DISTRICT OF SECHELT

TRANSPORTATION MASTER PLAN

Prepared For:	District of Sechelt
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EXECUTIVE SUMMARY

The District of Sechelt Transportation Master Plan was prepared as part of the recent update to the Official Community Plan (OCP). It was undertaken with the intent of identifying existing and possible future problems with the transportation system and to develop plans and policies that address these issues and guide transportation investment in the District.

An existing conditions analysis, including a review of previous planning and consultation, field observations, traffic operations and safety analyses, and stakeholder consultation, identified a number of existing transportation issues described below.

Road Network

Land use and transportation patterns are well-established in the District of Sechelt, and reflect the linear development of the community along the Davis Bay, West Sechelt, and Porpoise Bay waterfronts. Highway 101 is the primary transportation corridor, and local and regional traffic movements depend on this route. Many issues related to Highway 101 have been documented, including:

- Extensive direct driveway access: this road is constructed and functions as a local access road in addition to its regional traffic role in the Provincial Highway System. A bypass remains a priority for residents;
- High accident rates at a number of intersections. This is a particular concern in the Village where high traffic volumes and heavy vehicles mix within a busy commercial and pedestrian setting;
- The need for alternative routes for emergency access and improved local circulation, particularly in Selma Park / Davis Bay, East Porpoise Bay, and West Sechelt;
- A lack of safe and continuous routes for pedestrians and cyclists;
- Significant delay for minor streets intersecting with Highway 101 in Davis Bay / Selma Park, particularly during ferry surges. The need to slow traffic and break up ferry-related traffic platoons is a priority;
- Delayed implementation of left turn bays to enhance safety of vehicles turning into local roads from Highway 101 in Davis Bay / Selma Park; and
- The ability of the existing Highway 101 to accommodate future growth. It is expected that the existing highway will reach capacity some time in the next 5 to 10 years. Planning for alternatives needs to start immediately.

Transit

Transit has become a viable alternative for many areas of the community, mainly following patterns of higher density such as the Downtown / Village, and specific areas of Davis Bay and West Sechelt. For the more rural neighbourhoods, transit is infrequent or not available and will require increased density before it becomes viable. BC Transit regularly reviews transit services in the community.

Active Transportation (Walking / Cycling)

Active transportation modes including walking and cycling are impacted by the land use patterns and transportation systems established in the District. Walking activity is mainly focused around the areas of highest density and mixed use including the Village and pockets of West Sechelt and Davis Bay. Given the relative spread of land use throughout the District, cycling can exceed the range of pedestrians in accessing services. The lack of connective cycling route infrastructure does not encourage this mode of transportation.

Travel Demand Management (TDM)

TDM is the implementation of strategies to more effectively utilize transportation infrastructure and services and increase the competitiveness of non-automobile modes. Currently, there are a number of "ad-hoc" programs that aim to reduce reliance on automobile transportation. Increased coordination of these programs is necessary to realize noticeable change.

To assess future conditions, a **travel demand model** was developed to forecast traffic volumes under medium-term (10-year) and long-term (20-year) growth scenarios. This allowed locations where traffic operations would exceed desirable performance limits to be identified.

Future growth will result in an increase in the number of automobile trips made in the District and the overall number of vehicle-kilometres travelled (an increase of 38% over 20 years). The average trip duration will also increase. These factors will contribute to an increase in congestion, particularly along Highway 101 and increased transportation-related emissions if growth is allowed to occur unchecked.

The Transportation Master Plan addresses both existing and future transportation issues and has developed:

- A **Road Network Plan** that guides existing and future road network needs;
- An **Active Transportation Plan** that identifies routes and programs that will enhance access to active transportation modes (predominately walking and cycling); and
- A **travel demand management framework** that provides strategies towards automobile alternatives and trip suppression.

Recommendations are made throughout the document and collectively will form the basis of the Transportation Section of the Official Community Plan. A summary is included below.

Highway 101

Planning for an alternative to Highway 101 should begin immediately. The existing Highway 101 is anticipated to exceed capacity some time in the next 5 to 10 years. The preferred long-term highway option is still the construction of a regional bypass between Roberts Creek and Trout Lake as previously proposed by the Ministry of Transportation and Infrastructure (MOTI) and R.F. Binnie & Associates.

This option represents the most effective method of clearly defining regional and local traffic functions. However, MOTI have indicated that this project is a considerable time away given its need (in terms of traffic carrying capacity), cost, and priority amongst other projects in the Province.

In the interim (by 2015), it is recommended that a section of the bypass be constructed east of the Village from Wharf Road and connected to the existing Highway via Field Road. This will accommodate not only future traffic growth, but provide an alternative regional and emergency traffic route, and de-emphasize the existing Highway 101 to enhance active transportation.

The bypass will require geometric changes at the Highway 101 / Field Road intersection and the creation of a new intersection with Wharf Road to prioritize the new route. Similarly, the existing Highway 101 alignment, including the intersection with Wharf Road / Dolphin Street, should be downgraded.

West of the Village, it is recommended that a West Sechelt Connector (WSC) be constructed after 2018, but prior to 2028, or as required by development. The WSC may or may not be an extension of the Highway 101 bypass between Field Road and Wharf Road, but should use the alignment proposed for the regional bypass by MOTI adjacent to the BC Hydro right-of-way to connect from Trail Avenue to an interim connection with Tyler Road. This will require a signalized intersection at Trail Avenue and the consolidation of access for Neptune Road and Pebble Avenue to Salmon Drive. Prior to the regional bypass of Highway 101, the WSC does not replace the existing highway through the Village. However, it will provide a connection, although circuitous, back to Highway 101 via Mason and Acorn Roads.

Supporting Street Network

A series of supporting road network elements have been identified to address existing concerns or to accommodate the future major road network. These include:

- Access management along Highway 101 including construction of left turn lanes, right-in / right-out restrictions, or full closures at various intersections along Highway 101 in Davis Bay and Selma Park;
- Signalization of the Highway 101 / Davis Bay Road intersection to provide safer beach access, break-up ferry traffic platoons, and allow advance warning of the intersection to be installed;
- Completion of Laurel Avenue and extension to Selma Park Road (with future development) to provide an emergency access alternative to Highway 101;
- Work with the Sechelt Nation to open Titaway Road to relieve pressure for the Highway 101 / Wharf Road intersection and explore its extension to Dusty Road;
- Develop a supporting street network in West Sechelt to consist of:
    - Connection of Tyler Road to the WSC and to the Trail / Reef intersection;
    - Connection of Derby Road to the WSC;
    - Extension of Granite Road to Tyler Road;
    - Extension of Barnacle Street or Cowrie Street to Derby Road;
    - Local streets to be determined by development; and
- Improve sight distance at a number of intersections along Highway 101.

Functional Classification

The District should revise its *Subdivision and Development Control Servicing Standards Bylaw No. 430* to develop a set of guidelines that direct the design of various roadway classifications and provide definitive direction on direct access.

Design criteria should be flexible enough to react to the needs of the local environment. For example, alternative road standards such as pedestrian-scale street design should be considered provided they provide for the full range of transportation needs, provide environmental or community benefits, and are cost-effective for the District to maintain. A revised functional classification would include:

- **Major Arterials**: intended to move traffic between regional destinations (e.g. between the BC Ferries terminals). Access is normally limited to consolidated points such as intersections with minor arterials or collectors. Individual property access is atypical.
- **Minor Arterials**: intended to move traffic between local destinations (e.g. from the Village to East Porpoise Bay), however in Sechelt, some level of direct property access can be provided, although consolidated where possible.
- **Collectors**: provide a link between mobility and access and act to distribute traffic from the mobility-based roads to local streets. Direct land access is also provided through a mix of consolidated and individual driveways.
- **Main Street**: intended for the Village and other commercial areas to promote design that is conducive to economic activity such as slower vehicle speeds, on-street parking, and an improved pedestrian and cycling environment.
- **Local Streets**: provide access to individual properties. These streets provide no regional or local connections and are often discontinuous.

- **Limited Local Streets**: local streets terminating in a cul-de-sac.
- **Lanes**: provide access to individual properties or garages.

Active Transportation

An Active Transportation Network was developed to provide a network of safe, convenient, and continuous pedestrian and cycle routes. Supporting programs were also developed to and overall the goal of the Active Transportation Plan is to increase accessibility to these modes. Routes were classified as follows:

- **Regional Routes** that provide connection between major centres (e.g. between Langdale, Gibsons, and Sechelt);
- **Major Routes** that provide connection between locally significant destinations such as neighbourhood centres and major attractions;
- **Major Alternative Routes**: interim or low-cost alternatives that are more easily implemented prior to the major route network;
- **Support Routes** that "fill the gaps" between the major route network and deliver users to / from population centres;
- **Recreational Trails** not used for utilitarian transport - see the "Parks" section of the OCP.

Revisions were made to the sidewalk and bike route minimum provisions outlined in By-Law 430 to develop "typical" active transportation cross-sections. Routes were then evaluated based on expected return on investment. In general, funds should be allocated to developing the Active Transportation Network each year and should first be allocated to opportunities to overlap with new development, capital works, or non-District projects. Remaining funds should be allocated towards developing the major route priorities, these include (in order of priority):

- Highway 101 upgrades (to be coordinated with MOTI): cycle shoulders, sidewalks, or multi-use trail as part of the corridor upgrade;
- Watermain Trail: an alternative to Highway 101 between West Sechelt and the Village;
- Davis Bay Trail: a relatively inexpensive east-west route using low-traffic volume streets and off-street trails - prior to improvements on Highway 101;
- Trail Avenue: the north-south spine of the Active Transportation Network to include cycle lanes (where possible), sidewalks both sides of the street, and intersection treatments that prioritize pedestrians and cyclists;
- Completion of the Nickerson / Crowston / Ripple Trail network.

It is estimated that approximately 19% of the proposed Active Transportation Network already exists. A further (approximately 41%) could be developed through DCCs, developer construction, or other non-District funded road projects. The remainder would need to be funded by the District.

Other important elements of the Active Transportation Plan are: enhancing the availability of bicycle parking through incorporating cycle parking into the Zoning By-Law and establishing a bicycle rack program; the education of cyclists and motorists; and guidelines for the consistent application of pedestrian and cyclist pavement markings and signage.

Transportation Improvement Funding

Much of the recommended road and active transportation networks are tied to the needs of future growth. As such, Development Cost Contributions (DCCs) should be reviewed to ensure they can adequately fund the cost of these projects.

Transit

The role of transit in the District can be enhanced by higher density, mixed use, and more compact development within growth areas that will support transit service expansion and increased frequency.

Local service enhancements that support the well patronized Route 1 should continue to be investigated. In particular, demand-responsive transit that provides more flexible scheduling and more efficient utilization of the vehicle fleet and the creation of a multi-modal transportation hub that provides a competitive alternative to vehicle travel should be explored.

New Development: Traffic Impact Assessment

It is recommended that new developments generating over 50 new vehicle trips during the peak hour be required to prepare a Traffic Impact Assessment (TIA) to determine impacts of the proposed development on existing roads and other transportation infrastructure, and to identify upgrades required to service the new development. A TIA may also be triggered by specific concerns such as safety, intersection geometry, parking provision, sensitivity of local neighbourhoods, servicing, transit, etc.

The contribution of the development to active transportation, transit service enhancements, and other travel demand management (TDM) strategies should form part of the study.

1.0 Setting the Context

The District of Sechelt retained Bunt & Associates to prepare an update to the Transportation section of the Official Community Plan, which is currently being revised, and to prepare a Transportation Master Plan that includes an update to the:

- Road Network Plan;
- Active Transportation (Pedestrian and Cycling) Plan; and
- Non-Automobile Transportation Framework.

This report is separated into two sections, the first (Part A) will establish a "baseline" of current transportation conditions and identify pressures that could be placed on the system with future growth. The second (Part B) will develop and test strategies to alleviate these pressures resulting in a recommended plan that can be used to guide transportation decisions in the District.

Readers are referred to Section 12 for a summary of the Transportation Master Plan and its findings. This summary will also form the basis of the Transportation section of the updated Official Community Plan.

1.1 Geographic Extent

This study includes the seven major neighbourhood areas within the District of Sechelt:

- Downtown / Village;
- East Porpoise Bay;
- West Porpoise Bay;
- Selma Park / Davis Bay / Wilson Creek;
- West Sechelt;
- Tuwanek; and
- Sandy Hook.

Areas outside, but influencing the District, such as the Sechelt Nation, the Sunshine Coast Regional District, and external traffic demands along Highway 101, have also been considered where relevant. The study area is illustrated at **Figure 1.1**.

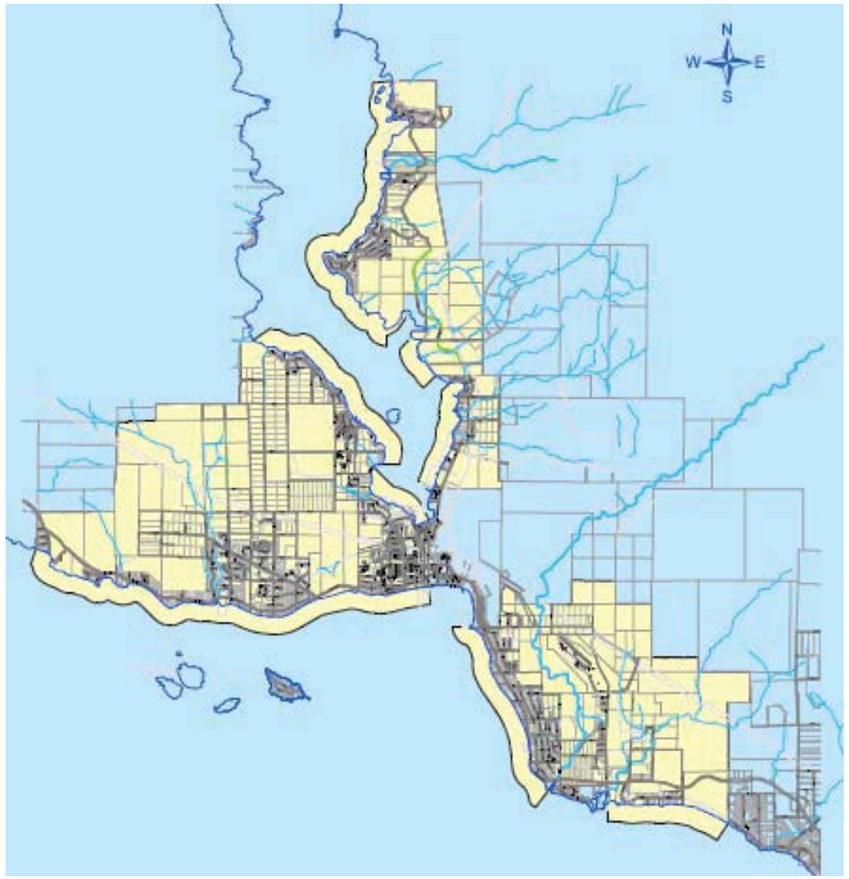


Figure 1.1: Study Area

2.0 Introduction

Part A of this report will establish a "baseline" of current transportation conditions and identify opportunities and constraints in the transportation system that will need to be addressed to accommodate future growth. The following tasks are included:

- Review previous transportation planning undertaken by the District and other regional stakeholders;
- Consult with local stakeholders to share existing and future transportation concerns;
- Inventory existing transportation infrastructure, traffic, and pedestrian volumes; and
- Prepare an analysis of existing transportation conditions.

2.1 Current Transportation Options

Residents of Sechelt currently have a variety of transportation options available including:

- **Private Vehicle**: this is the primary mode of travel on the Sunshine Coast and is the historic focus of most of the transportation infrastructure in the area;
- **Walking**: many streets in the Village and elsewhere provide sidewalks on one or both sides of the street. Where there are no sidewalks, on low traffic volume streets pedestrians are comfortable sharing the road with vehicles. However, on higher volume streets such as Highway 101, pedestrians are forced to walk on the road shoulder adjacent heavy and fast-moving traffic;
- **Cycling**: there are few designated bicycle lanes or paths in the District. As such, cyclists share the travel lanes with vehicles;
- **Transit**: BC Transit, through the SCRD, provides local bus routes in and around Sechelt and a regional connection between the Village and the Langdale Ferry Terminal. Malaspina Coach Lines, a private operator, offers a daily service between Powell River and the Vancouver International Airport, with stops in Sechelt;
- **Rideshare / Car-Pooling**: formal rideshare is provided through the Jack Bell Rideshare program. More informal rideshare and car-pooling also occurs amongst the local community;
- **Ferry**: BC Ferries provides service from the Sunshine Coast to the Lower Mainland (via the Langdale - Horseshoe Bay route) and Vancouver Island (via the Earls Cove – Saltery Bay and Powell River – Comox routes). The Langdale – Horseshoe Bay route is well patronized by commuters to the Lower Mainland and recreational users, which peak during summer;
- **Air**: regular float plane services are provided from Porpoise Bay to Nanaimo, Richmond / YVR, Jervis Bay, and other chartered locations. Small aircraft flights are also available to Victoria Airport from the Sechelt Airport located on Field Road;
- **Other**: water taxi services are provided to destinations along the Sunshine Coast and its nearby islands. Kayaks, sail boats, and other water-based transportation are also used to access more remote locations.

3.0 Previous Planning

A considerable amount of community and transportation planning has been conducted in the District over the past 15 years. These studies provide valuable background information on the historic approach to population growth and development, and an understanding of previous transportation planning decisions. A timeline of these studies is included at **Figure 3.1** and a review of each is included below.

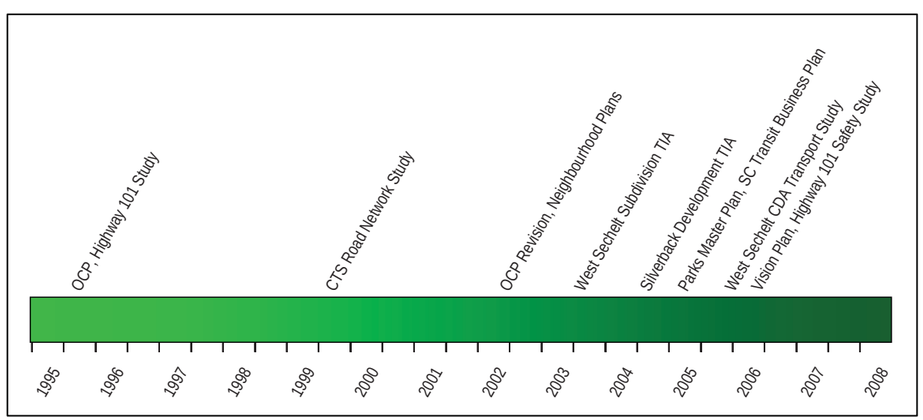
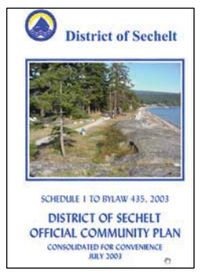


Figure 3.1: Timeline of Previous Studies.

3.1 District of Sechelt Official Community Plan (OCP) and Neighbourhood Plans

The OCP prepared by the District of Sechelt in 1996, and updated in 2003, establishes the District's policies towards planning, development, and environmental protection in the community. More detailed policies specific to each area are included in a series of Neighbourhood Plans. A review of the OCP is being undertaken in 2009; this Transportation Master Plan forms part of that review.



The OCP outlines a growth strategy aimed at increasing residential densities and mixed-use development, whilst preserving the unique characteristics of each neighbourhood. The intents of each of the land use designations are described in detail and policies developed around:

- Infrastructure and Public Utilities;
- Transportation;
- Education;
- Heritage Resources;
- Recreation, Parks, and Open Space; and
- Development Permit Areas.

Each of the Neighbourhood Plans provides a focus to the policies of the OCP, cognizant of their individual characteristics. For example, the West Sechelt Neighbourhood Plan includes policies that promote it as the primary area for residential growth, whereas the West and East Porpoise Bay Neighbourhood Plans focus on maintaining the existing rural character of these areas and emphasizing their natural and recreational opportunities.

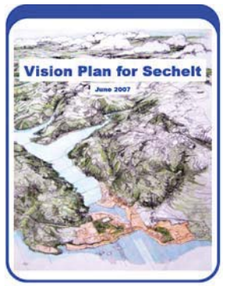
Commercial and retail development is generally confined to the Downtown / Village area (with the exception of pockets of commercial development along Highway 101 in Wilson Creek and Davis Bay). The lack of retail, commercial, and employment opportunities in most neighbourhoods (contrary to the policies contained in the OCP, which recognize the "direct relationships among land use densities, mix and proximity of uses, trip generation, and the viability of various modes") influences the number, length, and mode of trips created by these areas.

Similar to other communities in the Lower Mainland, the fiscal constraints of smaller communities often necessitate prioritization of the strategies identified by an OCP. Holistic improvement is achieved over time, e.g. very little ground has been gained on making the District more cycle-friendly, despite this being recognized as important within the community. However, proactive steps in the form of incorporating cycling facilities into the Development Servicing Bylaw and lobbying the Ministry of Transportation for improved access along Highway 101, are steps towards the future.

Although the OCP and the individual Neighbourhood Plans are being revised, a lot of the current language is still relevant today, and will form the basis for the revised document. The transportation discrepancies between the current OCP and a number of the Neighbourhood Plans will also be addressed in the revised document.

Copies of the existing OCP and Neighbourhood Plans are available on the District website:

http://www.district.sechelt.bc.ca/departments/landocp.php



3.2 Vision Plan

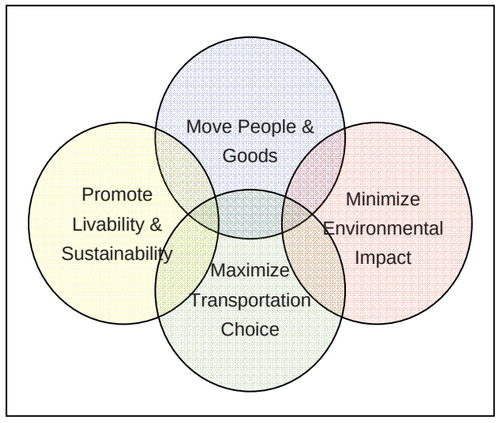
The 2007 Vision Plan for Sechelt provides a general direction for the community, developed through an extensive consultation process, addressing a variety of subjects. As stated in the Plan, the overall community vision is to:

"Create a community inclusive of all residents, which respects and conserves the natural environment, which ensures that growth is balanced, managed, and sustainable, and which realizes a high quality of life."

In terms of transportation, mobility, and access, the Vision Plan established a series of transportation goals to address the major concerns identified by the community, which included: the safety and lack of route alternatives to Highway 101; the coverage and adequacy of the current transit system; and the availability of automobile alternatives.

Specific strategies developed to support the Transportation Vision have not been repeated in detail; but focused on the following areas. These will form the basis of strategies developed as part of this study:

- Sunshine Coast Highway;
- Local Street Network;
- Pathway and Trail Network;
- Public Transit; and
- Air and Water Transportation.



Transportation Vision Elements.

A copy of the Vision Plan can be obtained from the District website:
http://www.district.sechelt.bc.ca/residents/communityvisioning2.php

3.3 Parks & Open Spaces Master Plan

The Parks and Open Spaces Master Plan prepared by the District of Sechelt in 2006 includes an analysis of existing parks and open spaces as well as a "Trails and Greenways Strategy" that details plans for the future development of these facilities.

The Plan recognizes that the District currently lacks multi-use pathways that link neighbourhoods and parks, which discourages cycling and walking as viable transportation modes. The Trails and Greenways Strategy proposes a system that will achieve the following goals:

- Connect all neighbourhoods with greenways;
- Create greenways that connect parks and open spaces;
- Create paths that connect residential areas to parks and open spaces;
- Create a network of trails/greenways that will encourage the use of auto-alternatives;
- Increase safety by providing an alternative to using the Sunshine Coast Highway as a pedestrian / cycling route; and
- Provide wildlife corridors.

Trail systems provide environmental, social, recreational, economic, and transportation benefits to the community and there are several trail types that were recommended for consideration in Sechelt including:

- Multi-use and shared-use trails;
- Pedestrian easements and walkways;
- Commuter bicycle lanes; and
- Hiking trails.

Proposed trail and path network improvements are described in more detail in the Parks & Open Spaces Master Plan. These will be integrated into the development of transportation strategies as part of this study.

A copy of the Parks & Open Space Master Plan can be obtained from the District website:
http://www.district.sechelt.bc.ca/pdfdocuments/ParksMasterPlan06.pdf

3.4 2000 Road Network Study

In 2000, the District commissioned the preparation of a Road Network Study by Creative Transportation Solutions Ltd. (CTS) and Associated Engineering to reflect the 1996 OCP and plan the transportation system to accommodate growth to 2021. This document has been used to guide infrastructure decisions, but was never officially adopted by Council.

The study reviewed traffic operations (at the time) to identify immediate operational and safety improvements. A traffic model was also developed, based on anticipated population growth, to test various future road network options including:

- Option 1: Do Nothing (i.e. the existing road network);
- Option 2A: With Highway 101 Bypass and Wharf connection;
- Option 2B: With Highway 101 Bypass and SIGD connection; and
- Option 3: With Davis Bay / West Sechelt connector.

Based on the options tested, the 2000 CTS Road Network Study suggested the following changes:

1. Construction of the proposed Highway 101 Bypass from Roberts Creek to Wharf Road;
2. Construction of a new municipal arterial known as the West Sechelt Connector from Lighthouse Avenue to Derby Road;
3. Extension of Tyler Road from Trail Avenue/Reef Road intersection to Mason Road as an arterial;
4. Construction of the Norwest Bay Road extension between Edward Road and Highway 101 as a collector road;
5. Signalization of the following intersections:
    - Existing Highway 101 & Field Road (completed);
    - Highway 101 Bypass & Field Road;
    - Highway 101 Bypass & Wharf Road;
    - Trail Avenue & new West Sechelt Connector;
    - Trail Avenue & Cowrie Street;
    - Wharf Road & E Porpoise Bay Road.
6. Yew Road be downgraded from a collector road to a local street;
7. Norwest Bay Road, between Mason Road and Lewarne Road be upgraded to an arterial road;
8. Mason Road be downgraded to a collector street, except between Norwest Bay Road and the Tyler Road extension;

The intermediate (2006 and 2011) and 20-year road network plans proposed as part of that study are included at **Appendix A**. This Transportation Master Plan represents an update to the 2000 study. Some of the above listed recommendations have been included in the new Road Network Plan.

3.5 Highway 101 Planning Studies

In 1996 and 1998 the Ministry of Transportation supported studies conducted by R.F. Binnie & Associates to identify and evaluate options for a bypass of Highway 101 between Elphinstone / Roberts Creek and Halfmoon Bay.

The study investigated four options and recommended an alignment that runs adjacent to the BC Hydro transmission lines and right-of-way, crossing Chapman Creek before passing through the Sechelt Band Lands north of the existing Hydro sub-station. It passes to the north of West Sechelt re-connecting with the existing highway just east of Trout Lake. The alignment is illustrated at **Figure 3.2** and consists of 4 stages:

- Stage 1: Roberts Creek from Pine Road to approximately the boundary with East Sechelt;
- Stage 2: East Sechelt and Sechelt Band Lands;
- Stage 3: Sechelt Business District;
- Stage 4: West Sechelt and Halfmoon Bay to Trout Lake.

The recommended bypass of Highway 101 is still the preferred long-range highway plan and has been reflected in this Transportation Master Plan. However, the Ministry has indicated that the relatively low population base served by the corridor (compared to other parts of the Province) and the difficulty in securing funding make this project a long-term proposition.

The Ministry is aware of the poor safety record of the existing Highway 101 and as an alternative to the bypass, investigated the feasibility of upgrading the existing corridor between the Conveyor Belt and Davis Bay in 2006. These improvements, taken to a preliminary design level by RF Binnie & Associates, were to include:

- Widening of road shoulders;
- Sidewalks;
- Cycle lanes;
- Left turn lanes at the following locations:
    - Mission Road (westbound);
    - Davis Bay Road (southbound);
    - Bay Road (southbound);

Proposed Highway 101 Bypass Alignment

(R.F. Binnie & Associates, 1996 - 1998)

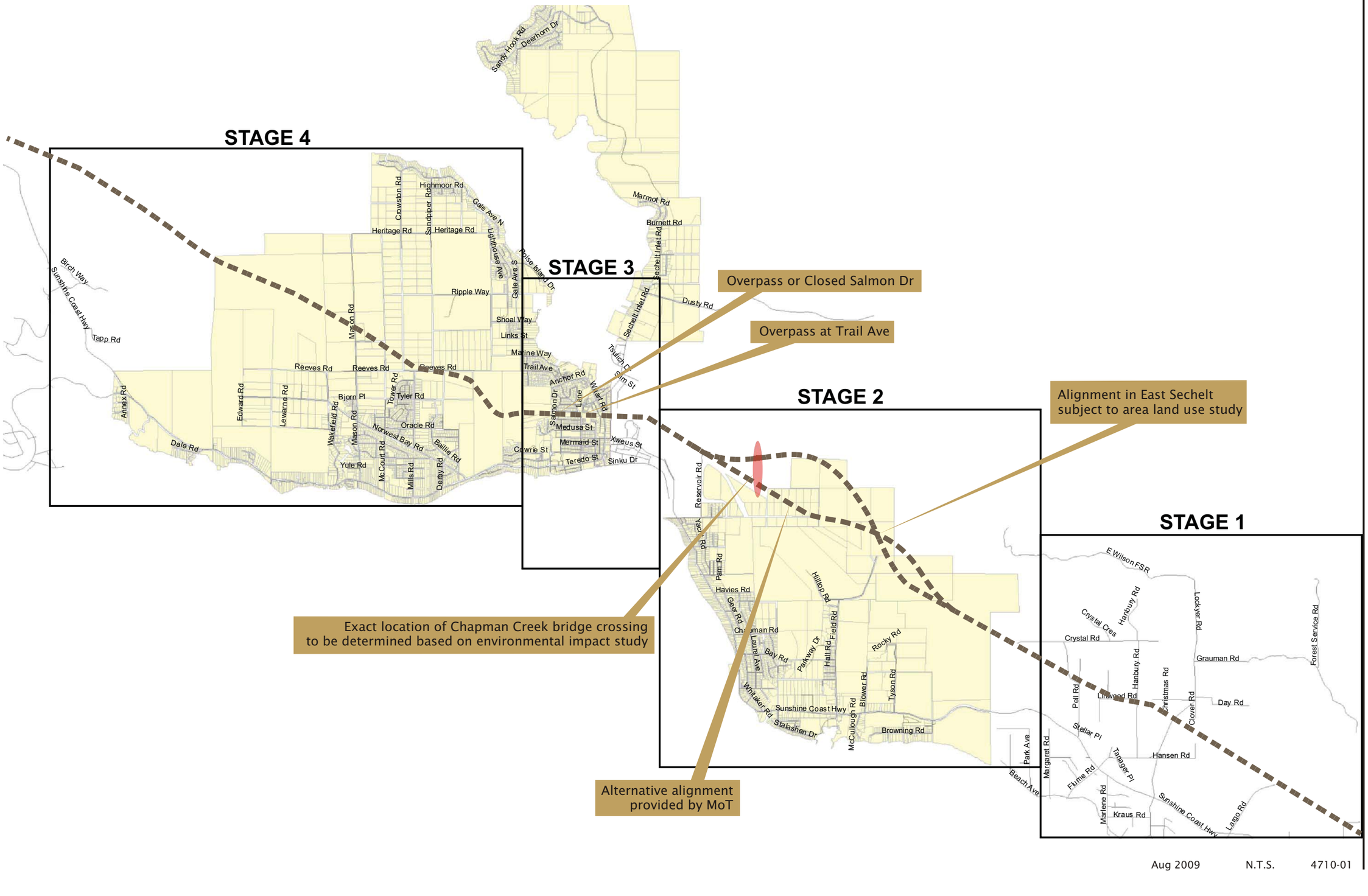


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Figure 3.2

- Heather Road (southbound);
- Nestman Road (southbound);
- Snodgrass Road (southbound);
- Selma Park Road (both directions);
- Monkey Tree Lane (southbound);

- Right-in / Right-out restrictions at Whitaker Road, Westly Road, and Havies Road; and
- Closure of Chapman Road and the frontage road east of the conveyor belt.

However, by 2008 increased land values (related to property acquisitions required for road widening) had altered the benefit / cost ratio such that the project was not considered cost-effective. As such, none of these changes have been made to the existing Highway 101, save for some re-grading of the road shoulders in isolated locations.

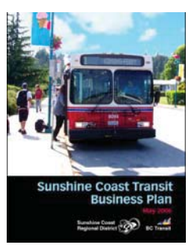
In 2007, the Ministry of Transportation commissioned a safety study by Urban Systems of the existing Highway 101 corridor between North Road in Gibsons and Redrooffs Road west of Sechelt. Collision rates in Sechelt were found to be above the Provincial average. As a result, three mitigation strategies were proposed:

1. General corridor-wide safety improvements to address ambient safety issues such as signage, pavement marking, guardrails, etc;
2. Spot safety and operational improvements including the signalization of Norwest Bay Road (completed in 2009); and
3. Corridor improvements within Sechelt including:
   a. Left-turn lanes, widened shoulders, sidewalks, and bike lanes through Davis Bay and Selma Park;
   b. Alternative Highway 101 routing options through Downtown Sechelt including two one-way couplet options included at **Appendix B**.

To date most of these improvements have not been made and conditions remain unsatisfactory.

3.6 Sunshine Coast Transit Business Plan

Transit service on the Sunshine Coast is delivered through a joint initiative between the Sunshine Coast Regional District and BC Transit. The Sunshine Coast Transit Business Plan was prepared in 2006 to guide development of an effective, reliable, and affordable transit system that serves both present and future demands. Current transit routes, and proposed modifications, are shown at **Figure 3.3**.



Population growth and land use trends will play a large part in the effectiveness of future transit service. The Business Plan recognizes that the majority of growth in the near and intermediate term is likely to occur in West Sechelt and that the fastest growing demographic is expected to be older seniors (i.e. persons over 80). A revision of service to this area is intended during 2009.

Ridership Facts (Source: BC Transit)
Peak time: weekday midday.
Demographics: 30% students; 20% seniors (aged 65+) or disabled.
Popular route: over 85% of weekday transit use is on Route 1: Langdale – Sechelt.

A number of service improvement options were considered, which focused on improved service frequencies and improved service coverage. It was recommended that increased weekday service frequencies on the existing Sechelt – Langdale route be implemented in phases, as shown in **Table 3.1**. Long-term, the service would be restructured to create separate regional and local routes (this would not affect Sechelt).

Table 3.1: Proposed BC Transit Service Increases

Phase	Description	Additional Buses	Increased Annual Service Hours
1A	Additional bus during peak periods (6-10 a.m. and 2-6 p.m.)	1	1,560
1B	Additional bus all day (6 a.m. – 6 p.m.)	0	1,040
2A	Second additional bus during peak periods (6-10 a.m. and 2-6 p.m.)	1	2,080
2B	Second additional bus all day (6 a.m. – 6 p.m.)	0	1,040
Total		2	5,720

The Business Plan also recognizes that fare strategies (e.g. pre-paid and integrated fares), on-street facilities (e.g. benches and shelters), transportation demand management, and effective promotion and marketing of the transit system would encourage greater transit ridership.

A copy of the Transit Plan can be obtained from the BC Transit website:

http://www.bctransit.com/regions/sun/news/bpl/pdf/sun-bpl1051.pdf

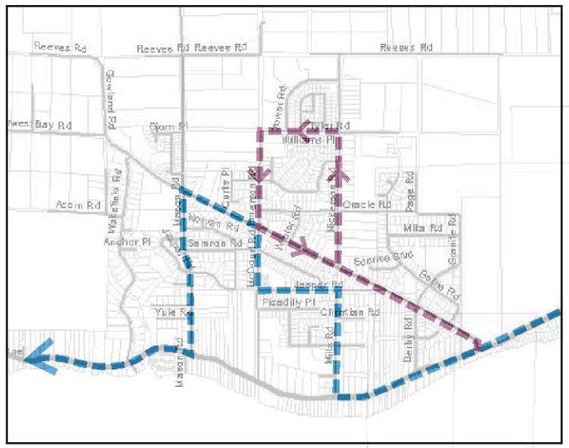
3.7 Traffic Impact Assessments

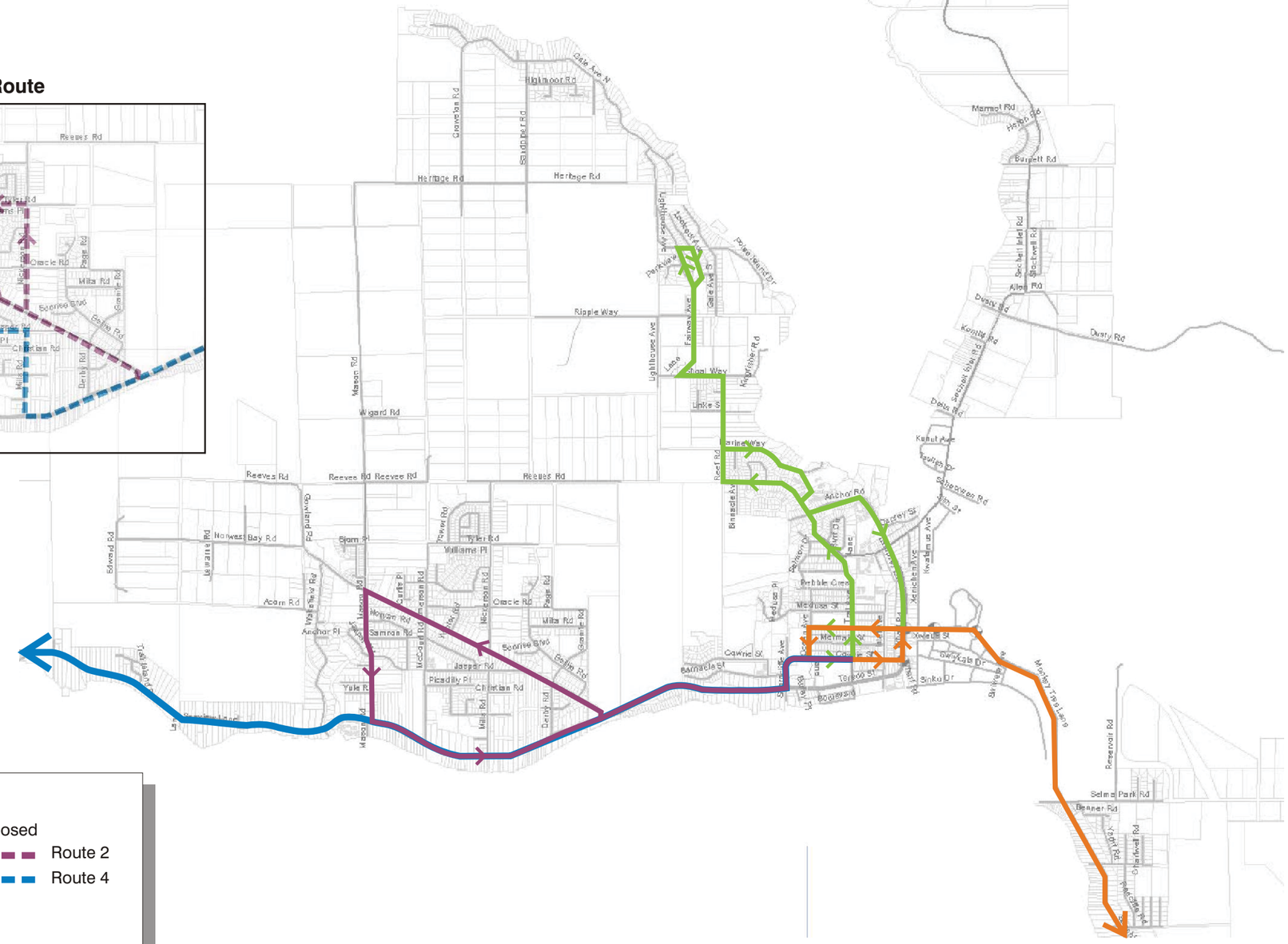
A number of traffic impact assessments have been conducted in association with land development applications in the District. These studies have suggested a number of improvements to the road network, some of which have been considered as part of this study. Details of these studies are included at **Appendix C**.

Transit Routes

District of Sechelt Transportation Master Plan

Proposed Route





Legend:

Current	Proposed
Route 1	Route 2
Route 2	Route 4
Route 3	
Route 4	

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Figure 3.3

3.8 Sechelt Nation

On the Sechelt Nation Lands, the Tita Way Road connection between Highway 101 and East Porpoise Bay Road was identified as necessary for Phase 2 of the SilverBack development. However, it would also serve the purpose of opening up the Sechelt Nation Lands for further development, and provide an alternative route for East Porpoise Bay, Sandy Hook, and Tuwanek residents.

It would also relieve some traffic from the busy Highway 101 / Wharf Street intersection. However, even with the removal of this traffic (and irrespective of the SilverBack development) additional improvements, e.g. intersection improvements or a bypass to Highway 101, are likely to be required to accommodate anticipated future traffic at this intersection (see Section 9).

It is understood (anecdotally) that the Sechelt Nation has recently completed a land use planning study that focused on commercial and industrial uses accessed via Tita Way Road. This will significantly increase the amount of industrial land in Sechelt. Given its proximity to both the Highway and the Village, the Band Lands would also be an ideal location for mixed use development and could accommodate a significant population, more easily served by infrastructure than other areas of the District.

4.0 Current Transportation Conditions

This section describes the existing transportation system in terms of road, transit, cycling, and pedestrian networks. It provides a snapshot of traffic and pedestrian volumes, analyses existing traffic operations, and identifies intersections with high collision frequency and/or rates.

The section finishes with a summary of an independently conducted Sunshine Coast Transportation Survey, which provides a sample of how people in the District currently travel and what transportation systems they would most likely use in the future.

4.1 Transportation Inventory

4.1.1 Road Network

Sechelt has a unique road network that serves both an urban and rural character. The historic development of many of Sechelt's neighbourhoods, as rural areas under the control of the SCRD, has resulted in many roads serving the dual functions of traffic movement (mobility) and land access (accessibility) given the lack of alternative routes to separate these functions.

Although a planning designation, functional classification determines whether a road should provide mobility, access, or a combination of both. This designation is important to guide future planning and design, as well as to provide residents with a more definitive expectation of how their street is to perform (e.g. whether it is expected to carry higher traffic volumes). In the existing OCP and the *Subdivision and Development Control Bylaw No. 430*, roads and streets in the District are categorized into the following functional classifications:

1. **Arterials**: intended to primarily move traffic between regional (e.g. between the BC Ferries terminals) and locally significant destinations. Where possible, access is limited to consolidated points such as intersections with collectors and local streets, however in the District of Sechelt, individual property access is not atypical, e.g. along Highway 101.
2. **Collectors**: provide a link between mobility and access and act to distribute traffic from the mobility-based roads to local streets. Direct land access is also provided through a mix of consolidated and individual driveways. Local Example: Mason Road.
3. **Local Streets**: provide access to individual properties. These streets provide no regional or local connections and are often discontinuous. Local example: Chartwell Road.
4. **Limited Local Streets**: are generally those local streets ending in a cul-de-sac.
5. **Lanes**: provide access to individual properties or garages.

The existing road network and functional classification is illustrated at **Figure 4.1**.

The existing designations for the most part seem appropriate. It is suggested that an additional classification be added to distinguish between major arterials (serving regional destinations) and minor arterials (serving local destinations). It is important to recognize that there is only one major arterial road in the District (i.e. a road primarily focused on moving traffic between regional destinations with limited or consolidated property access), that is Highway 101. All other existing arterials should be re-classified as minor arterials with the understanding that these roads balance their mobility function with land access. Over time, opportunities to consolidate access on both major and minor arterials should be taken.

A new designation of "Main Street" could be introduced in the Village and other commercial areas to promote design that is conducive to economic activity such as slower vehicle speeds, on-street parking, and an improved pedestrian and cycling environment. This has not been reviewed as part of this study and should form part of an update to Bylaw 430.

Further, an over-laying designation of "Active Transportation Corridors" should identify routes where priority is given to facilities and treatments that support cycling, walking, and other active transportation modes. This may include on-street cycle lanes, sidewalks on both sides of the street, parallel multi-use trails, and / or specific intersection treatments. These designations are noted in the Active Transportation Network Plan (see Section 10).

Note that functional classification of a roadway does not necessarily prescribe a specific design - it is possible to have a menu of roadway designs within each road class. Most municipalities maintain a set of standard roadway cross-sections linked to their roadway classification system to assist in future roadway planning with the flexibility of adapting these to suit the local environment, e.g. drainage and landscaping requirements. An example of these guidelines is included at **Appendix D**. Updates to the District's roadway cross-sections should be incorporated into a review of Bylaw 430.

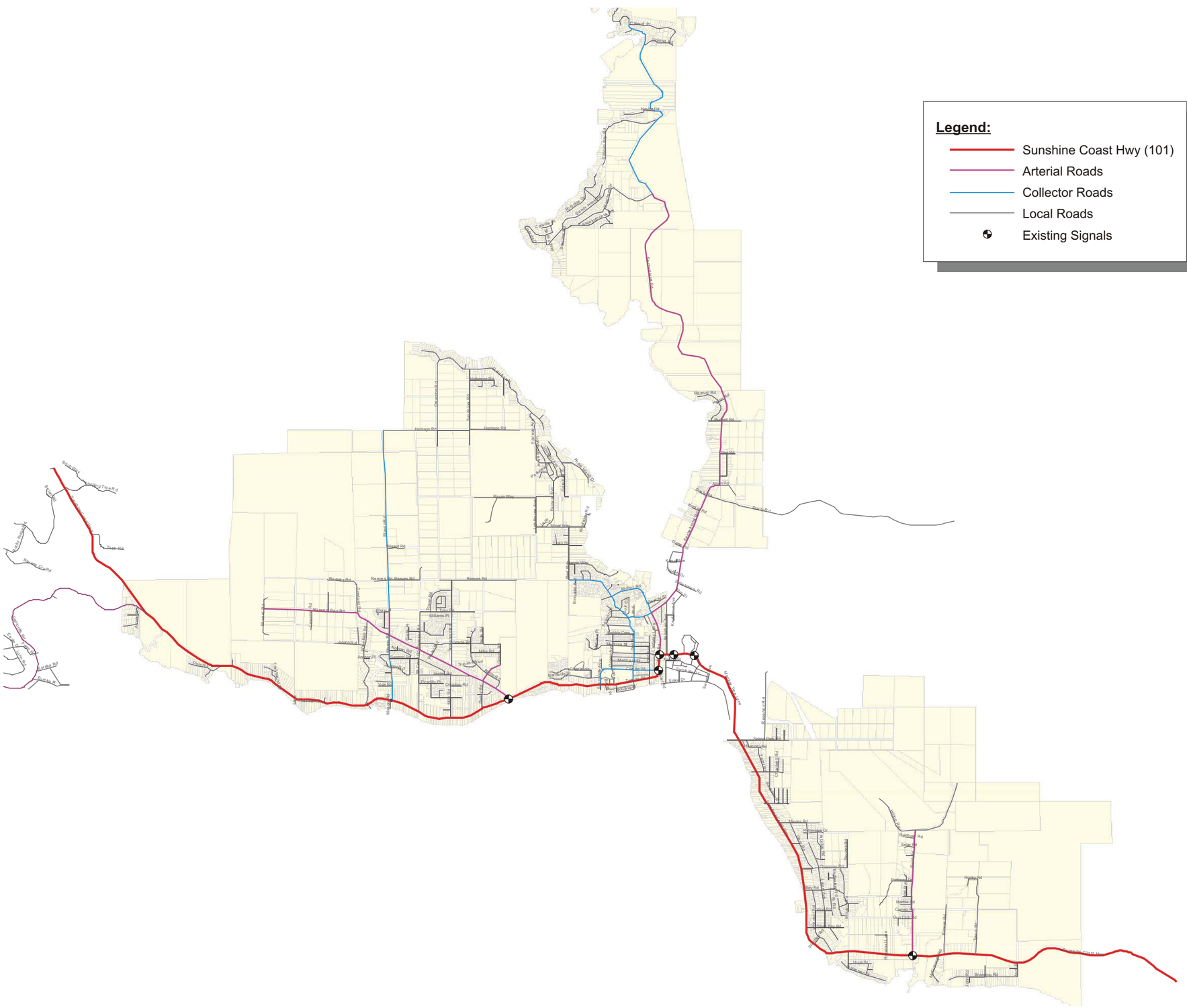
> **Recommendation 1**: that the District undertake a review of Bylaw 430. The review would include a revision of the functional classification to distinguish between major and minor arterials and add the "main street" designation. It should also update its recommended cross-section standards to incorporate the flexibility for context-sensitive design and the provision of active transportation facilities (i.e. trails, sidewalks, cycle lanes, etc.). A definitive position on direct access should be established for each road type – e.g. direct access should not be provided to major arterials and limited to only where necessary along minor arterials.

