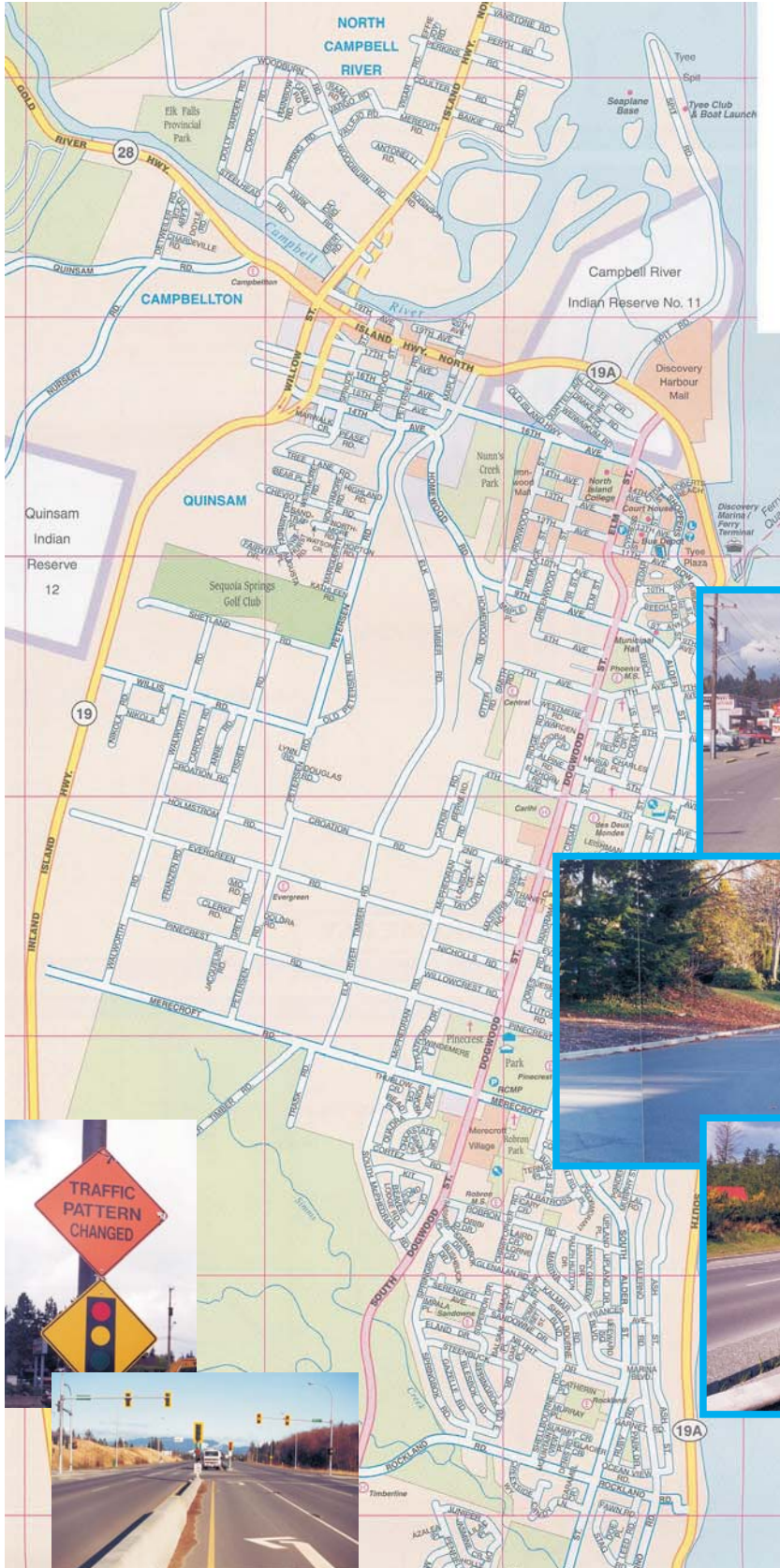
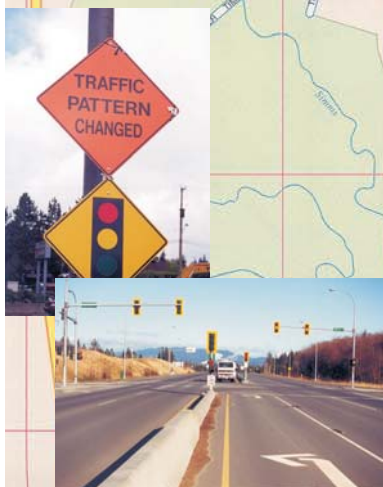


Report to District of Campbell River



District of Campbell River



On Master Transportation Plan for Area Roads



ward
consulting
group

- Traffic Impact
- Parking
- Transportation Planning
- Corridor Studies

- Traffic Operations
- Transit
- Trucking
- Network Modelling
- Bicycles/Pedestrians

May 3, 2004

District of Campbell River
301 St. Ann's Road
Campbell River, BC V9W 4C7

Attention: Mr. P. D. Skognes, A.Sc.T.
Engineering Services Manager

Dear Phil:

Re: Master Transportation Plan


In response to your request, we have now undertaken the necessary analysis and prepared a draft Master Transportation Plan of Area Roads for the District. The study, which was funded by the District, the Ministry of Transportation, ICBC, and Ministry of Community, Aboriginal and Women's Services, has sought to review the existing road network and traffic conditions on it. It also included preparing a refined transportation planning model that was used to project future 2023 traffic volumes on a number of alternative network improvements. These improvements were then evaluated and through this process a recommended road network for the 2023 time horizon established. Coupled with this plan, an implementation program has been prepared.

This document is our final report and incorporates the comments made by District staff, funding partners, Council, and its committees on our earlier drafts.

Thank you for the opportunity to undertake this study on your behalf.

Yours truly,

T. J. WARD CONSULTING GROUP INC.


Trevor J. Ward, P. Eng., M.B.A.
President

TJW:js

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EXECUTIVE SUMMARY

Ward Consulting Group was commissioned to prepare a Master Transportation Plan of Area Roads for the District of Campbell River. The first phase of the study examined existing conditions on the road network and looked at network continuity, traffic controls, traffic volumes, intersection performance, and traffic crashes. It also obtained public input through an open house held in November 2003. From this review, a number of issues were identified including the lack of continuity in the network especially in the east-west direction, congestion and safety concerns particularly on Dogwood Street, and the lack of truck routes in the District. It was also noted that the Island Highway carries a high volume of traffic. Because there are only two signals along its length, the constant stream of traffic makes it difficult for vehicles seeking to access the highway and travel into the Downtown on it.

The second phase of the study focused on identifying and evaluating alternative network improvements. To assist in this, a computer based transportation model was developed in order to project future traffic volumes to the 2023 time horizon on the alternatives. The population and employment projections for the District were prepared and allocated to 64 traffic zones. The traffic projected by the model on the existing road network indicated a need to provide an additional travel lane in the north-south direction by this time horizon. The traffic was then projected for a number of network improvements which ranged from upgrading the Island Highway, Alder Street, Dogwood Street, and Petersen Road with additional turn lanes or travel lanes to providing new connections such as the Nunns Creek, Petersen Road/Dogwood Street and Petersen Road/Jubilee Parkway connections, and an extension of Eagle Drive south to the Jubilee Parkway/Airport Connector on the west side of the Inland Island Highway. These alternatives were analysed and evaluated.

The third phase centred on preparing a set of recommended network plans covering different modes of transportation. The road network plan, shown as **Exhibit 1**, included the Petersen Road/Dogwood Street Connector which will help divert traffic from Dogwood Street to Petersen Road thereby providing relief to the congested north half of Dogwood Street, thus avoiding significant upgrading along this road and at the same time better utilizing the available capacity on Petersen Road and provide for future capacity beyond the 2023 horizon year. Another feature included was the upgrading of the Island Highway through the introduction of additional signals and left turn lanes, the construction of a centre median with landscaping where possible, and the potential provision of a select number of roundabouts. Through these features, there will be improved access to this scenic road from intersecting roads and improved traffic operations, safety, and pedestrian accessibility along the highway. A key recommendation is to reconfigure the Island Highway/Jubilee Parkway intersection to encourage through traffic to use the underutilized Inland Island Highway and reduce the pressure on the District's heavily utilized north-south arterials.

The plan also included the Willis Street/2nd Avenue Connector, as well as the Nunns Creek Connector, and an extension of Eagle Drive south to the Jubilee Parkway/Airport Connector, both of these last two in conjunction with development of adjacent lands. It also included the extension of Willis Road in a north-west direction to Argonaut Road in the long term. The plan

also recommended that the District's arterial roads be categorized into minor and major arterials and that collector roads be categorized based on the adjacent land use, i.e., residential and industrial/commercial. The separation into these subcategories will be beneficial in establishing design requirements for upgrades and future new roads that better suit the road users.

A recommended traffic signal plan was also prepared identifying locations at which future signals should be installed. A truck route network was proposed for the District whereby the majority of trucks will be restricted to the Inland Island Highway, Highway 28, the southern segment of Dogwood Street, Willis Road and its connection to 2nd Avenue, 16th Avenue, and the Island Highway between the Inland Island Highway and the ferry terminal. Hazardous goods should be restricted to the Inland Island Highway, Highway 28, and the Island Highway to the ferry terminal. The plan also includes identification of commuter bike routes in addition to the District's numerous recreational bike routes. These commuter bike routes primarily follow arterial roads and all such arterials should have provision for bicycles, either through separate bike lanes outside of the travel lanes or wider curb lanes at the expense of narrower inside lanes.

A number of short term improvements were also identified. These included provision of left turn lanes at key intersections along Alder Street, new signals at Erickson Road, Rockland Road, and 2nd Avenue on the Island Highway, the signalization of the Dogwood Street/Evergreen Road intersection, signal upgrades at the 7th Avenue, 4th Avenue, 2nd Avenue, and Mercroft Street intersections on Dogwood Street, a realignment of the Island Highway/Jubilee Parkway to better direct traffic arriving from the south onto the Parkway, and the creation of a left turn lane on the Island Highway at the ferry terminal. The report also provided guidelines on access to adjacent developments on arterial and collector roads as well as a number of policies related to the road network, traffic controls, traffic operations, and development approvals process.

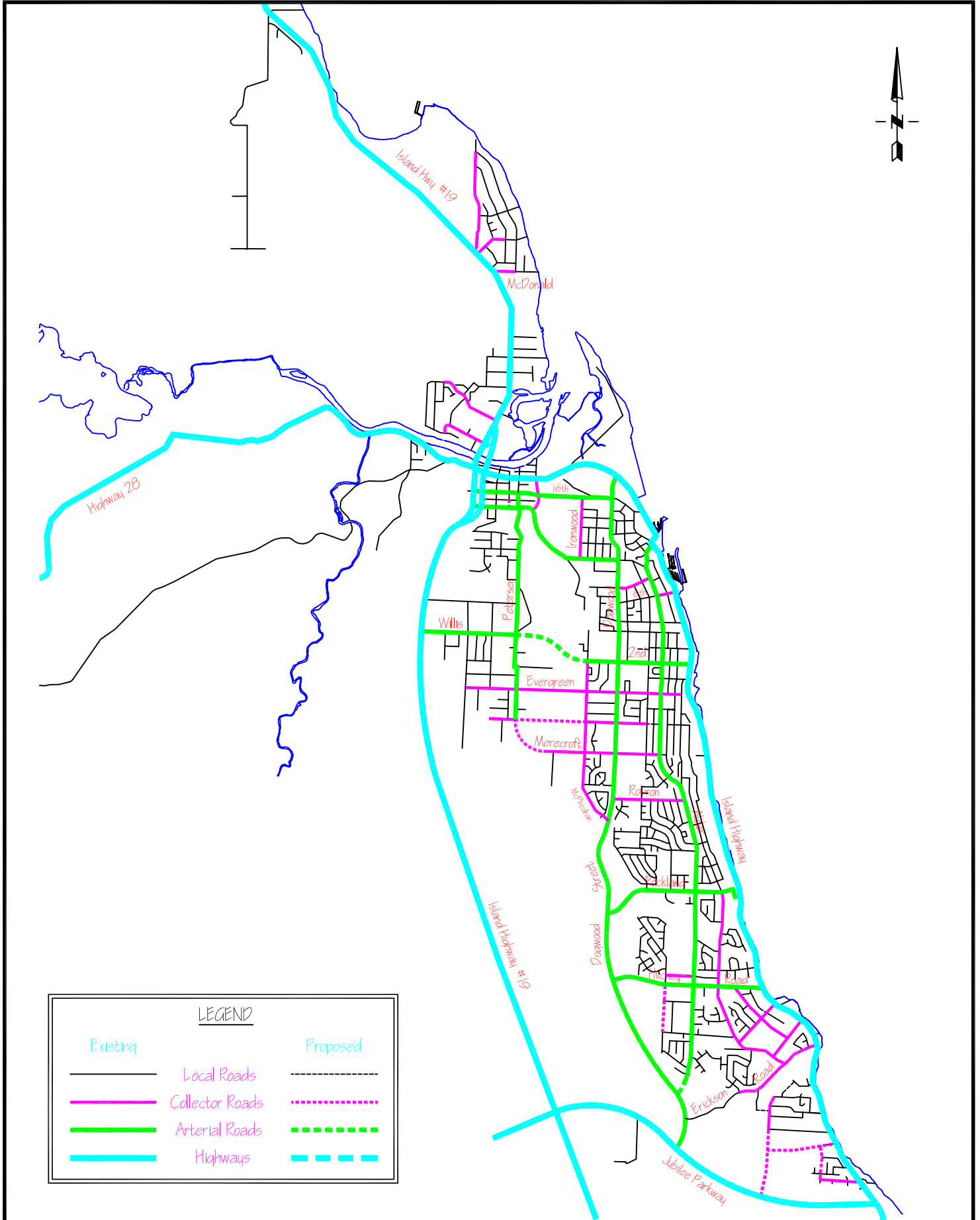
1.0 INTRODUCTION

1.1 Background To Study

The District of Campbell River, which currently has a population of approximately 30,000 people, is strategically located on Vancouver Island. At the present time there are three highway links and a ferry route from the Discovery Islands that provide access to and from Campbell River. The Ministry of Transportation recently completed the new four lane divided Inland Island Highway (Highway 19) that passes around the west side of the municipality and then rejoins the previously existing highway just before it crosses the Campbell River. Whilst this new highway carries much of the long haul of traffic on the island, the original two lane highway, which follows the coast and goes through the District's downtown, is still used, by tourist traffic as well as local residents. The District's current road classification plan depicting these highways as well as the key arterial and collector roads, both existing and proposed, is shown in **Exhibit 1.1**.

There has been a constant growth in population over the last few decades and this has placed a significant stress on the road network, especially on the few continuous roads that lead into and

EXISTING ROAD CLASSIFICATION



out of the downtown, in particular Dogwood Street, Alder Street, and the Island Highway (Highway 19A). The form of the municipality's road network has been influenced significantly by a number of factors including topography, Indian reserve boundaries, agriculture and forest reserve designation, and highway corridors. All of these play a significant role in selecting any new roads to augment the existing network. The existing collector and arterial roads in the municipality have evolved from local roads as the community grew. Whilst roads were reclassified, usually very few changes were made to the road design or accesses to adjacent properties.

The ongoing increase in volumes and congestion has resulted in a number of transportation issues being identified. The first is obviously that of congestion caused by increases in car ownership, recreational time, tourists and visitors, and spending powers. Congestion on the existing roads is compounded by poor road conditions, substandard geometrics, and poorly aligned intersections in some locations. This sometimes tends to divert traffic from one route to another which in turn can place an added stress on these roads and impact residential neighbourhoods.

Another issue is that of safety. As traffic has continued to increase on the historic roads, they have not seen an accompanying increase in traffic controls, intersection channelization, additional lanes, etc. to keep up with the increase in volumes. As a result, more and more safety problems have arisen. ICBC have recently identified the 15 most crash prone intersections around the municipality. The first four of these are all along Dogwood Street at 2nd Avenue, Merecroft Road, 9th Avenue, and Evergreen Road.

Along with the construction of the new Inland Island Highway, the Ministry provided a limited number of access points to the municipality. This has put pressure on the municipality to make some changes to the road network that in turn have had an impact on other roads. One of these in particular, Willis Road, has been considered for an extension from Petersen Road to connect up to 2nd Avenue in the vicinity of McPhedran Road to provide a new link in an east-west direction across the municipality.

The District initiated the preparation of a Master Transportation Plan in order to ensure that it establishes a network plan that provides safe efficient transportation that solves today's problems as well as meets the needs of anticipated growth into the future taking into account the often conflicting demands for smooth traffic flow as well as pedestrian access and safety. With the recommendations of the study in place, the District will then be able to work towards the ultimate plan knowing what road improvements should be constructed or upgraded, when and how. In addition, the development of presently vacant lands can be controlled in order to support the transportation plan rather than create new pressures elsewhere.

1.2 Project Objectives

The Request for Proposals states that the primary objective of the proposal request was to create a planning tool that will assist the District in identifying, prioritising, and implementing needed

improvements to its transportation network over the next 30 years. It is expected that the recommended master plan will then be used:

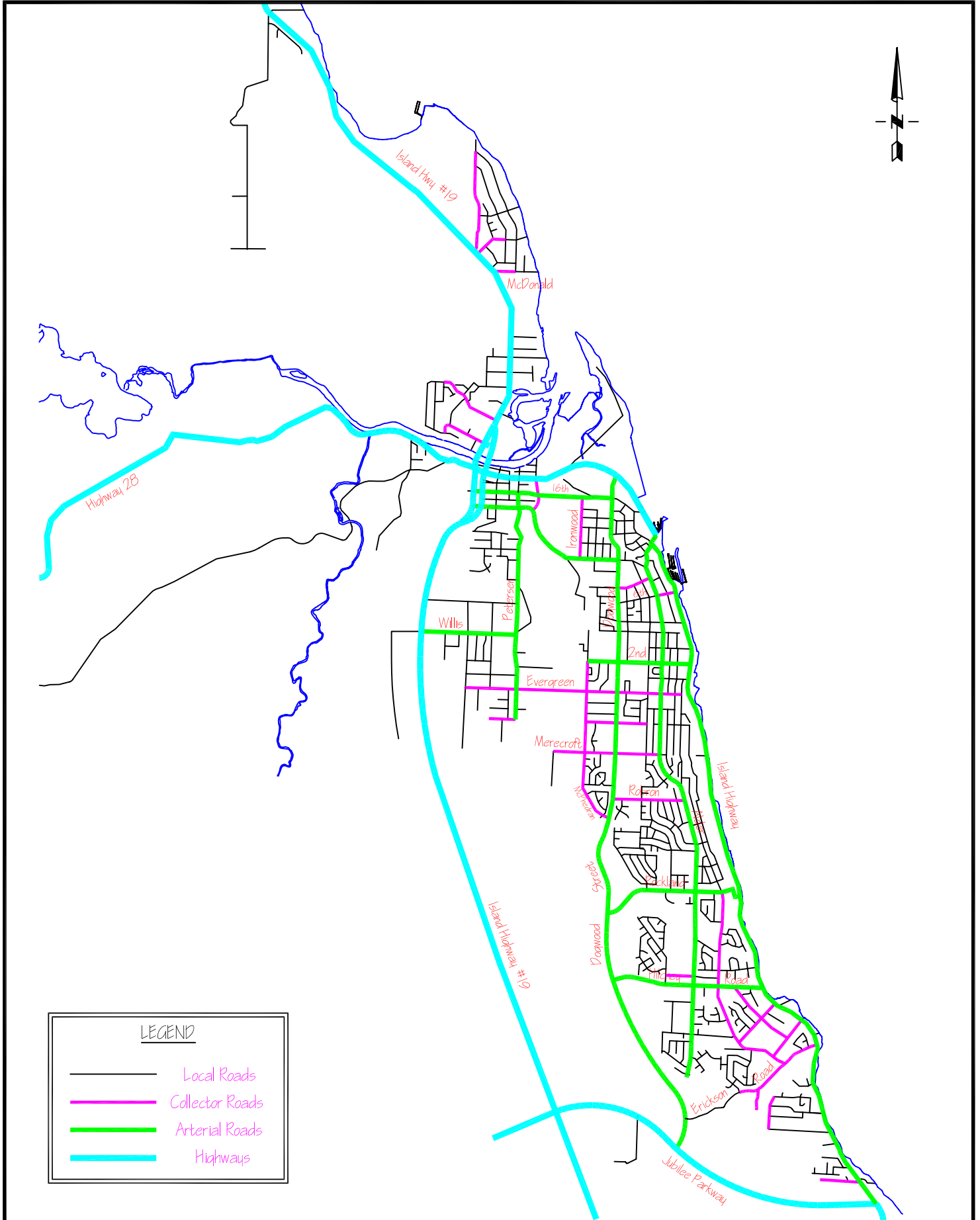
- to address current and short term deficiencies in the road network;
- as a basis for discussions with other agencies including the Ministry of Transportation over the funding of improvements;
- as input to capital planning and the calculation of Development Cost Charges; and
- to update the OCP to achieve the plan's goals.

