	2.9	1.1	0.1
		Level of Service	A	A	A	B	A	A	A	A	A	A	A	A
Sidney Avenue/3rd Street	4 / A	Volume (veh/hr)	63	60	4	10	50	34	23	54	38	21	183	13
		Delay (s)	9.5	8.4	6.8	7.1	7.1	5.2	3.3	0.7	0.3	2.7	1.2	0.7
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Sidney Avenue/2nd Street	5 / A	Volume (veh/hr)	196	61			22	8	6		55			
		Delay (s)	5.2	6.4			5.7	3.2	4.5		2.8			
		Level of Service	A	A			A	A	A		A			
Bevan Avenue/7th Street	23 / C	Volume (veh/hr)	1		324	74	193	3		17	1	63	3	
		Delay (s)	4.3		43.6	7.6	1.1	4.2		8.6	2.3	8.1	6.7	
		Level of Service	A		D	A	A	A		A	A	A	A	
Bevan Avenue/5th Street	10 / A	Volume (veh/hr)	41	117	47	57	78	30	82	168	85	35	228	113
		Delay (s)	8.7	9.3	6.9	10.7	11.4	8.6	9.5	11.4	8.0	9.6	10.5	6
		Level of Service	A	A	A	B	B	A	A	B	A	A	B	A
Bevan Avenue/4th Street	3 / A	Volume (veh/hr)	14	12	30	8	17	61	32	119	33	4	300	14
		Delay (s)	7.2	7.8	3.6	9.0	8.2	6.2	5.2	2.5	2.4	2.2	0.8	0.3
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/3rd Street	3 / A	Volume (veh/hr)	27	10	8	19	22	107	42	141	17	13	178	18
		Delay (s)	5.9	7.7	3.2	9.0	9.9	5.6	2.8	0.7	0.5	2.5	0.7	0.5
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/2nd Street	3 / A	Volume (veh/hr)	36	24	7	80	44	13	41	92	33	8	155	23
		Delay (s)	6.3	7.5	4.2	8.0	9.2	5.9	3.0	1.0	0.4	2.3	0.5	0.2
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
Bevan Avenue/1st Street	2 / A	Volume (veh/hr)	35	85	11	7	52	149	55	33	66	0	1	1
		Delay (s)	3.0	0.5	0.4	3.3	1.6	1.0	6.5	5.1	4.2	0.0	0.0	5.6
		Level of Service	A	A	A	A	A	A	A	A	A	A	A	A
N of Beacon/2nd Street	2 / A	Volume (veh/hr)		200	15	10	75					10		45
		Delay (s)			1.4	1.0	3.0	1.1				5.2		3.2
		Level of Service		A	A	A	A					A		A

Appendix B

Traffic Safety Analysis Details

Intersection	Total No. of Collisions (2004 – 2010)	Collision Severity (%INJ / %PDO)	Collision Frequency (A/Year)	Collision Severity	Prominent Type	Collision Direction of Collision	No. of Collisions with Pedestrians
Beacon Avenue/Seventh Street	64	27% / 73%	9.1	3.39	Rear End – 47%	Eastbound – 30%	2
Beacon Avenue/Resthaven Drive	19	32% / 68%	2.7	3.84	Rear End – 44%	Eastbound – 31%	2
Beacon Avenue/Fifth Street	9	22% / 78%	1.3	3.00	Conflicted – 37%	Eastbound – 34%	1
Beacon Avenue/Fourth Street	5	40% / 60%	0.7	4.60	Side Impact – 40%	Northbound – 40%	0
Beacon Avenue/Third Street	12	42% / 58%	1.7	4.75	Side Impact – 46%	Eastbound – 55%	0
Beacon Avenue/Second Street	2	100%/0%	0.3	10.0	Conflicted, Rear End – 50%	Southbound – 100%	1
Beacon Avenue/First Street	5	0%/100%	0.7	1.00	Side Impact – 60%	Eastbound – 60%	0
James White Blvd./Seventh Street	8	62%/38%	1.1	6.63	Rear End – 75%	Eastbound – 60%	1
James White Blvd./Resthaven Drive	16	37%/63%	2.3	4.38	Side Impact – 36%	Southbound – 60%	1
Sidney Avenue/Fifth Street	7	0%/100%	1.0	1.00	Side Impact – 71%	Eastbound – 40%	0
Sidney Avenue/Fourth Street	5	60%/40%	0.7	6.40	Conflicted – 50%	Westbound – 50%	1
Sidney Avenue/Third Street	3	67%/33%	0.4	7.00	Side Impact – 67%	Southbound 67%	1
Sidney Avenue/Second Street	1	0%/100%	0.1	1.00	Rear End 100%	Westbound – 100%	0
Bevan Avenue/Seventh Street	3	33%/67%	0.4	4.00	Conflicted, Rear End, Side impact – 33%	Southbound – 100%	0
Bevan Avenue/Fifth Street	19	42%/58%	2.7	4.79	Rear End – 56%	Westbound – 43%	2
Bevan Avenue/Fourth Street	6	33%/67%	0.9	4.00	Side Impact – 50%	Southbound – 50%	0
Bevan Avenue/Third Street	6	33%/67%	0.9	4.00	Rear End, Side Impact – 40%	Southbound – 80%	0
Bevan Avenue/Second Street	5	20%/80%	0.7	20.8	Side Impact – 60%	Westbound, Southbound – 40%	1
Bevan Avenue/First Street	5	20%/80%	0.7	2.80	Conflicted – 60%	Northbound, Southbound – 50%	1