The primary arterial route along the Sunshine Coast, and through Sechelt, is Highway 101, which connects the BC Ferries terminals at Earl's Cove and Langdale, via Gibsons and Sechelt. This is also the only officially dedicated truck route in the District.

N

Legend:

- Sunshine Coast Hwy (101)
- Arterial Roads
- Collector Roads
- Local Roads
- Existing Signals



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Existing Road Network

District of Sechelt Transportation Master Plan

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Figure 4.1

The varying cross-section of Highway 101 is illustrated at **Figure 4.2**. The Highway is a two-lane roadway (with the exception of a 4-lane section through the Sechelt Nation Lands) that provides both a traffic-carrying function as well as driveway access to individual properties. Except at the major intersections in Sechelt Village, there is no provision for left-turn lanes, sidewalks, or cycle facilities. The alignment of the Highway winds around the southern edge of the Village through a number of 90-degree turns. It poses a significant barrier for access to the Trail Bay waterfront.

Figure 4.2: Highway 101 Cross-Sections.

Davis Bay (top left), Selma Park (top right), South Village (bottom left), and West Sechelt (bottom right).

4.1.2 Base Traffic Volumes

Existing traffic conditions were surveyed at a number of intersections by Bunt & Associates on Friday, November 21st 2008 between 2:00 p.m. and 6:00 p.m. Where appropriate, traffic volumes were adjusted to account for seasonal variations based on a comparison of monthly traffic patterns at the permanent count station controlled by the Ministry of Transportation located approximately 12 km east of Sechelt.

A lower adjustment was applied to non-Highway movements in the Village to account for some "drop-in" of trips related to the summer traffic increase, although this is not to the same levels as for Highway traffic movements. For local traffic movements, where recreational traffic effects are less pronounced, if any, no adjustment was made to the counted volumes.

At intersections where historic counts were used, growth factors were applied to represent the effects of highway traffic growth and development. **Table 4.1** describes the adjustments applied to counted traffic volumes. The resulting "2008 Base" traffic volumes are illustrated at **Figure 4.3**.

4.1.3 Current Transit Network

The existing transit network was illustrated at Figure 3.3 and consists of four routes. Proposed changes to Route 2: West Sechelt and Route 4: Halfmoon Bay (shown at Figure 3.3) will enhance transit coverage in West Sechelt, however have not yet been approved by BC Transit.

Transit ridership and revenue was surveyed for the four Sunshine Coast Transit routes over a two-week period in November 2007. Findings are included at **Figure 4.4**. Overall, the majority of transit demand (over 85%) is for the Sechelt – Langdale route. The number of transit rides per service hour peaks during the afternoon (PM) period, and is significantly higher than other periods of the day (see **Figure 4.4A**).

Figure 4.4B shows that approximately 30% of patrons are students (i.e. full-time students up to Grade 12) and a further 20% are either seniors (aged 65 or over) or have a BC bus pass (i.e. a pass provided by the Provincial Government for seniors and persons with disabilities on restricted incomes).

Due to the high ridership of the Sechelt – Langdale route, it costs just over $2 / ride to provide this service. The less patronized routes cost between $4 and $7 per ride. During the evening, the cost of providing service can be as high as $13 per ride (West Sechelt) or $22 per ride (Sechelt Arena). Overall, the cost of providing transit service to the Sunshine Coast is approximately $2.60 per ride (shown at **Figure 4.4C**).

2008 Weekday Peak Hour Traffic Volumes (14:30 - 15:30)

District of Sechelt Transportation Master Plan

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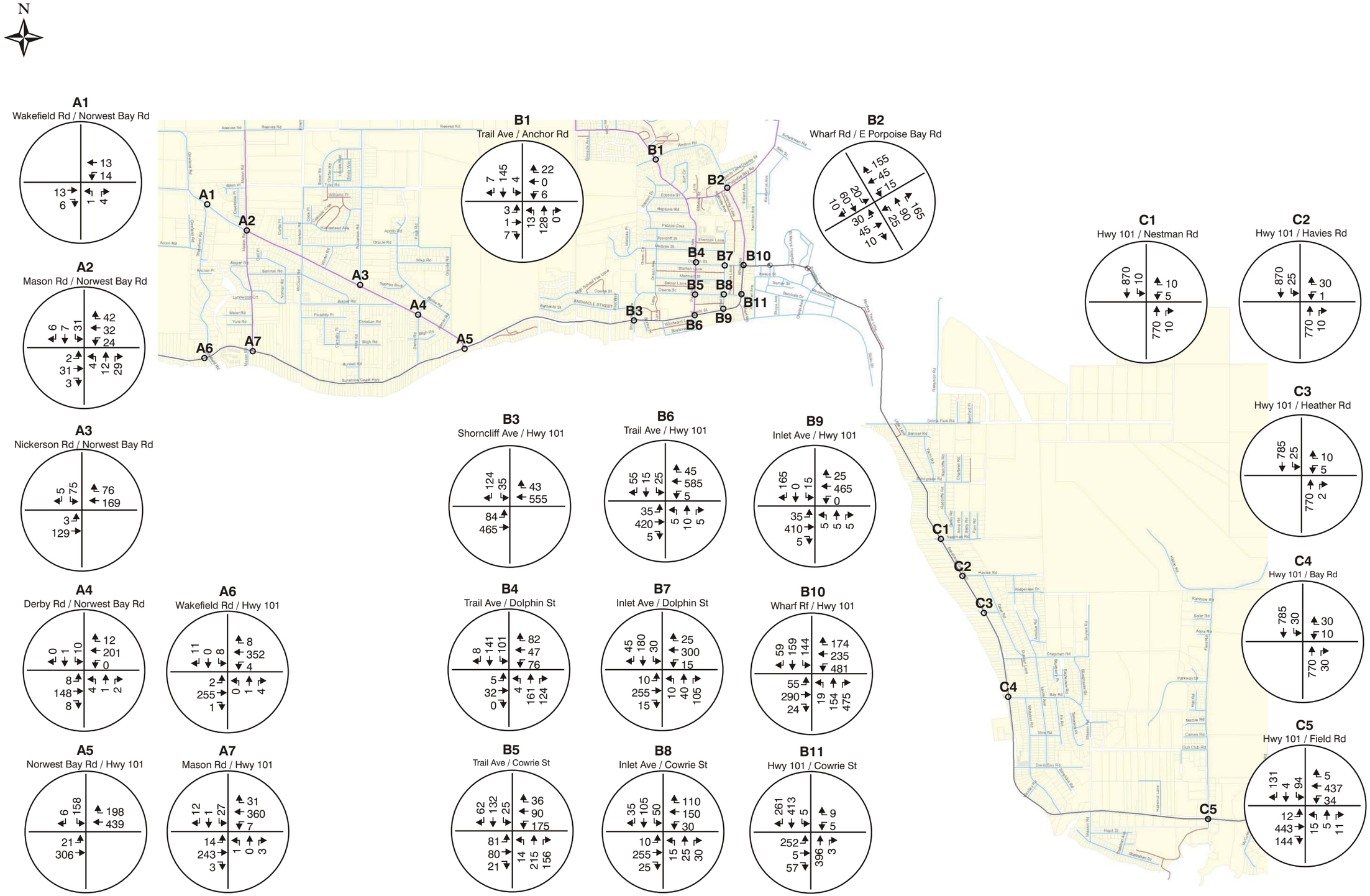


July 14, 2009 N.T.S. 4710-01

Figure 4.3

Table 4.1: Traffic Count Adjustments

Area	Intersection	Count Time		Adjustments Applied	
		Month	Year	Seasonal	Growth
Selma Park, Davis Bay, Wilson Creek	Hwy 101 / Field	Nov	2008	+15% (Hwy 101)	-
	Hwy 101 / Bay	Mar	2007	+15% (Hwy 101)	2.5% per year (Hwy 101) [1] 1% per year (other movements)
	Hwy 101 / Heather	Mar	2007		
	Hwy 101 / Havies	Feb	2006	+30% (Hwy 101)	
	Hwy 101 / Nestman	Feb	2006		
Downtown / Village	Hwy 101 / Wharf	Nov	2008	+15% (Hwy 101)	-
	Hwy 101 / Shorncliffe	Nov	2008		-
	Inlet / Dolphin	-	2007	-	-
	Inlet / Cowrie	-	2007	-	-
	Hwy 101 / Inlet	-	2007	-	2.5% per year (Hwy 101) [1]
	Hwy 101 / Trail	-	2007	-	
	Trail / Dolphin	Nov	2008	+5% (all movements)	-
	Trail / Cowrie	Nov	2008		-
	Wharf / Cowrie	Nov	2008		-
	Wharf / E Porpoise Bay	Apr	2005	-	1% per year (all movements)
	Trail / Anchor	Nov	2008	-	-
West Sechelt	Hwy 101 / Norwest Bay	May	2008	-	-
	Hwy 101 / Mason	May	2008	-	-
	Hwy 101 / Wakefield	May	2008	-	-
	Hwy 101 / Redroofs	May	2008	-	-
	Norwest Bay / Derby	Nov	2008	-	-
	Norwest Bay / Nickerson	Nov	2008	-	-
	Norwest Bay / Mason	May	2008	-	-
	Norwest Bay / Wakefield	May	2008	-	-

[1] Annual Average Daily Traffic (AADT) volumes on Highway 101 increased from 2,500 vpd in 2000 to 2,975 vpd in 2007, representing an average growth of 2.7%.

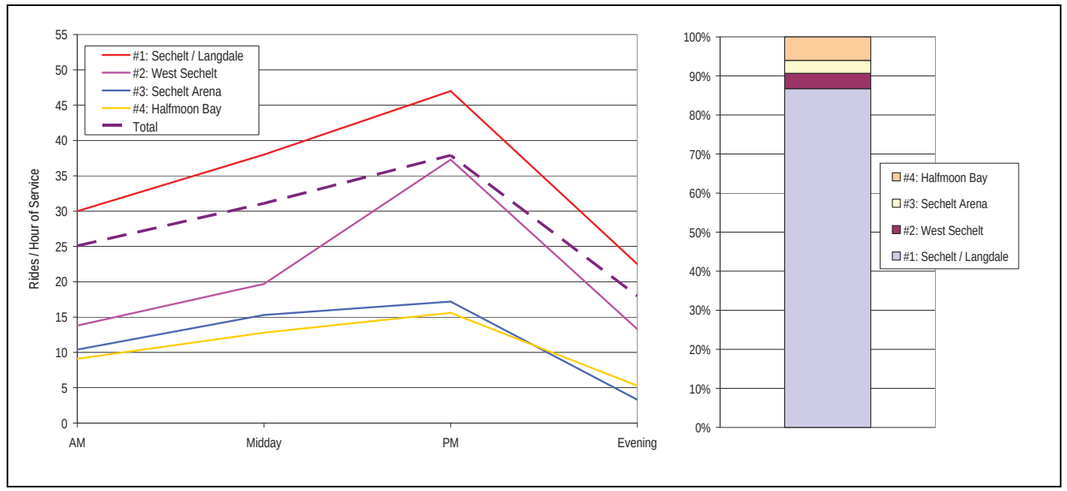


Figure 4.4A: Weekday Rides / Hour of Service Provided (main), Weekday Rides (inset).

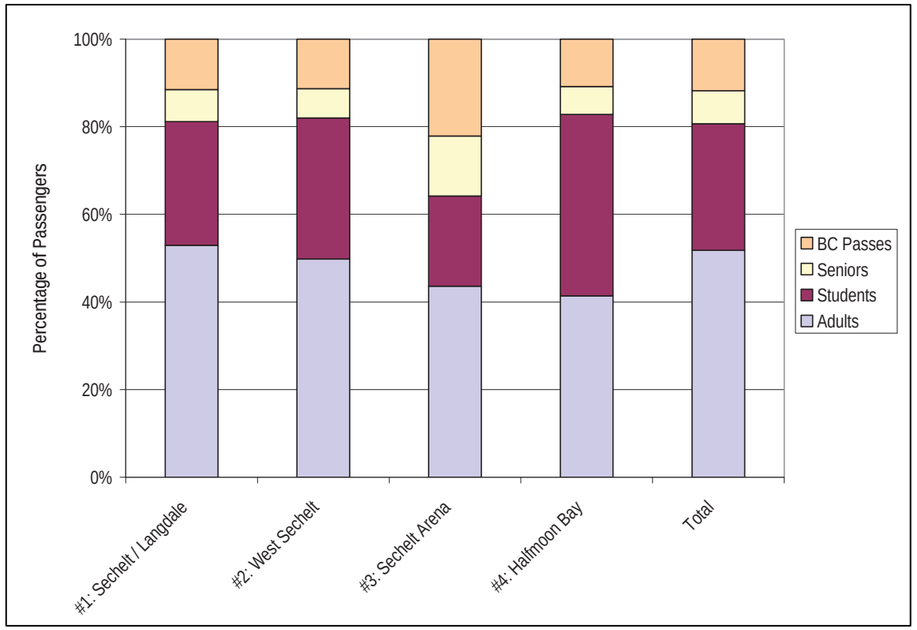


Figure 4.4B: Breakdown of Transit Clients (by Route).

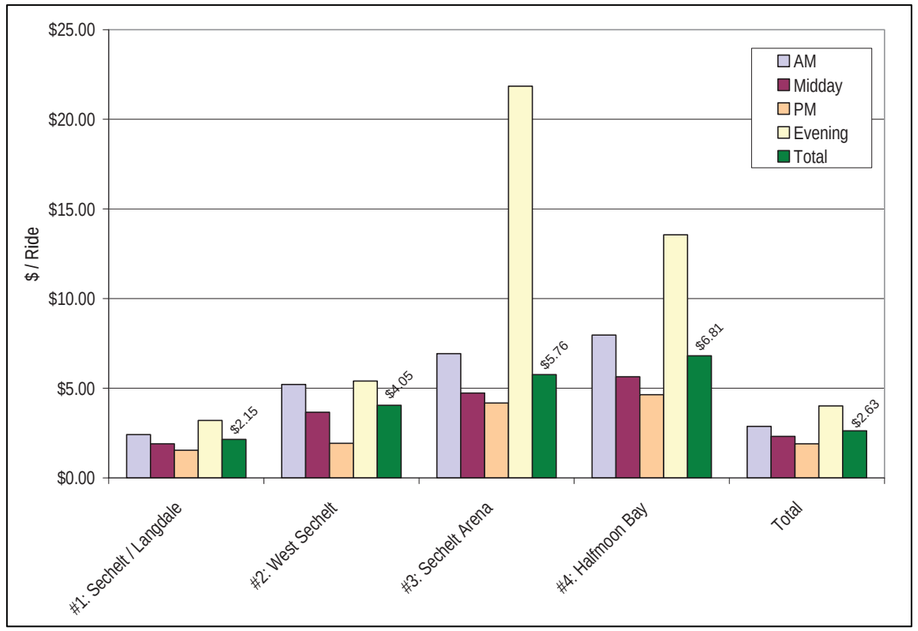


Figure 4.4C: Operating Cost / Transit Ride (by Route).

4.1.4 Current Bicycle / Pedestrian Infrastructure

The conditions for pedestrians and cyclists on many District roads are uncomfortable and at times dangerous. This has an effect on the desirability for people to use these modes.

Pedestrian counts were conducted at the study intersections at the same time as traffic counts (see Section 4.1.2). These are illustrated on **Figure 4.5** and show that in single-use areas, there are very few pedestrian movements observed. For example, the only significant pedestrian movements observed in West Sechelt were at the school and neighbourhood store at the intersection of Norwest Bay Road and Mason Road. It is recognized that pedestrian demands may peak at a different time than road traffic – likely to be during the middle of the day in the Village / commercial areas and in the mornings, evenings, and weekends in residential neighbourhoods.

The extent of the pedestrian sidewalk and trail network varies throughout the District. Areas that have a more extensive network of sidewalks include the Village, where most streets have sidewalks on at least one side; in Davis Bay along the waterfront and where redevelopment has occurred; and in West Sechelt as part of newer development. There are also a number of official and unofficial trails that connect various areas.

However, there are also many roads that do not have sidewalks. On local or low traffic volume streets, pedestrians can comfortably share the street. However a number of higher volume roads, including Highway 101 through Selma Park and west of the Village (which also provide the most direct and often the only pedestrian connections from these areas) do not have sidewalks. Pedestrians are frequently observed walking adjacent the traffic lanes on these roads.

Through the District's *Subdivision and Development Control Servicing Standards Bylaw No. 430*, new development is required to provide pedestrian routes and bike paths as "identified within a local or regional plan". The schedule repeated in **Table 4.2** identifies minimum sidewalk requirements. The Bylaw will allow the District's sidewalk network to build in the future, however there are a number of key connections identified in the Active Transportation Plan (see Section 10) that should be pursued more immediately by Council.

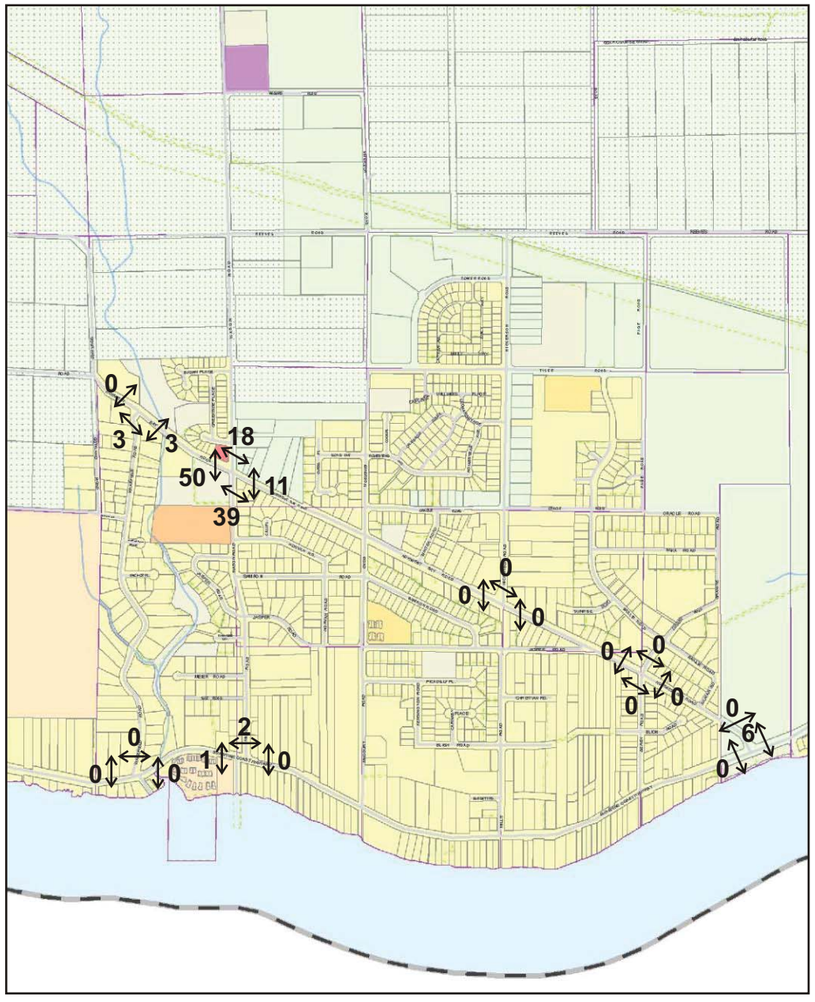
Table 4.2: Current Requirements for New Development (Bylaw 430)

Functional Classification	Requirement for Sidewalks			
	Single- and Two-Family Residential	Commercial, Institutional, and Multi-Family	Industrial	Rural
Local	Downtown / Village Neighbourhood only	1 – 2 sides	-	-
Limited Local	Downtown / Village Neighbourhood only	2 sides	-	-
Collector	1 side	2 sides	Required	Required
Arterial	1 side	2 sides	Required	Required

The current sidewalk requirements vary by road type and adjacent land use. However, this can lead to discontinuous sidewalk networks where various land uses are located along the same street. These standards should be consistent for each road type with variations introduced only between urban and rural roads. Bylaw 430 will need to be amended to incorporate revised sidewalk and bicycle requirements (see Section 10).

N

WEST SECHELT



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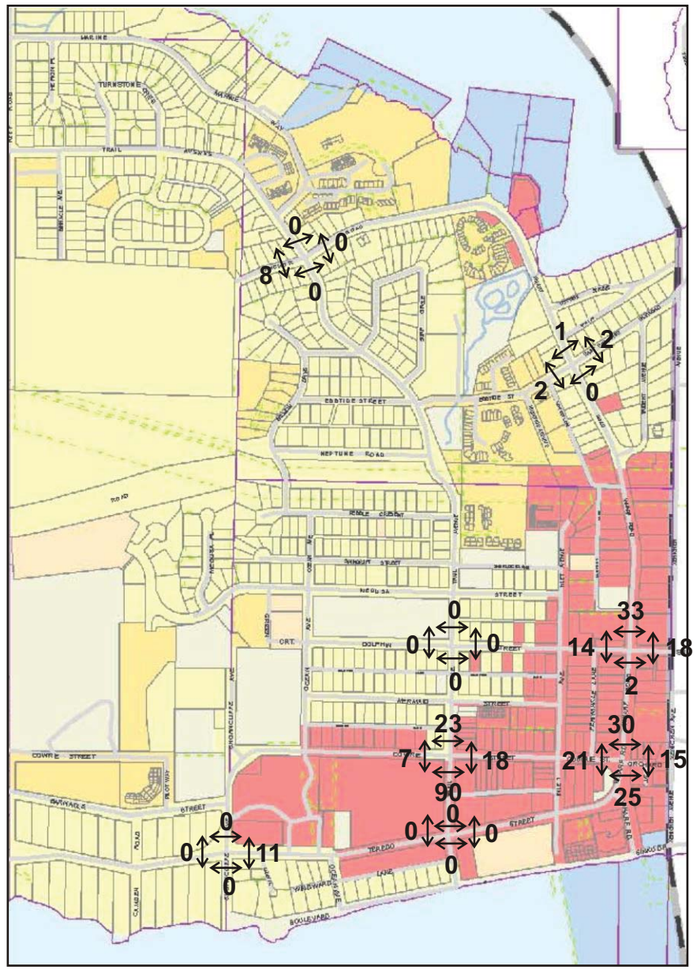
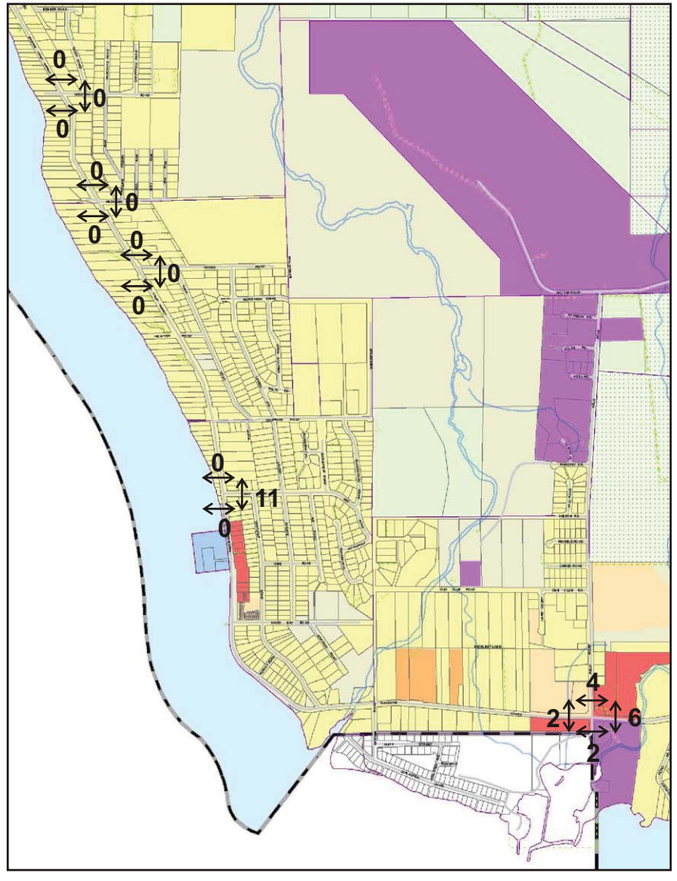


SELMA PARK, DAVIS BAY



Land Use Legend:

- Single Family Residential
- Multi-Family Residential
- Mobile Home Park
- Comprehensive Development
- Civic, Institutional, Recreational
- Commercial
- Industrial
- Rural Uses
- Marine
- Water

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2008 Weekday Peak Hour Pedestrian Volumes (14:30 - 15:30)

District of Sechelt Transportation Master Plan

Figure 4.5

Recommendation 2: that as part of the District's review of Bylaw 430, the requirements for new sidewalk and cycle facilities be updated to include (in addition to, or overlapping with, the routes proposed as part of the Active Transportation Plan):

- Local / Limited Local streets: sidewalks both sides (urban), sidewalks on neither or one side (rural), cyclists share street with motorists;
- Collector streets: sidewalks one or both sides (urban), sidewalks one side or off-road trail (rural), cycle lanes on-street; and
- Arterial roads: sidewalks both sides and on-street cycle lanes (urban), sidewalks on one side with cycling shoulders or provision of a multi-purpose off-road trail (rural).

Currently, bicycles share road space with vehicles on most District roads, i.e. there are very few dedicated cycle lanes. Paved shoulders are provided on certain sections of Highway 101. However, this is mixed with segments where no, or very narrow, shoulders are provided. In general, on-road riding conditions in the District are uncomfortable for cyclists. In terms of bicycle parking, the *Subdivision and Development Control Servicing Standards Bylaw* requires bike racks to be provided adjacent major offices, stores, and government buildings with development in the area of the Downtown Village Plan.

4.2 Traffic Operations

The ability of the road network to accommodate traffic demands is based on the capacities of intersections and the links that join them. This section explores traffic operations and explores how much of the available capacity is taken up by existing traffic volumes and what delays these vehicles currently experience.

4.2.1 Effect of Ferry Traffic

The unloading of ferry traffic at Langdale Ferry Terminal has a flow-on effect to the road network in Sechelt. These pulses of activity result in higher than normal delays for local traffic. This is particularly apparent during the summer months when ferry traffic is highest.

Based on the traffic counts conducted for this study, these pulses are anywhere from 20% to 40% higher than average traffic volumes (and may be even higher during the summer months). Overall, these pulses last for 15-30 minutes each time a ferry unloads, which represents approximately 20% of the day. This is particularly problematic after the 3:30 p.m. sailing from Horseshoe Bay to Langdale, which arrives at Sechelt between 4:30 – 5:00 p.m. and, although only occurring once per day and lasting for up to 30 minutes, combines with local traffic to form a larger than normal peak.

Basing road design on conditions that materialize for only short periods can lead to an over-design of the system. However, it is recognized that during ferry pulses, particularly along Highway 101 east of the Village there is nothing to break-up the flow of this traffic except for the signal at Field Road.

To assess more representative design conditions, peak hour volumes rather than peak 15-minute volumes have been used in the analysis. These volumes still include the volumes generated by the ferry pulses but allow the system to recover to more regular operations within the analysis period.

4.2.2 Performance Measures

Operational analysis has been performed using the VISUM software, consistent with the procedures of the *Highway Capacity Manual*. The intersection and movement volume-to-capacity (v/c) ratios and level-of-service (LOS) shown in **Table 4.3** have been used to determine when alternative intersection forms should be investigated. These criteria are generally accepted performance measures for small communities.

Table 4.3: Intersection Performance Criteria

		Unsignalized	Signalized
Overall	v/c	-	0.90
	LOS	-	D
Individual Movement	v/c	0.80	0.90
	LOS	D	E

Glossary

Volume-to-Capacity (v/c): a measure of the amount of roadway capacity taken up by traffic demand. The following scale has been adopted for the District of Sechelt:

- <0.80 : sufficient spare capacity;
- 0.80 – 0.95 : operations are congested and starting to approach capacity;
- 0.95 - 1.00 : intersection has reached effective capacity.

Level of Service (LOS): a qualitative measure of delay described using the letters A – F that represent certain delay conditions experienced by drivers. In this case, acceptable conditions represent delays of:

- <35 sec/veh at unsignalized intersections (i.e. LOS A – D); and
- <55 sec/veh at signalized intersections (i.e. LOS A – D).

Assuming the existing road network and signal timing plans, **Figure 4.6** shows the analysis results in terms of volume-to-capacity (v/c) ratio and level-of-service (LOS). Intersection performances are within acceptable conditions in West Section and the Village. Although particular movements at the Highway 101 / Wharf Road intersection, most notably the westbound left turn movement, are approaching capacity.

In Davis Bay, the minor street approaches at the Highway 101 intersections with Bay Road, Heather Road, Havies Road, and Nestman Road operate over-capacity and with significant delay.

A sensitivity test was conducted to determine the increased delays observed during the ferry pulses. These impacts are dependent on location, for example the additional delay incurred by vehicles turning out of Nestman Road in Davis Bay was an average of 7 seconds / vehicle, an increase of 44%. Whereas at the Highway 101 / Wharf Street intersection in the Village, overall delay increased by approximately 24% or an average of 3 seconds / vehicle.

4.2.3 Highway 101 Capacity

Traffic volumes on Highway 101 (just west of Field Road) were compiled using the November 2008 traffic counts (factored to July conditions) and the daily traffic profile observed from the nearest permanent count station 12km east of Sechelt. The resulting daily traffic profile is shown at **Figure 4.7** along with the capacity of the highway, calculated to be approximately 1,800 vehicles per hour (vph) based on the FHWA's *Highway Performance Monitoring Procedure*.

Current traffic volumes operate below operational capacity and based on current traffic growth trends on the Highway (approximately 2.5% growth per year), absolute capacity would not be reached for another 8 – 10 years and may be further prolonged if recent population growth can not be sustained under slowing economic conditions. However, the timeliness of the process (from planning to construction) necessitates that strategies to address the capacity (and safety) of Highway 101 be considered now.

> **Recommendation 3**: that the process for implementing strategies for Highway 101 be started immediately to ensure sufficient time to ensure that funding, planning, design, and construction can all take place prior to Highway 101 reaching practical capacity.

A comparison of the growth in Highway 101 traffic volumes compared to population growth in both the District of Sechelt and the Sunshine Coast Regional District since 2000 is included at **Figure 4.8**. The higher growth in traffic volumes (compared to population growth) may be a result of increased visitor and tourist numbers and/or a change in regional employment destinations with an increased number of people having to (or preferring to) commute to the Lower Mainland.

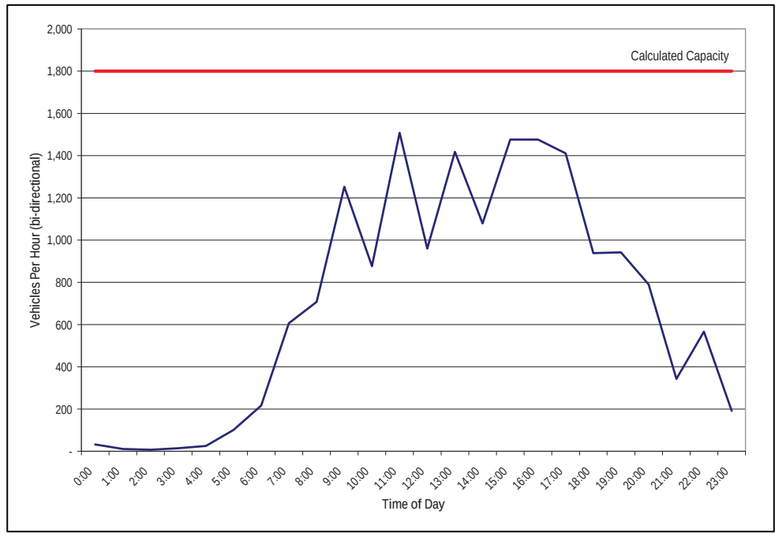


Figure 4.7: Highway 101 Daily Traffic Volume Profile (Representative of July 2008 Conditions, West of Field Road)

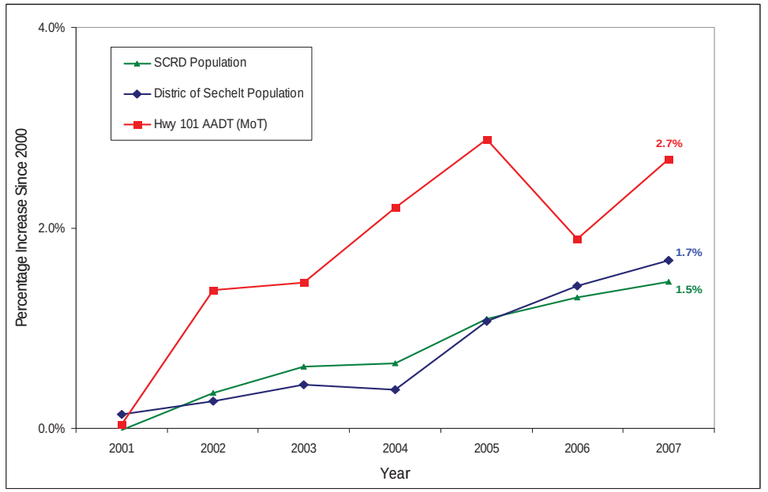
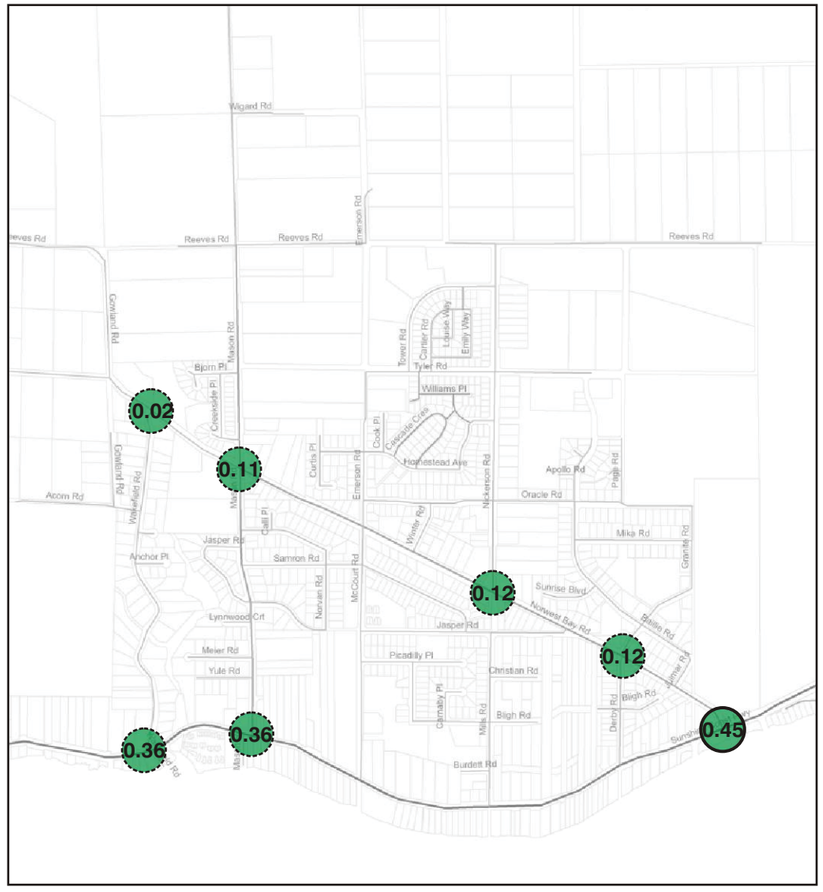


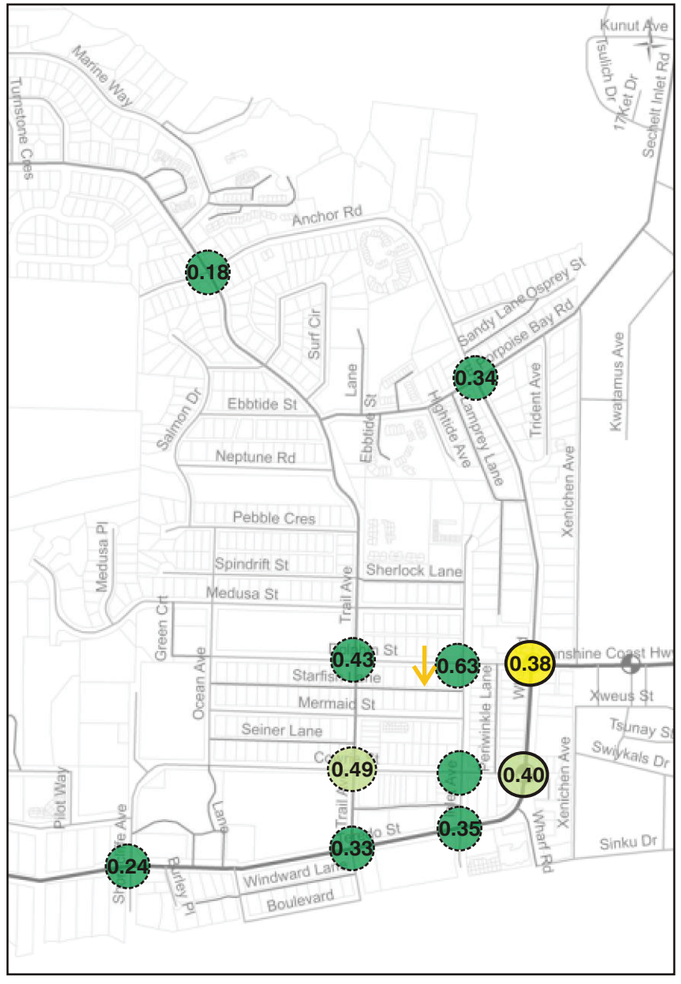
Figure 4.8: Comparison of District of Sechelt and SCRD Population Growth With Highway 101 Traffic Growth.

Existing (2008) Intersection Performance
Friday PM Peak Hour

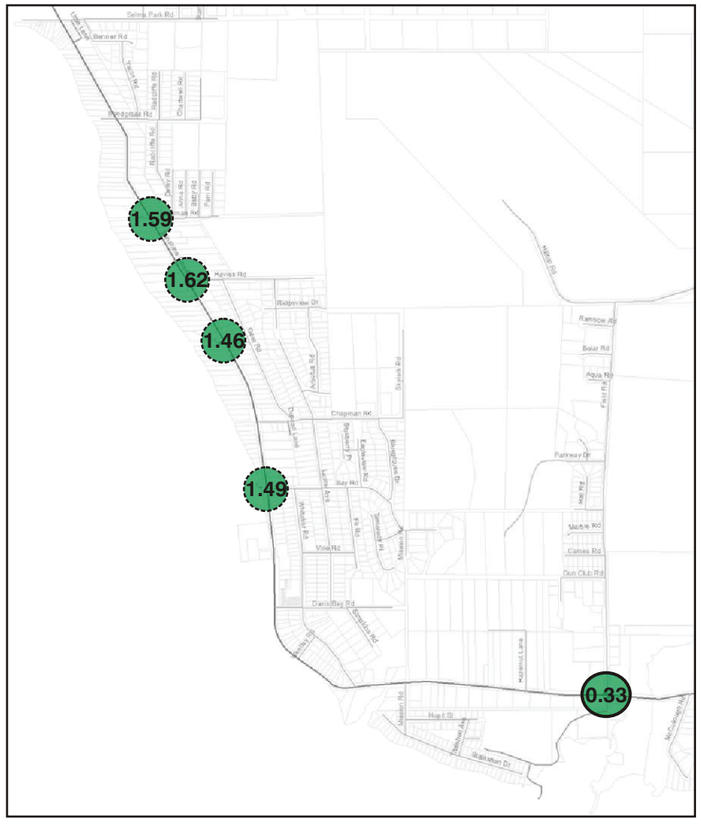
WEST SECHELT



DOWNTOWN



SELMA PARK, DAVIS BAY



Legend:

- Level of Service (LOS) A
- Level of Service (LOS) B
- Level of Service (LOS) C
- Level of Service (LOS) D
- Level of Service (LOS) E
- Level of Service (LOS) F

0.63 Volume-to-Capacity Ratio

→ Movement with LOS "D" or worse

Unsignalized

Signalized

NOTE:

Level of Service	Delay	
	Signalized	Unsignalized
A	≤ 10 sec	≤ 10 sec
B	≤ 20 sec	≤ 15 sec
C	≤ 35 sec	≤ 25 sec
D	≤ 55 sec	≤ 35 sec
E	≤ 80 sec	≤ 50 sec
F	> 80 sec	> 50 sec

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Figure
4.6

4.3 Transportation Safety

Crash history has been determined from reported crash data provided by the Insurance Corporation of British Columbia (ICBC), which includes both the insurance claims and police report databases. A total of 1,151 crashes were reported in the District for the five years between 2003 and 2007.

Figure 4.9 shows a breakdown of crashes by year and severity and illustrates the following trends:

- Few **fatal** crashes were recorded in the District; only 2 crashes, or 0.2% of all crashes;
- **Injury** crashes represent 30 - 40 reported crashes each year. On average, the number of injury crashes has increased approximately 6% per year since 2003;
- The number of **property (vehicle) damage** crashes has increased each year (approximately 16% per year) and represents the majority of crashes.

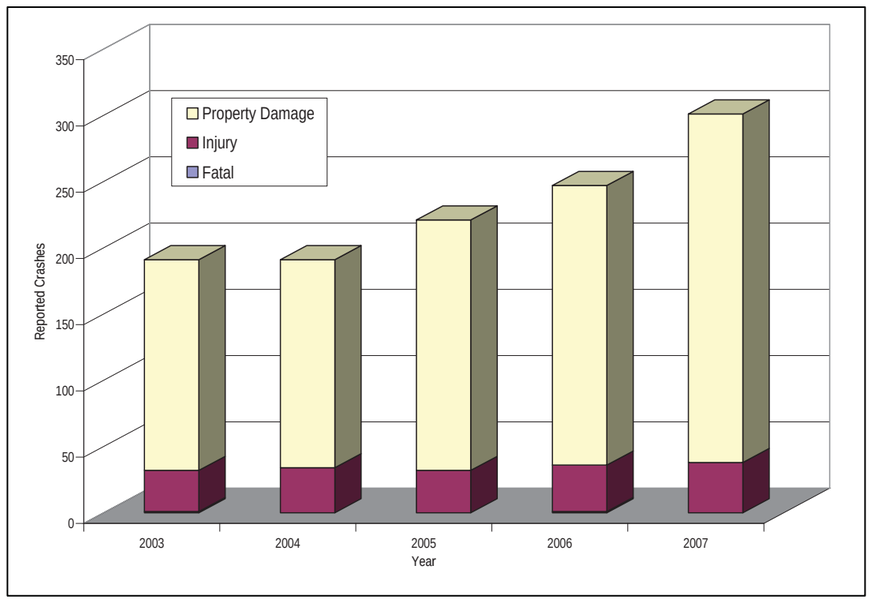

Figure 4.9: Trend in Reported Crashes in District of Sechelt (2003 – 2007)

Intersections have been analyzed in detail and a ranking developed from a combination of the highest frequency sites (weighted by severity) and sites with the highest crash rates. The results are summarized in **Table 4.4**. Intersections with crash rates exceeding Provincial averages have been highlighted.

The fatal crashes included in the ICBC database both occurred on Highway 101 west of Wakefield Road – a single vehicle crash in August 2003 and a head-on crash in July 2006. It is understood that there has also been a recent pedestrian fatality at the Highway 101 / Wharf Street / Dolphin Street intersection.

Table 4.4: Crash Rate Analysis

Intersection	Crashes			Weighted Score[1]	Crash Rate[2, 3]	Overall Rank[4]
	Total	Injury	PDO			
Wharf/Cowrie	67	4	63	143	2.17	T1
Teredo/Trail	48	9	39	219	2.08	T1
Dolphin/Trail	23	11	12	232	1.31	3
Cowrie/Trail	45	5	40	140	1.82	4
Hwy 101/Davis Bay*	21	12	9	249	0.54	5
Hwy 101/Redrooffs*	16	5	11	111	1.13	6
Norwest Bay/Mason	6	2	4	44	1.47	7
Cowrie/Inlet	19	3	16	76	1.18	T8
Inlet/Teredo	13	5	8	108	0.60	T8
Hwy 101/Norwest Bay	8	6	2	122	0.41	10
Wharf/Dolphin	20	5	15	115	0.38	T11
Hwy 101/Bay	12	6	6	126	0.31	T11
Hwy 101/Wakefield	8	4	4	84	0.56	T11
Inlet/Dolphin	12	1	11	31	0.61	14
Hwy 101/Snodgrass*	14	4	10	90	0.36	15
Wharf/East Porpoise Bay	7	1	6	26	0.42	16
Hwy 101/Monkey Tree*	6	2	4	44	0.15	17
Hwy 101/Selma Park*	8	1	7	27	0.21	18
Cowrie/Ocean*	5	0	5	5	0.30	19

[1] Weighted Score = 100 x fatal + 20 x injury + 1 x PDO (based on guidance from the TAC *Canadian Road Safety Audit Guide*).