2.0 EXISTING CONDITIONS

2.1 Road Network

The District has a well established road network as is illustrated in **Exhibit 2.1**. The key components of this are as follows:

- (a) Highways: As already stated, there are three highways as well as a ferry route to/from the Discovery Islands that provide access into and out of Campbell River. The highways are as follows:
- Inland Island Highway (Highway 19) which passes along the west side of the District of Campbell River and provides access from Nanaimo in the south and from Port Hardy in the north. From the south through to the south side of the Campbell River crossing, it is a four lane divided arterial with only two connections to the District of Campbell River south of Campbellton, these being the Jubilee Parkway and Willis Road. Through the Campbellton area it is a one-way couplet with two bridges across the Campbell River and then shortly north of this, it narrows down to a standard two lane highway.
 - The Island Highway, which was the primary route through the city until the Inland Island Highway was opened a few years ago, follows the coast for most of its length into the Downtown as a two lane highway with a rural cross-section, and left turn lanes at some intersections but not at others. This segment is now under the District's jurisdiction. It then bypasses the Downtown around its northeast side passing the ferry terminal and heads west to link back up to the Inland Island Highway just south of the river crossings. This segment is still a Ministry responsibility.
 - Highway 28 extends from the west end of the Island Highway west out to Gold River. It is also a standard two lane highway.
- (b) Arterial Roads : The city has a network of arterial roads, for which traffic movement of the longer length trips from one sector of the District to another is the major consideration. One of the key ones in the north-south direction is Dogwood Street which extends from the Jubilee Parkway at the south end of the District through to the Island



Highway in the north. It is a four lane arterial with no left turn lanes from 9th Avenue to Robron Road, a four lane undivided arterial with left turn lanes at intersections from south of Robron Road to the future Alder Street connection, and a four lane divided road with left turn lanes at intersections from this point south. Alder Street is the second longest arterial road, this one commencing at Nelson Road just north of the south end of Dogwood Street and running through well established residential neighbourhoods all the way to the Downtown. The third north-south arterial is Petersen Road which is a two lane road extending from the line of Pinecrest Road north to the Campbell River in Campbellton.

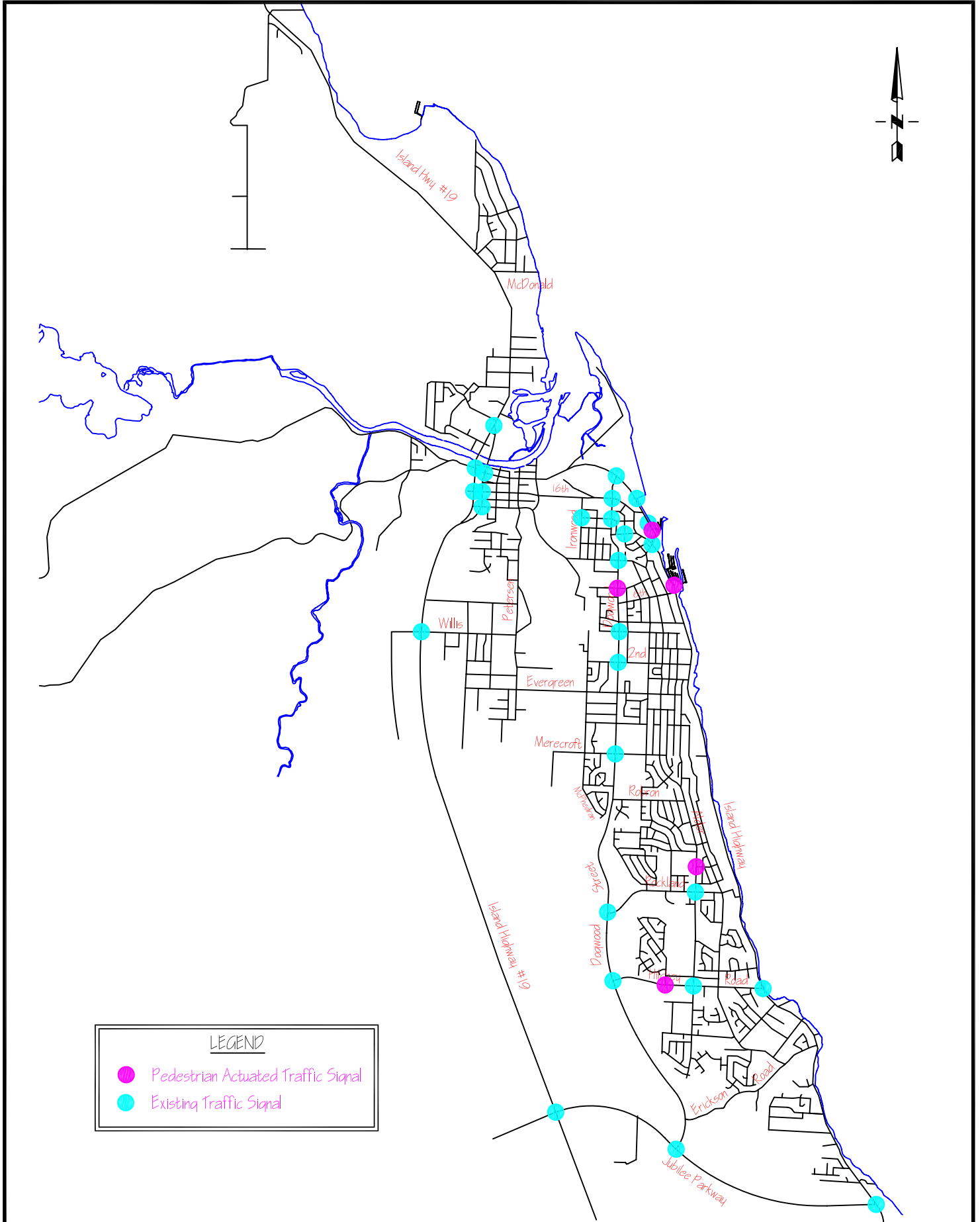
There are also six east-west arterial roads, all of which are of a similar length. The two at the south end, Hilchey Road and Rockland Road, connect Dogwood Street through to the Island Highway whilst the two at the north end, 16th Avenue and 14th Avenue/Homewood Road/9th Avenue, connect the Inland Island Highway to Dogwood Street. The other two in between are Willis Road and 2nd Avenue.

- (c) Collector Roads: The network also includes a number of collector roads whose function is to collect traffic from the local roads and provide a suitable route out to the arterials – traffic movement and land access are of equal importance for roads of this classification. A sampling of these are: Robron Road, McPhedran Road, Galerno Road, Evergreen Road, Ironwood Street, Maple Street, and Colorado Drive.
- (d) Future Network Roads: The current road classification plan, shown in Exhibit 1.1, indicates a number of future links that are intended to improve the connectivity of the existing network. These include:
- Willis Road/2nd Avenue connection extending from Petersen Road to McPhedran Road;
 - the southern extension of Alder Street completing its routing to Dogwood Street;
 - the connection of Mercroft Road and Petersen Road at the north end of the Beaver Lodge lands;
 - north extension of Penfield Road to Hilchey Road;
 - the extension of Willow Creek Road south from the Willow Point area to the Jubilee Parkway; and
 - a new collector road, Maryland Road, through the Maryland Estates residential development linking Willow Creek Road to the Island Highway.

2.2 Traffic Controls

There are some 26 signalized intersections within the District, 12 of which are on the Provincial highways and therefore under the Ministry's jurisdiction. A further eight are on Dogwood Street, two on Alder Street, and two on the Island Highway. The remaining two are in the Downtown area. The location of each of these is shown in **Exhibit 2.2**.

EXISTING TRAFFIC SIGNAL LOCATIONS



All unsignalized intersections intersecting arterial roads as well as a number of other intersections are under stop control; however many intersecting roads have no specific controls and vehicles must follow the standard practice of giving way to the right.

2.3 Traffic Volumes

Traffic volumes at a select number of intersections were established through turning movement counts undertaken as part of this study. Other count data was obtained from recent studies. The resultant 2003 afternoon peak hour traffic volumes (typically covering the 4:00 to 5:00 p.m. time period) are depicted in **Exhibit 2.3**. This indicates that the peak direction peak hour volume on Dogwood Street is of the order of almost 1,100 vehicles southbound between 9th Avenue and Merecroft Road. South of here it drops on a regular basis and is just above 200 approaching the Jubilee Parkway. Northbound volumes range from a low of 200 at the south end to almost 700 approaching 9th Avenue.

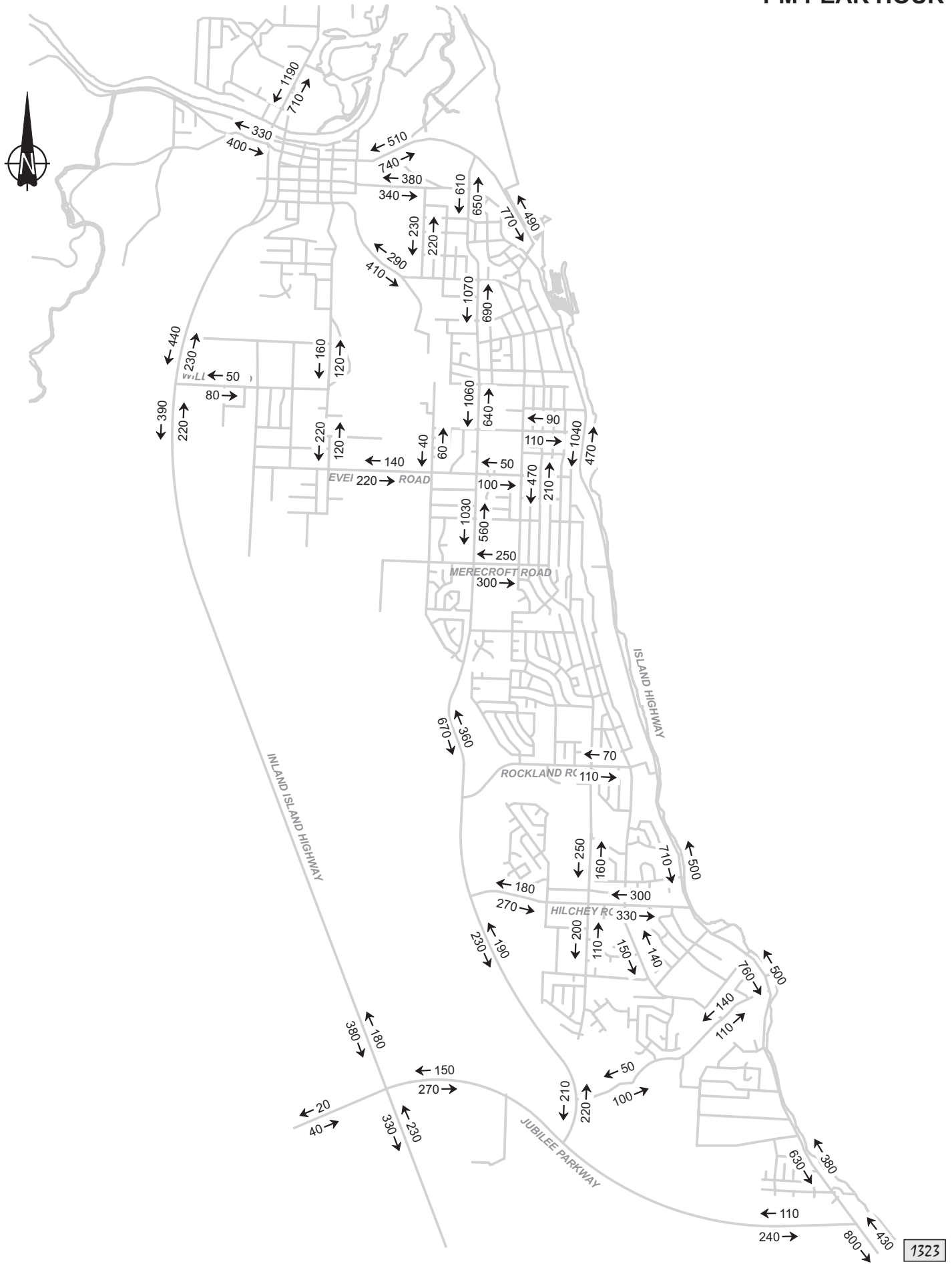
Volumes on all of the other District roads are significantly less. For example the maximum recorded on Alder Street is 470 southbound and 210 northbound in the vicinity of Evergreen Road. Other roads with volumes of this order of magnitude are Homewood Road/9th Avenue, the Inland Island Highway, and Highway 28. At the south end of Petersen Road it is 220 southbound and only 120 northbound, whilst on Willis Road approaching the Inland Island Highway it is even lower at 80 vehicles eastbound and 50 westbound.

Nearly all the recorded traffic volumes appear to be well within the capacity of the applicable roads, ignoring at this point the impact of intersections. The one exception to this is the Island Highway between the Downtown and Rockland Road where in excess of 1,000 vehicles are carried in a single lane on a road that has a capacity of 850 to 900, taking into account the direct accesses to adjacent properties along its length. This contrasts sharply with the new Inland Island Highway where there is a maximum of 440 vehicles in a peak hour in the two southbound lanes of this divided highway which has a capacity of approximately 1,600 vehicles per hour per lane. Based on this comparison, it would appear desirable to somehow encourage more of the longer distance traffic to divert to this new highway.

2.4 Intersection Performance

The level of service at the key intersections were analyzed using the *Highway Capacity Manual* methods. For signalized intersections, the operational analysis methodology gives three indicators for the overall performance of an intersection and for the individual turning movements. The first is the volume to capacity ratio (v/c) where the volume is the number of vehicles wishing to make a certain movement, and capacity is the maximum number of vehicles that can be accommodated in an hour. This takes into account the number of lanes available for the movement, whether the movement is protected or permitted, conflicting traffic, the cycle length, and the amount of green time the movement receives. The higher the v/c ratio, the more congested the intersection becomes. When the v/c ratio is greater than 1.00, this indicates that more vehicles wish to make a given movement than are able to, due to the limited capacity. The

**2003 TRAFFIC VOLUMES
- PM PEAK HOUR**



second measure, the average delay per vehicle, is based on the cycle length, the green time for each movement and the v/c ratios. The third measure is the level of service which is established from the average delay. The larger the average delay - and the higher the v/c ratio - the worse is the level of service. Table 2.1 shows the relationship between level of service, delay and v/c ratio.

Table 2.1
Volume/Capacity, Reserve Capacity vs. Level of Service

LoS	Signalized Intersection	Delays	Unsignalized Intersection
	Stopped Delay/Vehicle (s/veh)		Avg. Ttl Delay
A	≤ 10.0	Little or no delay	≤ 10
B	> 10.0 and ≤ 20.0	Short traffic delays	> 10 and ≤ 15
C	> 20.0 and ≤ 35.0	Average traffic delays	> 15 and ≤ 25
D	> 35.0 and ≤ 55.0	Long traffic delays	> 25 and ≤ 35
E	> 55.0 and ≤ 80.0	Very long traffic delays	> 35 and ≤ 50
F	> 80.0	Failure	> 50

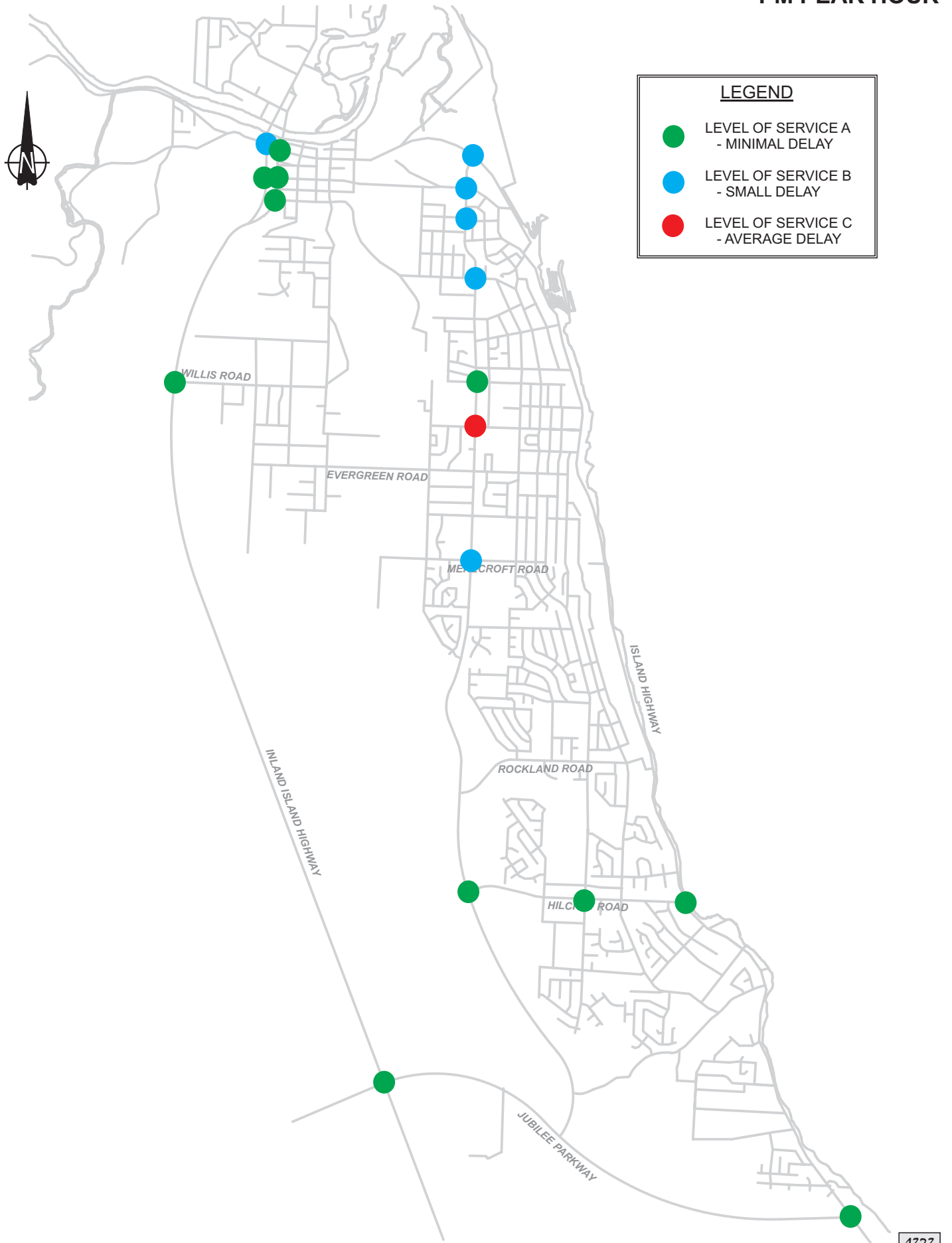
When analysing the performance of unsignalized intersections, the methodology for such intersections in the *Highway Capacity Manual* is used. The methodology estimates the capacity of each movement based on the conflicting pedestrian and traffic volumes. From the capacity, the actual volume is subtracted to arrive at the reserve capacity, which is the additional traffic volume increase which can be accommodated by each movement before the capacity is reached. An operational level of service is assigned to the movement based on the reserve capacity and the relationship between the two was included in Table 2.1.

While the overall level of service and delay for an unsignalized intersection provide a measure of overall performance, it is commonly turning movements at such intersections which are the primary focus of interest. With only low turning volumes to or from the minor road and high through volumes on the main road, delays to turning vehicles can become excessive. As delays increase, turning vehicles will attempt to turn across unacceptable gaps which can present safety concerns.

For a municipality the size of Campbell River, the performance of the intersections should be Level of Service C or better. This equates to a maximum stopped delay of 35 seconds per vehicle at signalized intersections and 25 seconds per vehicle at unsignalized intersections. All of the intersections for which turning movements were available were analysed for the p.m. peak hour and the results are illustrated in **Exhibit 2.4**. The only intersection operating at this Level of Service C is Dogwood Street/2nd Avenue. This intersection would require left turn lanes in order to improve its performance. All others analysed are Level of Service A or B which signify lesser delays than C.

Many intersections on Dogwood Street and the Island Highway have no left turn lanes thereby reducing the capacity of these arterial roads. The lack of such lanes also increases the likelihood of crashes.

LEVEL OF SERVICE - PM PEAK HOUR



2.5 Traffic Crashes

ICBC provided a summary of the crash statistics for all intersections within the District of Campbell River and highlighted the top 14 most crash prone intersections. The location of these is illustrated in **Exhibit 2.5**. It is noted from this that seven of the intersections along Dogwood Street are in the top 11 most crash prone intersections. The worst is at the signalized 2nd Avenue intersection with 194 crashes over a seven year period 1996 to 2002 – this intersection has almost twice as many crashes as any other intersection. Left turn lanes would no doubt improve this safety issue. The next two highest are also on Dogwood Street at Mercroft Road (101 crashes) and 9th Avenue (99 crashes), both of which are signalized, and again it is likely that left turn lanes would reduce these rates.