Appendix C

Notes for Base Case and Conceptual Options

BASE CASE- EXISTING CONDITIONS



Beacon Ave

Sidney Ave

Bevan Ave

1 Street

7 Street

Resthaven Dr

5 Street

4 Street

3 Street

2 Street

3 lanes, 2-way, between Resthaven Dr and Fifth St (parallel parking on both sides)

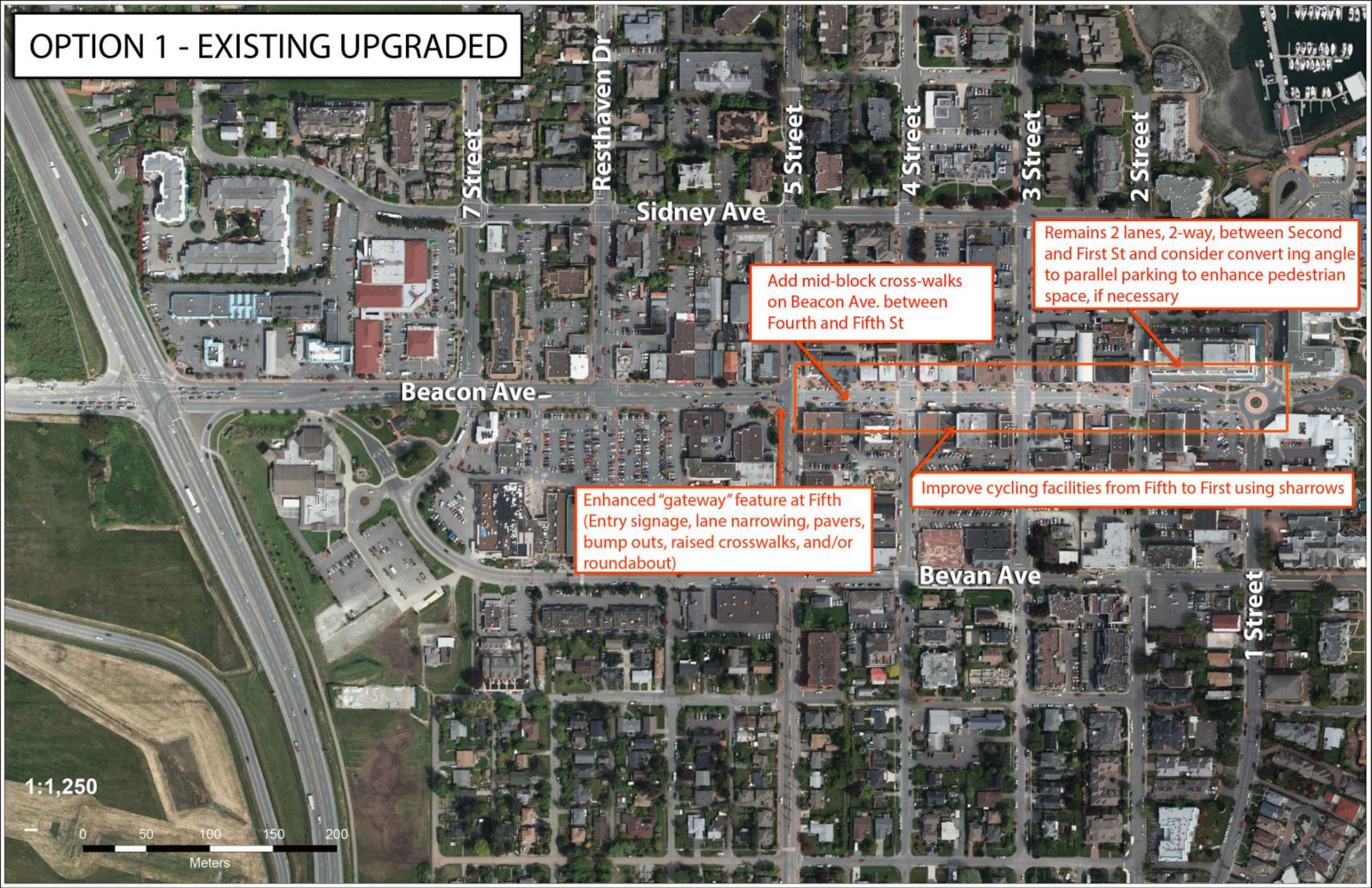
2 lanes, 2-way, between Second and First St (angle/parallel parking)