[2] Rate = crashes / million entering vehicles (MEV). The latter is based on factored peak hour volumes.

[3] Shaded cells do not meet the Provincial Averages as follows:

- Rural, 2-lane, unsignalized: 0.44 crashes / MEV;
- Urban, 2-lane, unsignalized: 0.50 crashes / MEV;
- Urban, signalized: 0.87 crashes / MEV.

[4] Overall rank is a combined rank based on weighted crash frequency and crash rate.

Consultation with emergency services providers (i.e. RCMP, Fire Department, and Ambulance Service) identified the following high-response locations:

- Highway 101 between Sechelt and Wilson Creek:
- Lack of protection for left-turning vehicles at all intersections and driveways;
- Drivers "missing" the bend south of Davis Bay Road (although reflective paint treatments seem to have had an effect);
- Intersection with Davis Bay Road observes a number of crashes. There is limited visibility around the curve to the south;
- Turning radius into Snodgrass Road requires vehicles to slow considerably, which contributes to rear-end crashes;
- Highway 101 / Redrooffs Road: intersection angle requires drivers to look over their shoulder to check for oncoming traffic.

4.4 Current Travel Patterns and User Perceptions

An independent survey of Sunshine Coast residents' travel patterns and preferences was undertaken by the Lighthouse Learning Network in April 2007. The survey covered all areas of the Sunshine Coast and garnered 465 residents, including 140 residents of Sechelt.

Residents were asked to record what transportation modes they used to get around on the Sunshine Coast. Findings, considering only Sechelt residents, are summarized below:

- Sechelt is still very much an auto-oriented community with over 75% of respondents using this mode three or more times per week;
- Walking is an essential part of the transportation spectrum. If it is not being used over the entire length of a trip, it is an essential link to and from other modes. Less than 5% of people responded that they never walk for transportation, and approximately 25% walked once per week or less;
- Cycling has the largest opportunity to influence travel choice over intermediate trip lengths, i.e. trips too far to walk, but not far enough to justify waiting for transit or the cost of operating a vehicle. Currently, more than 65% of respondents indicated that they never cycle. This is likely a result of limited cycling infrastructure;
- Transit also has an opportunity to make a greater impact on the market. Over 50% of respondents indicated that they never or rarely (less than once a month) use transit. Alterations to the service routes in West Sechelt and the frequencies of the Sechelt – Langdale route are intended to foster increased ridership;
- Interestingly, rideshare is undertaken on a regular basis (i.e. more frequently than once a week) by just under 30% of survey respondents.

The survey also found that the District of Sechelt has a significant percentage of households that do not own a vehicle (approximately 15% of respondents), behind only Gibsons and the area of West Howe Sound. Approximately 55% of households in the District own one vehicle or less. However, just under 10% own 3 or more vehicles, one of the higher rates on the Sunshine Coast.

Respondents were asked "what they would like to see more of" in enhancing their transportation experience on the Sunshine Coast. The responses (some respondents offered multiple suggestions) are summarized in **Table 4.5**.

Table 4.5: Suggested Transportation Enhancements

Suggestion	Category	Responses	Ranking
More buses / increased frequency	Transit Enhancement	122	1
Extended / More Transit Routes	Transit Enhancement	86	2
Bike Trails / Paths / Lanes	Bicycle Enhancement	50	3
Safer Bike Paths / Lanes	Bicycle Enhancement	33	T4
Smaller, Localized Buses	Transit Enhancement	33	T4
Car and Bike Share Programs	Other	29	6
Extend Transit Schedule	Transit Enhancement	22	7
Bus-Ferry Connection	Transit Enhancement	20	8
More Walking Paths / Trails	Pedestrian Enhancement	19	9
Safer Walking Opportunities	Pedestrian Enhancement	18	10

Consistent with consultation conducted as part of the Vision Plan and as part of this project (see Section 5), the most common improvements focused on improving the transit, cycling, and pedestrian networks. Interestingly, no road enhancements (e.g. wider roads, etc.) made the Top 10. The number of cycle and transit improvements further suggests that the community is increasingly supportive of these modes.

It is noted that these results are based on an independent survey and hence the effectiveness of survey questions or details of the sample are uncertain.

5.0 Stakeholder Consultation

Consultation was undertaken with several groups to understand transportation concerns and opportunities amongst the community. This included meetings with the following groups:

- OCP and Greenways Committees: made up of representatives from Council, staff, and resident and business associations from each of the neighbourhood;
- Public open house and internet posting (for active transportation);
- Local transportation stakeholders: including representatives from:
    - Emergency service providers: RCMP, Fire Department, BC Ambulance Service;
    - Truck operations: refuse collection, haulage companies; and
    - Bus service providers: SCRD Transit, Sechelt School Buses.

Transportation was also included as a significant component of the OCP consultation process including open houses, surveys / questionnaires, and display and comment boards.

In general, transportation concerns tended towards common themes, consistent also with consultation conducted as part of the recent Vision Plan. Neighbourhood representatives focused on the following issues:

- Safety of Highway 101 for all road users;
- Lack of route alternatives for both traffic operations and emergency response;
- Transportation choice: in particular the lack of pedestrian and cycling routes.

The stakeholder group focused on:

- The emergency response capability and performance of “single-route” neighbourhoods, particularly Highway 101 given its regional significance;
- Road-user safety;
- The ability of larger vehicles (e.g. trucks and buses to manoeuvre the road network.

6.0 Summary of Existing Conditions

The existing conditions analysis undertook a review of previous planning and consultation, analyzed traffic operations and safety, and identified the concerns of local stakeholders. From this analysis, the following primary issues were common themes:

1. A lack of local and regional route alternatives.

The District's neighbourhoods have developed in four directions from the Village centre. Most of these communities are served by a single road. The primary concern for these areas is emergency access. The West Sechelt and Davis Bay / Selma Park communities also contend with Highway 101, which serves both a regional traffic movement function, a traffic distribution function, and provides direct access to individual properties.

In Davis Bay, traffic volumes on Highway 101 are not likely to exceed practical capacity for another 3 – 6 years and absolute capacity for 8 – 10 years. However, the minor street intersections along this corridor already experience significant delay, which is exacerbated during ferry pulses. Coupled with the safety record of this corridor, alternatives to the existing Highway 101 should be considered immediately.

2. Road user safety, particularly on Highway 101.

There are a number of intersections in the District that have observed a higher than expected number of crashes. These are primarily located along Highway 101 in West Sechelt, Davis Bay / Selma Park, and in the Village.

3. A lack of transportation choice, in particular a lack of safe and comfortable pedestrian and bicycle facilities.

The automobile is the primary mode of travel in the District. Pedestrian connections are reasonable in many areas, however there are a number of areas lacking pedestrian routes alternative to major roads such as Highway 101. Many of these busier routes do not currently accommodate pedestrians. Cycling facilities are even scarcer. The Sechelt – Langdale transit route is well used, however local services are under-utilized.

Apart from in Davis Bay, there are no locations that exceed typically accepted traffic congestion thresholds. Nevertheless, it is recognized that there are a number of locations in the District that operate with delays considered significant by local residents, particularly during ferry traffic surges. Certain movements at the Highway 101 / Wharf Road intersection, in particular the westbound left turn, are approaching capacity. This intersection is the nexus of traffic operations in Sechelt serving both regional and local traffic and its performance will need to be addressed some time in the future.

7.0 Introduction

Part B explores the future transportation needs of the community and the means required to achieve these. A series of factors were considered in the development of a Transportation Plan for the District of Sechelt.

Firstly, the plan considers road network elements that **address existing issues** identified in the existing conditions review (Part A), namely the reliance, operation, and safety record of Highway 101 and the lack of alternatives to the automobile.

Secondly, a **travel demand model** was used to forecast traffic volumes under medium-term (10-year) and long-term (20-year) growth scenarios so as to identify road network needs to accommodate this growth.

Automobile alternatives and trip suppression were further considered through the development of a **Travel Demand Management** (TDM) framework and implementation plan. Particular emphasis was placed on travel modes supported by the public including walking and cycling through the development of an **Active Transportation Plan**.

Lastly, the **policies** needed to support the proposed Transportation Plan are addressed throughout this report. A concluding section that summarizes the findings and recommendations of this report will be included as the Transportation Section of the Official Community Plan.

8.0 Short-Term and Immediate Transportation System Needs

The development of a Transportation Master Plan must first give consideration to the concerns of the existing community. Local resident and stakeholder consultation, as well as traffic operations and safety data analysis was undertaken as part of the existing conditions analysis (see Part A) and identified a number of transportation concerns. These issues focused primarily on:

- The safety performance of a number of intersections in the District, in particular a number of intersections along Highway 101;
- Operations during traffic surges resulting from BC Ferries operations, primarily related to side streets along Highway 101 in Davis Bay, Selma Park, and in the Village;
- A lack of route alternatives to Highway 101, both from a community and emergency mobility standpoint; and
- A lack of convenient and safe alternatives to automobile travel, particularly a lack of walking and cycling facilities and promoting an increased role for transit.

Road network improvements that address these issues are discussed below for each neighbourhood and illustrated at Section 12 (see Figure 12.1).

8.1 Davis Bay / Selma Park / Wilson Creek

Issues in this area primarily relate to the reliance on Highway 101 for everything from individual property access to freight movement. The pressure resulting from these diverse roles, coupled with the physical constraints of the corridor, prompt the consideration of a "bypass" connection. The Provincial Ministry of Transportation and Infrastructure (MOTI) has indicated that a "regional" bypass of Highway 101 (see Section 3.5) is some time away. The regional bypass still represents the preferred long-term road network option and there is an opportunity to use its proposed alignment to pursue a "local" bypass in the near-term. The concept of a bypass is considered in more detail in Section 9 of this report, however, the investment required to finance any form of bypass will take time to materialize and as such it is prudent to offer solutions that can improve interim conditions along the existing Highway 101 corridor, which is the focus of this section.

Previous studies performed by the MOTI (conducted by Urban Systems and R.F. Binnie & Associates) have shown that the existing design of Highway 101 is inadequate to serve its intended functions (either mobility or access) and identified improvements in the form of shoulder widening; development of cycle lanes, pedestrian trails / sidewalks; and access management solutions that include the creation of left turn lanes, right-in / right-out restrictions, and full closure at a number of intersections. **These improvements still represent the most effective way to improve the existing corridor and should be pursued as much as possible.**

The development of pedestrian and cycling facilities throughout the length of this corridor is of paramount importance. Walking is the most accessible form of transportation and these facilities would provide a basic alternative to automobile travel. This may also encourage development of land uses that provide local services to the area. Creating cycle lanes on the road shoulder provides cycling connectivity to the rest of the District as well as benefits to traffic operations. This route forms a critical piece of the District's Active Transportation Plan. Although more expensive, the construction of a multi-use trail parallel to the highway could also be considered to better accommodate cyclists of all skill levels.

> **Recommendation 4**: that the District emphasize the importance of improvements to the existing corridor and that MOTI pursue these improvements. Joint funding is needed to initiate these improvements. There may also be grant funding available through programs such as LocalMotion to develop an active transportation corridor on the Provincial Highway system.
>
> Development in the area will be wholly or partly responsible for intersection and corridor improvements. As such performance of Highway improvements or contributions towards these should be collected as development occurs.

Surges in traffic from ferry unloading (and to some degree loading) at the Langdale Ferry Terminal, 25 kilometres to the east of Sechelt, result in drivers making hurried and often unsafe decisions through frustration. Apart from a signal at Field Road, there is little to break up traffic platoons. This could be addressed with additional signals in Davis Bay and/or Selma Park.

> **Recommendation 5**: that a signal be installed at the Highway 101 / Davis Bay Road intersection. This would provide:
>
> - A crossing opportunity for pedestrians that will enliven the Davis Bay beachfront and the surrounding retail activity;
> - A break in traffic surges for the intersections north of Davis Bay Road along Highway 101 to allow additional and longer opportunities for side street traffic to enter the Highway; and
> - An opportunity to install advance warning flashers on Highway 101 (east of the intersection) to better recognize the presence of an intersection at that location. The poor existing safety record can be partially attributed to the activity of the beachfront and nearby land uses coupled with the location of the intersection near a horizontal curve.

A second signal further north would regulate breaks in traffic from both directions. However, currently none of the other intersecting streets play a significant enough role to warrant installation of a traffic signal. Access management may serve to reduce the number of intersections (or available movements) along the corridor and consolidate traffic to one or two key intersections.

Recommendation 6: that a second signal further north be considered upon the creation of adequate access management along the corridor. Access management was identified by previous studies of Highway 101 to include:

- Creation of left turn lanes at:
  - Mission Road (westbound);
  - Davis Bay Road (southbound);
  - Bay Road (southbound);
  - Heather Road (southbound);
  - Nestman Road (southbound);
  - Snodgrass Road (southbound);
  - Selma Park Road (both directions);
  - Monkey Tree Lane (southbound);
- Implementation of right-in / right-out restrictions at:
  - Whitaker Road;
  - Westly Road; and
  - Havies Road;
- Closure of Chapman Road and the frontage road east of the conveyor belt.

If appropriate (based on a more detailed corridor study), alterations to these locations may be considered. For example, one proposal is to provide left turn bays at Havies Road and Chapman Road rather than Heather Road, which would become right-in / right-out.

The District of Sechelt, stakeholders, and local residents have identified a need for a secondary, parallel route to Highway 101 to serve as an emergency access. The connection of the missing section of Laurel Avenue, and its future extension further north as redevelopment occurs, provides the most logical route. Although there will be some increase in traffic from local residents using the street, its circuitous nature will ensure that it is not an attractive alternative to regional traffic travelling on Highway 101.

Recommendation 7: that Laurel Avenue be completed, and extended further north as redevelopment occurs. This will provide emergency access in the event of Highway 101 being shut down and relieve local traffic from the highway.

8.2 Downtown Village and Sechelt Indian Band

The majority of transportation concerns in the Downtown Village and Indian Band areas surround the interaction of Highway 101 with high-activity land use. In particular there are operational and safety concerns at the Highway 101 intersection with Wharf Road (primarily a result of the Highway turning 90-degrees at this intersection), Cowrie Street, Inlet Avenue, and Trail Avenue. There are also a number of intersections in the Village that experience crash rates higher than the provincial average.

The Highway 101 / Wharf Road intersection represents a land use and transportation confluence. Through its exposure, this intersection represents a significant local business centre and a transition between industrial / commercial land uses and retail-based uses. Given the lack of route alternatives, it also serves as the primary junction for both regional and local traffic. As a result of these factors, the intersection operates with some congestion, which will increase with additional population growth, and observes a crash rate above the Provincial average (as well as a number of fatalities).

Recommendation 8: that the following improvements be pursued at the Highway 101 / Wharf Road / Dolphin Avenue intersection:

- Construction and opening of Tita Way Road as a collector road through the Indian Band Lands extending to Dusty Road. This road has previously been tied to relieving the future traffic impact of the proposed SilverBack development. Whilst this is an important role, it also offers a number of benefits to the existing road network, including:
  - Relieving traffic pressure from the Wharf Road corridor – specifically an alternative route for heavy vehicles travelling to the industrial sites along East Porpoise Bay Road. This will relieve some conflicts with vulnerable road users, which has been cited as the cause of a number of crashes including a recent fatality involving a truck and a pedestrian at the Highway 101 / Wharf Road intersection;
  - Encouraging industrial development at alternative locations to Wharf Road. Over time, it is suggested that more complimentary land uses to those of the adjacent Village be developed along Wharf Road to provide a buffer between heavy vehicle movements (contained in the Indian Band industrial lands) and the pedestrian-scale uses of the Downtown Village.
- That a comprehensive road safety audit be conducted at the intersection to identify safety and operational mitigations at this intersection that are beyond the scope of this study.

It is understood that the Band has concerns regarding liability, ownership, and maintenance of Tita Way Road.

Recommendation 9: that the District initiate discussions with the Sechelt Indian Band and MOTI regarding the ownership, maintenance, and liability agreements for Tita Way Road. This link should be open for public use.

A number of other intersections in the Village observe crash rates in excess of the Provincial averages. These include the Trail Avenue and Inlet Avenue intersections with Dolphin Street, Cowrie Street, and Highway 101 / Teredo Street. Trail Avenue forms the primary north-south spine of the District's envisaged Active Transportation Network and would connect the two waterfronts to areas beyond. This designation represents an opportunity to emphasize pedestrian and cycling movements at these locations, which can also have a positive effect on traffic operations.

Recommendation 10: that Trail Avenue be designated as an Active Transportation Corridor and that the following treatments be pursued to enable this designation:

- Creation of on-street cycle lanes along Trail Avenue from Highway 101 to Anchor Road, where the existing road width can accommodate these changes;
- Complete any missing or deteriorated sidewalk segments on both sides of Trail Avenue between Highway 101 and Anchor Road;
- Installation of a pedestrian signal at the Highway 101 / Trail Avenue intersection.

Improvements affecting Highway 101 (Teredo Road) will need to be coordinated with MOTI. A determination of cost and ongoing maintenance responsibilities will need to be agreed. However, other improvements are the responsibility of the District.

8.3 West Sechelt / West Porpoise Bay

Transportation needs in West Sechelt are primarily derived from the need to accommodate the majority of the District's anticipated future residential growth. There are also a number of intersections that experience crash rates higher than the provincial averages. Local residents and stakeholders were concerned with the lack of route alternatives to Highway 101 and the traffic and safety pressures placed on the Highway as a result.

The remainder of the local street system is well served by the existing and proposed (as part of development) road network elements. Road network elements suggested as part of future development are described at Appendix C and include:

- Extension of Acorn Road to connect with Highway 101;
- Extension of Lewarne Road to connect to Acorn Road;
- Extension of Derby Street to connect with a future road (referred to as the West Sechelt Connector) through the BC Hydro right-of-way south of Neptune Street and forming an intersection with Wharf Road and a future Highway 101 bypass east of the Village. This is considered in more detail at Section 9;
- Extension of Tyler Road to connect to the West Sechelt Connector;
- Extension of Cowrie and Barnacle Streets to connect with the West Sechelt Connector and Baillie Road respectively.

Recommendation 11: that the Acorn and Lewarne Road extensions be funded as part of the Trails Estate development. That other collector and arterial street improvements be pursued through collection of development cost contributions and/or direct developer contribution / construction. The timing of construction for each road network component is to be established as part of the traffic impact studies for these developments.

A detailed assessment of the West Sechelt Connector is included at Section 9. Consideration must be given to whether this connection is intended to serve a local or regional traffic function and the implications of this decision.

Field observations and a review of historic crash data have identified a number of intersections with safety concerns. These include the Highway 101 intersections with Wakefield Road, Mason Road, McCourt Road, and Mill Road and the Mason Road intersection with Norwest Bay Road.

Recommendation 12: that the following geometric improvements be pursued to mitigate existing safety issues:

- Norwest Bay Road / Mason Road: geometric improvements to facilitate pedestrian movements, particularly related to the adjacent school and community store. In addition, traffic calming solutions near the intersection may need to be investigated to slow traffic at the approaches;
- Highway 101 intersections with Wakefield Road, Mason Road, McCourt Road, and Mills Road: increase sight distance for vehicles exiting the side streets onto the highway.

These problems should be rectified through developer contributions as development occurs in the area.

The primary transportation concerns in West Porpoise Bay are the lack of emergency access and automobile-alternative travel options. As identified by BC Transit's review of local services, the density of this neighbourhood is too low to support transit service. However, emphasis has been given to connecting this neighbourhood with trails and cycling routes.

The neighbourhood hosts a number of recreational destinations. Currently, residents of West Sechelt need to use Highway 101 and travel through the Village to access these facilities. A road connection should be provided to relieve this traffic from the highway. This will also provide an alternative (and emergency) access route to West Porpoise Bay.

It is noted that at the time of this report an active transportation (walking / cycling) corridor was being constructed along the Crowston Road right-of-way.

Recommendation 13: that a roadway connection be provided between West Sechelt and the northern neighbourhoods / community facilities. This would best connect Tyler Road and the Trail Avenue / Reef Road intersection.

8.4 East Porpoise Bay / Sandy Hook / Tuwanek

The primary transportation concerns of these communities are the lack of emergency access and automobile-alternative travel options. The topography of these areas provide limited opportunity for a cost-effective alternative road connection. Some localized alternatives will be provided with Tita Way Road and the roadway system proposed as part of the SilverBack development. Similar to West Porpoise Bay, densities are too low to support transit in a cost-effective manner.

Recommendation 14: that water- and air-based emergency response systems be emphasized for these areas as well as incident management contingencies. That active transportation facilities be pursued along existing road or trail corridors.

9.0 Long-Term (Future) Transportation System Needs

The performance of the existing road network under future travel demands and road network strategies to accommodate this growth were tested through the use of a travel demand model. The Sechelt model was developed in the VISUM software platform and consisted of the following steps:

1. **Network Reconciliation**: the District was organized into 35 "traffic zones" and the transportation network coded to reflect the most up-to-date network conditions.
2. **Measures of Effectiveness**: a series of transportation performance measures were selected to evaluate existing and future network performance.
3. **Base Model**: a "base model" was developed that reasonably replicated summer travel patterns observed in 2008. This was used as a basis of comparison for future year scenarios.
4. **Future Models**: anticipated 10-year (2018) and 20-year (2028) land use growth was used to forecast future traffic volumes. These models assume the existing road network is still in place.
5. **Scenario Testing**: the effect of network alterations, such as capacity improvements or the creation of new links, was tested.

9.1 Network Reconciliation

The Sechelt Travel Demand Model is an update of a similar model constructed for the CTS Road Network Plan in 2000. The traffic zone boundaries used in that model were left unchanged for this update and are illustrated at **Figure 9.1**.

The previous model was constructed using the TMODEL software platform and provided a skeletal representation of the District's road network. Enhancements in modeling software since that time allowed the new model to be converted into the VISUM platform, which supports a more detailed "GIS-based" representation of the road network.

The transportation network was updated to reflect the most recent conditions including the addition of new streets, capacity upgrades, and changes in intersection traffic control. Modelling focussed on the weekday afternoon peak hour, representative of conditions that might be observed on a summer Friday between 2:30 – 3:30 p.m.

9.2 Performance Measures

A series of transportation performance measures were selected to evaluate existing and future network performance. These include:

- **Network-wide** performance measures:
  - Number of vehicle trips;
  - Vehicle-hours travelled (VHT): the overall time vehicles spent in the network;
  - Vehicle-kilometres travelled (VKT): the overall distance of travel that occurs in the network;
- **Link** performance measures:
  - Volume-to-capacity (v/c) ratio: a comparison of the traffic demand for a link to its available capacity. Congestion becomes more noticeable as the v/c ratio approaches 0.80 and is problematic beyond 0.90;
- **Intersection** and **movement** performance measures shown in **Table 9.1**.

Table 9.1: Intersection and Movement Performance Measures

Performance Measure	Definition	Acceptable Conditions	
		Signalized	Unsignalized
Volume-to-capacity (v/c) ratio	A comparison of the traffic demand for an intersection or movement compared to the available capacity	< 0.90 (intersection); < 0.95 (movement)	< 0.80
Level-of-service (LOS)	A graduated measure of delay experienced by drivers as a result of traffic control, geometry, and congestion at an intersection	"D" or better (intersection); "E" or better (movement)	"D" or better

9.3 Base Model (2008) Development

As a basis for comparing the performance of future year conditions, a "base model" was created that reasonably represents summer travel patterns observed in 2008.

Land use forecasts were used to estimate the travel demands to and from each traffic zone. Trips generated by a zone, i.e. productions and attractions, were calculated by applying observed trip rates to each of the different land uses. Traffic from "special generators" such as hotels, recreational facilities, etc. was also considered. The schedule of existing land use used in the model is included at **Appendix E.1**.

N

Traffic Zone Boundaries

District of Sechelt Transportation Master Plan

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July 14, 2009 N.T.S. 4710-01

Figure
9.1

Model development then followed the steps of:

- **Trip distribution**: considers the attraction of travel between each pair of traffic zones based on the shortest path, and develops an "origin-destination matrix";
- **Assignment**: determines (or chooses) routes that traffic will take to travel from one zone to another. In this case, an "incremental equilibrium" assignment was used that distributes demand in such a way that changing routes would only increase personal journey time. This procedure considers the time to travel the link, intersection impedance, and delays from other vehicles; and
- **Trip balancing**: a number of iterations were performed to achieve a balance between trips to and from each zone.

Model Calibration

The 2008 Base Model was calibrated by comparing assigned volumes to observed volumes on certain links, with a particular emphasis on Highway 101. A number of iterations were made to strengthen the prediction by adjusting:

- Retail, office, and industrial trip generation rates[1];
- Connection of traffic zones to the road network;
- Distribution model parameters; and
- Capacity of road network elements to reflect local conditions.

Industry standard calibration parameters, including a co-efficient of determination (R^2) greater than 0.85 and a root mean square error (RMSE) of less than 0.35 were measured. The fit of data within these parameters is displayed at **Figure 9.2** and shows that the 2008 Base Model provides a reasonable level of accuracy in predicting observed traffic volumes.

2008 Base Model Performance

The performance of the existing road network under 2008 base model traffic volumes is summarized in **Table 9.2** in terms of the network-wide, link, and intersection parameters identified at Section 9.2.

The performance of the existing network establishes a base from which to compare future operations. The base network represents an average travel time of just under 8 minutes per vehicle and an average trip distance of approximately 6 km per vehicle.

[1] Note: final trip generation rates employed in the model were: 0.25 vph/unit (residential), 5.5 vph / 1,000sq.ft. GFA (retail), 1.5 vph / 1,000sq.ft. GFA (office), and 0.9 vph / 1,000sq.ft. GFA (industrial).

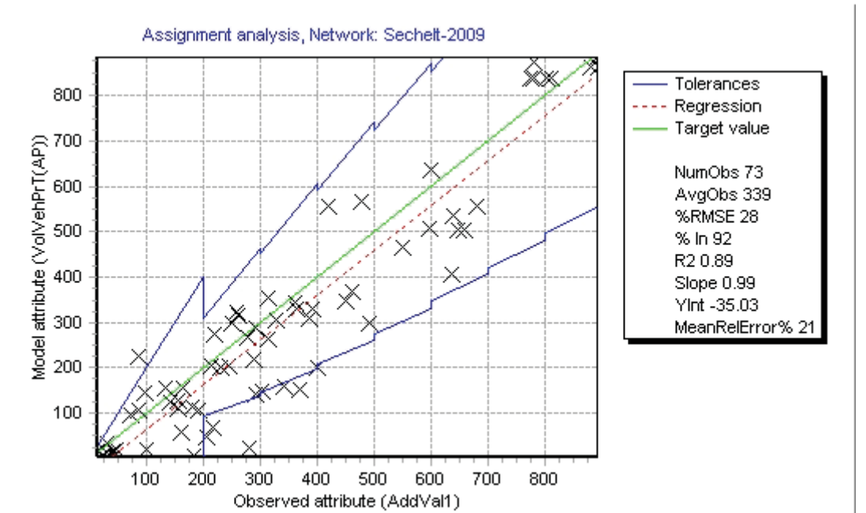

Figure 9.2: Base Model Calibration Performance
Comparison of 2008 Model and Observed Link Volumes.

Table 9.2: 2008 Base Model Performance
Existing Road Network - Weekday PM Peak Hour

Measure	Performance
Number of Vehicle Trips	3,650 trips
Network Travel Time[1]	475 veh-hrs (7.8 mins/veh)
Network Travel Distance[1]	21,600 veh-km (5.9 km/veh)
Link v/c Ratio	**Figure 9.3**
Intersection v/c Ratio & LOS	**Figure 9.4**[2]

[1] These numbers may under-represent the true length of trips to/from the District as they do not include travel beyond the extents of the District boundaries.

[2] Figure 9.4 is a repeat of Figure 4.6 in Part A.

Highway 101 through Davis Bay and Selma Park operates at volume-to-capacity ratios approaching acceptable performance thresholds (i.e. v/c = 0.80). Intersection and individual movement performances are within acceptable conditions at most intersections with the exception of the minor street approaches of intersections along Highway 101 in Davis Bay. In addition, particular movements at the Highway 101 / Wharf Road intersection, most notably the westbound left turn movement, are approaching capacity.

N

DOWNTOWN

Legend:

150 Volume (vehicles per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

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2008 Base Model - Link Peak Performance

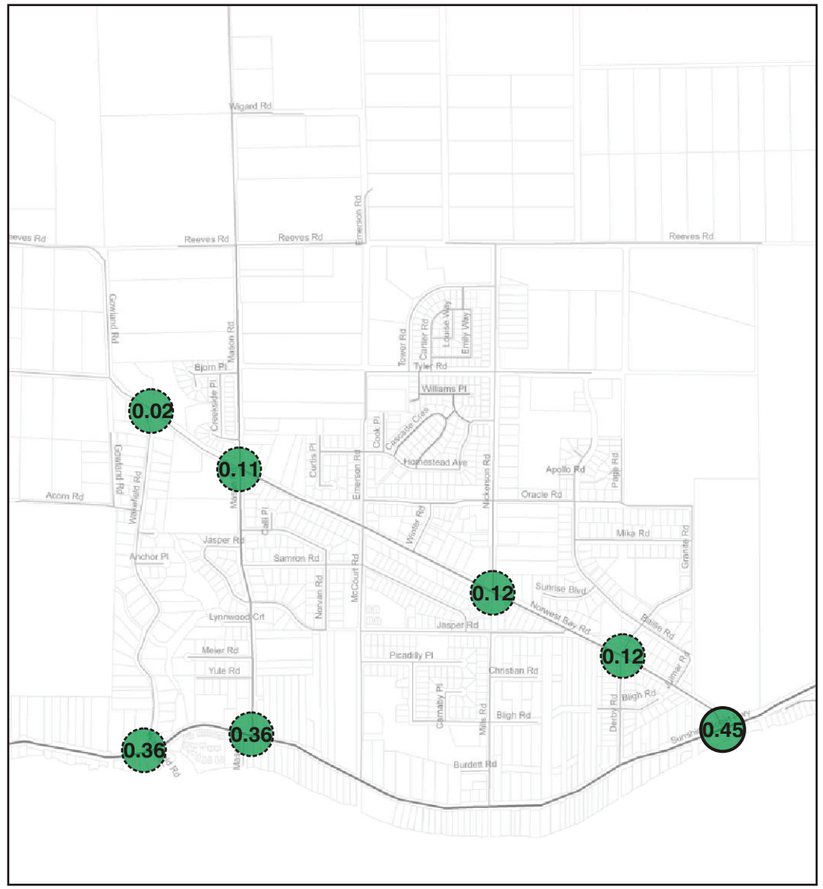
Friday PM Peak Hour

June 17, 2009 N.T.S. 4710-01

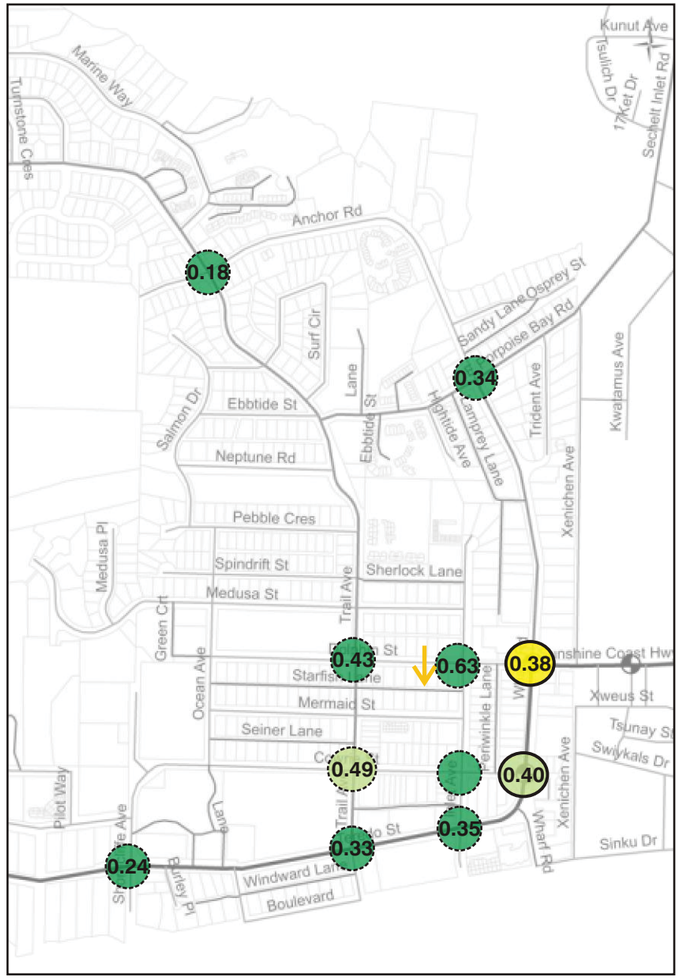
Figure 9.3

N

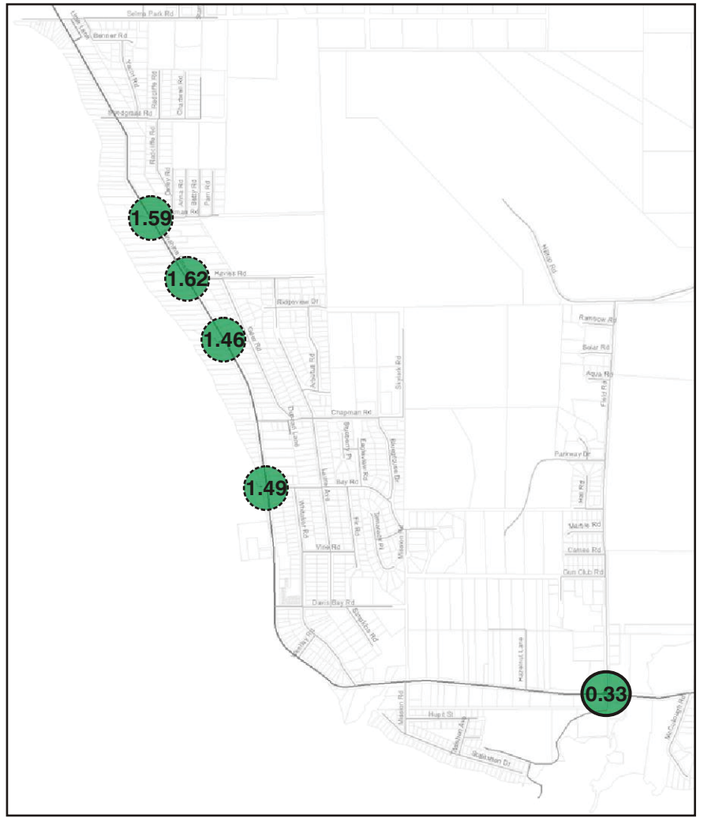
WEST SECHELT



DOWNTOWN



SELMA PARK, DAVIS BAY



Legend:

- Level of Service (LOS) A
- Level of Service (LOS) B
- Level of Service (LOS) C
- Level of Service (LOS) D
- Level of Service (LOS) E
- Level of Service (LOS) F

0.63 Volume-to-Capacity Ratio

→ Movement with LOS "D" or worse

Unsignalized

Signalized

NOTE:

Level of Service	Delay	
	Signalized	Unsignalized
A	≤ 10 sec	≤ 10 sec
B	≤ 20 sec	≤ 15 sec
C	≤ 35 sec	≤ 25 sec
D	≤ 55 sec	≤ 35 sec
E	≤ 80 sec	≤ 50 sec
F	> 80 sec	> 50 sec

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2008 Base Model - Intersection Performance

Friday PM Peak Hour

Figure
9.4

9.4 Future Travel Demands

Future Land Use

Future land use was carefully considered by the project team. It is imperative that a "reasonable" (i.e. not too high) level of growth be represented in the Transportation Master Plan to enable realistic infrastructure needs and priorities to be assessed.

Nevertheless, the expected increase in residential land use to 10- and 20-year development horizons was based on a District-wide growth rate of 2.0% per year. This was applied as 3.3% per year in West Sechelt, which is expected to host the majority of residential growth, and 1.0% per year in other areas of the District.

Future growth in retail, office, industrial, and other significant trip generating land uses was identified by the District of Sechelt through a zone-by-zone analysis of possible square footage and likely development timing. The 10-year and 20-year build-out projections are included at **Appendix E.2 and E.3** respectively.

The District-wide land use projections represent by-sector growth rates of:

- Retail: 0.7% annually over 10 years and 0.6% annually over 20 years;
- Office: 1.2% annually over 10 years and 3.1% annually over 20 years;
- Industrial: 1.5% annually over 10 years and 1.5% annually over 20 years;
- Other (e.g. hotel, recreation, etc.): 0.8% annually over 20 years.

The same procedure as for the base model was undertaken for future year models, i.e. trip generation, distribution, and assignment. As an indication of where change is expected to occur in the District, the increase in zonal traffic generation is illustrated at **Figure 9.5** for the 20-year design horizon.

2018 Transportation Network Performance

Performance of the existing network under 2018 traffic volumes is summarized in **Table 9.3**.

2028 Transportation Network Performance

The performance of the existing road network under 2028 traffic volumes is summarized in **Table 9.4**.

Table 9.3: 2018 Model Performance - Existing Road Network - Weekday PM Peak Hour

Measure	2008 Base	2018	Comparison / Analysis
Number of Trips	3,650 trips	4,325 trips	+ 18%
Network Travel Time	7.8 mins/veh (475 veh-hrs)	8.3 mins/veh (600 veh-hrs)	+ 6% + 0.5 mins/veh
Network Travel Distance	5.9 km/veh (21,600 veh-km)	5.8 km/veh (25,250 veh-km)	No change in average distance per vehicle
Link v/c Ratio	-	Appendix F.1	Hwy 101 in Davis Bay/Selma Park > 0.80
Intersection Volume-to-Capacity (v/c) Ratio & Level of Service (LOS)		Appendix F – Figure F.2	Following approaches exceed LOS criteria: Dolphin St / Inlet Ave (SB approach) Highway 101 / Trail Ave (SB approach)

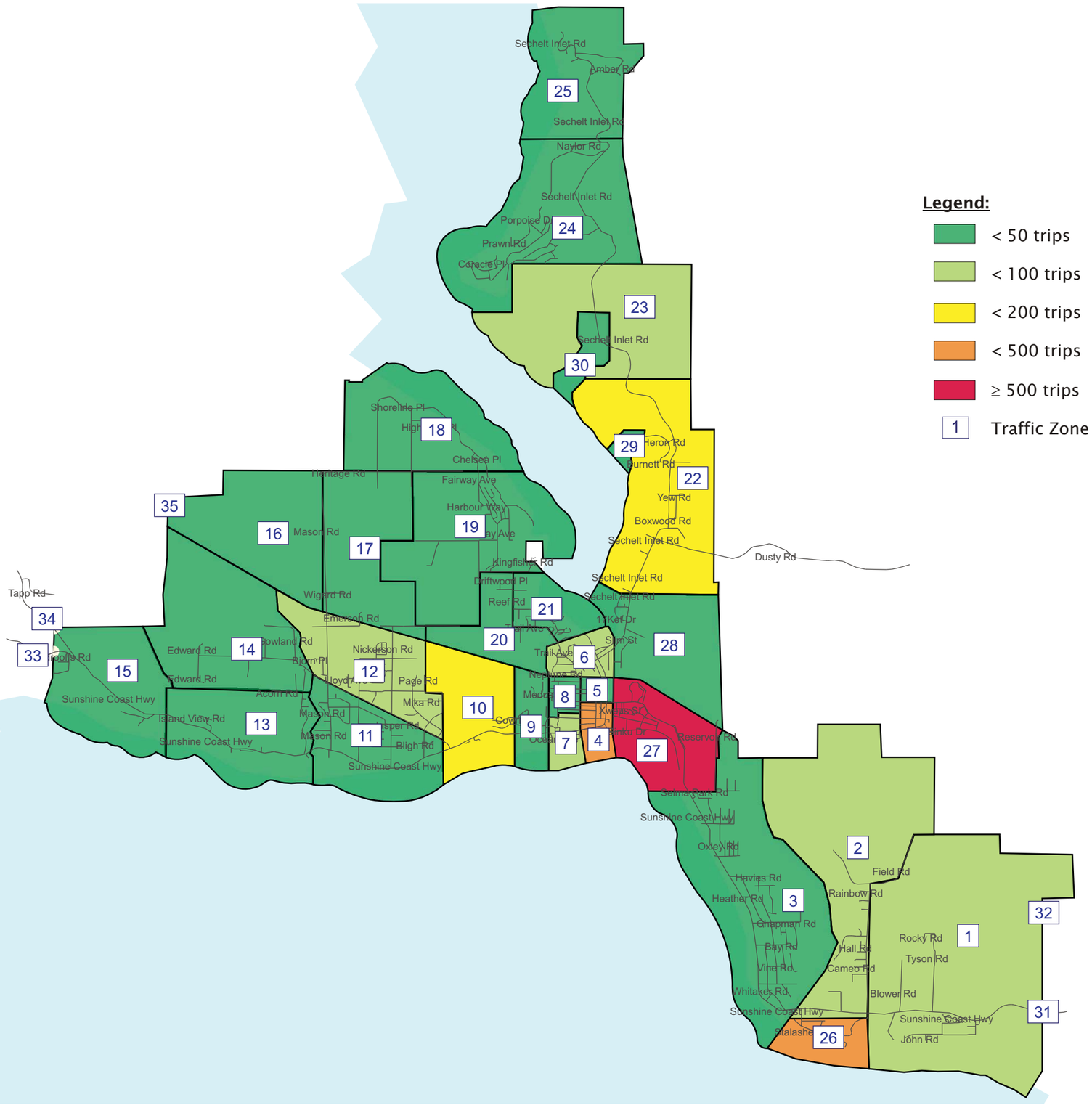
Note: SB = southbound

Table 9.4: 2028 Model Performance - Existing Road Network - Weekday PM Peak Hour

Measure	2008 Base	2028 Performance	Comparison / Analysis
Number of Trips	3,650 trips	5,035 trips	+ 38%
Network Travel Time	7.8 mins/veh (475 veh-hrs)	9.1 mins/veh (763 veh-hrs)	+ 17% + 1.3 mins/veh
Network Travel Distance	5.9 km/veh (21,600 veh-km)	5.8 km/veh (29,334 veh-km)	No change in average distance per vehicle
Link v/c Ratio	-	Appendix F.3	Hwy 101 in Davis Bay/Selma Park > 1.0
Intersection Volume-to-Capacity (v/c) Ratio & Level of Service (LOS)		Appendix F – Figure F.4	Following intersections exceed LOS criteria: Highway 101 / Field Rd (SB approach) Highway 101 / Bay Rd (WB approach) Highway 101 / Heather St (WB approach) Highway 101 / Nestman Rd (WB approach) Dolphin St / Inlet Ave (SB approach) Highway 101 / Inlet Ave (NB approach) Highway 101 / Trail Ave (NB & SB approaches) Highway 101 / Shorncliff (SB approaches)

Note: NB = northbound; WB = westbound; SB = southbound

N



Legend:

- < 50 trips
- < 100 trips
- < 200 trips
- < 500 trips
- ≥ 500 trips
- 1 Traffic Zone Number

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Zonal Traffic Generation Increase

20-Year Development Horizon

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Figure
9.5

Future growth will result in an increase in the number of automobile trips made in the District and the overall number of vehicle-kilometres travelled (an increase of 38% to 2028). The average time that each trip takes will also increase. These factors will contribute to an increase in congestion, particularly along Highway 101 and increased transportation-related emissions if growth is allowed to occur unchecked.

9.5 Strategic Road Network Testing

The analysis in Section 9.4 identified a number of concerns in accommodating future growth with the existing road network. This section explores the effects of introducing alterations to the road network and the required timing of these changes. Changes include capacity upgrades (e.g. expanding from 2- to 4-lanes), additional links (e.g. bypass routes to Highway 101), changes in traffic patterns (e.g. movement restrictions), or alterations to intersection control (e.g. introducing signals).

Recommended road network changes to accommodate future growth are summarized in Section 12 and shown on Figure 12.1.

A number of **strategic network options** have been developed, informed by previous planning studies and the feedback of stakeholder consultation. **Figure 9.6** illustrates those options tested using the Sechelt Travel Demand Model, which include:

- **Option 1: No Change**: this option explores how much growth could be accommodated by the existing road system within acceptable traffic performance thresholds;
- **Option 2: Expansion of Highway 101** on the existing alignment through Davis Bay and Selma Park from 2-lanes to 4-lanes;
- **Option 3:** Construction of a **Highway 101 Bypass** between Field Road and Wharf Road, which would serve a highway traffic function as a pre-cursor to a regional bypass; and completion of Tita Way Road through the Indian Band lands;
- **Option 4:** Extension of the **Highway 101 Bypass** from Wharf Road to Norwest Bay Road. This would serve a highway traffic function as a pre-cursor to a regional bypass of Highway 101; and
- **Option 5:** Construction of a **West Sechelt Connector** from Wharf Road to Tyler Road. This would serve a local traffic function. Highway 101 would remain on the existing alignment through the Village and West Sechelt. This may form an extension of a Highway 101 bypass between Field Road and Wharf Road.

In addition to the five options above, a Highway 101 bypass between Roberts Creek and Trout Lake has previously been considered by the Ministry of Transportation and Infrastructure (MOTI), going so far as to determine a preferred alignment as part of the R.F. Binnie & Associates studies conducted in 1996 and 1998 (see Section 3.5).

MOTI have indicated that the timing of this project is a considerable time away given its need (in terms of traffic carrying capacity), cost, and priority amongst other projects in the Province. This option represents the most effective method of clearly defining regional traffic carrying functions and local traffic functions amongst the District road network, and is the preferred long-term road network option. Recognizing this, the following discussion investigates interim road network options prior to the regional bypass, some of which make use of the proposed regional bypass alignment.

Recommendation 15: that the regional Highway 101 bypass proposed by MOTI and Binnie & Associates be pursued as the preferred long-term highway option.

Status Quo (Option 1)

The purpose of this option is to determine the growth potential that could be accommodated with the existing road network. Using link performance thresholds (recognizing that constraining intersections could be upgraded) and the anticipated growth scenario, the existing network would be expected to reach acceptable capacity levels in 2015.

It is recognized that a constrained network often introduces alterations to trip patterns such as less traveling or increased transit, etc. Assuming up to a 5% suppression in trip rates from travel demand management (TDM) or transit, performance thresholds along Highway 101 would be reached by 2017.

Network Alterations (Options 2, 3, 4, and 5)

The performance of Options 2, 3, 4, and 5 are summarized in **Tables 9.5 and 9.6** for the 10-year (2018) and 20-year (2028) design horizons and compared side-by-side in terms of link volume-to-capacity performance at **Figure 9.7**. Detailed network performance diagrams for each scenario are included at **Appendix F**.