The next eight intersections are as follows – signalized unless noted otherwise:

Location	# Crashes
Dogwood St/Evergreen Rd - unsignalized	74
Campbell River Rd/Island Hwy/Willow St	73
Island Hwy/Shoppers Row/St Ann's Rd	66
0 Blk Island Hwy - unsignalized	64
7 th Ave/Dogwood St – pedestrian signal	57
Rockland Rd/S Alder St	50
Rockland Rd/S Dogwood St	40
4 th Ave/Dogwood St	40

The fact that all but three of the 14 intersections are signalized indicates that the lack of signals is not the predominant cause of crashes.

2.6 Transit

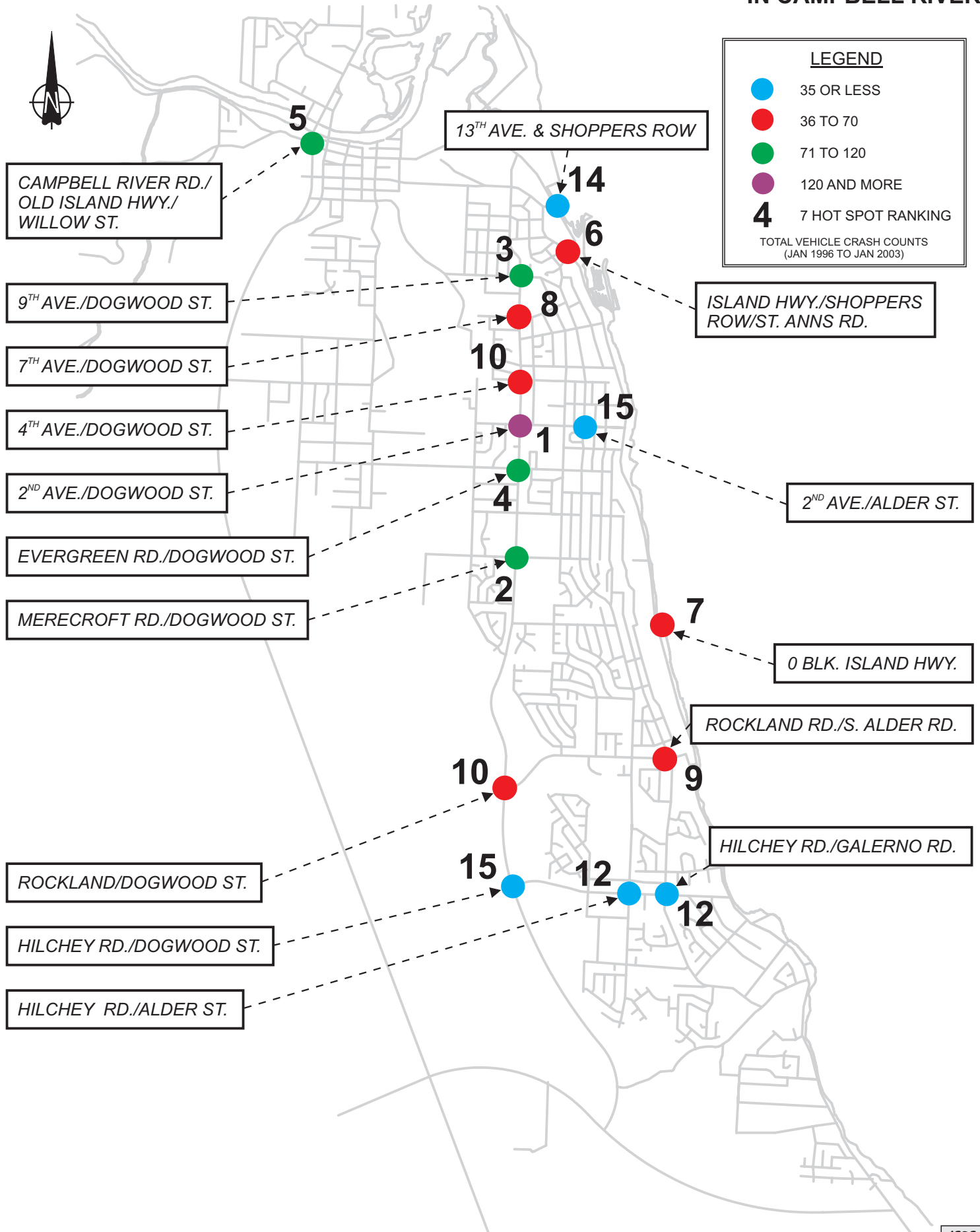
The District has a transit service that provides nine routes which cover the majority of the residential areas of the municipality as well as some south of the municipality. All but one of these are focused on the transit exchange located in the Tyee Plaza in the Downtown. For the majority of the routes, transit service is provided on an hourly basis between approximately 7:00 a.m. and 6:00 p.m. but there are numerous variations to this theme. The only major exception to this is *Route #15 – Homalco* which runs between North Island College and Homalco just three times a day.

2.7 Trucks

There are no designated truck routes in Campbell River and trucks can therefore use any roads, including local roads. This is seen as a problem that needs to be addressed. One complaint over truck traffic is the unnecessary use of McPhedran Road by trucks.

The traffic counts undertaken during the study did not reveal any truck volumes greater than eight in a peak hour other than on the two highways, Jubilee Parkway, Ironwood Road, and the

TOP 15 HIGH CRASH LOCATIONS IN CAMPBELL RIVER



roads leading to and from the Inland Island Highway south of the Campbell River. This means that trucks represent less than 2 to 4% of the volumes on the roads in the peak hours.

2.8 Bicycles

The District has established a network of bicycle routes, which are illustrated in **Exhibit 2.6**. Some of these routes are on existing roads where bicycles must share the pavement with vehicles while others are on paths or trails where they share the routes solely with pedestrians. A sampling of the roads designated as bicycle routes include the Inland Island Highway, the Island Highway between Jubilee Parkway and Evergreen Road, Dogwood Street between Jubilee Parkway and Robron Road, Alder Street between Dogwood Street and Mercroft Road, Erickson Road, Mercroft Road, 14th Avenue, and Maple Street.

2.9 Stakeholder Input

As part of the study, stakeholders and other interested parties were consulted to obtain their input on the existing conditions on the District's road network. These included School District #72, the RCMP, Campbell River Transit, BC Ferries, Ministry of Transportation, Rivercorp., and the Comox-Strathcona Regional District.

2.10 Public Input

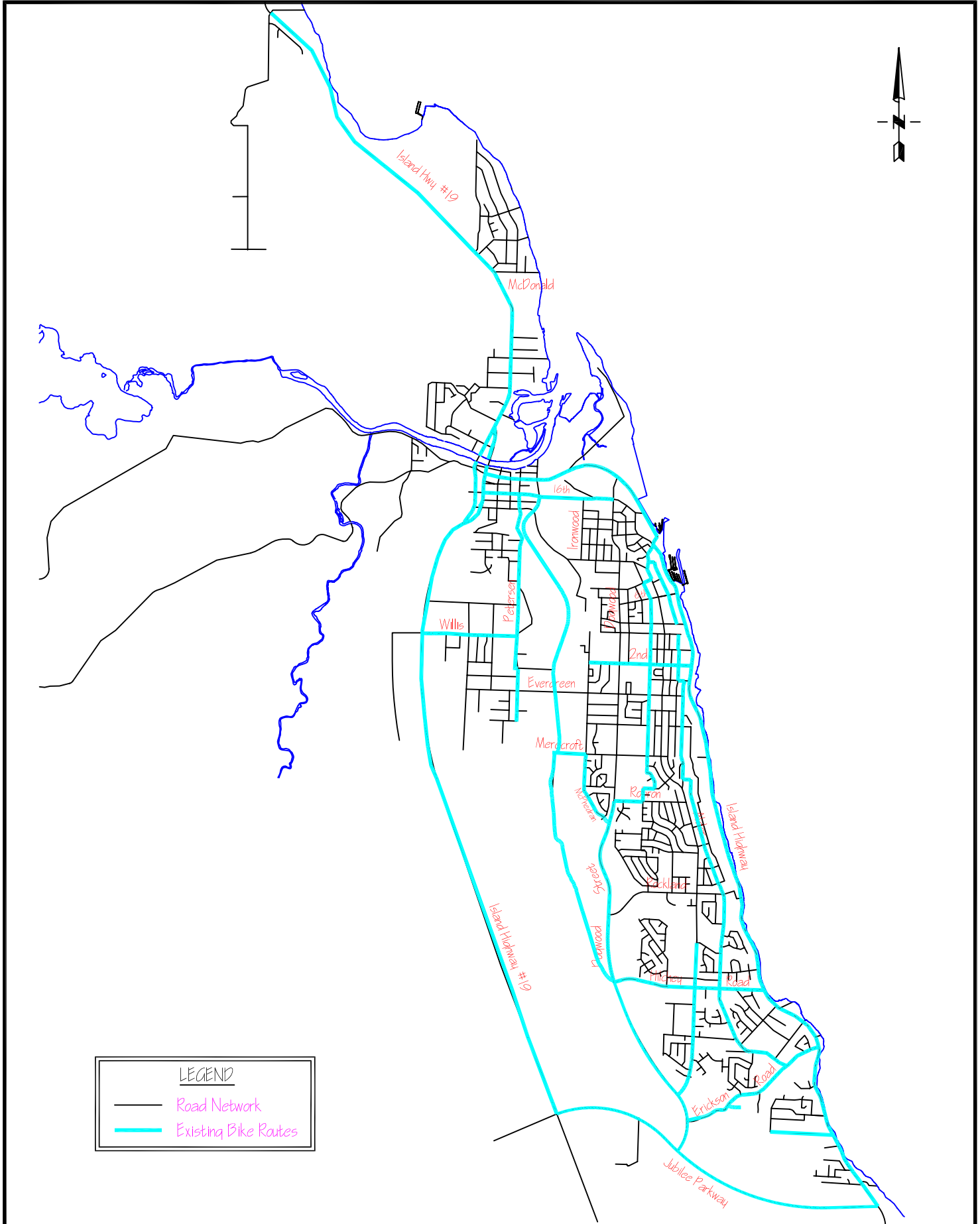
During the study, the public was given the opportunity to provide input on the District's road network through attendance at a public open house held November 23, 2003. Input was received through a question/answer period and completed questionnaires.

The District sent out letters to the major employees requesting input from employees and posted a similar survey on the web site for the general public in order to solicit travel characteristics information for use in calibrating the transportation model. The draft report was presented to Council and to a special meeting for the District's Committees and Commissions in order to receive comments on the recommendations presented in the draft report.

2.11 Issues

Based on the review of existing conditions as well as input received from District staff, stakeholders, and the public, the following is a summary of the issues and concerns with the District's existing road network:

- (a) Road Network: From a review of the District's road classification plan, the following shortcomings are noted:



- Alder Street does not connect to Dogwood Street at its south end, although this is shown on the District’s Road Classification Plan and it is understood that this will eventually occur;
 - there is a lack of an east-west connection from the residential area along the Alder Street corridor to the Island Highway between Rockland Road and 1 Avenue;
 - there is a lack of east-west connections between Petersen Road and Dogwood Street – Evergreen Avenue is the only such connection south of 9th Avenue;
 - Willis Road and 2nd Avenue are both designated as east-west collector roads in the District’s Road Classification Plan but there is at present no connection between them – from a network perspective this connector is highly desirable; and
 - Dogwood Street, Alder Street, and the Island Highway provide good north-south connections between the residential growth areas of Rockland and Willow Point and the Downtown area – however, there is no similar direct connection between these growth areas and the commercial/industrial area of Campbellton.
- (b) Traffic Volumes: The Island Highway between the Downtown and Rockland Road carries more traffic than should be carried on a single lane road – this makes it difficult for vehicles to turn onto and off of the road into the adjacent properties. Desirably more of this traffic, especially those travelling longer distances, should be diverted to the underutilized Inland Island Highway.
- (c) Intersection Performance: The key issues over intersection performance are:
- whilst all intersections operate at an acceptable level of service, the intersection of Dogwood Street/2nd Avenue is approaching the threshold of unacceptable;
 - many of the intersections on Dogwood Street and the Island Highway have no left turn lanes thereby reducing the capacity of these arterial roads and increasing the likelihood of crashes;
 - accesses to adjacent properties located close to signalized intersections; and
 - the lack of traffic signals at 9th Avenue/Ironwood Street causes significant delays to buses.
- (d) Safety: The three highest crash prone intersections are all on Dogwood Street, these being at 2nd Avenue, Mercroft Road, and 9th Avenue. Improvements are required in order to reduce the crash rates at these locations as a minimum. Other safety concerns include:
- inconsistent signal head placement at the 2nd Avenue and 4th Avenue signalized intersections on Dogwood Street; and

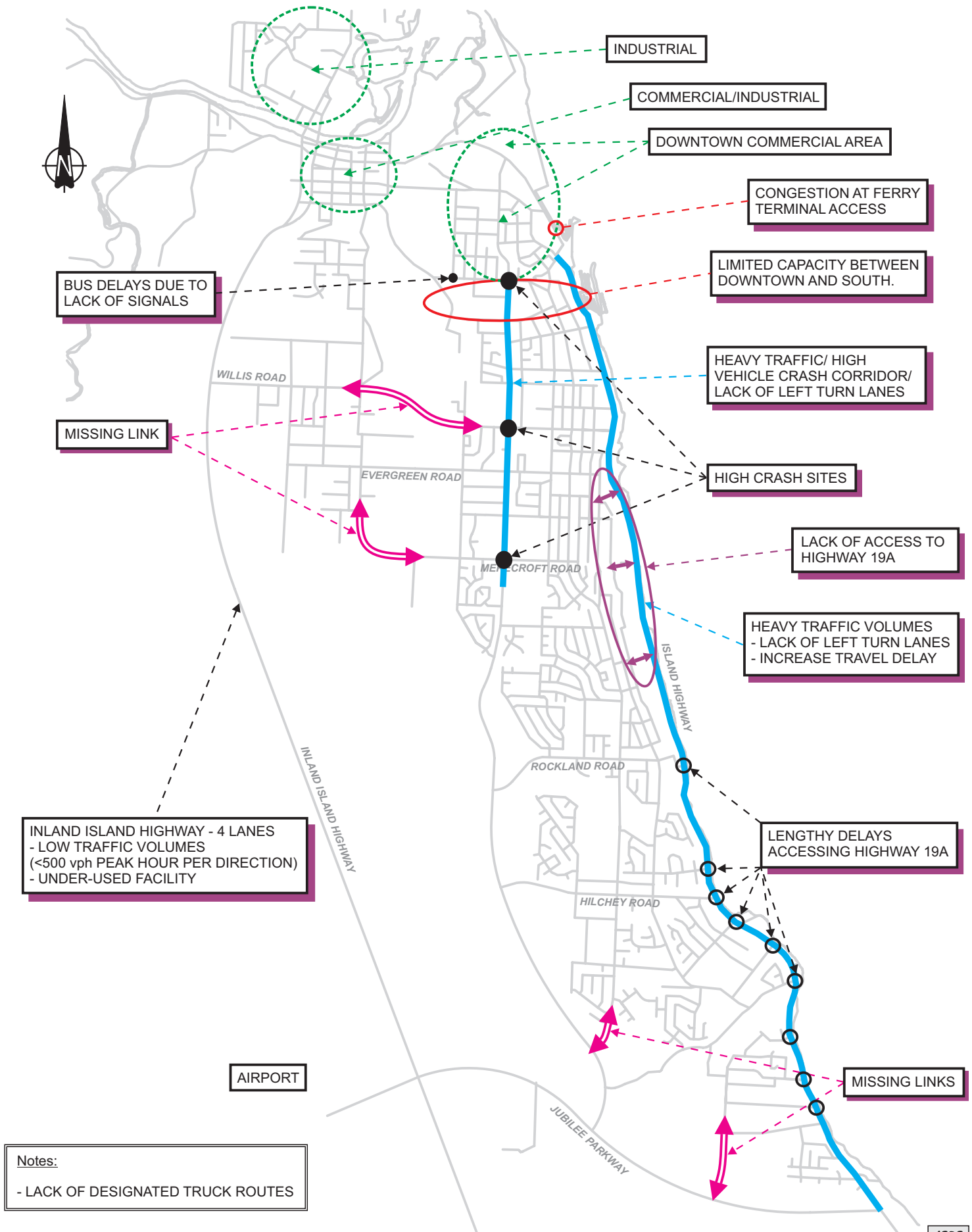
- limited visibility or inadequate sight distance at the 9th Avenue, 7th Avenue, Evergreen Road, and Mercroft Road intersections along Dogwood Street.
- (e) Trucks: Selected roads should be designated as truck routes in order to reduce the intrusion of trucks through residential neighbourhoods.
- (f) Other Concerns: Other additional concerns raised by stakeholders and the public are as follows:
- stop sign controls are inconsistent;
 - more pedestrian crosswalks are needed on the Island Highway;
 - trucks should be removed off the Island Highway;
 - traffic volumes on Dogwood Street north of Mercroft Road are too heavy;
 - access to the Island Highway from roads in the Willow Point area is difficult because of the constant stream of traffic in both directions on the highway resulting from the lack of traffic signals;
 - there is a need for more east-west connectors, including the extension of Rockland Road or Hilchey Road connection through to the Inland Island Highway;
 - vehicles arriving from the Inland Island Highway to the west and queuing to enter the Ferry Terminal parking area cause congestion to southbound through traffic on Discovery Crescent;
 - any three laning of Dogwood Street could result in significant conflict between vehicles and buses at bus stops unless pull-outs are provided and also between vehicles and garbage trucks; and
 - improved signing to key destination points within the District is required both on the approaches to Campbell River and within the municipality.

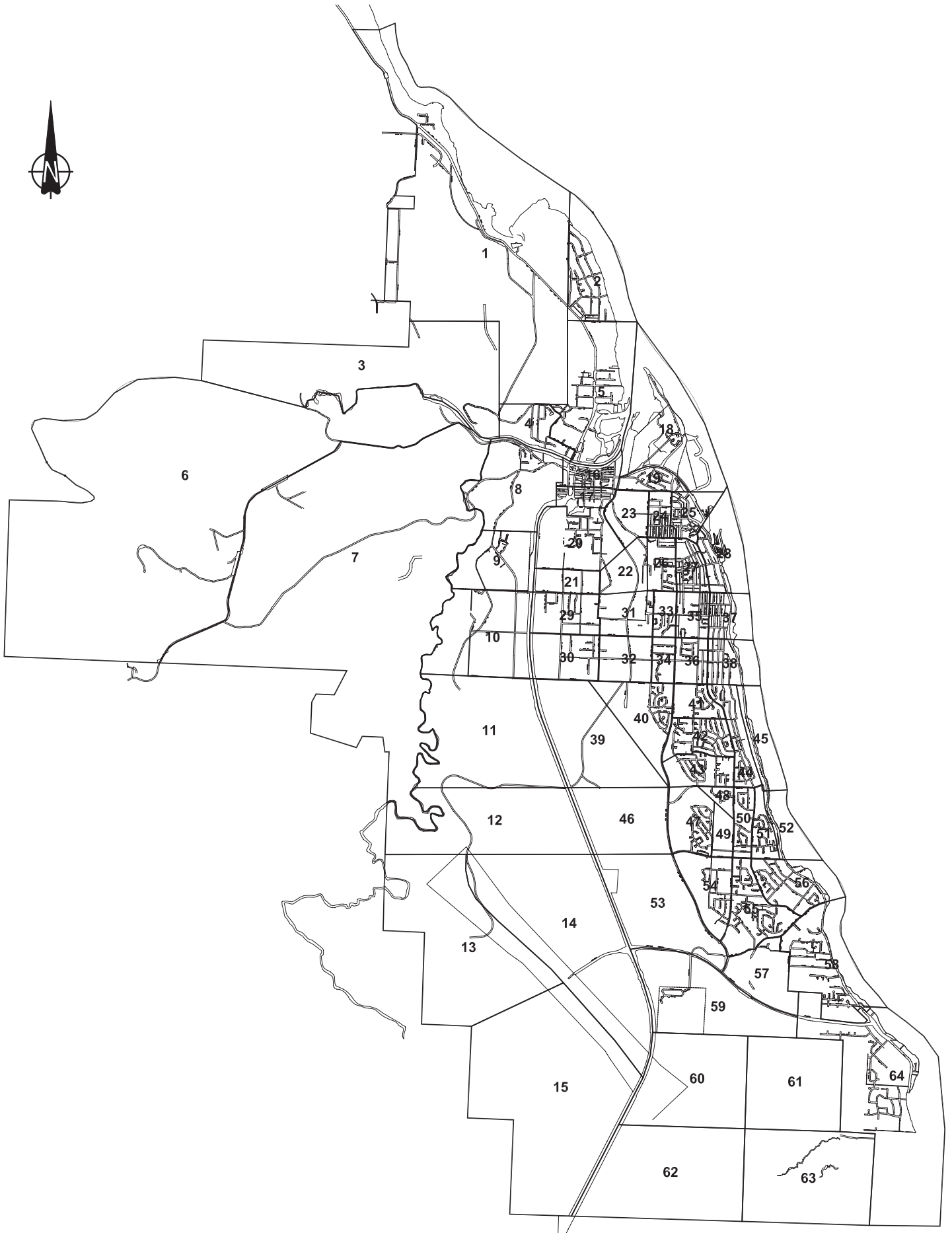
The key issues noted above are illustrated in **Exhibit 2.7**.

