Highway 4 Port Alberni Corridor Study

BC Ministry of Transportation and Infrastructure | Final Report

June 2020

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BC Ministry of Transportation and Infrastructure

Highway 4 Port Alberni Corridor Study Draft Final Report

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BC Ministry of Transportation and Infrastructure
FINAL REPORT
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1.0 Study Background

The British Columbia Ministry of Transportation and Infrastructure (BC MOTI) retained ISL Engineering and Land Services (ISL) to carry out a planning corridor study for Highway 4 (Johnson Street) within the City of Port Alberni limits. The study involves performance assessment of the existing and future conditions, problem definition, development of corridor improvement options from Helen Street to Beaver Creek Road along Highway 4 that address active transportation travel, transit and beautification, and a high-level evaluation of solutions. In addition, the assignment will include concept design development of a roundabout and a traffic signal at the Highway 4/Beaver Creek Road intersection.

Study Area

Highway 4 is classified as a secondary highway in BC and is the primary east-west connection from the east shore to Port Alberni and Vancouver Islands west coast attractions (Tofino, Ucluelet and Pacific Rim National Park). As the highway also functions as one of the Main Streets of Port Alberni, there are competing interests along the corridor. The Ministry’s focus is to preserve the secondary highway role and function, while the City’s focus may be to slow vehicles down to improve safety, repurpose space to enhance the streetscape, and encourage people to stop rather than drive through. It will be critical to the success of the study, that options developed satisfy the needs of both the Ministry and City.

The Ministry defines the functional classification for secondary highways as “a network which serves inter/intra provincial travel having a trip length of regional significance. They integrate with primary highways to provide a balanced highway network. Connect urban areas with population typically from 5,000 to 50,000, and significant activity centers not served by the primary system. May be freeways or expressways, but are usually arterials.”

Highway 4 through Port Alberni where it functions as a main street also goes by the names Johnston Road and River Road where it parallels the waterfront. For the purposes of this report it will be referenced as Highway 4 or Johnston Road.

2.0 Document Review

Background review of multiple technical, strategic and engineering documents were completed to assess characteristics of the Highway 4 Corridor and the City of Port Alberni. Below is a snapshot of key elements from these existing documents that are relevant to the Highway 4 Corridor (Johnston Road) through the City of Port Alberni. The list of documents includes:

- Central Island Highway Conditions Draft Report, Urban Systems, October 2016
- Vancouver Island Transportation Infrastructure System Draft Report, SNC Lavalin, July 2014
- City of Port Alberni Corporate Strategic Plan, 2019-2023
- Port Alberni Active Transportation Report, 2014
- Port Alberni Official Community Plan, 2007
- Port Alberni Charette Summary, 2016

2.1 Central Island Highway Conditions Draft Report, 2016

The study was a high-level review of highway conditions in central Vancouver Island, the study area spanned the width of the island, including the east shore communities from Parksville to Campbell River and to west coast communities of Tofino and Ucluelet. It is noted that Port Alberni is the only sizable community outside the east shore with a population of approximately 18,000.

Highway 4 bisects Vancouver Island, connecting the east shore to Port Alberni to the west coast communities of Tofino and Ucluelet. The size of Port Alberni and proximity to the east shore make the stretch of roadway between Highway 19 and Port Alberni vitally important. Further Highway 4 is the only roadway in and out of the west coast communities.

Highway 4 is primarily a two to three lane rural highway, except through Port Alberni where it functions as a four lane urban arterial road (six with parking lanes) that doubles as a community main street.

2.2 Vancouver Island Transportation Infrastructure System (VITS), 2014

The study provides a review of demographic, economic and transportation infrastructure conditions for Vancouver Island. It assessed existing concern from infrastructure performance and condition as well as future concern from projected changes in travel demand. Some notable elements for consideration of the Highway 4 Corridor Study are:

- Active transportation infrastructure is sometimes deficient on provincial roads in urban areas. Investments in improved facilities could increase user safety and encourage mode shift that would relieve congestion and support a healthy lifestyle.
- Review of the municipal and regional plans provided general consensus that provincial jurisdiction primary and rural secondary highways must be protected and maintained to meet their strategic functions for the safe, efficient and speedy longer distance movement of people and goods. Conversely some of the urban secondary highway and major roads can be made more accommodating to the needs of pedestrians, cyclists, transit and slower moving vehicles.
- Central island population growth between a 17 year period from 1996 to 2013, has seen an average annual growth of 0.95%; where as employment grew an average of 1.2% over the same time period.

- As described in the VITS report, BC Transit does not have a future transit plan for the Alberni-Clayoquot Transit System. As such, corresponding transit supportive measures along Highway 4 are unclear.
- An important function of Highway 4 is providing access to the deep sea port in Port Alberni. The Port is handling less volume than previous decades; however, it continues to support the logging and lumber industry. As described in the VITS report, in future the Port could expand operations to include container traffic.
- Highway 4 is classified as a rural arterial highway. It is expected to provide relatively high overall travel speeds, with minimum interference to through movements, and all weather/all season access for legal roads. It may be designated as an arterial highway, with lower speeds, where it passes through an incorporated municipality.
- Highway 4 can be separated at Port Alberni with east of Port Alberni to Highway 19 seeing an AADT ranging from 7000 to 9000 vehicles and west of Port Alberni to Tofino/Ucluelet seeing an AADT of approximately 2000 vehicles. There are insufficient permanent count stations to determine historical traffic growth.
- For individuals living in Port Alberni, the large majority, 97% also work in Port Alberni. The remaining 3% commute out of Port Alberni, typically to Courtenay or Nanaimo.
- The Highway 4 segments in Port Alberni known as Johnston Road and River Road were identified as candidates for complete street design to urbanize the segment and support improved active transportation and transit travel modes.

2.3 Port Alberni Corporate Strategic Plan, 2019- 2023

The City of Port Alberni Corporate Strategic Plan focused on five key areas:

- Responding to demographic change and improving the quality of life
- Enabling a new economy
- Providing and maintain quality services
- Championing environmental leadership, and
- Fostering a complete community that is safe, healthy and inclusive.

From the five key areas, specific transportation related themes surface including:

- Goal 1.1 – Be a community that is connected by safe, walkable, green streets and accessible multi-modal pathways.
- Goal 2.1 – The tourism/visitor sector of the local economy flourishes.
- Goal 2.5 – The City takes an active and innovative role in the redevelopment of brownfield sites.
- Goal 3.1 – the highest and best use if made of city-owned assets.
- Goal 4.2 – the City infrastructure is renewed in a sustainable and environmentally conscious manner.
- Goal 5.3 – the community is connected with safe pathways and trails that are multi-modal. Pedestrians and cyclists are safe and feel welcome.

2.4 2007 Official Community Plan (OCP)

With respect to transportation, the OCP states as one of its goals and objectives is to maintain the environmental quality of the community by providing alternative transportation options, relying less on automobile travel and encouraging community choices that minimize impact on the environment.

The OCP also outlines several key goals and policies that would enhance and expand the City's active transportation network, including:

- Supporting the development of a comprehensive connected system of pedestrian and bicycle corridors that serve to link neighbourhoods, community services and amenities.
- Bicycle corridors shall be developed as:
  - On-road routes through dedicated bicycle lanes or shared automobile/bicycle lanes; and
  - Off-road routes utilizing the primary trail network.
- Pedestrian corridors shall include:
  - Sidewalks;
  - Pathways; and
  - Multiple-use trails.
- Providing end of trip facilities including bike parking.
- New developments shall provide connectivity to the existing network of bicycle and pedestrian corridors when physically possible.

2.5 Port Alberni Active Transportation Plan – 2014

Port Alberni is a community of 18,000 residents. According to 2011 National Household Survey 9% of trips to work in Port Alberni are made by either walking or cycling. The majority of commuter trips in the City are made by car, as 87% of Port Alberni residents use a car to get to work either as a driver or as a passenger. The remaining 4% of commuter trips are 3% by public transit and 1% of were done by other modes.

The report states Port Alberni can be said to have wide roads. These create issues for both pedestrians and cyclists. The issues include long crosswalks, which can take time to cross and can make it difficult for vehicles to see pedestrians. The wide roads also provide additional space that vehicles may use to pass others on the right. Further, sight lines may be obscured by turning vehicles. They can also make it difficult for pedestrians and cyclists to see past parked cars or stopped vehicles.

The report states Port Alberni has some steep slopes that can have a significant impact on both walking and cycling. A number of locations have slopes that are greater than 8%. ISL compared this with existing conditions and concludes that while the study area is relatively flat there is a grade that starts to the east of Helen Street.

The report notes under the implementation strategy there are three priority categories, short term (0 to 5 years), medium term (5 to 10 years), and the long term (10 years and beyond). Specific to the Highway 4 planning assignment, Action Area, Strategy 1.1 identifies Johnston Road between Victoria Quay and John Street as a short-term bicycle improvement priority. Short-term bicycle improvement priorities were assigned to facilities that will provide direct routes to key destinations within the City and allow cyclists to travel through the City efficiently.

Figure E1 of the Active Transportation Report provides a map that identifies the study corridor as a primary route bicycle facility. The report describes three facility types that are suitable for a primary route bicycle facility:

- Off-street pathways – physically separated from motor vehicles and provide sufficient width and supporting facilities to be used by cyclists, pedestrians, and other non-motorized users. Off-street pathways can have paved (i.e. asphalt) or unpaved surface, however paved surfaces provide the greatest level of accessibility. They are also called multi-use paths, as they are used by cyclists, pedestrians and other non-motorized users.
- Cycle Tracks – are physically separated from motor vehicle travel lanes but are located within the road right-of-way.
- Bicycle Lanes – separate lanes that are designated exclusively for bicycle travel and also include pavement markings. Protected or buffered bike lanes provide additional separation between cyclists and vehicle traffic through the use of a painted on-street buffer, using parked cars, or installing bollards or posts.

It should be noted that the Port Alberni Active Transportation Plan was prepared prior to recent updates to the TAC Geometric Design Guide and the release of the BC Active Transportation Design Guide. As such the option to provide bicycle lanes are no longer considered suitable for all ages and abilities.

The report identifies under Strategy 1.2: Increase Sidewalk Connectivity, that Port Alberni will work to ensure full sidewalk coverage on both sides of all urban collector and arterial roads, and on both sides of urban local roads that are on routes to schools, parks, commercial areas, regional trails, other community facilities, and bus stops. Given sidewalks are already present on most of the corridor this isn’t fully relevant to the study other than these facilities should be maintained.

Under Strategy 2.1: Signalized Pedestrian Crossings, the report identifies the intersection at Gertrude Street / Johnston Road and Helen Street / Johnston Road for audible pedestrian signals. Helen Street / Johnston Road is also identified for pedestrian push buttons and pedestrian countdown timers. The report states to improve pedestrian safety and accessibility at each of these intersections, all signalized intersections should have consistent treatments and retrofitted to include pedestrian push buttons, pedestrian countdown timers, audible pedestrian signals, and other features. The Helen Street / Johnston Road intersection has been upgraded from a pedestrian signal to fully signalized intersection since the report was published.

The study corridor includes the Kitsuksis Creek Bridge, built in 1958 with two vehicle travel lanes and a sidewalk on each side. Under Strategy 2.2: Bicycle Street and Bridge Crossings, the report states the City is working to identify unique solutions for each bridge, and in the long term should ensure that any bridge repair or replacements provides additional space for cyclists and pedestrians to cross safety and comfortably.

The report identifies under Strategy 3.1: Pedestrian Accessibility, a need for wider sidewalks to improve pedestrian accessibility, to accommodate scooters and ascribe other accessibility features, including lighting and benches.

Under Strategy 3.2: Bicycle Parking, the report identifies a need to increase bicycle parking first at all municipal and community facilities. There are no such facilities along the study corridor. The second strategy is to update the City's Zoning Bylaw to include requirements for bike parking in new developments, especially multi-family and commercial developments. The final strategy is to partner with local businesses to install bicycle parking.

2.6 Johnston Road and Northport Commercial Area Charrette Summary, 2016

The aim of the Johnston Road and Northport Commercial Area Charrette was to bring together diverse stakeholders and the City to generate a cohesive vision and coordinated approach for recommendations, improvements, and investments for Johnston Road (Highway 4).

The input includes creating a cohesive multi-modal experience from end to end and establishing it as place to linger. People also called to make it pedestrian friendly and introduce more street trees.

The input also includes creating a safe, comfortable and picturesque atmosphere which is an interesting place to walk around. There should be continuous sidewalks and trees. It should also be welcoming day or night and all seasons. There should also be slow vehicle speeds.

It was also expressed to extend the waterfront promenade north. Having bikes accommodated on parallel routes, instead of Johnston Road was another idea put forward. Furthermore, people also desired to convert the intersection at Victoria Quay / Johnston Road to a 1-lane roundabout.

From Session D the summarized priorities include traffic calming such as curb extensions, to shorten crossing distances. Another priority that was voted on included side street improvements to make them feel smaller and include centre angle parking with trees and wider sidewalks. Other ideas that were summarized but received no priority votes include a signalized intersection at Helen Street, which has been addressed. There was also a call for a long-term consideration for reduction to two lanes on Johnston Road however this was not voted as a priority and received no votes.

There were a number of cross sections that served as graphic summaries of recommendations.

Figure 2.1: Charrette Corridor Concept Option A

While the charrette covered a wider area, it also focused on the Johnston Road and Northport Commercial Area similar to the limits of this study. Option A is on Johnston Road and included a centre median, parallel parking on both sides and four travel lanes, with significant construction required and relocation of curbs, it was noted this option would have higher costs. ISL compared this with existing conditions, the provision of a centre lane and retention of existing lanes would require the sidewalk and boulevard width to be reduced.

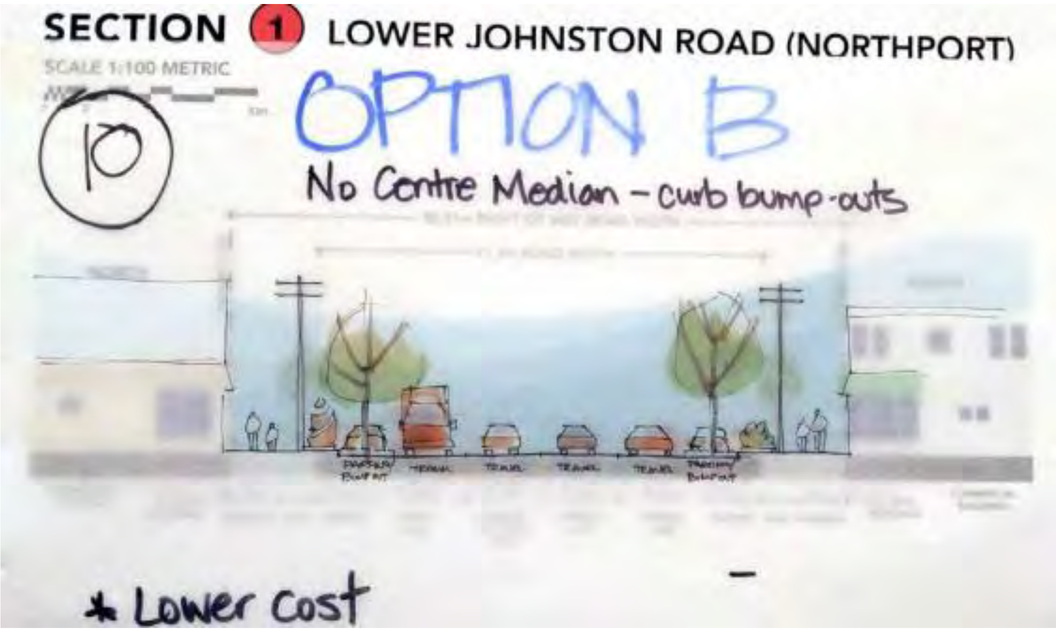

Figure 2.2: Charrette Corridor Concept Option B

Option B is on Johnston Road and had curb extensions, parallel parking on both sides and four travel lanes. Parking is maintained in this option. The same number of travel lanes are maintained. According to the Johnston Road and Northport Commercial Area Charrette Summary this would incur a lower cost. This option would reduce crossing distances at intersections for pedestrians. This would also provide a buffer between the travel lanes and the sidewalks.

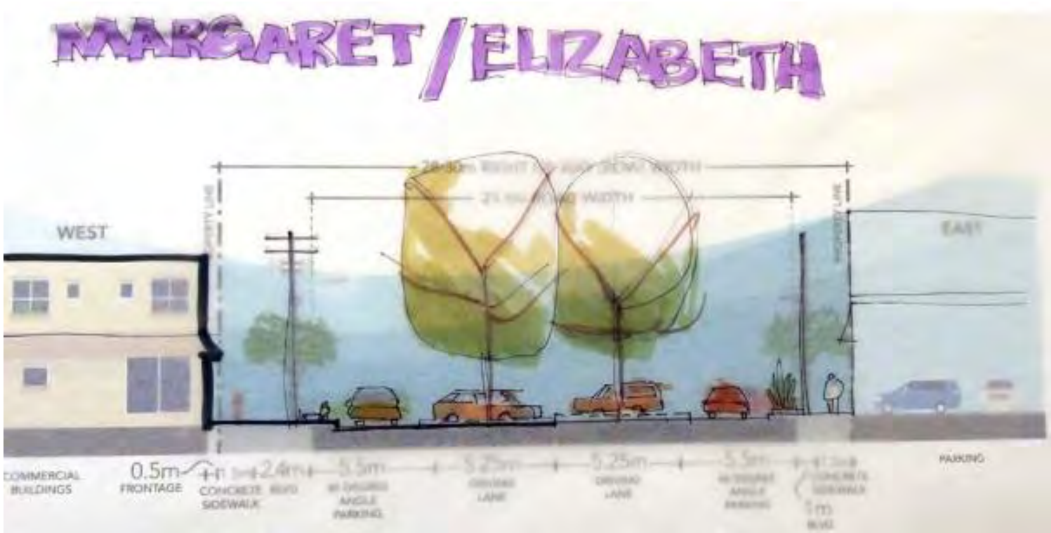

Figure 2.3: Charrette Corridor Concept Option C

Option C is on Margaret/Elizabeth Street and had traffic calming, reduced road width, angle parking and tree planting in the centre of the road and travel lanes adjacent to the curb. The same number of travel lanes are maintained. This option also maintains parking. One advantage is that it this would reduce the crossing distance across these side streets.

3.0 Existing Transportation Infrastructure

The following subsections describe the conditions along each block with respect to land use, pedestrian facilities, cycling facilities, parking availability, and access. Conditions were reviewed during a site visit on December 13, 2019 by ISL and the Ministry.

3.1 Spatial Use Map

The map in **Figure 3.1** identifies the different spatial uses for the study corridor. As shown in the existing condition spatial use maps in Appendix A the following outlines how the space along Johnston Road is utilized:

- Sidewalks account for 13% of the corridor space.
- Crosswalks account for 7% of the corridor space.
- Sidewalk driveways account for 1% of the corridor space.
- Boulevards account for 9% of the corridor space.
- On-street parking with 59 parking stalls accounts for 6% of the corridor space.
- Cycling facilities account for 0% of the corridor space.
- Transit facilities with two bus stops account for 0.4% of the corridor space.
- Vehicle movements account for 64% of the corridor space.
- There is a total of 30 street trees along the corridor.
- There is a total of 321 off-street parking stalls covering 14,984 m^2 bordering Johnston Road.

Currently the road space allocation is 70% for vehicles and 30% for sustainable transportation uses.

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Pedestrian Space (Sidewalk 2,224 Square Metres, Crosswalk 1,197 Square Metres)

Vegetation (12 Square Metres, 30 Street Trees)

Boulevard Space (1,517 Square Metres)

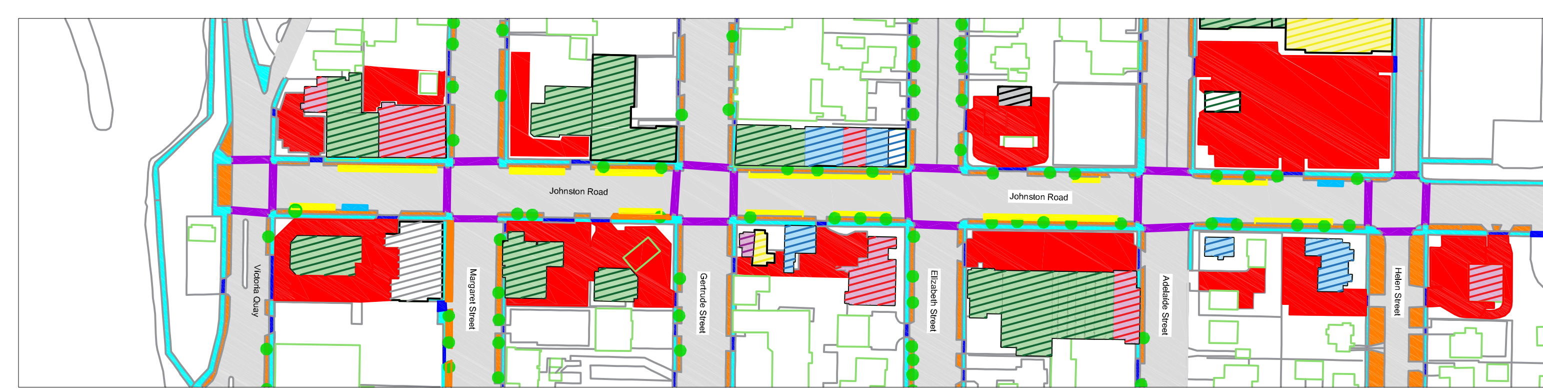
Transit (3 Transit Stops)

On-Street Parking (1,024 Square Metres, 59 Parking spaces)

Off-Street Parking (14,984 Square Metres, 321 Parking spaces)

Vehicle Movement (11,150 Square Metres)

All Uses Combined



- Sidewalk
- Driveway Crossing
- Crosswalk
- On-Street Parking
- Off-Street Parking
- Vehicle Movement
- Boulevard
- Transit
- Trees
- Retail
- Restaurant
- Office
- Gas Station
- Grocery
- Hotel/Restaurant
- Public Building

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Port Alberni Johnston Street Corridor Study
Existing Condition Spatial Use Maps

3.2 Beaver Creek Road to Johnston Road/Victoria Quay


Highway 4 Looking West towards Beaver Creek Road


Inaccessible Crosswalk at Beaver Creek Road

Beaver Creek Road features approximately 2m wide sidewalks on both sides with an approximately 3.5m boulevard on the north side at the intersection with Highway 4. The boulevard tapers away heading east. At the intersection with Highway 4 there are stairs that lead from the sidewalk to the roadway with no letdown, and there is also no letdown on the median islands. There are two benches along the north sidewalk. Heading east towards Johnston Road and across the Kitsuksis Creek Bridge, the sidewalk on the north side is adjacent to the vehicle lanes with no separation. On the south side, an approximately 2.2m wide sidewalk starts from the Marina parking lot until Johnston Road, again with no separation from the vehicle lanes. A second separate pedestrian path on the south side also connects to a waterfront promenade south of Highway 4. The sidewalk is in a good state of repair. Near Johnston Road there is an approximately 5.8m wide boulevard. At the south-east corner of the Victoria Quay intersection there is a signal pole in the middle of the letdown.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

There are no bus stop facilities in this section. This section is serviced by two bus routes through town. Route 3 connects A.W. Neill Middle School to the Echo Centre. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There are no on-street parking stalls in this section. For motor vehicles the roadway features one lane in either direction with left-turn lanes from the highway into the marina and from the highway to Johnston Road at the Victoria Quay intersection. The lanes are approximately 3.3 m wide in this section. The turn lane is approximately 3.6m wide.

Just north of the Highway 4 and Victoria Quay signalized intersection, a one-way access road, also named Victoria Quay creates an unsignalized skewed intersection with Highway 4. The one-way access road provides access to Pescadores Bistro restaurant off-street parking which has 11 parking stalls which also has access from Johnston Road. There's also access to the marina on the west side at Beaver Creek Road which may form a 4th leg of any intersection configuration or be relocated. The Marina has 9 parking stalls.

The zoning designation is C7 Core Business, W1 Waterfront Commercial (Marina), P2 Parks and Recreation (Kitsuksis Creek and adjacent lands), C8 Commercial Recreation (north east of Beaver Creek Road), and C4 Highway Commercial (Petro Canada Gas Station).

3.3 Victoria Quay to Margaret Street

Looking East along Highway 4 (Johnston Road) from Victoria Quay

Looking West along Johnston Road towards Victoria Quay

There are approximately 3.2m wide sidewalks with an approximately 1.2m wide boulevard on the north side. There are approximately 2.4m wide sidewalks with an approximately 1.8m wide boulevard on the south side. There is a patio that encroaches on the sidewalk on the south side. The majority of buildings on the north side have no setbacks, and one property on the south side with no set back. The remaining properties have setbacks with off-street parking in front. The sidewalk is in a good state of repair in this section. There are streetlamps, utility poles, fire hydrants, street trees and planter boxes located in the boulevard. There are also benches located in the boulevard. At the north-west corner of the Margaret Street intersection there is a utility pole in the middle of the letdown.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

There is one bus stop on the south side which serves two bus routes through town. Route 3 connects A.W. Neill Middle School to the Echo Centre. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There is one private access on the south side for the Liquor Depot off-street parking which has 13 parking stalls, there is an alternative side street driveway access from Margaret Street. There is also one private access on the north side to the Pescadores Bistro restaurant off-street parking which has 11 parking stalls, there is an alternative side street driveway access from Highway 4.

There are 7 on-street parking stalls on the north side and 2 on-street parking stalls on the south side, all with 1-hour parking restrictions between 9 a.m.- 6 p.m. and 9 a.m.-9 p.m. on Fridays. For motor vehicles the roadway features two travel lanes and one parking lane in either direction. The left travel lanes are approximately 3.6m wide and accommodate through and left turning traffic, thus when vehicles are waiting to turn left, they reduce through capacity. The right travel lanes are approximately 4.4 m wide in this section. The parking lanes are approximately 2.4m wide. Margaret Street has a single wide lane in each direction. There is no traffic signal control at Margaret Street and Highway 4. There are stop controls on Margaret Street and a marked crosswalk across the highway on the west side of the intersection.

The zoning designation either side of Highway 4 is C7 Core Business and the land use designation is General Commercial.

3.4 Margaret Street to Gertrude Street


Looking East along Highway 4 from Margaret Street

Looking West along Highway 4 towards Margaret Street

There are approximately 2.5m wide sidewalks with an approximately 1.8m wide boulevard on the north side. There are approximately 2.6m wide sidewalks with an approximately 1.6m wide boulevard on the south side. Some properties on the north side have no set-backs, while other properties in this section have setback buildings with off-street parking along the frontage. The sidewalk is in a good state of repair in this section. There are streetlamps, utility poles, street trees and planter boxes located in the boulevard. There are also benches located on the sidewalk.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

There are no bus stop facilities in this section. This section is serviced by two bus routes through town. Route 3 connects A.W. Neill Middle School to the Echo Centre. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There is one private access on the south side for the 7-Eleven which has 21 off-street parking stalls, there is an alternative side street driveway access from Gertrude Street.

There are 9 on-street parking stalls on the north side and 3 on-street parking stalls on the south side, all with 1-hour parking restriction between 9 a.m.- 6 p.m. and 9 a.m.-9 p.m. on Fridays. For motor vehicles the roadway features two travel lanes and one parking lane in either direction. The left travel lanes are approximately 3.6m wide and accommodate through and left turning traffic, thus when vehicles are waiting to turn left, they reduce through capacity. The right travel lanes are approximately 4.4 m wide in this section. The parking lanes are approximately 2.4m wide. There is a traffic signal at Gertrude Street and Highway 4. Gertrude Street includes three northbound lanes, a right turn lane, through lane and left turn lane. The southbound direction features a left turn lane, through lane and shared through/right lane. Pedestrian crosswalks are provided across all approaches.