The analysis results show that all options would reduce the average travel time compared to maintaining the existing road network. In comparing road network options for Davis Bay / Selma Park, constructing a local bypass from Field Road to Wharf Road (Option 3) provides a travel time benefit (approximately a 7% reduction) compared to expanding the existing Highway 101 corridor (Option 2). Additional travel time savings, in the order of 3 – 4%, are realized with an extension of the Highway 101 bypass (Option 4) or the construction of the West Sechelt Connector (Option 5).

If Highway 101 was expanded from 2-lanes to 4-lanes (Option 2), it could accommodate future growth within acceptable performance levels throughout the 20-year design horizon, although a number of the side-streets through Davis Bay would still operate with higher than acceptable delay. In addition, expansion to 4-lanes would create a significant barrier in the community and is not recommended.

N

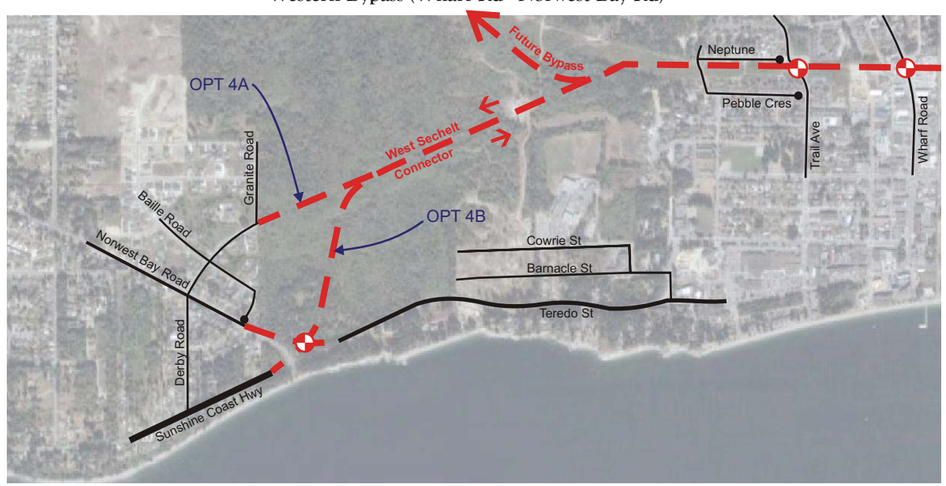
OPTION 2
Upgrade Hwy 101 to 4-Lanes (Field Rd - Wharf Rd)

OPTION 3
Eastern Bypass (Field Rd - Wharf Rd)

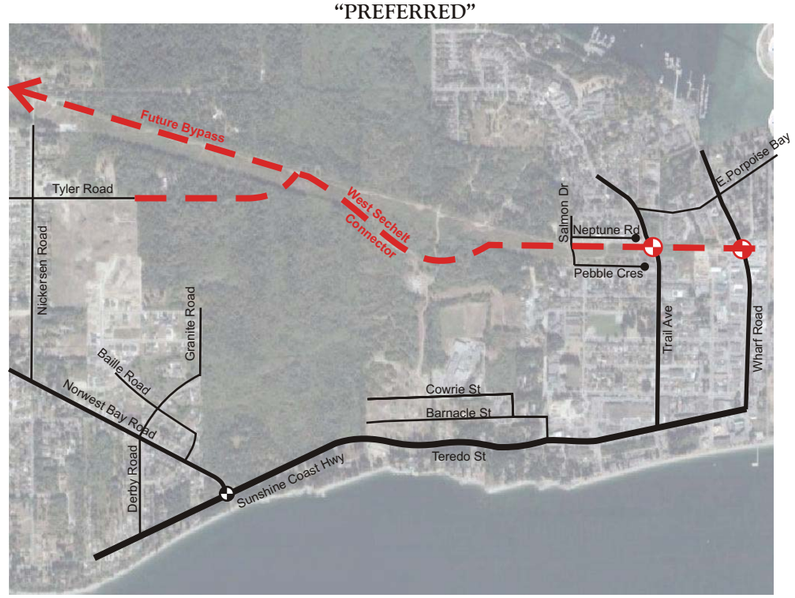
Legend:

- Existing Signal
- New Signal
- New Road / New Alignment

OPTION 4
Western Bypass (Wharf Rd - Norwest Bay Rd)



OPTION 5
West Sechelt Connector (Trail Ave - Tyler Rd)
"PREFERRED"



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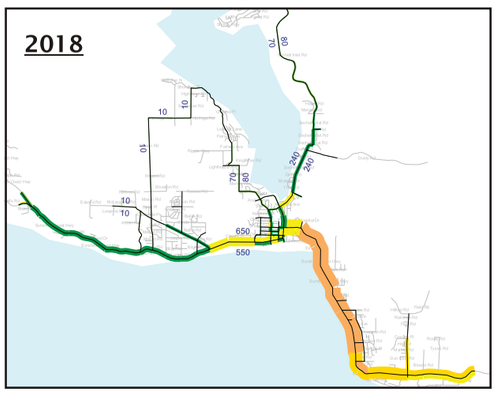
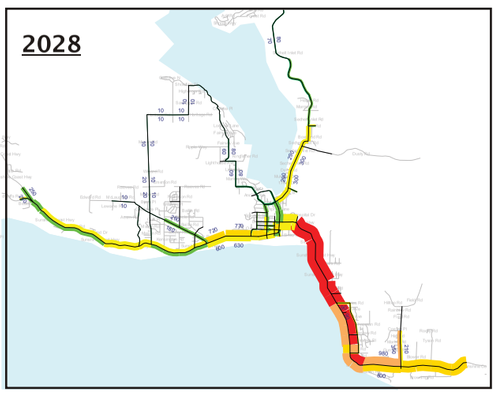
Road Network Strategic Options
District of Sechelt Transportation Master Plan

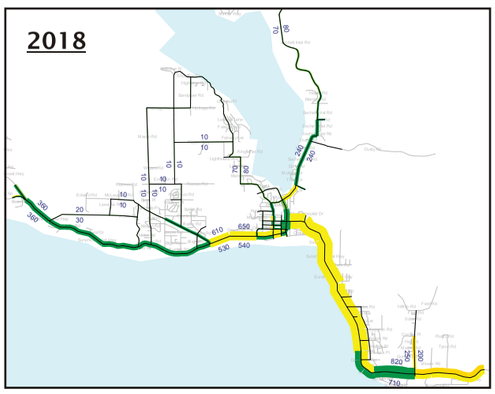
Figure
9.6

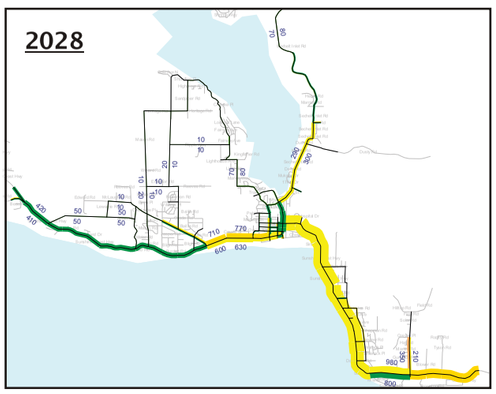
OPTION 1 - DO NOTHING



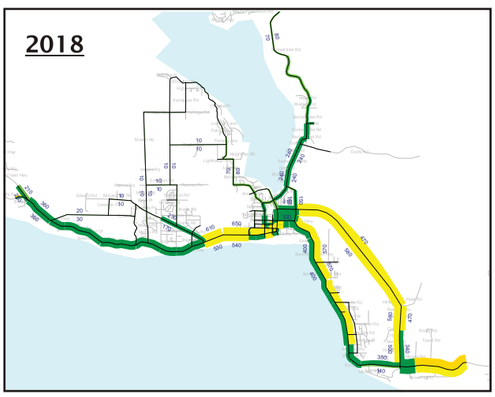


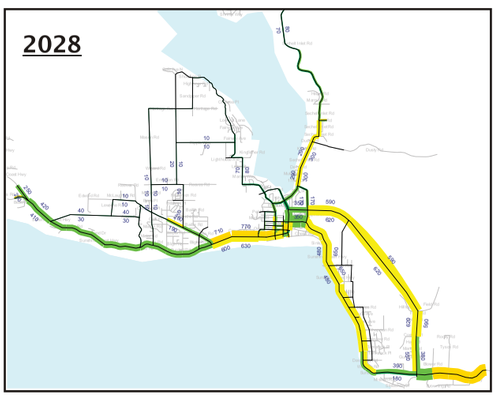
OPTION 2 - UPGRADE HWY 101 TO 4-LANES (FIELD RD - WHARF RD)



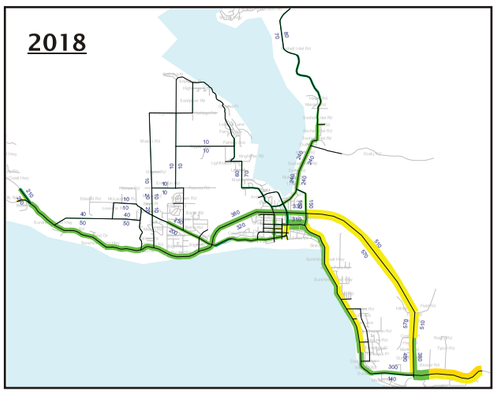


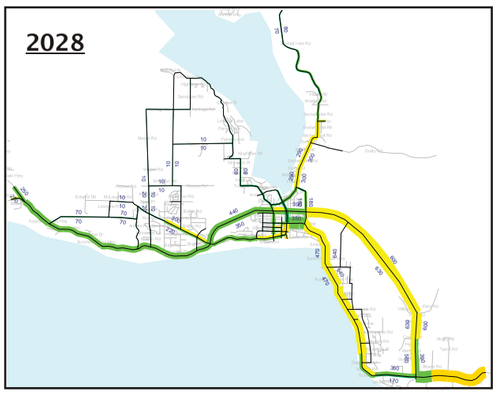
OPTION 3 -EASTERN BYPASS (FIELD RD - WHARF RD)



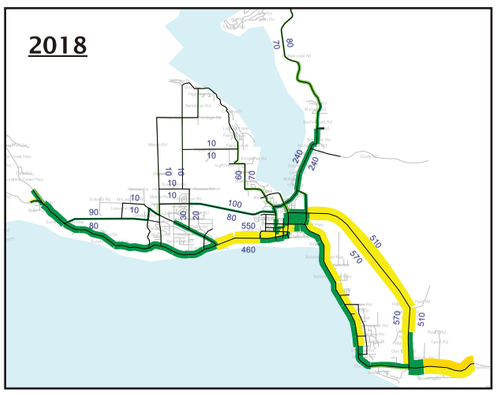


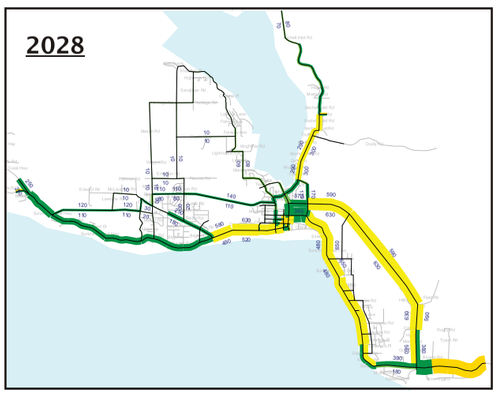
OPTION 4 - WESTERN BYPASS (WHARF RD - NORWEST BAY RD)





OPTION 5 - WEST SECHELT CONNECTOR (TRAIL AVE - TYLER RD)





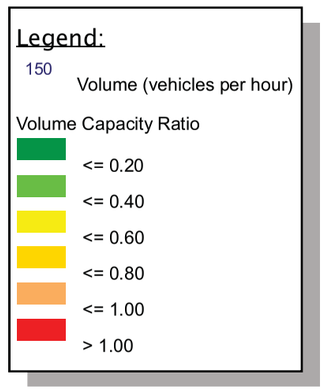


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Figure 9.7

Comparison of Option Performances

Link Volume-to-Capacity Friday PM Peak Hour

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Table 9.5: 2018 Model Performance – Network Alterations (Weekday PM Peak)

Measure	Option 1 (Status Quo)	Option 2 (4-Lane)	Option 3 (East Bypass) Preferred	Option 4 (West Bypass)	Option 5 (West Sechelt Connector) Preferred
Vehicle Trips	4,325 trips	4,325 trips	4,325 trips	4,325 trips	4,325 trips
Network Travel Time	8.3 mins/veh (600 veh-hrs)	7.1 mins/veh (510 veh-hrs)	6.6 mins/veh (475 veh-hrs)	6.4 mins/veh (465 veh-hrs)	6.5 mins/veh (470 veh-hrs)
Travel Distance	5.8 km/veh (25,250 veh-km)	5.9 km/veh (25,700 veh-km)	5.8 km/veh (25,200 veh-km)	5.8 km/veh (25,250 veh-km)	5.8 km/veh (25,000 veh-km)
Link v/c Ratio	Appendix F.1	Appendix F.5	Appendix F.6	Appendix F.7	Appendix F.8

Note: intersection performance is considered as part of the local street system analysis (see below).

Table 9.6: 2028 Model Performance – Network Alterations (Weekday PM Peak)

Measure	Option 1 (Status Quo)	Option 2 (4-Lane)	Option 3 (East Bypass) Preferred	Option 4 (West Bypass)	Option 5 (West Sechelt Connector) Preferred
Vehicle Trips	5,035 trips	5,035 trips	5,035 trips	5,035 trips	5,035 trips
Network Travel Time	9.1 mins/veh (763 veh-hrs)	7.4 mins/veh (625 veh-hrs)	6.9 mins/veh (575 veh-hrs)	6.6 mins/veh (555 veh-hrs)	6.7 mins/veh (565 veh-hrs)
Travel Distance	5.8 km/veh (29,334 veh-km)	5.9 km/veh (29,900 veh-km)	5.8 km/veh (29,100 veh-km)	5.8 km/veh (29,150 veh-km)	5.7 km/veh (28,950 veh-km)
Link v/c Ratio	Appendix F.3	Appendix F.9	Appendix F.10	Appendix F.11	Appendix F.12

Note: intersection performance is considered as part of the local street system analysis (see below).

A bypass constructed from Field Road to Wharf Road (Option 3) would serve regional traffic and alleviate pressures on the Davis Bay and Selma Park sections of Highway 101. The replaced section of Highway 101 could then be "turned over" to serve a local traffic function.

A sensitivity test was conducted on Option 3 to determine the attractiveness of the bypass route to regional traffic (i.e. traffic that travels through Sechelt). The design speed of the bypass was tested at 60 km/h and 80 km/h. At the lower speed, regional traffic preferred the existing Highway 101 corridor (approximately 70% chose this route). At 80 km/h, the result was reversed. This shows that for the bypass to be attractive to regional traffic, it will need to be designed to a higher speed.

As is, the existing section of Highway 101 west of the Village will experience increased congestion as a result of growth in West Sechelt, however, this will not exceed acceptable capacity thresholds (i.e. v/c = 0.90) until beyond the 20-year design horizon. Local concerns regarding safety and a lack of route alternatives, as well as a need to serve future development in the northern eastern sector of West Sechelt, provide a compelling reason to consider a western connection regardless.

The role of this link has been considered at length. On the one hand, it would provide an opportunity for a "local" bypass to Highway 101 prior to a "regional bypass" (Option 4). However, there are constraints in rejoining the new road to Highway 101, namely the local traffic function of the preferred Derby Road alignment and the topography at Norwest Bay Road. Alternatively, the Connector could be constructed further north connecting to Tyler Road (Option 5). The latter provides an opportunity to tie into the long-term regional bypass alignment and is the preferred interim option in West Sechelt.

Qualitative Review

The strategic road network options considered above will have impacts beyond merely traffic operations. These effects include: altered land use patterns (i.e. impacts on existing land use and induced changes in land use patterns), consistency with regional objectives, and the amenity of local residents. These effects are reviewed in **Table 9.7**.

There are advantages and disadvantages to each of the strategic road network options. Considering the eastern communities, upgrading the existing Highway 101 corridor allows the District to maintain land use patterns status quo. However, it would significantly reduce the amenity of the local community, increase the traffic safety risk, and pose an even larger barrier to the Waterfront.

Conversely, a bypass would create pressure for a shift in the centre of mass of the Village towards the new connection and for "highway" patterns of development to emerge along the corridor. These are not intended objectives of the bypass (and should be recognized and emphasized by the Official Community Plan). However, it would provide more effective access and safety for local residents. A portion of the route would also be consistent with the future regional bypass alignment between Roberts Creek and Halfmoon Bay.

West of Downtown, an extension of the bypass to replace Highway 101 is consistent with the long-term Roberts Creek – Halfmoon Bay route. Option 4 would remove the highway traffic function from the Village and allow the integration of the waterfront, Village, and Indian Band Lands. However, the existing topography and geology in the area north-east of the Highway 101 / Norwest Bay Road intersection makes this connection cost-prohibitive. Connecting to Derby Road instead would be place highway traffic onto an established neighbourhood street.

Table 9.7: Qualitative Review of Strategic Road Network Options

Option	Advantages	Disadvantages
1. Do Nothing	*Land Use Pattern:* Maintains existing land use patterns.	*Land Use Pattern:* Restricts growth potential. *Regional Objectives:* Not consistent with a regional bypass. *Local Amenity:* Does not provide alternative route nor address safety/accessibility issues.
2. 4-Lane	*Land Use Pattern:* Allows for increased growth following the established land use pattern. *Local Amenity:* Some improvement in traffic safety.	*Regional Objectives:* Not consistent with a regional bypass. *Local Amenity:* Does not provide alternative route; creates a significant barrier; increased safety risk; increased noise; etc.
3. East Bypass (Preferred)	*Land Use Pattern:* Opportunity to develop on band lands fronting bypass. *Regional Objectives:* Part of alignment consistent with regional bypass. *Local Amenity:* Provides alternative route to Highway 101. Former alignment can be downgraded.	*Land Use Pattern:* Could encourage "highway development" patterns along new corridor. Reduced traffic exposure for established commercial development on the existing highway corridor. Could encourage migration of the centre of mass of the Village.
4. West Bypass	*Land Use Pattern:* Removes highway function from Village. Allows Village to be connected to commercial development in Band Lands. *Regional Objectives:* Part of alignment consistent with regional bypass. *Local Amenity:* Provides alternative route to Highway 101. Former alignment can be downgraded.	*Land Use Pattern:* Could encourage "highway development" patterns along new corridor. Reduced traffic exposure for established commercial development on the existing highway corridor. Could encourage migration of the centre of mass of the Village.
5. West Sechelt Connector (Preferred)	*Land Use Pattern:* Consistent with road network needs of future development. *Regional Objectives:* Provides a secondary connection through West Sechelt. *Local Amenity:* Could be some infiltration of regional traffic using the local connection.	*Land Use Pattern:* Maintains highway function through Village. *Regional Objectives:* Not consistent with a regional bypass. *Local Amenity:* Existing highway will still pose a barrier between the Village and the waterfront.

Note: intersection performance is considered as part of the local street system analysis (see below).

Constructing the West Sechelt Connector to Tyler Road is preferred. It would serve a local traffic function consistent with the road network requirements of future development and could be integrated with a future regional highway bypass. However, until the regional bypass is constructed this option would not relieve the role of the existing highway through the Village.

The proposed regional highway bypass (prepared by Binnie & Associates) is believed to use, for a significant part of its length, the BC Hydro corridor. Where interim options follow this alignment, it is noted the significant cost associated with moving the utilities including the overhead Hydro wires as well as water and gas trunk lines. In a number of places, there is difficult topography, geology, or water crossings to overcome.

Recommendation 16: that an interim bypass of Highway 101 between Field Road and Wharf Road be constructed by 2015, when the existing highway is expected to reach practical capacity. A cost feasibility study will need to be undertaken to evaluate the practicality of constructing a bypass compared to upgrading the existing highway to 4-lanes. However, there are a number of qualitative reasons that emphasize the construction of a bypass.

The alignment should follow, where possible, the future regional bypass alignment proposed by Binnie & Associates. The overlapping section should be funded by the MOTI who will take over the alignment as part of the regional bypass of Highway 101 in the future. The remainder should be funded by the District through the collection of DCCs or direct developer contributions / construction.

Recommendation 17: that the Highway 101 bypass be supported with appropriate land use policies to encourage the vitality of the Village centre and discourage inappropriate development patterns along the new route. Initiating the innovative delivery of people to the existing Village centre (through walking, cycling, transit, and increased residential density) will strengthen the appeal of the Village Centre.

Recommendation 18: that the District pursue a West Sechelt Connector between Trail Avenue and Tyler Road. This connection will serve new development in the immediate term and should be funded through the collection of DCCs or direct developer contributions / construction.

The alignment should follow, where possible, the future regional bypass alignment proposed by Binnie & Associates. It would circuitously connect back to Highway 101 via the extension of Acorn Avenue. However, it should be undertaken with the understanding that the primary traffic carrying function of Highway 101 would remain through the Village until a regional bypass is constructed.

9.6 Supporting Improvements

Local improvements will be required to support the strategic network options described above. In particular, specific treatments will be required along Highway 101 at Field Road, through the Village, and in West Sechelt. Each of these areas is considered below.

Field Road

The Highway 101 / Field Road intersection marks the beginning of the regional road system at the eastern boundary of the District. As such, it needs to reflect the priorities of the major road network. For Strategic Options 1 and 2 (described at Section 9.5) the existing structure of the road network would be maintained with priority given to the existing Highway 101 corridor.

For the preferred Option 3, the regional road network would use the existing Highway 101 alignment east of Field Road, and the Field Road alignment north of the intersection. This would need to be given priority by either:

Field Road Option A: Geometric improvements to the intersection such as dual southbound left-turn lanes and alterations to the signal phasing to provide more priority to the new route; or

Field Road Option B: Redesign / reconfiguration of the intersection to make the new route the priority movement.

These options are illustrated at **Figure 9.8**. Given the complexity of Field Road Option "B" with the possibility of property acquisition and the redundancy of these improvements if and when a regional bypass is constructed, it is recommended that Field Road Option "A" be implemented for the design of the Highway 101/ Field Road intersection.

Under the preferred Strategic Option 3, Field Road will be upgraded to an arterial standard. It is important that this be reflected in the design of this road to include sidewalks on both sides of the street and on-street cycle lanes to protect vulnerable road users.

Recommendation 19: to support the construction of an interim bypass between Field Road and Wharf Road it is recommended that geometric changes be made at the Highway 101 / Field Road intersection to provide priority to the new route. These changes should include dual southbound left-turn lanes and signal phasing changes (see Field Road Option A).

That Field Road be appropriately upgraded to accommodate all road users. This includes constructing sidewalks on both sides and on-street cycle lanes. These provisions should be extended along the new highway route.

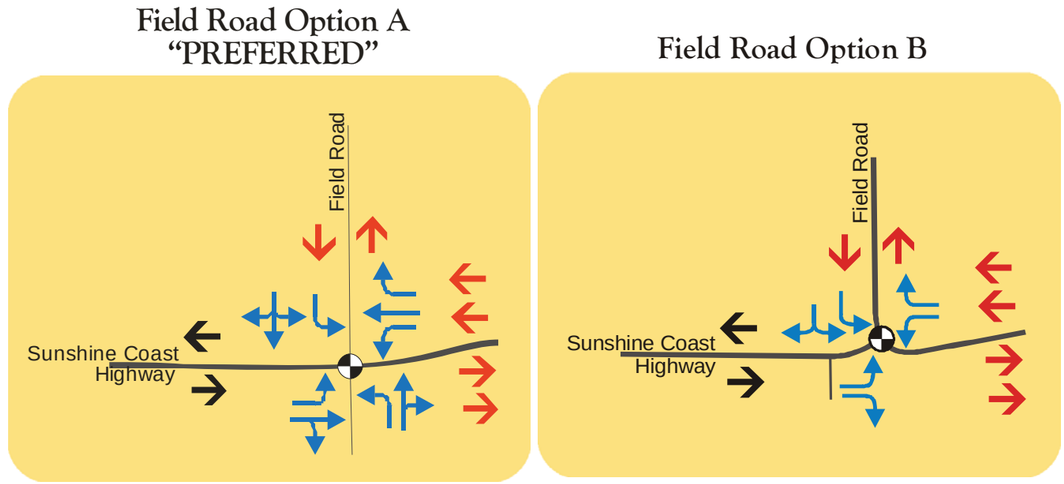


Figure 9.8: Field Road Design Options

Wharf Road

There are existing operational and safety concerns at a number of Highway 101 intersections through the Village, in particular the Wharf Road / Dolphin Street intersection. Emphasis has been given to the treatment of Strategic Options 1 - 5 and the following improvement options were considered (shown at **Figure 9.9**):

Wharf Road Option A: Expand the existing Highway 101 / Wharf Road / Dolphin Street intersection or consider a roundabout;

Wharf Road Option B: Implement geometric changes and/or turn restrictions at the Highway 101 / Wharf Road / Dolphin Street intersection;

Wharf Road Option C: Implement a one-way couplet system through the Village (as per the Urban Systems Report dated 2007);

Wharf Road Option D: Create a second intersection on Wharf Road, north of the existing Highway 101 connection to accommodate a Highway 101 bypass route.

In the eastern communities, the preferred Strategic Option 3 would require the construction of Wharf Road Option "D".[2] Until the bypass is extended to the west, Highway 101 would still use Wharf Road and Teredo Avenue through the Village. The existing Highway 101 intersection with Dolphin Avenue can be downgraded and the former highway alignment promoted as an active transportation (walking / cycling) corridor to Selma Park, Davis Bay, and Wilson Creek.

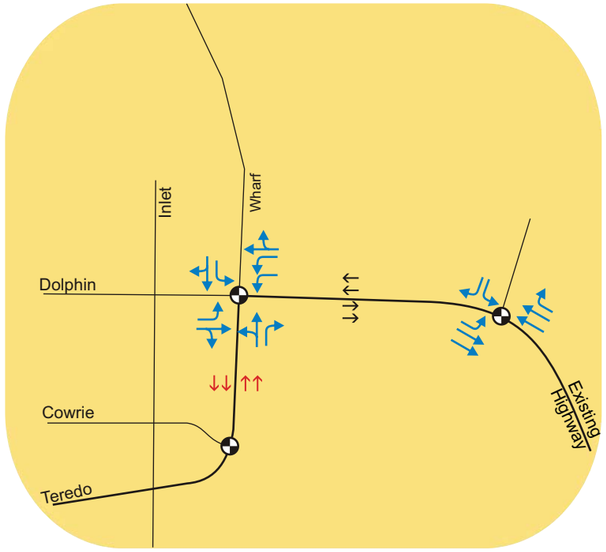
Recommendation 20: that a new intersection be constructed at the junction of the proposed regional bypass right-of-way and Wharf Road to support the bypass between Field Road and Wharf Road. The existing Highway 101 corridor, including the intersection with Dolphin Avenue, should be downgraded to perform the role of a commercial street and an active transportation (walking / cycling) corridor to Selma Park, Davis Bay, and Wilson Creek.

Construction of the West Sechelt Connector (preferred Option 5) does not depend on extending the bypass from Wharf Road to Trail Avenue. If however this is constructed, it would alter the needs of the new intersection (see Figure 9.9).

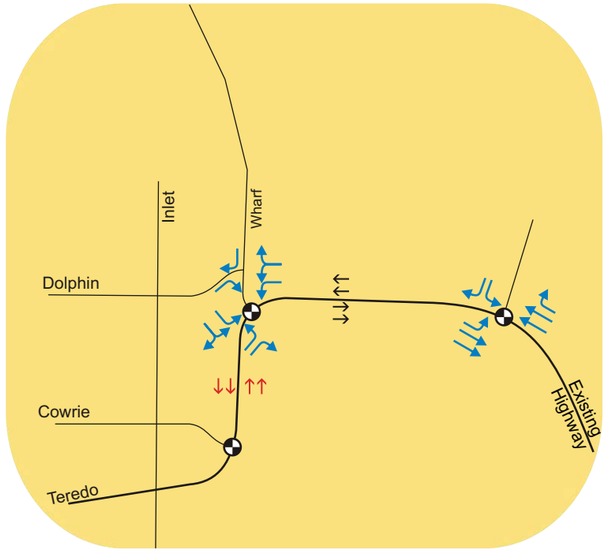
[2] Wharf Road Options A, B, or C would only be applicable under Strategic Options 1 or 2. Wharf Road Options A and B would require considerable changes at the Highway 101 / Wharf Road intersection and Option C, developed by Urban Systems in 2007, is unfavourable with the local business community and would isolate part of the Village within a "ring" of arterial roads.

N

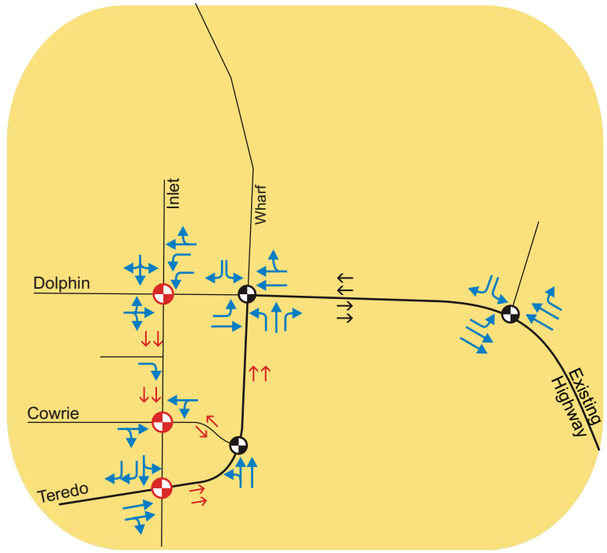
Wharf Road Option A



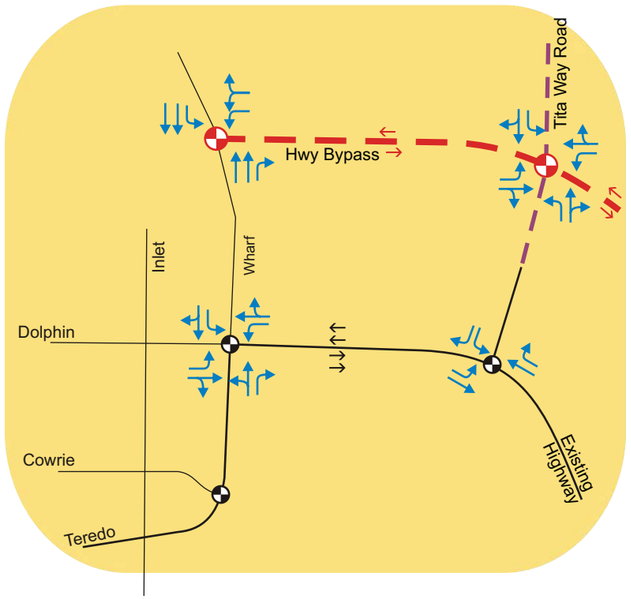
Wharf Road Option B



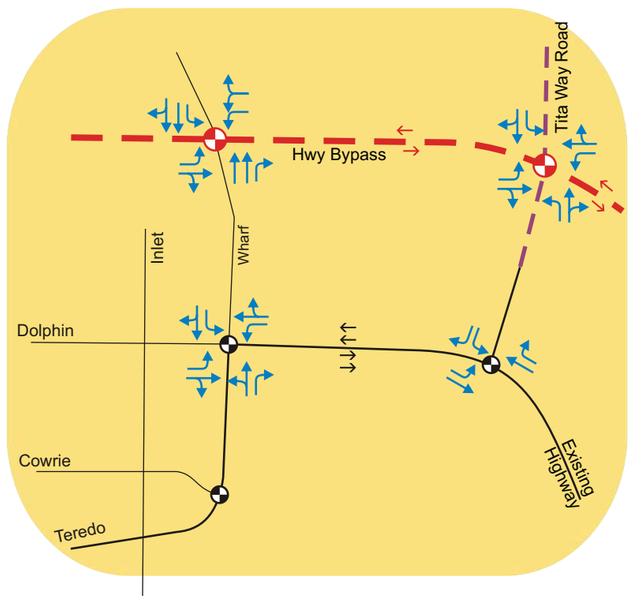
Wharf Road Option C



Wharf Road Option D (with Strategic Options 3 or 5)



Wharf Road Option D (with Strategic Option 4 or 5) " PREFERRED"



Legend:

- Existing Signal
- New Signal

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Wharf Road Design Options

District of Sechelt Transportation Master Plan

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Figure 9.9

Neptune Road

Options for West Sechelt, i.e. Strategic Options 4 and 5, need to consider the most appropriate connection to Trail Avenue. Two possible alignments were considered (shown at **Figure 9.10**):

Neptune Road Option A: use the existing Neptune Road alignment either: as a temporary / short-distance link to accommodate initial development in West Sechelt; or to connect to Tyler Road prior to a regional highway bypass;

Neptune Road Option B: use the BC Hydro ROW with Neptune downgraded to a frontage road. This may or may not be extended between Trail Avenue and Wharf Road.

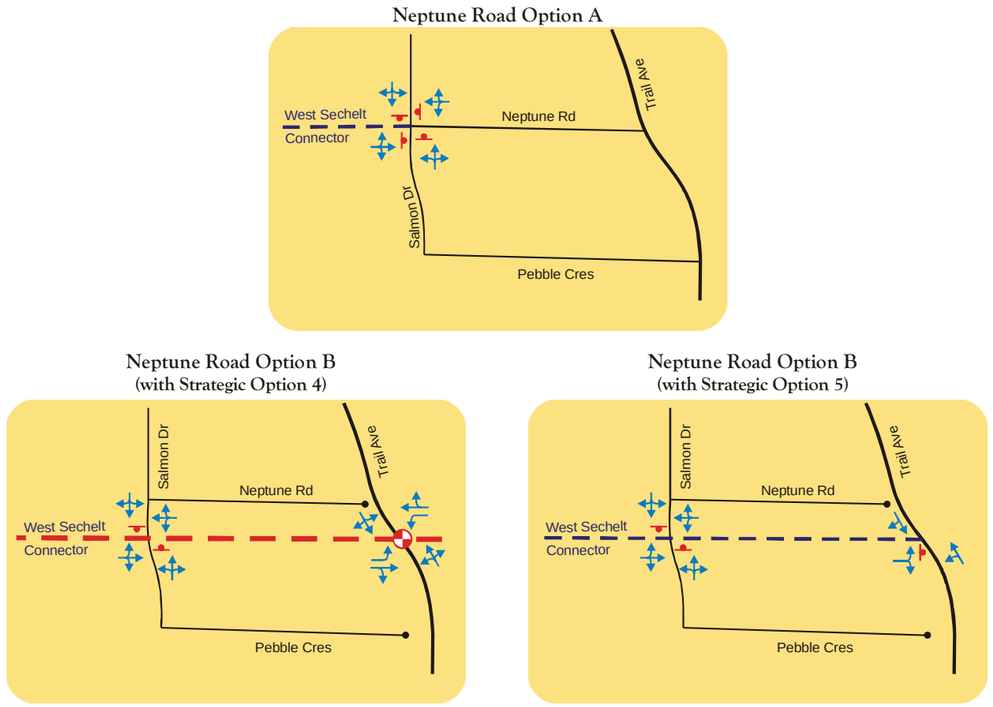

Figure 9.10: Neptune Road Design Options

Neptune Road Option "A" has a number of significant disadvantages, the least of which is the impact on residents of Neptune Road who have driveway access to this street. However, it could be used in the interim, prior to the construction of Neptune Road Option "B", to accommodate an additional 250 single-family units before traffic volumes exceed the typically accepted levels of a local street (i.e. approximately 3,000 vehicles per day).

Using the existing Neptune Road alignment would not allow the extension of the bypass from Wharf Avenue to Trail Avenue as it would introduce closely spaced off-set T-intersections along Trail Avenue, which would be difficult to coordinate.

There may be practical difficulties with constructing a roadway through or adjacent to the BC Hydro right-of-way including topography and relocation of the utility services and sub-station. However, assuming that these constraints are manageable, Neptune Road Option "B" should be pursued with some modifications to the local street network to support it. This would include the closure of Neptune Road at Trail Avenue and consolidation of access via Salmon Drive.

The proximity of the Trail Avenue / Pebble Crescent intersection to the new intersection with Trail Avenue may require the same treatment for this street. Additional access to offset impacts to these streets may include right-in / right-out access from the new road. It is recommended that operations at these locations be monitored before these actions are taken.

Given the West Sechelt Connector (preferred Option 5) does not replace Highway 101 until a future regional bypass is built (i.e. the alignment proposed by Binnie & Associates), it is not essential that the interim bypass through east Sechelt be extended between Wharf Road and Trail Avenue.

Recommendation 21: that Neptune Road be used only as an interim access for initial development in West Sechelt until the West Sechelt Connector between Trail Avenue and Tyler Road can be constructed. Traffic volumes on Neptune Avenue should be kept below typically accepted local street volumes (i.e. approximately 3,000 vehicles per day).

That the West Sechelt Connector be constructed using the future regional bypass alignment proposed by Binnie & Associates. This connection is not intended to use, replace, or extend Neptune Road.

New at-grade intersections will be created at Trail Avenue (signalized) and Salmon Drive (unsignalized). Neptune Road and Pebble Crescent will form "service" or "frontage" roads to the West Sechelt Connector and their existing intersections with Trail Avenue will be closed. This can be offset with right-in / right-out driveways from the Connector if necessary.

West Sechelt

In terms of traffic operations along Highway 101, the need for a connection with West Sechelt is not required within the 20-year design horizon. However, there are a number of accessibility reasons for pursuing an alternative to Highway 101.

The long-term road network in West Sechelt will consist of the regional highway bypass as proposed by MOTI and R.F. Binnie & Associates. In the interim, it is recommended (see Section 9.5) that a West Sechelt Connector be constructed using the future bypass alignment where possible and providing a connection to Tyler Road. Although this connection is intended to serve the West Sechelt community, a circuitous connection back to Highway 101 would be provided via Mason Road and Acorn Road.

The West Sechelt Connector will provide an alternative route for the northern areas of West Sechelt. Tyler Road can be extended north to connect to the recreational areas of West Porpoise Bay via the existing Trail Avenue / Reef Road intersection.

The major road network can be completed with the extension of Granite Road to Tyler Road, the extension of Derby Road to the West Sechelt Connector, and the extension of Cowrie and/or Barnacle Streets to Derby Road. This network will provide alternative routes to the Highway and support infill development of the area between West Sechelt and the Village. The Cowrie Street / Shorncliffe Avenue intersection can not accommodate large traffic volumes and as such the Cowrie and/or Barnacle Street extensions should not be constructed until the Derby Road – West Sechelt Connector is completed.

The recommended major road network in West Sechelt is shown at Figure 12.1. The local street network necessary to support future development is to be determined through traffic impact assessment.

Recommendation 22: that prior to the construction of a regional highway bypass, the West Sechelt Connector be constructed using, where possible, the future regional bypass alignment proposed by Binnie & Associates with a connection to Tyler Road. This will circuitously reconnect to Highway 101 via Mason Road and Acorn Road.

The major road network in the area should be completed through an extension of Tyler Road to the Trail Avenue / Reef Road intersection, the extension of Granite Road to Tyler Road, the extension of Derby Road to the West Sechelt Connector, and the extension of Cowrie and / or Barnacle Street to Derby Road. The latter should not be constructed until Derby Road is connected to the West Sechelt Connector.

The major road network should be funded through direct developer contribution / construction, or through the collection of DCCs. The supporting local street network should be determined through traffic impact assessment of new development.

Option Co-ordination

Although this report recommends a preferred road network strategy for the District, it is important that alternatives exist in the event of altered conditions such as right-of-way constraints, economic feasibility, etc. A matrix of strategic and local transportation options is included in **Table 9.8** to allow the District to identify which local options fit with which strategic options. It is stressed, that the implications of each option, identified in the sections above, be revisited before any alterations to the recommended Road Network Plan are considered.

Table 9.8: Strategic and Local Road Network Combinations

Strategic Network Option	Local Option			
	Field Road	**Wharf Road**	**Neptune Road**	**West Sechelt**
1. No Change	-	Option A Option B Option C	-	-
2. Upgrade Existing Corridor	-	Option A Option B Option C	-	-
3. Bypass (Field – Wharf)	Option A Option B	Option D	-	-
4. Bypass (Wharf – Norwest Bay)	-	Option D	Option B	Supporting Streets
5. West Sechelt Connector	-	Option D	Option A Option B	Supporting Streets

Preferred Option

A summary of the preferred road network options is included at **Figure 9.11**.

Preferred Road Network Options

District of Sechelt Transportation Master Plan

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Legend:

- Future Bypass
- Interim Arterial Road
- Interim Collector Road
- New Collector Road
- New Signal

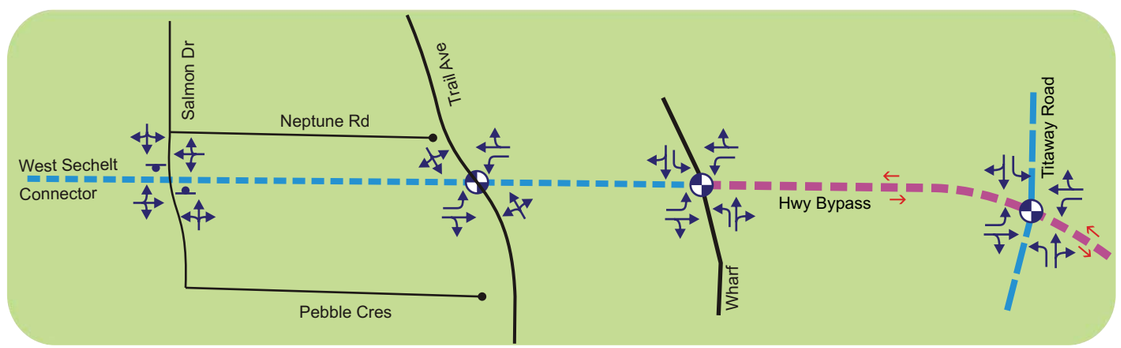
Strategic Option 5

Strategic Option 3

Highway Bypass

Alternative Alignment

West Sechelt Connector



Neptune Road Option B

Wharf Road Option D

Field Road Option A

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Figure 9.11

10.0 Active Transportation Plan

Active transport includes walking, cycling, and any other self-propelled mode. The Active Transportation Plan will guide the development of walking and cycling infrastructure and identify a framework of programs and policies to encourage the use of these modes as transportation options. The reader is referred to the Parks section of the Official Community Plan for information on non-utilitarian and recreational paths and trails.

The objectives of the Active Transportation Plan are based on elements of the transportation vision included in the *Vision Plan for Sechelt* to "move people and goods; maximize transportation choice; promote liveability and sustainability; and minimize environmental impact". Specific objectives are to:

1. Provide **safe** active transportation routes that link major destinations throughout the District;
2. Promote an active and healthy lifestyle by encouraging **greater participation** in walking and cycling;
3. Improve **accessibility** and social equity by providing low-cost transportation options; and
4. Engage **environmental stewardship** and reduce greenhouse gas emissions.

Walking is the most basic form of transportation and encourages a number of individual and community health, social, economic, and environmental benefits. Increases in walking can be achieved through:

- Reducing the distance between trip origin and destination through effective land use planning;
- Providing safe, comfortable, and convenient walking routes; and
- Prioritizing pedestrians as the basis for a healthy transportation system.

For cycling, an extensive network of routes that provide direct, comfortable, and safe connection for cyclists of all skill levels is the first step towards encouraging greater cycling activity. Providing cyclists a convenient and safe place to park, as well as end-of-trip facilities for long-stay cyclists is also important in attracting new cyclists.

10.1 Active Transportation Network

The most effective active transportation networks provide efficient and safe connections between population centres and local attractions (e.g. employment nodes, commercial districts, transport hubs, schools, recreational activities, etc.). A map of the District's existing land uses and major destinations is included at **Figure 10.1**.

An Active Transportation Network has been developed for the District considering:

- *Connectivity*: a primary, radial network was developed to connect the District's neighbourhoods (these are high priority routes). Population centres were linked to the primary system through a network of "supporting" routes;
- *Safety*: off-street routes or low-traffic volume streets are considered safer, particularly by less frequent users. Where practical, these routes were explored;
- *Constraints*: physical constraints such as restricted rights-of-way, difficult terrain, etc. were avoided where possible;
- *Comfort*: the inclusion of steep hills, busy intersections, narrow roadways, etc. can impact the desirability to cycle. These features were avoided where possible;
- *Integration*: to ensure efficient use of funds and resources, active transportation projects that overlap with proposed road network improvements were identified.

The proposed Active Transportation Network Plan is included at **Figure 12.2** as part of Section 12 and reflects the following Route Classification:

- **Regional Routes:** provide connection between major centres (e.g. between Langdale, Gibsons, and Sechelt);
- **Major Routes:** provide connection between locally significant destinations such as neighbourhood centres and major attractions;
- **Major Alternative Routes**: interim or low-cost alternatives that are easier to implement prior to the major route network;
- **Support Routes:** "fill the gaps" between the major route network and delivers users to / from population centres;
- **Recreational Trails:** not used for utilitarian transport. Recreational trails are not shown on Figure 12.2 - see the "Parks" section of the OCP.

10.2 Route Cross-Sections

Cross-section needs were developed based on a review of Bylaw 430's sidewalk and cycle route requirements (as recommended at Section 4.1). Recommended changes to the bylaw schedule are included in **Table 10.1** and include distinguishing roads and streets only by functional classification and rural or urban. The proposed "Main Street" designation for commercial streets is also included.