3.0 TRANSPORTATION MODEL

3.1 Model Development

The TMODEL2 software was used to develop a transportation planning model for use in projecting future traffic volumes on alternative road networks. Whilst a similar model was developed by Ward Consulting Group in 1993, the new model is effectively a complete revamp. The District was firstly subdivided into 64 zones, an increase of 16 over the number of zones in the earlier model. The zone structure for the new model is provided in **Exhibit 3.1**. For each zone, population and employment statistics were established, initially for the calibration year of 2001. All of the key roads in the District were then input to the model with each road represented in terms of its classification, length, speed, number of lanes, and intersection controls – this includes all arterials and collector as well as some of the local roads of significance. For each zone, the location of a suitable centroid was identified and this centroid then connected to the model's road network at up to four strategically selected locations.





Transportation planning models typically follow a four step process to establish the trips internal to the study area. They are:

- (a) Step 1: Trip Generation/Attraction – In this step, the model calculates the number of trips expected to be generated and attracted by each zone, based on the population in each zone and the type and amount of employment, and trip generation equations established for the model and relevant to the study area.
- (b) Step 2: Trip Distribution – The trips generated by each zone are then matched to the trips attracted in other zones following the gravity model principal which takes into account the size of all other zones and the time of travel between the zones. The model firstly calculates the travel time between all zone pairs assuming free flow speeds, i.e., no hindrance resulting from other traffic on the roads, and then uses this in distributing the trips to other zones. Through this process a matrix of trips between each zone and all other zones is established and this is referred to the “trip table”.
- (c) Step 3: Modal Split – In some models, the travel time between all zone pairs is calculated for both road and transit and then an estimate made of the split of trips between these two modes based on the difference in travel times. The Campbell River model does not include the modal split capability.
- (d) Step 4: Trip Assignment – The auto trips between each zone are then assigned to the road network in an incremental manner. The model first uses the paths determined in Step 2 as being the minimum paths to assign a certain percentage of the trips. Once these trips are placed on the road network, the model recalculates the minimum travel paths since typically as traffic volumes increase on a road, the speed decreases. These paths are then used as the basis for assigning the next increment of trips. This process is then continued until all trips in the “trip table” are assigned to the road network. The model’s network then has the resultant total traffic volumes on each link, including turning movements at its intersections.

The model also included an external trip table. This table is typically outside of the four steps outlined above and is established based on available information. These trips, external-to-external, i.e., through trips, as well as external-to-internal and internal-to-external, are superimposed onto the internal trip table determined through the trip distribution process of Step 2 and are therefore included in the trip assignment process.

3.2 2001 Population and Employment

The estimated population and employment in each of the 64 zones at the calibration year of 2001 were prepared based on available data such as the 2001 Canada Census results. For employment, this was split between retail employment, general employment, and shift employment. The resultant estimates are provided in Table 3.1

**Table 3.1
2001/2023 Population and Employment**

Zone	2001					2023				
	Pop	Ret. Emp	Gen. Emp	Shift Emp	Total Emp	Pop	Ret. Emp	Gen. Emp	Shift Emp	Total Emp
1	225	0	750	500	1250	300	0	1000	650	1650
2	574	10	124	0	134	650	10	124	0	134
3	0	0	0	0	0	0	0	0	0	0
4	604	0	0	0	0	604	20	0	0	20
5	743	188	691	0	879	850	200	779	0	979
6	155	0	128	0	128	200	0	128	0	128
7	70	0	0	0	0	100	0	20	0	20
8	357	10	124	0	134	450	10	130	0	140
9	212	10	124	0	134	400	360	174	0	534
10	0	0	0	0	0	0	50	200	0	250
11	0	0	0	0	0	0	25	125	0	150
12	0	0	0	0	0	0	20	123	0	143
13	0	0	0	0	0	0	0	0	0	0
14	0	50	0	0	50	0	100	200	150	450
15	0	0	0	0	0	0	0	0	0	0
16	278	200	500	0	700	300	250	650	0	900
17	172	150	400	0	550	200	200	500	0	700
18	23	850	750	0	1600	150	875	975	0	1850
19	261	100	300	0	400	251	125	475	0	600
20	704	10	124	0	134	950	20	130	0	150
21	68	0	0	0	0	120	10	10	0	20
22	83	0	0	0	0	180	10	10	0	20
23	156	150	400	0	550	210	200	400	0	600
24	454	100	500	0	600	554	400	500	0	900
25	276	1066	1441	0	2507	536	1150	1650	0	2800
26	853	10	124	0	134	1000	20	164	0	184
27	1015	10	124	0	134	1300	20	164	0	184
28	515	80	250	0	330	700	100	300	0	400
29	329	0	0	0	0	500	10	10	0	20
30	123	0	0	0	0	220	0	0	0	0
31	279	0	0	0	0	400	5	0	0	5
32	92	10	124	0	134	200	10	124	0	134
33	422	10	124	0	134	500	10	124	0	134
34	508	0	70	0	70	570	0	70	0	70
35	899	10	320	80	410	950	50	480	80	610
36	875	10	350	0	360	900	10	350	0	360
37	579	24	230	0	254	600	50	304	0	354
38	746	12	140	0	152	760	30	197	0	227
39	0	0	0	0	0	0	0	0	0	0
40	945	0	0	0	0	1155.4	10	15	0	25
41	1096	150	191	0	341	1150	150	191	0	341
42	1583	10	124	0	134	1750	10	124	0	134
43	1403	10	124	0	134	1500	10	124	0	134
44	1308	0	0	0	0	1350	0	0	0	0
45	446	60	0	0	60	650	80	80	0	160
46	0	0	0	0	0	0	0	0	0	0
47	1091	0	0	0	0	1091	20	80	0	100
48	499	0	0	0	0	550	0	0	0	0
49	72	20	124	0	144	100	20	124	0	144
50	813	0	0	0	0	820	0	0	0	0
51	695	0	100	0	100	710	0	100	0	100
52	137	30	0	0	30	200	50	30	0	80
53	100	0	0	0	0	2400	75	430	0	505

Zone	2001					2023				
	Pop	Ret. Emp	Gen. Emp	Shift Emp	Total Emp	Pop	Ret. Emp	Gen. Emp	Shift Emp	Total Emp
54	651	10	124	0	134	4001	80	470	0	550
55	1997	10	124	0	134	2747	15	205	0	220
56	1750	90	230	0	320	2300	330	370	0	700
57	465	0	0	0	0	1500	10	140	0	150
58	1071	70	149	0	219	2500	50	350	0	400
59	0	0	0	0	0	1354	10	171	0	181
60	0	0	0	0	0	0	0	0	0	0
61	180	0	0	0	0	200	0	0	0	0
62	0	0	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0
64	2249	0	40	0	40	2600	0	60	0	60
Total	31201	3530	9542	580	13652	46233	5270	13654	880	19804

3.3 Model Calibration

The model was then calibrated based on 2001 conditions. The 2001 estimates of population and employment for each of the model's traffic zones were input to the model and the model run to produce estimated 2001 volumes. Screenline lines were established and the model's projected 2001 volumes across each screenline were then compared with field counts. The model's various coefficients for trip generation and trip distribution were then modified and refined until such time as the model's projected volumes were considered to be acceptable when compared to the field counts.

The second step in the calibration process was to compare volumes on some of the key links. Adjustments were then made to the assumed travel speeds in order to ensure that the volumes assigned to specific links more closely resembled the assignment results of the field surveys on a link by link basis across the screenlines.

The Transportation Research Board (TRB) publication *NCHRP 255 – Highway Traffic Data for Urbanized Area Project Planning and Design* provides a guide as to the closeness of fit between a model's calibration year projections and field counts considered acceptable – this closeness of fit is a function of the magnitude of the volumes across the screenline. This is effectively the “yard stick” used to determine whether or not a model has been adequately calibrated. For the screenlines selected for the Campbell River model, the two-way allowable deviation was in the range of 32% to 49%. The screenline calibrations for the Campbell River model were all within the range 1% to 11% of the observed volumes which is less than one quarter of the limits allowed as given by the TRB publication.

3.4 Population and Employment Growth

District staff prepared estimates of population and employment to the 2023 horizon year on the same zone basis as was established for 2001 for use in calibration of the model. This data, which is included in Table 3.1, indicated that the population of the District is expected to increase from 31,200 in 2001 to 43,290 in 2023, whilst the employment will increase at a similar rate from

13,650 in 2001 to 18,940 in 2023. The distribution of these population and employment estimates by sector around the municipality is illustrated in **Exhibit 3.2**.

3.5 Future Traffic on Existing Network

Prior to identifying potential network improvement options, the projected 2023 population and employment estimates were input to the model. The model was run for this 2023 time horizon and the projected traffic assigned to the existing road network, i.e., without any improvements. This determined that the Island Highway, Alder Street, Homewood Street/9th Avenue, Dogwood Street, and Erickson Road would be operating over their practical capacity. A selection of the roads together with the projected volumes and the model’s assumed capacities are given in Table 3.2.

Table 3.2
Projected 2023 Volumes on Existing Road Network

Road Link	Projected Volume	Capacity
Island Highway	1080	850
Alder Street	560	500
Homewood Street/9 th Avenue	550	500
Dogwood Street	1630	1500
Erickson Road	560	500

This indicates a need to provide additional capacity in the north-south direction in order to accommodate the increased traffic resulting from growth in the municipality

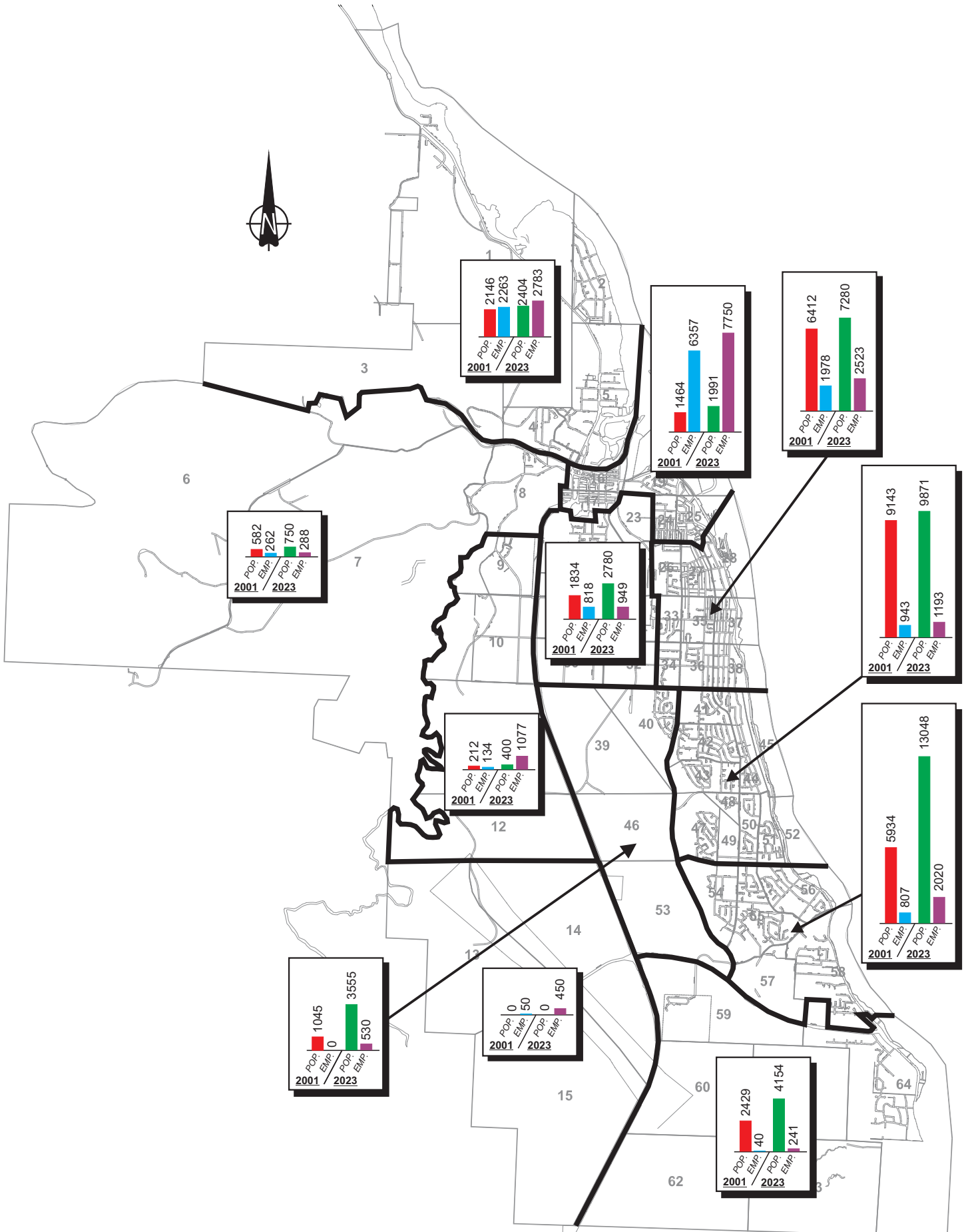
3.6 Future Use of the Model

With the model satisfactorily calibrated, it can be used to examine traffic related issues throughout the municipality. Whilst the land use data prepared for this study was at the 2023 horizon year, any horizon year can be selected. Either the land use data can be interpolated between 2003 and 2023, as was done for the 2011 time horizon in this study, or a new set of data prepared by the District for a specific horizon year. The disadvantage of interpolating is that it assumes growth occurs proportionately in all zones over the time period 2003 to 2023 and does not take into account the fact that some areas in the municipality may see a predominate share of the growth for the first few years and other areas have the growth in later years. However, the advantage is that it is simple to produce whereas preparing a new set of data for a given year for all 64 zones can take a significant amount of time and effort.

For whatever time horizon is selected, the road network needs to be modified to reflect the base conditions, i.e., any network improvements that should be assumed to be in place at that horizon year should be added in.

The model can then be used to evaluate numerous different network, land use, or development scenarios for the specified horizon year. These could include the following:

EXISTING AND FUTURE LAND USE



- (a) Network Changes: The model can be used to estimate future traffic volumes that result from changes to the road network and that need to be accommodated or to compare the implications of alternative network improvement proposals. These changes can include:
- upgrading existing roads from two to four lanes;
 - adding in left turn lanes;
 - adding in new road network links;
 - modifying existing road network links to reflect realignment, e.g., similar to the potential realignment of Petersen Road from its existing intersection with 14th Avenue to Maple Street/Homewood Street.
- (b) Changes in Land Use: It can also be used for determining the traffic implications of opening up development in a new area within the municipality or comparing the implication of developing one area or another. The model would produce the projected volumes on the road network resulting from increased residents or employment in the area.
- (c) Use With Specific Development Projects: The model can be used to determine the distribution of trips generated by a new development and this distribution then used to assign the trips estimated for the development based on the standard Institute of Transportation Engineers (ITE) or Ministry of Transportation (MoT) *Trip Generation Rates Manual* either by hand or by using an alternative model to the road network. The site generated traffic would then be superimposed on background volumes which could also be obtained from the model.

The transportation planning model should not however be used to determine the impact of individual developments, especially when there is the potential of the development having to contribute to the improvement of off-site road network facilities. A transportation planning model is a very dynamic tool and if a new development in a specific location is added, the trips generated by the development will tend to push existing traffic volumes on roads immediately adjacent to the development site over onto other parallel routes, thereby minimizing the potential impact of the development under review. At the same time, volumes on other routes will be increased and because these are further away, they have the potential to not be considered part of the development's responsibility.

4.0 ANALYSIS OF NETWORK IMPROVEMENT OPTIONS

4.1 Goals and Objectives

In conjunction with the preparation of the network plan, District and consultant staff prepared a set of proposed goals and objectives for the road network. A summary of this is as follows:

- (a) Objective: The road network provides the backbone of the Campbell River transportation system and will continue to account for at least 80% of future travel in the District, particularly outside the peak commuter hours. The objective of the plan is to maintain an efficient road network which will facilitate the movement of people and goods in, out and around the District, which is key to maintaining a healthy economy for the region.
- (b) Goals: The goals of the road network component of the plan are:
- To provide a hierarchical road network that reflects the volume and composition of traffic on each link.
 - To designate selected major roads as truck routes.
 - To ensure that the road network accommodates a range of transportation modes.
 - To maximize the efficiency of the existing road network through integrating land use and new developments with transportation planning.
 - To minimize the requirements for new road infrastructure.
 - To minimize the environmental impact of any new transportation facilities.
 - To maintain safe and efficient access for trucks travelling to/from and within the District.
 - To provide attractive access to and from the Inland Island Highway (IIH) for residents, employees and tourists.
 - To enhance access to the Campbell River Airport and support its development as a regional air terminus.
 - To cooperate with other transportation agencies to minimize duplication of transportation infrastructure and maximize network consistency.

4.2 Identification of Options

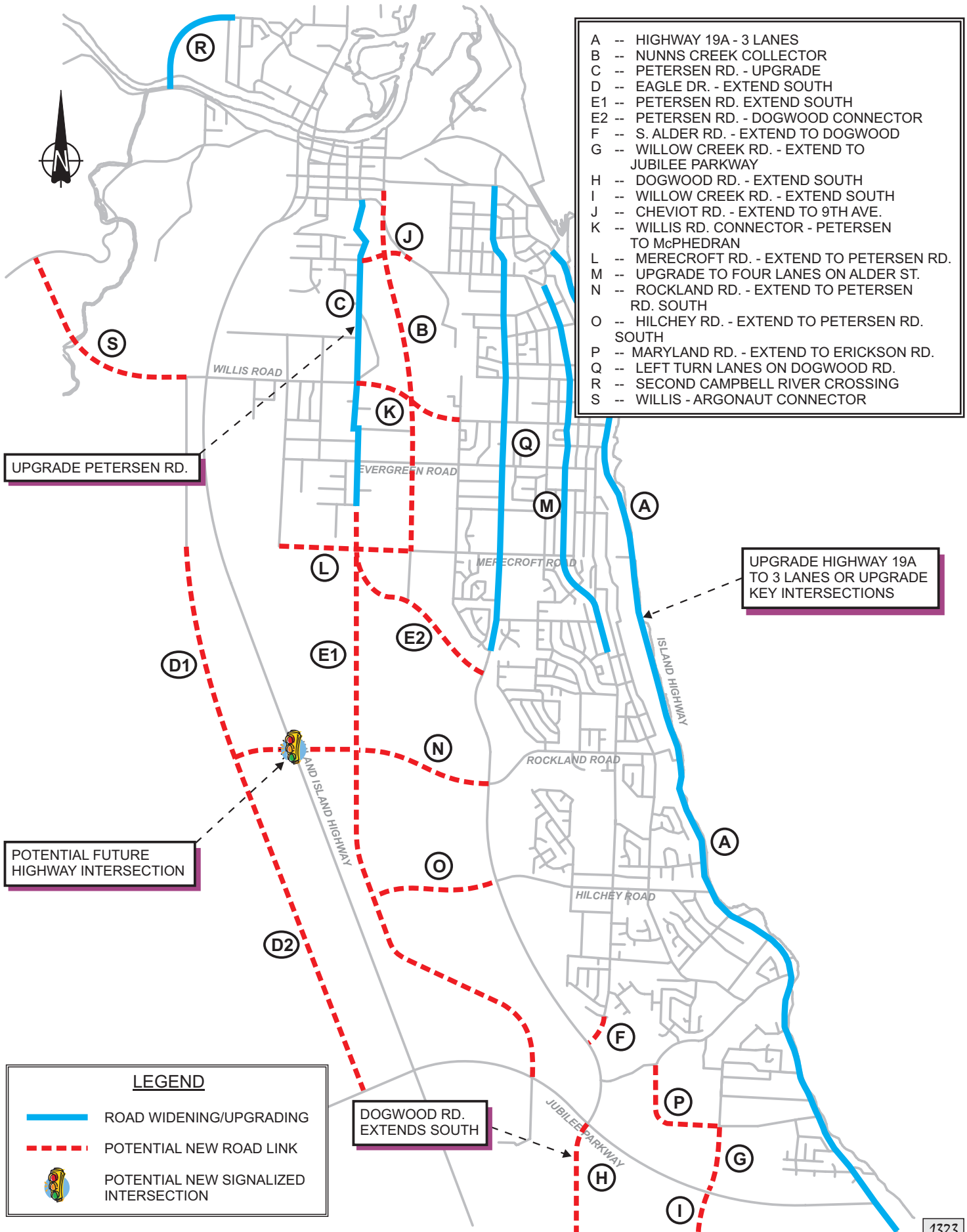
In establishing the options for improvements to the road network to be considered in this study, a number of sources were used. These included:

- the District's current road classification plan;
- previous network plans including the Ministry of Transportation's Major Street Network;
- resultant volumes on the existing network using preliminary 2023 land use data;
- reports from previous road network studies;
- discussions with stakeholder staff; and
- the stated goals and objectives of the District's road network.