The zoning designation either side of Highway 4 is C7 Core Business and the land use designation is General Commercial.

3.5 Gertrude Street to Elizabeth Street

Looking East along Highway 4 from Gertrude Street


Looking West along Highway 4 towards Gertrude Street

There are approximately 2.6m wide sidewalks with an approximately 1.6m wide boulevard on the north side. There are approximately 2.6m wide sidewalks with an approximately 1.4m wide boulevard on the south side. There is a patio that encroaches on the sidewalk on the north side. The sidewalk is in a good state of repair in this section. The properties on the north side have no set back. There is one property on the south side with no set back, the other properties have setbacks for patios and ramps. There are streetlamps, utility poles, street trees and planter boxes located in the boulevard. There are also benches located on the sidewalk. At the north-east and south-east corners there are utility poles in the middle of letdowns.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

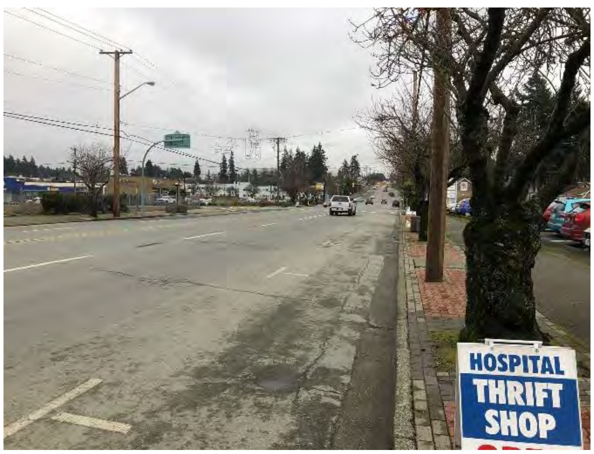
There are no bus stop facilities in this section. This section is serviced by two bus routes through town. Route 2 connects the Pacific Rim Centre to the North Island College. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There is one private access on the south side for the BMO bank off-street parking which has 24 parking stalls, there is an alternative side street driveway access from Gertrude Street.

There are 10 on-street parking stalls on the north side with 2-hour parking 8 a.m. - 8 p.m. 7 days a week. There are 8 on-street parking stalls on the south side with 1-hour parking 9 a.m.- 6 p.m. and 9 a.m.-9 p.m. on Fridays. For motor vehicles the roadway features two lanes travel lanes and one parking lane in either direction. The left travel lanes are approximately 3.6m wide and accommodate through and left turning traffic, thus when vehicles are waiting to turn left, they reduce through capacity. The right travel lanes are approximately 4.4 m wide in this section and the parking lanes are approximately 2.4m wide. Elizabeth Street is stop controlled and has a single wide lane in each direction. There is a marked crosswalk across the highway on the west side of the intersection.

The zoning designation either side of Highway 4 is C7 Core Business and the land use designation is General Commercial.

3.6 Elizabeth Street to Adelaide Street



Looking East along Highway 4 from Elizabeth Street

Looking West along Highway 4 towards Elizabeth Street

There are approximately 2.7m wide sidewalks with an approximately 1.4m wide boulevard on the north side. There are approximately 2.6m wide sidewalks with an approximately 1.6m wide boulevard on the south side. The properties on the north and south side have set backs with parking in front. The sidewalk is in a good state of repair in this section. There are streetlamps, utility poles, street trees and planter boxes located in the boulevard. There are also benches located in the boulevard. At the time of the site visit, a crosswalk across Highway 4 is half covered in new asphalt.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

There are no bus stop facilities in this section. This section is serviced by two bus routes through town. Route 2 connects the Pacific Rim Centre to the North Island College. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There are three private accesses on the north side. Two lead to a vacant lot. The third is for a gas station which has 8 off-street parking stalls. There is an alternative access on the side street (Elizabeth Street).

There are 2 on-street parking stalls on the north side and 9 on-street parking stalls on the south side with 1-hour parking restriction between 9 a.m.- 6 p.m. and 9 a.m.-9 p.m. on Fridays. For motor vehicles the roadway features two travel lanes and one parking lane in each direction. The left travel lanes are approximately 3.6m wide and accommodate through and left turning traffic, thus when vehicles are waiting to turn left, they reduce through capacity. The right travel lanes are approximately 4.4 m wide in this section and the parking lanes are approximately 2.4m wide. Adelaide Street is stop controlled and has a single wide lane in each direction. There is a marked crosswalk across the highway on the west side of the intersection.

The zoning designation either side of Highway 4 is C7 Core Business and the land use designation is General Commercial.

3.7 Adelaide Street to Helen Street

Looking East along Highway 4 from Adelaide Street


Looking East along Highway 4 towards Helen Street

There are approximately 2.2m wide sidewalks with an approximately 1.7m wide boulevard on the north side. There is a bus stop on the north side. There are approximately 2.3m wide sidewalks with an approximately 1.8m wide boulevard on the south side. There is a bus stop on the south side. The properties on the north and south side have set backs. The sidewalk is in a good state of repair in this section. There are streetlamps, utility poles, street trees and planter boxes located in the boulevard. There are also benches located in the boulevard.

There are no cycling facilities in this section. There is also no bicycle parking in this section.

There is a bus stop on the north side and the south side. This section is serviced by two bus routes through town. Route 2 connects the Pacific Rim Centre to the North Island College. Route 4 connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital.

There is one private access on the north side for the Northport Plaza commercial area which has 144 off-street parking stalls, there are alternative side street driveway access’s from both Adelaide Street and Helen Street.

There are 4 on-street parking stalls on the north side and 5 on-street parking stalls on the south side with no parking restrictions. For motor vehicles the roadway features two travel lanes and one parking lane in each direction. The left travel lanes are approximately 3.6m wide and accommodate through and left turning traffic, thus when vehicles are waiting to turn left, they reduce through capacity. The right travel lanes are approximately 4.4 m wide in this section and the parking lanes are approximately 2.4m wide. Helen Street is traffic signal controlled and has a single lane in both directions. Pedestrian crosswalks are provided across all approaches.

The zoning designation is C4 Highway Commercial, C7 Core Business and the land use designation is General Commercial.

3.8 Transit Service

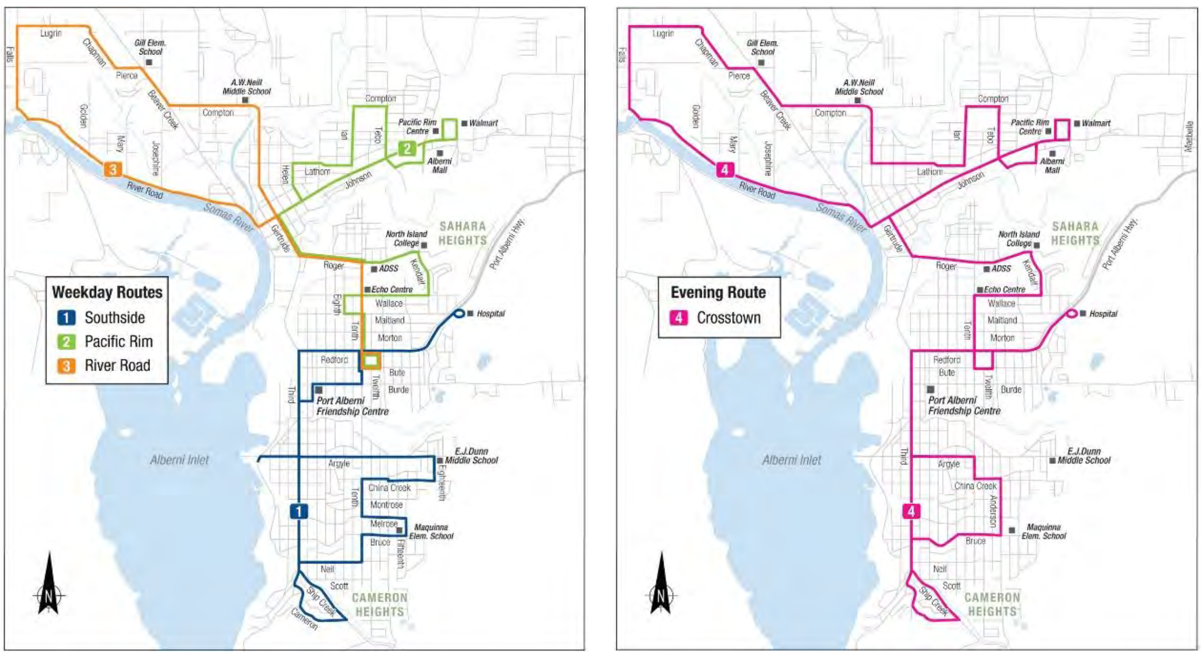


Figure 3.2: Existing Transit Routes

There are three transit routes that service the study area as shown in Figure 3.2. Two day time routes that operate partially on Highway 4, Routes 2 and 3. There is also one evening route (Route 4) that operates on Highway 4. Route 2 travels between the east and the south and connects the Pacific Rim Centre to North Island College. Route 3 travels between the north-west and the south and connects A.W. Neill Middle School to the Echo Centre. Route 4 travels in all areas of the city and connects the Pacific Rim Centre, Alberni Mall, A.W. Neill Middle School, the Echo Centre and the Hospital. Table 3.1 includes the route frequency and ridership by time of day:

Table 3.1: Existing Route Frequencies

Route	Weekday Hours of Operation	Peak Frequency	Off Peak Frequency	Weekend Frequency	Daily Ridership
2	6:25 a.m. - 5:45 p.m.	40 minutes	40 minutes	40 minutes	295
3	7:00 a.m. – 6:25 p.m.	40 minutes	40 minutes	40 minutes	151
4	6:55 p.m. – 9:35 p.m.	80 minutes	80 minutes	80 minutes	57

In terms of upcoming transit service expansion, there are none approved at this point. BC Transit is currently doing a feasibility study for some rural transit services outside of Port Alberni in the electoral areas; however, at this time it has not gone to the Regional District Board for approval. If approved it would be a modest expansion, adding approximately 3 to 6 trips daily along portions of the highway.

4.0 Existing Performance Assessment

4.1 2020 Traffic Volumes

Disclaimer: ***Due to a general lack of current (and summertime/peak) traffic counts the analysis process (which the Ministry accepts) to determine performance were based on a number of assumptions and results should not be interpreted as truly validated and that any future study/design should include an analysis of existing conditions based on current summertime traffic counts.***

Available Data: The most recent intersection traffic volumes for three signalized intersections was provided by the Ministry including:

- Helen Street: November 13 to November 20, 2019
- Gertrude Street: January 9 to January 17, 2020
- Victoria Quay Street: December 12 to December 23, 2019; and January 6 to January 17, 2020

In addition, the surveyed count data at the Beaver Creek Road / Marina Access intersection (collected in the August of 2006) and the Gertrude Street traffic volumes were extracted from "River Road/Beaver Creek Road Intersection Safety and Operational Analysis" by CH2M HILL and used as secondary information to identify the annual traffic growth, seasonal factor, and turning movement splits at Beaver Creek Road.

At the time of traffic analysis, no traffic volumes were available at the unsignalized intersections including: Adelaide Street, Elizabeth Street, and Margaret Street. In addition, crossing pedestrian / cyclist volumes, and heavy vehicle percentage were not available at the study intersections. To estimate the annual traffic growth and seasonal factor, no permanent count site is located in the vicinity of the study area; therefore, the traffic data of two short count sites located within 4km of the study area were used to estimate these factors. Overall, due to insufficient data, several assumptions were made to complete the traffic analysis; these are discussed in detail in this section.

Average Annual Daily Traffic (AADT): As no Ministry permanent count site is located along the study corridor, the AADT was not available. Thus, the most recent signal download traffic volumes (November and December 2019, January 2020) were used to identify the range of the AADT at different sections of the study corridor. As a result, the AADT was found to range from 8,000 to 16,000 vehicles per day. Overall, Highway 4, east side of Gertrude Street, had higher AADT compared to the west side.

Intersection Traffic Volumes: At each signalized intersection, the 15-minute lane-based volumes for the weekdays (Tuesday to Thursday) of the most recent data that is – Helen Street November 2019, Gertrude Street January 2020, and Victoria Quay Street January 2020, were averaged into one typical weekday. It was found that weekdays (Tuesday to Thursday) of the provided data have higher traffic volumes compared to other days of the week. Three peak hours were identified for the theoretical average weekday:

- AM peak: 0815 to 0915 hours;
- School peak: 1430 to 1530 hours; and,
- PM peak: 1615 to 1715 hours.

Due to Alberni Elementary school, which is situated on the northeast corner of the Helen Street intersection, and shopping activities within the study area, 1430 to 1530 hours was found to be the third peak for traffic volumes throughout the day. As this peak hour is around the closure time for school classes, it is called School peak. Based on the total traffic volumes at the study intersection, the School peak traffic volumes were highest, followed by PM peak, and AM peak traffic volumes.

As the provided signal download traffic volumes are lane-based and not distinguished between movements with a shared lane, assumptions were made to split the volumes for several shared lanes of the study intersections based on the expected traffic patterns, surrounding land uses, and signal operation. For the unsignalized intersections, traffic volumes were estimated based on the upstream signalized intersections, road classification, and surrounding land uses. Moreover, the most recent data belong to the fall/winter time (November to January) and were compared to historical summer data to identify the need for seasonal factor. Below, the details of the assumptions at each intersection are discussed.

Helen Street: six shared lanes can be found at this location. Highway 4 has two lanes in each direction; a left-through and a through-right. Helen Street has one lane in each direction which is shared between all movements. 5% of Helen Street approach traffic volumes were assumed to cross the highway to the other side. The remaining 95% was distributed 50%-50% to the west and east, as the eastbound and westbound Highway 4 traffic volumes are slightly different. It was also assumed that 10% of Highway 4 approach traffic would turn left or right onto Helen Street (5% each) in each direction.

Adelaide Street: no traffic volumes were available at this intersection. Similar to Helen Street, Adelaide Street is classified as collector road. In addition, due to higher number of residential buildings on the north side of the highway compared to south, a higher number of vehicles is expected to travel to and from north of the highway. Helen Street southbound approach has higher volume compared to northbound approach. Comparing with Helen Street, although there is no school on the southbound approach, an access to the shopping plaza and Huu-ay-aht First Nations government office can be found. Overall, it is expected that inbound/outbound Adelaide Street traffic volumes are lower than Helen Street (about 30%). Highway 4 through movements were determined from volume balancing based on the location of commercial accesses such as the gas station and plaza entrance. Same distribution percentages (5% for each movement) were assumed for turning movements from Highway to Adelaide Street.

Elizabeth Street: no traffic volumes were available at this intersection. Turning movement volumes were assigned to Elizabeth Street movements based on similar rationale used for Adelaide Street. Due to gas station with secondary access on the north east corner of the intersection, southbound approach volumes were assumed to be higher than the northbound approach. Highway 4 turning movement volumes were estimated based on Gertrude Street intersection and commercial accesses (retails and gas station).

Gertrude Street: five shared lanes can be found at this location. Highway 4 has two lanes in each direction; a left-through and a through-right. Gertrude Street has one shared lane between through and right-turn movements in southbound direction. It was identified that the one of the major movement is the northbound right-turn (from Gertrude Street south to Highway 4 east). With the provision of a protected-permissive left-turn phase for the westbound left-turn movement, it is expected that the westbound left-turn movement (from Highway 4 east to Gertrude Street south) may have the similar traffic volumes as northbound right-turn movement. This assumption allocates 90% of westbound left-through shared lane traffic to left-turn movement. For the eastbound shared lanes, it is expected that the major movement is through movement. Hence 35% of left-through lane volume was assigned to left-turn movement and 45% of right-through lane volume was considered as right-turn movement. In the southbound direction, 35% of through-right turn lane volume was considered as right-turn movement.

Margaret Street: no traffic volumes were available at this intersection. Turning movement volumes were assigned to Margaret Street movements based on same rationale used for other unsignalized intersections. Compared to Elizabeth Street, lower volumes were assumed for Margaret Street approaches, since a smaller portion of residential buildings is expected to use this street to access Highway 4. Highway 4 turning movement volumes were estimated based on Gertrude Street and Victoria Quay intersection volumes and commercial accesses.

Victoria Quay Street: the provided data was sufficient at this intersection as each lane is utilized by only one movement.

Beaver Creek Road / Marina Access: The turning movement splits were determined using 2006 traffic data (CH2M Hill Report). Highway 4 through volumes, east of Beaver Creek Road, were derived from the intersection volumes downloaded from the Victoria Quay Street 2020 signal data. Between Victor Quay and Beaver Creek Road, the 2020 two-way through volume is 948 vehicles per hour and the 2006 volume is 803 vehicles per hour in the AM peak. The resulting growth factor is 18% for the 14 year period which was also applied to 2006 volumes at Beaver Creek Road to estimate the 2020 turning movement volumes.

Other Traffic Modelling Assumptions: Based on the surrounding land uses, location of crosswalks, and time of the day (AM, School, PM), 5 to 30 pedestrians per hour were assigned to each crosswalk. At the intersections where no crosswalk is provided (e.g. east leg of Adelaide Street), higher pedestrian volumes were assigned to other crosswalks. From the CH2M HILL report, a 2% heavy vehicle percentage was applied to Highway 4 and Beaver Creek Road approaches. As Gertrude Street is also classified as arterial, the same 2% heavy vehicle percentage was used. For all other approaches at the study intersections, it was assumed that up to 1% of total traffic volumes may consist of heavy vehicles. These assumptions were applied to all peak hours in this study.

On-street parking is generally provided near the majority of intersection approaches that may negatively impact the operation of the intersection. No survey was conducted to determine the number of parking maneuvers per hour at applicable approaches. However, for traffic modelling (Synchro and SimTraffic), five parking maneuvers per hour was considered for approaches that on-street parking is allowed.

Seasonal Factor: It is understood that to assess the existing intersection performance, the worst case scenario which has the highest peak hour intersection entering traffic volumes should be considered. To identify the worst case scenario, several sources of data were reviewed to determine whether traffic volumes vary through the year (month by month). Ideally, a permanent count site would be used to determine the seasonal factor; however, due to lack of such data, the following dataset's were reviewed and compared to the fall 2019 / winter 2020 data:

- August 2006 Beaver Creek Road surveyed count data and August 2006 Gertrude Street lane-based volumes from CH2MHill report; and,

- August 2007 and December 2009 data at the short count site located at Highway 4 "0.1km east of McCoy Lake Road and 0.4km west of the River Bend Bridge" (3km west of Beaver Creek Road) from MoTI's Traffic Data Program.

To consider the annual traffic growth for 2006 to 2009 data, 0.5% linear growth rate was applied to older data (based on CH2M Hill report). At the short count site, for all peak hours, the traffic volume of August 17 (Friday) and August 18 (Saturday) was 75% higher than the average of December 7 (Monday) and December 8 (Tuesday). However, the summer time data were extracted on Friday and Saturday that typically experience higher traffic.

Using to CH2M Hill report, the August 2006 Gertrude Street intersection lane-based volumes were also projected to 2020 using 0.5% linear annual growth rate and then compared with the 2020 January data (the most recent data). During the AM peak, the January traffic (winter) volumes were 20% higher than the August volumes (summer). While, the school peak and PM peak traffic volumes of January were on average 17% lower than the August data.

Highway 4 eastbound and westbound peak hour traffic volumes, east of Beaver Creek Road, were also compared between August data (CH2M HILL report) and January data. The AM peak volume was 15% higher for January data; while, the August school and PM peak volumes were higher for 28% on average.

With all these taken into consideration, AM peak hour traffic volumes of the most recent data (November 2019 and January 2020) were used as provided. While, the school and PM peak traffic volumes were factored by 1.2 to account for seasonal variance.

The 2020 estimated peak hour traffic volumes are summarized in **Table 4.1**.

Table 4.1: 2020 Estimated Traffic Volumes (vehicle/hour)

Peak Hour	Study Intersection (along Highway 4)	Highway 4						Intersecting Street						Total
		Eastbound			Westbound			Northbound			Southbound			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM (winter)	Helen Street	58	470	42	39	449	54	34	5	35	44	5	42	1,277
	Adelaide Street	32	511	27	28	466	32	23	2	22	36	2	36	1,217
	Elizabeth Street	58	471	42	39	462	54	34	5	35	44	5	42	1,291
	Gertrude Street	35	135	47	343	167	60	82	179	327	78	235	40	1,728
	Margaret Street	35	171	30	40	151	45	19	2	26	40	2	32	593
	Victoria Quay		-		26	-	179	-	206	15	221	342	-	989
	Beaver Creek Road	8	376	2	12	262	116	2	2	7	180	5	15	987
School (summer)	Helen Street	28	734	21	21	763	28	41	5	40	51	5	52	1,789
	Adelaide Street	51	747	32	33	790	51	32	2	33	51	2	51	1,875
	Elizabeth Street	34	750	25	25	846	34	50	6	48	61	6	62	1,947
	Gertrude Street	54	169	60	492	328	114	110	277	493	114	271	54	2,536
	Margaret Street	41	216	25	38	342	60	37	2	26	41	2	60	890
	Victoria Quay		-		52	-	389	-	396	36	246	337	-	1,456
	Beaver Creek Road	20	445	2	31	541	220	14	7	34	104	2	19	1,439
PM (summer)	Helen Street	20	727	15	16	787	22	28	5	26	36	5	39	1,726
	Adelaide Street	44	720	36	36	750	44	34	2	33	39	2	39	1,779
	Elizabeth Street	24	680	18	19	750	27	34	6	32	44	6	47	1,687
	Gertrude Street	46	139	92	412	313	94	92	251	480	72	175	42	2,208
	Margaret Street	35	216	29	43	317	52	38	2	28	31	2	46	839
	Victoria Quay		-		35	-	377	-	464	26	253	310	-	1,465
	Beaver Creek Road	24	444	1	8	572	260	13	2	14	103	2	25	1,468

4.2 Performance Criteria

Traffic operation performance at the study intersections were analyzed using Synchro 9 software, which is based on the standard methods of the Highway Capacity Manual (HCM). In HCM, measures of effectiveness were developed, including control delay (second per vehicle) and volume-over-capacity (V/C) ratio. Level of Service (LOS) is defined based on the average control delay and is shown in **Table 4.2**.

For capacity analysis in urban areas, LOS D or better has historically been considered as the threshold for acceptable LOS for both signalized and unsignalized intersections. In congested urban centres, Level of Service E or F are becoming more commonplace and with little scope for widening often accepted as inevitable realities of successful cities. However, in Port Alberni, where congestion is not a significant concern, Level of Service D is still considered an appropriate threshold for acceptable traffic performance. When evaluating traffic performance, given the purpose of this project is to consider the conditions for active transportation and preserving the secondary highway classification, care must be taken that excess vehicle capacity for potential future traffic is not prioritized at the expense of space for active transportation today. The latest signal timing sheets, as provided by the Ministry, were used for this study.

Table 4.2: LOS Definition for Signalized and Unsignalized Intersections in HCM

Traffic Control	LOS	A	B	C	D	E	F
Signalized	Delay (SEC/VEH)	0-10	10-20	20-35	35-55	55-80	>80
Unsignalized		0-10	10-15	15-25	25-35	35-50	>50

4.3 Existing Traffic Performance

Intersection Operation Performance

The overall intersection and individual movement performances for all peak hours in the existing condition (2020), under existing traffic control and lane configurations, were determined and shown in **Table 4.3 (a) to (c)**. The average delay, LOS, and V/C were identified. LOS E / F and V/C ratios above 0.90 are marked red in the tables. EB, WB, NB, and SB corresponds to eastbound, westbound, northbound, and southbound, respectively. L, T, and R imply left-turn, through, and right-turn movements. It should be noted that for the signalized intersections, the maximum green times provided in the signal timing sheets were applied in the traffic modelling.

The overall performance for all study intersections are at an acceptable level (LOS D or better) during weekday AM, school, and PM peak hours. However, several individual movements with poor performance were identified. The 2020 peak hour performance of each study intersection is discussed in details.

- Helen Street (signalized) – no issues are expected at this intersection.
- Adelaide Street (stop-controlled) – no operational issues are expected in the AM peak; while, during the school and PM peak hours, due to relatively higher traffic on Highway 4, it could be challenging for vehicles on Adelaide Street to turn left onto or cross Highway 4.
- Elizabeth Street (stop-controlled) – no operational issues are expected in the AM peak; while, during the school and PM peak hours, due to relatively higher traffic on Highway 4, it could be challenging for vehicles on Elizabeth Street to turn left onto or cross Highway 4.

- Gertrude Street (signalized) – no operational issues are expected in the AM and PM peak hours; however, the westbound approach traffic experience delays in the school peak. The majority of westbound traffic on Highway 4 turns left onto Gertrude Street southbound.
- Margaret Street (stop-controlled) – no operational issues are expected at this intersection.
- Victoria Quay (signalized) – no operational issues are expected at this intersection.
- Beaver Creek Road / Marina Access (stop-controlled) – the southbound approach operates poorly in all peak hours. The majority of traffic on Beaver Creek Road turns left onto Highway 4 eastbound and it could be difficult to find a crossing gap due to high through traffic on Highway 4.

Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	58	470	42	570	39	449	54	542	34	5	35	74	44	5	42	91	1,277
	Delay (s / veh)	7	7	7	7	6	6	6	6	10			10	10			10	7
	LOS	A	A	A	A	A	A	A	A	A			A	A			A	A
	V/C	0.32	0.32	0.32	-	0.27	0.27	0.27	-	0.23			-	0.25			-	-
Adelaide Street (stop-controlled)	Applied Volume	32	511	27	570	28	466	32	526	23	2	22	47	36	2	36	74	1,217
	Delay (s / veh)	0	1	0	1	0	1	0	1	22			22	21			21	3
	LOS	A	A	A	A	A	A	A	A	C			C	C			C	A
	V/C	0.03	0.18	0.18	-	0.03	0.17	0.17	-	0.19			-	0.27			-	-
Elizabeth Street (stop-controlled)	Applied Volume	58	471	42	571	39	462	54	555	34	5	35	74	44	5	42	91	1,291
	Delay (s / veh)	1	1	0	1	0	1	0	1	30			30	31			31	5
	LOS	A	A	A	A	A	A	A	A	D			D	D			D	A
	V/C	0.06	0.18	0.18	-	0.04	0.18	0.18	-	0.36			-	0.42			-	-
Gertrude Street (signalized)	Applied Volume	35	135	47	217	343	167	60	570	82	179	327	588	78	235	40	353	1,728
	Delay (s / veh)	21	21	21	21	17	17	17	17	14	28	7	15	14	25	25	22	18
	LOS	C	C	C	C	B	B	B	B	B	C	A	B	B	C	C	C	B
	V/C	0.35	0.35	0.35	-	0.91	0.91	0.91	-	0.21	0.49	0.58	-	0.20	0.43	0.43	-	-
Margaret Street (stop-controlled)	Applied Volume	35	171	30	236	40	151	45	236	19	2	26	47	40	2	32	74	593
	Delay (s / veh)	0	1	0	1	0	1	0	1	12			12	13			13	4
	LOS	A	A	A	A	A	A	A	A	B			B	B			B	A
	V/C	0.03	0.07	0.07	-	0.03	0.08	0.08	-	0.09			-	0.14			-	-
Victoria Quay (signalized)	Applied Volume	-				26	-	179	205	-	206	15	221	221	342	-	563	989
	Delay (s / veh)					17		2	4		17	9	16	5	4		4	7
	LOS					B		A	A		B	A	B	A	A		A	A
	V/C					0.06		0.25	-		0.41	0.03	-	0.26	0.23		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	8	376	2	386	12	262	116	390	2	2	7	11	180	5	15	200	987
	Delay (s / veh)	8	0	0	0	8	0	9	0	13			13	36			23	9
	LOS	A	A	A	A	A	A	A	A	B			B	E			E	A
	V/C	0.01	0.24	0.24	-	0.01	0.17	0.12	-	0.03			-	0.67			-	-

Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	28	734	21	783	21	763	28	812	41	5	40	86	51	5	52	108	1,789
	Delay (s / veh)	7	7	7	7	7	7	7	7		14		14		13		13	8
	LOS	A	A	A	A	A	A	A	A		B		B		B		B	A
	V/C	0.43	0.43	0.43	-	0.41	0.41	0.41	-		0.30		-		0.34		-	-
Adelaide Street (stop-controlled)	Applied Volume	51	747	32	830	33	790	51	874	32	2	33	67	51	2	51	104	1,875
	Delay (s / veh)	1	1	0	1	1	1	0	1		65		65		95		95	8
	LOS	A	A	A	A	A	A	A	A		F		F		F		F	A
	V/C	0.07	0.26	0.26	-	0.05	0.28	0.28	-		0.57		-		0.81		-	-
Elizabeth Street (stop-controlled)	Applied Volume	34	750	25	809	25	846	34	905	50	6	48	104	61	6	62	129	1,947
	Delay (s / veh)	1	1	0	1	1	1	0	1		209		209		271		271	30
	LOS	A	A	A	A	A	A	A	A		F		F		F		F	D
	V/C	0.05	0.26	0.26	-	0.04	0.29	0.29	-		1.13		-		1.32		-	-
Gertrude Street (signalized)	Applied Volume	54	169	60	283	492	328	114	934	110	277	493	880	114	271	54	439	2,536
	Delay (s / veh)	28	28	28	28	85	85	85	85	15	31	7	16	15	25	25	23	44
	LOS	C	C	C	C	F	F	F	F	B	C	A	B	B	C	C	C	D
	V/C	0.53	0.53	0.53	-	1.46	1.46	1.46	-	0.26	0.61	0.67	-	0.31	0.42	0.42	-	-
Margaret Street (stop-controlled)	Applied Volume	41	216	25	282	38	342	60	440	37	2	26	65	41	2	60	103	890
	Delay (s / veh)	0	1	0	2	0	1	0	1		17		17		16		16	4
	LOS	A	A	A	A	A	A	A	A		C		C		C		C	A
	V/C	0.04	0.09	0.09	-	0.03	0.15	0.15	-		0.19		-		0.26		-	-
Victoria Quay (signalized)	Applied Volume		-			52	-	389	441	-	396	36	432	246	337	-	583	1,456
	Delay (s / veh)					23		12	13		21	7	20	6	4		5	12
	LOS					C		B	B		C	A	B	A	A		A	B
	V/C					0.14		0.61	-		0.64	0.07	-	0.37	0.24		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	20	445	2	467	31	541	220	792	14	7	34	55	104	2	19	125	1,439
	Delay (s / veh)	9	0	0	0	9	0	10	0		22		22		124		124	14
	LOS	A	A	A	A	A	A	A	A		C		C		F		F	B
	V/C	0.02	0.29	0.29	-	0.03	0.35	0.23	-		0.22		-		0.95		-	-

Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	20	727	15	762	16	787	22	825	28	5	26	59	36	5	39	80	1,726
	Delay (s / veh)	7	7	7	7	7	7	7	7	13			13	13			13	7
	LOS	A	A	A	A	A	A	A	A	B			B	B			B	A
	V/C	0.40	0.40	0.40	-	0.39	0.39	0.39	-	0.23			-	0.26			-	-
Adelaide Street (stop-controlled)	Applied Volume	44	720	36	800	36	750	44	830	34	2	33	69	39	2	39	80	1,779
	Delay (s / veh)	1	1	0	1	1	1	0	1	54			54	54			54	5
	LOS	A	A	A	A	A	A	A	A	F			F	F			F	A
	V/C	0.06	0.25	0.25	-	0.05	0.27	0.27	-	0.52			-	0.56			-	-
Elizabeth Street (stop-controlled)	Applied Volume	24	680	18	722	19	750	27	796	34	6	32	72	44	6	47	97	1,687
	Delay (s / veh)	0	1	0	1	0	0	0	0	61			61	70			70	7
	LOS	A	A	A	A	A	A	A	A	F			F	F			F	A
	V/C	0.03	0.23	0.23	-	0.03	0.26	0.26	-	0.57			-	0.69			-	-
Gertrude Street (signalized)	Applied Volume	46	139	92	277	412	313	94	819	92	251	480	823	72	175	42	289	2,208
	Delay (s / veh)	22	22	22	22	34	34	34	34	14	19	7	14	14	22	22	20	23
	LOS	C	C	C	C	C	C	C	C	B	C	A	B	B	C	C	B	C
	V/C	0.45	0.45	0.45	-	1.13	1.13	1.13	-	0.21	0.56	0.67	-	0.20	0.29	0.29	-	-
Margaret Street (stop-controlled)	Applied Volume	35	216	29	280	43	317	52	412	38	2	28	68	31	2	46	79	839
	Delay (s / veh)	0	1	0	1	0	1	0	1	16			16	15			15	4
	LOS	A	A	A	A	A	A	A	A	C			C	C			C	A
	V/C	0.03	0.09	0.09	-	0.04	0.14	0.14	-	0.19			-	0.19			-	-
Victoria Quay (signalized)	Applied Volume	-				35	-	377	412	-	464	26	490	253	310	-	563	1,465
	Delay (s / veh)					23		14	15		23	8	22	6	4		5	14
	LOS					C		B	B		C	A	C	A	A		A	B
	V/C					0.10		0.63	-		0.69	0.05	-	0.41	0.22		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	24	444	1	469	8	572	260	840	13	2	14	29	103	2	25	130	1,468
	Delay (s / veh)	9	0	0	1	8	0	10	0	24			24	90			90	11
	LOS	A	A	A	A	A	A	A	A	C			C	F			F	B
	V/C	0.03	0.28	0.28	-	0.01	0.37	0.27	-	0.14			-	0.85			-	-

TABLE 4.3 (c): Synchro Results for Existing Condition (2020) – PM Peak

Queue Length Analysis

To determine whether the length of the turn bays at the study intersections are sufficient to accommodate the existing traffic demand, queue length analysis was conducted using SimTraffic (traffic microsimulation of Synchro). This analysis also identifies whether there is vehicle spillover to the upstream intersections. Average and 95th percentile queue lengths as well as the existing storage / lane lengths are provided in **Table 4.4**.

Accordingly, in the AM and PM peak hours, no major queuing issues were noted at the study intersections, except for the Highway 4 southbound left-turn movement at the Victoria Quay intersection, for which the 95th queue length exceeds the 20m storage length.

Due to higher traffic volumes in the school peak hour and un-optimized signal timing at the Gertrude Street intersection, there could be vehicle stacking on Highway 4 to the upstream intersections, namely Elizabeth Street and Margaret Street. The traffic operation at the Gertrude intersection could also cause long vehicle queues on the side street approaches of the upstream unsignalized intersections; since there could be vehicles blocking the intersection and not allowing side-street traffic to turn onto Highway 4. In addition, the northbound right-turn bay and southbound left-turn bay at the Gertrude Street intersection have inadequate storage capacity in the school peak hour.

Table 4.4: SimTraffic Results for Existing Condition (2020)

Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)	Highway 4				Intersecting Street			
			EB		WB		NB		SB	
			LT	TR	LT	TR	L	R	L	R
Helen Street (signalized)		Storage / Lane Length (m)	80		200					
	AM	Average	16	19	22	14	10		12	
		95th %ile	28	32	40	28	18		22	
	School	Average	15	18	66	62	43		48	
		95th %ile	37	43	141	141	113		124	
	PM	Average	22	26	34	24	9		12	
		95th %ile	39	43	61	48	20		21	
Adelaide Street (stop-controlled)		Storage / Lane Length (m)	80		80					
	AM	Average	5	1	4	1	7		10	
		95th %ile	13	6	15	5	15		18	
	School	Average	6	1	47	43	45		61	
		95th %ile	18	9	**111**	**113**	121		153	
	PM	Average	9	3	11	4	13		13	
		95th %ile	23	11	32	21	28		26	
Elizabeth Street (stop-controlled)		Storage / Lane Length (m)	80		80					
	AM	Average	8	2	7	0	11		11	
		95th %ile	17	9	20	4	19		20	
	School	Average	40	38	66	64	108		91	
		95th %ile	**106**	**110**	**123**	**125**	170		180	
	PM	Average	6	3	16	4	18		18	
		95th %ile	16	12	48	20	45		46	
Gertrude Street (signalized)		Storage / Lane Length (m)	80		80			60	30	-
	AM	Average	16	14	40	17	12	22	12	-
		95th %ile	29	26	68	38	22	38	23	-
	School	Average	44	45	55	50	10	50	22	-
		95th %ile	**94**	**94**	**129**	**124**	26	**81**	**37**	-
	PM	Average	18	20	68	39	14	36	11	-
		95th %ile	31	35	**103**	71	27	60	22	-
Margaret Street (stop-controlled)		Storage / Lane Length (m)	80		80					
	AM	Average	2	0	2	0	7		9	
		95th %ile	8	1	9	3	14		15	
	School	Average	26	24	2	1	34		42	
		95th %ile	**85**	**84**	8	5	107		134	
	PM	Average	5	1	3	1	9		9	
		95th %ile	13	4	10	7	15		16	

Table 4.4: (CONT.) SimTraffic Results for Existing Condition (2020)

Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)		-		Highway 4		Victoria Quay		Highway 4	
				EB		WB		NB		SB	
				LT	TR	L	R	T	R	L	T
Victoria Quay (signalized)	Storage / Lane Length (m)			-		80		-	40	20	-
	AM	Average		-		4	10	-	3	13	13
		95th %ile				11	20	-	9	25	36
	School	Average		-		5	16	-	10	20	70
		95th %ile				14	38	-	31	33	234
	PM	Average		-		6	30	-	7	19	16
		95th %ile				14	52	-	25	30	43

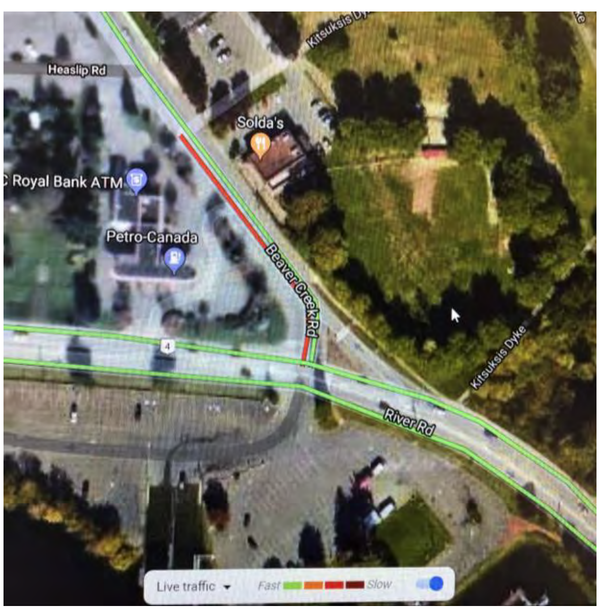
Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)		Highway 4				Marina Access	Beaver Creek Rd
				EB		WB		NB	SB
				L	TR	L	R	LTR	LTR
Beaver Creek Road / Marina Access (stop-controlled)	Storage / Lane Length (m)			40	-	25	30		
	AM	Average		0	Free Flow	1	0	3	19
		95th %ile		3		7	3	9	32
	School	Average		2		5	1	13	21
		95th %ile		11		14	5	35	39
	PM	Average		3		1	1	5	17
		95th %ile		9		6	6	12	29

Note:

1. red color indicates lanes/bays with issues.
2. the through movements queue of the intersecting streets with turn bays are not provided.

GoogleMaps Traffic Data Review

Due to insufficient data, significant assumptions were made as mentioned above to estimate traffic volumes for the study intersections. GoogleMaps Traffic data was reviewed as a secondary data source to provide level of comfort with analysis output. The below screen capture during the school peak hour simulates similar conditions to the existing condition output with the areas in red indicating lower vehicle speeds and congested conditions extending from Gertrude Street further east to Adelaide Street and for Beaver Creek Road southbound approach.



Highway 4 and Beaver Creek Road

Highway 4 and Gertrude Street

4.4 Collision Analysis

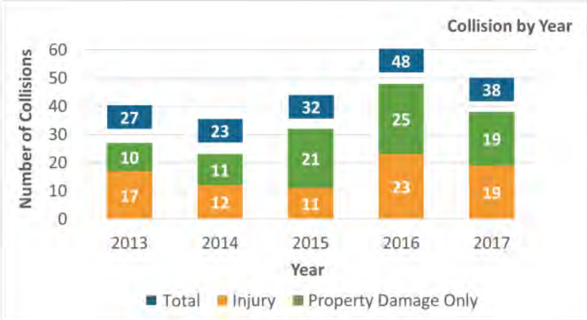
Five years of Insurance Corporation of British Columbia (ICBC) claim data of the study corridor between Helen Street and Beaver Creek Road (172 collisions recorded from January 1, 2013 to December 31, 2017) were collected and reviewed. BC MOTI Collision Information System (CIS) data of Highway 4 (Segment 2382) between Arrowsmith Road and Heath Road in Port Alberni (from January 1, 2014 to August 31, 2019) was also collected and reviewed to indicate three additional collisions. A total of 175 collisions were reported from both datasets (with no duplication) for the five-year study period (2013 to 2017). Through filtering of incidents (7 cases) out of the study area and within parking lots or gas stations, a total of 168 relevant collisions were identified and analyzed.

Corridor-Wide Collision Characteristic

Out of 168 total collisions from Helen Street to Beaver Creek Road, 82 collisions (about 49% of total collisions) were reported as injury and 86 collisions (51%) as property damage only (PDO), yielding a collision severity index (CSI) of 5.4. No fatal collisions were reported between 2013 and 2017 (up to August of 2019 per the CIS dataset). The study corridor averaged 33.6 collisions per year. Traffic volume used to determine the collision rate was based on the estimated AADT of about 12,000 vehicles per day. The collision rate in terms of traffic volume and travelled length (about one kilometre) was determined as 7.7 collisions per million vehicles-kilometre.

Based on the BC MOTI *Provincial Average Collision Rates, Number of Collisions and Collision Severity by Service Class and Traffic Volume Range* (2016) for an urban undivided highway with average daily traffic volume between 10,001 and 15,000, it is understood that collision rate of the study corridor (7.7) is significantly higher compared to the provincial average (0.77). In terms of CSI, casualty (fatality and injury) collision proportion of the study corridor (5.4) is found to be slightly higher than the provincial average (5.1). It should be noted that the provincial averages are only based on the CIS data, that mainly reports injury or fatal collisions instead of all insurance claims in the ICBC dataset, including PDO. For the purpose of this study, both datasets are taken into account because of the urban context, involving vulnerable users, on-street parking, and driveway accesses and the low number of CIS reported incidents in the study area.

Further review of the reported data for the study corridor, including collisions distributed by temporal (year, month, day of week, and starting hour), type, contributing factor, direction, intersection, plus severity (in reference to total collisions), are summarized in **Figure 4.1** to **4.4**. Collisions with unknown information were not taken into account for the calculations of collision proportions.



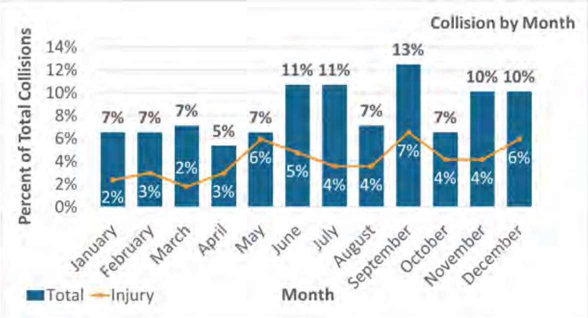


Figure 4.1: Temporal Collision Distributions by Year and Month (2013 to 2017)

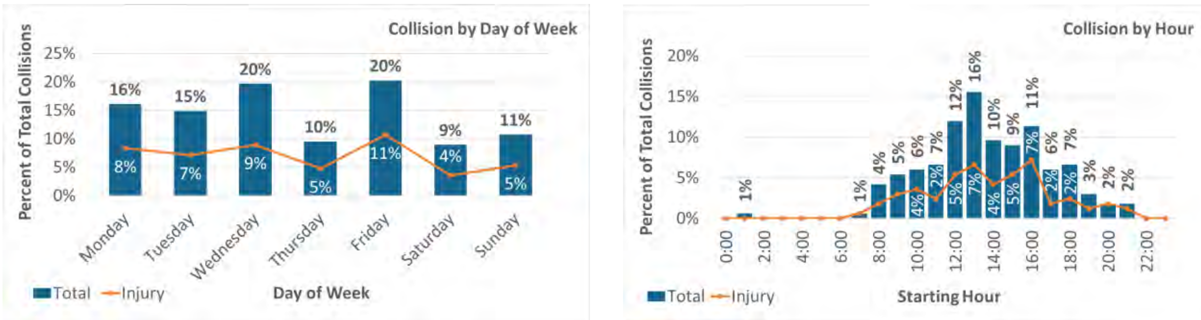


Figure 4.2: Temporal Collision Distributions by Day of Week and Hour (2013 to 2017)

Year: 2016 had the highest number of collisions – 48 collisions (about 29% of total collisions), followed by 2017 – 38 collisions (23%). The annual number of collisions were increased through the study period, although the percentages of injury collisions to total collisions were reduced.

Month: Fall (September to November) season experienced the highest number of collisions – 49 collisions (about 30% of total collisions), followed by summer season (June to August) with 48 collisions. It is found that higher number of collisions were recorded during the tourist as well as school seasons, and might be due to a higher traffic volume. December also had 10% of the total collisions, which might be related to poor road conditions (wet, ice, and snow).

Day of Week: The highest number of collisions and injuries occurred on both Wednesday and Friday – about 20% of total collisions each. A higher number of weekday collisions might be due to high commuter and school traffic volumes along the study corridor besides businesses and an elementary school. Collisions on Friday might also be high due to tourist travelling in the westbound direction (heading to the ferry terminal).

Hour of Day: Collision frequencies are higher in the afternoon between 1200 to 1700 hours – about 58% of total collisions. This five-hour period is fairly consistent with lunch, school (class ends), and afternoon peak hours; that is, when vehicular and pedestrian traffic are relatively high due to shopping, class dismissal, and commuting.

Collision Type: As shown in **Figure 4.3** on the next page, rear end was the predominant collision type – 75 collisions (about 45% of total collisions); 19% of that are identified relating to left-turns and 8% to right-turns. It was followed by sideswipe and left-turn opposing with relatively high injuries – 19 and 18 collisions (11% each), respectively. “Other” included collisions due to vehicle failure (trailer detachment).

Some of the rear-end collisions were indirectly involved with crossing pedestrians, adjacent cyclists, on-street parking, driveway accesses, as well as lane changes. Based on collision descriptions and site observations, aggressive or impatient drivers might weave between lanes along the study corridor to overtake stopped eastbound and westbound vehicles waiting to turn due to lack of left-turn bays, slow right turns, and/or vehicles encroaching too far from side streets.

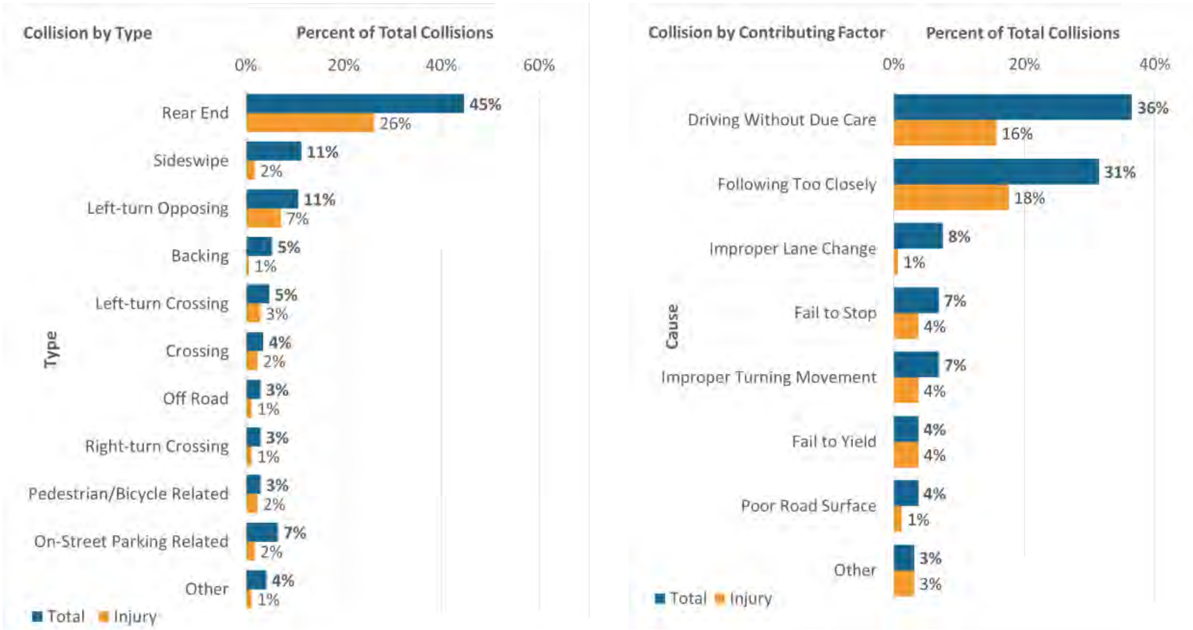


Figure 4.3: Collision Distributions by Type and Contributing Factor (2013 to 2017)

Contributing Factor: Driving without due care was the most dominant contributing factor identified – about 36% of total collisions. Following too closely was the second highest number reported factor – 31%, but the highest for injured collisions. Both causes primarily involved rear end collisions along the study corridor. “Other” contributing factors involved alcohol, speeding, driver blackout, and trailer detachment.

Compared to other highway intersections on the Vancouver Island, according to the VITS Report, the primary collision type (rear-end), contributing cause (driver inattentive), and crash severity (PDO slightly higher than injury) were similar for this study corridor.

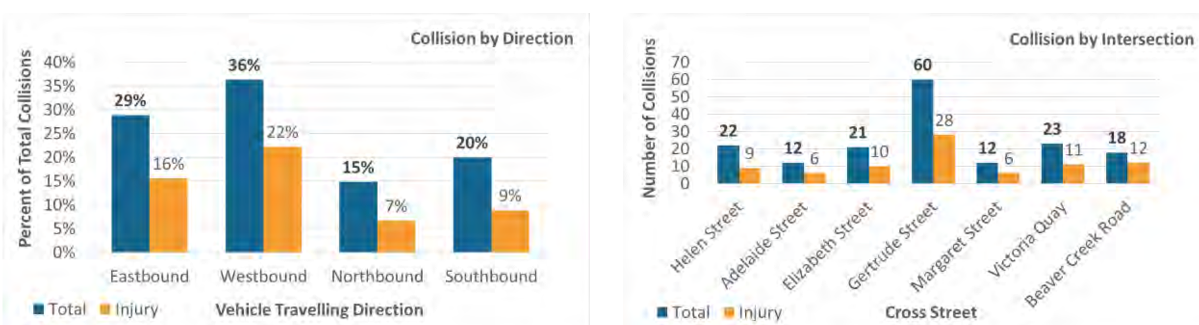


Figure 4.4: Collision Distributions by Direction and Intersection (2013 to 2017)

Vehicle Travelling Direction: Most collisions occurred in the westbound direction along the study corridor – about 36% of total collisions, which might be due to some drivers not slowing down in time after a long, generally straight, and free-flow section (one kilometre) of Highway 4. It was followed by eastbound direction – about 29%; that is, 65% of the total collisions occurred on the highway.

Collision Location: According to the data, most collisions occurred at the Gertrude Street and Highway 4 intersection – 60 collisions (about 36% of total collisions), followed by the two other signalized intersections at Victoria Quay and Helen Street – between 22 to 23 collisions (13% to 14%). About 87% of the total collisions within the study area occurred at these top three high collision intersections (all signalized). A high proportion of injury collisions is found at the Beaver Creek Road and Highway 4 intersection.

According to the ICBC *Crash Map* online, between 2013 and 2017, the study intersection of Gertrude Street and Highway 4 is ranked second in terms of high collision locations in Port Alberni. This study intersection was also identified as one of the collision prone location in the VITS Report, noting that only CIS data was used (generally not taking into consideration of minor PDO collisions) from 2008 and 2012.

Intersection-Specific Collision Pattern

Review of the descriptions from each reported collision data at the study intersections were undertaken. No mid-block collisions were identified, most likely due to the close intersection spacing. Collision diagrams with identified type, severity, direction, and location (including driveways and on-street parking) are illustrated for the study corridor from Helen Street to Beaver Creek Road in **Figure 4.5** and for the Beaver Creek Road and Highway 4 intersection in **Figure 4.6**. Collisions with unknown information are not shown, but might be reflected in the collision pattern. Along with the collision diagrams and site visit, the following observations of the Highway 4 intersection collisions shown are noted:

Helen Street (signalized):

- Other than at Gertrude Street, most sideswipe collisions within the study area occurred at this location, and 4 out of 5 sideswipe collisions were reported in the eastbound direction. Sideswipe collisions were likely due to lane changes to either approach the school or enter Tim Hortons.
- Out of the four left-turn related collisions (opposing and crossing), two related to/from Helen Street (elementary school and shopping plaza) and two related to Tim Horton driveways; relatively high entering/exiting traffic was observed during the afternoon peak period.
- Majority of collisions were related to eastbound and westbound vehicles (about 90% at Helen Street), which might be due to higher east-west traffic volumes on Highway 4 compared to side street. Two multi-vehicle rear ends (involving 3 vehicles each) occurred in the westbound direction, likely due to not slowing down in time after a long stretch of free-flow highway.

Adelaide Street (stop-controlled):

- About 50% of the total collisions for this stop-controlled intersection were reported as injury, including one related to pedestrian on the crosswalk. Based on the site observations, it is difficult for drivers to spot pedestrians crossing the long mid-block crosswalk and yield on Highway 4 due to volume and following too closely most of the time.
- Similar to Helen Street and traffic patterns, the majority of collisions occurred along the east-west directions. Vehicles following too closely as well failing to stop or yield (33% each) were the dominant contributing factors.

Elizabeth Street (stop-controlled):

- Vehicles following too closely was 29% of the total contributing factors, and 67% of that was indirectly related to crossing pedestrians across the study corridor.
- Three multi-vehicle rear ends (involving 3 to 4 vehicles each) occurred in the east-west directions, likely due to vehicles following too closely.

Gertrude Street (signalized):

- Different variety of collision types occurred here on all approaches and at the intersection, including 12% of the total intersection collisions related to on-street parking (all along Highway 4), 3 out of 5 total pedestrian/bicycle-related collisions within the study area happened at this intersection (mainly due to driving without due care and/or failing to yield), and three driveway-related collisions at the southwest quadrant; indicating a intersection with lots of vehicle-vehicle or vehicle-pedestrian/cyclists conflicts.
- Vehicles travelling in the east-west directions (about 55%) on Highway 4 had the highest number of collisions and north-south directions (45%) on Gertrude Street. Gertrude Street had the highest number of collisions on cross street within the study area, especially northbound with three right-turn rear ends and backing collisions each, may be due to high approach traffic volumes.

Margaret Street (stop-controlled):

- Rear end (about 75%) was the predominant type; 25% of the total intersection collisions were indirectly related to crossing pedestrians (all westbound direction).
- All collisions occurred in the east-west direction, about 75% in westbound including one three-vehicle right-turn rear-end collisions.

Victoria Quay (signalized):

- Rear end was the predominant type, particularly southbound (43% of total intersection collisions).
- One property damage only occurred on the north leg, relating to both bicycle and driveway.