Land Use and Major Attractions

District of Sechelt Active Transportation Plan

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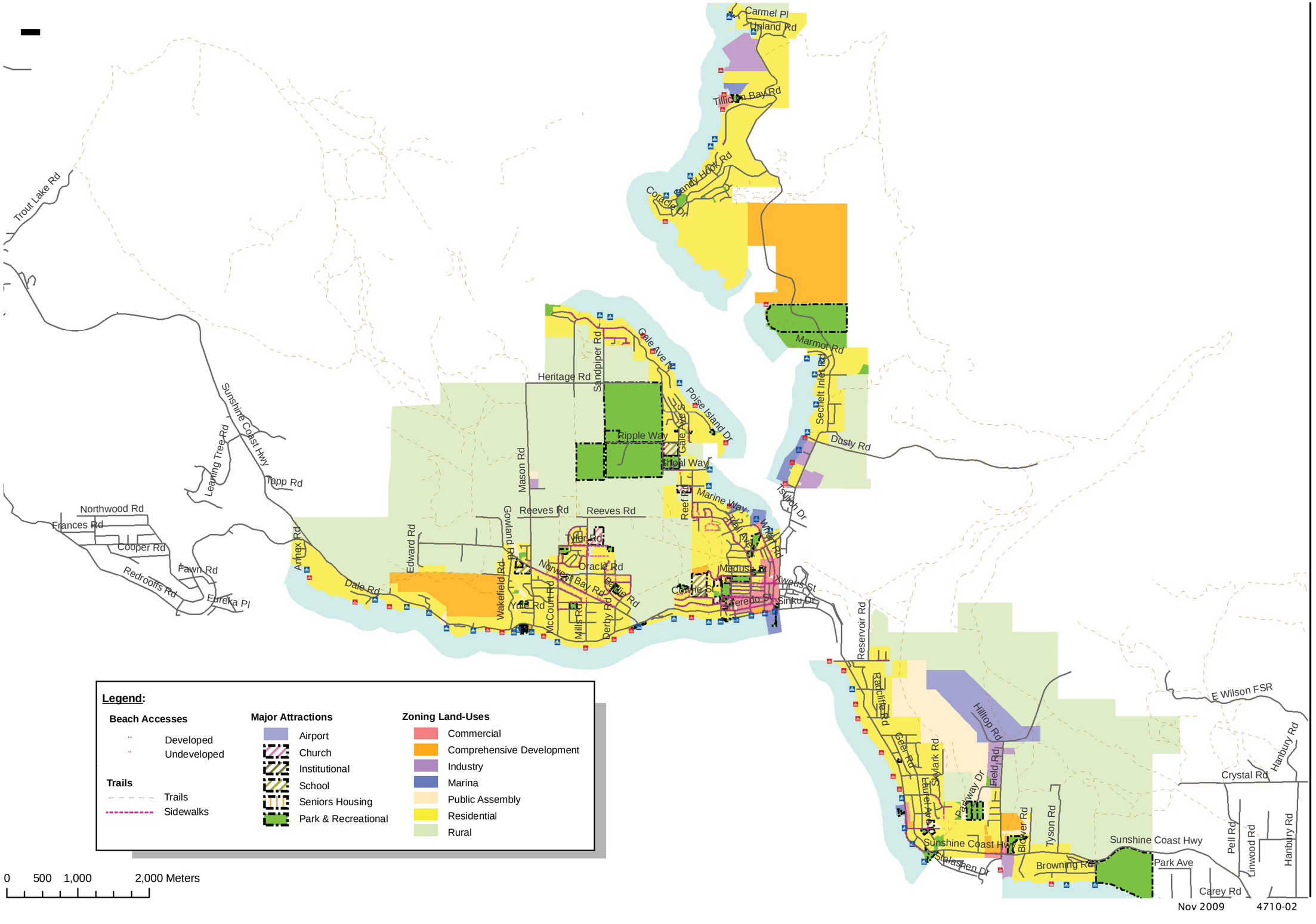

Figure
10.1

Nov 2009 4710-02

West Sechelt / West Porpoise Bay / Sechelt Village

Land Use and Major Attractions

Legend:

Beach Accesses
- Developed
- Undeveloped

Trails
- Trails
- Sidewalks

Major Attractions
- Airport
- Church
- Institutional
- School
- Seniors Housing
- Park & Recreational

Zoning Land-Uses
- Commercial
- Comprehensive Development
- Industry
- Marina
- Public Assembly
- Residential
- Rural

Heritage Rd
Crowston Rd
Sandpiper Rd
Highmoor Rd
Gale Ave N
Fairway Ave
Lighthouse Ave
Lookout Ave
Poise Island Dr
Gale Ave S
Ripple Way
Fairview Dr
Lighthouse Ave
Lagoon Dr
Tidal Way
Kingfisher Rd
Links St
Marine Way
Reef Rd
Binnacle Ave
Anchor Rd
Delta Rd
Mukway Dr
Sechelt Inlet Rd
Slim St
Osprey St
Kwatamus Ave
Xenichen Ave
Lamprey Lane
Wharf Rd
Xweus St
Swiykals Dr
Sinku Dr
Surf Crk Lane
Salmon Dr
Pebble Cres
Medusa St
Medusa Pl
Mermaid St
Cowrie St
Tidal Ave
Inlet Ave
Ocean Ave
Shoreline Ave
Teredo St
Boulevard
Mason Rd
Wigard Rd
Reeves Rd
Gowland Rd
Edward Rd
Lewarne Rd
Norwest Bay Rd
Bjorn Pl
Tower Rd
Tyler Rd
Williams Pl
Curtis Pl
McCourt Rd
Emerson Rd
Nickerson Rd
Oracle Rd
Page Rd
Granite Rd
Mika Rd
Sunrise Blvd
Gallie Rd
Jasper Rd
Picadilly Pl
Christian Rd
Mills Rd
Derby Rd
Yule Rd
Acorn Rd
Wakefield Rd
Anchor Pl
Norvan Rd
Samron Rd
Jasper Rd
Redroffs Rd
Annex Rd
Dale Rd
Trail Island Dr
Lane
Seaview Lane
Sunshine Coast Hwy

0 500 1,000 2,000 Meters

Nov 2009 4710-02

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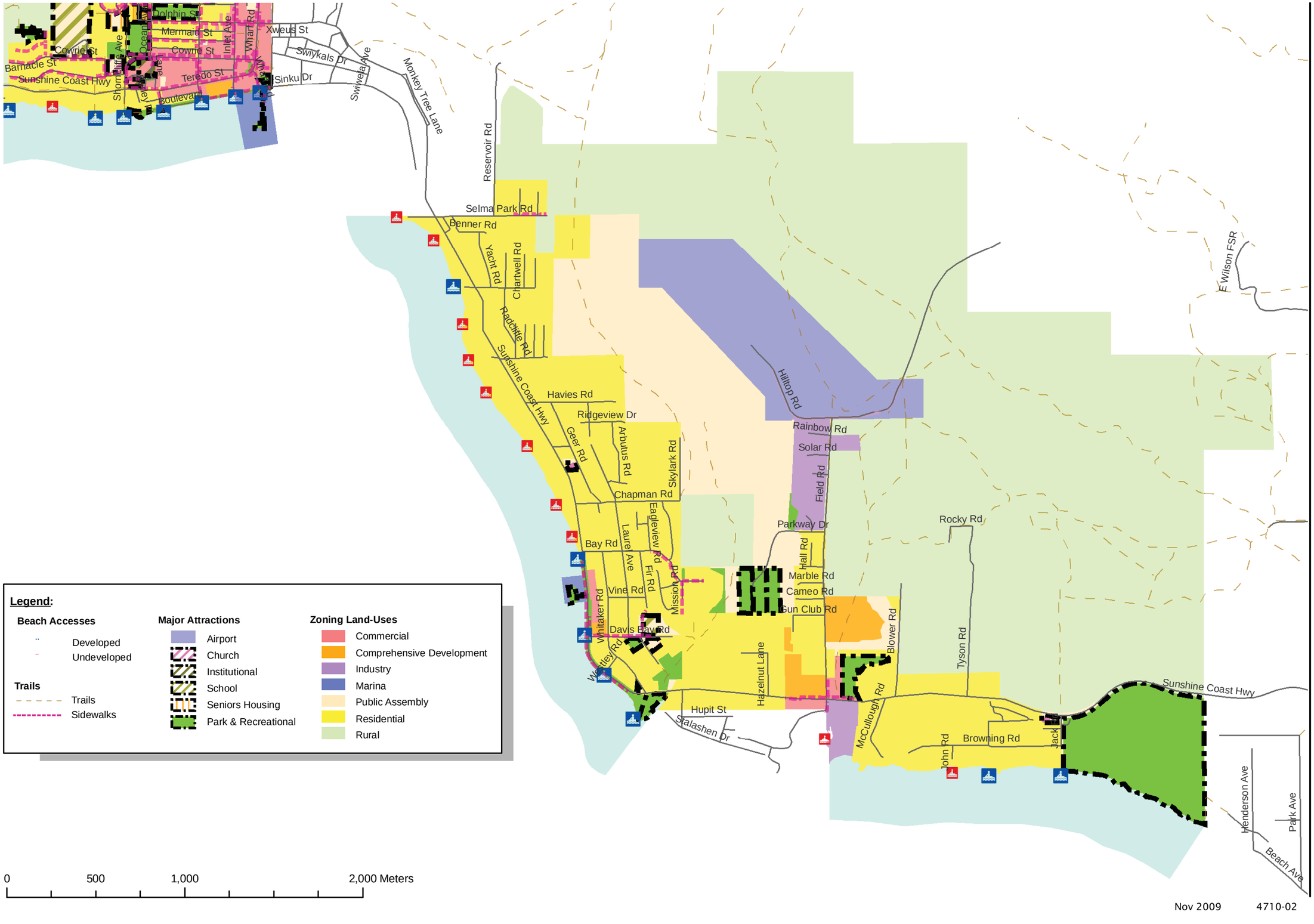
Figure
10.1a

Selma Park / Davis Bay / Wilson Creek

Land Use and Major Attractions



Legend:

Beach Accesses
- Developed
- Undeveloped

Trails
- Trails
- Sidewalks

Major Attractions
- Airport
- Church
- Institutional
- School
- Seniors Housing
- Park & Recreational

Zoning Land-Uses
- Commercial
- Comprehensive Development
- Industry
- Marina
- Public Assembly
- Residential
- Rural

0 500 1,000 2,000 Meters

Nov 2009 4710-02

Figure
10.1b

Tuwanek / Sandy Hook / East Porpoise Bay

Land Use and Major Attractions

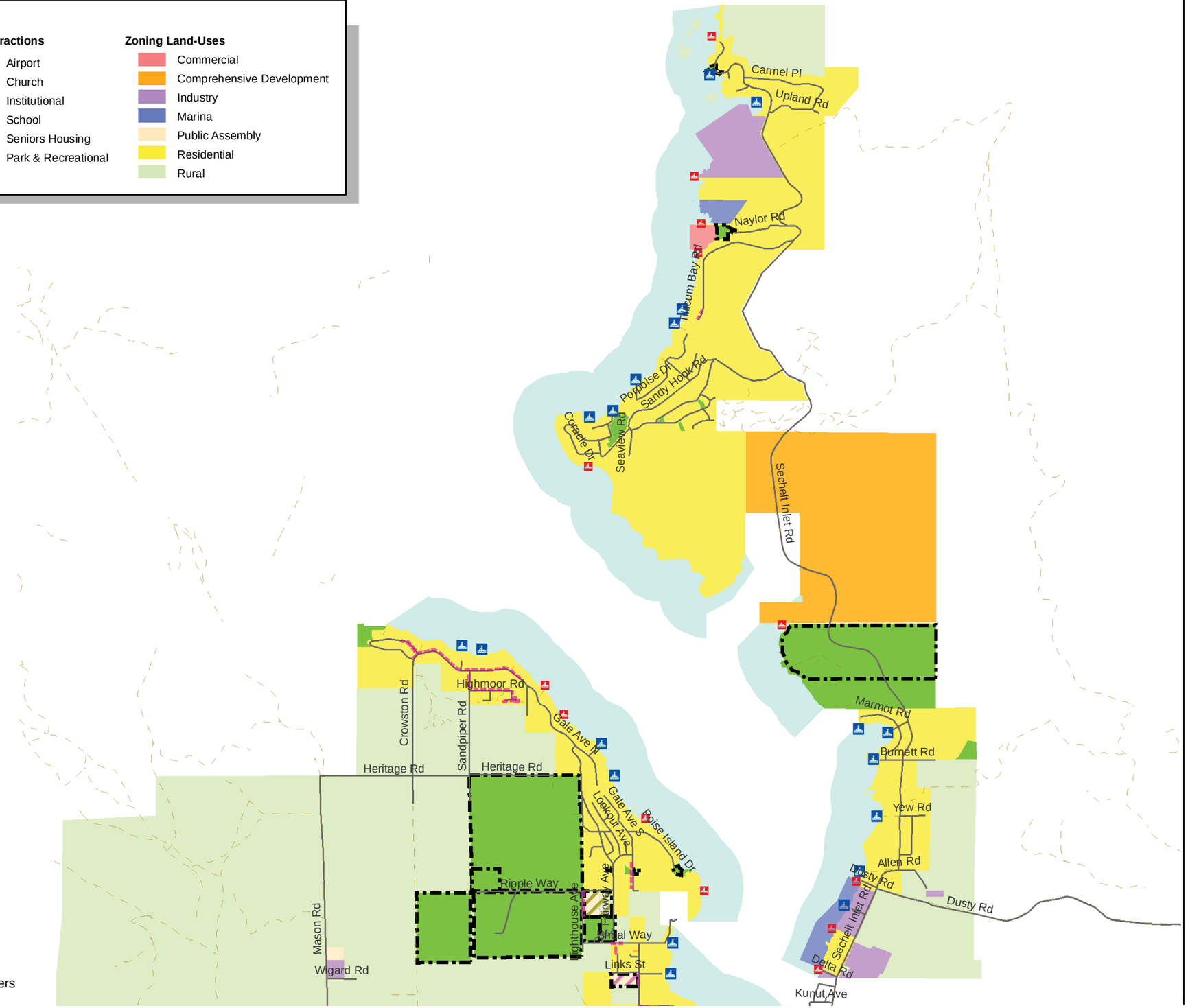
Legend:

Beach Accesses
- Developed
- Undeveloped

Trails
- Trails
- Sidewalks

Major Attractions
- Airport
- Church
- Institutional
- School
- Seniors Housing
- Park & Recreational

Zoning Land-Uses
- Commercial
- Comprehensive Development
- Industry
- Marina
- Public Assembly
- Residential
- Rural



0 500 1,000 2,000 Meters

Nov 2009 4710-02

Figure 10.1c

Table 10.1: Revised Sidewalk and Cycle Route Requirements for New Development (Bylaw 430)

Functional Classification	Pedestrian Requirement		Bicycle Requirement	
	Urban (Sidewalk)	Rural (Trail)	Urban	Rural
Local	One or both sides	None or one side	Shared with vehicles	Shared with vehicles
Limited Local	One or both sides	None or one side	Shared with vehicles	Shared with vehicles
Collector	Both sides	One side	Cycle lanes	Cycle shoulders
Main Street	Both sides	n/a	Shared parking lane	n/a
Arterial	Both sides	One or both sides or parallel multi-use trail	Cycle lanes	Cycle shoulders or parallel multi-use trail

The revised requirements result in the following Active Transportation route typology:

- Off-Street Multi-Use Trail;
- Urban Local / Limited Local – shared street with sidewalk one or both sides;
- Urban Main Street – shared parking lane with sidewalk both sides;
- Urban Collector – on-street cycle lanes and sidewalk both sides;
- Urban Arterial – on-street cycle lanes and sidewalk both sides;
- Rural Collector / Arterial – trail one or both sides and cycle shoulders;
- Rural Collector / Arterial – parallel multi-use trail.

Existing roadway cross-sections (included in Bylaw 430) were modified to reflect the needs of each of these route types and are illustrated at **Figure 10.2**. A plan of the Active Transportation Network broken down by route type is included at **Figure 10.3**.

10.3 Return on Investment

The Active Transportation network was evaluated in terms of potential return on investment - balancing need and likely patronage of a route with its expected cost and ease of implementation. This is shown at **Figure 10.4** as:

- **High Return**: essential in creating the major route network; relatively low cost; implementation mostly accommodated within existing infrastructure;
- **Good Return**: important network element, costly and / or difficult to implement due to physical constraints or the need to build or re-build infrastructure;
- **Some Return**: supporting network elements; less immediate need or to be coordinated with new development, road resurfacing, etc.;
- **Future Return**: network elements to be incorporated into future road construction.

Table 10.2 breaks down the route priorities by length and identifies the amount of the network already present or that could be developer contributed / constructed or funded as part of a non-District road project (e.g. Band or MOTI-sponsored road projects).

Table 10.2: Active Transportation Route Priorities

	High Return	Good Return	Some Return	Future Return	All
Total Length	14.7 km	11.2 km	24.7 km	24.2 km	74.8 km
Existing	*47%*	*5%*	*23%*	*4%*	*19%*
Developer- or Other Funding	*19%*	*23%*	*15%*	*91%*	*41%*
New / Retrofit	*34%*	*72%*	*62%*	*5%*	*40%*

Approximately 19% of the proposed Active Transportation Network already exists. A further 41% could be coordinated through developer or other non-District funded road projects. The remaining network elements are the responsibility of the District of Sechelt (or collaborative projects with MOTI or the Indian Band) and should be developed as funding and/or other opportunities (e.g. road resurfacing, etc.) become available.

For new / retrofit routes, class "D" (i.e. order of magnitude) unit cost estimates were developed assuming routes were upgraded from their "typical" existing cross-section to the minimum cross-section standards illustrated at Figure 10.2. It was also assumed that there were no significant impediments (e.g. land acquisition, relocating utilities, extensive cut-and-fill, etc.). Unit costs are included at **Appendix G**.

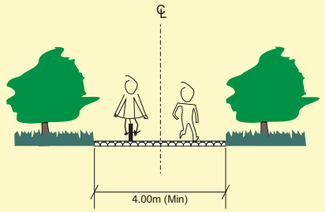
Resulting order of magnitude costs to retrofit sections of the Active Transportation Network are summarized in **Table 10.3**.

Table 10.3: Order of Magnitude Cost Estimates to Retrofit the Active Transportation Network (2009 $ millions)

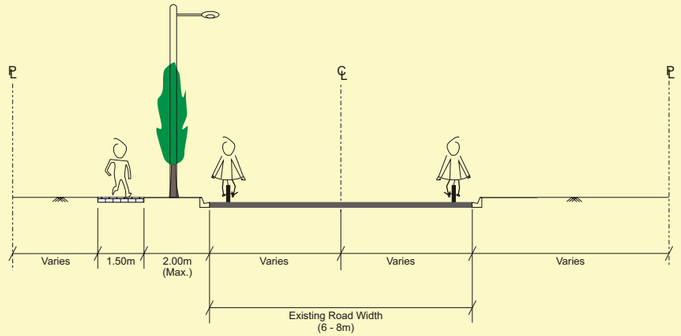
Route Type	*Cost ($ 2009)*
Off-Street Multi-Use Trail	*$200,000*
Urban Local / Limited	*$2,200,000*
Urban Main Street	*$700,000*
Urban Collector / Arterial	*$14,000,000*
Rural Arterial	*$6,400,000 – $12,400,000*
Total	***$23,500,000 – $29,500,000***

N

Off-Street Multi-Use Trail

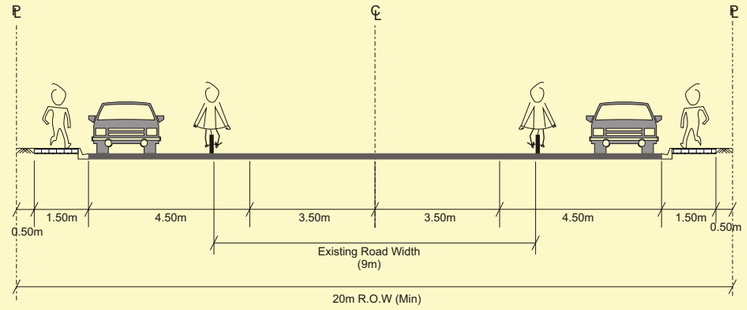


Urban Local/Limited Local
Shared Street with Sidewalk One Side



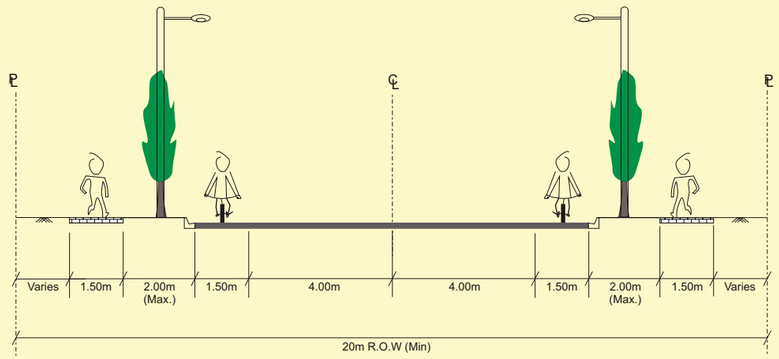
Note: Sidewalk could be replicated on the other side

Urban Main Street
Shared Parking & Bike Lanes with Sidewalk

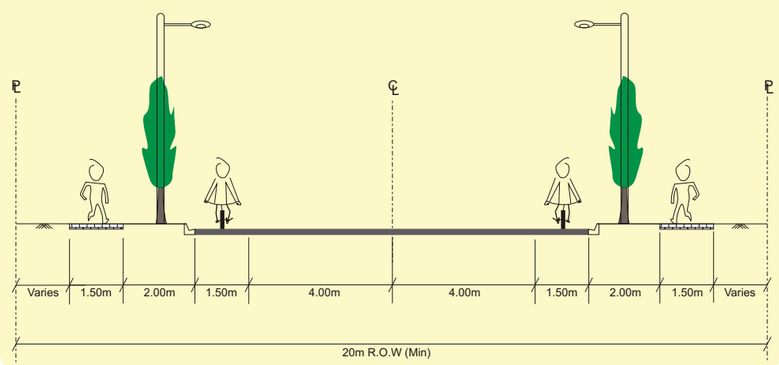


Note: Sidewalk could be replicated on the other side

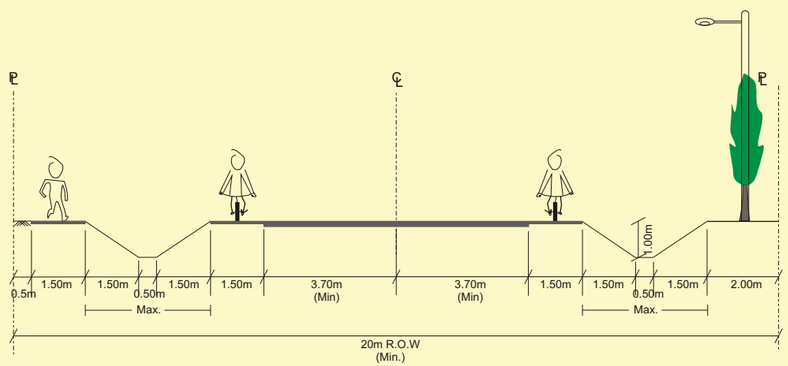
Urban Collector
Bike Lanes & Sidewalk Both Sides



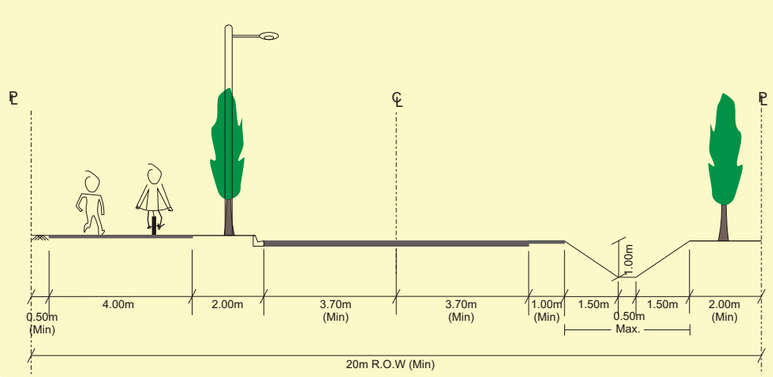
Urban Arterial
Bike Lanes & Sidewalk Both Sides



Rural Arterial
Bike Shoulders & Trail One Side



Rural Arterial
Multi-Use Trail on One Side



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Active Transportation Cross-Sections - Minimum Standards

Sechelt Active Transportation Plan

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Figure
10.2

Active Transportation Network (by Route Type)

District of Sechelt Active Transportation Plan

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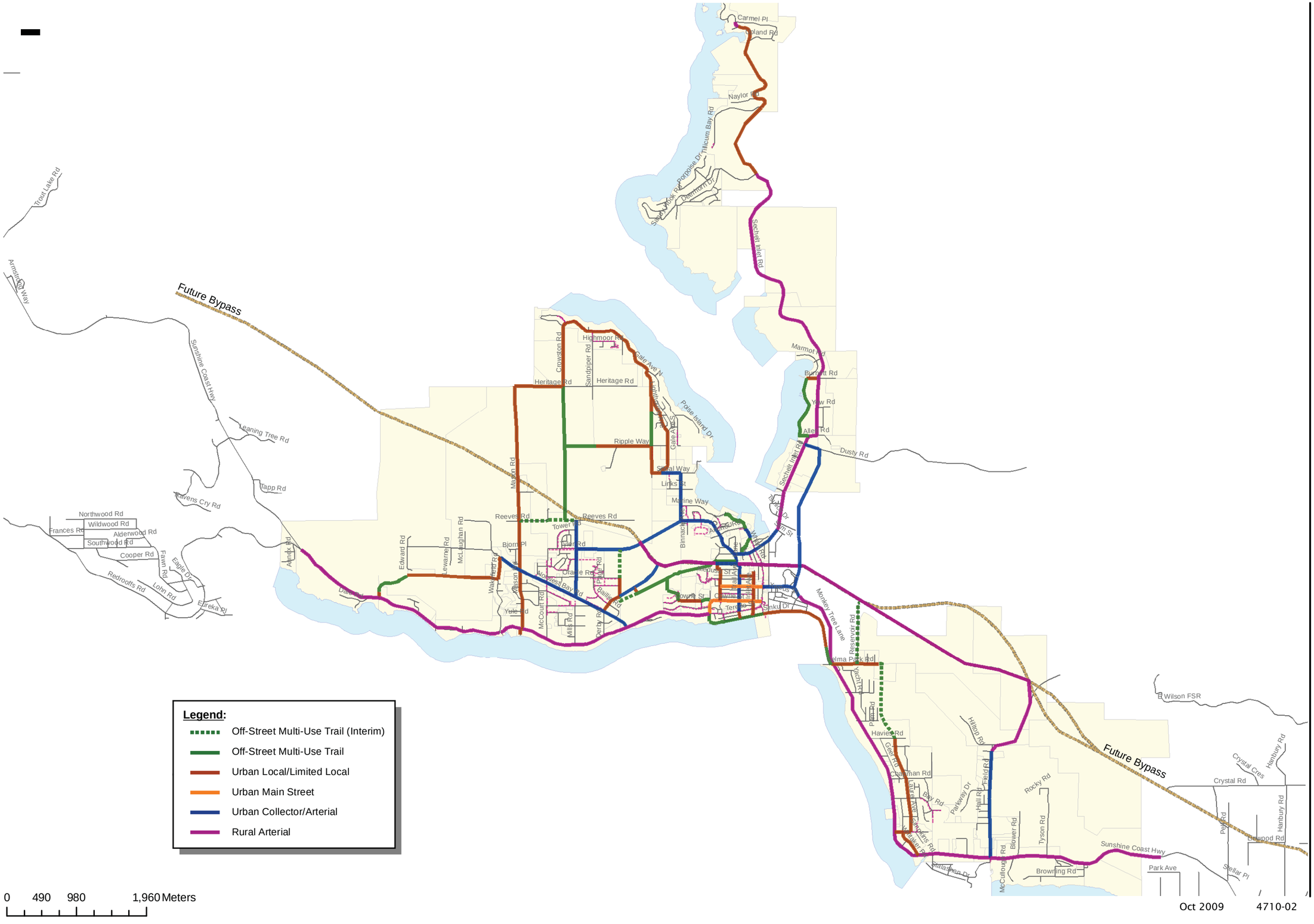

Legend:

- Off-Street Multi-Use Trail (Interim)
- Off-Street Multi-Use Trail
- Urban Local/Limited Local
- Urban Main Street
- Urban Collector/Arterial
- Rural Arterial

0 490 980 1,960 Meters

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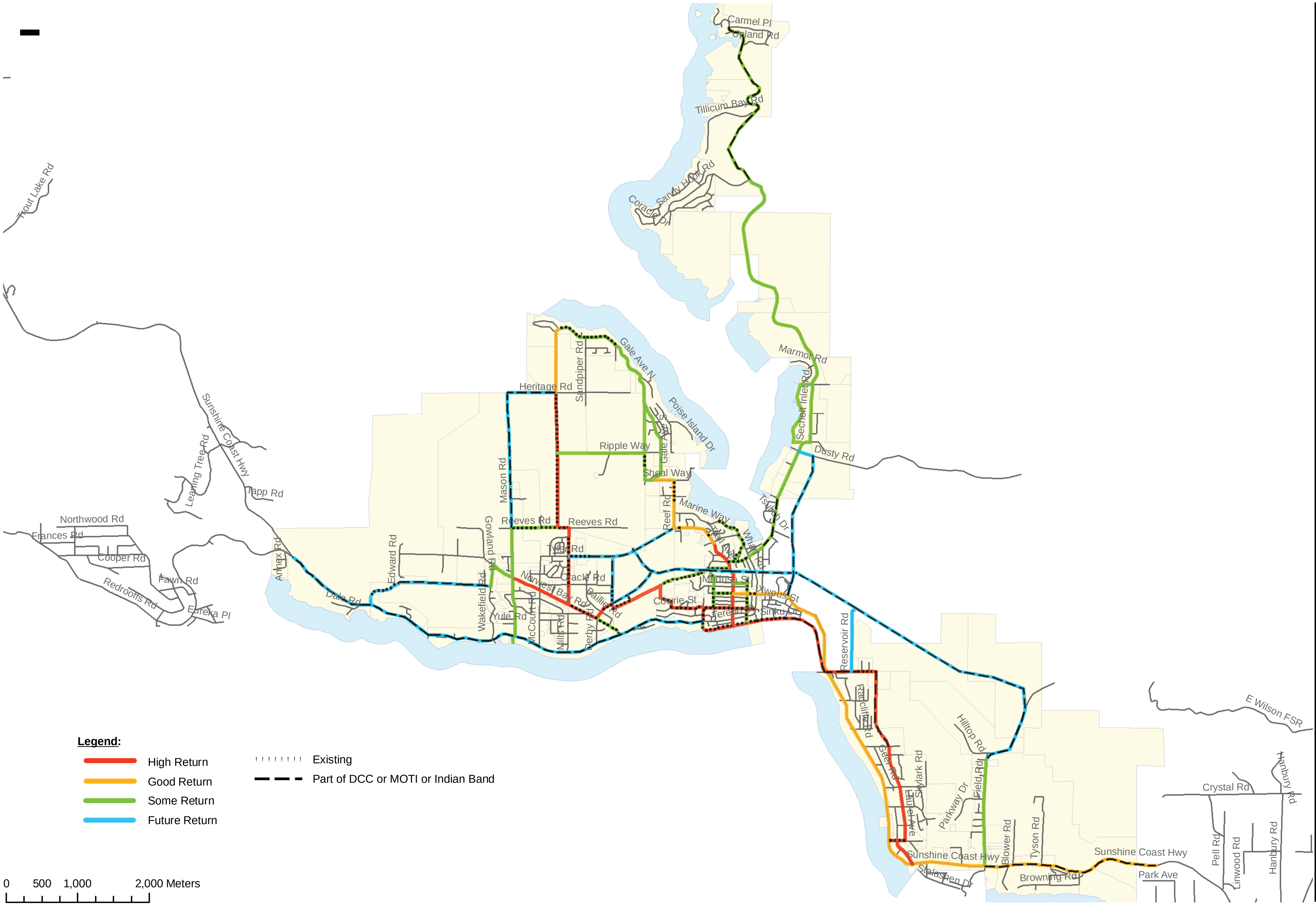
Figure
10.3



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Expected Return on Investment

District of Sechelt Active Transportation Plan

Figure
10.4

10.4 Priority Projects

The approach to establishing the Active Transportation network should be "opportunistic" in that it integrates network elements into capital works projects, grant applications, MOTI / SCRD projects, and development applications as these opportunities arise.

However, not all projects will be able to integrate with other projects and so it is prudent to prioritize the routes for which dedicated funds should be allocated each year. For the most part, the top priorities follow the "major" or "major alternative" routes in an attempt to better connect neighbourhood centres. The highest priority routes are described below:

1. **Highway 101**: the Road Network Plan recommends that pedestrian and cycling facilities be incorporated into the existing Highway 101 corridor. Previous studies have gone so far as to include cycle-able road shoulders and a parallel pathway or sidewalk into preliminary designs for the corridor upgrade.

   This represents the number one priority of the Active Transportation Network and forms the long-term east-west spine that connects the Village and Band Lands with Selma Park and Davis Bay. Funding for this project will be dependent on negotiations with MOTI regarding the Highway 101 bypass. An interim alternative route, the "Davis Bay Trail" has been developed (see Figure 10.4) using "back streets" such as Laurel Avenue, Selma Park Road, and Sinku Drive.

2. **Watermain Trail**: an off-highway route between the Village and established areas of West Sechelt. The trail will use Cowrie Street to connect the Village to an upgrade of the existing Watermain Trail. This provides a connection to Derby Road and Norwest Bay Road.

   A concept plan for the development of this trail is included at **Appendix H1**.

3. **Davis Bay Trail** (Laurel Avenue / Selma Park Road / Sinku Drive): an interim network element prior to the improvement of Highway 101. This route will capture stunning views, but must overcome a number of significant grades, e.g. Selma Park Road. The route will utilize local streets with low traffic volumes and will require:

   - Construction of an off-street multi-use trail in the future Laurel Avenue right-of-way north of Havies Road. This will require easement rights to be granted from the property owners;
   - Possible treatment of the Highway 101 / Selma Park Road intersection to ensure safe crossing (e.g. trimming vegetation to improve sight distance, warning signs for motorists, etc.); and
   - Connection to Sinku Drive from Selma Park Road and cooperation of the Sechelt Nation to use Sinku Drive as part of the Davis Bay Trail.

   A concept plan for the development of this trail is included at **Appendix H**.

4. **Trail Avenue**: forms the north-south spine of the network and should be constructed with sidewalks on both sides and on-street cycle lanes, on widened pavement where possible. Intersection treatments may be required at the Highway 101, Dolphin Avenue, and Anchor Road intersections, and at the future intersection with the West Sechelt Connector.

   Consideration was given to Wharf Avenue as an alternative north-south spine, however there are concerns with the amount of heavy vehicle traffic that currently uses this route. Marine Way was also considered for part of the Trail Avenue route, however it is somewhat circuitous and adds two difficult intersection manoeuvres where the route leaves Trail Avenue that would not be necessary with a direct path along Trail Avenue. Traffic volumes on Marine Way are relatively low and this route will still be available for users that find Marine Way more comfortable than Trail Avenue.

   A concept plan for the development of this trail is included at **Appendix H**.

5. **Nickerson / Crowston / Ripple Trail**: this trail will connect West Sechelt to the recreation facilities in West Porpoise Bay. A multi-use trail was being constructed along the Crowston Road and Ripple Road right-of-ways at the time of this report. Some portions of Nickerson Road need to be completed with sidewalk and / or marked cycle lanes.

10.5 Support

Encouraging greater walking and cycling participation in the District of Sechelt starts by providing an extensive and convenient active transportation network. This is supported by policies and programs that:

1. Enhance the walking and cycling experience: e.g. incorporating pedestrian-oriented design into development guidelines;
2. Increase the attractiveness of these modes: e.g. providing secure bicycle parking and end-of-trip facilities; and
3. Engage collective / community action: e.g. encouraging participation through volunteer or advocacy groups, safe-routes-to-school programs, or promotional activities.

Policies and Programs

Programs that could support active transportation in the District of Sechelt are described in **Table 10.4** and assessed in terms of their cost to the District, ease of implementation, parties responsible for implementation, and effectiveness.

Education

It is essential that pedestrians, cyclists, and motorists be educated on the use of the Active Transportation System. The Town of Langford's Bicycle Plan provides a good example of where education programs should focus their energies:

- Ensuring that cyclists and motorists understand the "rules of the road";
- Ensuring that cyclists and motorists understand that the *Motor Vehicle Act* applies equally to cyclists and motor vehicles;
- Ensuring that all cyclists (but particularly new cyclists) are equipped with the appropriate level of skill to handle their bicycles in all situations;
- Ensuring that cyclists understand the issues of safety and protection relating to bicycle use; and
- Ensuring that cyclists understand the importance of regular bicycle maintenance.

Apart from the District, other agencies with a stake in education may include the RCMP, the Insurance Corporation of British Columbia, local school districts, and cycling advocacy groups. Information dissemination could take the form of:

- Cycling skills courses;
- Information distribution through press releases, website postings, leaflets with vehicle registration and insurance renewal, etc.; and
- Grassroots programs through schools and community centres.

Signage

Another important consideration is the signage of active transportation routes. This needs to enable a user to easily identify a route and should communicate a <u>consistent</u> message regarding the accommodations that will be afforded. Directional signage may also be considered.

Examples are included at **Figure 10.5**. These include the City of Vancouver's "greenway" signage, which uses the bike symbol on its street signs to identify these streets as greenways, which cyclists know provide accommodations such as pedestrian signals at major intersections, traffic calming to limit vehicle traffic, and cycle lanes where necessary. An example of directional signage shows the direction and distance to points of interest along the route. Off-street trails can also be "branded" as is the case with Port Coquitlam's PoCo Trail.

Pavement Marking

Consistent application of pavement marking is essential in creating consistent expectation and building the trust of users. Examples of markings intended for use in Sechelt are included at **Figure 10.6**.

Bicycle Parking

The first step in encouraging greater participation in cycling is undoubtedly providing a safe place to ride. Second, is providing a place to park. Bike racks provide quick and effective short-term parking, however for longer-term parking more secure options are desirable. In addition, particularly for long-stay cyclists, end-of-trip facilities such as showers, lockers, and washrooms encourage cyclists to participate without compromising convenience.

Many municipalities require parking to be provided at popular destinations such as residential, commercial, office, and institutional / service-based land uses. A review of bylaw requirements for these uses is included in **Table 10.5** for Langley and Maple Ridge (areas that service both rural and urban land uses) and could be used to develop parking requirements in the District of Sechelt.

Table 10.5: Comparison of Bicycle Parking Requirements

Land Use	Short-Stay Bicycle Parking Spaces		Long-Stay Bicycle Parking Spaces	
	City of Langley	District of Maple Ridge	City of Langley	District of Maple Ridge
Residential	6 per building	2 – 6 per 20 units	0.5 per unit	1 per 4 – 20 units (depending on use)
Commercial	6 per unit	6 per 1,500m^2 GFA	1 per 500m^2 GFA or 1 per 10 employees	1 per 750m^2 GFA
Office	6 per unit	6 per 1,500m^2 GFA	1 per 750m^2 GFA	1 per 750m^2 GFA
Institutional	10 per building	6 per 1,500m^2 GFA	-	15% of auto spaces

Including bicycle parking as part of the Zoning or Development Services Bylaw allows bicycle parking supply to be provided with new development or redevelopment. <u>Bicycle Rack Programs</u> can be used to increase existing bicycle parking supply. These programs typically work through requests received from businesses or land owners interested in installing bicycle racks. The District would then work with these parties to identify a suitable location on public right-of-way or on the owner's property to install a bike rack.

A certain amount of monies can be set aside each year for use in this program and typically costs for installing racks are shared. Bike racks cost in the order of $500 – 800 (including installation) and a consistent (range) of rack designs should be chosen at the outset of the program.

Table 10.4: Programs to Support Walking and Cycling

Strategy	Description	Cost to District	Responsibility	Ease of Implementation	Effect
Walking					
Pedestrian-Oriented Design	Create more walkable communities by incorporating pedestrian-oriented street design into development guidelines.	**Low** - Costs included in project development and tend to be lower than conventional approaches.	District Developer	**Medium** - Incorporate into design standards. Control through development review process.	**High**
Smart Growth	Increase the number of people within walking distance of services.	**Low** - Incorporate into OCP and development policies.	District Developer	**Medium** - Incorporate into policies. Control through development review process.	**High**
Prioritize Pedestrians	Walking should lead the hierarchy of transportation, followed by cycling, transit, then automobiles.	**Low** - Incorporate into OCP policies.	District	**Medium** - Needs to be supported at all levels.	**High**
Safe-Routes-to-School	Provide children safe opportunities to walk to school or parent escorts, e.g. walking school bus.	**Low**	Schools	**Easy** - Coordination required.	**Low**
Walking Groups	Introduce people to walking through recreation.	**Low**	Community	**Easy** - Coordination required.	**Low**
Maps	Distribute maps of the pedestrian and cycling networks	**Medium** - Cost of producing maps.	District	**Easy** - Distribute through District website, local stores, etc.	**Low**
Cycling					
Cyclist-Oriented Street Design	Create more cycle-friendly transportation system through a permeable street network and cycle-friendly traffic calming	**Low** - Costs included in project development and tend to be lower than conventional approaches.	District Developer	**Medium** - Incorporate into design standards. Control through development review process.	**High**
Bicycle Parking	Provide secure long-term parking at employment and other long-stay locations; and convenient short-term parking at retail, recreation, and service locations. Host "valet" bicycle parking for community events	**Medium** Bike racks ~ $500 - $800 (incl. installation) Lockers ~ $1000	District Developer	**Medium** - Incorporate into development requirements. Retrofit existing areas through a "Bicycle Rack Program" that subsidizes businesses installing racks.	**High**
End-of-trip facilities	Provide comfortable facilities, e.g. showers, clothes lockers, washrooms, etc. for long-stay cyclists	**Low** - Costs included in project development.	District Developer	**Medium** - Development review process.	**Medium**
Bike-on-Bus	Fit all buses with cycle racks	**Low**	BC Transit	**Medium** - Coordinate with BC Transit and other bus operators.	**Medium**
Promotions	Activities to encourage greater participation, e.g. bike-to-work week, incentive schemes, activities with local clubs, etc.	**Medium** - Program management; preparation of materials.	District	**Medium** - Requires program coordinator.	**Medium**
Cycling Advocacy	Encourage the development of bicycling in the community Provide training and education	**Low**	District / Private Organization	**Easy** - Groups tend to form organically.	**Medium**
Bike-Share / Bike-Rental	Stations throughout the District where bicycles can be rented for a fee.	**Medium** - $600 per bicycle to install an electronic station with credit card charge facilities.	District Private operator	**Medium** - Private operator, agency, maintenance of fleet required.	**Medium**
Developer-Provided Bikes	Developer includes a bike or voucher for bike purchase to unit / house buyers	**Low** – developer funded: $300 – 500 for a low/mid-range comfort bike.	Developer	**Easy** - Implemented by the developer.	**Medium**
Electric Bikes	Provide added mobility to less-confident and older users	**Medium** - $1,000 - $3,000 (new); $600 (conversion)	Local bike stores	**Medium** - May require revision of bylaw to recognize vehicle type.	**Medium**

Figure 10.5: Examples of Cycling Signage.

Clockwise from left: Bikeway street signage from City of Vancouver; directional signage from the UK; Bikeway route signage from City of Vancouver, PoCo Trail signage from City of Port Coquitlam.

Figure 10.6: Examples of Pavement Markings.

Clockwise from top left: cycling shoulder, shared parking / cycle lane (with parking restrictions), shared parking / cycle lane (no parking restrictions), cycle lane adjacent parking, cycle lane abutting curb, sharrow (middle).

10.6 Active Transportation Summary

The following recommendations are made regarding active transportation.

Recommendation 23: that the Active Transportation Network be adopted and that the revised requirements (sidewalk and cycle route schedule and road / street cross-sections) be incorporated into Bylaw 430.

Recommendation 24: that specific funding be allocated to the creation of the Active Transportation Network. These funds should be deployed in an "opportunistic" manner to take advantage of developer construction / funding of improvements, grant applications, collection of DCCs, and integrating with scheduled capital works projects or non-District funded projects.

Beyond this, the following projects should be developed as funds permit (in order of priority):

- Highway 101 improvements (dependent on MOTI);
- Watermain Trail;
- Davis Bay Trail;
- Trail Avenue;
- Nickerson / Crowston / Ripple Trail.

Recommendation 25: that the District incorporate bicycle parking standards into its Zoning By-Law to enhance the supply of short- and long-stay bicycle parking through new development and redevelopment.

Also, that the District establish a Bicycle Rack Program that works with interested land owners to supplement the existing supply of bicycle parking.

Recommendation 26: that the District develop a schedule of desirable programs (similar to Table 10.4) that would support the Active Transportation Plan. Education of pedestrians, cyclists, and motorists is critical.

Other programs should focus on reducing the number of vehicle trips and increasing participation in active transportation. These strategies can be coordinated with schools, local businesses, MOTI, etc. or could be offered by developers to offset site impacts (to be identified as part of traffic impact assessments).

Recommendation 27: that consistent guidelines be developed for the application of pavement marking and signage as it relates to pedestrian and cycling infrastructure. Maintaining consistency enables users to develop consistent expectations of the accommodations these routes afford them.

11.0 Travel Demand Management

Increasingly, reduced capital budgets coupled with public attitudes towards environmental sensitivity and the limitations of traditional energy sources, are directing municipal agencies towards ways to better manage their existing transportation infrastructure. Reduced automobile infrastructure can be achieved through travel demand management (TDM) strategies that promote the use of alternative transportation modes, increase the number of people using each vehicle, or suppress overall trip-making.

Some strategies are more effective than others and as such there are numerous ways to package a TDM strategy to achieve an intended goal. The degree of effectiveness of TDM is wholly dependent on the "aggressiveness" of the program and the support given to the program within the community and amongst decision makers. Specific strategies are addressed below followed by a TDM framework that has been developed to allow the District to implement programs in the short- and long-terms.

11.1 Land Use / Development Patterns

Land use is the single largest factor affecting trip making. Mixed land use and compact development patterns encourage shorter trip making and as such allow more effective modal choices (such as transit, walking, cycling, car-sharing, etc.) to be provided for less cost. These goals should be reflected in land use and development policies and bylaws.

Vehicle trip rates in smart growth / mixed use developments are typically 30% to 40% less than conventional / auto focused designs [3, 4, 5, 6] and in some cases have been recorded up to 60% less [7]. These reductions are reflected in a lower automobile mode split where, for example, a "pedestrian and green" development pattern has 54% auto use compared to an "auto-oriented" pattern with 85% or above[6].

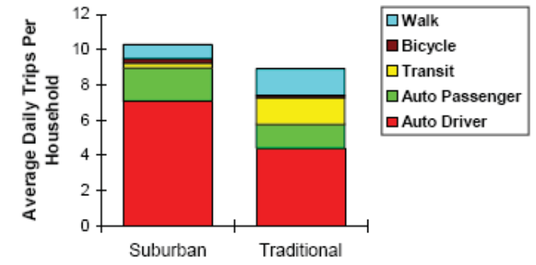
Relative changes in travel behaviour are highlighted in the table below for different urban area configurations and in particular show how transit and rideshare increase as single-occupant vehicle use reduces and urban form become more concentrated.

Table 11.1: Mode Split by Location (US DOT – 1993)

	Low Density Suburb	Activity Centre	Regional CBD
Single Occupant Vehicle	85%	66%	41%
Transit	7%	16%	30%
Rideshare	8%	18%	29%

The survey highlights the relative changes by urban form, but it is somewhat dated and does not necessarily represent smaller Canadian communities. However, even within Sechelt this phenomenon is evident. During November 2008, pedestrian counts were taken at various intersections throughout the District including adjacent to mixed-use developments in Davis Bay, at the Norwest Bay Road / Mason Road intersection in West Sechelt, and in the Downtown Village. These locations observed a significantly higher number of pedestrians than single use areas such as in residential neighbourhoods in West Sechelt.