Each option identified for consideration in the study is illustrated in **Exhibit 4.1**. It should be noted that the location of the options shown are very conceptual – no account has been taken of property availability and impacts, environmental issues, etc. A discussion on each option is given below. Whilst this list is extensive, they are only the options that were considered. It is acknowledged that some are unacceptable for various reasons and progressed no further than this identification stage. They are however included for the sake of completeness.

NETWORK IMPROVEMENT OPTIONS

- A -- HIGHWAY 19A - 3 LANES
- B -- NUNNS CREEK COLLECTOR
- C -- PETERSEN RD. - UPGRADE
- D -- EAGLE DR. - EXTEND SOUTH
- E1 -- PETERSEN RD. EXTEND SOUTH
- E2 -- PETERSEN RD. - DOGWOOD CONNECTOR
- F -- S. ALDER RD. - EXTEND TO DOGWOOD
- G -- WILLOW CREEK RD. - EXTEND TO JUBILEE PARKWAY
- H -- DOGWOOD RD. - EXTEND SOUTH
- I -- WILLOW CREEK RD. - EXTEND SOUTH
- J -- CHEVIOT RD. - EXTEND TO 9TH AVE.
- K -- WILLIS RD. CONNECTOR - PETERSEN TO McPHEDRAN
- L -- MERECROFT RD. - EXTEND TO PETERSEN RD.
- M -- UPGRADE TO FOUR LANES ON ALDER ST.
- N -- ROCKLAND RD. - EXTEND TO PETERSEN RD. SOUTH
- O -- HILCHEY RD. - EXTEND TO PETERSEN RD. SOUTH
- P -- MARYLAND RD. - EXTEND TO ERICKSON RD.
- Q -- LEFT TURN LANES ON DOGWOOD RD.
- R -- SECOND CAMPBELL RIVER CROSSING
- S -- WILLIS - ARGONAUT CONNECTOR



LEGEND

- ROAD WIDENING/UPGRADING
- - - POTENTIAL NEW ROAD LINK
- POTENTIAL NEW SIGNALIZED INTERSECTION

- (a) Upgrade Highway 19A – This road shown as ‘A’ in the exhibit is presently two lanes for most of its length with left turn lanes being provided at selected intersections. It currently carries more traffic than a two lane arterial road with accesses to adjacent properties should handle. Two proposals were considered. The first (A1) is to upgrade this highway to three lanes with the third lane being a centre lane to accommodate left turn movements at intersections and into adjacent properties. A three lane facility should be able to be accommodated within the existing right-of-way for the full length.

The second (A2) is to keep it as a two lane road preserving its historic character, and provide roundabouts at all or at least strategic intersections. A raised centre median would restrict all movements to adjacent properties to right-in/right-out movements only. Vehicles travelling to and from these properties would then have to use the roundabouts to reverse direction if wishing to make a left turn into or out of the site.

Highway 19A is considered to be the scenic route through Campbell River and will continue to attract tourists. In addition, it is used by local residents, particularly those with residences or businesses along its length. It is important to continue to provide access to and from these properties but at the same time eliminating the potential for crashes and unnecessary delays to through traffic caused by vehicles turning left onto or off of the highway. The advantage of such an upgrading is therefore two fold: to increase the capacity and to improve safety.

- (b) Nunns Creek Collector – This has been proposed in conjunction with the opening up of development along the corridor between Petersen Road and Homewood Road/Catkin Road. The advantages of such a road would be that the upgrading of the more difficult segments of Petersen Road may be able to be avoided and also that it would provide good accessibility to the lands along this corridor as they are developed.
- (c) Upgrade Petersen Road – This is presently a two lane road connecting the commercial area east of Campbellton to the developing areas to the south. It is the only continuous north-south road between Dogwood Street and the Inland Island Highway. It requires upgrading, as a minimum with the addition of left turn lanes at selected intersections. It could also be extended south as far as the line of Mercroft Road with Mercroft Road extended west to this point. These two links would then provide another connection between the potential residential area at the south end of Petersen Road and Dogwood Street and Alder Street to the east. Another option being considered by the District is to realign the north end to intersect Homewood Road opposite Maple Street.
- (d) Eagle Drive Extension – This existing road on the west side of the highway accessed via the Willis Road intersection is shown as being extended south with two sub-options. The first (D1) in Exhibit 4.1 is to connect to a potential new intersection on the Inland Island Highway – this could be at the intersection of a potential Rockland Road or Hilchey Road extension. The second (D2) is to continue south all the way to the Jubilee Parkway connection to the airport.

The primary purpose with this extension is to provide good access to an area that has been identified for potential future industrial/commercial development on the west side of the highway.

It is understood that the District and Ministry of Transportation have an agreement whereby there are to be no new connections to the Inland Island Highway. However, with the potential growth of Campbell River in the area between Willis Road and the Jubilee Parkway, a new connection to the highway from the east side may be desirable. Therefore the connection into the potential commercial/industrial lands on the west side of the highway at this point would seem appropriate.

- (e) Petersen Road Extension – The first sub-option (E1) in Exhibit 4.1 is to extend Petersen Road south of Merecroft Road all the way to the Jubilee Parkway. The primary purpose of this extension would be to provide an arterial road servicing the future lands especially south of the Beaver Lodge Lands, and to provide another parallel route to Dogwood Street and Alder Street. It is acknowledged that this will pass through the Beaver Lodge lands and this will likely be impossible to achieve. If it is to be pursued, the impact could possibly be minimized by making use of the Elk River Timber Road and/or skirting the lands along the west side adjacent to the highway.

A second sub-option of this Petersen Road Extension (E2) is to connect Petersen Road to Dogwood Street along the northwest edge of the Beaver Lodge lands north of Simms Creek. This would then compliment Dogwood Street which is a four lane divided road with left turn lanes where appropriate to the south but is a congested four lane road without left turn lanes to the north that carries higher volumes. Such a connection would siphon off some of this Dogwood Street traffic, especially for those destined to the commercial/industrial area east of Campbellton. It may be desirable to have a land swap in order to make this connection possible.

- (f) South Alder Road Extension– This extension to Dogwood Street shown as ‘F’ in Exhibit 4.1 is currently in the District’s road network plan and is considered an essential component of the arterial road network.
- (g) Willow Creek Road Extension to Jubilee Parkway – The proposal here is to extend Willow Creek Road south to the Jubilee Parkway, thereby providing better accessibility into this growing residential area between Erickson Road and the Parkway. Willow Creek Road is the logical road to make this connection.
- (h) Dogwood Street South Extension – This is a proposal to extend Dogwood Street south into the potential long term growth area south of the Jubilee Parkway should it be included in the District. It is assumed, should this area be developed, it needs at least one arterial road and ideally this should connect into the south end of the existing Dogwood Street arterial, thereby utilizing the existing intersection on the Parkway. It could possibly service as a second access for the planned Homalco Band lands development.

- (i) Willow Creek Road South Extension – Similarly, the Willow Creek Road Extension identified above could be extended south of Jubilee Parkway into any future growth in this area to serve as a second exit route. Whether or not this is required will depend on future population growth in this area.
- (j) Cheviot Road Extension – In order to reduce the volume of traffic on the north segment of Dogwood Street, a potential improvement is to provide a connection between 9th Avenue/Homewood Road and Petersen Road in the vicinity of Cheviot Road as is shown by ‘J’ in Exhibit 4.1. This would eliminate the need for traffic using Petersen Road to go north as far as 14th Avenue and then travel south again as they head west. It is acknowledged that the terrain in this area is difficult and that one or more homes and a mobile home park may be affected in order to achieve this connection. But it could also wait until redevelopment occurs. The realignment of Petersen Road to intersect Homewood Road opposite Maple Street as referenced in (c) above is an alternative to this.
- (k) Willis Road Connector – This option has been long considered by the District and would connect Willis Road at Petersen Road through to 2nd Avenue at McPhedran Road. It would then provide for the only direct connection between the Inland Island Highway and Highway 19A from Jubilee Parkway in the south to 16th Avenue in the north. It is considered an important link in the strategic network.
- (l) Merecroft Road Extension – This proposal is to extend Merecroft Road through to meet up with the south extension of Petersen Road and then ideally continue west as far as Walworth Road. This would provide an improved grid network for this South Quinsam Heights area south of Willis Road.
- (m) Upgrade Alder Street – The segment of Alder Street north of Robron Road could be upgraded to either three lanes to include a continuous centre left turn lane (M1) – this would require the permanent removal of some on-street parking – or to four lanes, possibly during peak periods only by removing on-street parking at these times (M2).
- (n) Rockland Road Extension – This option sees an extension of Rockland Road through to either the south extension of Petersen Road or all the way through to the Inland Island Highway. It is acknowledged that this road passes through the environmentally sensitive Beaver Lodge Lands and may be very difficult to achieve. However, should the lands bounded by Willis Road, Jubilee Parkway, Dogwood Street, and the Inland Island Highway see a significant amount of growth in the future, this extension could be a desirable connection. Allowing traffic generated by this area to use the Inland Island Highway may reduce the need to provide for some of the other connections that may touch on environmentally sensitive lands such as the upgrading Petersen Road (C), the Petersen Road-Dogwood Street Connector (E2), and the Nunns Creek Connector (B) in Exhibit 4.1, although this latter one is required to service the development of the lands along its length.

- (o) Hilchey Road Extension – This is a potential second connection through the Beaver Lodge Lands, this time just to Petersen Road should it ever be extended all the way south to Jubilee Parkway. This would only be considered if these lands were eventually developed.
- (p) Maryland Extension – In order to provide an adequate collector road network for this area bounded by Erickson Road, Jubilee Parkway, and Highway 19A, Maryland Road could be extended west through the Maryland Estates development and then north to Erickson Road.
- (q) Upgrade Dogwood Street – Dogwood Street has been identified as having some of the highest crash locations within the District of Campbell River. The first option here sees the addition of left turn lanes at all intersections along this road between Robron Road and 9th Avenue (Q1). This will improve traffic operations and safety at each intersection. It has been also suggested that Dogwood Street could be changed to a three lane cross-section with one through lane in each direction and a centre left turn lane at all intersections (Q2).
- (r) New Campbell River Crossing – Consideration could be given to a new public crossing of the Campbell River, somewhere west of the existing Highway 19 bridges, to replace an existing logging bridge and John Hart Dam crossing, both of which could be closed. This could possibly connect to Woodburn Road as shown in Exhibit 4.1 or to the Comox Logging Road.
- (s) Willis Road – Argonaut Road Connector – A request has been made for a connection from Highway 19 to either Highway 28 or Argonaut Road. The second sub-option is illustrated in Exhibit 4.1.

4.3 Future 2023 Traffic on Network Improvements

A number of model runs were then made incorporating many of the network improvement options identified in Section 4.2. The improvement options included in each of the network “scenarios” are as follows:

- Sc. I Willis Connector (K), South Alder Road Extension (F), and the Willow Creek Road Extension to Jubilee Parkway (G) – since these three improvements are all included in the District’s road classification plan as future improvements, they were all included in all other model runs, except Scenario II.
- Sc. II Willis Connector (K) without the other “givens” of Scenario I, as well as the Rockland Road Extension to the Inland Island Highway (N).
- Sc. III Upgrade Petersen (C), Petersen Road/Dogwood Street Connector (E2), Cheviot Road Extension (J).

- Sc. IV Same as Scenario III but without Willis Road Connector (K).
- Sc. Va Upgrade Dogwood Street with left turn lanes in addition to the existing four lanes (Q1).
- Sc. Vb Change Dogwood Street to only one through lane in each direction and left turn lanes at all intersections (Q2).
- Sc. VI Upgrade Highway 19A to four lanes (A), extend Petersen Road to the Jubilee Parkway (E1), extend Rockland Road to the Inland Island Highway (N), extend Hilchey Road (O), extend Eagle Drive (D1 and D2), and add the Willis Road/Argonaut Road Connector (S),
- Sc. VIIa Alder Street upgrade to three lanes, i.e., with left turn lanes (M1).
- Sc. VIIb Alder Street upgrade to four lanes with no left turn lanes (M2).
- Sc. VIIIa Upgrade Highway 19A to three lanes by adding a left turn lane wherever required.
- Sc. VIIIb Upgrade Highway 19A to four lanes with no separate left turn lanes.
- Sc. IX Add the Nunns Creek Connector (B).

A summary of the volumes on the north-south roads at two key east-west screenlines, these being north of Willis Road and south of Mercroft, and on east-west roads at one key north-south screenline west of McPhedran Road, for each of these network scenarios is presented in Table 4.1.

4.4 Discussion of Options

Based on the projected volumes established for each of the options, the following is a summary of some of the key findings.

- (a) Willis Road/2nd Avenue Connector – The construction of this connector with no other improvements will attract of the order of 500 vehicles in the peak direction. Just over 300 of these vehicles are diverted from Evergreen Avenue and as a consequence Petersen Road south of Willis Road also experiences a similar reduction. Dogwood Street south of 2nd Avenue experiences an increase in traffic volumes but to the north there is a reduction. There is also a small reduction in volumes on the Island Highway. The construction of this connector provides a much more direct route right from the Inland Island Highway to the Island Highway and avoids the circuitous nature of the Evergreen Road route. It therefore reduces turning movements at key intersections and this in turn will improve safety.

Table 4.1
Projected 2023 Volumes on Network Options

north of Willis	Option I		Option II		Option III		Option IV		Option Va		Option VI		Option VIIa		Option VIIb		Option VIIIa		Option VIIIb		Option IX	
	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
Nusery	34	10	41	10	32	10	32	10	34	10	24	6	34	10	34	10	34	10	34	10	34	10
III	377	822	483	1014	322	692	323	693	371	808	385	912	370	808	370	807	377	822	377	808	371	806
Petersen	168	357	168	257	426	824	414	742	167	320	149	224	167	317	167	315	168	357	168	357	125	169
Nun's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344
McPhedran	14	2	4	0	14	2	14	2	0	0	5	0	5	0	5	0	14	2	14	0	27	0
Dogwood	1001	1535	929	1482	844	1288	848	1362	1045	1619	1009	1479	919	1432	917	1379	1001	1535	1003	1483	746	1404
Alder	260	487	238	470	231	424	237	429	243	466	242	463	419	758	422	853	260	481	260	401	255	487
Hwy 19A	484	1002	480	983	488	976	487	976	483	991	460	969	422	900	420	863	484	1008	485	1165	484	995
Total	2338	4215	2343	4216	2357	4216	2355	4214	2343	4214	2274	4053	2336	4225	2335	4227	2338	4215	2341	4224	2338	4215
Two-way	6553		6559		6573		6569		6557		6327		6561		6562		6553		6565		6553	
south of Merceroft																						
Nusery	140	56	140	56	140	56	140	56	140	56	0	0	140	56	140	56	140	56	140	56	140	56
Eagle	0	0	0	0	0	0	0	0	0	0	70	83	0	0	0	0	0	0	0	0	0	0
III	337	834	507	1120	290	720	291	722	330	816	396	1003	329	816	330	816	337	836	336	818	327	815
Petersen	0	0	0	0	380	650	386	677	0	0	98	107	0	0	0	0	0	0	0	0	0	0
McPhedran	80	104	60	105	50	69	50	68	65	100	50	67	64	97	64	97	80	104	80	99	136	114
Dogwood	927	1637	812	1403	682	1257	681	1237	964	1682	827	1353	853	1499	851	1462	927	1638	929	1582	887	1647
Alder	259	451	242	423	238	392	237	389	246	441	240	411	421	643	428	708	259	452	257	404	256	453
Murphy	127	242	125	240	128	237	128	237	126	239	125	238	94	242	94	240	127	242	127	255	127	242
Hwy 19A	535	1023	523	1006	507	977	504	975	534	1014	505	994	506	998	502	974	535	1020	539	1137	532	1022
Total	2405	4347	2409	4353	2415	4358	2417	4361	2405	4348	2311	4256	2407	4351	2409	4353	2405	4348	2408	4351	2405	4349
Two-way	6752		6762		6773		6778		6753		6567		6758		6762		6753		6759		6754	
West of McPhedran																						
Hwy 19A	615	658	597	648	580	647	582	649	611	654	387	409	618	656	626	656	615	658	622	657	478	494
16th Ave	284	251	260	239	199	183	201	189	291	242	330	396	291	242	288	241	284	251	289	250	402	424
Homewood	508	404	449	303	282	230	363	251	544	412	554	442	541	412	538	412	508	404	509	404	398	159
Chevriot	0	0	0	0	82	125	130	160	82	125	82	125	82	125	82	125	82	125	82	125	82	125
Willis	493	283	303	229	323	172	0	464	284	282	210	459	282	282	458	282	492	283	496	283	646	532
Evergreen	116	127	116	127	38	55	194	152	116	129	66	83	116	129	116	130	116	127	115	126	115	126
Merceroft	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	63
New Link	0	0	0	0	650	380	677	386	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockland	0	0	499	362	0	0	0	0	0	0	414	269	0	0	0	0	0	0	0	0	0	0
Hilchey	0	0	0	0	0	0	0	0	0	0	181	119	0	0	0	0	0	0	0	0	0	0
Jubilee	1071	710	872	532	959	666	960	666	1061	712	893	524	1060	710	1060	711	1072	710	1054	710	1052	702
Total	3087	2433	3096	2440	2463	2078	2430	2067	3169	2558	3189	2577	3167	2556	3168	2557	3169	2558	3167	2555	3251	2625
Two-way	5520		5536		4541		4497		5727		5766		5723		5725		5727		5722		5876	

- (b) Petersen Road – The construction of the Petersen Road/Dogwood Street Connector would result in a very high utilization, viz., of the order of 680 vehicles in the peak southbound direction with more than 350 of these being diverted off of Dogwood Street between the new intersection and 2nd Avenue. This link also results in a reduction in volumes on the Inland Island Highway – up to 100 in each direction – and on Alder Street – up to 120 vehicles southbound.
- (c) Dogwood Street – Upgrading Dogwood Street to a five lane cross-section without the Petersen Street/Dogwood Street Connector will see an increase of approximately 200 vehicles as a result of the improvements to the capacity of Dogwood Street. The projected 2023 volumes are now of the order of 1,825 vehicles in the southbound direction. This minimal increase is possibly a result of Dogwood Street being at capacity.
- (d) Alder Street – Two different scenarios were run here, one with three lanes with the centre lane being for left turn movements, and the second being with four lanes. The three lane concept results in an increase of just under 300 vehicles on Alder Street with some of this traffic being diverted from Dogwood Street and some from Highway 19A. Upgrading it to a four lane cross-section rather than three lanes sees a further increase of just over 100 vehicles to 850 which is the practical capacity of a single lane on an arterial road with direct access – this would seem to indicate that Alder Street cannot attract a high enough volume to warrant four lanes.
- (e) Highway 19A – This was also run in two options. The first with the three lane concept results in very little increase in the traffic volumes on this road. Upgrading to a four lane facility sees an increase of 100 vehicles in the peak southbound direction with some of this increase being diverted from Alder Street and some from Dogwood Street. There is virtually no change on the Inland Island Highway.
- (f) Rockland/Hilchey Connection to Highway 19 – This was run in Scenario IV and here the volume on this connection to the highway saw a high usage with 550 vehicles leaving the Inland Island Highway as far as the Petersen Road Extension and then 420 to Dogwood Street. As a result of this high use, a second option was run, Option Ia, without the Petersen Road Extension to the Jubilee Parkway and this still found a high usage of 500 vehicles in the peak direction. It is acknowledged that this runs through the Beaver Lodge Lands but does demonstrate that such a connection to the Inland Island Highway would be well used by Campbell River residents. It provides some relief to Dogwood Street – a maximum of 170 vehicles in one direction.
- (g) West Side Roads – The extension of Eagle Drive south is very much dependant upon the amount of development that takes place in this area. The volume of traffic expected to be generated based on the 2023 land use established for the area does not justify a connection to the Inland Island Highway. However, it is acknowledged that it is a long length of road to construct if it is extended all the way to the Jubilee Parkway-Campbell River Airport Road. If Rockland Road is ever connected through to the Inland Island Highway, a connection to Eagle Drive at the same point would be a good first phase.