Beaver Creek Road (stop-controlled):

- About 67% of the total intersection collisions were reported as injury, significantly higher than the corridor-wide average of 49%. Most collisions were involved in the westbound direction (about 47%). Drivers inattentive was the dominant contributing factor.
- Left-turn crossing (39% of the total intersection collisions) was the predominant type; 72% of that involved southbound left-turn and westbound vehicles. For left-turn crossing collisions, 7 out of 8 within the study area occurred at this intersection, the next prominent collision types were left-turn opposing and rear end (22% each).

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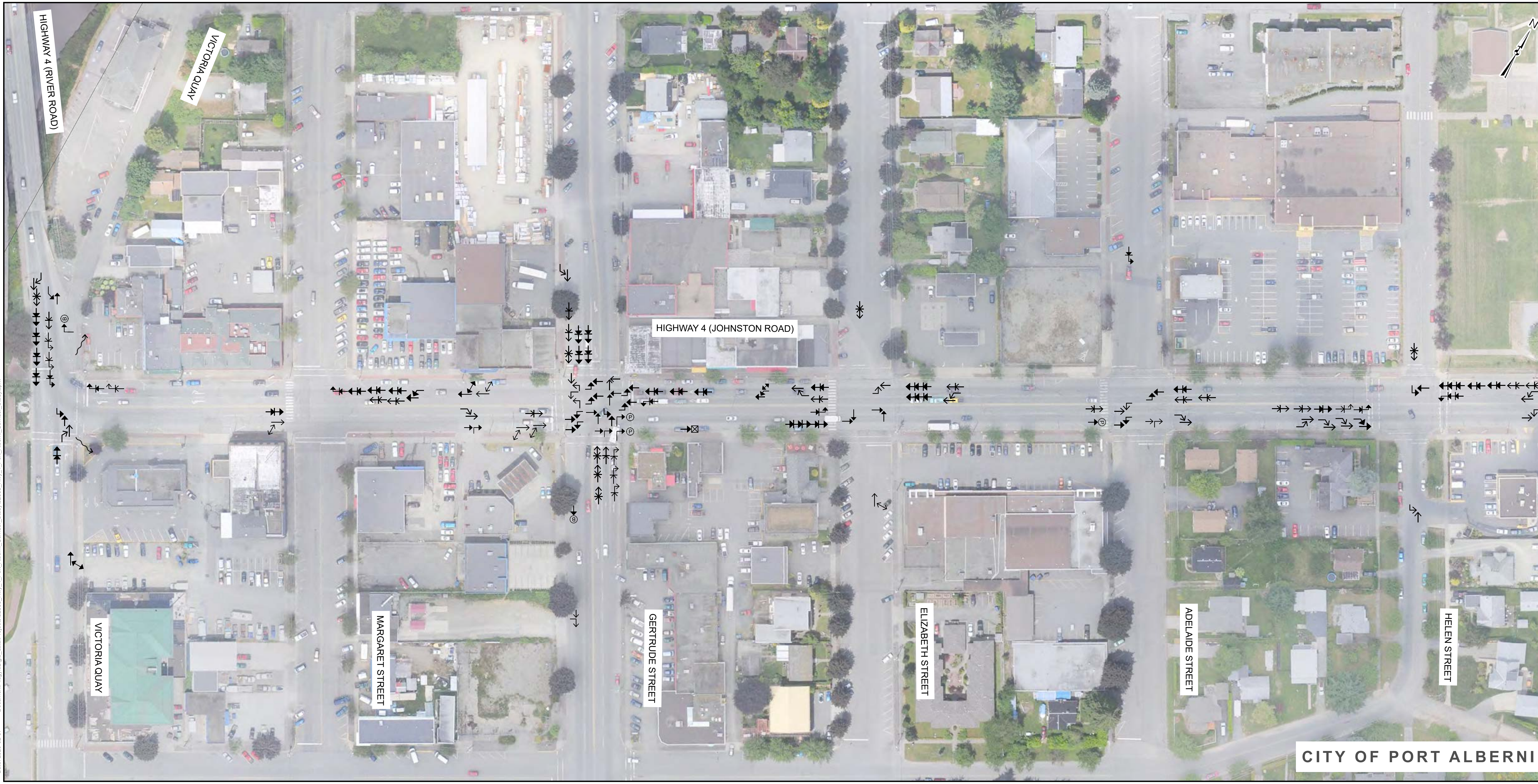


LEGEND

- PROPERTY DAMAGE
- INJURY
- VEHICLE DIRECTION
- Ⓟ PEDESTRIAN
- Ⓑ BICYCLE
- ⊠ OBJECT

COLLISION TYPE

- BACKING
- CROSSING
- LEFT-TURN CROSSING
- LEFT-TURN OPPOSING
- OFF ROAD
- PARKING RELATED
- PEDESTRIAN / BICYCE RELATED
- REAR END
- RIGHT-TURN CROSSING
- SIDESWIPE

(119 of 150 Collisions Shown)

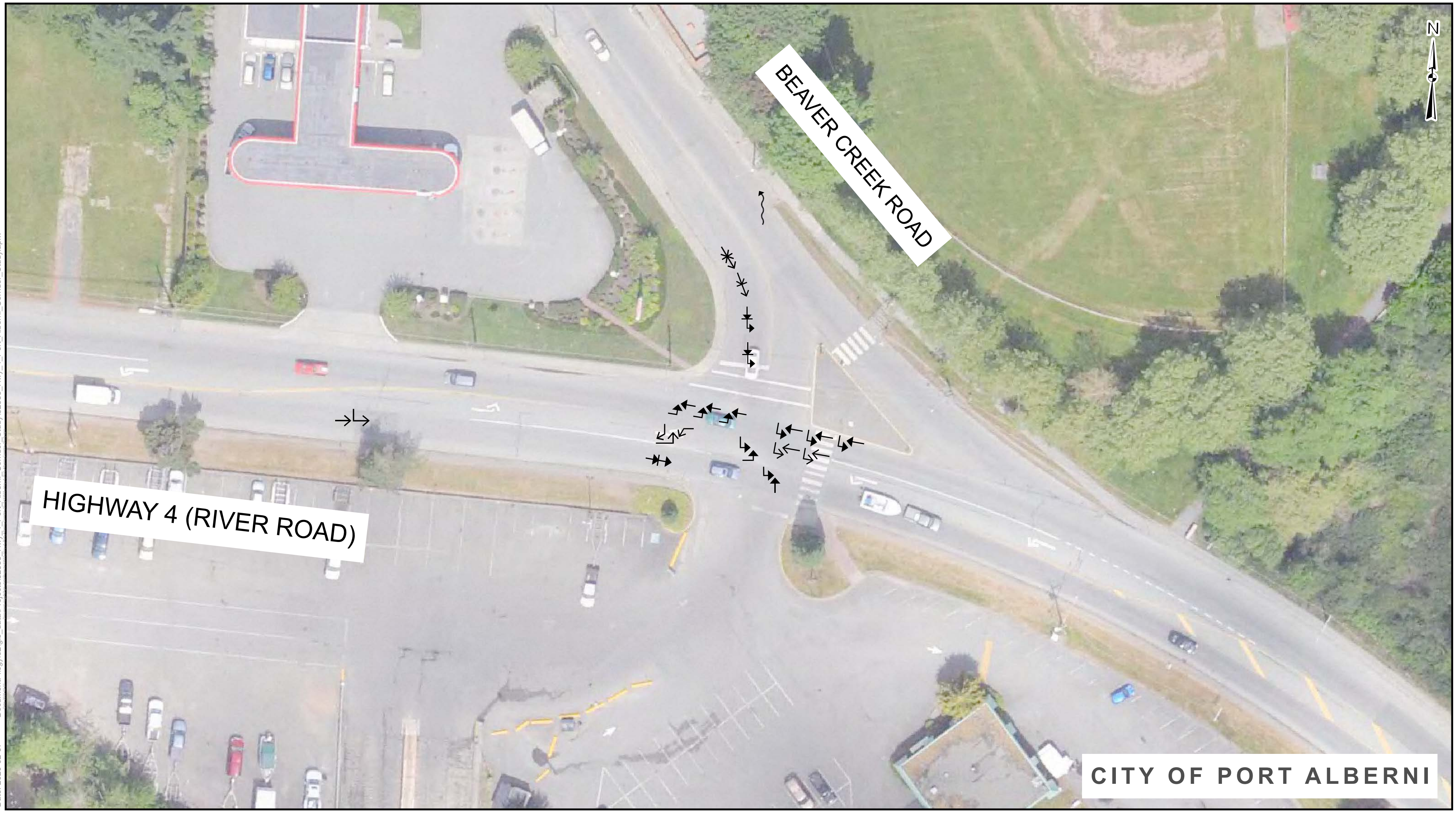
FIGURE 4.5:
HIGHWAY 4 (JOHNSTON ROAD)
BETWEEN
HELEN STREET AND VICTORIA QUAY
COLLISION DIAGRAM

0 5 10 20 30 40 50 Meters

1:1,500 NAD 1983 CSRS UTM Zone 10N

ISL

Integrated Expertise. Locally Delivered.



Date: 2020-02-07 Document: \\cgyfs2\gis_data\Projects\32533_Hwy_4_Port_Alberni_Corridor_Study\32533_Hwy_4_Port_Alberni_Corridor_Study.aprx

LEGEND

PROPERTY DAMAGE
INJURY
VEHICLE DIRECTION

(18 of 18 Collisions Shown)

COLLISION TYPE

BACKING
LEFT-TURN CROSSING
LEFT-TURN OPPOSING
OFF ROAD
REAR END
SIDESWIPE

FIGURE 4.6:

BEAVER CREEK ROAD
AND
HIGHWAY 4 (RIVER ROAD)
COLLISION DIAGRAM

0 2.5 5 10 15 20 25 Meters

1:800 NAD 1983 CSRS UTM Zone 10N

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4.5 Access Management and On-Street Parking

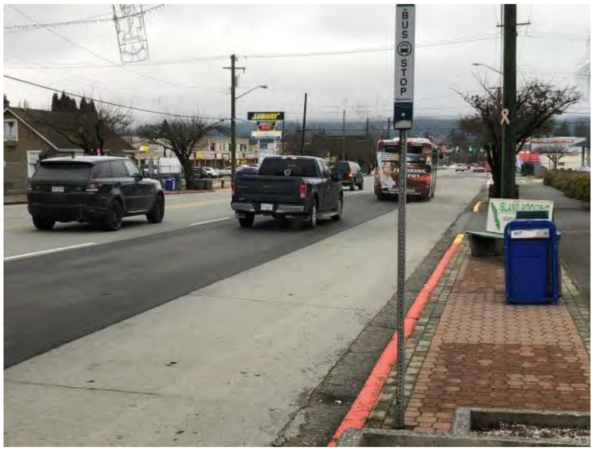
On-Street Parking with 1 Hour Time Restriction

On-Street Parking Reduced to Provide Driveway Access

There are a number of businesses that take direct access from the study corridor through driveway letdowns across the sidewalk and boulevard. In terms of the corridors function as a highway, these points of access can disrupt the flow of traffic as drivers make their turns in gaps in the opposing traffic or wait for pedestrians to pass the driveway. Ideally, any development would access these properties from the side streets with limited direct highway access where possible which should be considered in the development of improvement options. This has the additional benefit of providing additional on-street parking and off-street parking where the driveway currently exists.

On-street parking is provided at various locations along the corridor, typically it is time restricted to 1 hour between 9am and 6pm most days or 9am to 9pm on a Friday, one block features 2-hour parking. This encourages high turnover which can support customer access to businesses along the corridor, albeit ample parking is typically available in off-street parking lots or side streets. With any decision to change parking community consultation and consideration must be made for disabled access requirements as there are several disabled on-street parking stalls along the corridor.

4.6 Transit Performance Assessment



Westbound Transit Stop on Highway 4 with Seating and Waste Receptacles

Eastbound Transit Stop on Highway 4 with Waste Receptacles

Transit service is limited along the corridor, with a service frequency of 40 minutes, it provides essentially a limited service for those without access to an automobile and is not sufficient to attract significant ridership. The limited service frequency can influence how transit users arrive at their stop, often arriving early to avoid missing the bus and having a long wait. Therefore, bus stop facilities that include weather protection can help make the wait more comfortable, be that providing shade from the sun, or protection from the wind, rain or snow. Currently the stops along the corridor include seating at some locations, and waste receptacles at most.

4.7 Active Transportation Performance Assessment

In terms of performance assessment, this is more qualitative for active transportation modes until such time as demand increases. This section identifies key performance issues identified for people walking or rolling.

Highway 4 Marked Crosswalk across Six Lanes is Approximately 21m wide

Like Highway 4, Elizabeth Street has approximately 21m of Pavement

People walking along the corridor are generally well catered for with wide sidewalks, separated from the roadway by a paved boulevard and occasional street trees as well as on-street parking providing separation and protection from moving vehicles where provided. However, some challenges are evident from our site visit and review of background information.

Johnston Road is wide creating long crossing distances. Where the intersections are signalized this is less of an issue, but there are three marked crosswalks (at Margaret Street, Elizabeth Street and Adelaide Street) where there is a real risk that someone driving won't see a pedestrian crossing from the far side as they focus on the lanes immediately in front of them. For a pedestrian, stepping out into the marked crosswalk brings significant risk, hoping that drivers in all of the lanes are paying attention. Similarly when crossing the minor roads the width of these roads means a pedestrian is on the roadway for a long time, and when you see vehicles waiting to make a left turn in gaps in the opposing traffic, the drivers are often more focused on that than the presence of pedestrians.

Sidewalk Fenced off for Patio Seating Forces Pedestrians into the Boulevard


Uneven Sidewalk is a Trip Hazard

The sidewalks are generally in reasonable condition, however there are a few features that impact the path of pedestrians and particularly those with mobility impairments or using wheelchairs. The sidewalks feature occasional cracks and uneven slabs that create trip hazards. Patios for the adjacent land use occasionally utilize the entire sidewalk, forcing pedestrians to walk on the paved boulevard. In term of placemaking and adding life to the street this is positive, providing the boulevard strip is well maintained and accessible.

Highway 4 Marked Crosswalk
with no Curb Ramp

Beaver Creek Road Steps from
Sidewalk to Roadway are inaccessible

At the Western end of the corridor the pedestrian crossings provided at Highway 4 and Beaver Creek Road are inaccessible for people using mobility devices and potentially any mobility impairment with access to the crosswalks requiring pedestrians to negotiate a set of steps on the east side of the intersection and a median island with no curb ramps in the centre of the intersection.

Misalignment of Curb Ramp and Crosswalk Lines

Recent Repaving Missing Pavement Markings

Some minor pavement marking issues were identified, at some locations the crosswalk markings do not align with the curb ramps, technically meaning people may cross outside of the crosswalk to a small degree. During the site visit it was observed that a number of locations had been recently repaved and pavement markings had not been reinstated at the time of the site visit.

Concrete Planters Sitting Empty in Winter

Benches with Advertising on the Seatbacks Facing Traffic

In terms of street furniture and beautification, there are a number of benches located at intersection corners the face out to the roadway. The importance of retaining these are not clear, and their purpose may be more related to advertising than functionality. The sitting at the edge of the roadway looking at traffic is not a pleasant experience for a pedestrian but creates more eyes on the advertising from passing motorists. There need and aesthetic qualities should be reviewed as part of the option development process. There were a number of empty planters located along the corridor that are likely planted in the summer months but sit empty in the winter during the time of the site visit. They also include framing for banners or hanging baskets. Like the seating, the aesthetic quality of these should be reviewed.

Root Structure Taking Over the Curb

Root Structure Disrupting the Sidewalk

Street trees are well established, with root structures often disrupting the sidewalk surface and creating uneven slabs, or in some cases taking over the curb. Communities can often have a passionate attachment to their street trees and their removal could see some level of public opposition, even where replacements are proposed. Going forward, any new trees should be provided with suitable soil volume and soil cells if appropriate.

With regard to Pedestrian Facility selection the BC Active Transportation Design Guide indicates that a Main Street/Commercial Street should feature an enhanced separated sidewalk which consists of a wide separated sidewalk with ample space for pedestrian movement, sidewalk utilities, and placemaking opportunities.

Limited Space in Wide Travel Lane for People Cycling

Person Choosing to Cycle on the Sidewalk

There are no facilities for cyclists along the corridor. The centre lane, between the parking lane and the left lane on each side of the roadway is wide at approximately 4.4m indicating shared use or simply providing a door zone for those parking to open their doors without fear of being struck by a passing vehicle. Where parked vehicles are present and trucks are passing, the space between them is very uncomfortable. The corridor offers no dedicated cycling facilities at this time.

5.0 Future Do Nothing Performance Assessment

5.1 Future Demand

Port Alberni's OCP developed in 2007 provides some indication of how the City will grow. In terms of demographics the OCP acknowledges that the community is trending towards an aging population that will have implications for services and housing choice. With respect to transit, those without the financial ability or physical ability to drive an automobile may become more dependent upon transit. For those earlier in retirement, getting around by active transportation to fulfill leisure needs may become more prevalent.

Over the last several census periods, population in the City has generally remained about the same as it is today. The 2016 census recorded 17,678 residents in the City of Port Alberni, 17,743 in 2011, 17548 in 2006, and 17,748 in 2001. The OCP included three scenarios going forward to 2026, including negative growth, positive growth and no growth. To date, the no growth scenarios seems most likely for the current OCP term.

Of relevance to this study are the growth plans in Tofino and Ucluelet, the two primarily tourism-based communities on the west coast of Vancouver Island that are only accessed by land via Highway 4 through Port Alberni. Significant increases in their populations or tourism activity would see additional through traffic on the highway.

Tofino's OCP is currently undergoing renewal, the official OCP is dated 2013. That document noted quite significant growth in Tofino of 51.6% between 1996 and 2011 where population increased from 1,170 to 1,876. In 2016 population growth slowed a little with a population recorded as 1,932, a 3% increase from 2011.

In Ucluelet, the 2016 Census counted a resident population of 1,717 people, and a total of 735 occupied private dwellings. This represents 1.36% annual population growth.

Based on the above analysis, an increase in through traffic may be reasonable with limited increase in local traffic.

5.2 25-year Horizon Traffic Volume (2045)

To assess the future traffic performance in 25-year horizon (2045) condition under the existing traffic controls and lane configurations (Do Nothing Scenario), the 2020 estimated traffic volumes should be projected using a reasonable annual traffic growth rate. Beside the 2006 CH2M HILL report, the following studies and dataset were reviewed:

- Highway 4 Port Alberni Summit (ISL Engineering and Land Services, November 2017);
- Central Island Highway Conditions (Urban Systems, October 2016);
- Historical dataset at two nearby short count sites (within 4km of the study area) extracted from MoTI's Traffic Data Program from 2007 to 2018; and,
- Victoria Quay signal download data for April 2014 and January 2020.

According to the Highway 4 Port Alberni Summit, a linear annual growth rate of 1.5% was applied to develop a peak summer day up to the design year 2043. The Central Island Highway Conditions Report mentioned about modest levels of traffic growth since 2006 in the Central Island area highways. Accordingly, Highway 19A and Highway 4 West have experienced a compound annual growth rates of 1% or less. According to CH2M Hill report, an annual 0.5 percent traffic growth was calculated between 1999 and 2006 at the Beaver Creek Road Intersection.

The AADT were also extracted from the MoTI’s Traffic Data Program at two nearby locations – Highway 4, 0.1km west of Old Port Alberni Highway (4km east of Helen Street) and Highway 4 0.1km east of McCoy Lake Road and 0.4km west of the River Bend Bridge (3km west of Beaver Creek Road). Accordingly, the AADTs vary from 4,000 to 8,000 vehicles per day without a consistent trend. In other words, the historical data shows an increase from 2012 to 2015; while, the 2018 AADT was decreased.

Using the Victoria Quay signal download data, the April 2014 Highway 4 AADT, east of Victoria Quay, was found at approximately 8,500 vehicles per day (April 15 to April 24). While, the January 2020 AADT was estimated at 7,000 vehicles per day. Considering the monthly variation (1.2), the comparison indicates that minimal growth rate is expected.

With all these taken into account, linear annual traffic growth rate of 1% was assumed for this study and applied to the 2020 estimated traffic volumes. The 2045 estimated peak hour traffic volumes are summarized in **Table 5.1**. The annual growth rate was applied to all turning volumes at every study intersection and the projected traffic volumes were rounded to 5 or 10 for calculations.

Table 5.1: 2045 Projected Traffic Volumes (vehicle/hour)

Peak Hour	Study Intersection (along Highway 4)	Highway 4						Intersecting Street						Total
		Eastbound			Westbound			Northbound			Southbound			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
AM (winter)	Helen Street	75	590	55	50	560	70	45	5	45	55	5	55	1,610
	Adelaide Street	40	640	35	35	585	40	30	5	30	45	5	45	1,535
	Elizabeth Street	75	590	55	50	580	70	45	5	45	55	5	55	1,630
	Gertrude Street	45	170	60	430	210	75	105	225	410	100	295	50	2,175
	Margaret Street	45	215	40	50	190	55	25	5	35	50	5	40	755
	Victoria Quay		-		35	-	225	-	260	20	275	430	-	1,245
	Beaver Creek Road	10	470	5	15	330	145	5	5	10	225	5	20	1,245
School (summer)	Helen Street	35	920	25	25	955	35	50	5	50	65	5	65	2,235
	Adelaide Street	65	935	40	40	990	65	40	5	40	65	5	65	2,355
	Elizabeth Street	45	940	30	30	1060	45	65	10	60	75	10	80	2,450
	Gertrude Street	70	210	75	615	410	145	140	345	615	145	340	70	3,180
	Margaret Street	50	270	30	50	430	75	45	5	35	50	5	75	1,120
	Victoria Quay		-		65	-	485	-	495	45	310	420	-	1,820
	Beaver Creek Road	25	555	5	40	675	275	20	10	45	130	5	25	1,810
PM (summer)	Helen Street	25	910	20	20	985	30	35	5	35	45	5	50	2,165
	Adelaide Street	55	900	45	45	940	55	45	5	40	50	5	50	2,235
	Elizabeth Street	30	850	25	25	940	35	45	10	40	55	10	60	2,125
	Gertrude Street	60	175	115	515	390	120	115	315	600	90	220	55	2,770
	Margaret Street	45	270	35	55	395	65	50	5	35	40	5	60	1,060
	Victoria Quay		-		45	-	470	-	580	35	315	390	-	1,835
	Beaver Creek Road	30	555	5	10	715	325	15	5	20	130	5	30	1,845

5.3 25-year Horizon Traffic Performance

Intersection Operation Performance

The overall intersection and individual movement performance for all peak hours in the future condition (2045), under existing traffic control and lane configurations, were determined and shown in **Table 5.2 (a)** to **(c)**. It should be noted that signal optimization was performed at the signalized intersections.

Accordingly, it is expected that the signalized intersections will still operate at an acceptable LOS during all peak hours. However, during the school and PM peak hours, the unsignalized intersections at Adelaide Street, Elizabeth Street, and Beaver Creek Road will have overall intersection capacity deficiencies. The performance of each study intersection along Highway 4 is discussed in details.

- Helen Street (signalized) – no operational issues are expected at this intersection.
- Adelaide Street (stop-controlled) – for all peak hours, due to high traffic volumes on Highway 4, it could be challenging for vehicles on Adelaide Street to turn left onto or cross Highway 4.
- Elizabeth Street (stop-controlled) – for all peak hours, due to high traffic volumes on Highway 4, it could be challenging for vehicles on Elizabeth Street to turn left onto or cross Highway 4.
- Gertrude Street (signalized) – no operational issues are expected in the AM and PM peak hours. However, the westbound approach traffic will continue to experience significant delays in the school peak.
- Margaret Street (stop-controlled) - no operational issues are expected at this intersection.
- Victoria Quay (signalized) – no operational issues are expected at this intersection.
- Beaver Creek Road / Marina Access (stop-controlled) – similar to the existing condition, the southbound approach will continue to experience delays in all peak hours.

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Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	75	590	55	720	50	560	70	680	45	5	45	95	55	5	55	115	1,610
	Delay (s / veh)	8	8	8	8	7	7	7	7	13			13	13			13	8
	LOS	A	A	A	A	A	A	A	A	B			B	B			b	A
	V/C	0.46	0.46	0.46	-	0.38	0.38	0.38	-	0.32			-	0.32			-	-
Adelaide Street (stop-controlled)	Applied Volume	40	640	35	715	35	585	40	660	30	5	30	65	45	5	45	95	1,535
	Delay (s / veh)	1	1	0	1	1	1	0	1	36			36	37			37	5
	LOS	A	A	A	A	A	A	A	A	E			E	E			E	A
	V/C	0.04	0.23	0.23	-	0.04	0.21	0.21	-	0.39			-	0.48			-	-
Elizabeth Street (stop-controlled)	Applied Volume	75	590	55	720	50	580	70	700	45	5	45	95	55	5	55	115	1,630
	Delay (s / veh)	1	1	0	1	1	1	0	1	88			88	98			98	13
	LOS	A	A	A	A	A	A	A	A	F			F	F			F	B
	V/C	0.09	0.22	0.22	-	0.06	0.23	0.23	-	0.76			-	0.85			-	-
Gertrude Street (signalized)	Applied Volume	45	170	60	275	430	210	75	715	105	225	410	740	100	295	50	445	2,175
	Delay (s / veh)	19	19	19	19	20	20	20	20	19	31	7	16	19	26	26	24	19
	LOS	B	B	B	B	B	B	B	B	B	C	A	B	B	C	C	C	B
	V/C	0.39	0.39	0.39	-	1.07	1.07	1.07	-	0.32	0.57	0.64	-	0.31	0.49	0.49	-	-
Margaret Street (stop-controlled)	Applied Volume	45	215	40	300	50	190	55	295	25	5	35	65	50	5	40	95	755
	Delay (s / veh)	0	1	0	1	0	2	0	2	14			14	15			15	4
	LOS	A	A	A	A	A	A	A	A	B			B	C			C	A
	V/C	0.04	0.09	0.09	-	0.04	0.1	0.1	-	0.14			-	0.23			-	-
Victoria Quay (signalized)	Applied Volume	-				35	-	225	260	-	260	20	280	275	430	-	705	1,245
	Delay (s / veh)					14		3	4		15	7	14	6	5		5	7
	LOS					B		A	A		B	A	B	A	A		A	A
	V/C					0.08		0.34	-		0.46	0.04	-	0.37	0.3		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	10	470	5	485	15	330	145	490	5	5	10	20	225	5	20	250	1,245
	Delay (s / veh)	8	0	0	0	9	0	9	0	16			16	145			145	34
	LOS	A	A	A	A	A	A	A	A	C			C	F			F	D
	V/C	0.01	0.3	0.3	-	0.02	0.21	0.15	-	0.06			-	1.14			-	-

TABLE 5.2 (a): Synchro Results for 25-year Horizon Condition (2045) – AM Peak

Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	35	920	25	980	25	955	35	1015	50	5	50	105	65	5	65	135	2,235
	Delay (s / veh)	8	8	8	8	7	7	7	7		16		16		17		17	9
	LOS	A	A	A	A	A	A	A	A		B		B		B		B	A
	V/C	0.52	0.52	0.52	-	0.48	0.48	0.48	-		0.39		-		0.43		-	-
Adelaide Street (stop-controlled)	Applied Volume	65	935	40	1040	40	990	65	1095	40	5	40	85	65	5	65	135	2,355
	Delay (s / veh)	2	1	0	2	1	1	0	1		520		520		853		853	69
	LOS	A	A	A	A	A	A	A	A		F		F		F		F	F
	V/C	0.11	0.32	0.32	-	0.07	0.36	0.36	-		1.73		-		2.54		-	-
Elizabeth Street (stop-controlled)	Applied Volume	45	940	30	1015	30	1060	45	1135	65	10	60	135	75	10	80	165	2,450
	Delay (s / veh)	1	1	0	1	1	1	0	1		Error *		-		Error *		-	1228
	LOS	A	A	A	A	A	A	A	A		F		F		F		F	F
	V/C	0.08	0.32	0.32	-	0.05	0.37	0.37	-		3.85		-		4.35		-	-
Gertrude Street (signalized)	Applied Volume	70	210	75	355	615	410	145	1170	140	345	615	1100	145	340	70	555	3,180
	Delay (s / veh)	20	20	20	20	60	60	60	60	44	67	21	39	100	47	47	61	48
	LOS	B	B	B	B	E	E	E	E	D	E	C	D	F	D	D	E	D
	V/C	0.41	0.41	0.41	-	1.38	1.38	1.38	-	0.61	0.86	0.86	-	0.96	0.61	0.61	-	-
Margaret Street (stop-controlled)	Applied Volume	50	270	30	350	50	430	75	555	45	5	35	85	50	5	75	130	1,120
	Delay (s / veh)	1	1	0	2	0	1	0	1		25		25		24		24	6
	LOS	A	A	A	A	A	A	A	A		C		C		C		C	A
	V/C	0.05	0.11	0.11	-	0.04	0.19	0.19	-		0.34		-		0.43		-	-
Victoria Quay (signalized)	Applied Volume	-				65	-	485	550	-	495	45	540	310	420	-	730	1,820
	Delay (s / veh)					27		21	22		22	6	21	8	4		6	15
	LOS					C		C	C		C	A	C	A	A		A	B
	V/C					0.21		0.79	-		0.7	0.07	-	0.5	0.3		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	25	555	5	585	40	675	275	990	20	10	45	75	130	5	25	160	1,810
	Delay (s / veh)	9	0	0	0	9	0	10	1		47		47		700		700	75
	LOS	A	A	A	A	A	A	A	A		E		E		F		F	F
	V/C	0.03	0.36	0.36	-	0.05	0.43	0.29	-		0.50		-		2.27		-	-

Note: when the V/C ratio is significantly over 1.00, Synchro is not able to calculate the delay.