4 lanes, 2-way, West of Resthaven Dr (no parking)

2 lanes, 1-way, between Fifth and Second St (parallel parking on both sides)



OPTION 1 - EXISTING UPGRADED



7 Street

Resthaven Dr

5 Street

4 Street

3 Street

2 Street

Sidney Ave

Beacon Ave

Bevan Ave

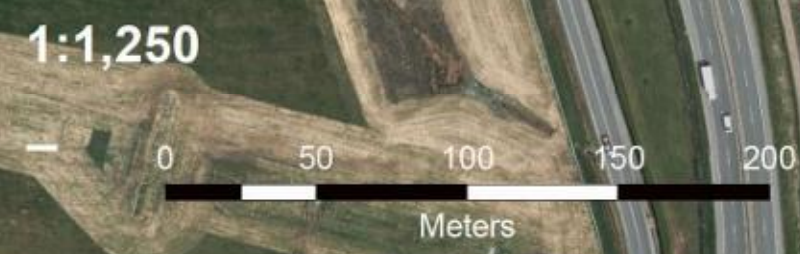
1 Street

Add mid-block cross-walks on Beacon Ave. between Fourth and Fifth St

Remains 2 lanes, 2-way, between Second and First St and consider converting angle to parallel parking to enhance pedestrian space, if necessary

Enhanced "gateway" feature at Fifth (Entry signage, lane narrowing, pavers, bump outs, raised crosswalks, and/or roundabout)

Improve cycling facilities from Fifth to First using sharrows



OPTION 2 - 2-WAY MULTI-MODAL

GENERAL CORRIDOR IMPROVEMENTS

- Improve cycling facilities using sharrows
- Traffic calm – pavers / bump-outs
- Parking reduced to about 13 spaces per block, reduction of 6 spaces

Second to First St– consider increasing pedestrian space by converting angle parking to parallel, if necessary

Emphasize mid-block cross-walks and benches

Enhanced “gateway” feature at Fifth (Entry signage, lane narrowing, pavers, bump outs raised crosswalks, and/or roundabout)

Change Fifth to Second St to 2-way operation; – consider removal of centre turning lanes and banning left turns with these to be carried out along the Bevan and Sidney Ave parallel roadways

1:1,250

0 50 100 150 200

Meters

OPTION 3 - 2-WAY SHARED STREET

GENERAL CORRIDOR IMPROVEMENTS

- Enhance pedestrian facilities- pavement treatment, wide sidewalks, street furniture
- Enhance mid-block cross walks, eg. Add texture, etc.
- Traffic calming – pavers / bump-outs
- Emphasize the pedestrian environment using unique roadway surface texture, such as stamped concrete pavers pavement texture and roll-over curbs
- Cycling - sharrows

Parking – parallel parking from Fifth to Second but limited due to greater emphasis on pedestrian and traffic calming facilities

Enhanced “gateway” feature at Fifth (Entry signage, lane narrowing, pavers, bump outs, raised crosswalks, and/or roundabout)

Change Fifth to Second St to 2-way operation; – consider removal of centre turning lanes and banning left turns with these to be carried out along the Bevan and Sidney Ave parallel roadways

1:1,250

0 50 100 150 200

Meters