The analysis also found that a connection between the Willis Road/Inland Island Highway intersection and Argonaut Road would be used with a peak direction volume in the p.m. peak hour of 190 vehicles. Much of this traffic is traffic that would otherwise use Highway 28 and continue on the Island Highway and then take Dogwood Street into the residential area.

4.5 Meeting the North-South Travel Demand

Clearly the key network issue facing the District of Campbell River is how to accommodate the growth in travel demand in a north-south direction between the expanding residential area in the south of the District and the commercial and industrial core to the north. At the present time this demand, as represented by the number of vehicles crossing an east-west screenline just north of the line of Willis Street/2nd Avenue, is 3,180 vehicles in the southbound direction during the p.m. peak hour. If the Inland Island Highway is left out of this, then the demand is 2,740 vehicles. The transportation planning model projections indicate that this demand could increase to a total of 4,220 vehicles by 2023 if the Inland Island Highway is included. If the 800 vehicles projected for this IIH by this horizon year are taken off, this means an increase to 3,400 vehicles, once again, in the southbound direction in the p.m. peak hour. This is an increase of almost 700 vehicles which is approaching the capacity of a single lane on an arterial road. A summary of this is presented in Table 4.2.

**Table 4.2
Comparison of North-South Arterials**

	IIH	Petersen	Dogwood	Alder	OIH	Total	w/o IIH
2003 Volumes pk. direction	440	160	1070	470	1040	3180	2740
North of Willis							
Existing No. of lanes two-way	4 + LT	2	4	2	2	14	10
Capacity/Direction	2800	500	1500	500	850	6150	3350
2023 Demand North of Willis	760	220	1630	560	1080	4250	3490
Potential improvement	-	3	4	5	3	4	4
Capacity/direction	2800	700	1200	1700	700	1200	1600

“IIH” = Inland Island Highway; “Total” = total volume across screenline including the IIH; “w/o IIH” = total without the IIH

There are at present five lanes available to accommodate the existing one-direction demand (excluding the Inland Island Highway) with one on each of Petersen Road, Alder Street, and the Island Highway, and two on Dogwood Street. These four roads are estimated to have a combined capacity of 3,350 vehicles. With the impending upgrade of Petersen Road to a three lane cross-section, this capacity will increase to 3,550 vehicles. This is, in theory, sufficient to accommodate the projected 2023 demand of 3,490 vehicles, assuming that each is almost filled to capacity. However, without any changes to the network, Petersen Road will continue to have a significant increased surplus of capacity whilst Dogwood Street will be over capacity. If the existing form of the road network is retained, it is not likely that the use of these four roads will ever be balanced, even with a new Willis Road/2nd Avenue connector in place. Providing the Petersen Road/Dogwood Street connection would certainly assist in solving this problem as it very conveniently diverts some of the excess traffic trying to use Dogwood Street over to Petersen Road.

All three of the long term arterial roads, viz., Petersen Road, Dogwood Street, and Alder Street, are designated as arterial roads and this normally means that at sometime in the future they can be expected to become four lane roads – Dogwood Street is already at this configuration. Presumably because of the predominance of Dogwood Street as a traffic carrying route, the nature of the development along this road is different from that along Alder Street, i.e., Dogwood Street tends to have a mix of commercial and higher density residential whereas Alder Street is concentrated with single-family lots, certainly north of 2nd Avenue.

Because of this difference, if Alder Street was upgraded to a four lane facility similar to Dogwood Street, its capacity would never be as high as Dogwood Street. Given the frequency of accesses to the residential homes along Alder Street, it is doubtful that this road should ever be upgraded to a full four lane facility. It should however, remain as an arterial road carrying its share of locally generated traffic between the residential areas along its length and the Downtown. Dogwood Street, on the other hand, has a four lane plus left turn lane cross-section south of McPhedran Road with few accesses, and a four lane section north of here with a limited number of direct accesses. Dogwood Street should therefore continue to serve as the key north-south arterial parallel to, and located between, the Inland Island Highway and the Island Highway. However, Dogwood Street itself will not be able to meet the projected demand through to 2023 and therefore as already noted, some method of being able to efficiently divert traffic over to the underutilized Petersen Road is considered to be highly desirable. In addition, Petersen Road provides direct access into the commercial/industrial Campbellton area and this results in a more efficient route of the east-west routes at the north end of Dogwood Street.

The other issue in meeting this north-south travel demand is how much traffic should be carried on the Island Highway. Many residents have a desire to preserve this as the scenic route along the waterfront. On the other hand it is a direct route into the Downtown for those arriving from south of the Jubilee Parkway. If the speed to travel along this road is slowed down in order to try and push some of the traffic onto alternative routes, they may use Alder Street or Dogwood Street and this may not be desirable either. One possibility is to encourage traffic arriving from the south on the Island Highway to take the Jubilee Parkway all the way to the Inland Island Highway and this could be done by upgrading the existing intersection between the Parkway and the Island Highway so that traffic is automatically routed onto the Parkway. In order to travel on the Island Highway within the District, drivers must make a deliberate right turn movement. By introducing more signalized intersections along the Island Highway between the Jubilee Parkway and the Downtown together with some roundabouts for local convenience, this will tend to slow down the speed of traffic along the Island Highway and in turn may divert additional vehicles onto the Inland Island Highway as it will be faster.

It is noted that Delcan's *Dogwood Street Corridor Safety and Traffic Review Phase 1 Report* of April 2002 for ICBC recommended that Dogwood Street be modified to a three lane cross-section with one lane in each direction and left turn lanes. The primary purpose of this study and its recommendation was to reduce access and intersection conflicts, provide pedestrian refuge, and reduce speed. However, given the existing demand for travel along the Dogwood Street corridor, the projected increase based on the continued growth of the District to the south, and the lack of suitable alternative routes to easily redirect this traffic onto, this is not considered to

be a suitable course of action since it will reduce rather than increase the traffic carrying capacity of Dogwood Street.

In essence, the District’s north-south arterial roads are carrying, and will continue to carry, more than their share of north-south traffic and as a result operate at or even over capacity. At the same time, the Inland Island Highway operates far below its capacity. In order to avoid major widening of Dogwood Street, Alder Street, or Island Highway, it is essential that through traffic be encouraged to use the Inland Island Highway.

4.6 Evaluation of Network Improvement Options

The key network improvement options were next evaluated based on a number of criteria and the results of this evaluation process are presented in Table 4.3. The criteria used as given in this table include the impact on overall travel costs resulting from a more efficiency in the road network, i.e., less travel distance and increased travel speeds, improvement to safety in terms of better intersection channelization and fewer turn movements, impact on residential lands either through increased traffic volumes or requiring property for road expansion, cost of implementation for example when a road is presently going through undeveloped lands as opposed to widening an existing road, construction costs, environmental impacts particularly the necessity to cross streams or other environmentally sensitive areas, support of future land use projected for the municipality, in particular the ability to accommodate the increased traffic volumes, improve traffic operations on Dogwood Street, and compliments the overall major road network of the District.

**Table 4.3
Evaluation of Network Improvement Options**

	A	B	C	D	E	F	G	H	I
Impact on Travel Costs	○	○	x	x	x	x	x	x	○
Improvement to Safety	○	○	○	○	●	○	○	x	○
Impact on Residential	○	x	●	x	●	x	●	x	○
Ease of Implementation	○	○	●	○	○	●	●	○	○
Construction Costs	●	●	●	○	○	●	●	●	●
Environmental Impacts	●	x	x	x	x	x	x	●	●
Support of Future Land Use	x	○	○	○	○	○	○	○	○
Improves Traffic Operations on Dogwood	x	○	○	○	○	x	x	x	○
Compliments Existing Road Network	○	○	x	x	x	x	x	○	○
Rating	12	14	9	14	11	9	8	10	14

○ Positive x Neutral ● Negative

A – Willis Road/2nd Avenue Connector F – Highway 19A 3 laning
 B – Petersen/Dogwood Road Connector G – Highway 19A 4 laning
 C – Dogwood 5 laning H – Nunns Creek Connector
 D – Alder 3 laning I – Rockland/Hilchey Connection to Highway 19
 E – Alder 4 laning

The key network improvement options were given a positive, neutral, or negative rating as is shown in Table 4.3. These ratings were then giving weights of 3, 2, and 1 respectively. The summation of these weights indicates that the highest scoring options are the Petersen

Road/Dogwood Road Connector, the three laning of Alder Street, and the Rockland/Hilchey Connection to Highway 19. It is acknowledged that this last option faces the issue of constructing a road through the Beaver Lodge Lands and that this will be extremely difficult, if not impossible to achieve. It was therefore dropped from consideration in the final plan even though it clearly has some significant benefits to the District of Campbell River as a whole.

5.0 RECOMMENDED PLAN

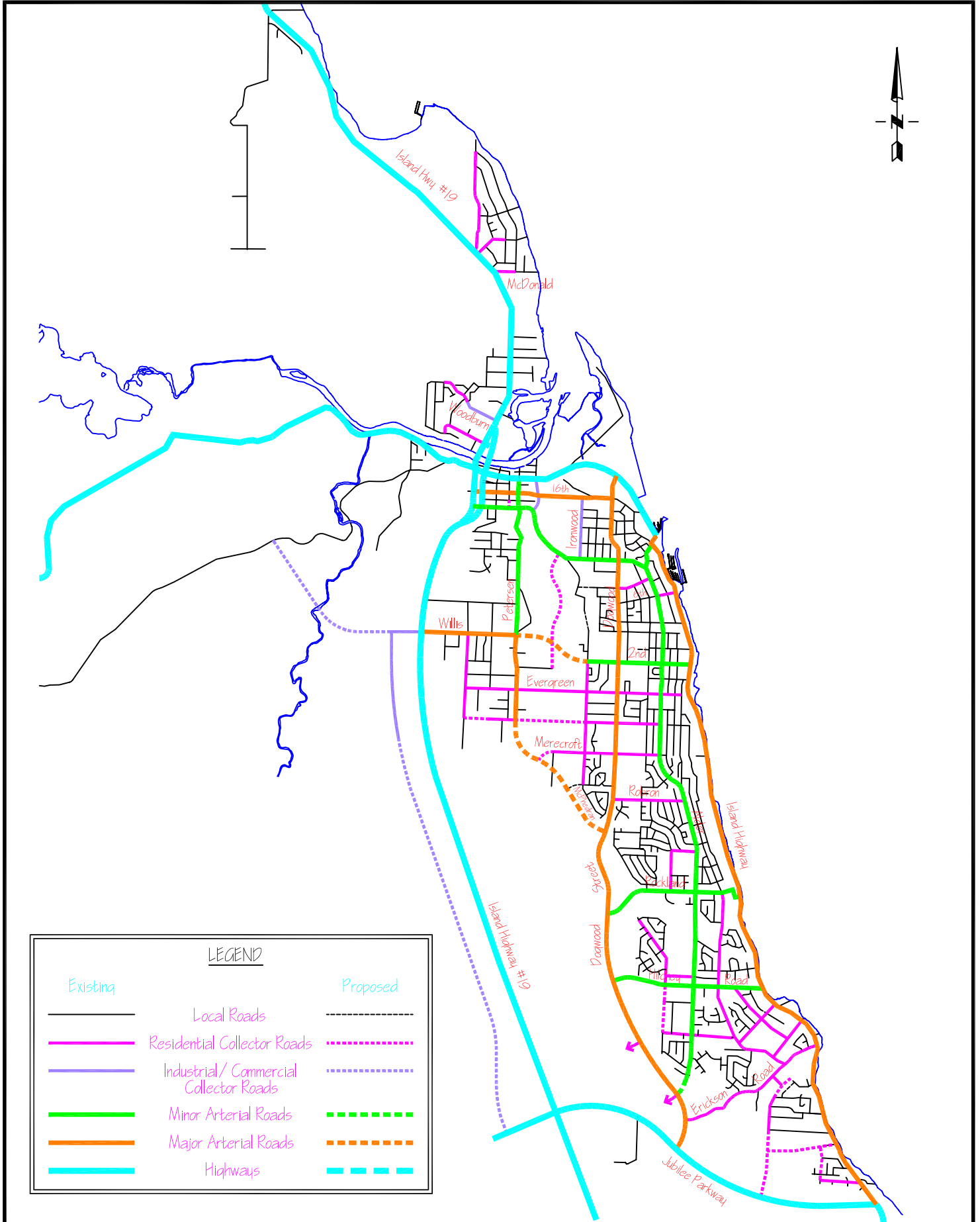
5.1 Road Network

The recommended road network for the District of Campbell River required to accommodate future growth in the municipality through to the 2023 time horizon is presented in **Exhibit 5.1**. In undertaking a transportation planning study it is desirable to minimize the number of changes to an existing road classification plan since such a plan is typically used by municipalities in establishing right-of-way requirements for new subdivisions and rezoning applications, planning for future road improvements, etc. In addition, persons purchasing properties, whether they be residential or business, are also often interested in the classification of a road and therefore changes should be minimized wherever possible.

With this in mind, the new plan shown in Exhibit 5.1 includes the following:

- (a) Dogwood Street: This road can remain in its present four lane configuration from Robron Street north, albeit with left turn lanes added at Merecroft Street, Evergreen Road, and 2nd Avenue in order to minimize the impact of left turning traffic on the capacity of Dogwood Street at the key intersections along its length. This is on the condition that the Petersen Road/Dogwood Street Connector is constructed. This will require the acquisition of property – typically up to 0.5 metres from both sides of the road – at these three intersections in order to implement these recommended improvements as the four travel lanes on the road together with curb and gutter presently take up 17.3 metres (four lanes at 3.5 metres per lane and a 1.65 sidewalk on either side) out of the approximately 20.0 metre right-of-way available. While these 3.5 metre through lanes could be maintained, the left turn lane should be 3.3 metres wide with a 0.3 metre separation from the opposing traffic. When this 3.6 metres is added into the existing 17.3 metres, this requires a widening of 0.45 metres on either side for approximately 50 metres on either side of the intersections, tapering back to zero over another 10 metres. If Dogwood was to be upgraded to a five lane cross-section to provide a left turn lane for all accesses and intersections, this would necessitate widening the right-of-way over the entire length of Dogwood Street between Robron Road and 9th Avenue/Homewood Road. This will result in a substantial land cost and have a significant social cost.
- (b) Alder Street: This is an arterial road and, as with all arterial roads, could be expected to eventually be a four lane road. Although four laning of this road in order to handle increased volumes on this road that will result from the increasing volume, congestion, and delays on Dogwood Street and Island Highway was considered, there are many accesses to private residences along its length and four laning would not achieve the

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desired increase in capacity and would increase its accident rate. Furthermore, if it is four laned now, it may eventually end up with the same problem as Dogwood Street – the desire to provide a fifth lane at intersections. It is therefore concluded that the existing Alder Street should be modified to accommodate a centre left turn lane for its full length from Dogwood Street to Shoppers Row, thereby improving accessibility into the numerous collector and local roads that intersect this arterial. Here the travel lanes should be 3.6 metres in width while the centre lane should be 3.7 metres. This then allows for a 0.3 metre separation of flows at intersections. This will require removing on-street parking on one side and the side affected should be alternated along its length at least from Rockland Road north. The implementation of this three laning could be done over several years. However, left turn lanes on Alder Street at its intersections with all collector roads should be implemented in the short term. This three laning should be confirmed north all the way into St. Ann's Road as far as Shoppers Row.

- (c) Island Highway: This road between the Jubilee Parkway and the Ferry Terminal, which is the scenic route into the community, should be reclassified as an arterial road as it is now under the jurisdiction of the District. As a result of an extensive consultation process with the public and a council decision in 1997, this is to be upgraded to a three lane cross-section by the District through the segment having commercial and other developments along both sides between Barlow Road and Hilchey Road in 2004/2005. North of here where there is only development on the east side, there are two options. The first option is to retain it as a two lane road but with traffic signals and left turn lanes at all strategic intersections, and with a limited number of roundabouts in between where signal spacing exceeds 1.25 kilometres. This road could then be upgraded with a landscaped median. The roundabouts would both slow down traffic and enable vehicles to do 180° turns in order to enter and exit all accesses along its length via right-in/right-out movements only. This configuration would also allow for more pedestrian crossings at the signalized intersections and the roundabouts. The second option is to widen the highway to three lanes whenever it fronts developed properties or passes through intersections with the centre lane serving as a left turn lane for vehicles turning both into and out of the adjacent properties or intersecting streets. This issue should be referred to the District's Oceanside Highway Liaison Committee for their review and recommendation.
- (d) Existing Petersen Road: After reviewing the traffic projections, the network needs, and the McElhanney letter reports on the two options for the alignment of the north end of Petersen Road, it is concluded that this road should remain on its existing alignment at its north end rather than swing over to Maple Street. It would then continue all the way north to the Inland Island Highway. The primary reasons for this selection are that in the present location it provides a good connection into the Campbellton area and it has a better or safer intersection configuration with 14th Avenue than with Homewood Road/Maple Street. Realigning it to Maple Street does not provide such a direct route to this area and will result in a lower use of Petersen Road. The existing Petersen Road should be upgraded to a full three lane standard that includes left turn lanes at intersections all the way from Evergreen Road to 16th Avenue.

- (e) Erickson Road: Erickson Road clearly functions as a collector road and is the only east-west road between the Jubilee Parkway in the south to Hilchey Road in the north. Historically it has served a major role in the District's road network providing the primary connection to the airport. Between Martin Road and Dogwood Street, Erickson Road needs to be upgraded to a collector road to be compatible with the eastern half of this road and to provide a strategically important link to both Dogwood Street and the Island Highway for the growth areas both north and south of it. Without this classification and the stop controls on intersecting local roads, this traffic may be tempted to use other local roads and this will have a negative impact on these neighbourhoods.
- (f) Willis Road/2nd Avenue Connector: This new connection is currently being actively planned for by the District and will serve as the only connection between the Inland Island Highway and the Island Highway between 16 Avenue and the Jubilee Parkway. It provides good accessibility between each of these highways and the large residential area that extends from 9th Avenue to approximately Rockland Road.
- (g) Petersen Road/Dogwood Street Connector: Petersen Road is extended in a southeast direction in the vicinity of the northeast edge of the Beaver Lodge lands to connect to Dogwood Street. As was noted earlier, this is a very attractive connection and provides a significant relief to Dogwood Street north of Robron Street. In conjunction with this new connector road to Dogwood Street, McPhedran Road would be closed at Dogwood Street. In addition, Mercroft Road and Cortez Road would be extended in a southwest direction to intersect the new road. This would be designated as an arterial in keeping with the Petersen Road classification. Two lanes plus left turn lanes at intersections would be sufficient on this new road through to beyond 2023.

Without this connection, Dogwood Street will have to be upgraded to a full five lane cross-section with a centre left turn lane to accommodate left turn movements at all intersections and accesses in order to have sufficient capacity to carry the projected volumes. This will mean additional right-of-way from all properties along Dogwood Street between Robron Street and 9th Avenue. Once this new connection is in place, this widening could be delayed by at least 10 years. An alternative scenario should this recommended connector not be pursued, is that the District will eventually require Petersen Road to be extended more directly south through the Beaver Lodge lands and this will require the District to pressure the Province to give its approval.

- (h) Nunns Creek Collector: This proposed new road should be constructed in conjunction with the development of the vacant lands between Petersen Road and McPhedran Road. This will eventually link Homewood Road with the Willis Road/2nd Avenue Connector.
- (i) Eagle Drive Extension: This road on the west side of the Inland Island Highway should be extended south in conjunction with development in this area, eventually connecting to the Jubilee Parkway/Airport connector. Because of its length, this road should ideally connect to the Inland Island Highway at a new intersection; however, given the Memorandum of Understanding between the Ministry and District and the projected traffic volume on it, such a connection is not required, at least until beyond 2023. Some

of the area through which this road passes is in the Agriculture Land Reserve (ALR). As it will only be constructed as development occurs, and as development will only occur if and when it comes out of the ALR, this should not be a problem.

- (j) Walworth Road: This should be upgraded to a collector road status between Willis Road and Pinecrest Road in order to better serve the potential growth in this area.
- (k) Willis Road Extension to Argonaut Road: Although this is shown on the recommended plan, this need only be considered in the long term. It is expected that many of the vehicles using this route will be trucks. Whilst it is acknowledged that providing such a route will remove some of the traffic off of the Highway 28 approach to the Inland Island Highway intersections, the volume of traffic projected to use it does not warrant its cost of construction. The development of the lands in the vicinity of this future road however, could accelerate its need and at the same time help towards paying for its cost.
- (l) McPhedran Road – Homewood Road Connection: The existing segments of McPhedran Road and Homewood Road should, if physically possible, be extended north and south respectively to provide a connection between the two. This will not only improve the road network from a continuity perspective but will also improve safety and security as both are presently long cul-de-sacs.

The District's three collector roads proposed to serve the area bounded by Erickson Road, Jubilee Parkway, and Island Highway, viz., Willow Creek Road to the Parkway, the new bridge connection to Martin Road, and the west extension of Maryland Road, will be sufficient collector roads to serve this area.