Intersection along Highway 4 (control type)	Measure of Effectiveness	Highway 4								Intersecting Street								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Helen Street (signalized)	Applied Volume	25	910	20	955	20	985	30	1035	35	5	35	75	45	5	50	100	2,165
	Delay (s / veh)	7	7	7	7	7	7	7	7	15			15	15			15	8
	LOS	A	A	A	A	A	A	A	A	B			B	B			B	A
	V/C	0.49	0.49	0.49	-	0.48	0.48	0.48	-	0.29			-	0.35			-	-
Adelaide Street (stop-controlled)	Applied Volume	55	900	45	1000	45	940	55	1040	45	5	40	90	50	5	50	105	2,235
	Delay (s / veh)	1	1	0	1	1	1	0	1	406			406	424			424	37
	LOS	A	A	A	A	A	A	A	A	F			F	F			F	E
	V/C	0.08	0.32	0.32	-	0.07	0.34	0.34	-	1.52			-	1.60			-	-
Elizabeth Street (stop-controlled)	Applied Volume	30	850	25	905	25	940	35	1000	45	10	40	95	55	10	60	125	2,125
	Delay (s / veh)	1	1	0	1	1	1	0	1	378			378	445			445	44
	LOS	A	A	A	A	A	A	A	A	F			F	F			F	E
	V/C	0.05	0.29	0.29	-	0.04	0.32	0.32	-	1.48			-	1.69			-	-
Gertrude Street (signalized)	Applied Volume	60	175	115	350	515	390	120	1025	115	315	600	1030	90	220	55	365	2,770
	Delay (s / veh)	16	16	16	16	37	37	37	37	27	46	13	25	29	32	32	31	29
	LOS	B	B	B	B	D	D	D	D	C	D	B	C	C	C	C	C	C
	V/C	0.39	0.39	0.39	-	1.21	1.21	1.21	-	0.38	0.74	0.79	-	0.43	0.41	0.41	-	-
Margaret Street (stop-controlled)	Applied Volume	45	270	35	350	55	395	65	515	50	5	35	90	40	5	60	105	1,060
	Delay (s / veh)	0	1	0	1	1	1	0	1	24			24	21			21	5
	LOS	A	A	A	A	A	A	A	A	C			C	C			C	A
	V/C	0.05	0.11	0.11	-	0.05	0.17	0.17	-	0.34			-	0.33			-	-
Victoria Quay (signalized)	Applied Volume	-				45	-	470	515	-	580	35	615	315	390	-	705	1,835
	Delay (s / veh)					29		25	25		24	7	23	12	4		8	18
	LOS					C		C	C		C	A	C	B	A		A	B
	V/C					0.16		0.8	-		0.76	0.05	-	0.54	0.27		-	-
Beaver Creek Road / Marina Access (stop-controlled)	Applied Volume	30	555	5	590	10	715	325	1050	15	5	20	40	130	5	30	165	1,845
	Delay (s / veh)	10	0	0	1	9	0	10	0	45			45	600			600	66
	LOS	A	A	A	A	A	A	B	A	E			E	F			F	F
	V/C	0.04	0.36	0.36	-	0.01	0.46	0.34	-	0.32			-	2.07			-	-

TABLE 5.2 (c): Synchro Results for 25-year Horizon Condition (2045) – PM Peak

Queue Length Analysis

Queue length analysis was conducted to assess the capacity of the turn bays and identify the potential vehicle spillover. Average and 95th percentile queue lengths as well as the existing storage / lane lengths are provided in **Table 5.3** and the results are compared to the 2020 traffic conditions

In the AM peak, it is expected that the southbound left-turn bay at the Victoria Quay intersection will continue having storage deficiency, similar to the existing condition. In addition, the westbound left-through shared lane at the Gertrude Street intersection could spillover to the Elizabeth Street intersection. No other queuing issues were found at the study intersections.

During the school peak hour and similar to the existing condition, vehicle spillover is expected in both highway directions at the Gertrude Street and Elizabeth Street intersections. The queue will extend further to the east up to Adelaide Street and to the west up to Margaret Street and cause operational issues along the study corridor. The southbound left-turn and northbound right-turn bays at the Gertrude Street and Victoria Quay intersections will have capacity deficiencies.

In the PM peak hour, vehicle spillover was found in the westbound direction at the Gertrude Street intersection as well as capacity deficiencies for the southbound left-turn bays at the Gertrude Street and Victoria Quay intersections.

Table 5.3: SimTraffic Results for 25-year Horizon Condition (2045)

Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)	Highway 4				Side Street			
			EB		WB		NB		SB	
			LT	TR	LT	TR	L	R	L	R
Helen Street (signalized)	Storage / Lane Length (m)		80		200					
	AM	Average	21	22	28	18	12		14	
		95th %ile	36	36	52	39	22		26	
	School	Average	13	15	87	81	60		68	
		95th %ile	39	44	154	154	134		144	
	PM	Average	27	30	41	32	10		15	
		95th %ile	45	47	76	64	22		26	
Adelaide Street (stop-controlled)	Storage / Lane Length (m)		80		80					
	AM	Average	6	1	7	1	10		12	
		95th %ile	17	8	22	10	18		22	
	School	Average	7	3	**66**	**64**	94		122	
		95th %ile	23	14	**119**	**123**	156		177	
	PM	Average	13	7	22	11	27		27	
		95th %ile	30	22	56	45	55		57	
Elizabeth Street (stop-controlled)	Storage / Lane Length (m)		80		80					
	AM	Average	11	3	12	1	19		17	
		95th %ile	23	11	28	8	39		32	
	School	Average	53	50	**87**	**85**	127		150	
		95th %ile	**119**	**121**	**117**	**121**	150		172	
	PM	Average	10	5	30	12	73		80	
		95th %ile	24	16	74	50	150		177	
Gertrude Street (signalized)	Storage / Lane Length (m)		80		80			60	30	
	AM	Average	17	19	60	26	15	30	17	-
		95th %ile	30	33	**91**	51	27	50	**30**	-
	School	Average	56	57	43	43	31	**68**	**30**	-
		95th %ile	**108**	**108**	**120**	**120**	105	**74**	**37**	-
	PM	Average	22	25	78	48	32	**60**	18	-
		95th %ile	37	42	**106**	**82**	100	**86**	**31**	-
Margaret Street (stop-controlled)	Storage / Lane Length (m)		80		80					
	AM	Average	4	0	4	1	8		10	
		95th %ile	12	4	12	4	16		17	
	School	Average	44	41	2	1	56		74	
		95th %ile	**110**	**110**	10	9	142		184	
	PM	Average	7	0	4	2	12		13	
		95th %ile	20	3	13	11	22		24	

Table 5.3: (CONT.)SimTraffic Results for 25-year Horizon Condition (2045)

Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)	-		Highway 4		Victoria Quay		Highway 4	
			EB		WB		NB		SB	
			LT	TR	L	R	L	R	L	T
	Storage / Lane Length (m)		-		80		-	40	20	-
Victoria Quay (signalized)	AM	Average	-		5	14	-	3	16	18
		95th %ile			13	26	-	10	**29**	45
	School	Average	-		5	19	-	21	**25**	133
		95th %ile			17	55	-	**53**	**32**	322
	PM	Average	-		7	45	-	10	**24**	26
		95th %ile			17	76	-	33	**34**	66

Study Intersection along Highway 4 (control type)	Peak Hour	Queue Length (m)	Highway 4				Marina Access	Beaver Creek Rd
			EB		WB		NB	SB
			L	TR	L	R	LTR	LTR
	Storage / Lane Length (m)		40	-	25	30		
Beaver Creek Road / Marina Access (stop-controlled)	AM	Average	1	Free Flow	2	1	4	26
		95th %ile	5		7	4	11	42
	School	Average	1		4	1	23	28
		95th %ile	7		14	7	49	45
	PM	Average	4		1	2	16	27
		95th %ile	12		6	9	47	45

Note:

1. red color indicates lanes/bays with issues.
2. the through movements queue of the intersecting streets with turn bays are not provided.

6.0 Problem Definition

The corridor is trying to balance the competing needs in its function as a secondary highway and through route for tourist traffic to the west coast, and its role as a main street or commercial centre for the City of Port Alberni. As such, while a lot of the right-of-way is dedicated to traffic movement, there are features that often contribute to a more urban streetscape including on-street parking, reasonably wide sidewalks with boulevards and street trees.

While the corridor includes many components that contribute to a welcoming street environment, the aging infrastructure is falling behind in terms of aesthetics and maintenance. Design features could be updated to reflect best practice and a hierarchy that prioritizes the vulnerable road user including addressing the existing risk with the long crossing distances on Highway 4 and side street marked crosswalks. For cyclists, or other wheeled modes, there is no infrastructure along the study corridor which best practice would indicate requires separated facilities if the route is to be considered suitable for all ages and abilities.

Most collisions occurred due to vehicles following too closely and people driving without due care. A number of collisions were also indirectly involved with vulnerable road users, on-street parking, and driveway accesses along the corridor. Moreover, aggressive or impatient drivers might weave between lanes along the corridor to overtake stopped eastbound and westbound vehicles waiting to turn left due to the lack of turn bays, slow right turns, and/or vehicles encroaching too far from side streets to see around parked vehicles. Overall, the collision rate along the corridor significantly exceeds the provincial average for urban undivided highways and the severity is slightly above the provincial average. At Beaver Creek Road approximately two-thirds of all collisions were reported as injury which is substantially higher than the provincial average.

In terms of traffic performance, the majority of intersections operate at acceptable levels of service under existing and future conditions, but some individual intersection movements experience longer delays and queues than would be desirable. When traffic volumes along the corridor are at or around their peak, there are a number of issues that arise. The stop-controlled side streets such as Margaret, Elizabeth and Adelaide begin to experience large delays for left turning vehicles that must find a gap in the four lanes of highway traffic. Furthermore, Gertrude Street sees high volumes of westbound left turning traffic, effectively reducing the westbound direction to one through lane. Similarly, at peak times, the intersection at Beaver Creek Road sees frequent queues due to left-turning vehicles, the high traffic volumes and lack of gaps in the highway traffic.

Improvements to laning, intersection control and signal timing could be considered to address some traffic and motor vehicle safety concerns, but this must be balanced with the needs of vulnerable road users and the adjacent land uses. Geometric improvements which focus on safety improvements, enhancing facilities for vulnerable road users, and which improve the streets aesthetics are recommended for the option development phase of the study.

7.0 Option Development

Options were developed in consultation with the Ministry. In line with the problem definition, solutions are targeted at geometric improvements which focus on safety and enhancing facilities for vulnerable road users. Three options for Helen Street to Victoria Quay were developed, one option for Victoria Quay to Beaver Creek Road and two options for the intersection of Highway 4 and Beaver Creek Road. Functional plan drawings are provided in Appendix A. When reviewing functional plans consider there are many small design opportunities, changes and enhancements that could be made within options.

Class D cost estimates for the corridor and intersection options are provided in Appendix B. Cost estimates are in 2019 dollars and do not include escalation. Construction costs are broken down into core quantities and indirect or other costs have been added to determine approximate total cost. Options key risks and opportunities are undefined at this time and would need to be reviewed and costed at a future planning stage, a 10% risk allowance is included for each estimate. In addition to the risk allowance additional costs include: engineering (10%), construction administration (10%), regional recoveries (10%) and stakeholder/First Nations/Other (10%).

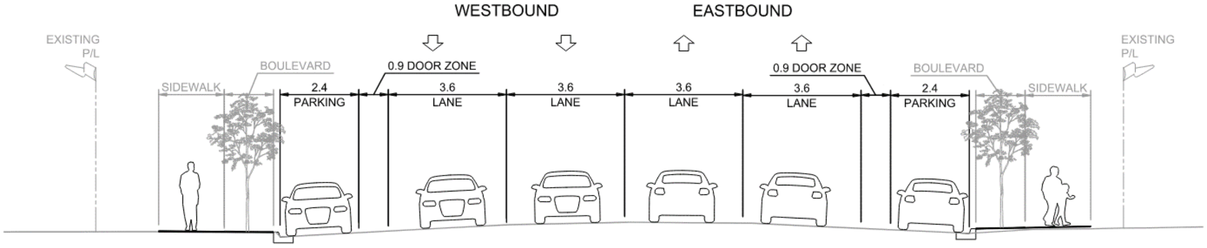
7.1 Helen Street to Victoria Quay

The three options developed for this segment each maintains the existing road right-of-way and repurposes the existing asphalt width between curbs, avoiding property purchase. Each option recommends closure of the existing driveway accesses which may require licenses to construct for private property; these would need to be confirmed at a future design stage.

Closure of the existing accesses provides opportunity for additional on-street and off-street parking spaces. It also reduces potential conflict between pedestrians / cyclists and turning vehicles. Limiting direct highway access reduces the number of conflict points thus increasing safety and increasing the walkability and main street feel of the highway segment. Access closures are common to all options and viability would need to be confirmed through discussion with the City of Port Alberni, confirmation of alternative legal access and stakeholder consultation.

7.1.1 Option 1: 4-lane section with curb bulges

Option 1 addresses elements from the defined problem of improving safety for vehicles and pedestrians and providing space to improve the streets aesthetics.



TYPICAL SECTION A-A

Option 1 maintains existing laning of a 4-lane cross-section, two westbound lanes and two eastbound lanes. At each intersection curb bulges/extensions are introduced to minimize pedestrian crossing distances of Highway 4 and side streets. The curb bulges also formalize on-street parking extents and minimize parking and turning conflicts at intersections. Curb bulges provide opportunity for enhanced landscaping and hardscaping and street furniture at intersections.

Similar to existing, cyclists are not accommodated in a separate facility, rather they need to share the through lane as the lane width and adjacent door zone for parking is too narrow to accommodate a separate space for cyclists.

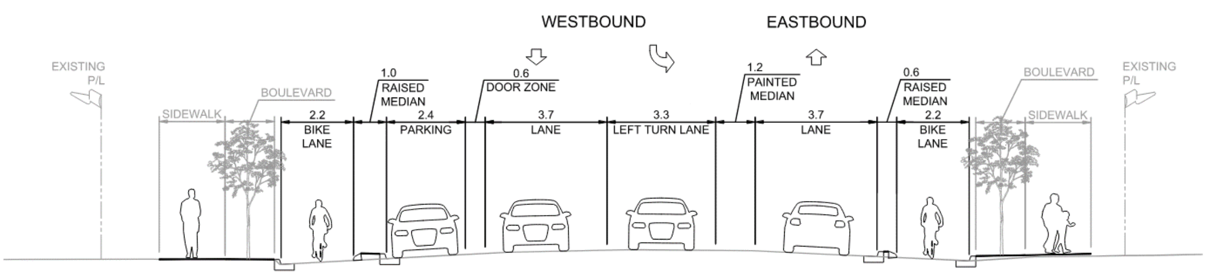
The target design vehicle was a WB-20 for turning paths at the intersections. For core highway movements, turns from Highway 4 to Victoria Quay, a WB-20 is accommodated. Some movements onto or from side streets only accommodate an IBUS or WB-15 as indicated on the concept plan. In these cases a WB-20 can be accommodated with over tracking; these limitations would need to be confirmed in a future design stage.

The approximate construction cost with a 40% contingency is $2.8M and a total cost of $4.2M. Note for this option these costs include replacement of existing curb and gutters and repaving Highway 4. These are high cost items that could be considered optional as curbs are in the same location (with the exception of removals and replacements for curb bulges) and pavement markings are in the same location. If existing curbs and pavement markings were maintained the construction cost would be approximately $1.6M and a total cost of $2.4M.

Overall this option has minimal changes to the flow and function of Highway 4 but improves safety and crossings for vulnerable users. This option could be staged to Option 3.

7.1.2 Option 2: 3-lane section with protected bike lanes

Option 2 addresses the defined problem of improving safety for vehicles and pedestrians, enhancing facilities for vulnerable road users and providing space to improve the streets aesthetics.



TYPICAL SECTION A-A

Option 2 modifies laning to a 3-lane cross-section, with two westbound lanes from Helen Street to Gertrude Street and one eastbound lane. The inside westbound lane at Gertrude would be a left-turn lane, as approximated traffic volumes indicate balanced left-turning traffic and through traffic. Dedicating it as a turn lane will minimize weave conflicts for drivers continuing westbound on Highway 4 and provide more queue storage in peak hours by removing through traffic from the left turn lane.

West of Gertrude the 3-lane cross-section is shown as one westbound lane and one eastbound lane with left-turn lanes for Victoria Quay and Margaret Street. Traffic analysis was not completed as current traffic data is unavailable, specific laning, turn movement and storage lengths would need to be confirmed and the design adjusted to best accommodate peak period volumes.

With confirmation of the laning, consideration should be given for location of the existing road crown compared to lane markings and wheel paths. It is not a significant concern with the slower speeds and urban nature of the segment, but a consideration for future design stage.

Similar to Option 1, curb bulges/extensions are introduced at intersections to minimize pedestrian crossing distances of Highway 4 and side streets. Curb bulges are smaller than Option 1 and of different geometry as they also protect the bike lane. Pedestrians would cross the bike lane to the curb bulge, then the vehicle traffic lanes. Curb bulges provide opportunity for enhanced landscaping and hardscaping and street furniture at intersections.

This option provides the safest facility type for cyclists, including protected bike lanes with raised concrete median islands separating cyclists from traffic on the south side, and from parked vehicles with a suitable door zone on the north side. The facility is suitable for all ages and abilities of cyclist and is the most likely to enable the cyclists who are interested in cycling more but concerned for their safety. Because cyclists are confined to the right side of the roadway, any cyclists wishing to turn left cannot access the vehicle left turn lane and must make a two-stage left turn, by proceeding through the eastbound or westbound stop line, and waiting in front of the northbound or southbound through lane in a designated bike left turn box in front of the vehicle stop line.

On the north side there is one transit stop which will be located on a floating island with raised crossing over the bike lane. On the south side there is no space for a floating island, and thus any bus passengers must board and alight from the bike lane which would be elevated to sidewalk level at this point, cyclists would be required to yield to passengers boarding and alighting. An alternative treatment would be to redirect the bike lane into the boulevard space and include a small landing area to reduce conflicts.

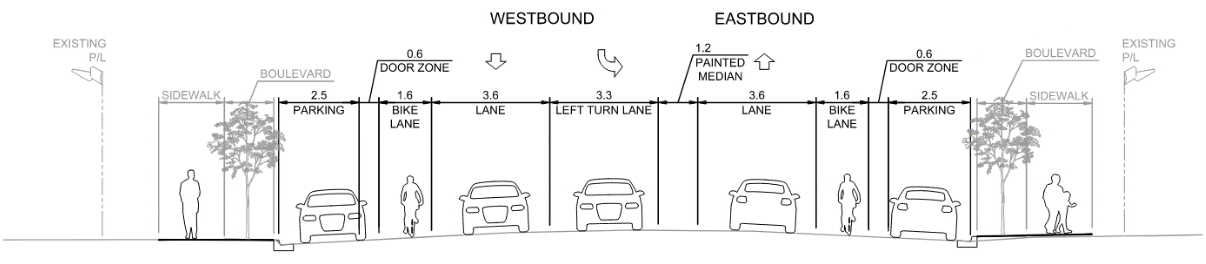
To accommodate the protected bike lanes, the south side on-street parking was removed but the north side on-street parking was maintained. The removal of accesses allowed for additional on-street parking on the north side and provides more opportunity for off-street parking on both sides.

The target design vehicle was a WB-20 for turning paths at the intersections. For core highway movements, turns from Highway 4 to Victoria Quay, a WB-20 is accommodated. Some movements onto or from side streets only accommodate an IBUS or WB-15 as indicated on the concept plan. In some cases, a WB-20 or WB-15 can be accommodated with over tracking; these limitations would need to be confirmed in a future design stage. In general, turning movements are more constrained to/from side streets than Option 1.

The approximate construction cost with a 40% contingency is $3.3M and a total cost of $4.9M.

7.1.3 Option 3: 3-lane section with shoulder bike lanes

Option 3 addresses the defined problem of improving safety for vehicles and pedestrians, providing facilities for vulnerable road users and providing space to improve the streets aesthetics.



TYPICAL SECTION A-A

Option 3 can be built off Option 1 and implemented at a later stage if desired. Option 3 shares the same curb lines as Option 1 and therefore the same drainage infrastructure.

Option 3 modifies laning to a 3-lane cross-section, with two westbound lanes from Helen Street to Gertrude Street and one eastbound lane. The inside westbound lane at Gertrude would be a left-turn lane, as approximated traffic volumes indicate balanced left-turning traffic and through traffic. Dedicating it as a turn lane will minimize weave conflicts for drivers continuing westbound on Highway 4 and provide more queue storage in peak hours. West of Gertrude the 3-lane cross-section is shown as one westbound lane and one eastbound lane with left-turn lanes for Victoria Quay and Margaret Street. Traffic analysis was not completed as current traffic data is unavailable, specific laning, turn movement and storage lengths would need to be confirmed and design adjusted to suit.

With confirmation of the laning, consideration should be given for location of the existing road crown compared to lane markings and wheel paths. It is not a significant concern with the slower speeds and urban nature of the segment, but a consideration for future design stage.

Similar to Option 1 curb bulges/extensions are introduced at intersections to minimize pedestrian crossing distances of Highway 4 and side streets. Curb bulges provide opportunity for enhanced landscaping and hardscaping and street furniture at intersections.

This option includes painted bike lanes on the highway which maintain a suitable distance from parked vehicles to allow for a door zone. Due to the lack of protection and crossing movements to access parking, the volume and possibly speed of traffic on the highway, this facility type cannot be considered suitable for all ages and abilities, rather it provides a better facility than at present for existing and relatively confident cyclists. It is unlikely to attract new cyclists or those classified as 'interested but concerned'. In this option, while cyclists are not confined to the right side by a physical barrier, many will not be willing to weave across busy traffic lanes to access the vehicle left turn lane. Like option 2, this option provides left turn bike boxes to allow cyclists to make a two-stage left turn if they wish.

Transit stops in this option are designed with a floating island, requiring the bus to stop in-lane, and allowing cyclists to pass behind the stop avoiding conflict with traffic in the general travel lanes when a bus is stopped.

With the addition of the shoulder bike lanes both the north and south side on-street parking was maintained. The removal of accesses allowed for additional on-street parking on and provides more opportunity for off-street parking.

The target design vehicle was a WB-20 for turning paths at the intersections. For core highway movements, turns from Highway 4 to Victoria Quay, a WB-20 is accommodated for the right-turn where an IBUS was accommodated for the left-turn (a WB-20 can be accommodated with over tracking). Some movements onto or from side streets only accommodate an IBUS or WB-15 as indicated on the concept plan. In some cases, a larger vehicle can be accommodated with over tracking; these limitations would need to be confirmed in a future design stage. In general, turning movements are more constrained to/from side streets than Option 1.

The approximate construction cost with a 40% contingency is $2.9M and a total cost of $4.4M.

7.2 Victoria Quay to Beaver Creek Road

No significant changes are proposed to the segment between Victoria Quay and Beaver Creek Road as the segment is constrained by the Kitsuksis Creek Bridge including the left-turn bay at Victoria Quay and Beaver Creek Road intersection geometry. The Kitsuksis Creek Bridge has one westbound lane and one eastbound lane with minimal sidewalks on both sides. When Kitsuksis Creek Bridge is scheduled for rehabilitation or replacement, cross-section improvements to improve active transportation road users should be considered.

Options 2 and 3 for Helen Street to Victoria Quay include a new bike path from the Victoria Quay north crosswalk to the existing pathway within Port Alberni's waterfront park. It should be noted there are signal poles, utility poles and landscaping that may be impacted in this location. However, the connection allows pedestrians and cyclists a more direct connection to the boardwalk and separated crossing of the Kitsuksis Creek. On the west side of Kitsuksis Creek a new multi-use path is proposed for active transportation continuity west of the Beaver Creek intersection.

Consideration could be given to remove the unsignalized one-way skewed intersection to Victoria Quay just north of the signalized intersection. Alternative access is available via Margaret Street and Burke Road. A cul-de-sac turnaround could be created at the marina parking lot to close access to Highway 4 and provide turnaround facilities for maintenance vehicles. Repurposing the space would provide opportunities for landscaping enhancement. Removing the skewed intersection would improve function and clarity for road users and improve safety by removing pedestrian and vehicle conflict points.

7.3 Highway 4 and Beaver Creek Road Intersection

A roundabout and signal option was developed for the Beaver Creek intersection. Each utilize the existing road right-of-way with minor widening and property acquisition required from the north east side of the intersection. Both options include retaining walls to minimize impact to the existing marina parking lot. Both options maintain access to the gas station and modify access to the marina. Access to the marina property does not consider future development potential.

Pedestrian and cyclist accommodation for both options share a common feature of a new multi-use path proposed for the south edge of Highway 4 between the highway and marina which formalizes an existing dirt pathway and connects to the existing wood boardwalk across Kitsuksis Creek.

7.3.1 Roundabout Option

The Highway 4 and Beaver Creek Road roundabout option requires reconstruction of the intersection that will impact the off leash dog park more significantly than the signalized intersection option. Property impacts are encountered on the northeast corner of the intersection on two properties and on the south side of Highway 4 in order to incorporate a 3.0m multi-user path.

Both Highway 4 and Beaver Creek Road maintain the existing crown with a mill and fill pavement approach for three legs of the intersection. As the profile raises vertically for the design of the roundabout, a pavement removal with well graded base leveling course is assumed. Roadway widths increase from the existing, therefore existing curb and gutter of varying condition was assumed to be replaced with new sidewalks or multi-user paths adjacent. In order to minimize cross-sectional property impacts, boulevards were not incorporated. Incorporating a boulevard separating the sidewalks and multi-user paths would improve the pedestrian and cyclists experience, providing separation and reducing the likelihood of anyone walking or cycling close to the curb (and passing vehicles) on these facilities, however it would have an increased property impact.