To further emphasise changing travel dynamics by urban form, a study by Friedman, Gordon and Peers ([8]) showed an overall reduction in person trips in traditional neighbourhoods (which contain many of the attributes of Smart Growth) as well as increased levels of walking and transit activities.

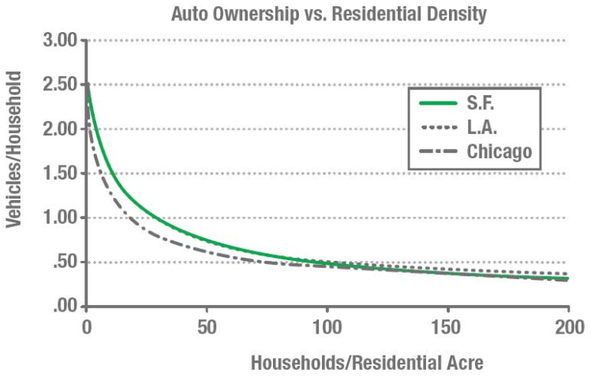


Another important change observed with Smart Growth communities is a reduction in vehicle kilometres-traveled (VKT). Ohland and Shelley ([9]) found that the effect of providing good transit and mixed use development reduces vehicle miles travelled (VMT) per capita by around 40% compared to areas without these services. The addition of mixed-use alone (i.e. not providing good transit) achieved a 26% reduction in VMT per capita.

A study conducted by Holtzclaw et al. ([10]) developed an elasticity relationship that showed a doubling in density resulted in a 25% reduction in VMT. The Sustainable Development Research Institute (5), showed that a "pedestrian and green" development pattern typically exhibits 33 VKT per household per day; approximately 50% less than that expected from an "auto-oriented" development pattern.

[3] Lewis, L. Celebration Study Reaffirms Benefits of Mixed Use Development. Transportline, Vol.14, No.2, September 2004.
[4] Portland State University ITE Student Chapter (2007). Parking and Mode Split Study for Transit Oriented Development. Department of Civil and Environmental Engineering.
[5] Teed, J., Condon, P., Muir, S. and Midgley, C. Sustainable Urban Landscapes Neighbourhood Pattern Typology. Sustainable Development Research Institute.
[6] Institute of Transportation Engineers (2003). Trip Generation. Washington DC, 7th Edition, Vol.2.
[7] Portland State University (2005). Establishment and Statistical Analysis of Trip Generating Data for Mixed-Use Development. Department of Civil and Environmental Engineering.

[8] Friedman, Gordon, and Peers (1995). Household Travel by Neighbourhood Type (cited on www.vtpi.org)
[9] Litman, T. (2008). Transit Oriented Development. Victoria Transport Policy Institute, Canada.
[10] Holtzclaw, J., Clear, R., Ditmar, H., Goldstein, D., and Haas, P. (2002). Location Efficiency: Neighbourhood and Socio-Economic Characteristics Determine Auto Ownership and Use. Transportation Planning and Technology, Vol.25.



Finally, auto ownership levels also reduce in Smart Growth communities. Holtzclaw et al (10) looked at the relationship between residential density and auto ownership. They found that with reasonable levels of density (i.e. 20 units per acre) auto-ownership drops to less than 1 vehicle per unit.

Common across all the studies reviewed is the message that transportation behaviour changes positively in compact and mixed-use communities, manifesting in lower levels of auto use and ownership. It is therefore essential that the transportation demands for such communities are fully understood and evaluated to avoid the over-construction of streets / roads and parking areas, which is often all too familiar in more auto-focused developments. Equally important, it will assist in rebalancing the priorities for street design to the benefit of pedestrians, cyclists and transit users, which is fundamental for such communities to work.

11.2 Transportation Options

Vehicle ownership can be costly and a recent survey conducted by the Lighthouse Learning Institute found that approximately 15% of respondent households in Sechelt did not own a vehicle and a further 40% of respondent households owned only one vehicle. Providing transportation choice is an essential ingredient towards achieving social equity.

Specific TDM strategies that target the use of alternatives to single-occupant vehicle travel are described below and summarized in **Table 11.2**.

Active Transport

Active transport provides an affordable alternative to automobile travel. The District's Active Transportation Plan (see Section 10) provides a strategy for increasing the accessibility and attractiveness of these modes.

Ride-Share

Residents in Sechelt have developed an informal rideshare system through the local community (e.g. "I can give you a ride to town"). The Jack Bell Ride-Share is a more formal arrangement and offers seats in a vanpool between Gibsons and Downtown Vancouver and Burnaby BCIT. There are also similar programs that could be offered at a local level through local, phone, or internet media.

Car-Share

Car-sharing in BC and Canada is growing exponentially as more and more people become aware of the benefits it brings. In particular, it provides a low cost and flexible alternative to private vehicle ownership, while developers benefit by being able to reduce parking requirements and therefore achieving cost savings (e.g. the cities of Vancouver and Burnaby allow reductions in parking through car-sharing).

A certain level of density is required to support these programs. Typically, one car-share vehicle can support somewhere between 150 and 200 units within a reasonable walking distance These may be particularly relevant schemes for new development where vehicles could be purchased by the developer ($15,000 to $35,000 depending on the model) and maintained by the car-share operator (Cooperative Auto Network, Zip Car; both operating in BC). Memberships could be offered by the developer as part of the move-in package and could be tied to the property rather than with the owner.

Table 11.2: Selection of TDM Strategies

Walking	**Ride-Share**
See Active Transportation Plan (Section 10)	Internet Database or Community Facebook Page
	School Ride-Matching
	Employer Shuttles
Cycling	Guaranteed Ride Home Program
See Active Transportation Plan (Section 10)	BC Ferry HOV Lanes
Community and Coordination	**Car-Share**
TDM Trust Fund	Car-Share Program
Program Administrator	Fleet-Share Program
TravelSmart	Electric Vehicles / Alternate Fuels
"Commuter Store"	**Parking**
Promotions	Pricing Strategies
Tax Credits	Un-Bundle Parking
Vehicle Buy-Back	Payment In-Lieu
Pay-As-You-Go Insurance	Shared Parking
	Maximum Parking Rates
	Density Bonuses
Transit	**eTransport**
Improve Existing Services	High-Speed Internet Services
Multi-Modal Transportation Hub	Tele-Centres
	Local e-Trade

Best practice suggests that vehicles should be located in publically accessible and visible locations and preferably be located close to community facilities. In some cases, car-share vehicles are dedicated to a particular development/strata corporation and are for use by those residents only.

Parking Strategies

Excessive parking provision can undermine TDM initiatives, impact urban design, and potentially reduce cost-savings that could be used toward TDM and therefore its provision needs to be balanced with these objectives. There are two main mechanisms in which parking can be used to drive transportation change – supply and cost.

Reducing the parking supply is considered to be one of the more "aggressive" forms of TDM, and one of the most effective. It is acknowledged that reduced parking supply strategies could affect the attractiveness of developing in areas with higher restrictions than others. This requires a coordinated approach to address these imbalances through area-wide schemes or incentive programs (such as increased density in return for lower parking provision).

For residential areas, where alternative transportation modes are provided and the development form accommodates it, limiting in-unit parking to one garage space per unit plus space for one additional vehicle in the unit driveway is an appropriate mechanism to shift the emphasis of development form away from the garage and focus attention on curb appeal.

Parking cost strategies may include charging for on-street parking, un-bundling parking, paid residential parking permit schemes, etc. Paid parking schemes need to consider the cost of enforcement/collection, although this does not need to exceed 10-15% of revenue. However, if costs and/or management of metered parking are not viable or desirable, an alternative is to lease on-street parking to residents for a percentage of the value of the property associated with the space. This type of program has the potential to provide a "long-term, economically sustainable approach to parking" ([11]).

Community & Promotion

Actively engaging the local community and building on the interest of local champions can increase the longevity of a TDM scheme. This interest could be created through the creation of neighbourhood transportation groups, establishing a TDM fund to pay for community-based TDM, or the opening of a "transportation store" that sells walking and cycling equipment, transit passes, scooter rentals, guaranteed ride home subscriptions, access to information, etc.

Many individual TDM measures also require some form of promotion or information dissemination to be successful. This may initiate the establishment of a part- or full-time staff member that oversees TDM. The TDM officer would be responsible (amongst other things) for promotion of the various schemes. This may include:

4. Self-promotion through visible location and media interest;
5. Community notice board;
6. Support and involvement of local businesses;
7. Brochures, guides, information packets, training seminars;
8. Creating a neighbourhood transportation watch (a la neighbourhood watch).

e-Transport

The impetus behind electronic or e-transport is to eliminate the need to make particular trips altogether, in particular shopping, education, and commuter trips (which are a large component of Sunshine Coast trip making). Initiating these programs requires an investment in a comprehensive network of communications services such as telephone, internet, and video.

These systems should build on the platform of existing internet transactions that are already available such as bank and local government business. These and other local business initiatives can be promoted through information sessions. As well, work-from-home initiatives including employer assistance packages and tax breaks for employees can reduce commuter trips, in particular long commutes to the Lower Mainland.

11.3 Transit

Stakeholder and community consultation has shown support for enhanced transit service in Sechelt. These improvements could be realized most effectively with service enhancements and/or the establishment of a transportation hub. These are described below.

Service Enhancements

Service enhancement strategies to encourage transit use can include:

9. Increasing the frequency of the existing BC Transit service;
10. Supplementing the existing service with a community shuttle service;
11. Re-routing the BC Transit service through the neighbourhood; and
12. Providing transit stop facilities with route information, shelter, and seating.

BC Transit conducted a recent review of services on the Sunshine Coast and has implemented a number of changes to enhance service. These reviews occur on a regular basis and as such, future reviews should again consider delivery of the supporting services to Route 1, which is reasonably well patronized.

[11] Gardiner, Richard (2008). *Lease Curb Spaces to Residents? Why Not?* Parking Today, Vol. 13, No. 6. Bricepac Incorporated.

A novel approach to consider is a localized, demand responsive transit service to support Route 1. An example of the Taxibus system from Rimouski, Quebec is described below.

Taxi Bus – Rimouski, Quebec

Application: A demand-responsive transit service that accepts bookings between two stops in the network. Routes are then optimized to maximize occupancy based on stops and time of travel.

Features: Much more flexible than regular transit in terms of time and stop locations. It also makes the most efficient use of the vehicle fleet.

Case Study: Rimouski, Quebec (Population: 31,000)

Cost: Operating: $480,000; Revenue breakdown: fares 45%, municipal subsidy 37%, provincial subsidy 18%, other 1%

Management: Requires an operator to take bookings and optimize routes, drivers and other staff.

Promotion: Community-wide advertising, similar to existing transit service.

Multi-Modal Transportation Hub

The arrangement of the District as a "hub and spoke" system, lends itself to the development of a centralized multi-modal transportation hub supported by a network of neighbourhood nodes.

A transportation hub provides a:

13. Focal point and centre of activity;
14. Catalyst for changing travel behaviour and providing travel choice;
15. Seamless connection between transportation modes that is competitive with the private automobile;
16. Increased awareness of transit and other sustainable travel modes;
17. Cooperation of local and regional transportation connections; and
18. Supportive environment for Smart Growth design principles.

The Village would make an ideal location for the hub, which could offer a complete range of transportation services including local and regional bus services, hotel and recreational shuttle connections, connections to water taxi and float plane terminals, a well connected bicycle network, secure bicycle parking (e.g. lockers), bicycle rental or public bike station, car-sharing, car rental, ride-share, and taxi services.

The terminal is typically an off-street facility provided in a designated building or weather-protected waiting area. The hub is conducive to the development of a higher-density, mixed-use neighbourhood and its use can be maximized by promoting its walkability through:

19. Maximizing population within 800m (i.e. a reasonable walking distance);
20. Promoting pedestrian-oriented street design, in particular encouraging more public realm and less road space; and
21. Enhancing the urban design through street-fronting development, increased density, and high activity land uses.

The neighbourhood nodes are "smaller scale" versions of the transportation hub. They offer fewer transportation services focussing on the basic elements such as local transit services, bicycle network connections, secure bicycle parking, and a walkable environment around the station / stop.

These facilities do maintain the concept of being focussed around areas of higher density and mixed-use, but are typically located on-street and for bus-focussed transportation, provide a shelter, seating, and travel information. These could be established at centralized locations in the primary neighbourhoods.

11.4 TDM Summary

Recommendation 28: that mixed use and compact development be encouraged through the land use policies of the OCP. In particular, developments that encourage neighbourhood services such as retail, local services, live-work space, schools, etc. should be encouraged in neighbourhood centres in exchange for reasonable increases in density, where necessary. As in Davis Bay and the Village, this enables walking or cycling to occur between uses and offers concentrations of people that creates a platform to support transit, ride-sharing, car-sharing, etc.

Recommendation 29: that TDM forms part of the terms of reference for Traffic Impact Assessments (TIA). This will require new development to address how they propose to reduce automobile trip-making or contribute to existing or new TDM programs. A process for the collection of development contributions to a TDM fund may also be considered.

Specifically, the TIA should investigate the role of transit and in particular what the development is contributing to the enhancement of this mode. This may include land use, development form, fare incentives, physical provisions (e.g. bus shelters), etc.

Recommendation 30: that, in consultation with BC Transit and other transportation stakeholders, an appropriate site be identified within the Village for the future development of a transportation hub and in the neighbourhood centres for transportation nodes. These locations may be publically owned properties or become available through redevelopment.

12.0 Official Community Plan Recommendations

The following recommendations are based on the findings of the Transportation Master Plan and will form the basis of the Transportation section of the updated Official Community Plan.

12.1 Existing Transportation Conditions

Major Road Network

Land use and transportation patterns are well-established in the District of Sechelt, and reflect the linear historic development of the community along the Davis Bay, West Sechelt, and Porpoise Bay waterfronts. Highway 101 is the primary transportation corridor, and local and regional traffic movements depend on this route. Many issues related to Highway 101 have been documented, including:

22. Extensive direct driveway access: this road is constructed and functions as a local access road, in addition to its regional traffic role in the provincial highway system. A bypass remains a priority for residents;
23. High accident rates at intersections in the Village, in part due to high traffic volumes and heavy vehicle mix within a busy commercial and pedestrian setting;
24. The need for alternative routes for emergency use and improved local circulation, particularly in Selma Park/Davis Bay, East Porpoise Bay, and West Sechelt;
25. Lack of safe, continuous shoulders for pedestrian and bicycle safety.
26. Significant delay for minor streets intersecting with Highway 101 in Davis Bay / Selma Park, particularly during ferry surges. The need to slow traffic and break up ferry-related traffic platoons in the Davis Bay and Selma Park areas;
27. Provision of left turn bays to enhance safety of vehicles turning into local roads along the Highway;
28. The ability of existing Highway 101 to accommodate future growth. It is expected that the existing highway will reach capacity some time in the next 5 to 10 years. Planning for alternatives needs to start immediately.

Transit

Transit has become a viable alternative for many areas of the community, mainly following patterns of higher density such as the Downtown/Village, and specific areas of Davis Bay and West Sechelt. For the more rural neighbourhoods, transit is infrequent or not available, and will require increased density before it becomes viable. BC Transit regularly reviews transit services in the community.

Airport

The Sechelt Airport is located between Wilson and Chapman Creeks at the north end of Field Road. The airport lands (80 ha total) are owned by the District of Sechelt. The airport has remained a relatively small-scale local facility due to limitations of runway length and navigation systems. Commercial helicopter and fixed wing businesses operate from the airport, as well as a number of non-airport uses. An Airport Master Plan was prepared, which outlined the requirements for upgrading the airport. The financial/business plan of that report was recently updated in efforts to secure financing.

The Master Plan defined those portions of the airport necessary for long-term functioning of the airport, and also identified additional lands that would be suitable for light industry (non-aviation). Consideration needs to be given to the alignment of Field Road to connect with the future regional bypass.

Active Transportation (Walking / Cycling)

Active transportation modes including walking and cycling are impacted by the land use patterns and transportation systems established by the District. Walking activity is mainly focused around the areas of highest density and mixed use including the Village and pockets of West Sechelt and Davis Bay. Given the relative spread of land use throughout the District, cycling can exceed the range of pedestrians in accessing services. The lack of connective cycling route infrastructure does not encourage this mode of transportation.

Travel Demand Management (TDM)

TDM is the implementation of strategies to more effectively utilize transportation infrastructure and services and increase the competitiveness of non-automobile modes. Currently, there are a number of "ad-hoc" programs that aim to reduce reliance on automobile transportation. Increased coordination of these programs is necessary to realize noticeable change.

12.2 Policies

12.2.1 A Road Network Plan was developed for the District of Sechelt to address existing transportation issues and accommodate anticipated growth. It is included at **Figure 12.1**.

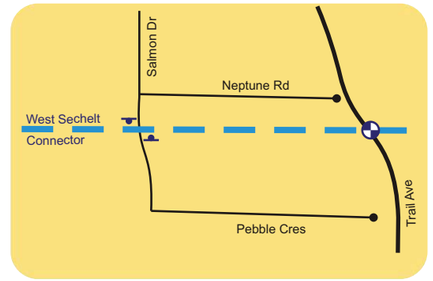
Highway 101

In terms of Highway 101, it is recommended that:

12.2.2 Planning for an alternative to Highway 101 begin immediately. The existing Highway 101 is anticipated to exceed capacity some time in the next 5 to 10 years.

Notes:

1



Alternative Alignment

Legend:

Existing Road:
- Sunshine Coast Hwy (101)
- Arterial Roads
- Collector Roads
- Main Streets
- Local Roads

Proposed Road:
- Future Bypass
- Interim Arterial Roads
- Interim Collector Roads
- New Collector Roads

Intersection Improvements:
- New Signals
- New Pedestrian Actuated Signals
- Stop Signs
- Geometric or Sight Distance Improvements
- Right-in/Right-out Only
- Add Left-turn Lane

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Road Network Plan

District of Sechelt Transportation Master Plan

Figure 12.1

Nov 2009 N.T.S. 4710-01

N

Legend:

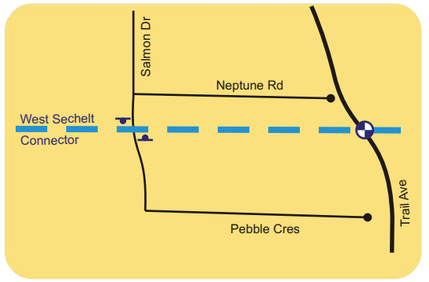
Existing Road:
- Sunshine Coast Hwy (101)
- Arterial Roads
- Collector Roads
- Main Streets
- Local Roads

Proposed Road:
- Future Bypass
- Interim Arterial Roads
- Interim Collector Roads
- New Collector Roads

Intersection Improvements:
- New Signal
- New Pedestrian Actuated Signal
- Geometric or Sight Distance Improvements

Notes:

1



West Sechelt / West Porpoise Bay / Sechelt Village

Road Network Plan

Nov 2009 N.T.S. 4710-01

Figure 12.1a

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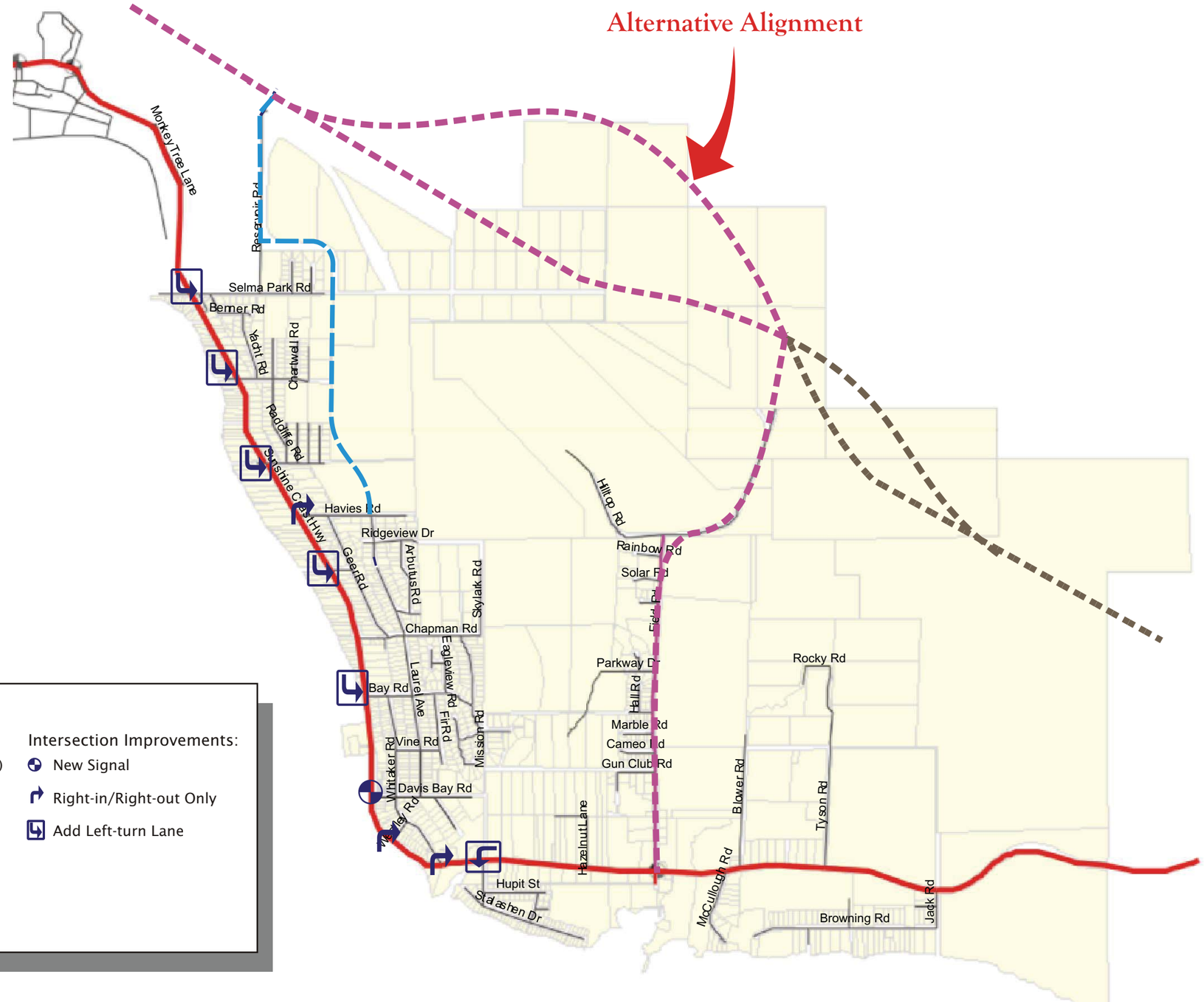
N



Legend:

Existing Road:
- Sunshine Coast Hwy (101)
- Arterial Roads
- Local Roads

Proposed Road:
- Future Bypass
- Interim Arterial Roads
- New Collector Roads

Intersection Improvements:
- New Signal
- Right-in/Right-out Only
- Add Left-turn Lane

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Selma Park / Davis Bay / Wilson Creek

Road Network Plan

Nov 2009 N.T.S. 4710-01

Figure
12.1b

N

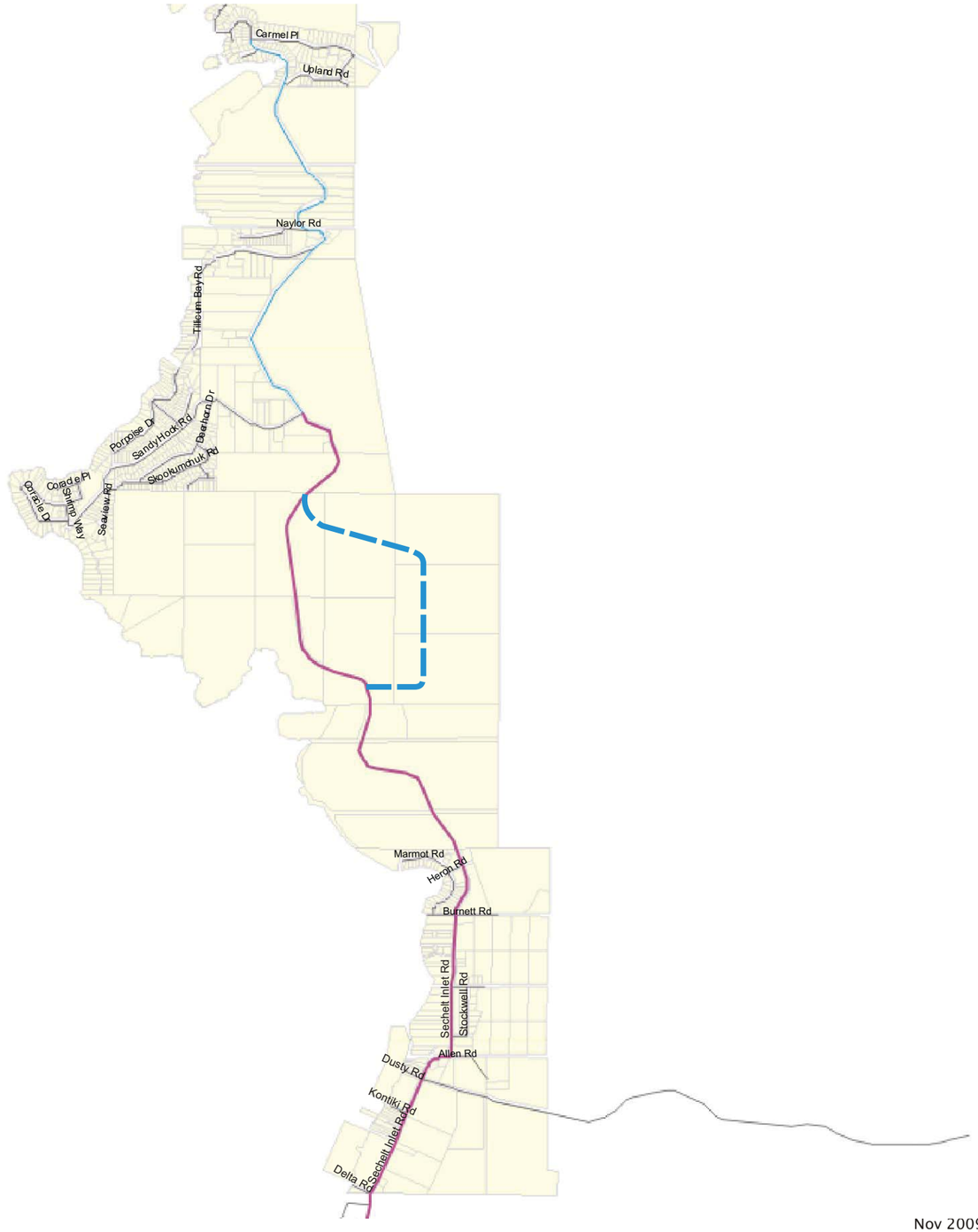
Legend:

Existing Road:

- Arterial Roads
- Collector Roads

Proposed Road:

- New Collector Roads



Nov 2009 N.T.S. 4710-01

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Tuwanek / Sandy Hook / East Porpoise Bay

Road Network Plan

Figure

12.1c

12.2.3 A bypass to Highway 101 be constructed between Field Road and Wharf Road by 2015 to provide an alternative regional and emergency traffic route, to alleviate increasing traffic congestion, to encourage less emphasis on the existing section of Highway 101, and to provide a better opportunity to improve active transportation. Where appropriate, the bypass route should follow the alignment proposed for the regional bypass by the Ministry of Transportation and Infrastructure (MOTI) adjacent to the BC Hydro right-of-way.

The bypass will require geometric changes at the Highway 101 / Field Road intersection and the creation of a new intersection with Wharf Road to prioritize the new route. Similarly, the existing Highway 101 alignment, including the intersection with Wharf Road / Dolphin Street, should be downgraded.

12.2.4 A West Sechelt Connector be constructed after 2018, but prior to 2028, or as required by development. The West Sechelt Connector may or may not be an extension of the Highway 101 bypass between Field Road and Wharf Road, but should use the alignment proposed for the regional bypass by MOTI adjacent to the BC Hydro right-of-way to connect from Trail Avenue with an interim connection to Tyler Road. This will require a signalized intersection with Trail Avenue and the consolidation of access for Neptune Road and Pebble Avenue to Salmon Drive.

The West Sechelt Connector does not replace the regional function of Highway 101 through the Village. However, it does provide a connection, although circuitous, back to Highway 101 via Mason and Acorn Roads.

12.2.5 The Highway 101 bypass will be supported with appropriate land use policies that ensure the vitality of the Village Centre and encourage only appropriate development along the new route. Initiating the innovative delivery of people to the existing Village centre (through active transportation and increased residential density) will reduce these effects.

Supporting Street Network

12.2.6 As a regional highway bypass is considered to be a very long term proposition and a local bypass is not scheduled until 2015, the District of Sechelt has identified a number of more immediate upgrades that are essential to the safety and functioning of the community transportation system. These are included in **Table 12.1**.

Table 12.1: Proposed Road Network Changes

	Network Change	Trigger
Davis Bay / Selma Park / Wilson Creek		
1	Highway 101 / Davis Bay Road – *signalize intersection*	Near-term
2	Highway 101 Access Management (as considered appropriate): 29. Install left turn lanes at: o Mission Road (westbound) a. Davis Bay Road (southbound); b. Bay Road (southbound); o Heather Road (southbound); 30. Install left turn lanes at (cont.): c. Nestman Road (southbound); d. Snodgrass Road (southbound); e. Selma Park Road (both directions); f. Monkey Tree Lane (southbound); 31. Implement right-in / right-out restrictions at: o Whitaker Road; o Westly Road; o Havies Road; 32. Close Chapman Road and the frontage road east of the conveyor belt.	Ongoing improvements with redevelopment
3	Highway 101 Active Transportation (Walking / Cycling) Corridor: • Creation of cycling shoulders • Sidewalk construction	Active Transportation Plan initiative
4	Laurel Avenue: • Complete existing street • Extend north to Selma Park Road	 Near-term With redevelopment
Village / Sechelt Indian Band		
5	Tita Way Road connection	Immediate
6	Designate Trail Avenue as an Active Transportation (Walking / Cycling) Corridor: • Cycle lanes on Trail Avenue • Complete missing sidewalk segments • Highway 101 / Trail Avenue – pedestrian signal • Trail Avenue / Future West Sechelt Connector - signalize	Active Transportation Plan initiative

Table 12.1 (continued): Proposed Road Network Changes

Network Change		Trigger
West Sechelt / West Porpoise Bay		
7	Acorn Street and Lewarne Extensions	Development driven
8	Norwest Bay Road / Mason Road – *geometric improvements to enhance pedestrian safety*	Near-term
9	Highway 101 intersections with Wakefield Road, Mason Road, McCourt Road, and Mills Road – *sight distance improvements*	With redevelopment
10	Creation of a walking / cycling greenway along Crowston Road right-of-way.	Near-term
11	Connection between West Sechelt and West Porpoise Bay / community facilities – *Tyler Road to Trail Avenue / Reef Road intersection.*	Near-term
12	Connection between Derby Road and West Sechelt Connector.	Following West Sechelt Connector
13	Extension of Barnacle and / or Cowrie Streets	Development driven
East Porpoise Bay		
14	Proposed SilverBack road network	Development driven

Functional Classification

12.2.7 The functional classification system of District roadways be revised to reflect:

- Major Arterials: intended to primarily move traffic between regional destinations (e.g. between the BC Ferries terminals). Access is normally limited to consolidated points such as intersections with minor arterials or collectors. Individual property access is atypical. Example: Highway 101.
- Minor Arterials: intended to primarily move traffic between local destinations (e.g. from the Village to East Porpoise Bay), however in Sechelt, some level of direct property access can be provided, although consolidated where possible. Example: East Porpoise Bay Road.
- Collectors: provide a link between mobility and access and act to distribute traffic from the mobility-based roads to local streets. Direct land access is also provided through a mix of consolidated and individual driveways. Local Example: Mason Road.
- Main Street: intended for the Village and other commercial areas to promote design that is conducive to economic activity such as slower vehicle speeds, on-street parking, and an improved pedestrian and cycling environment.
- Local Streets: provide access to individual properties. These streets provide no regional or local connections and are often discontinuous. Local example: Chartwell Road.
- Limited Local Streets: local streets terminating in a cul-de-sac.
- Lanes: provide access to individual properties or garages.

12.2.8 The District maintain a set of guidelines that direct the design of various roadway classifications, but that the design criteria be flexible enough to react to the needs of the local environment. These guidelines should include a definitive position on direct access for each road type, in general direct access should not be provided to major arterials, and limited to only where necessary on minor arterials.

Active Transportation

12.2.9 An Active Transportation (Walking / Cycling) Network Plan was developed for the District of Sechelt that identifies a classification of routes that would make up the long-term pedestrian and cycling network. This is included at **Figure 12.2**.

12.2.10 Revisions were made to the sidewalk and bike route minimum provisions outlined in By-Law 430 to develop "typical" active transportation cross-sections. Routes were then evaluated based on expected return on investment. In general, funds should be allocated to developing the Active Transportation Network each year and should first be allocated to opportunities to overlap with new development, capital works, or non-District projects. Remaining funds should be allocated towards developing the major route priorities, these include (in order of priority):

- Highway 101 upgrades (to be coordinated with MOTI): cycle shoulders, sidewalks, or multi-use trail as part of the corridor upgrade;
- Watermain Trail: an alternative to Highway 101 between West Sechelt and the Village;
- Davis Bay Trail: a relatively inexpensive east-west route using low-traffic volume streets and off-street trails - prior to improvements on Highway 101;
- Trail Avenue: the north-south spine of the Active Transportation Network to include cycle lanes (where possible), sidewalks both sides of the street, and intersection treatments that prioritize pedestrians and cyclists;
- Completion of the Nickerson / Crowston / Ripple Trail network.

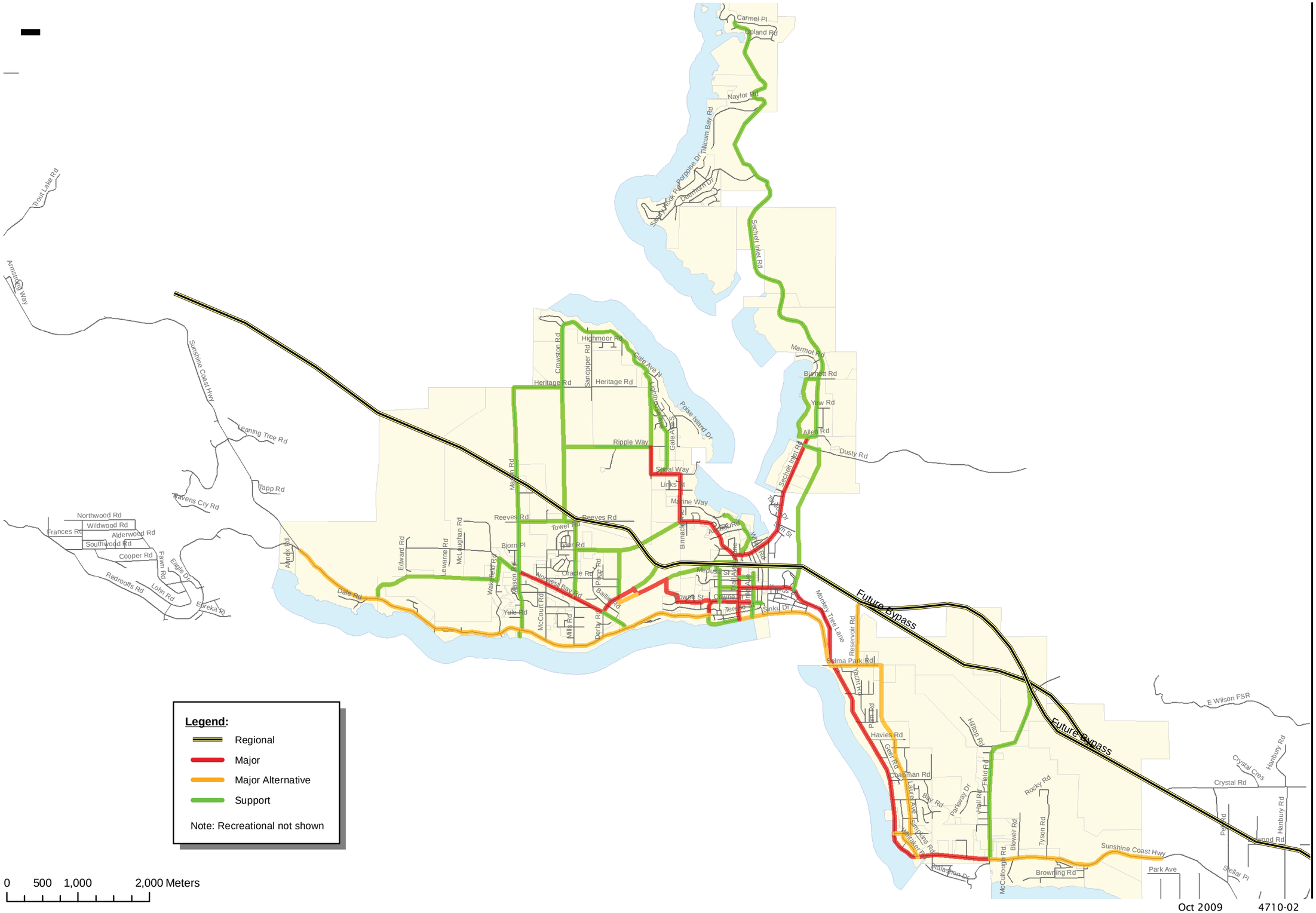
12.2.11 An investment should be made into programs and policies that support the Active Transportation Plan. These include enhancing the availability of bicycle parking through incorporating cycle parking into the Zoning By-Law and establishing a bicycle rack program; the education of cyclists and motorists; and creating guidelines for the consistent application of pedestrian and cyclist pavement markings and signage.

Road Design Standards

12.2.12 Revised road standards for urban and rural areas be incorporated into a review of Bylaw 430, and that these be considered the basic standard for new developments.

Active Transportation Network Plan

District of Sechelt Active Transportation Plan



Figure

12.2

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12.2.13 The District may consider alternative road standards (e.g. pedestrian-scale street design) provided the alternative standard provides for the full range of transportation needs, provides environmental or community benefits, and is cost-effective for the District to maintain.

Transportation Improvement Funding

12.2.14 Development Cost Contributions (DCCs) be reviewed to fund the cost of District-related road and active transportation improvements. Direct development contributions are to be collected or construction undertaken for designated road network elements associated with a development site.

Transit

12.2.15 Sechelt encourages higher density, mixed use, and more compact development within growth areas in order to support transit service and frequency.

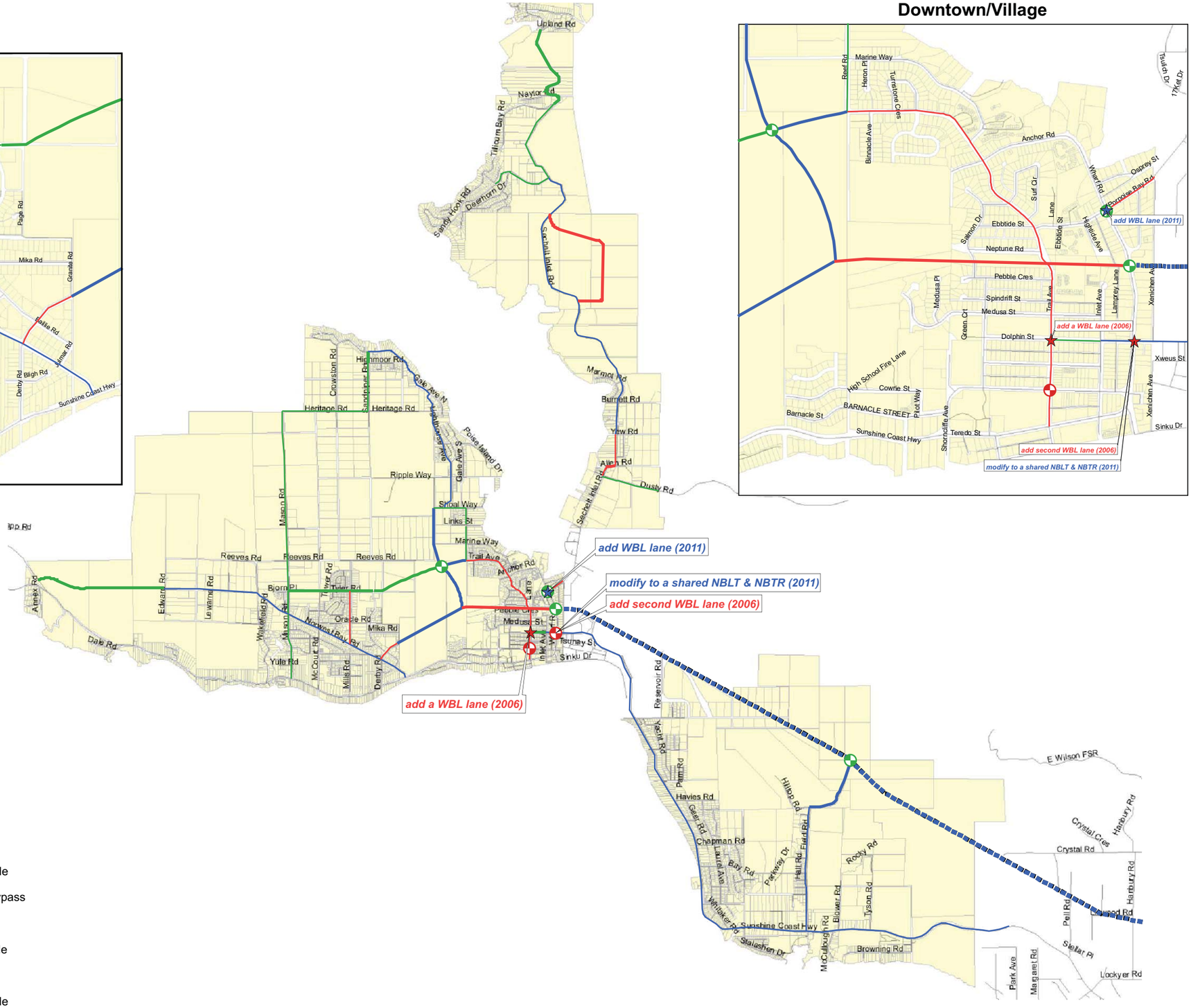
12.2.16 Local service enhancements that support the well patronized Route 1 should continue to be investigated. In particular, demand-responsive transit that provides more flexible scheduling and more efficient utilization of the vehicle fleet and the creation of a multi-modal transportation hub that provides a competitive alternative to vehicle travel should be investigated more thoroughly.

New Development: Traffic Impact Assessment

12.2.17 New developments generating over 50 new vehicle trips during the peak hour will be required to prepare traffic impact assessments to determine impacts of the proposed development on existing roads and other transportation infrastructure and to identify upgrades required to service the new development. Typically, there is very little impact derived from developments generating fewer than 50 new peak hour vehicle trips. A traffic impact assessment may also be triggered by specific concerns such as safety, roadway or intersection geometry, parking provision, sensitivity of local neighbourhoods, servicing, transit, etc.

The contribution of the development to active transportation, transit service enhancements, and other travel demand management (TDM) should also form part of this study. This may include identifying TDM programs being proposed as part of the development and addressing if the development increases the transit ridership base, provides complimentary services, or will be responsible for physical improvements (e.g. bus shelters, benches), etc.

2000 Road Network Plan
(CTS - 2000)



Legend:

Intersection Upgrades
- 2006
- 2011

Future Traffic Signals
- 2006
- 2021

Road Improvements
- 2006, new
- 2006, upgrade
- 2011, hwy bypass
- 2011, new
- 2011, upgrade
- 2021, new
- 2021, upgrade

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Figure
A.1

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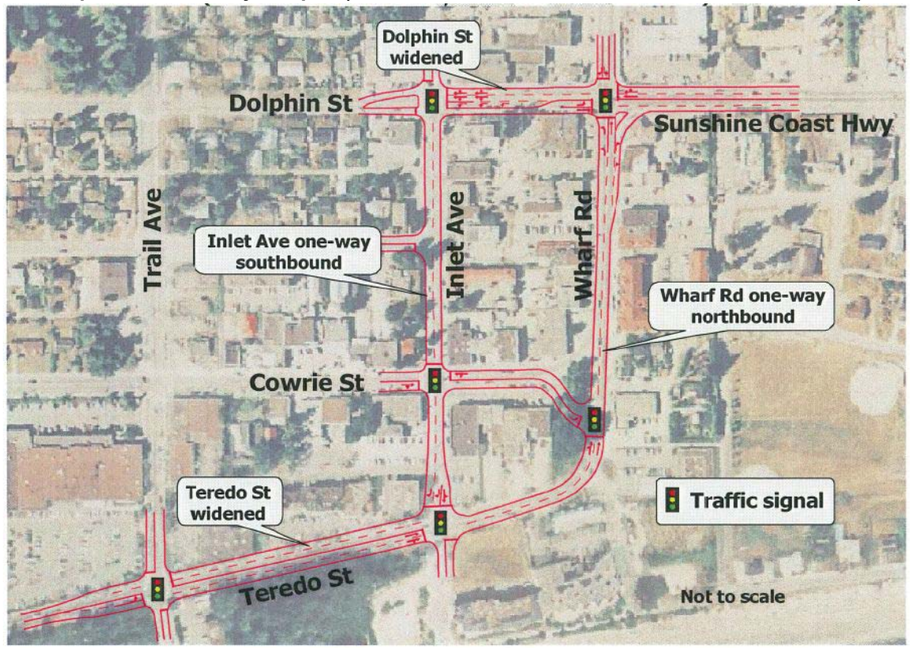
Appendix B

Downtown Sechelt Highway 101 Re-Routing Options

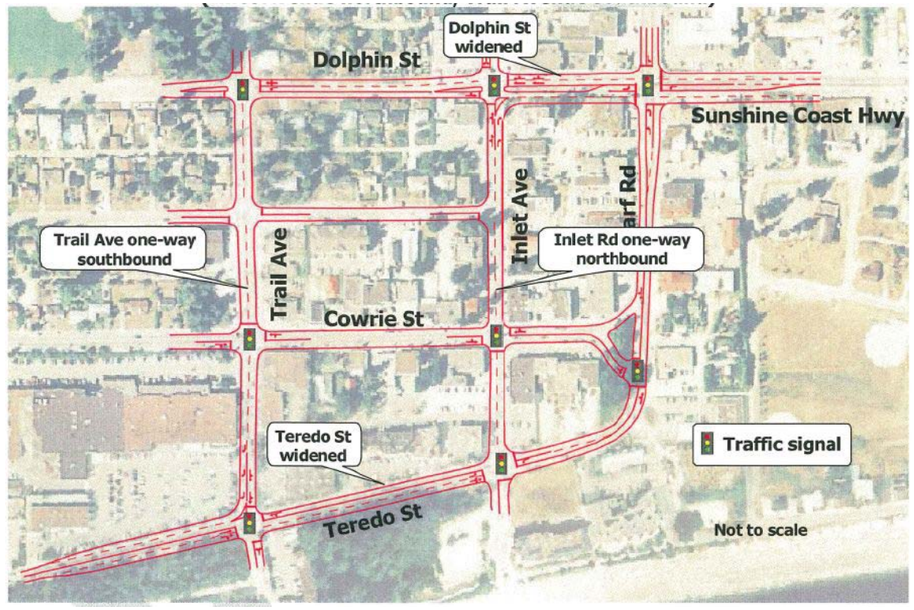
Urban Systems Report (2007)

N

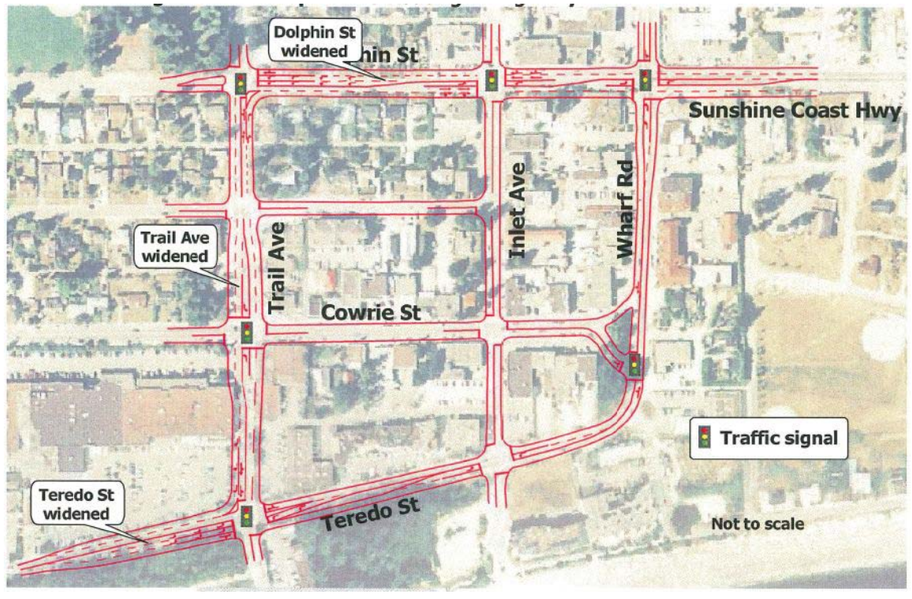
Option 1: One-Way Couplet (Wharf Road Northbound / Inlet Avenue Southbound)



Option 2: One-Way Couplet (Inlet Avenue Northbound / Trail Avenue Southbound)



Option 3: Re-Routing of Highway to Trail Avenue



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Downtown Sechelt Highway Re-routing Options

(Urban Systems - 2007)

July 30, 2009 N.T.S. 4710-01

Figure B.1

Appendix C

Traffic Impact Assessment

Suggested Improvements

A number of traffic impact assessments have been conducted in association with land development applications in the District. These studies identify the scale, traffic generation, and road network changes that would be required for each development.