While an extension of Cheviot Road from Petersen Road through to Homewood Road was considered, it does not attract enough vehicles to warrant including in the District's plan, i.e., there is projected to be a maximum of 160 vehicles in the peak direction in the 2023 p.m. peak hour.

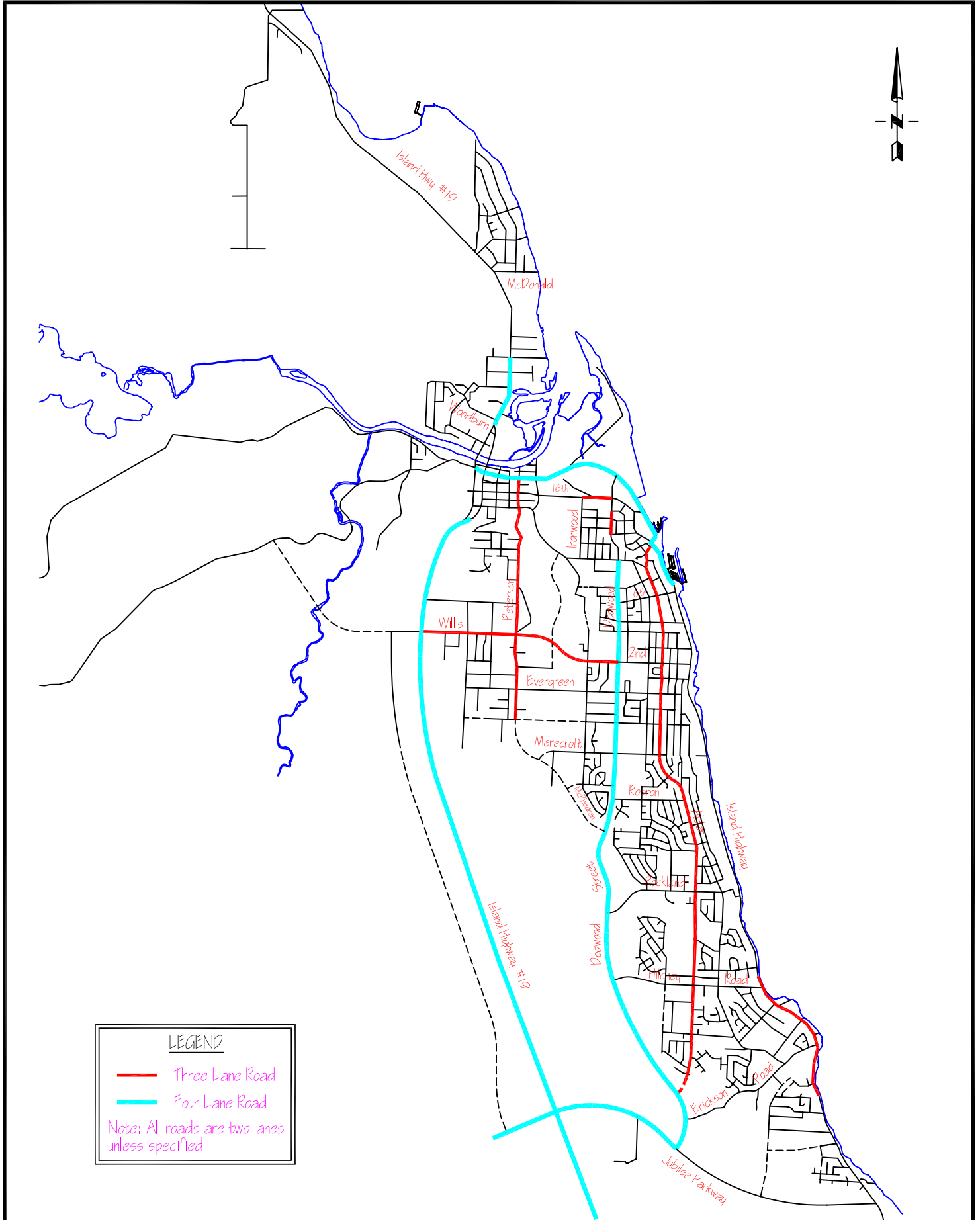
The recommended laning for each of the roads in the road network plan through to 2023 is shown in **Exhibit 5.2**. It should be noted that all two lane arterial roads should have left turn lanes at all intersections along their lengths This is not included in Exhibit 5.2.

5.2 Role of North-South Arterials

It is very apparent from the study and the analysis that the District has five north-south roads designated either as a highway, this being Highway 19 or the Inland Island Highway, or arterial, these being Petersen Road, Dogwood Street, Alder Street and the Island Highway.

- (a) Highway 19: This highway, which is under the jurisdiction of the Ministry of Transportation, is in the Ministry's mind primarily for inter-municipal travel. This means that as a minimum it should be used by all of those arriving from the north and south and destined to Campbell River. The longer these vehicles are kept on this highway, the less

LANING REQUIREMENTS TO 2023



impact they will have on municipal roads. However, the Island Highway to the south of Jubilee Parkway as well as Jubilee Parkway itself are also highways under the Ministry's jurisdiction. Every effort should therefore be made to direct traffic arriving in the municipality from the south on the Island Highway to be diverted over to the new Inland Island Highway via the Jubilee Parkway and not travel along either the Island Highway or Dogwood Street through the municipality unless this is clearly the fastest route to their destination. This can be achieved by modifying the existing configuration of the Island Highway/Jubilee Parkway intersection and by erecting suitable signing directing traffic to Highway 19 but also noting the direction to the scenic waterfront route.

- (b) Dogwood Street: Whilst the remaining four, viz., Petersen Road, Dogwood Street, Alder Street, and the Island Highway are all designated as arterial roads, all four are very different in terms of their existing laning, adjacent land uses, and available right-of-way. Dogwood Street has been and will continue to be the major facility of these four since it is already four lanes and the use of the lands along side as well as the configuration of the road network serving the adjacent areas mirrors this four lane condition. It should therefore be maintained as an arterial road carrying as much traffic as is possible.

Based on the analysis, the demand for travel on this road will exceed its existing capacity. At some point in the future, therefore, the choice will have to be made between constructing the proposed new connection to the south end of Petersen Road or upgrading Dogwood Street by providing a fifth lane for much of its length. Constructing the new connection will create significantly more north-south capacity than a fifth lane on Dogwood Street and this will then provide additional capacity to accommodate growth beyond 2023.

- (c) Petersen Road: Although Petersen Road is designated as an arterial road, it carries a very low traffic volume at the present time and even into the future. By diverting traffic over to Petersen Road, this will provide some relief to Dogwood Street but will also, in turn, provide relief to Alder Street and the Island Highway. Petersen Road also has the potential for a significant amount of redevelopment along its length. With an improved connection at the south end and the District's planned upgrading of Petersen Road itself, these two changes may in fact encourage some redevelopment.
- (d) Alder Street: Although Alder Street is designated as an arterial road, to upgrade it to a four lane facility would be very difficult and possibly ineffective due to the high number of individual driveways along its length. To increase traffic on Alder Street to the level of Dogwood Street would create a dangerous situation at the many driveways with vehicles turning in and out. It should remain as an arterial road but only with one travel lane and a centre lane that provides for left turn movements at all intersections.
- (e) Island Highway: The Island Highway is clearly a separate category again providing relatively scenic route along the waterfront into the Downtown. To upgrade this to a four lane road in order to accommodate the additional north-south traffic will, to many, be a serious compromise on the quality of this road. Every effort therefore should be made to maintain this quality. This could be achieved through the provision of left turn lanes at

key intersections with arterial and collector roads and maintaining a single lane in each direction and restricting access to right-in/right-out movements only, or alternatively, providing a centre lane that will provide safer conditions for left turn movements in and out of adjacent properties and intersections.

5.3 Traffic Controls

Ideally all arterial/arterial intersections should be signalized and indeed most of the District's intersections that fall into this category are already. Key collector roads intersecting arterials could also be signalized when traffic volumes meet the Ministry of Transportation's standard signal warrants. Intersections that should be considered for future signalization are shown on **Exhibit 5.3**.

The District should replace any fixed time traffic signal controllers with fully actuated controllers which are particularly beneficial outside of the peak periods since they can be given the ability to "rest" on the main street and are only activated for the side street traffic on demand. The District should also work towards coordinating the signals especially those along the Dogwood Street corridor. This provides for improved efficiency especially in the peak direction in the peak periods. Coordination of the signals along the Island Highway would not be beneficial because of the significant distances between these signals.

It is also recommended that the District adopt a policy of introducing traffic controls at all intersections along arterial and collector roads so that local traffic approaching these busier roads must stop. This will also help define the road hierarchy in residential areas and allow collector roads to be clearly identified.

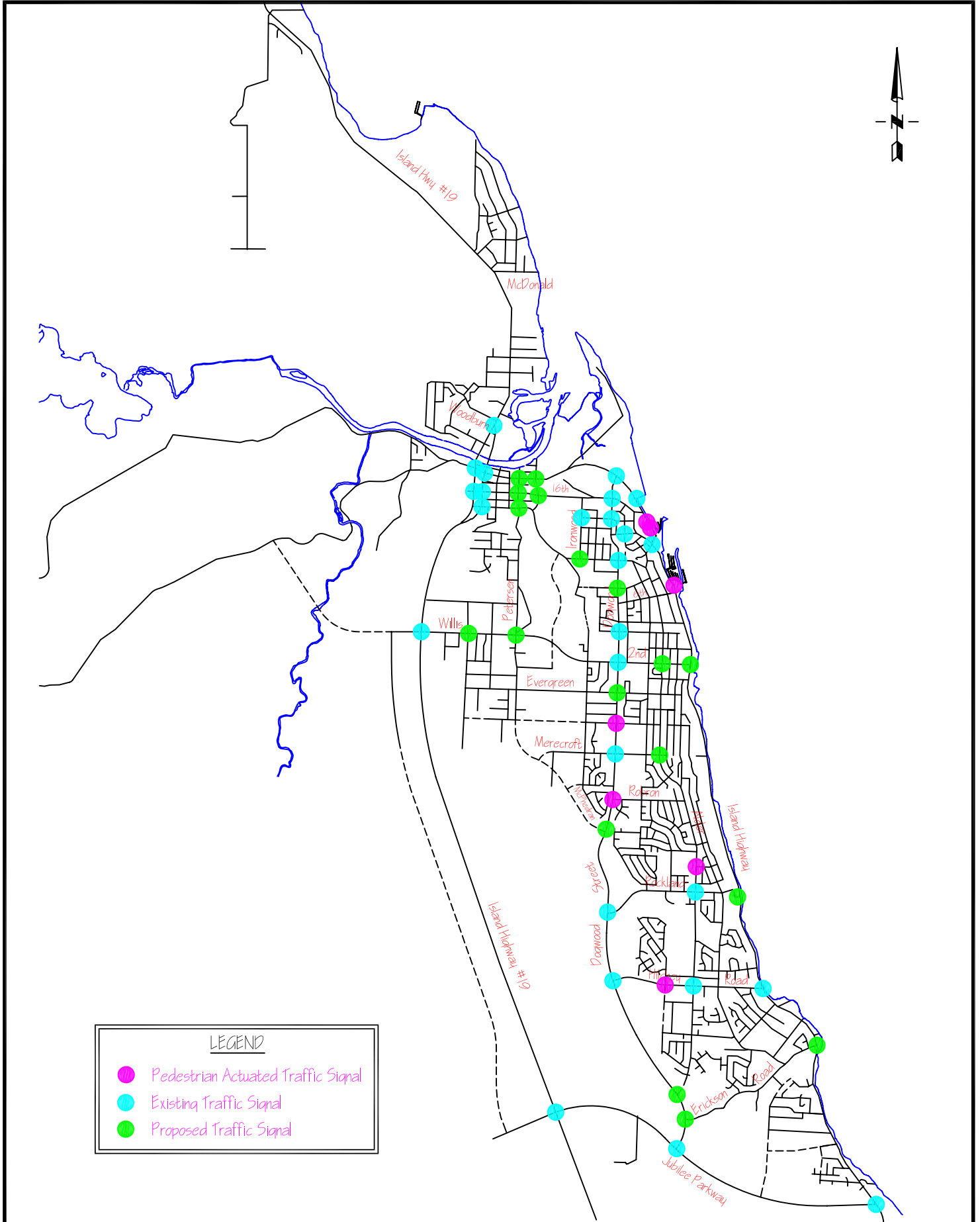
Improved controls for pedestrians are also necessary. At the present time there are only three signalized crossings of the Island Highway, these being at Jubilee Parkway, Hilchey Road, and north of the line of 6th Avenue. The signals recommended for Erickson Road, Rockland Road, and 2nd Avenue will improve this situation. Additional mid-block crosswalks are needed particularly between Rockland Road and 2nd Avenue. These could initially be standard crosswalks with easily visible flashing pedestrian crosswalk signs that may eventually need to be upgraded to full signalized pedestrian crosswalks.

The timing for implementing these pedestrian signals as well as introducing pedestrian signals at the existing pedestrian crosswalks on Dogwood Street at Pinecrest Road and Robron Road should be determined using the Ministry of Transportation's standard warrants for pedestrian crossings. The plan includes new signals at Dogwood Street/Evergreen Road and this will provide another signalized pedestrian crossing.

5.4 Truck and Hazardous Goods Routes

As was noted earlier, one of the existing concerns is the lack of truck routes in the District. It is recommended that the District adopt both a truck route by-law and a hazardous goods route

RECOMMENDED TRAFFIC SIGNAL LOCATIONS



bylaw. This means that trucks must keep to these routes. When delivering to a location that is not on a truck or hazardous good route, they must stay on the designated route and take the shortest path between the designated route and their destination.

Any road under the jurisdiction of the Ministry of Transportation must always be considered a truck route and therefore the Inland Island Highway, Jubilee Parkway, Highway 28, and the Island Highway between the Inland Island Highway and the ferry terminal fall into this category. It is recommended that in the long term, Dogwood Street from the Jubilee Parkway to 2nd Avenue, Willis Road and its future connection to 2nd Avenue between the Inland Island Highway and Dogwood Street, also be designated as truck routes. Until this connection is constructed, Petersen Road south of Willis Road and Evergreen Road through to Dogwood Street as well as Dogwood Street north from 2nd Avenue to Homewood Road/9th Avenue and Homewood Road should be designed as a truck route on an interim basis. Restricting trucks to these roads will eliminate most trucks off other roads in residential areas.

In addition, in order to minimize the impact on the flow of trucks within the Campbellton area, 14th Avenue and 16th Avenue between the Inland Island Highway and Petersen Road as well as Petersen Road between 14th Avenue and the Island Highway should also be designated as a truck route. Trucks destined to the residential area between the Jubilee Parkway and 14th Avenue/Homewood Road will all be originating either south of the municipality or in the Downtown or Campbellton area. These trucks must now make a decision as to whether to use the Inland Island Highway, Dogwood Street, or the Island Highway in order to travel to their destination and they can do this at either end of this residential area. The recommended truck routes are illustrated in **Exhibit 5.4**.

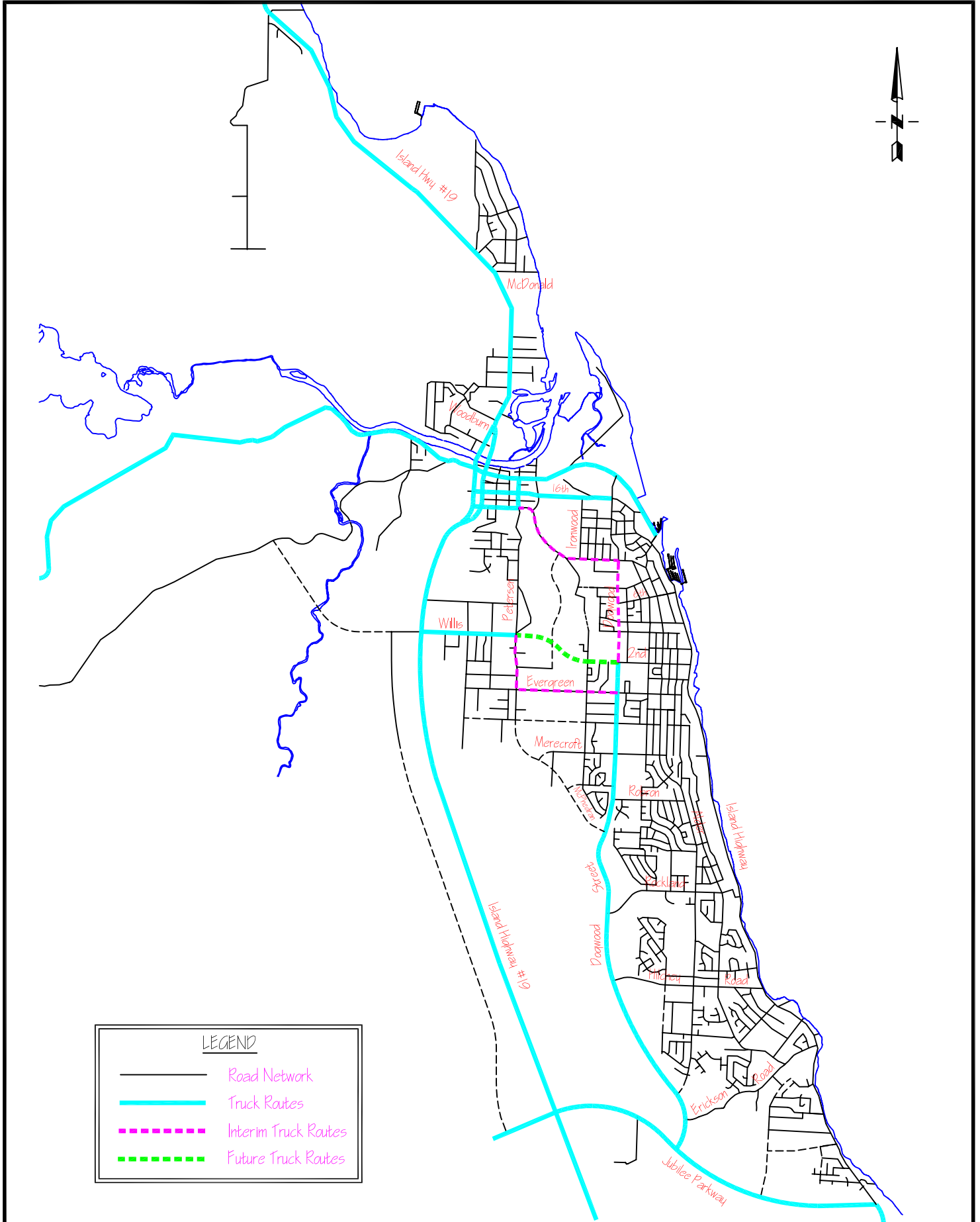
All trucks carrying hazardous goods within the District of Campbell River should be limited to the Inland Island Highway, Highway 28, or the Island Highway between the Inland Island Highway and the ferry terminal. Any trucks carrying such goods to destinations within the District would then be required to take the shortest distance between these routes and their destination using the designated truck routes wherever possible since they are still trucks. The recommended hazardous goods routes are illustrated in **Exhibit 5.5**.