The roundabout design vehicle for turning movements is a WB-20. Due to the acute angle between Highway 4 and Beaver Creek Road, the southbound right turn movement would require the WB-20 to enter and circulate around the roundabout in order to head west. The Highway 4 east/west through movements can be designed to accommodate oversize (OS-OW) vehicles during future design stages once specific oversize requirements are confirmed. On other provincial highway roundabouts, this has been accommodated with modifying the shape of the centre island and increasing the truck apron and allowing OS-OW vehicles to move counterflow through the roundabout with traffic control measures.

The approximate construction cost with a 40% contingency is \$5.3M and a total cost of \$8.0M.

25-year Horizon Traffic Performance (SIDRA)

SIDRA analysis, in the 25-year horizon (2045), was completed for the Highway 4 and Beaver Creek Road roundabout. The analysis determined a single lane roundabout operates well (LOS A) for all approaches during the 2045 AM, School and PM Peak hours. The longest 95th percentile queue length at the intersection was noted for the westbound approach with 52m. Analysis summary results are provided in Table 7.1.

Traffic volumes from Section 5.2 of this report were estimated and limited existing data suggests current traffic volumes be obtained and the analysis re-run to confirm output results. Secondly, the future traffic volumes do not consider redevelopment of the marina lands to alternate use.

7.3.2 Signal Option

The Highway 4 and Beaver Creek Road signalization upgrades the functionality of the intersection while minimizing impacts to the surrounding properties. Property impacts are encountered on the northeast corner of the intersection in order to realign Beaver Creek Road and on the south side of Highway 4 to incorporate a 3.0m multi-user path. In order to minimize the property impacts on the south side of Highway 4, retaining walls have been incorporated into the design.

Both Highway 4 and Beaver Creek Road maintain the existing crown with a mill and fill pavement approach. Minor widening of the road surface is required therefore reducing the amount of required full depth pavement structure. Existing curb and gutter of varying condition was assumed to be replaced with new sidewalks or multi-user paths adjacent. With a goal of this design to minimize property impacts, boulevards were not incorporated. Incorporating a boulevard separating the sidewalks and multi-user paths would improve the pedestrian and cyclists experience by adding separation and reducing the likelihood of anyone walking or cycling close to the curb (and passing vehicles) on these facilities, however would have an increased property impact.

The intersection design vehicle for turning movements is primarily an IBUS however accommodates a WB-20 with over-tracking. The east/west Highway 4 through movements can accommodate oversize vehicles however confirmation of specific oversize requirements should be confirmed during the detailed design stage.

The approximate construction cost with a 40% contingency is $4.1M and a total cost of $6.1M.

25-year Horizon Traffic Performance (Synchro)

Synchro analysis, in the 25-year horizon (2045), was completed for the Highway 4 and Beaver Creek Road signal. The analysis determined a signalized intersection operates well (LOS B) for all approaches during the 2045 AM, School and PM Peak hours. The longest 95th percentile queue length at the intersection was noted for the westbound approach with 60m. Analysis summary results are provided in Table 7.2.

Traffic volumes from Section 5.2 of this report were estimated and limited existing data suggests current traffic volumes be obtained and the analysis re-run to confirm output results. Secondly, the future traffic volumes do not consider redevelopment of the marina lands to alternate use.

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Table 7.1: Highway 4 and Beaver Creek Roundabout SIDRA Analysis (2045)
Port Alberni Corridor - MoTI Highway 4 at Beaver Creek Road

Horizon Year	Scenario	MOE	APPROACH																Intersection OVERALL
			Eastbound				Westbound				Northbound				Southbound				
			EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
Available Storage / Lane Length (Metres)																			
2045	AM PEAK	Applied Volume	10	470	-	480	-	330	145	475	-	-	-	0	225	-	20	245	1200
		Delay (s / veh)	9	3	-	4	-	6	3	5	-	-	-	-	4	-	5	4	4
		LOS	A	A	-	A	-	A	A	A	-	-	-	-	A	-	A	A	A
		95th %ile Queue (m)	17	17	-	-	-	11	11	-	-	-	-	-	8	-	8	-	-
	SCHOOL PEAK	Applied Volume	25	555	-	580	-	675	275	950	-	-	-	0	130	-	25	155	1685
		Delay (s / veh)	9	3	-	3	-	7	3	5	-	-	-	-	6	-	7	6	5
		LOS	A	A	-	A	-	A	A	A	-	-	-	-	A	-	A	A	A
		95th %ile Queue (m)	39	39	-	-	-	22	22	-	-	-	-	-	8	-	8	-	-
	PM PEAK	Applied Volume	30	555	-	585	-	715	325	1040	-	-	-	0	130	-	30	160	1785
		Delay (s / veh)	9	3	-	3	-	7	3	5	-	-	-	-	7	-	7	7	5
		LOS	A	A	-	A	-	A	A	A	-	-	-	-	A	-	A	A	A
		95th %ile Queue (m)	23	23	-	-	-	52	52	-	-	-	-	-	9	-	9	-	-

Notes:
- Traffic volumes were extracted from the *Hwy 4 Port Alberni Corridor Study Report - DRAFT* (February 2020)
- Estimated 5 pedestrians crossing each leg during the AM peak hour, and 10 pedestrians during the School and PM peak hours.
- Assumed 1% Heavy Vehicles and 1% Large Trucks for all movements.

Table 7.2: Highway 4 and Beaver Creek Signal Synchro Analysis (2045)
Hwy 4 Port Alberni Corridor Study
BC Ministry of Transportation and Infrastructure

AM Peak

Option	Measure of Effectiveness	Highway 4								Beaver Creek Road / Marina Access								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
	Storage / Lane Length (m)	40				45		40										
Install signal Permissive Left-turn phase for Highway 4 Actuated Uncoordinated No crosswalk on west approach (similar to existing)	Applied Volume	10	470	5	485	15	330	145	490	5	5	10	20	225	5	20	250	1,245
	Delay (s / veh)	9	15	15	15	10	12	12	12		9		9		19		19	15
	LOS	A	B	B	B	A	B	A	B		A		A		B		B	B
	V/C	0.03	0.65	0.65	-	0.06	0.45	0.45	-		0.04		-		0.60		-	-
	Average Queue (m)	2	30		-	2	20	1	-		3		-		23		-	-
	95th percentile Queue (m)	7	51		-	9	37	4	-		10		-		38		-	-
Do Nothing (stop-controlled)	Delay (s / veh)	8	0	0	0	9	0	9	0		16		16		145		145	34
	LOS	A	A	A	A	A	A	A	A		C		C		F		F	D
	V/C	0.01	0.30	0.30	-	0.02	0.21	0.15	-		0.06		-		1.14		-	-
	Average Queue (m)	1	1		-	2	0	1	-		4		-		26		-	-
	95th percentile Queue (m)	5	5		-	7	4	4	-		11		-		42		-	-

Note: westbound right-turn movement is channelized with yield sign and its performance is not affected by the intersection control type.

School Peak

Option	Measure of Effectiveness	Highway 4								Beaver Creek Road / Marina Access								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
	Storage / Lane Length (m)	40				45		40										
Install signal Permissive Left-turn phase for Highway 4 Actuated Uncoordinated No crosswalk on west approach (similar to existing)	Applied Volume	25	555	5	585	40	675	275	990	20	10	45	75	130	5	25	160	1,810
	Delay (s / veh)	7	10	10	10	7	13	10	12		11		11		26		26	13
	LOS	A	B	B	B	A	B	A	B		B		B		C		C	B
	V/C	0.10	0.57	0.57	-	0.12	0.69	0.69	-		0.21		-		0.56		-	-
	Average Queue (m)	4	31		-	5	39	5	-		9		-		21		-	-
	95th percentile Queue (m)	13	53		-	13	59	29	-		19		-		38		-	-
Do Nothing (stop-controlled)	Delay (s / veh)	9	0	0	0	9	0	10	1		47		47		700		700	75
	LOS	A	A	A	A	A	A	A	A		E		E		F		F	F
	V/C	0.03	0.36	0.36	-	0.05	0.43	0.29	-		0.50		-		2.27		-	-
	Average Queue (m)	3	1		-	4	2		-		10		-		30		-	-
	95th percentile Queue (m)	10	8		-	12	9		-		20		-		47		-	-

Note: westbound right-turn movement is channelized with yield sign and its performance is not affected by the intersection control type.

PM Peak

Option	Measure of Effectiveness	Highway 4								Beaver Creek Road / Marina Access								Intersection OVERALL
		Eastbound				Westbound				Northbound				Southbound				
		EBL	EBT	EBR	Total	WBL	WBT	WBR	Total	NBL	NBT	NBR	Total	SBL	SBT	SBR	Total	
	Storage / Lane Length (m)	40				45		40										
Install signal Permissive Left-turn phase for Highway 4 Actuated Uncoordinated No crosswalk on west approach (similar to existing)	Applied Volume	30	555	5	590	10	715	325	1050	15	5	20	40	130	5	30	165	1,845
	Delay (s / veh)	8	10	10	10	6	14	14	14		13		13		25		25	14
	LOS	A	B	B	B	A	B	B	B		B		B		C		C	B
	V/C	0.14	0.56	0.56	-	0.03	0.72	0.72	-		0.12		-		0.55		-	-
	Average Queue (m)	6	30		-	1	41	4	-		6		-		21		-	-
	95th percentile Queue (m)	14	52		-	7	60	20	-		14		-		38		-	-
Do Nothing (stop-controlled)	Delay (s / veh)	10	0	0	1	9	0	10	0		45		45		600		600	66
	LOS	A	A	A	A	A	A	B	A		E		E		F		F	F
	V/C	0.04	0.36	0.36	-	0.01	0.46	0.34	-		0.32		-		2.07		-	-
	Average Queue (m)	4	1		-	1	3	2	-		7		-		27		-	-
	95th percentile Queue (m)	12	8		-	6	15	9	-		16				45			

Note: westbound right-turn movement is channelized with yield sign and its performance is not affected by the intersection control type

8.0 Multiple Account Evaluation

A high level qualitative multiple account evaluation (MAE) is contained in the below tables. The approach does not score or rank options against each other rather it provides descriptions of how the option addresses the evaluation criteria.

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Evaluation Criteria	Existing (Base Case)	Option 1 4 lane cross section with curb bulges	Option 2 3 lane cross section with protected bike lanes	Option 3 3 lane cross section with shoulder bike lanes
Highway Function	Supports highway through traffic and access to Port Alberni community	Supports highway through traffic and access to Port Alberni community	Balances corridor needs between through traffic and active transportation modes. Supports highway function, vehicle capacity to be confirmed.	Balances corridor needs between through traffic and active transportation modes. Supports highway function, vehicle capacity to be confirmed.
"Main Street" Function	Space primarily dedicated to vehicles, on-street parking supports business but adjacent land use also heavily biased to vehicles with frontage (off-street) parking in many locations.	Curb extensions can somewhat help reduce vehicle space, and provide opportunities for landscaping and beautification. But space still primarily dedicated to vehicles. Potentially closes driveways reducing disruption to pedestrians, but the presence of frontage (off-street) parking still somewhat detracts from the main-street potential.	Reduces vehicle space in favour of protected bicycle facilities, and closes driveways reducing disruption to pedestrians, the presence of frontage (off-street) parking still somewhat detracts from the main-street potential.	Reduces vehicle space in favour of bicycle lanes and curb extensions. Curb extensions can somewhat help reduce vehicle space, and provide opportunities for landscaping and beautification. Potentially closes driveways reducing disruption to pedestrians, but the presence of frontage (off-street) parking still somewhat detracts from the main-street potential.
Vehicle Capacity	4-lane cross-section with no dedicated turn-bays. Left turn volumes impact through capacity of left lane. i.e., essentially one through lane and one turn lane at Gertrude.	Existing 4-lane cross section maintained. Potential for increased capacity throughput with laning modifications, i.e., restricting some left turns to improve through capacity.	Theoretical reduction of vehicle capacity with 3-lane cross-section. Impacts to be confirmed with updated traffic analysis.	Theoretical reduction of vehicle capacity with 3-lane cross-section. Impacts to be confirmed with updated traffic analysis.
Collision Reduction	Collisions exceed provincial averages for frequency and severity. Majority of collisions are rear-end and are at intersections.	If pedestrian signals are implemented at collector cross streets it would provide priority for pedestrians and likely reduce rear-end collisions.	If pedestrian signals are implemented at collector cross streets it would provide priority for pedestrians and likely reduce rear-end collisions. The change to dedicated turn lanes may reduce	If pedestrian signals are implemented at collector cross streets it would provide priority for pedestrians and likely reduce rear-end collisions. The change to dedicated turn lanes may reduce

Evaluation Criteria	Existing (Base Case)	Option 1 4 lane cross section with curb bulges	Option 2 3 lane cross section with protected bike lanes	Option 3 3 lane cross section with shoulder bike lanes
			weaving and collision potential.	weaving and collision potential.
Access and Parking	There are 5 existing accesses on the north side and 3 on the south side. There are 32 parking stalls on the north side and 27 on the south side.	All accesses are proposed to be closed, will require detailed property review and stakeholder consultation. There are 36 parking stalls on the north side and 33 on the south side. Closing accesses provides opportunities for more on-street and off-street parking.	All accesses are proposed to be closed, will require detailed property review and stakeholder consultation. There are 32 parking stalls on the north side. Parking is removed on the south side. Closing accesses provides opportunities for more on-street and off-street parking.	All accesses are proposed to be closed, will require detailed property review and stakeholder consultation. There are 37 parking stalls on the north side and 32 on the south side. Closing accesses provides opportunities for more on-street and off-street parking.
Pedestrian	Very long pedestrian crossings (6 lanes and 21m on Highway 4 and side roads.	Minimize crossing distance with addition of curb bulges. Crossing 4-lanes of traffic (16m).	Minimize crossing distance with addition of curb bulges. Crossing 3-lanes of traffic and protected cycle lanes. 15m crossing vehicle lanes. Potential conflict with cyclists and pedestrians.	Minimize crossing distance with addition of curb bulges. Crossing 3-lanes of traffic and bike lanes (16.4m). Vehicles may use bike lane to make right turn bypassing queuing traffic in through lane.
Cyclist	No separate cyclist accommodation. Cyclists share the vehicle lanes. Wide lane widths are too narrow for shared use and a parking door zone, i.e., cyclists would have to ride in the vehicle path to avoid the door zone.	No separate cyclist accommodation. Cyclists share the vehicle lanes. Regular lane widths require cyclists to ride in the vehicle path to avoid the door zone.	Cyclists of all ages and abilities accommodated with protected bike lanes. Left turn boxes provided to allow two-stage left-turns from highway to connecting streets.	Confident cyclists accommodated with painted bike lanes (with door zone from parked vehicles). Left turn boxes provided to allow two-stage left-turns from highway to connecting streets.

Evaluation Criteria	Existing (Base Case)	Option 1 4 lane cross section with curb bulges	Option 2 3 lane cross section with protected bike lanes	Option 3 3 lane cross section with shoulder bike lanes
Aesthetics	Streetscaping includes aging sidewalks, paved boulevards, street trees, concrete planters, and some patios taking over the sidewalk.	Opportunities to enhance landscaping and streetscape on curb bulges.	Opportunities to enhance hardscaping, less landscaping opportunity than option 1.	Opportunities to enhance landscaping and streetscape on curb bulges.
Maintenance	No raised existing maintenance concerns. Site visit identified some issues with uneven sidewalks and street trees outgrowing the soil volume. Some sections of roadway recently repaired.	Minor increased maintenance compared to existing with additional catch basins added at curb bulges. Increased upkeep of landscaping elements if included.	May require new maintenance equipment to sweep and plow protected bike lanes (width is 2.2m). May require maintenance agreement with Port Alberni for bike boxes and elephants feet pavement markings.	May require maintenance agreement with Port Alberni for bike boxes and elephants feet pavement markings. Increased upkeep of landscaping elements if included.
Construction Cost **Total Cost (excluding property)**		**$2.8M** **$4.2M**	**$3.3M** **$4.9M**	**$2.9M** **$4.4M**

Evaluation Criteria	Existing Unsignalized Intersection (Base Case)	Roundabout Option	Signalized Option
Highway Function	Supports highway through traffic. Beaver Creek turning movements operate at poor levels of service.	Supports highway through traffic and access to Port Alberni community with improved priority to/from Beaver Creek Road.	Supports highway through traffic and access to Port Alberni community with improved connectivity to Beaver Creek Road..
Intersection Operation (2045 Horizon) **traffic analysis to be confirmed upon receipt of current traffic volumes**	Overall Intersection LOS F Highway Movements LOS A or B Beaver Creek Movements LOS E or F	Overall Intersection LOS A Highway Movements LOS A Beaver Creek Movements LOS A	Overall Intersection LOS B Highway Movements LOS A or B Beaver Creek Movements LOS B or C
Collision Reduction	Collisions exceed provincial averages for frequency and severity. Left-turn crossing was the predominant collision type with almost ¾ of those collisions involving southbound left-turn and westbound vehicles.	Roundabouts typically improve safety by reducing conflict points and minimizing conflict severity often to low speed side-impact collisions.	Traffic signals will improve safety for turning traffic, but could increase rear-end collisions for highway traffic.
Access	Provides 2 accesses to the marina parking lot and 2 accesses to the gas station.	Maintains the west access to the marina parking lot and adds a new right-in/right-out access east of the roundabout. Maintains the 2 accesses to the gas station.	Consolidates marina access into 4th leg of the proposed signal and closes existing accesses. Requires significant rework of marina parking lot. Maintains the 2 accesses to the gas station.
Property	Adjacent properties include a marina parking lot, gas station, and ball fields.	Property impacts to marina parking lot, ball fields, and lot adjacent the ball field. Approx.. 2200 m^2	Property impacts to marina parking lot and ball fields. Approx.. 1100 m^2

Evaluation Criteria	Existing Unsignalized Intersection (Base Case)	Roundabout Option	Signalized Option
Pedestrian	Sidewalks on the north side of highway, Beaver Creek Road and pathway to Marina parking lot. Crosswalks are inaccessible for disabled (ie. stairs, no letdowns).	Provides continuous sidewalks with shoulder bike lanes or a multi-use path.	Provides continuous sidewalks or a multi-use path.
Cyclist	Cyclists required to share road with vehicles.	Shoulder bike lanes provided with access to MUP to navigate roundabout, or MUP provided.	Cyclists required to share road with vehicles or use MUP and cross Highway 4 via zebra crossing at west end. (Note: design could be updated to include shoulder bike lanes however constrained at the bridge structure).
Aesthetics		Opportunities to enhance landscaping and entrance to Port Alberni with roundabout gateway feature.	Minimal opportunity to improve. Traffic signals may be deemed a detriment to aesthetics.
Maintenance	No raised existing maintenance concerns.	May require maintenance agreement with Port Alberni for centre landscaping and elephants feet pavement markings.	New signal will require ongoing maintenance.
Constructability	Not applicable	Requires widening, some fill on the north east corner and construction of new retaining walls.	Requires widening, some fill and culvert extension on the north east corner and construction of new retaining walls.
Construction Cost **Total Cost (excluding property)**		**$5.3M** **$8.0M**	**$4.1M** **$6.1M**

9.0 Conclusion and Next Steps

Highway 4 as a secondary highway in the provincial transportation system purpose is to serve inter/intra provincial travel and connect urban areas. Highway 4 through Port Alberni is the last urban community prior to the final destinations of Tofino or Ucluet for most tourists and passerby's. Improving the main street feel of Highway 4, specifically from Helen Street to Victoria Quay, is supported by most background studies and recent undertakings by the City of Port Alberni.

The overall segment is approximately 550m in length and includes three signalized intersections and three unsignalized intersections. Both sides of Highway 4 are flanked with local businesses and retail outfits. The defined problem included improvements to the above average collision frequency and severity, enhancing facilities for vulnerable road users and improving aesthetics which will encourage passerby's to stop and contribute to the City's economy.

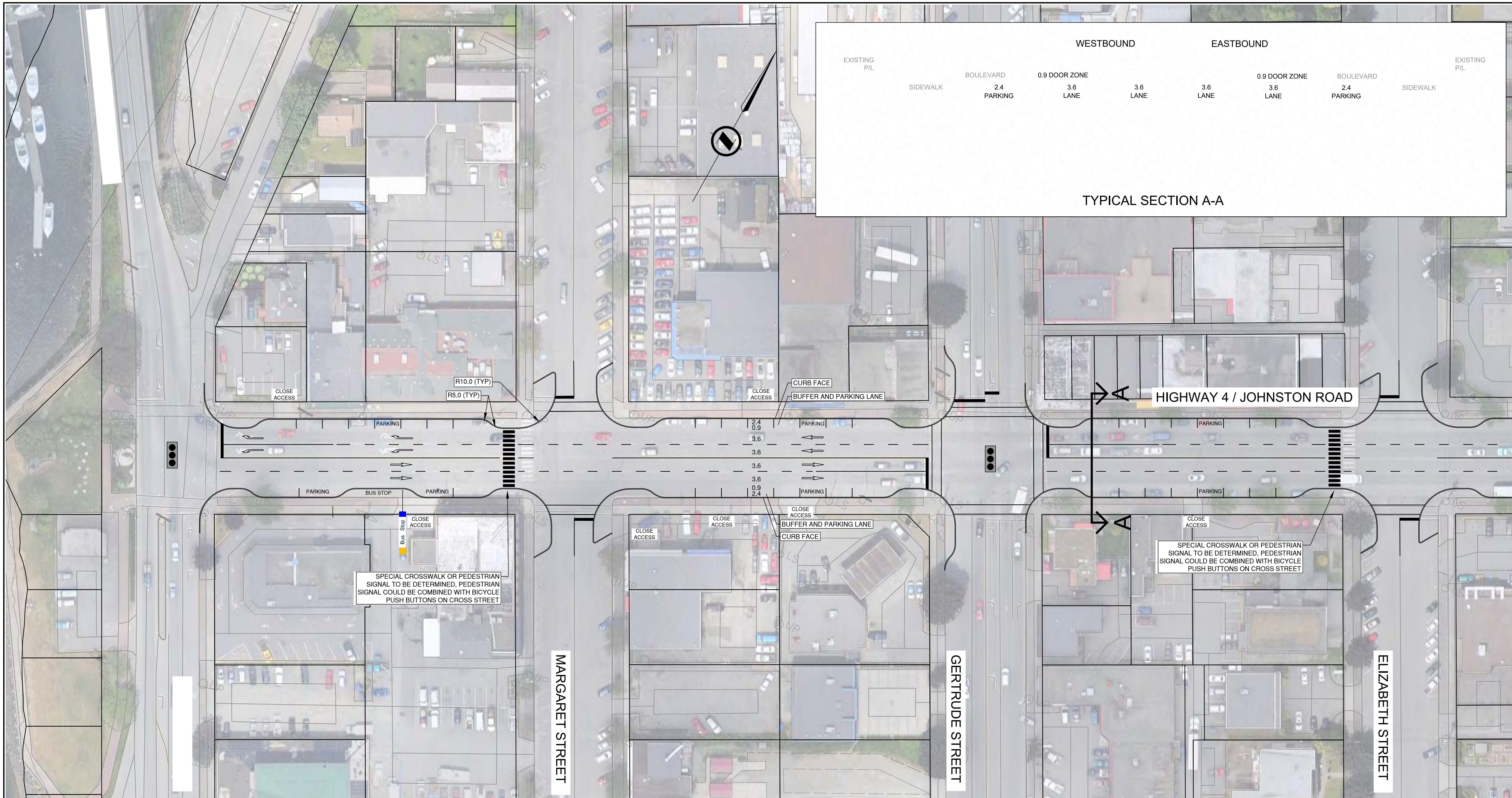
Three corridor options were developed that address the problem to various extents. Key items to confirm prior to option selection include:

- Confirmation and review of the defined problem with the City of Port Alberni.
- Confirmation and review of the City's long-term bicycle network plans.
- Acquisition of updated traffic counts including turning movements to confirm existing traffic analysis and complete future traffic analysis to confirm proposed laning and geometrics operation.
- Consideration of options and features within each option to refine concepts and cost estimates.
- Update of the concepts, MAE and cost estimates to reflect changes from the traffic analysis.

The intersection of Beaver Creek Road has been identified for improvement for numerous years. Turning movements to and from Beaver Creek Road operate at a failing level of service and the intersection sees a high collision rate and it exceeds the provincial average for collision severity. Two options were developed, a signal and a single-lane roundabout. Both options achieve acceptable operational level of service. The roundabout provides more opportunity for improved aesthetics and to include an entrance feature to Port Alberni. It is recommended both options designs be advanced to reduce contingency on the cost estimates and confirm with the Ministry and City of Port Alberni future development plans for the marina property and take the development access into consideration.