Table C.1 summarizes the form, traffic generation, and anticipated year of build-out for significant development applications in the District. This information was obtained from traffic studies prepared for these developments. Road network changes suggested from these studies are illustrated at **Figure C.1**. Some of these network elements have been included in the recommended Road Network Plan.

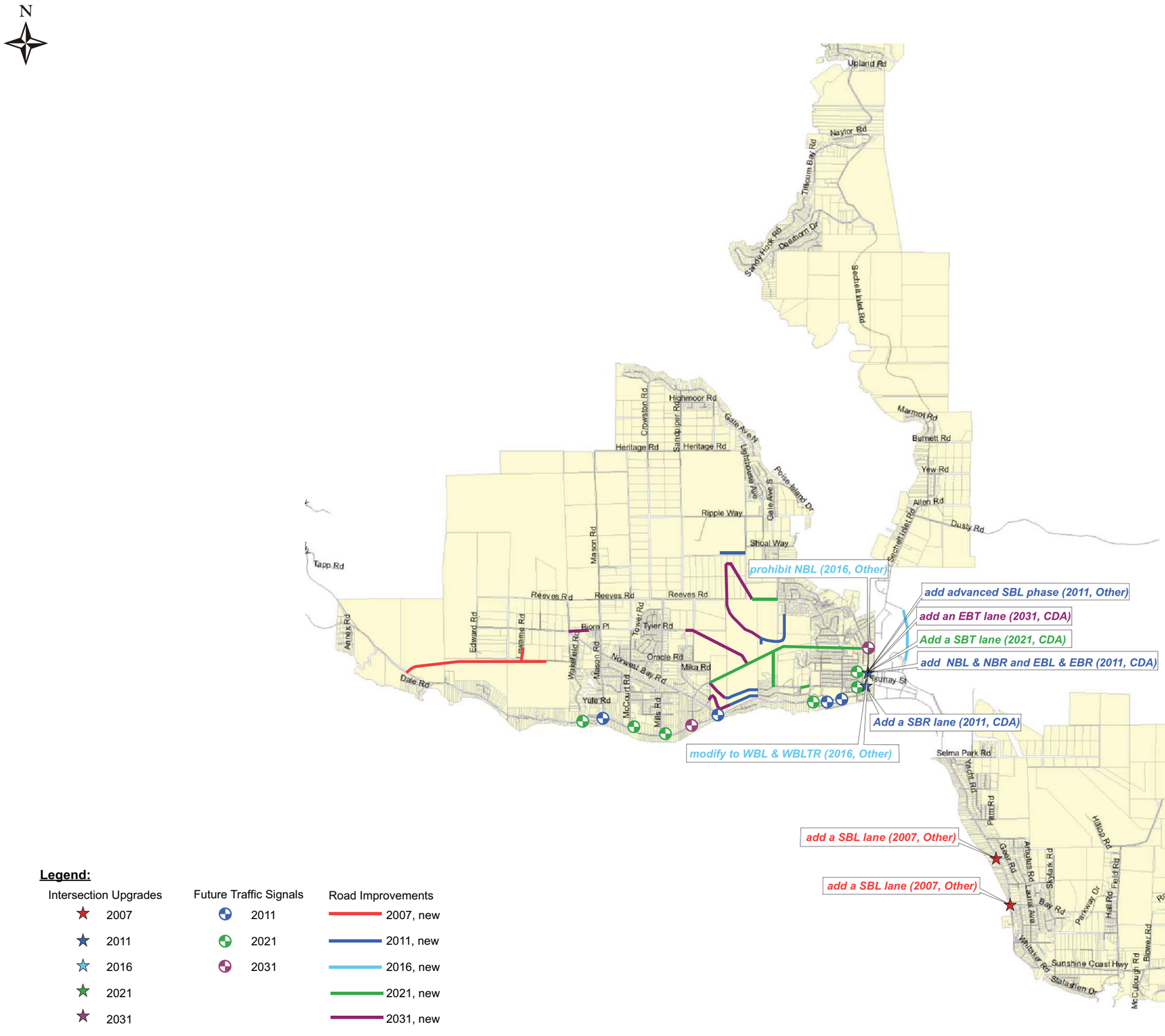
Table C.1: Transportation Improvements Suggested by Development Traffic Impact Assessments

Study	Development	Peak Hour Trips*	Horizon	Suggested Road Network Changes (shown at Figure C.1)
The Trails Subdivision	90 single-family units and 40 multi-family units	270 vph	2009	- Extend Lewarne Road and Acorn Road
Trail Bay Estate	Phase 1: 61 residential units Phase 2: 700 m^2 college (250 students) and 15.5 ha residential	42 vph 240 vph	2011 2011 – 2031	See Figure C.1 – West Sechelt Comprehensive Development Area improvements
West Sechelt Subdivision	Up to 2,000 units	Up to 2,000 vph	-	See Figure C.1 – West Sechelt Comprehensive Development Area improvements
SilverBack Development	Phase 1: 18-hole golf course; 120 room hotel; 600 residential units Phase 2: Conference centre; 30,000 sq.ft. commercial, 1,000 residential units	899 vph	2011 2016	- Add SB left turn phase to 101/Wharf intersection (P1); - Construct Tita Way Rd between E Porpoise Bay and Hwy 101 through Band Lands (P2); - Add SB left-turn bay at Hwy 101/Tita Way Road intersection (P2); - Ban NB left-turn at Hwy 101/Wharf (irrespective of development); - Convert WB approach at Hwy 101/Wharf to a left-turn lane plus a shared left/through/right lane (irrespective of development).
Havies Road Subdivision	74 single family homes	75 vph	2007	Highway 101 improvements including right-in / right-out at Havies Road and left turn bay at Heather Road
Canfor Residential Development	80 single family homes, or 66 single family and 30 townhouse units	81 vph, or 90 vph	2008	- SB left-turn lanes at Highway 101/ Heather Road and Highway 101/Bay Road
5160 Davis Bay Road	60 residential units 186 m^2 office	45 vph	2011	See Figure C.1

* Peak hour is Friday afternoon.

Traffic Impact Assessment Suggested Improvements

District of Sechelt Transportation Master Plan



Legend:

Intersection Upgrades	Future Traffic Signals	Road Improvements
2007	2011	2007, new
2011	2021	2011, new
2016	2031	2016, new
2021		2021, new
2031		2031, new

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Figure C.1

Appendix D

Example of Road and Street Characteristics

Table D.1: Example of Road and Street Characteristics in the District of Sechelt

	Lanes	Local Streets	Collector	Minor Arterial	Major Arterial
Service Function	Access	Access	Primarily access with some mobility	Access and Mobility evenly shared	Mobility with consolidated access
Connectivity	Driveways, Local	Driveways, collectors	Local, other collectors, arterials	All, connects local destinations	Connects local or regional destinations
Traffic Volumes (vpd)	<300	<1,000	<2,000	2,000 – 3,000	>3,000
No. Travel Lanes	1 or 2	2	2	2 or 4	2 or more
Travel Lane Widths	See note*	3.0 m	3.0 – 4.3 m	3.2 – 4.3 m	3.2 – 3.5 m
Turn Lanes	None	None	None	Left	Left and Right
Traffic Flow	Interrupted	Interrupted	Interrupted	Interrupted	Uninterrupted except at intersections
Desirable Speed	< 20 km/h	< 30 km/h	30 – 50 km/h	30 – 50 km/h	>60 km/h 50 km/h in built-up areas
Heavy Vehicles	No	No	No	Some	Yes
Transit Service	No	No	No	Yes	Yes
Cyclist Accommodation	Shared street	Shared street	Wide shared lane	Wide shared lane or on-street lanes	On-street lanes or separate facilities
Pedestrian Accommodation	Shared street	No special facilities necessary	Trails one or both sides	Trails one or both sides, crosswalks	Sidewalks both sides, signalized crossings
Parking	On sides	On-street, few restrictions	On-street, few restrictions	On-street, few restrictions	Limited or prohibited
Intersection Spacing	60 m	60 m	60 m	60 m	200 m
Right-of-Way Width	6 m	15 – 20 m	20 – 24 m	20 – 24 m	24 – 40 m

* Width of the travel way should be approximately 3.0m, however should be constructed with reinforced shoulders or pockets to allow vehicle passing opportunities.

Appendix E

Land Use Schedules

Table E.1: Existing Land Use Schedule

Zone	Residential	Retail	Office	Industrial	Other	
					In	Out
	(units)	(sq.ft.)	(sq.ft.)	(sq.ft.)	(vph)	(vph)
1	112	15,000	857	7,411	-	-
2	106	37,000	4,113	40,895	8	8
3	815	42,660	2,999	-	99	99
4	60	225,156	119,951	283	-	-
5	83	98,532	24,633	5,064	8	8
6	182	12,047	2,143	875	20	20
7	26	100,000	55,692	-	28	28
8	119	-	-	-	20	20
9	39	-	-	-	20	20
10	50	1,285	326	-	-	-
11	539	6,778	-	-	20	20
12	427	10,153	1,877	-	16	16
13	159	1,285	326	-	-	-
14	30	-	-	-	-	-
15	57	-	-	-	-	-
16	5	-	-	-	-	4
17	5	-	-	-	-	-
18	150	-	-	-	-	-
19	155	-	-	-	40	40
20	80	2,261	754	-	16	16
21	125	-	-	-	-	-
22	111	240	-	7,591	40	48
23	15	2,571	-	-	40	40
24	311	-	-	-	-	-
25	127	-	-	-	11	23
26	174	13,026	5,707	-	-	-
27	112	80,514	8,181	-	-	-
28	142	21,958	9,688	15,069	-	-
29	13	-	-	-	-	-
30	-	-	-	-	-	-
Total	**4,330**	**670,467**	**237,247**	**77,190**	**385**	**409**

Table E.2: 10-Year Land Use Forecast

Zone	Residential	Retail	Office	Industrial	Other	
					In	Out
	(units)	(sq.ft.)	(sq.ft.)	(sq.ft.)	(vph)	(vph)
1	122	15,000	11,177	8,523	-	-
2	112	37,000	18,113	47,030	8	8
3	821	44,660	2,999	-	99	99
4	69	237,956	119,951	326	-	-
5	86	98,532	24,633	5,824	8	8
6	186	12,047	2,143	1,006	20	20
7	31	110,000	57,692	-	28	28
8	121	-	-	-	20	20
9	102	-	-	-	20	20
10	251	1,285	326	-	-	-
11	564	6,778	-	-	20	20
12	570	10,153	1,877	-	16	16
13	203	1,285	326	-	-	-
14	62	-	-	-	-	-
15	109	-	-	-	-	-
16	5	-	-	-	-	4
17	6	-	-	-	-	-
18	155	-	-	-	-	-
19	165	-	-	-	40	40
20	89	2,261	754	-	16	16
21	131	-	-	-	-	-
22	116	17,030	-	8,730	40	48
23	144	2,571	-	-	40	40
24	315	-	-	-	-	-
25	129	-	-	-	11	23
26	232	27,287	10,818	-	-	-
27	137	165,011	18,406	-	-	-
28	167	22,497	9,688	17,330	-	-
29	28	-	-	-	-	-
30	-	-	-	-	-	-
Total	**5,230**	**811,352**	**278,903**	**100,347**	**385**	**409**

Table E.3: 20-Year Land Use Forecast

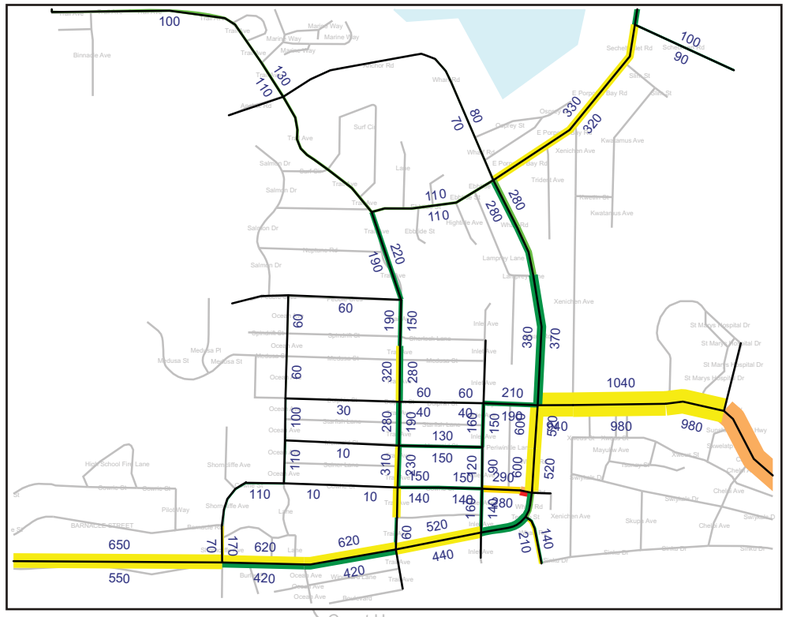
Zone	Residential	Retail	Office	Industrial	Other	
					In	Out
	(units)	(sq.ft.)	(sq.ft.)	(sq.ft.)	(vph)	(vph)
1	131	15,000	52,457	9,635	-	-
2	118	37,000	48,113	53,164	8	8
3	828	44,660	2,999	-	99	99
4	79	257,956	130,951	368	-	-
5	89	98,532	24,633	6,584	8	8
6	190	12,047	24,143	1,137	41	41
7	36	110,000	57,692	-	28	28
8	123	-	-	-	20	20
9	166	-	-	-	20	20
10	453	1,285	326	-	-	-
11	589	6,778	-	-	20	20
12	714	10,153	1,877	-	16	16
13	246	1,285	326	-	-	-
14	94	-	-	-	-	-
15	161	-	-	-	-	-
16	5	-	-	-	-	4
17	7	-	-	-	-	-
18	161	-	-	-	-	-
19	176	-	-	-	40	40
20	99	2,261	754	-	16	16
21	137	-	-	-	-	-
22	121	17,030	-	9,869	82	90
23	272	2,571	-	-	40	40
24	319	-	-	-	-	-
25	131	-	-	-	11	23
26	290	41,549	15,931	-	-	-
27	162	249,507	28,632	-	-	-
28	192	23,035	9,688	19,590	-	-
29	42	-	-	-	-	-
30	-	-	-	-	-	-
Total	**6,130**	**930,649**	**398,522**	**123,504**	**448**	**472**

Appendix F

Detailed Road Network Analysis Results

N

DOWNTOWN



Legend:

150 Volume (vehicles per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

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2018 Option 1 - Do Nothing

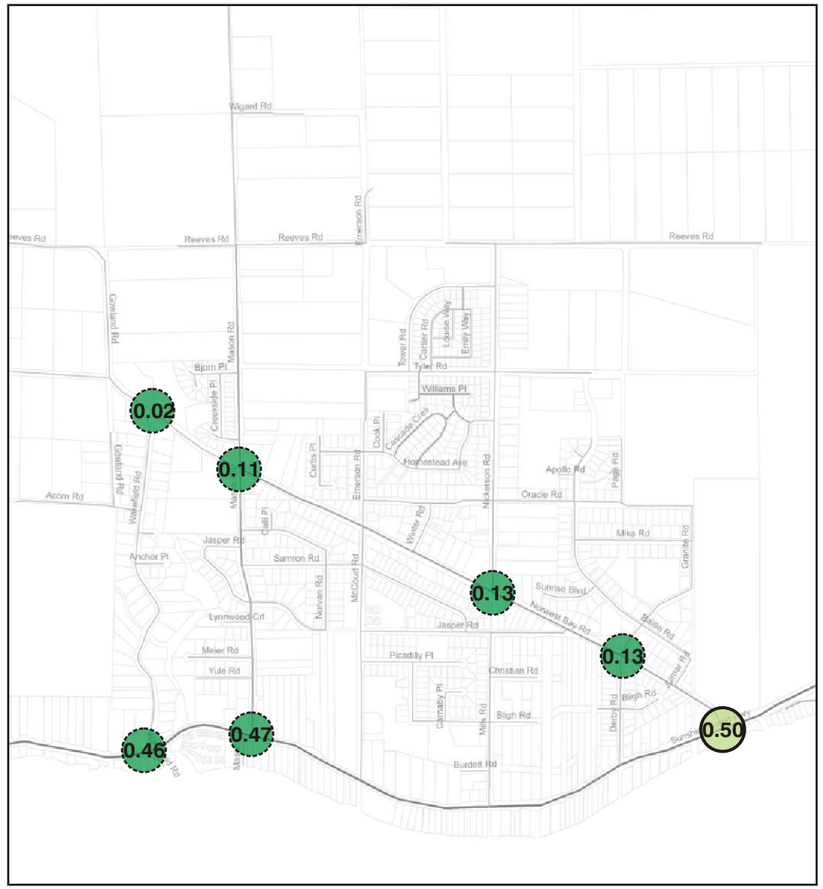
Link Volume-to-Capacity Friday PM Peak Hour

July 30, 2009 N.T.S. 4710-01

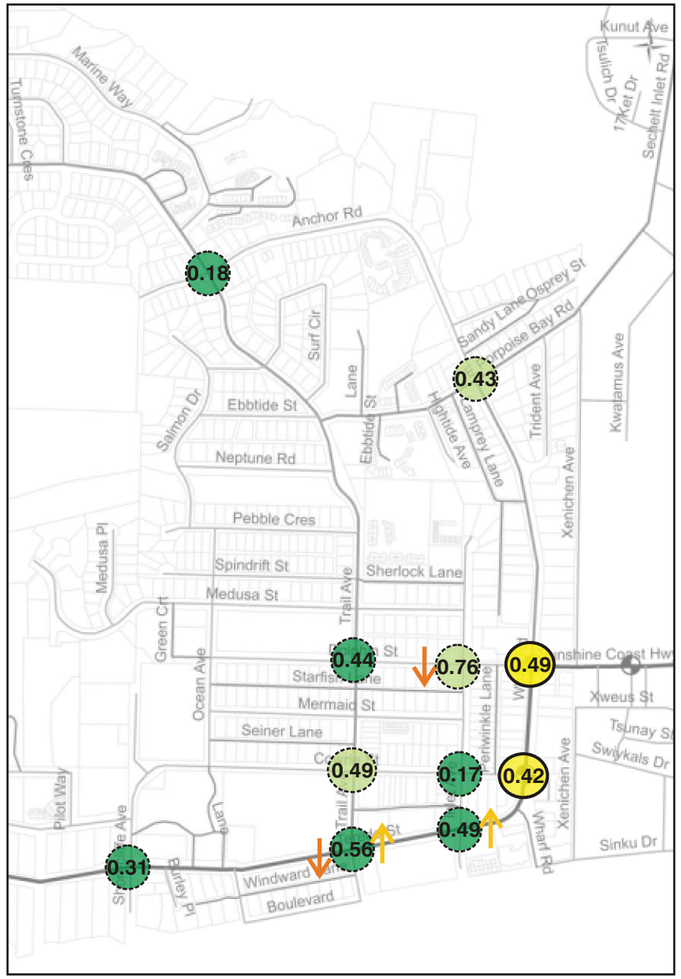
Figure F.1

N

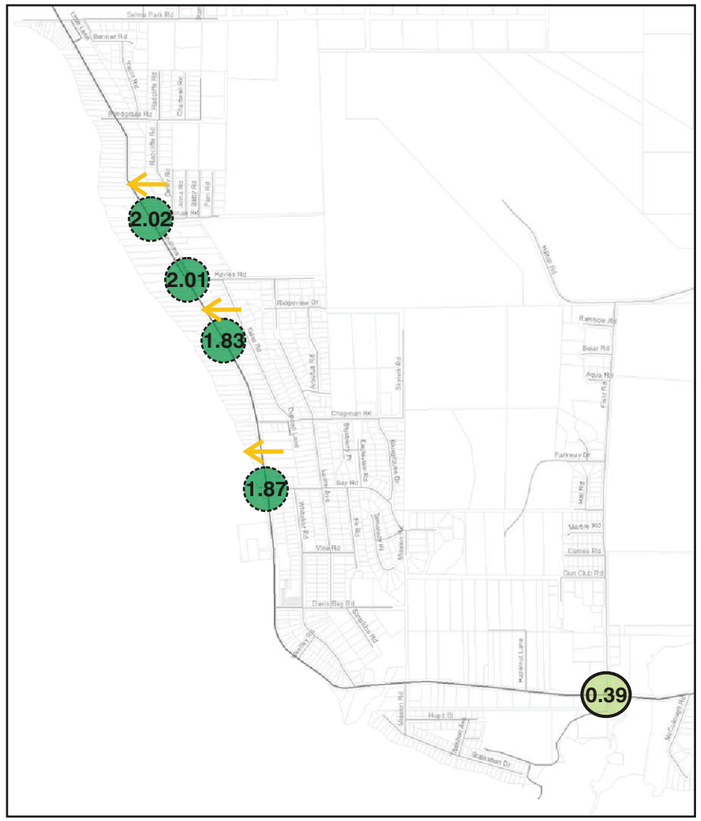
WEST SECHELT



DOWNTOWN



SELMA PARK, DAVIS BAY



Legend:

- Level of Service (LOS) A
- Level of Service (LOS) B
- Level of Service (LOS) C
- Level of Service (LOS) D
- Level of Service (LOS) E
- Level of Service (LOS) F

0.63 Volume-to-Capacity Ratio

→ Movement with LOS "D" or worse

Unsignalized

Signalized

NOTE:

Level of Service	Delay	
	Signalized	Unsignalized
A	≤ 10 sec	≤ 10 sec
B	≤ 20 sec	≤ 15 sec
C	≤ 35 sec	≤ 25 sec
D	≤ 55 sec	≤ 35 sec
E	≤ 80 sec	≤ 50 sec
F	> 80 sec	> 50 sec

July 30,2009 N.T.S. 4710-01

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2018 Option 1 - Do Nothing

Intersection Performance - Friday PM Peak Hour

Figure
F.2

N

DOWNTOWN

Legend:

150 Volume (vehicle per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 1.00
- > 1.00

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2028 Option 1 - Do Nothing

Link Volume-to-Capacity Friday PM Peak Hour

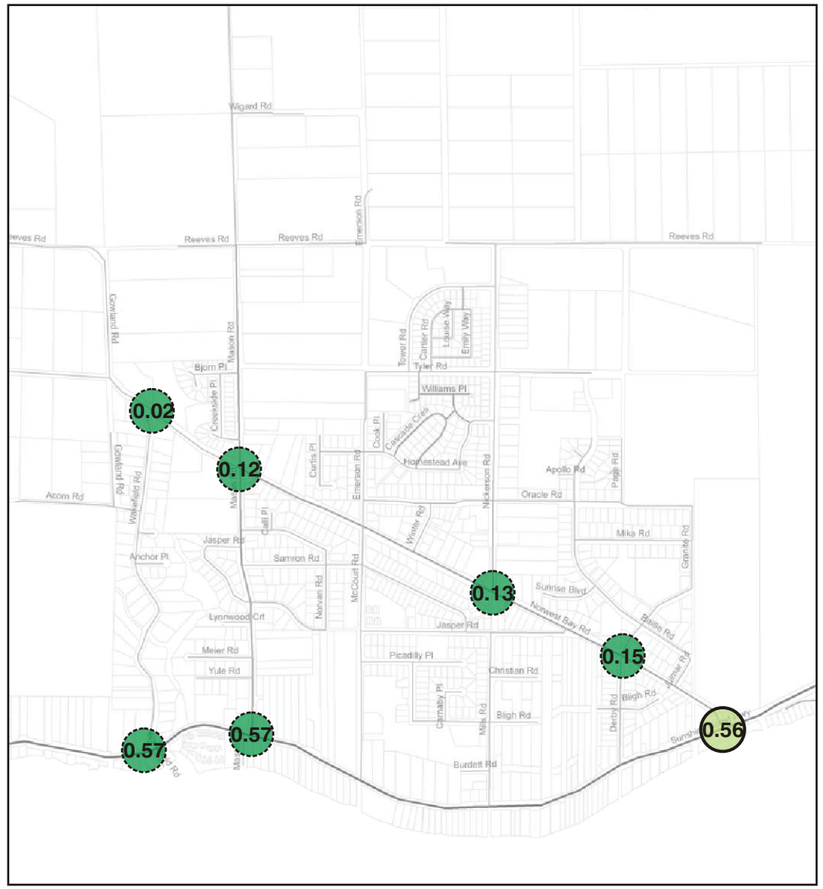
July 14, 2009 N.T.S. 4710-01

Figure

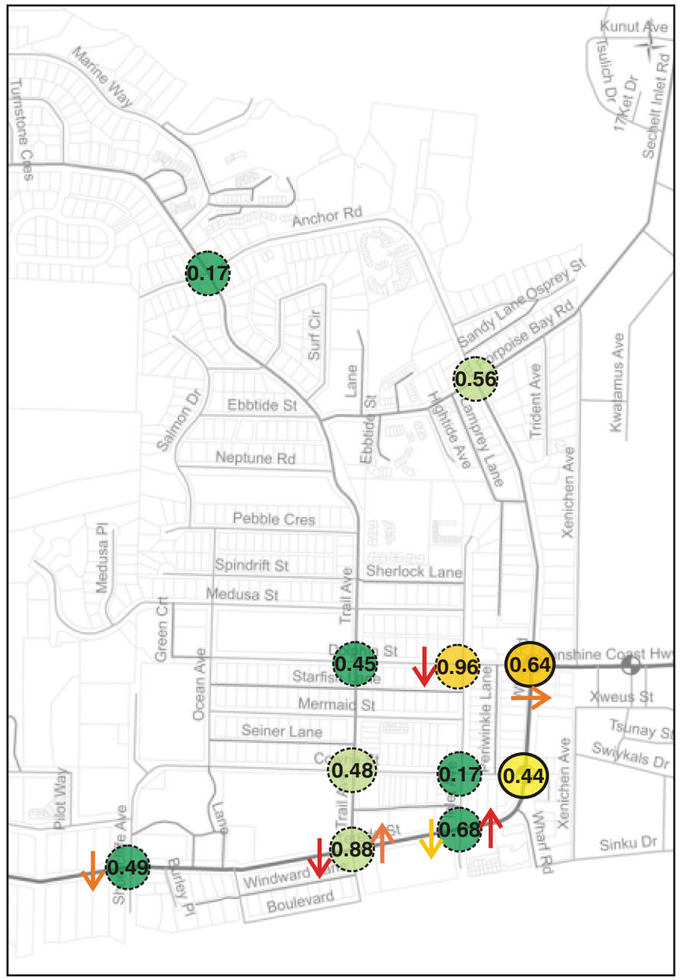
F.3

N

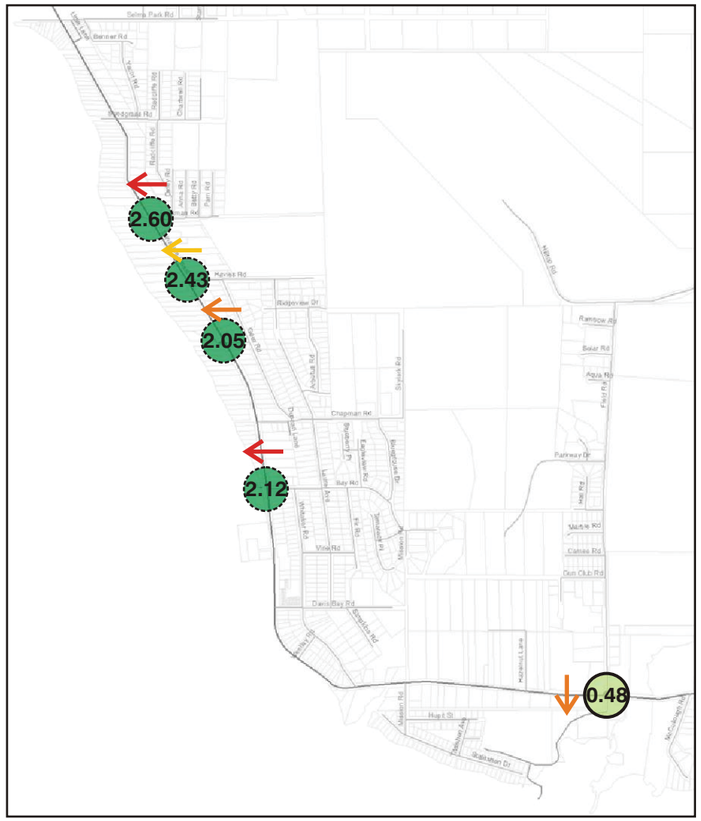
WEST SECHELT



DOWNTOWN



SELMA PARK, DAVIS BAY



Legend:

- Level of Service (LOS) A
- Level of Service (LOS) B
- Level of Service (LOS) C
- Level of Service (LOS) D
- Level of Service (LOS) E
- Level of Service (LOS) F

0.63 Volume-to-Capacity Ratio

→ Movement with LOS "D" or worse

Unsignalized

Signalized

NOTE:

Level of Service	Delay	
	Signalized	Unsignalized
A	≤ 10 sec	≤ 10 sec
B	≤ 20 sec	≤ 15 sec
C	≤ 35 sec	≤ 25 sec
D	≤ 55 sec	≤ 35 sec
E	≤ 80 sec	≤ 50 sec
F	> 80 sec	> 50 sec

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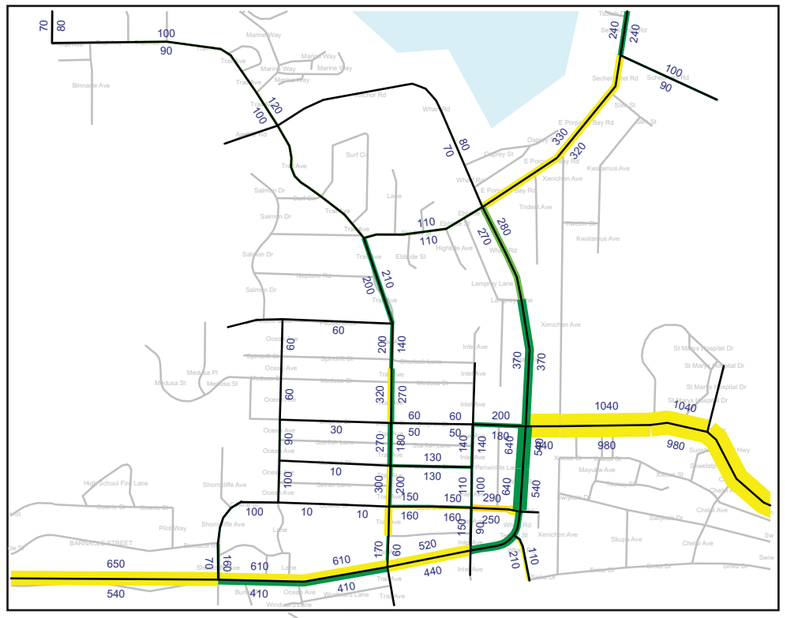
2028 Option 1 - Do Nothing
Intersection Performance - Friday PM Peak Hour

July 30,2009 N.T.S. 4710-01

Figure
F.4

N

DOWNTOWN



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2018 Option 2 - Upgrade Hwy 101 to 4-Lanes (Field Rd - Wharf Rd)

Link Volume-to-Capacity Friday PM Peak Hour

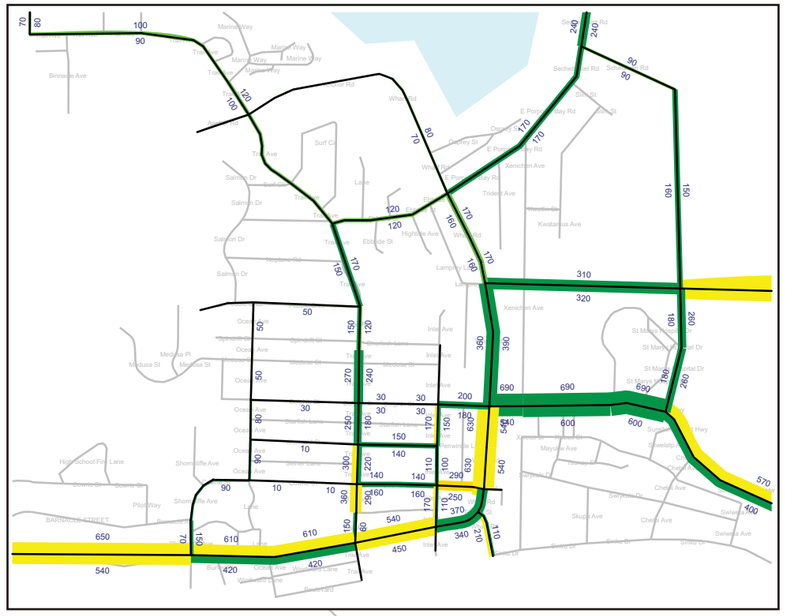
Figure

F.5

July 30, 2009 N.T.S. 4710-01

N

DOWNTOWN



Local Road Options Assumed:

- Field Road Option A
- Wharf Road Option D
- Neptune Road Option B

July 30, 2009 N.T.S. 4710-01

Legend:

150 Volume (vehicles per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

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2018 Option 3 - Eastern Bypass (Field Rd - Wharf Rd)

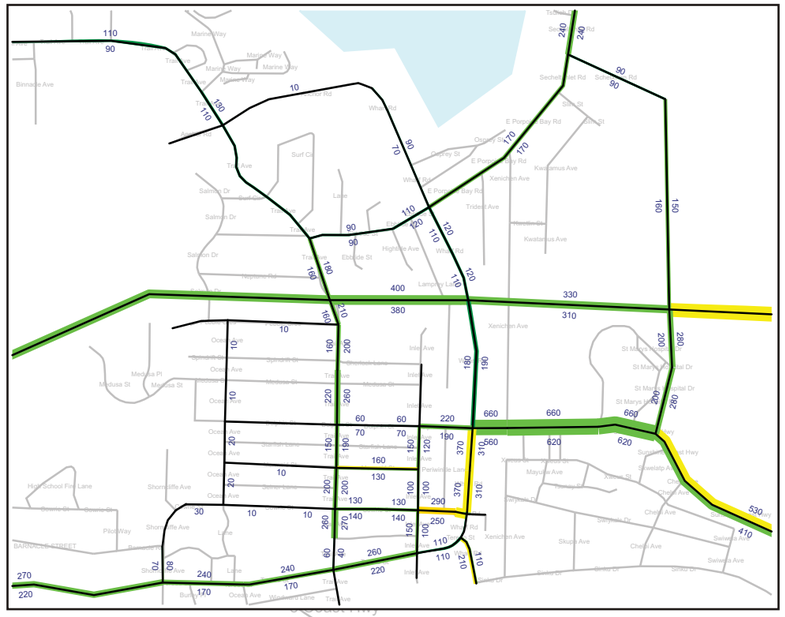
Link Volume-to-Capacity Friday PM Peak Hour

Figure

F.6

N

DOWNTOWN



Legend:

150 Volume (vehicles per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

Local Road Options Assumed:

- Field Road Option A
- Wharf Road Option D
- Neptune Road Option B
- West Sechelt Option A

July 30, 2009 N.T.S. 4710-01

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2018 Option 4 - Western Bypass (Wharf Rd - Norwest Bay Rd)

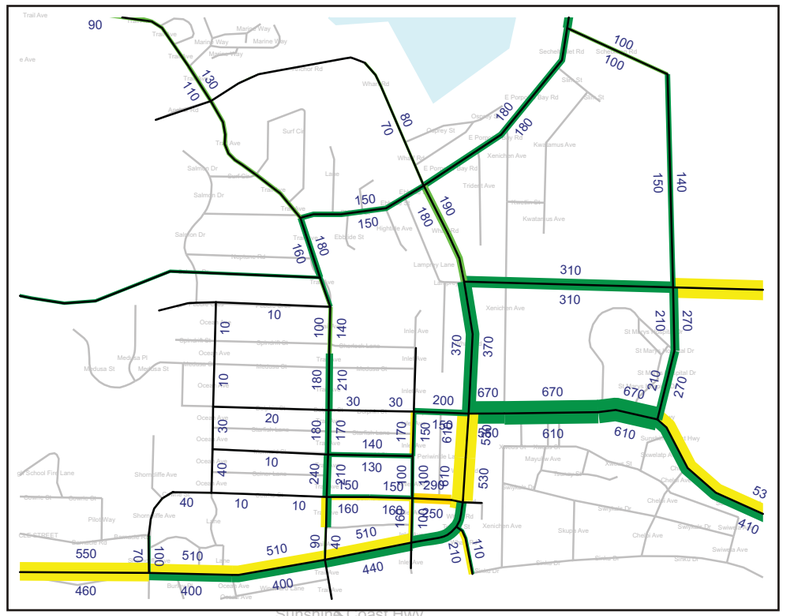
Link Volume-to-Capacity Friday PM Peak Hour

Figure

F.7

N

DOWNTOWN



July 30, 2009 N.T.S. 4710-01

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2018 Option 5 - West Sechelt Connector (Trail Ave - Tyler Rd)

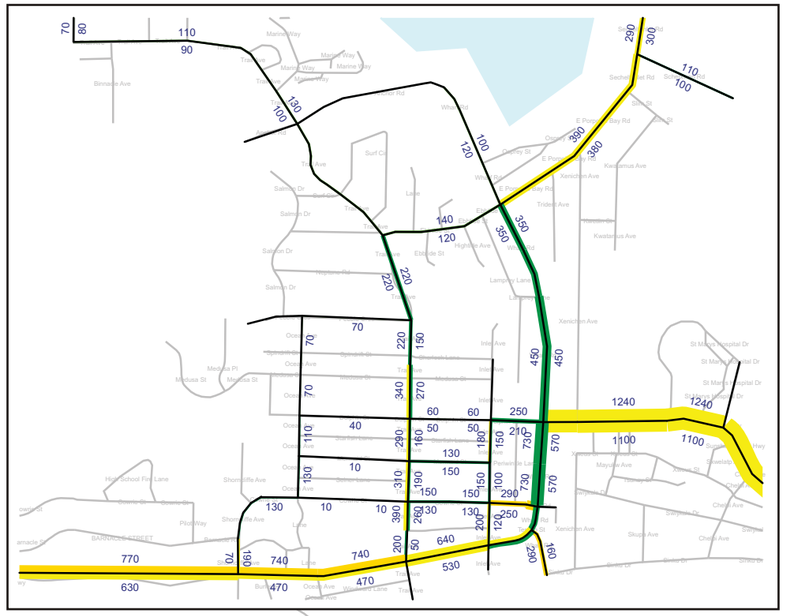
Link Volume-to-Capacity Friday PM Peak Hour

Figure

F.8

N

DOWNTOWN



Local Road Options Assumed:

♦Wharf Road Option A

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2028 Option 2 - Upgrade Hwy 101 to 4-Lanes (Field Rd - Wharf Rd)

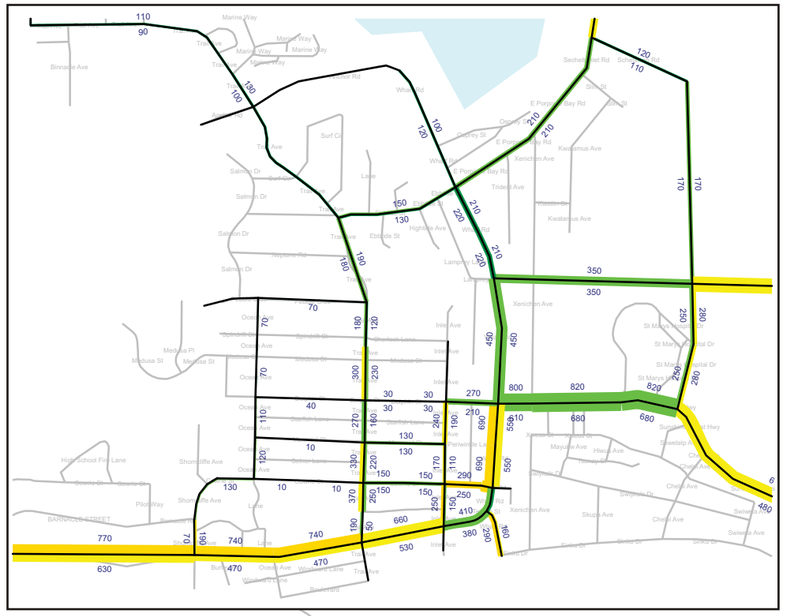
Link Volume-to-Capacity Friday PM Peak Hour

Figure

F.9

N

DOWNTOWN



Local Road Options Assumed:

- Field Road Option A
- Wharf Road Option D
- Neptune Road Option B

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2028 Option 3 - Eastern Bypass (Field Rd - Wharf Rd)

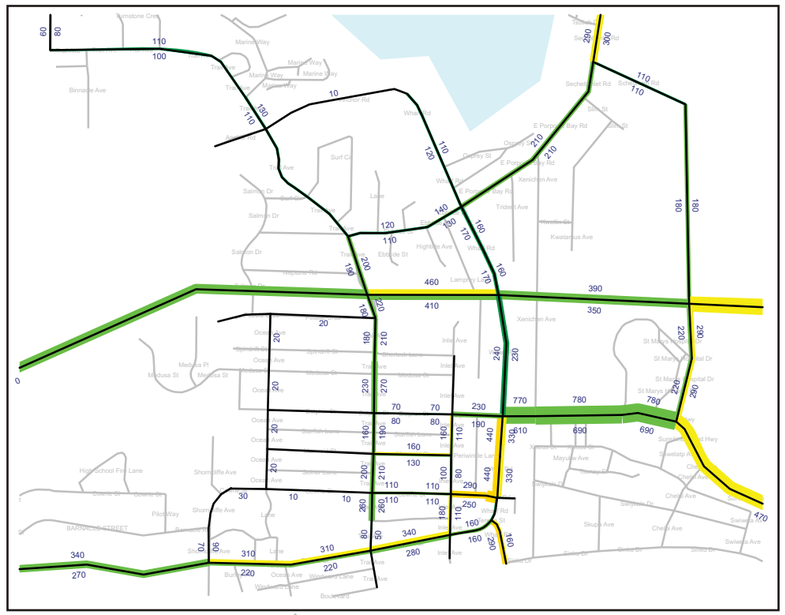
Link Volume-to-Capacity Friday PM Peak Hour

Figure

F.10

N

DOWNTOWN



Local Road Options Assumed:

- Field Road Option A
- Wharf Road Option D
- Neptune Road Option B
- West Sechelt Option A

Legend:

150 Volume (vehicle per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

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2028 Option 4 - Western Bypass (Wharf Rd - Norwest Bay Rd)

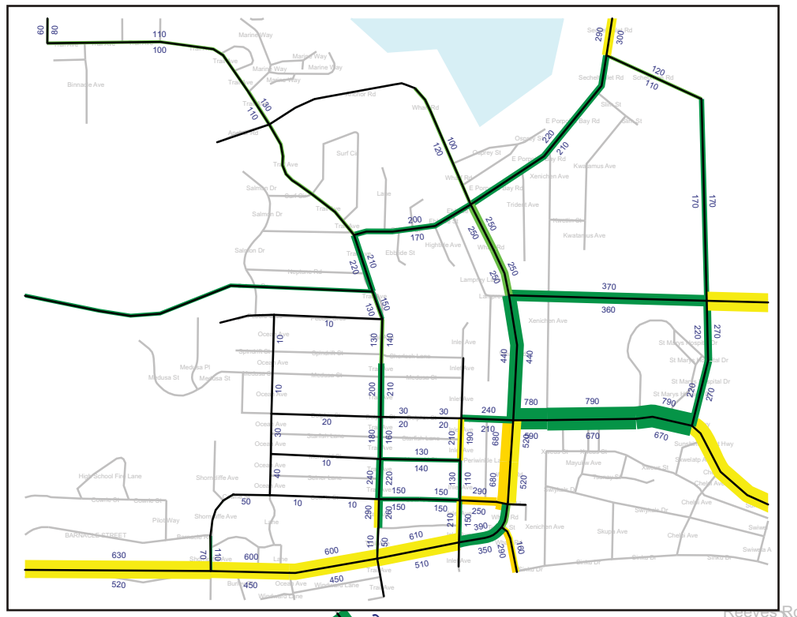
Link Volume-to-Capacity Friday PM Peak Hour

July 14, 2009 N.T.S. 4710-01

Figure F.11

N

DOWNTOWN



Local Road Options Assumed:

- Field Road Option A
- Wharf Road Option D
- Neptune Road Option B
- West Sechelt Option C

Legend:

150 Volume (vehicle per hour)

Volume Capacity Ratio

- <= 0.20
- <= 0.40
- <= 0.60
- <= 0.80
- <= 1.00
- > 1.00

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2028 Option 5 - West Sechelt Connector (Trail Ave - Tyler Rd)

Link Volume-to-Capacity Friday PM Peak Hour

July 14, 2009 N.T.S. 4710-01

Figure F.12

Appendix G

Active Transportation Upgrade Unit Cost Estimates

4710-02

Cost Estimates per Running Meter of Road

Classification	Type	Existing Typical Width (m)		Construction Item	Material	Width per Side (m)	# of Sides	Cost per m length ($)	Total Cost per m length
		Pavement	Gravel Shoulder						
Off-Street Multi-Use Trail	multi-use trail		4.0	Create gravel trail	Gravel	4.0	1	$40	$40
Urban Local/Limited Local	shared street with sidewalk one side	7.0		Landscaping	Soil, grass, tree	2.0	1	$65	
				Sidewalk	Concrete	1.5	1	$180	$245
Urban Main Street	shared parking & bike lanes with sidewalk	9.0		Widen road width	Asphalt	3.5	2	$3,130	
				Adding Curb & gutter	Concrete		1	$230	
				Pavement marking (line & bike symbol)	Paint			$5	$3,365
Urban Collector/Arterial	bike lanes & sidewalk both sides	7.5	1.5	Paving shoulder for bike lane	Asphalt	1.5	2	$1,240	
				Adding Curb & gutter	Concrete		2	$460	
				Sidewalk	Concrete	1.5	2	$360	
				Landscaping	Soil, grass, tree	2.0	2	$130	
				Pavement marking (line & bike symbol)	Paint			$5	$2,195
Rural Arterial	bike shoulders & sidewalk one side	6.5	1.0	Paving shoulder for bike lane	Asphalt	1.0	2	$1,000	
				Filling ditch and paving bike lane	Asphalt	0.5	2		
				Construct trail	Asphalt	1.5	1		
				Construct ditch		3.5	2	$60	
				Pavement marking (line & bike symbol)	Paint			$5	
				Landscaping	Soil, grass, tree	2.0	1	$100	$1,165
Rural Arterial	multi-use trail one side	7.0	1.0	Filling ditch to construct trail	Asphalt	4.0	1	$420	
				Adding Curb & gutter	Concrete		1	$115	
				Landscaping	Soil, grass, tree	2.0	1	$65	$600

Note: Does not include contingency

Appendix H

Active Transport Priorities
Route Concept Plans

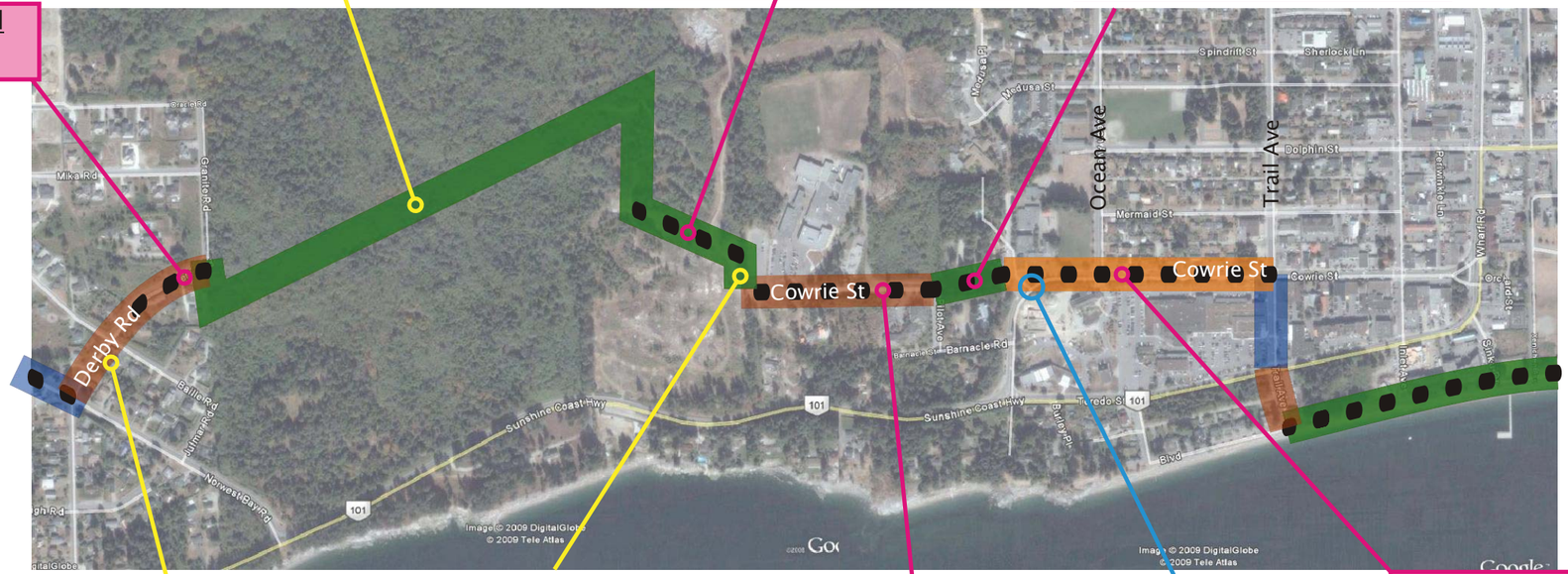
N

Off-Street Multi-Use Trail
- Existing Track – upgrade to Multi-Use Trail standard

Off-Street Multi-Use Trail
– Existing –

Off-Street Multi-Use Trail
– Existing –

Urban Local/Limited Local
– Existing –



Urban Local/Limited Local
- Install sidewalk (one side)

Off-Street Multi-Use Trail
- Existing Track – upgrade to Multi-Use Trail standard
- Connect Cowrie St to Watermain trail through existing eastment west of parking lot

Urban Local/Limited Local
– Existing –

Urban Main Street
– Existing –

Cowrie St / Shorncliffe Rd
Consider need for:
- Pedestrian crosswalk (check warrant);
- Traffic calming (e.g. Curb bulges)

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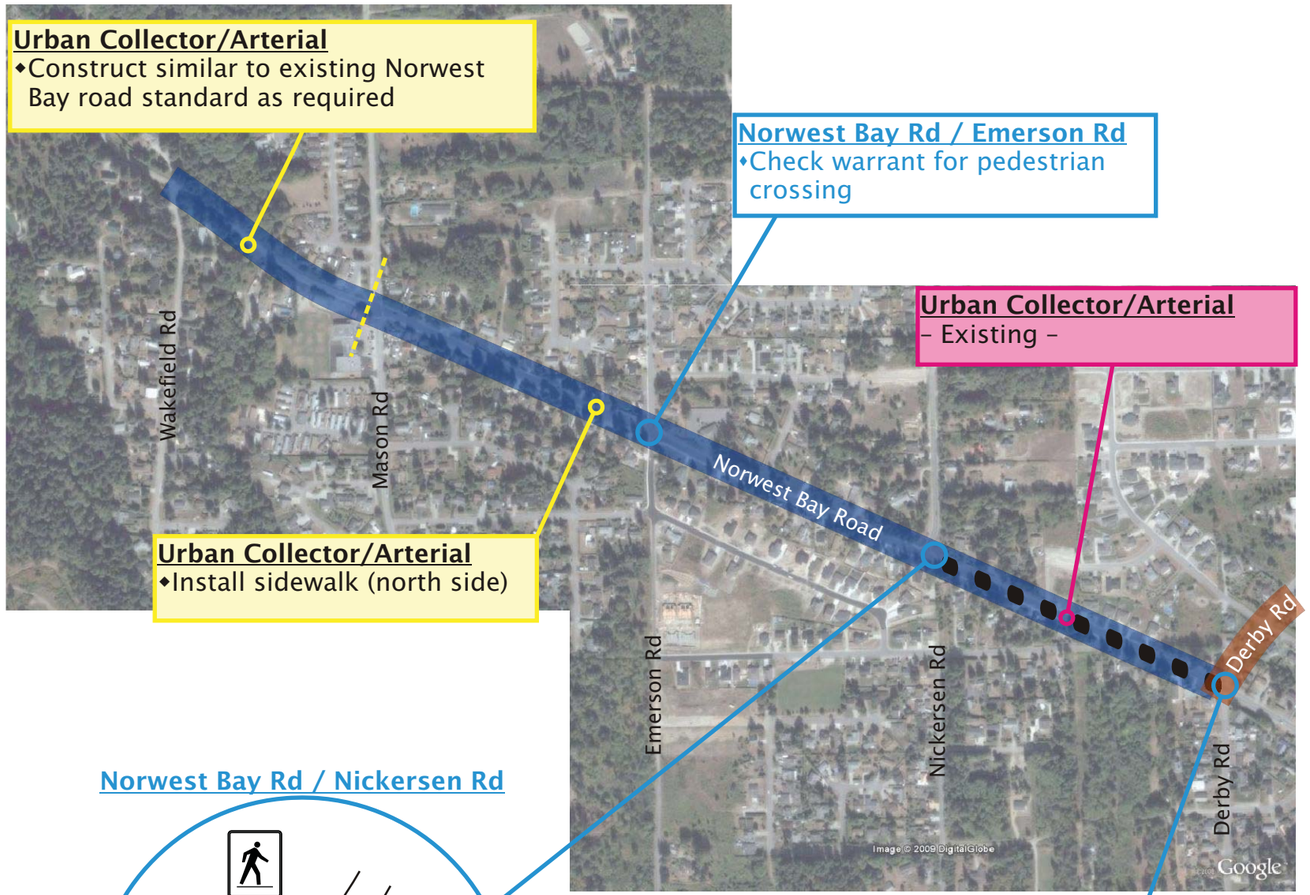
Cowrie Street - Watermain Trail

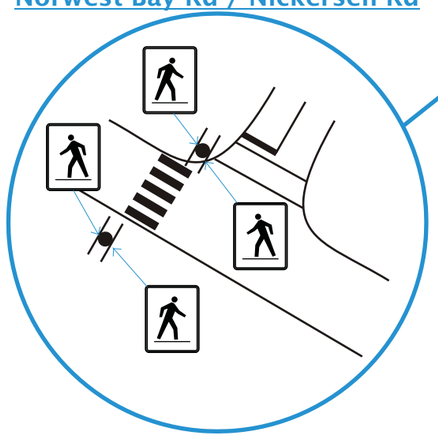
Conceptual Road Design

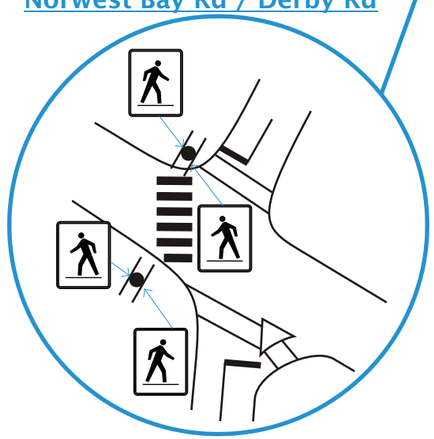
Figure
H1a

Oct 2009 N.T.S. 4710-02

N







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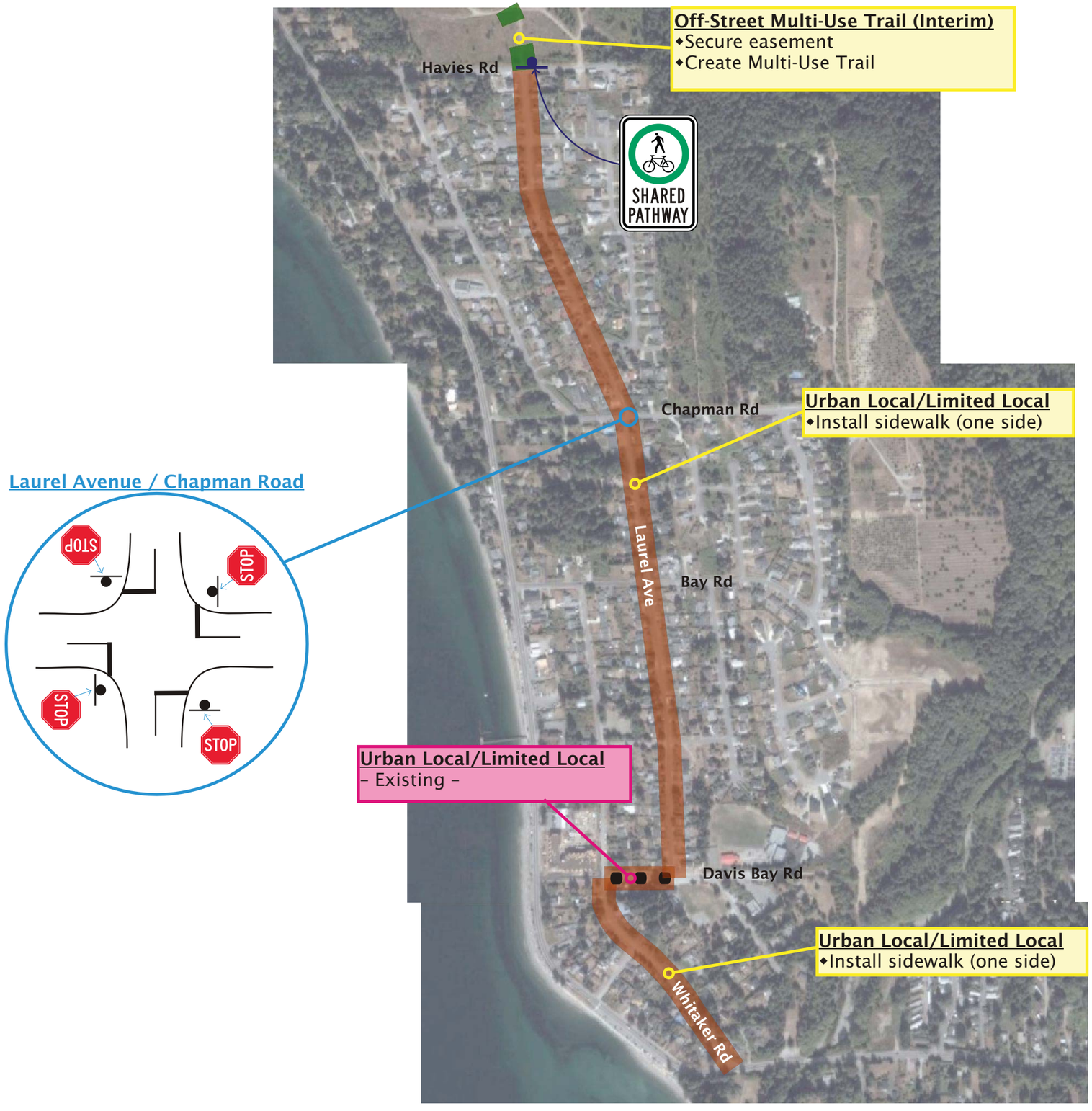
Norwest Bay Road

Conceptual Road Design

Oct 2009 N.T.S. 4710-02

Figure
H1b

N



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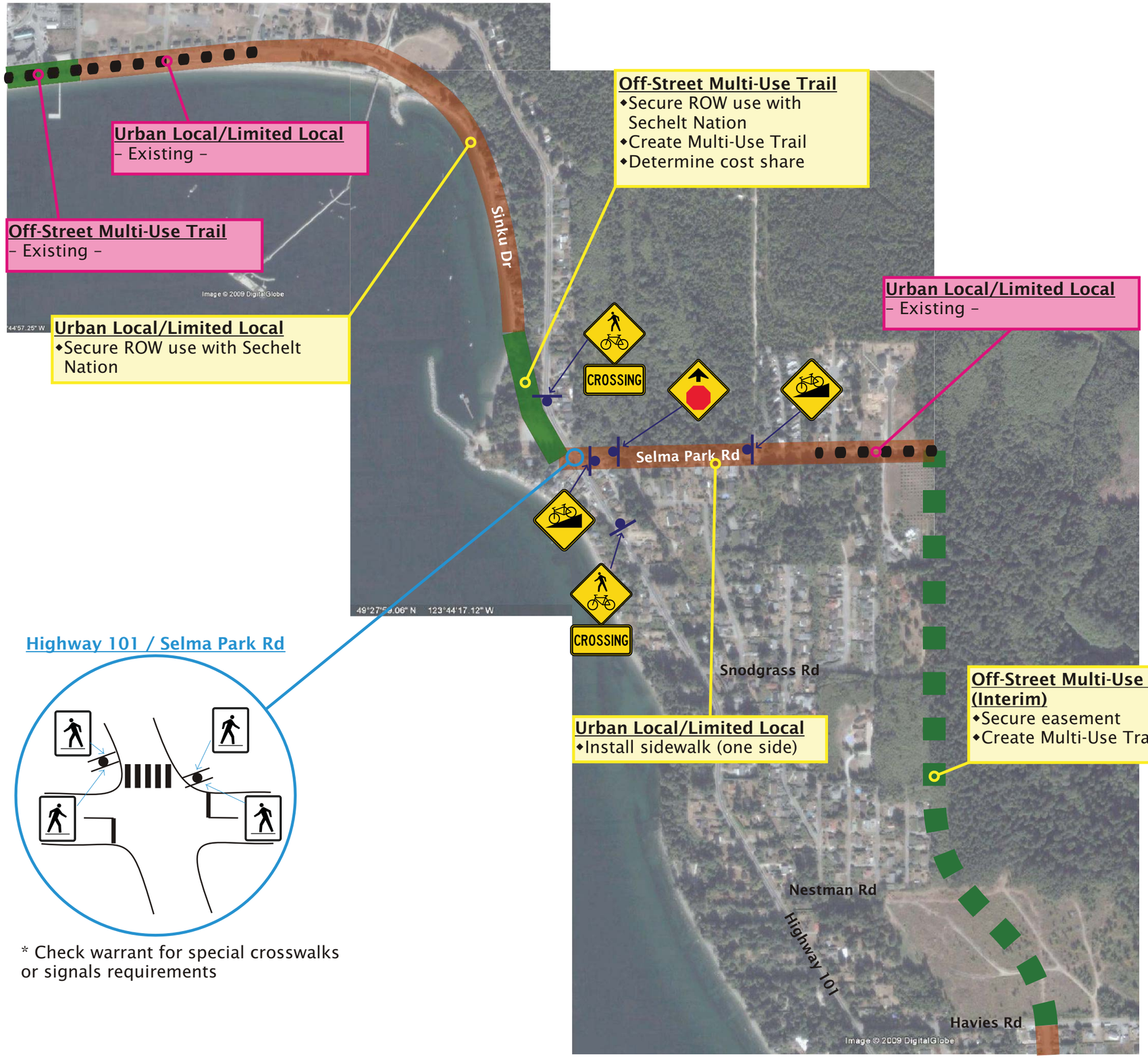
Laurel Avenue (Davis Bay Area)

Conceptual Road Design

Oct 2009 N.T.S. 4710-02

Figure
H2a

N



Highway 101 / Selma Park Rd

* Check warrant for special crosswalks or signals requirements

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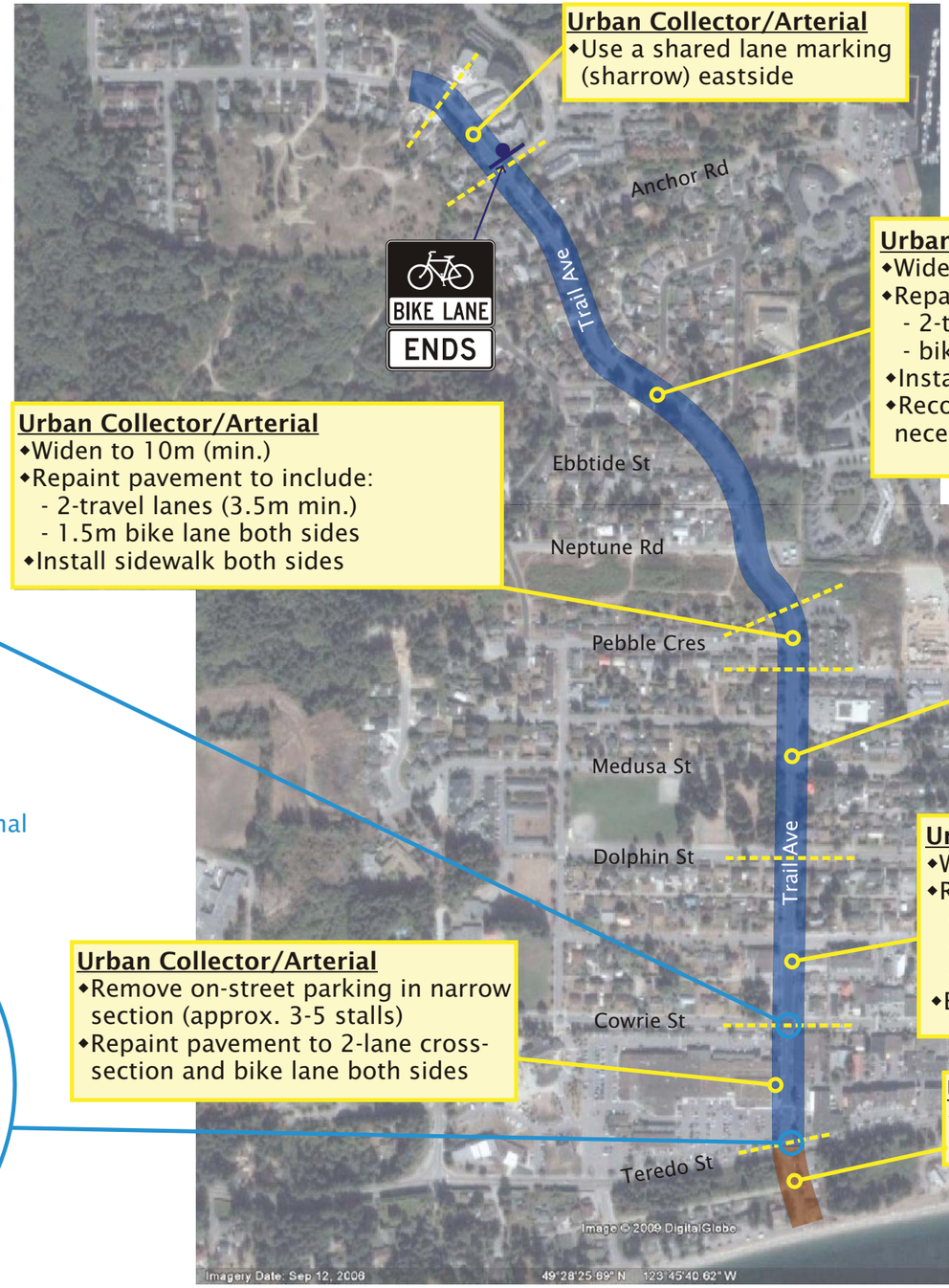
Selma Park Road - Sinku Drive

Conceptual Road Design

Oct 2009 N.T.S. 4710-02

Figure
H2b

N



Urban Collector/Arterial
- Use a shared lane marking (sharrow) eastside

Urban Collector/Arterial
- Widen to 10m (min.)
- Repaint pavement to include:
  - 2-travel lanes (min 3.5m each)
  - bike lane both sides
- Install sidewalk westside
- Reconstruct sidewalk on eastside (where necessary) to separate from roadway

Urban Collector/Arterial
- Widen to 10m (min.)
- Repaint pavement to include:
  - 2-travel lanes (3.5m min.)
  - 1.5m bike lane both sides
- Install sidewalk both sides

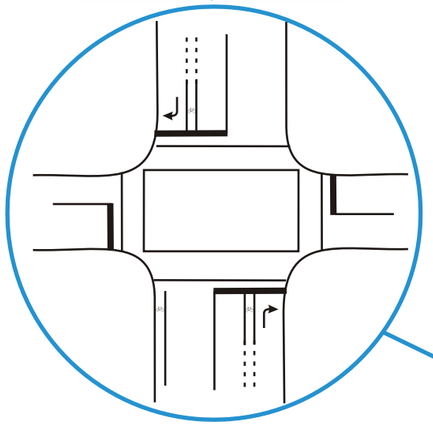
Urban Collector/Arterial
- Repaint pavement to include bike lane both sides
- Install sidewalk westside

Urban Collector/Arterial
- Widen to 12.7m (min.)
- Repaint pavement to include:
  - shared parking & bike lane eastside (min 4.2m);
  - 1.5m bike lane (no parking) westside
  - 2-travel lanes (3.5m min.)
- Extend sidewalk westside

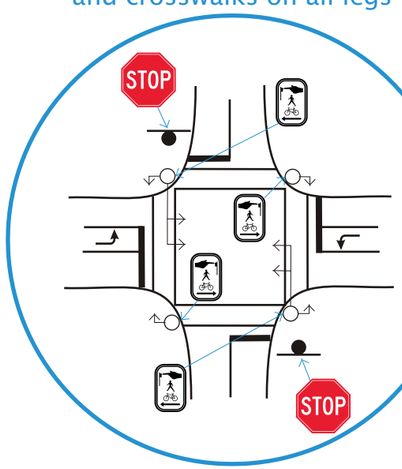
Urban Collector/Arterial
- Remove on-street parking in narrow section (approx. 3-5 stalls)
- Repaint pavement to 2-lane cross-section and bike lane both sides

Urban Local/Limited Local
- Install sidewalk (at least one side)

Cowrie St / Trail Ave



Highway 101 / Trail Ave
Install new pedestrian actuacted signal and crosswalks on all legs



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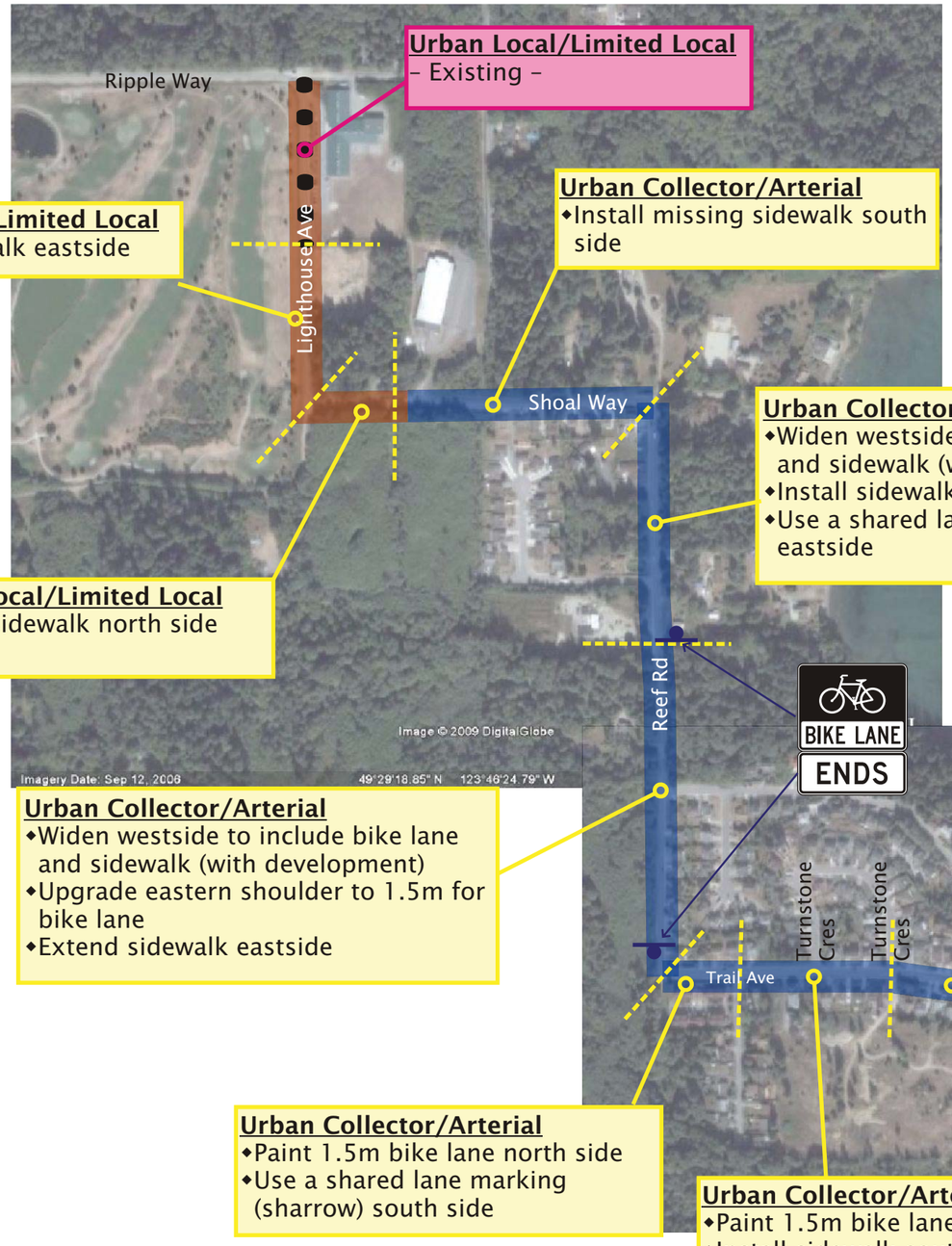
Trail Avenue (Village Area)
Conceptual Road Design

Oct 2009 N.T.S. 4710-02

Figure
H3a

N



Urban Local/Limited Local
– Existing –

Urban Local/Limited Local
- Install sidewalk eastside

Urban Collector/Arterial
- Install missing sidewalk south side

Urban Collector/Arterial
- Widen westside to include bike lane and sidewalk (with development)
- Install sidewalk eastside
- Use a shared lane marking (sharrow) eastside

Urban Local/Limited Local
- Install sidewalk north side

Urban Collector/Arterial
- Pave south side shoulder for bike lane
- Paint 1.5m bike lane north side
- Install sidewalk north side

Urban Collector/Arterial
- Widen westside to include bike lane and sidewalk (with development)
- Upgrade eastern shoulder to 1.5m for bike lane
- Extend sidewalk eastside

Urban Collector/Arterial
- Paint 1.5m bike lane north side
- Use a shared lane marking (sharrow) south side

Urban Collector/Arterial
- Paint 1.5m bike lane north side
- Install sidewalk south side

Shared Lane Marking
(Sharrow)

Source: http://www.bicyclinginfo.org/

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Trail Avenue (East Porpoise Bay Area)

Conceptual Road Design

Figure
H3b

Oct 2009 N.T.S. 4710-02

Based on TAC Sign Pattern Manual 2001

STOP SIGN / STOP — RA-1

DIMENSIONS (mm)	600 x 600	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	MUTCDC A2.2.1	BACKGROUND / FOND	RED / ROUGE
		BORDER / BORDURE	RED / ROUGE
ENLARGEMENT / AGRANDISSEMENT	4	MESSAGE	WHITE / BLANC

LEFT SIDE PEDESTRIAN CROSSWALK SIGN / PASSAGE POUR PIÉTONS — RA-4L

DIMENSIONS (mm)	600 x 750	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	MUTCDC A6.4.1	BACKGROUND / FOND	WHITE / BLANC
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	5	MESSAGE	BLACK / NOIR

RIGHT SIDE PEDESTRIAN CROSSWALK SIGN / PASSAGE POUR PIÉTONS — RA-4R

DIMENSIONS (mm)	600 x 750	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	MUTCDC A6.4.1	BACKGROUND / FOND	WHITE / BLANC
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	5	MESSAGE	BLACK / NOIR

SHARED PATHWAY SIGN / PISTE CYCLO-PÉDESTRE — RB-93

DIMENSIONS (mm)	300 x 450	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 3.7.10	BACKGROUND / FOND	WHITE / BLANC
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	3	MESSAGE	GREEN / VERT BLACK / NOIR

LEFT PUSHBUTTON SIGN / PANNEAU DU BOUTON POUSSOIR — ID-20L

DIMENSIONS (mm)	130 x 200	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 5.2.3	BACKGROUND / FOND	WHITE / BLANC
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	2	MESSAGE	BLACK / NOIR

RIGHT PUSHBUTTON SIGN / PANNEAU DU BOUTON POUSSOIR — ID-20R

DIMENSIONS (mm)	130 x 200	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 5.2.3	BACKGROUND / FOND	WHITE / BLANC
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	2	MESSAGE	BLACK / NOIR

HILL SIGN FOR BICYCLES / PENTE RAIDE — WA-41

DIMENSIONS (mm)	450 x 450	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 4.4.2	BACKGROUND / FOND	YELLOW / JAUNE
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	4.5	MESSAGE	BLACK / NOIR

STOP AHEAD SIGN / SIGNAL AVANCÉ D'ARRÊT — WB-1

DIMENSIONS (mm)	750 x 750	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	MUTCDC A3.6.1	BACKGROUND / FOND	YELLOW / JAUNE
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	7.5	MESSAGE	RED / ROUGE BLACK / NOIR

PEDESTRIAN AND BICYCLE CROSSING AHEAD SIGN / SIGNAL AVANCÉ DE PASSAGE POUR PIÉTONS ET BICYCLETTES — WC-46

DIMENSIONS (mm)	600 x 600	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 4.6.3	BACKGROUND / FOND	YELLOW / JAUNE
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	6	MESSAGE	BLACK / NOIR

CROSSING TAB SIGN / PANONCEAUX COMPLÉMENTAIRE — WC-7S

DIMENSIONS (mm)	600 x 300	COLOUR / COULEUR	
REFERENCE / RÉFÉRENCE	BTCGC / GCSVC 4.6.3	BACKGROUND / FOND	YELLOW / JAUNE
		BORDER / BORDURE	BLACK / NOIR
ENLARGEMENT / AGRANDISSEMENT	4	MESSAGE	BLACK / NOIR

Based on Manual of Uniform Traffic Control Devices 2003

R3-17
750mm x 600mm

R3-17b
750mm x 300mm

bunt & associates
TRANSPORTATION PLANNERS AND ENGINEERS

Standard Traffic Signs
Conceptual Road Design

Oct 2009 N.T.S. 4710-02

Figure
H4

Appendix I

List of Recommendations

Recommendation 1: that the District undertake a review of Bylaw 430. The review would include a revision of the functional classification to distinguish between major and minor arterials and add the "main street" designation. It should also update its recommended cross-section standards to incorporate the flexibility for context-sensitive design and the provision of active transportation facilities (i.e. trails, sidewalks, cycle lanes, etc.). A definitive position on direct access should be established for each road type – e.g. direct access should not be provided to major arterials and limited to only where necessary along minor arterials.

Recommendation 2: that as part of the District's review of Bylaw 430, the requirements for new sidewalk and cycle facilities be updated to include (in addition to, or overlapping with, the routes proposed as part of the Active Transportation Plan):

- Local / Limited Local streets: sidewalks both sides (urban), sidewalks on neither or one side (rural), cyclists share street with motorists;
- Collector streets: sidewalks one or both sides (urban), sidewalks one side or off-road trail (rural), cycle lanes on-street; and
- Arterial roads: sidewalks both sides and on-street cycle lanes (urban), sidewalks on one side with cycling shoulders or provision of a multi-purpose off-road trail (rural).

Recommendation 3: that the process for implementing strategies for Highway 101 be started immediately to ensure sufficient time to ensure that funding, planning, design, and construction can all take place prior to Highway 101 reaching practical capacity.

Recommendation 4: that the District emphasize the importance of improvements to the existing corridor and that MOTI pursue these improvements. Joint funding is needed to initiate these improvements. There may also be grant funding available through programs such as LocalMotion to develop an active transportation corridor on the Provincial Highway system.

Development in the area will be wholly or partly responsible for intersection and corridor improvements. As such performance of Highway improvements or contributions towards these should be collected as development occurs.

Recommendation 5: that a signal be installed at the Highway 101 / Davis Bay Road intersection. This would provide:

- A crossing opportunity for pedestrians that will enliven the Davis Bay beachfront and the surrounding retail activity;
- A break in traffic surges for the intersections north of Davis Bay Road along Highway 101 to allow additional and longer opportunities for side street traffic to enter the Highway; and
- An opportunity to install advance warning flashers on Highway 101 (east of the intersection) to better recognize the presence of an intersection at that location. The poor existing safety record can be partially attributed to the activity of the beachfront and nearby land uses coupled with the location of the intersection near a horizontal curve.

Recommendation 6: that a second signal further north be considered upon the creation of adequate access management along the corridor. Access management was identified by previous studies of Highway 101 to include:

- Creation of left turn lanes at:
  - Mission Road (westbound);
  - Davis Bay Road (southbound);
  - Bay Road (southbound);
  - Heather Road (southbound);
  - Nestman Road (southbound);
  - Snodgrass Road (southbound);
  - Selma Park Road (both directions);
  - Monkey Tree Lane (southbound);
- Implementation of right-in / right-out restrictions at:
  - Whitaker Road;
  - Westly Road; and
  - Havies Road;
- Closure of Chapman Road and the frontage road east of the conveyor belt.

If appropriate (based on a more detailed corridor study), alterations to these locations may be considered. For example, one proposal is to provide left turn bays at Havies Road and Chapman Road and rather than Heather Road, which would become right-in / right-out.

Recommendation 7: that Laurel Avenue be completed, and extended further north as redevelopment occurs. This will provide emergency access in the event of Highway 101 being shut down and relieve local traffic from the highway.

Recommendation 8: that the following improvements be pursued at the Highway 101 / Wharf Road / Dolphin Avenue intersection:

- Construction and opening of Tita Way Road as a collector road through the Indian Band Lands extending to Dusty Road. This road has previously been tied to relieving the future traffic impact of the proposed SilverBack development. Whilst this is an important role, it also offers a number of benefits to the existing road network, including:
  - Relieving traffic pressure from the Wharf Road corridor – specifically an alternative route for heavy vehicles travelling to the industrial sites along East Porpoise Bay Road. This will relieve some conflicts with vulnerable road users, which has been cited as the cause of a number of crashes including a recent fatality involving a truck and a pedestrian at the Highway 101 / Wharf Road intersection;
  - Encouraging industrial development at alternative locations to Wharf Road. Over time, it is suggested that more complimentary land uses to those of the adjacent Village be developed along Wharf Road to provide a buffer between heavy vehicle movements (contained in the Indian Band industrial lands) and the pedestrian-scale uses of the Downtown Village.
- That a comprehensive road safety audit be conducted at the intersection to identify safety and operational mitigations at this intersection that are beyond the scope of this study.

Recommendation 9: that the District initiate discussions with the Sechelt Indian Band and MOTI regarding the ownership, maintenance, and liability agreements for Tita Way Road. This link should be open for public use.

Recommendation 10: that Trail Avenue be designated as an Active Transportation Corridor and that the following treatments be pursued to enable this designation:

- Creation of on-street cycle lanes along Trail Avenue from Highway 101 to Anchor Road, where the existing road width can accommodate these changes;
- Complete any missing or deteriorated sidewalk segments on both sides of Trail Avenue between Highway 101 and Anchor Road;
- Installation of a pedestrian signal at the Highway 101 / Trail Avenue intersection.

Improvements affecting Highway 101 (Teredo Road) will need to be coordinated with MOTI. A determination of cost and ongoing maintenance responsibilities will need to be agreed. However, other improvements are the responsibility of the District.

Recommendation 11: that the Acorn and Lewarne Road extensions be funded as part of the Trails Estate development. That other collector and arterial street improvements be pursued through collection of development cost contributions and/or direct developer contribution / construction. The timing of construction for each road network component is to be established as part of the traffic impact studies for these developments.

A detailed assessment of the West Sechelt Connector is included at Section 9. Consideration must be given to whether this connection is intended to serve a local or regional traffic function and the implications of this decision.

Recommendation 12: that the following geometric improvements be pursued to mitigate existing safety issues:

- Norwest Bay Road / Mason Road: geometric improvements to facilitate pedestrian movements, particularly related to the adjacent school and community store. In addition, traffic calming solutions near the intersection may need to be investigated to slow traffic at the approaches;
- Highway 101 intersections with Wakefield Road, Mason Road, McCourt Road, and Mills Road: increase sight distance for vehicles exiting the side streets onto the highway.

These problems should be rectified through developer contributions as development occurs in the area.

Recommendation 13: that a roadway connection be provided between West Sechelt and the northern neighbourhoods / community facilities. This would best connect Tyler Road and the Trail Avenue / Reef Road intersection.

Recommendation 14: that water- and air-based emergency response systems be emphasized for these areas as well as incident management contingencies. That active transportation facilities be pursued along existing road or trail corridors.

Recommendation 15: that the regional Highway 101 bypass proposed by MOTI and Binnie & Associates be pursued as the preferred long-term highway option.

Recommendation 16: that an interim bypass of Highway 101 between Field Road and Wharf Road be constructed by 2015, when the existing highway is expected to reach practical capacity. A cost feasibility study will need to be undertaken to evaluate the practicality of constructing a bypass compared to upgrading the existing highway to 4-lanes. However, there are a number of qualitative reasons that emphasize the construction of a bypass.

The alignment should follow, where possible, the future regional bypass alignment proposed by Binnie & Associates. The overlapping section should be funded by the MOTI who will take over the alignment as part of the regional bypass of Highway 101 in the future. The remainder should be funded by the District through the collection of DCCs or direct developer contributions / construction.

Recommendation 17: that the Highway 101 bypass be supported with appropriate land use policies to encourage the vitality of the Village centre and discourage inappropriate development patterns along the new route. Initiating the innovative delivery of people to the existing Village centre (through walking, cycling, transit, and increased residential density) will strengthen the appeal of the Village Centre.

Recommendation 18: that the District pursue a West Sechelt Connector between Trail Avenue and Tyler Road. This connection will serve new development in the immediate term and should be funded through the collection of DCCs or direct developer contributions / construction.

The alignment should follow, where possible, the future regional bypass alignment proposed by Binnie & Associates. It would circuitously connect back to Highway 101 via the extension of Acorn Avenue. However, it should be undertaken with the understanding that the primary traffic carrying function of Highway 101 would remain through the Village until a regional bypass is constructed.

Recommendation 19: to support the construction of an interim bypass between Field Road and Wharf Road it is recommended that geometric changes be made at the Highway 101 / Field Road intersection to provide priority to the new route. These changes should include dual southbound left-turn lanes and signal phasing changes (see Field Road Option A).

That Field Road be appropriately upgraded to accommodate all road users. This includes constructing sidewalks on both sides and on-street cycle lanes. These provisions should be extended along the new highway route.

Recommendation 20: that a new intersection be constructed at the junction of the proposed regional bypass right-of-way and Wharf Road to support the bypass between Field Road and Wharf Road. The existing Highway 101 corridor, including the intersection with Dolphin Avenue, should be downgraded to perform the role of a commercial street and an active transportation (walking / cycling) corridor to Selma Park, Davis Bay, and Wilson Creek.

Recommendation 21: that Neptune Road be used only as an interim access for initial development in West Sechelt until the West Sechelt Connector between Trail Avenue and Tyler Road can be constructed. Traffic volumes on Neptune Avenue should be kept below typically accepted local street volumes (i.e. approximately 3,000 vehicles per day).

That the West Sechelt Connector be constructed using the future regional bypass alignment proposed by Binnie & Associates. This connection is not intended to use, replace, or extend Neptune Road.

New at-grade intersections will be created at Trail Avenue (signalized) and Salmon Drive (unsignalized). Neptune Road and Pebble Crescent will form “service” or “frontage” roads to the West Sechelt Connector and their existing intersections with Trail Avenue will be closed. This can be offset with right-in / right-out driveways from the Connector if necessary.

Recommendation 22: that prior to the construction of a regional highway bypass, the West Sechelt Connector be constructed using, where possible, the future regional bypass alignment proposed by Binnie & Associates with a connection to Tyler Road. This will circuitously reconnect to Highway 101 via Mason Road and Acorn Road.

The major road network in the area should be completed through an extension of Tyler Road to the Trail Ave / Reef Road intersection, the extension of Granite Road to Tyler Road, the extension of Derby Road to the West Sechelt Connector, and the extension of Cowrie and / or Barnacle Street to Derby Road. The latter should not be constructed until Derby Road is connected to the West Sechelt Connector.

The major road network should be funded through direct developer contribution / construction, or through the collection of DCCs. The supporting local street network should be determined through traffic impact assessment of new development.

Recommendation 23: that the Active Transportation Network be adopted and that the revised requirements (sidewalk and cycle route schedule and road / street cross-sections) be incorporated into Bylaw 430.

Recommendation 24: that specific funding be allocated to the creation of the Active Transportation Network. These funds should be deployed in an “opportunistic” manner to take advantage of developer construction / funding of improvements, grant applications, collection of DCCs, and integrating with scheduled capital works projects or non-District funded projects.

Beyond this, the following projects should be developed as funds permit (in order of priority):

- Highway 101 improvements (dependent on MOTI);
- Watermain Trail;
- Davis Bay Trail;
- Trail Avenue;
- Nickerson / Crowston / Ripple Trail.

Recommendation 25: that the District incorporate bicycle parking standards into its Zoning By-Law to enhance the supply of short- and long-stay bicycle parking through new development and redevelopment.

Also, that the District establish a Bicycle Rack Program that works with interested land owners to supplement the existing supply of bicycle parking.

Recommendation 26: that the District develop a schedule of desirable programs (similar to Table 10.4) that would support the Active Transportation Plan. Education of pedestrians, cyclists, and motorists is critical.

Other programs should focus on reducing the number of vehicle trips and increasing participation in active transportation. These strategies can be coordinated with schools, local businesses, MOTI, etc. or could be offered by developers to offset site impacts (to be identified as part of traffic impact assessments).

Recommendation 27: that consistent guidelines be developed for the application of pavement marking and signage as it relates to pedestrian and cycling infrastructure. Maintaining consistency enables users to develop consistent expectations of the accommodations these routes afford them.

Recommendation 28: that mixed use and compact development be encouraged through the land use policies of the OCP. In particular, developments that encourage neighbourhood services such as retail, local services, live-work space, schools, etc. should be encouraged in neighbourhood centres in exchange for reasonable increases in density, where necessary. As in Davis Bay and the Village, this enables walking or cycling to occur between uses and offers concentrations of people that creates a platform to support transit, ride-sharing, car-sharing, etc.

Recommendation 29: that TDM forms part of the terms of reference for Traffic Impact Assessments (TIA). This will require new development to address how they propose to reduce automobile trip-making or contribute to existing or new TDM programs. A process for the collection of development contributions to a TDM fund may also be considered.

Specifically, the TIA should investigate the role of transit and in particular what the development is contributing to the enhancement of this mode. This may include land use, development form, fare incentives, physical provisions (e.g. bus shelters), etc.

Recommendation 30: that, in consultation with BC Transit and other transportation stakeholders, an appropriate site be identified within the Village for the future development of a transportation hub and in the neighbourhood centres for transportation nodes. These locations may be publically owned properties or become available through redevelopment.