APPENDIX
Functional Plan Drawings

A

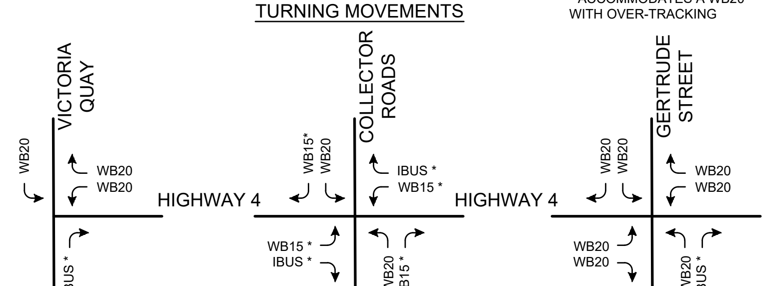


CONSIDERATION CAN BE GIVEN FOR LEAVING PARALLEL PARKING STALLS UNMARKED IN THE EFFORTS TO INCREASE FUNCTIONAL PARKING CAPACITY. ACCESS CLOSURES TO BE CONFIRMED DURING FUTURE DESIGN STAGES

BUS STOP CONFIGURATION BASED ON BC TRANSIT INFRASTRUCTURE DESIGN

INTERSECTION TURNING MOVEMENTS

NOTE:
* ACCOMMODATES A WB20 WITH OVER-TRACKING



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SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

SCALE 0 5 1:500 25m

CAD FILENAME HWY 4 OPTION 1.DWG
PLOT DATE 2020-03-20

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FUNCTIONAL PLAN
HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 1

SENIOR DESIGNER
DATE

DESIGNED R. CHANG DATE 2020-03-20
QUALITY CONTROL R.SYMONS DATE 2020-03-20
QUALITY ASSURANCE A. PELLAM DATE 2020-03-20
DRAWN R. CHANG DATE 2020-03-20

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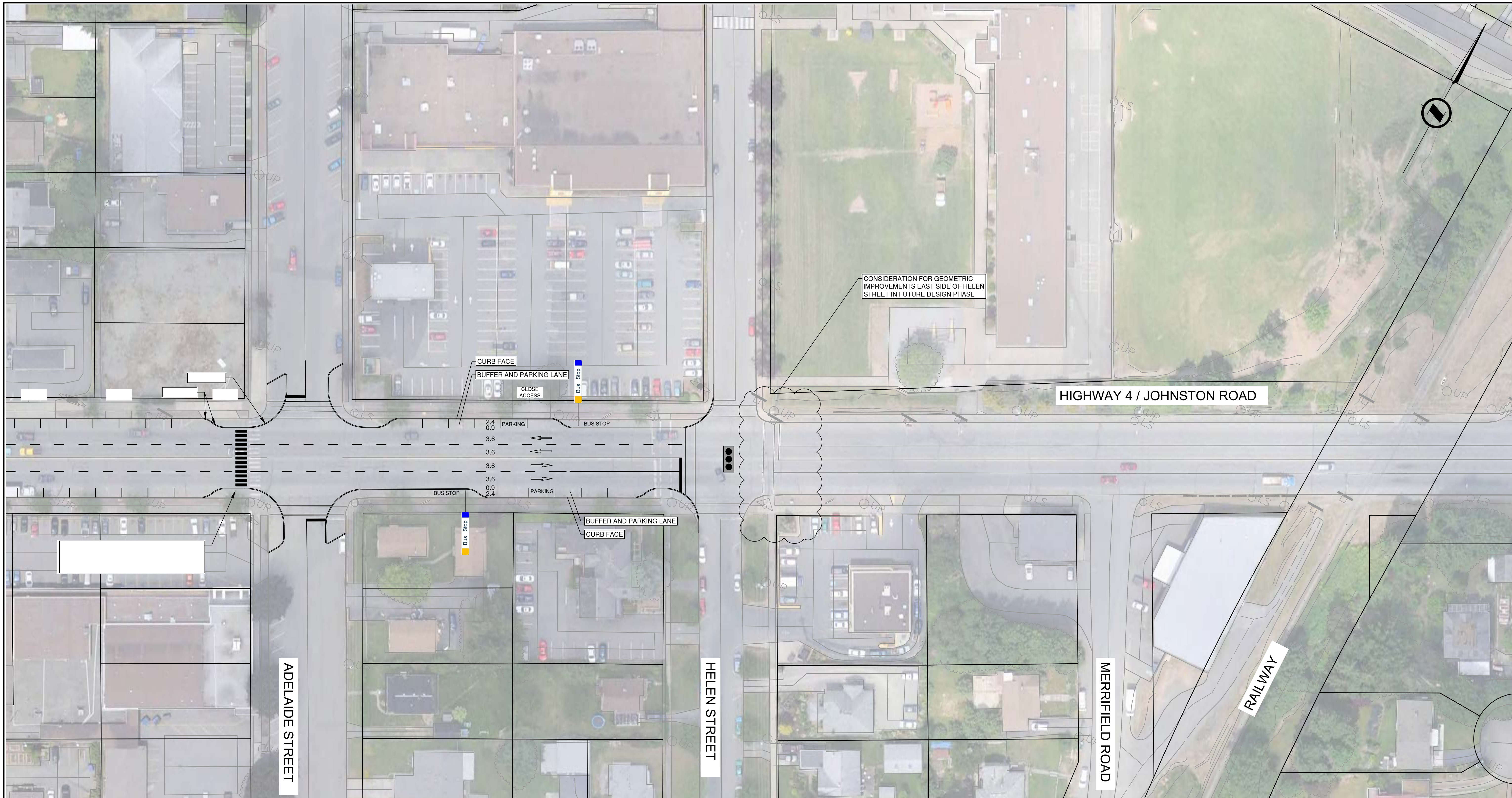

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NOTE:
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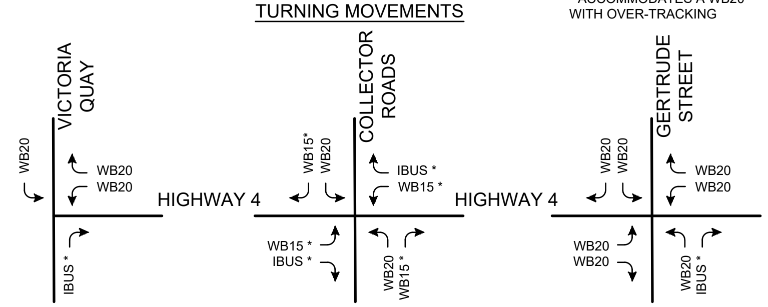

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BRITISH COLUMBIA
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SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

FUNCTIONAL PLAN
HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 1

SENIOR DESIGNER
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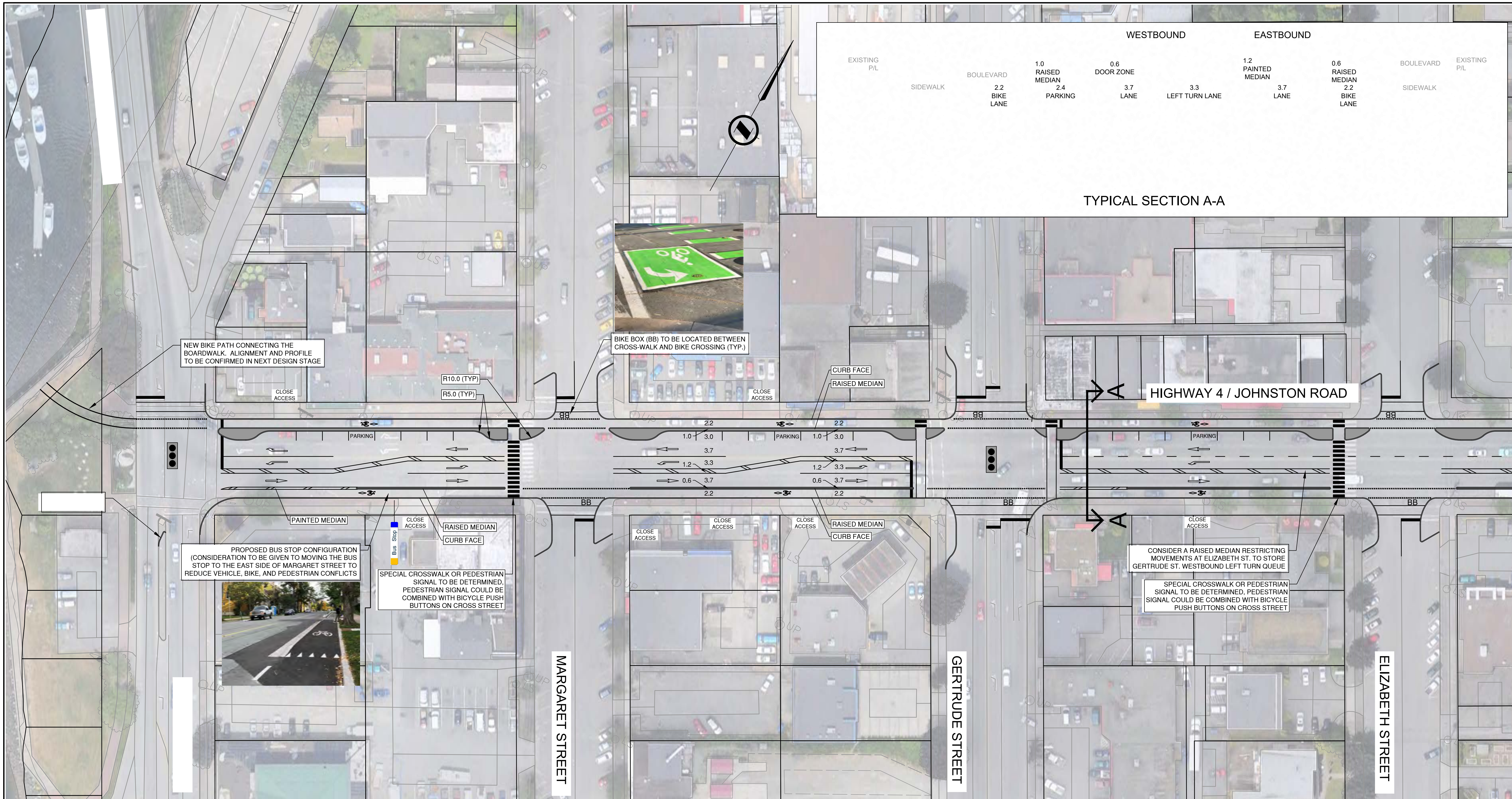
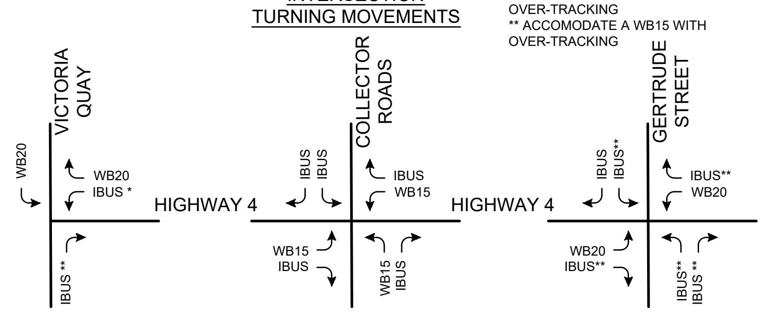


LANING AND TURN LANE STORAGE LENGTHS TO BE CONFIRMED DURING FUTURE DESIGN

LEFT TURNS FROM HIGHWAY 4 TO COLLECTOR ROADS MAY NEED TO BE RESTRICTED.
CONSIDERATION CAN BE GIVEN FOR LEAVING PARALLEL PARKING STALLS UNMARKED IN THE EFFORTS TO INCREASE FUNCTIONAL PARKING CAPACITY.
ACCESS CLOSURES TO BE CONFIRMED DURING FUTURE DESIGN STAGES WITH

BIKE SEPARATED MEDIANS TO BE DEPRESSED AT DISABILITY PARKING STALLS.

INTERSECTION TURNING MOVEMENTS



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* ACCOMMODATES A WB20 WITH OVER-TRACKING
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SCALE 0 5 1:500 25m

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BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

FUNCTIONAL PLAN

HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 2

DESIGNED R. CHANG DATE 2020-03-20
QUALITY CONTROL R.SYMONS DATE 2020-03-20
QUALITY ASSURANCE A. PELLAM DATE 2020-03-20
DRAWN R. CHANG DATE 2020-03-20

SENIOR DESIGNER
DATE

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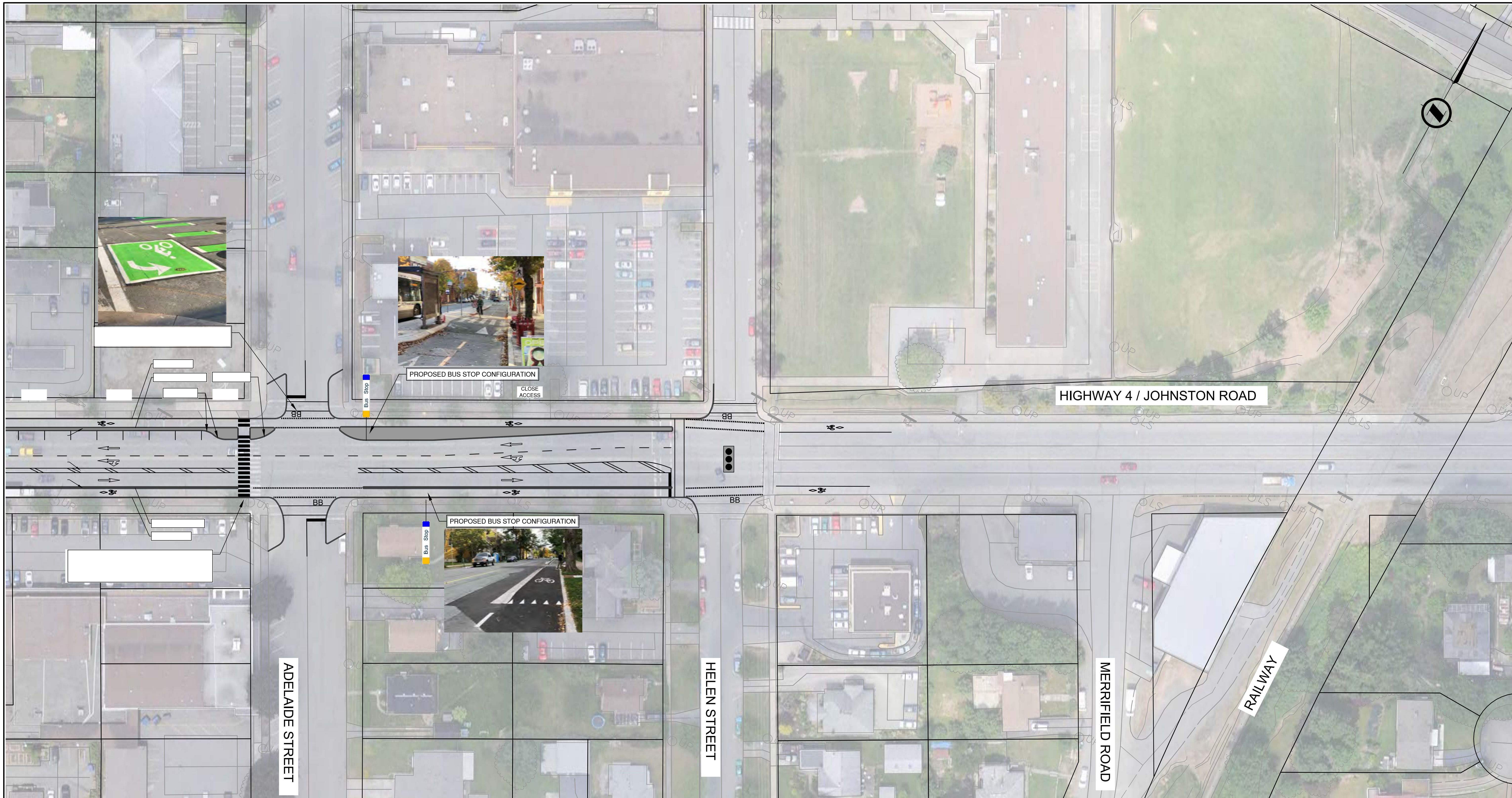

LANING AND TURN LANE STORAGE LENGTHS TO BE CONFIRMED DURING FUTURE DESIGN

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ACCESS CLOSURES TO BE CONFIRMED DURING FUTURE DESIGN STAGES WITH

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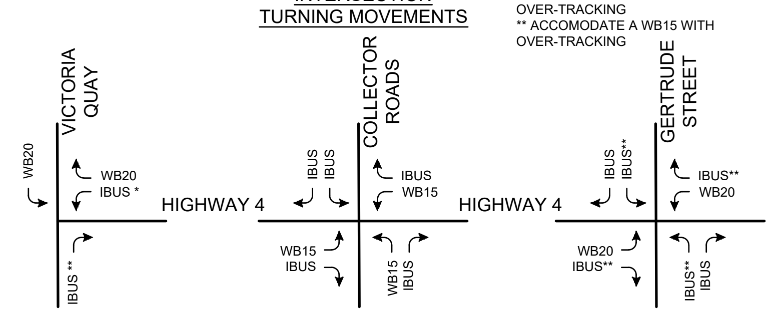
INTERSECTION TURNING MOVEMENTS



NOTE:
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BRITISH COLUMBIA
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FUNCTIONAL PLAN
HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 2

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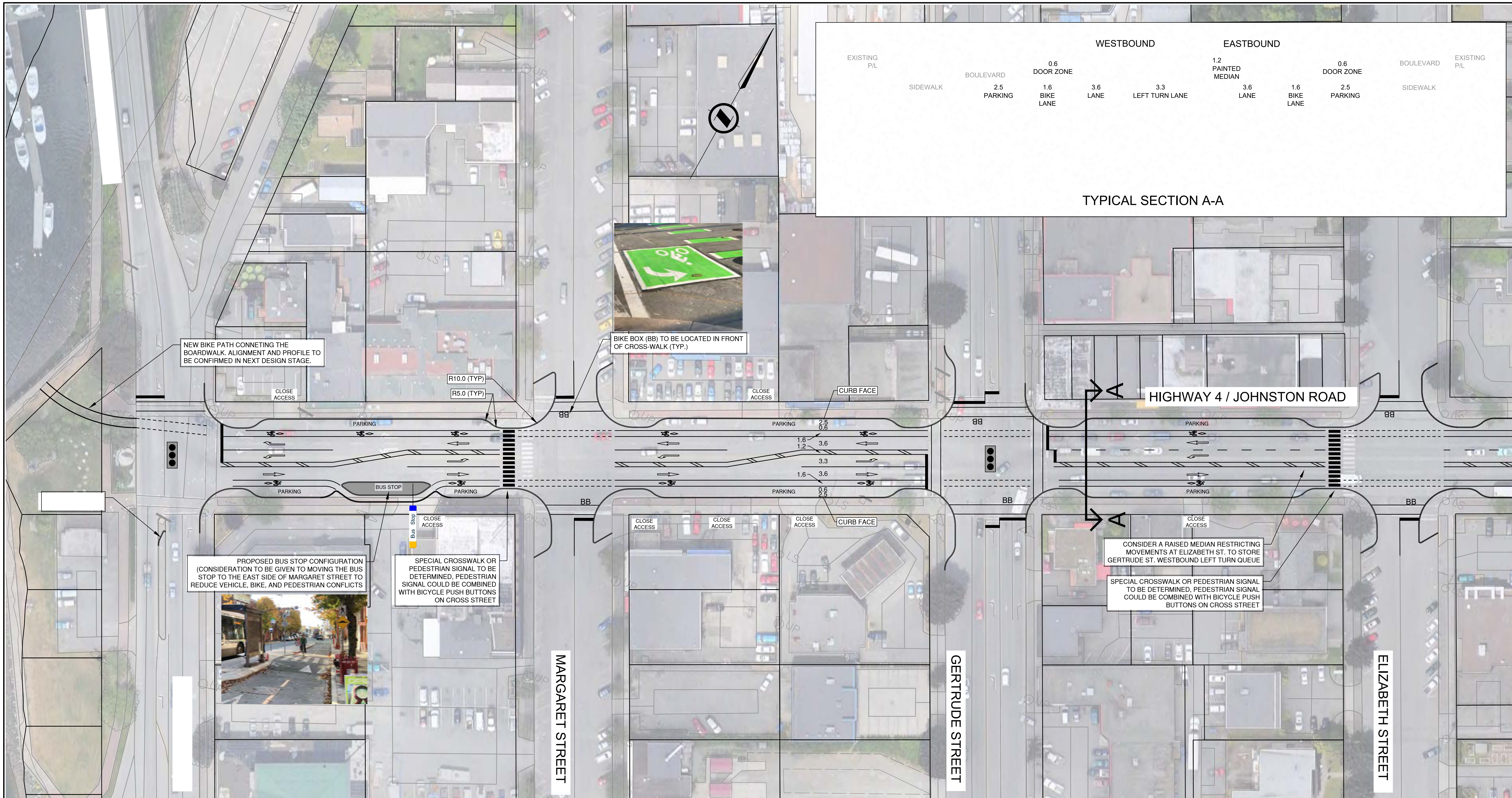
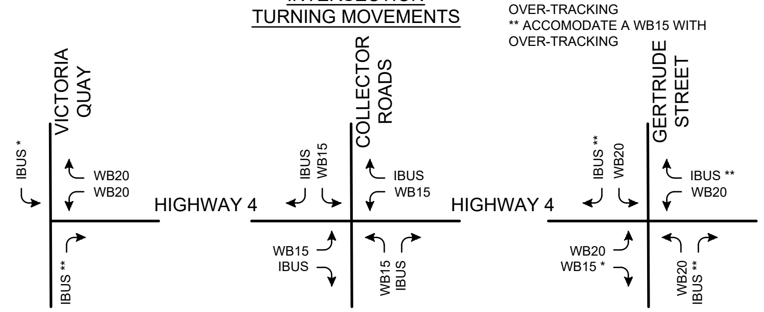


LANING AND TURN BAY STORAGE LENGTHS TO BE CONFIRMED DURING FUTURE DESIGN

LEFT TURNS FROM HIGHWAY 4 TO COLLECTOR ROADS MAY NEED TO BE RESTRICTED.
CONSIDERATION CAN BE GIVEN FOR LEAVING PARALLEL PARKING STALLS UNMARKED IN THE EFFORTS TO INCREASE FUNCTIONAL PARKING CAPACITY.
ACCESS CLOSURES TO BE CONFIRMED DURING FUTURE DESIGN STAGES WITH

INTERSECTION TURNING MOVEMENTS



NOTE:
* ACCOMMODATES A WB20 WITH OVER-TRACKING
** ACCOMODATE A WB15 WITH OVER-TRACKING

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SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

FUNCTIONAL PLAN
HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 3

SENIOR DESIGNER
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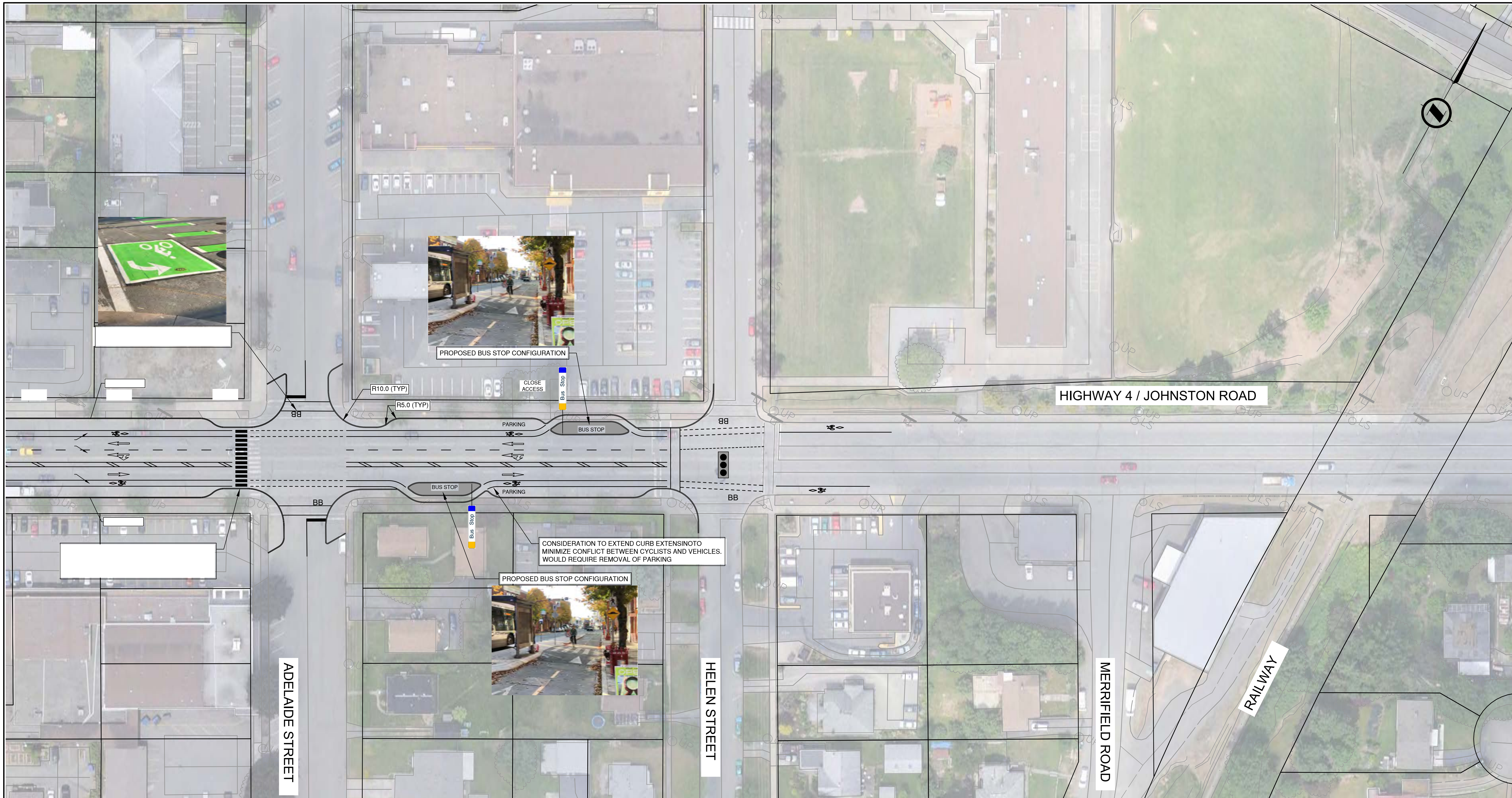

LANING AND TURN BAY STORAGE LENGTHS TO BE CONFIRMED DURING FUTURE DESIGN

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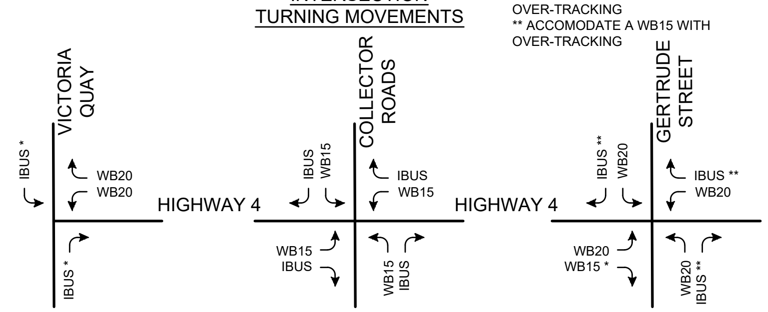
CONSIDERATION CAN BE GIVEN FOR LEAVING PARALLEL PARKING STALLS UNMARKED IN THE EFFORTS TO INCREASE FUNCTIONAL PARKING CAPACITY.
ACCESS CLOSURES TO BE CONFIRMED DURING FUTURE DESIGN STAGES WITH

INTERSECTION TURNING MOVEMENTS



NOTE:
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** ACCOMODATE A WB15 WITH OVER-TRACKING

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SCALE 0 5 1:500 25m

CAD FILENAME HWY 4 OPTION 3.DWG
PLOT DATE 2020-03-20

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FUNCTIONAL PLAN
HIGHWAY 4 CORRIDOR STUDY
VICTORIA QUAY TO HELEN STREET
OPTION 3

SENIOR DESIGNER

DATE

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FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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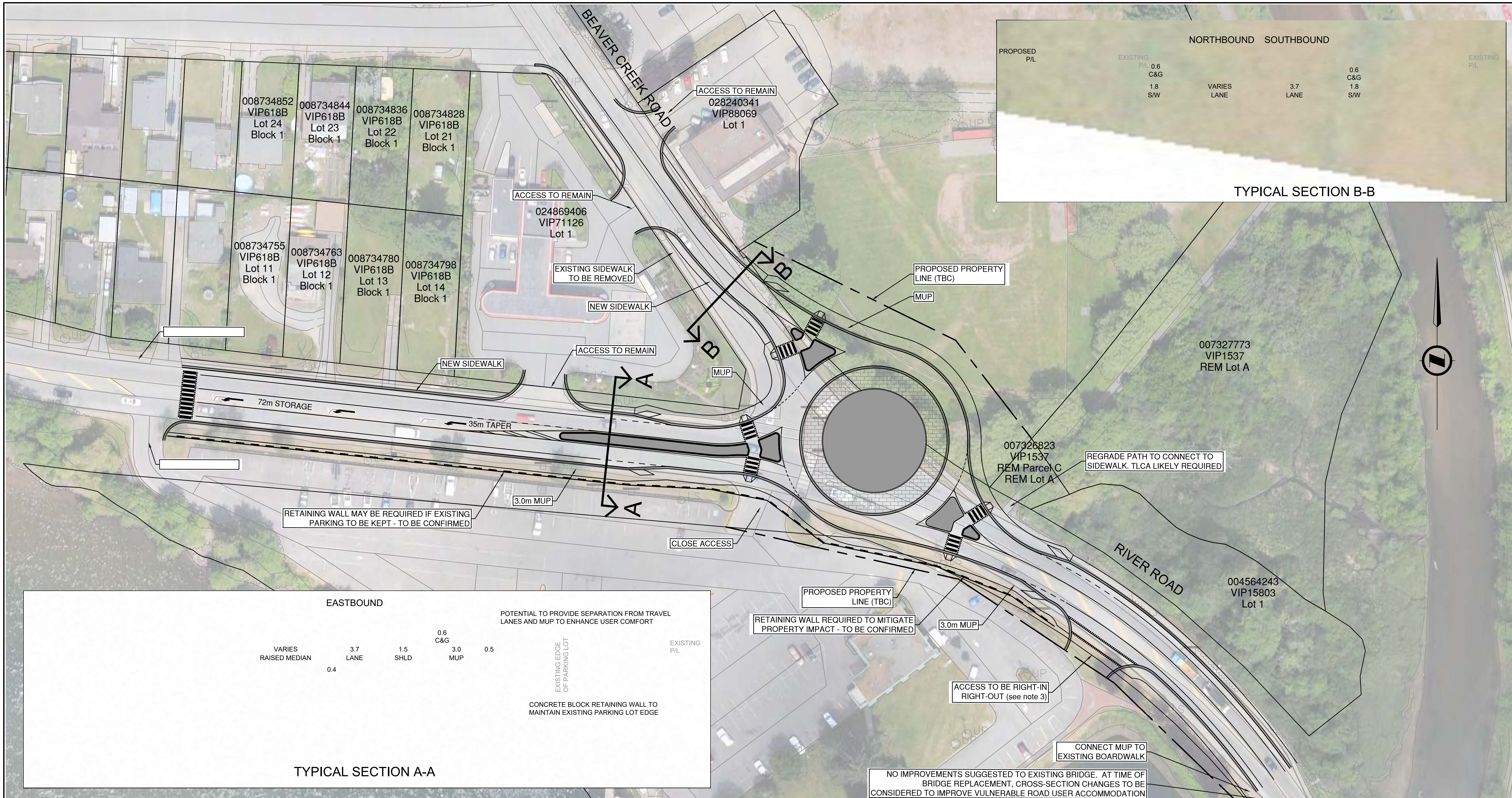

TRUCK APRON TO BE MODIFIED FOR OVER-SIZED OVER-WEIGHT TRUCK MOVEMENTS IN FUTURE DESIGN STAGE
VERTICAL GEOMETRY AND CROSS SECTION ELEMENTS TO BE CONFIRMED
CONSIDERATION FOR ADDING RAISED MEDIAN TO PHYSICALLY RESTRICT ACCESS MOVEMENTS TO RIGHT-IN/RIGHT-OUT

INTERSECTION TURNING MOVEMENTS

L200 (BEAVER CREEK RD.)
WB-20
WB-20
WB-20
L100 (HIGHWAY 4)
WB-20

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SCALE 0 5 1:500 25m

PLOT DATE 2020-03-20

REV	DATE	REVISIONS	NAME
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BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

FUNCTIONAL PLAN
HIGHWAY 4 INTERSECTION IMPROVEMENTS
BEAVER CREEK RD
ROUNDABOUT OPTION

DESIGNED R. CHANG DATE 2020-03-20
QUALITY CONTROL G. NGIENG DATE 2020-03-20
QUALITY ASSURANCE A. PELLAM DATE 2020-03-20
DRAWN R. CHANG DATE 2020-03-20

SENIOR DESIGNER
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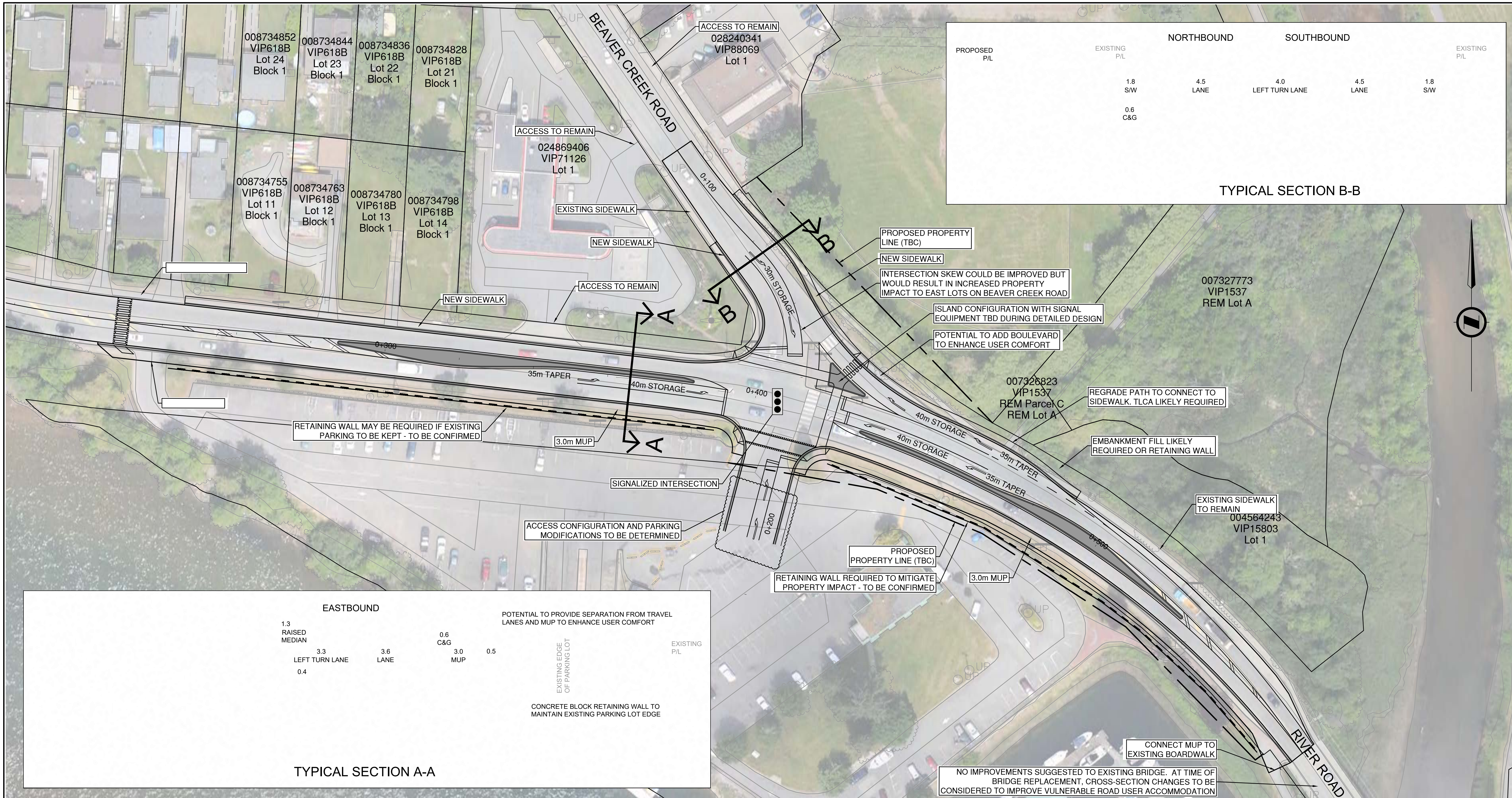

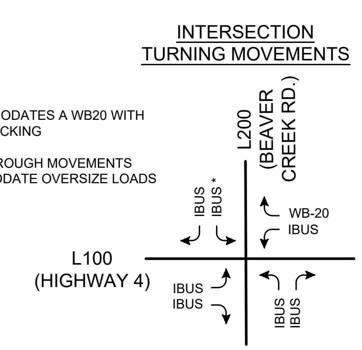

NOTE:
* ACCOMMODATES A WB20 WITH OVER-TRACKING

HWY 4 THROUGH MOVEMENTS ACCOMMODATE OVERSIZE LOADS

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BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

SCALE 0 5 1:500 25m

CAD FILE: BEAVER CREEK RD SIGNAL.DWG
PLOT DATE 2020-03-19

REV	DATE	REVISIONS	NAME
PA	2020-03-20	FUNCTIONAL PLAN	A. PELLAM
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

FUNCTIONAL PLAN

HIGHWAY 4 INTERSECTION IMPROVEMENTS
BEAVER CREEK ROAD
SIGNALIZED OPTION

SENIOR DESIGNER
DATE

DESIGNED	R. STOKES	DATE	2020-03-20
QUALITY CONTROL	G. GNIENG	DATE	2020-03-20
QUALITY ASSURANCE	A. PELLAM	DATE	2020-03-20
DRAWN	R. STOKES	DATE	2020-03-20

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
32533	XXXXX-0000	1	BCR-SIG-1	PA

APPENDIX
Planning Level Class D Cost Estimate

B

Highway 4 Corridor - Option 1

Port Alberni Hwy 4 - Intersection Concept Plans

Mobilization (5%)	LS	100%	$	115,000.00	$	115,000.00	
Traffic Management (2.5%)	LS	100%	$	58,000.00	$	58,000.00	
Quality Management (3.5%)	LS	100%	$	81,000.00	$	81,000.00	
Site Modificaitons (5%)	LS	100%	$	115,000.00	$	115,000.00	
Removal Ex Curb	m	1200	$	40.00	$	48,000.00	
Remove Concrete Sidewalk	m2	0	$	40.00	$	-	
Removal Ex Islands-Medians	m	0	$	40.00	$	-	
Pavement Cutting	m	1300	$	15.00	$	19,500.00	
Cold Milling	m2	13300	$	20.00	$	266,000.00	
Pavement Removal	m2	1500	$	15.00	$	22,500.00	
Drainage Allowance	LS	100%	$	130,000.00	$	130,000.00	
Hydro Relocates	LS	2	$	2,000.00	$	4,000.00	
Asphalt Stockpile	tonne	1629	$	25.00	$	40,731.25	
Asphalt Top Lift	tonne	1629	$	200.00	$	325,850.00	
Asphalt MUP	m2	0	$	100.00	$	-	
Concrete Curb & Gutter	m	1300	$	200.00	$	260,000.00	
Median Curb	m	0	$	150.00	$	-	
Concrete sidewalk	m2	2437	$	175.00	$	426,475.00	
Concerete Median Infill	m2	0	$	175.00	$	-	
Stamped Concrete or Bricks	m2	200	$	175.00	$	35,000.00	
Detectable warning Mats	ea	32	$	200.00	$	6,400.00	
Signal Installation	LS	0%	$	200,000.00	$	-	
Road Lighting	LS	0%	$	100,000.00	$	-	
Signs	LS	100%	$	10,000.00	$	10,000.00	
Paint & Thermoploastic	LS	100%	$	10,000.00	$	35,000.00	
Subtotal					$	1,998,456.25	
Construction Contingency				40%	$	799,382.50	
Total					**$**	**2,797,838.75**	

Notes:

Approx Property Required (m2) 0

1) No allowance for property acquisition
2) asphalt includes tack coat
3) no electrical upgrades or Hydro relocates along the main corridor, 2 hydro at Victoria intersection
4) mill and fill for main road area
5) remove existing curb (optional except at curb bulge locations)
6) remove full depth asphalt where new curb bulges are added
7) curb bulges infill indicated as concerete sidewalk
8) stamped concete added for boulevard where driveways are removed
9) Paint markings include layout & painting
10) No allowance for signal modifcations or new pedestrian signals
11) assumes repaving the entire road surface

Drainage Allowance Basics

20 CB @ $3500 ea	$ 70,000.00
200m CB Lead @ $300m	$ 60,000.00
Total	**$ 130,000.00**
	as is

Note: Assumed existing storm main down Hwy to tie into

Total Cost Items			
Property (TBD)	**m2**	**0**	
Risk Allowance (10%)			**$ 279,784**
Engineering (10%)			**$ 279,784**
Construction Adminstration (10%)			**$ 279,784**
Regional Recoveries (10%)			**$ 279,784**
Stakeholder, FN, Other (10%)			**$ 279,784**
Total Project Cost			**$ 4,196,758**

Highway 4 Corridor - Option 2

Port Alberni Hwy 4 - Intersection Concept Plans

Mobilization (5%)	LS	100%	$	134,000.00	$	134,000.00	
Traffic Management (2.5%)	LS	100%	$	67,000.00	$	67,000.00	
Quality Management (3.5%)	LS	100%	$	94,000.00	$	94,000.00	
Site Modificaitons (5%)	LS	100%	$	134,000.00	$	134,000.00	
Removal Ex Curb	m	1200	$	40.00	$	48,000.00	
Remove Concrete Sidewalk	m2	0	$	40.00	$	-	
Removal Ex Islands-Medians	m2	10	$	40.00	$	400.00	
Pavement Cutting	m	1700	$	15.00	$	25,500.00	
Cold Milling	m2	14000	$	20.00	$	280,000.00	
Pavement Removal	m2	800	$	15.00	$	12,000.00	
Drainage Allowance	LS	100%	$	195,000.00	$	195,000.00	
Hydro Relocates	LS	2	$	2,000.00	$	4,000.00	
Asphalt Stockpile	tonne	1715	$	25.00	$	42,875.00	
Asphalt Top Lift	tonne	1715	$	200.00	$	343,000.00	
Asphalt MUP	m2	70	$	100.00	$	7,000.00	
Concrete Curb & Gutter	m	1700	$	200.00	$	340,000.00	
Median Curb	m	1200	$	150.00	$	180,000.00	
Concrete sidewalk	m2	950	$	175.00	$	166,250.00	
Concerete Median Infill	m2	900	$	175.00	$	157,500.00	
Stamped Concrete or Bricks	m2	200	$	175.00	$	35,000.00	
Detectable warning Mats	ea	32	$	200.00	$	6,400.00	
Signal Installation	LS	0%	$	200,000.00	$	-	
Road Lighting	LS	0%	$	100,000.00	$	-	
Signs	LS	100%	$	10,000.00	$	10,000.00	
Paint & Thermoploastic	LS	100%	$	10,000.00	$	45,000.00	
Subtotal					$	2,326,925.00	
Construction Contingency				40%	$	930,770.00	
Total					**$**	**3,257,695.00**	

Notes:

Approx Property Required (m2) 0

1) No allowance for property acquisition
2) asphalt includes tack coat
3) no electrical upgrades or Hydro relocates
4) mill and fill for main road area
5) remove existing curb (optional except at curb bulge locations)
6) remove full depth asphalt where new curb bulges are added
7) curbg bulges infill indicated as concerete sidewalk
8) stamped concete added for boulevard where driveways are removed
9) combination of median curb and concerete curb and cutter to be used
10) Paint markings include layout & painting
11) No allowance for signal modifcations or new pedestrian signals
12) assumes repaving the entire road surface
13) assumes existing road crown remains as is

Drainage Allowance Basics

30 CB @ $3500 ea	$ 105,000.00
300m CB Lead @ $300m	$ 90,000.00
Total	**$ 195,000.00**
	as is

Note: Assumed existing storm main down Hwy to tie into

Total Cost Items			
Property (TBD)	**m2**	**0**	
Risk Allowance (10%)			**$ 325,770**
Engineering (10%)			**$ 325,770**
Construction Adminstration (10%)			**$ 325,770**
Regional Recoveries (10%)			**$ 325,770**
Stakeholder, FN, Other (10%)			**$ 325,770**
Total Project Cost			**$ 4,886,543**

Highway 4 Corridor - Option 3

Port Alberni Hwy 4 - Intersection Concept Plans

Mobilization (5%)	LS	100%	$	120,000.00	$	120,000.00
Traffic Management (2.5%)	LS	100%	$	60,000.00	$	60,000.00
Quality Management (3.5%)	LS	100%	$	84,000.00	$	84,000.00
Site Modificaitons (5%)	LS	100%	$	120,000.00	$	120,000.00
Removal Ex Curb	m	1200	$	40.00	$	48,000.00
Remove Concrete Sidewalk	m2	0	$	40.00	$	-
Removal Ex Islands-Medians	m2	10	$	40.00	$	400.00
Pavement Cutting	m	1300	$	15.00	$	19,500.00
Cold Milling	m2	13300	$	20.00	$	266,000.00
Pavement Removal	m2	1500	$	15.00	$	22,500.00
Drainage Allowance	LS	100%	$	143,000.00	$	143,000.00
Hydro Relocates	LS	2	$	2,000.00	$	4,000.00
Asphalt Stockpile	tonne	1617	$	25.00	$	40,425.00
Asphalt Top Lift	tonne	1617	$	200.00	$	323,400.00
Asphalt MUP	m2	70	$	100.00	$	7,000.00
Concrete Curb & Gutter	m	1300	$	200.00	$	260,000.00
Median Curb	m	10	$	150.00	$	1,500.00
Concrete sidewalk	m2	2600	$	175.00	$	455,000.00
Concerete Median Infill	m2	0	$	175.00	$	-
Stamped Concrete or Bricks	m2	200	$	175.00	$	35,000.00
Detectable warning Mats	ea	32	$	200.00	$	6,400.00
Signal Installation	LS	0%	$	200,000.00	$	-
Road Lighting	LS	0%	$	100,000.00	$	-
Signs	LS	100%	$	10,000.00	$	10,000.00
Paint & Thermoploastic	LS	100%	$	10,000.00	$	50,000.00
Subtotal					$	2,076,125.00
Construction Contingency				40%	$	830,450.00
Total					**$**	**2,906,575.00**

Notes:

Approx Property Required (m2) 0

1) No allowance for property acquisition
2) asphalt includes tack coat
3) no electrical upgrades or Hydro relocates
4) mill and fill for main road area
5) remove existing curb (optional except at curb bulge locations)
6) remove full depth asphalt where new curb bulges are added
7) curbg bulges infill indicated as concerete sidewalk
8) stamped concete added for boulevard where driveways are removed
9) combination of median curb and concerete curb and cutter to be used
10) Paint markings include layout & painting
11) No allowance for signal modifcations or new pedestrian signals
12) assumes repaving the entire road surface
13) assumes existing road crown remains as is

Drainage Allowance Basics

22 CB @ $3500 ea	$ 77,000.00
220m CB Lead @ $300m	$ 66,000.00
Total	**$ 143,000.00**
	as is

Note: Assumed existing storm main down Hwy to tie into

Total Cost Items			
Property (TBD)	**m2**	**0**	
Risk Allowance (10%)			**$ 290,658**
Engineering (10%)			**$ 290,658**
Construction Adminstration (10%)			**$ 290,658**
Regional Recoveries (10%)			**$ 290,658**
Stakeholder, FN, Other (10%)			**$ 290,658**
Total Project Cost			**$ 4,359,863**

Beaver Creek Road - Roundabout Concept

Port Alberni Hwy 4 - Intersection Concept Plans

Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount	Category Totals
General					**$ 701,000.00**
Mobilization (5%)	LS	100%	$ 219,000.00	$ 219,000.00	
Traffic Management (2.5%)	LS	100%	$ 110,000.00	$ 110,000.00	
Quality Management (3.5%)	LS	100%	$ 153,000.00	$ 153,000.00	
Site Modificaitons (5%)	LS	100%	$ 219,000.00	$ 219,000.00	
Removals					**$ 81,800.00**
Clearing	LS	100%	$ 5,000.00	$ 5,000.00	
Removal Ex Curb	m	860	$ 40.00	$ 34,400.00	
Removal Ex Islands-Medians	m	110	$ 40.00	$ 4,400.00	
Remove Concrete Sidewalk	m2	950	$ 40.00	$ 38,000.00	
Pavement Cutting & Removals					**$ 111,500.00**
Pavement Cutting	m	100	$ 15.00	$ 1,500.00	
Cold Milling	m2	3400	$ 20.00	$ 68,000.00	
Pavement Removal	m2	2800	$ 15.00	$ 42,000.00	
Excavation					**$ 54,000.00**
Stripping - off site	m3	900	$ 30.00	$ 27,000.00	
Excavation - off site	m3	900	$ 30.00	$ 27,000.00	
Granular Materials					**$ 147,000.00**
SGSB	m3	600	$ 50.00	$ 30,000.00	
WGB	m3	1100	$ 60.00	$ 66,000.00	
Type D Embankment - import	m3	1700	$ 30.00	$ 51,000.00	
Drainage & BC Hydro Utilities					**$ 362,000.00**
Drainage Allowance	LS	100%	$ 350,000.00	$ 350,000.00	
Hydro Relocates	LS	6	$ 2,000.00	$ 12,000.00	
Paving					**$ 931,468.75**
Asphalt Stockpile	tonne	3565	$ 25.00	$ 89,118.75	
Asphalt Top Lift	tonne	2095	$ 200.00	$ 418,950.00	
Asphalt Bottom Lift	tonne	1470	$ 220.00	$ 323,400.00	
Asphalt MUP	m2	1000	$ 100.00	$ 100,000.00	
Concrete & Wall					**$ 1,312,700.00**
Concrete Curb & Gutter	m	1100	$ 200.00	$ 220,000.00	
Median Curb	m	210	$ 150.00	$ 31,500.00	
Concrete sidewalk	m2	1300	$ 175.00	$ 227,500.00	
Concerete Median Infill	m2	300	$ 175.00	$ 52,500.00	
Concrete Truck Apron	m2	600	$ 300.00	$ 180,000.00	
Detectable warning Mats	ea	6	$ 200.00	$ 1,200.00	
Concrete Block Retaining Wall	m2	600	$ 1,000.00	$ 600,000.00	
Electrical					**$ 100,000.00**
Signal Installation	LS	0%	$ 200,000.00	$ -	
Road Lighting	LS	100%	$ 100,000.00	$ 100,000.00	
Signing & Paint					**$ 15,000.00**
Signs	LS	100%	$ 10,000.00	$ 10,000.00	
Paint & Thermoploastic Layout	LS	100%	$ 5,000.00	$ 5,000.00	
Subtotal				$ 3,816,468.75	
Construction Contingency			40%	$ 1,526,587.50	
Total				$ 5,343,056.25	
Total Roundup				**$ 5,344,000.00**	

Notes:

Approx Property Required (m2) 2200
(signal acquisition plus ball diamond)

1) No allowance for property acquisition
2) No allowance made for ravine infill and culvert extension
3) No allowance for sub-drains
4) Stripping assumed at 0.3m
5) Mill and Fill for the three legs until profile lifts for roudnabout construction
6) Full depth pavement removal with WGB leveling/fill for raised roundabout area
7) Drainage: See Drainage Allowance Basics Below
8) excavation for area outside existing ground at ball diamond
9) SGSB for new area by ball diamond
10) WGB for full depth area at roudnabout
11) MUP gravels are 200mm WGB included in WGB calc
13) Embankment fill 300m along water side with wm wide by 1m high (1m height is from the lidar surface)
14) Roundabout Centre fill included in embankment fill number
15) 250m long wall is assumed to run along the south property (assumed 3 blocks)
16) assumed hand rail to be included in wall price
17) No landscaping or art feature included for rounabout centre

Drainage Allowance Basics

5 manholes @ $6000 ea	$ 30,000.00
440m Storm main @ $400 m	$ 176,000.00
20 CB @ $3500 ea	$ 70,000.00
200m CB Lead @ $300m	$ 60,000.00
Total	**$ 336,000.00**
	round to 350

Note: drainage may be a lot higher depending on where we have to get the water
seems to only be one CB on the Highway indicating that there is no storm main

Total Cost Items				
Property (TBD)	**m2**	**2200**		
Risk Allowance (10%)			**$**	**534,400**
Engineering (10%)			**$**	**534,400**
Construction Adminstration (10%)			**$**	**534,400**
Regional Recoveries (10%)			**$**	**534,400**
Stakeholder, FN, Other (10%)			**$**	**534,400**
Total Project Cost			**$**	**8,016,000**

Beaver Creek Road - Signal Concept

Port Alberni Hwy 4 - Intersection Concept Plans

Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount	Category Totals
General					**$ 538,000.00**
Mobilization (5%)	LS	100%	$ 168,000.00	$ 168,000.00	
Traffic Management (2.5%)	LS	100%	$ 84,000.00	$ 84,000.00	
Quality Management (3.5%)	LS	100%	$ 118,000.00	$ 118,000.00	
Site Modificaitons (5%)	LS	100%	$ 168,000.00	$ 168,000.00	
Removals					**$ 69,400.00**
Clearing	LS	100%	$ 5,000.00	$ 5,000.00	
Removal Ex Curb	m	1000	$ 40.00	$ 40,000.00	
Removal Ex Islands-Medians	m	110	$ 40.00	$ 4,400.00	
Remove Concrete Sidewalk	m2	500	$ 40.00	$ 20,000.00	
Pavement Cutting & Removals					**$ 135,000.00**
Pavement Cutting	m	100	$ 15.00	$ 1,500.00	
Cold Milling	m2	6300	$ 20.00	$ 126,000.00	
Pavement Removal	m2	500	$ 15.00	$ 7,500.00	
Excavation					**$ 24,150.00**
Stripping - off site	m3	400	$ 30.00	$ 12,000.00	
Excavation - off site	m3	405	$ 30.00	$ 12,150.00	
Granular Materials					**$ 60,900.00**
SGSB	m3	300	$ 50.00	$ 15,000.00	
WGB	m3	540	$ 60.00	$ 32,400.00	
Type D Embankment - import	m3	450	$ 30.00	$ 13,500.00	
Drainage & BC Hydro Utilities					**$ 322,000.00**
Drainage Allowance	LS	100%	$ 310,000.00	$ 310,000.00	
Hydro Relocates	LS	6	$ 2,000.00	$ 12,000.00	
Paving					**$ 392,000.00**
Asphalt Stockpile	tonne	1200	$ 25.00	$ 30,000.00	
Asphalt Top Lift	tonne	1000	$ 200.00	$ 200,000.00	
Asphalt Bottom Lift	tonne	200	$ 220.00	$ 44,000.00	
Asphalt MUP	m2	1180	$ 100.00	$ 118,000.00	
Concrete & Wall					**$ 1,075,350.00**
Concrete Curb & Gutter	m	700	$ 200.00	$ 140,000.00	
Median Curb	m	450	$ 150.00	$ 67,500.00	
Concrete sidewalk	m2	600	$ 175.00	$ 105,000.00	
Concerete Median Infill	m2	350	$ 175.00	$ 61,250.00	
Concrete Truck Apron	m2	0	$ 300.00	$ -	
Detectable warning Mats	ea	8	$ 200.00	$ 1,600.00	
Concrete Block Retaining Wall	m2	700	$ 1,000.00	$ 700,000.00	
Electrical					**$ 300,000.00**
Signal Installation	LS	100%	$ 200,000.00	$ 200,000.00	
Road Lighting	LS	100%	$ 100,000.00	$ 100,000.00	
Signing & Paint					**$ 10,000.00**
Signs	LS	100%	$ 5,000.00	$ 5,000.00	
Paint & Thermoploastic Layout	LS	100%	$ 5,000.00	$ 5,000.00	
Subtotal				$ 2,926,800.00	
Construction Contingency			40%	$ 1,170,720.00	
Total				$ 4,097,520.00	
Total Roundup				**$ 4,098,000.00**	

Notes:

Approx Property Required (m2) 1100

1) No allowance for property acquisition
2) No allowance made for ravine infill and culvert extension
3) No allowance for sub-drains
4) Stripping assumed at 0.3m
5) Mill and Fill for whole area of existing asphalt
6) Full depth pavement removal for accesses to south property
7) Drainage: See Drainage Allowance Basics Below
8) stripping on the NE & NW corners primarily
9) excavation primarily on the south side with two pockets on the northeast
10) embankment on south side and NE at ballpark
11) 300m long wall along south side (assumed at 3 blocks)
12) hand rail assumed to be included in wall costs
13) AC top lift is mill & fill plus Full Depth
14) AC bottom lift is only for full depth
15) MUP gravels are 200mm WGB included in WGB calc

Drainage Allowance Basics	
5 manholes @ $6000 ea	$ 30,000.00
440m Storm main @ $400 m	$ 176,000.00
16 CB @ $3500 ea	$ 56,000.00
160m CB Lead @ $300m	$ 48,000.00
Total	**$ 310,000.00**
	as is

Note: drainage may be a lot higher depending on where we have to get the water
seems to only be one CB on the Highway indicating that there is no storm main

Total Cost Items			
Property (TBD)	**m2**	**1100**	
Risk Allowance (10%)			**$ 409,800**
Engineering (10%)			**$ 409,800**
Construction Adminstration (10%)			**$ 409,800**
Regional Recoveries (10%)			**$ 409,800**
Stakeholder, FN, Other (10%)			**$ 409,800**
Total Project Cost			**$ 6,147,000**

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