5.5 Road Classifications

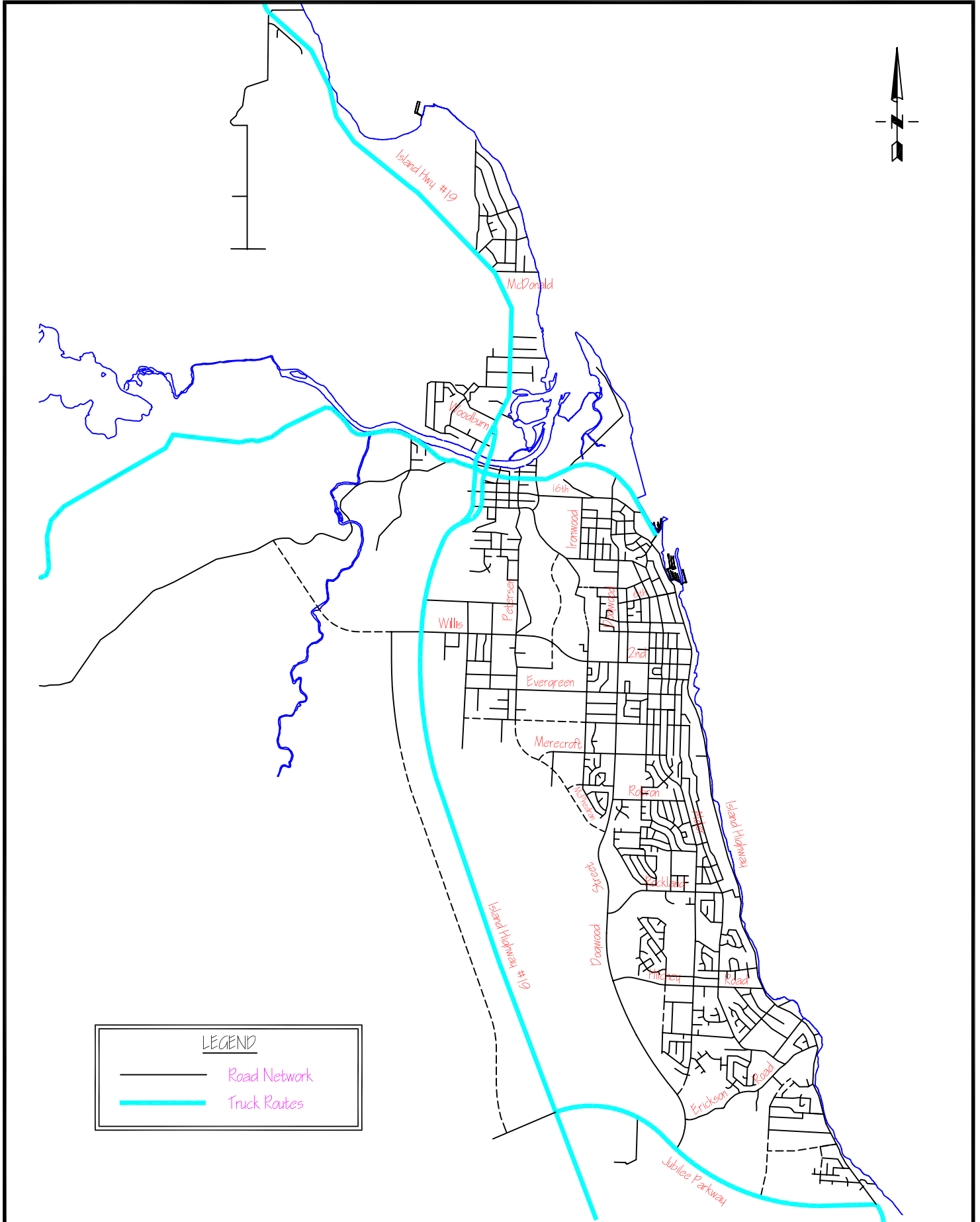
The District currently classifies roads as “highway” – presumably those under the jurisdiction of the Ministry of Transportation, “arterials”, “collectors”, and “locals.” Changes to these classifications are recommended as follows:

- (a) Arterials: The main purpose of arterial roads, as noted earlier, is to carry the longer length trips from one sector of the District to another. Major arterials typically have very rigid access controls whilst minor arterials have some access control. Dogwood Street would fall into the category of a major arterial whilst Alder Street would be an example of a minor arterial. Major arterials carry daily traffic volumes of up to 30,000 vehicles which equates to a two-way peak hour volume of 3,000 vehicles. Parking is often prohibited on major arterials just as it is on Dogwood Street, or as a minimum is

CAMPBELL RIVER PROPOSED TRUCK ROUTES



PROPOSED HAZARDOUS GOODS ROUTES



restricted in peak periods. Desirably intersection spacing along major arterial roads is a minimum of 400 metres. Minor arterials on the other hand carry traffic volumes of up to 20,000 vehicles per day which equates to 2,000 vehicles two-way in a peak hour. Intersection spacing along this type of road is a minimum of 200 metres.

Although the District of Campbell River have a number of roads designated as arterials, there are clearly significant differences as already noted, especially when considering Dogwood Street and Alder Street. It is therefore recommended that the District split the arterial category into two: “major arterials” and “minor arterials”. Dogwood Street, Willis Street, 16th Avenue, the Island Highway, and Petersen Road south of Willis Road as well as the proposed Willis Street/2nd Avenue Connector and Petersen/Dogwood Street Connector should all be designated as major arterials with rigid access control. All other arterials, including Petersen Road north of Willis Road, Hilchey Road, and Rockland Road, should be “minor arterials” with some access control where possible.

- (b) Collectors: The second category is collector roads whose function is to collect traffic from local roads and provide a suitable route out to the arterials. For collector roads the traffic movement and land access are of equal importance. These are often also separated into two, this time by the use of the lands through which they pass, i.e., residential and industrial/commercial. Residential collectors typically can be expected to carry volumes up to 8,000 vehicles in a day or 800 vehicles two-way in a peak hour and primarily serve passenger and service vehicles. Minimum intersection spacing on these collectors should be 60 metres. Sidewalks should be provided on both sides. Industrial/commercial collectors on the other hand can carry up to 12,000 vehicles in a day or 1,200 vehicles two-way in the peak hour. This category of collector road carries all types of vehicles including trucks. Since they are serving industrial and commercial developments, sidewalks need only be provided on one side. On-street parking can be provided on one or both sides but occasionally parking restrictions are in place during the peak hours.

Because of the different characteristics of collector roads within these two different land use categories, it is recommended that the District classify collectors based on the type of land use they serve. It is therefore recommended that Maple Street, Ironwood Street, Eagle Drive and its extension, as well as the Willis Road/Argonaut Road connector be designated as an industrial/commercial collector whilst all others remain as residential collectors.

5.6 Bicycle Routes

Whenever possible, arterial roads should be designated as bicycle routes in order to accommodate commuter cyclists. The primary exception to this is Dogwood Street north of Robron Road because of the heavy volume of traffic and lack of additional width for bicycles. On existing roads, the pavement widths should be modified to accommodate bicycles either by a straight widening of 1.3 metres on each side of a two lane road. Where there is already curb and gutter on an existing four lane urbanized road, these can be achieved by modifying the lane widths such that the left hand travel lane is slightly narrower, e.g., reduced to 3.2 metres, and the

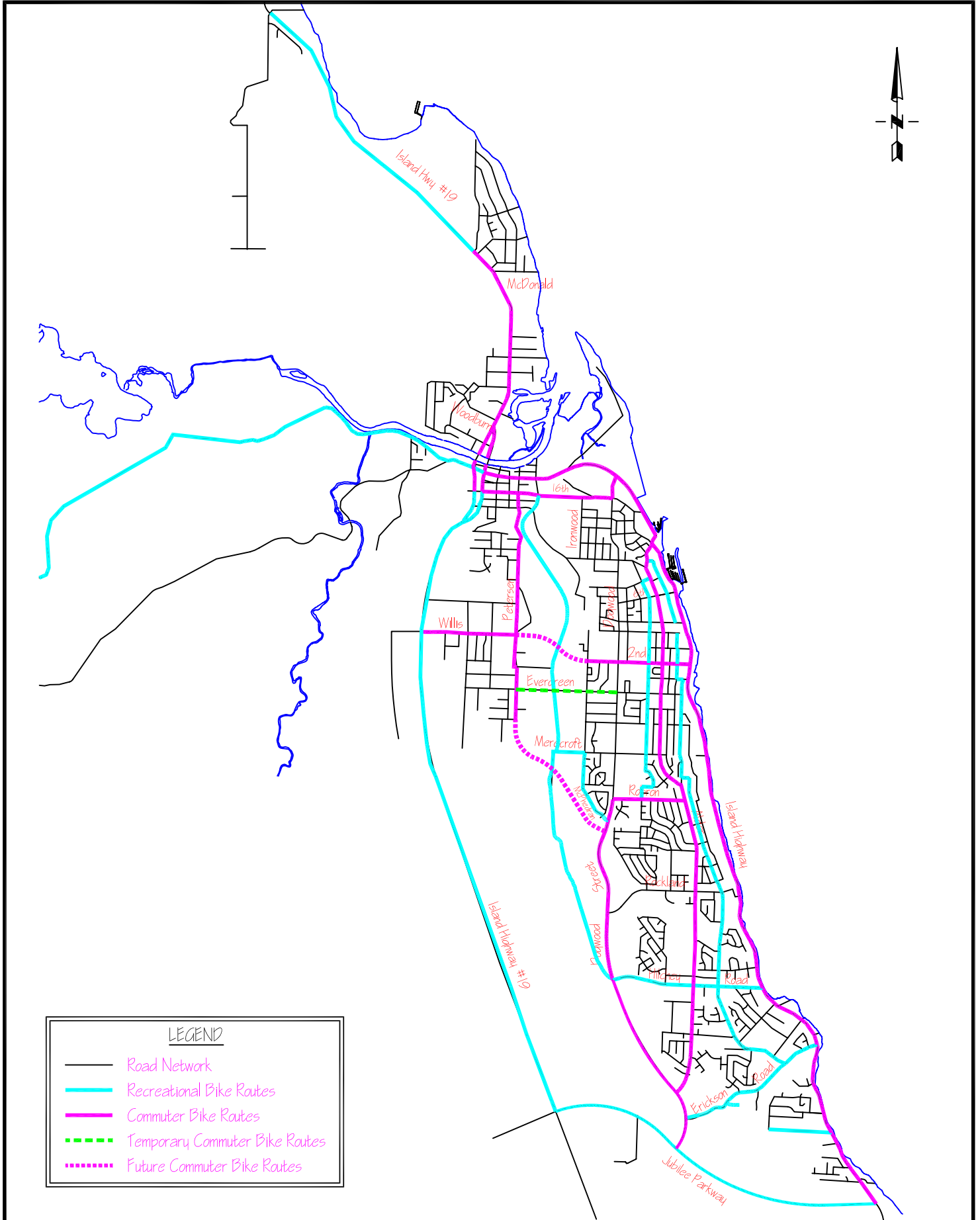
curb lane is slightly wider, e.g., widened to 4.0 metres, on a standard 14.4 metre pavement. All new segments of arterial roads should be constructed with provision for bicycle lanes. The recommended bicycle path network is presented in **Exhibit 5.6**. This retains all of the bicycle paths shown earlier in Exhibit 2.6 but now creates commuter bicycle routes, some of which were included in the existing plan but others are new.

5.7 Short Term Improvements

As a result of the review of existing conditions and the reports by other consultants on issues, particularly the safety concerns along Dogwood Street, a number of short term improvements have been identified. These improvements, all of which should be implemented within the next five years, are listed in alphabetical order as follows:

- (a) Feasibility Study of Petersen Road/Dogwood Street Connector – A more detailed feasibility study should be undertaken for this proposed connector to determine its feasibility, identify the preferred location and right-of-way requirements, establish a more detailed cost estimate, and compare the financial implications of this with the widening of Dogwood Street north of McPhedran Road to a full five lane cross-section.
- (b) Ferry Terminal – Modify the Island Highway to create a centre left turn lane to accommodate vehicles arriving from the north and waiting to turn into the ferry terminal parking area – this was one of the options prepared by EarthTech in their February 2001 *Campbell River Ferry Terminal Study Final Report* for BC Ferries.
- (c) Left Turn Lanes/Signals: – Add left turn lanes on all four legs of the intersection of Dogwood Street/Evergreen Road and signalize to improve safety. Also add left turn lanes on both legs of Dogwood Street at Mercroft Street and at 2nd Avenue and add a southbound left turn phase to the signals to improve safety.
- (d) Realign Intersection of Jubilee Parkway/Island Highway – Realign the intersection such that the continuity is between the Island Highway south of this intersection and the Jubilee Parkway to the west so that any traffic turning onto the Island Highway north towards the Downtown must make a deliberate turn. This will encourage more of the longer distance or through traffic to continue north on the Jubilee Parkway and then the Inland Island Highway and reduce traffic on the Island Highway. In addition, signs should be erected directing tourists oriented to the Downtown to take the Island Highway whilst those going to North Campbell River, Sayward and beyond would take the Inland Island Highway.
- (e) Speed Reduction/Capacity Improvements on Island Highway – Introduce new signals together with left turn lanes on the Island Highway at Erickson Road, Rockland Road, and 2nd Avenue.

RECOMMENDED BIKE ROUTES



- (f) Stop Controls – Introduce stop controls on all roads intersecting collector roads.
- (g) Upgrade Lane Designations on Alder Street – Prepare a plan for the future three laning of the entire length of Alder Street. Then introduce left turn lanes at all intersections with collector and arterial roads along its length as a first phase to improve capacity and safety.
- (h) Upgrade Signal Heads: – Improve the signal heads facing east-west traffic on 2nd Avenue and 4th Avenue at Dogwood Street to improve safety.
- (i) Upgrade to Collector: Upgrade the west segment of Erikson Road and Woodburn Road to a full collector road standard with curb, gutter, and a sidewalk on both sides.
- (j) Upgrade to Full Signal: – Convert the existing pedestrian signal at the intersection of Dogwood Street/7th Avenue to a full traffic signal.
- (k) Coordination of Signals: Existing signals along arterial corridors should be coordinated. The priorities are:
 - Dogwood Street between Merecroft Road and Island Highway;
 - Island Highway between Dogwood Street and St. Ann’s Road.
- (l) Upgrade Intersection: The intersection of Alder Street/9th Avenue should be upgraded to provide for all movements.

5.8 Implementation Phasing

In order to determine the timing of the major improvements, the model was run for the 2013 horizon year using the recommended network plan. Of the major changes proposed in the recommended 2023 road network plan, the connection of Petersen Road through to Dogwood Street is considered to be the priority, at least in terms of planning for it, since this will provide additional north-south capacity and accommodate the projected continual growth in the area to the south, particularly on the Timberwest, Georgia Homes, and Jubilee Heights subdivisions. Furthermore, this improvement, which should be implemented by the time the District reaches the 38,000 population level, results in a greater reduction in traffic volumes on Dogwood Street to the north.

The Willis Road/2nd Avenue connector is also considered to be an important link. Although it will not provide the same sort of relief to the congested Dogwood Street and Alder Street corridors as the Petersen Road/Dogwood Street connection, it does fill a vital void in the District’s transportation network and will bring benefits to the municipality. Furthermore, the District is well along on the project with planning, design, property acquisitions, and commitments. It should therefore remain as the highest priority item of the larger projects.

It is assumed that the other new connections shown in Exhibit 5.1, especially the Willow Creek Road Extension, Maryland Road Extension, Nunns Creek Connector, Pinecrest Road Extension, and the Eagle Drive Extension will be implemented in conjunction with the development of the surrounding lands.

The recommended schedule for implementing the improvements identified in this study, both short term and long term, is presented in Table 5.1. The first priority improvements proposed for 2004 to 2009 are illustrated in **Exhibit 5.7** while the Phase 2 improvements for 2010 to 2014 and Phase 3 improvements for 2015 to 2023 are illustrated in **Exhibits 5.8 and 5.9** respectively. Many of the new roads shown in Exhibit 5.1, e.g., Nunns Creek Collector, Willow Creek Road, Maryland Road, and Pinecrest Road, will presumably be constructed in conjunction with the development of the surrounding lands and have therefore been omitted from Table 5.1.

**Table 5.1
Improvement Implementation**

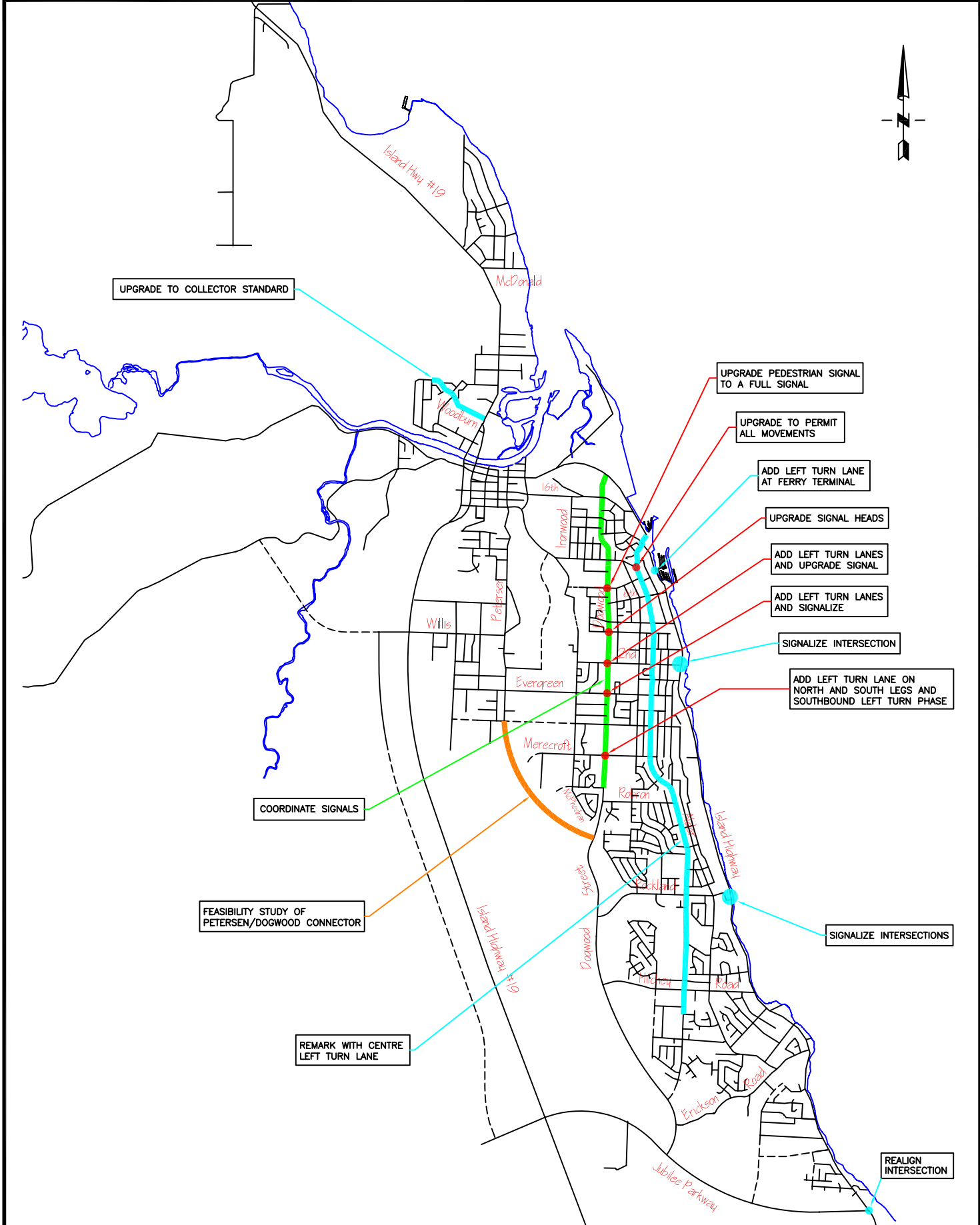
	Facility	Classification	Improvement	Need	Cost	Schedule
1	Dogwood St/2 nd Ave	Arterial	upgrade signals	Safety	\$ 80,000	2004
2	Dogwood St/Evergreen Rd	Arterial	add left turn lanes and signalize	Safety	\$ 250,000	2004
3	Island Hwy/Rockland Rd	Arterial	add left turn lanes and signalize	Safety	\$ 180,000	2005
4	Various	n/a	install stop controls all intersections	Safety	\$ 40,000	2005-2007
5	Alder Street	Arterial	design 3-lane concept	Safety	\$ 30,000	2005
6	Island Hwy/2 nd Avenue	Arterial	add left turn lanes and signalize	Safety	\$ 250,000	2005
7	Dogwood St/7 th Avenue	Arterial	upgrade to full signal	Safety	\$ 80,000	2005
8	Petersen/Dogwood Connector	Arterial	feasibility study	Capacity	\$ 100,000	2006
9	Dogwood St/4 th Avenue	Arterial	upgrade signals	Safety	\$ 60,000	2006
10	Jubilee Parkway/Island Hwy	Highway	realign intersection	Capacity	\$ 400,000	2006
11	Island Highway/Ferry Terminal	Arterial	add left turn lane	Cap/Safety	\$ 80,000	2006
12	Upgrade Alder St	Arterial	remark with left turn lanes	Safety	\$ 30,000	2005
13	Dogwood St/Mercroft St	Arterial	add left turn lanes and adv green	Cap/Safety	\$ 150,000	2007
14	Willis Rd/2 nd Ave	Arterial	new connector	Capacity	\$8,000,000	2008-2009
15	Erickson Rd	Collector	upgrade to collector	Capacity	\$ 140,000	2008
16	Island Hwy/Erickson Rd	Arterial	add left turn lanes and signalize	Safety	\$ 250,000	2008
17	Peterson Rd/Dogwood St	Arterial	new connector	Capacity	\$9,000,000	2015-2016

5.9 Traffic Calming

It is understood that some of the residential neighbourhoods in the municipality experience what are considered to be high traffic volumes, sometimes with associated high speeds. A brief review of this issue, particularly in the vicinity of Montana Drive and Colorado Drive revealed that one of the contributing factors to such a problem is the lack of intersection controls. Many municipalities have a policy of installing traffic control signs at all intersections so that a vehicle approaching an intersection knows whether or not they have the priority. It is recommended that this policy be adopted by the District of Campbell River. All local roads intersecting arterial or collector roads would face stop signs; then at intersections between two collector roads or two local roads, the road with the higher through movements would be given priority and the lower volume roads be stop controlled. Implementing this policy will then clearly identify which roads are collectors and which are not, and possibly reduce the problem in some areas. Applying this to Colorado Drive, which is designated by the District as a collector road, would resolve this

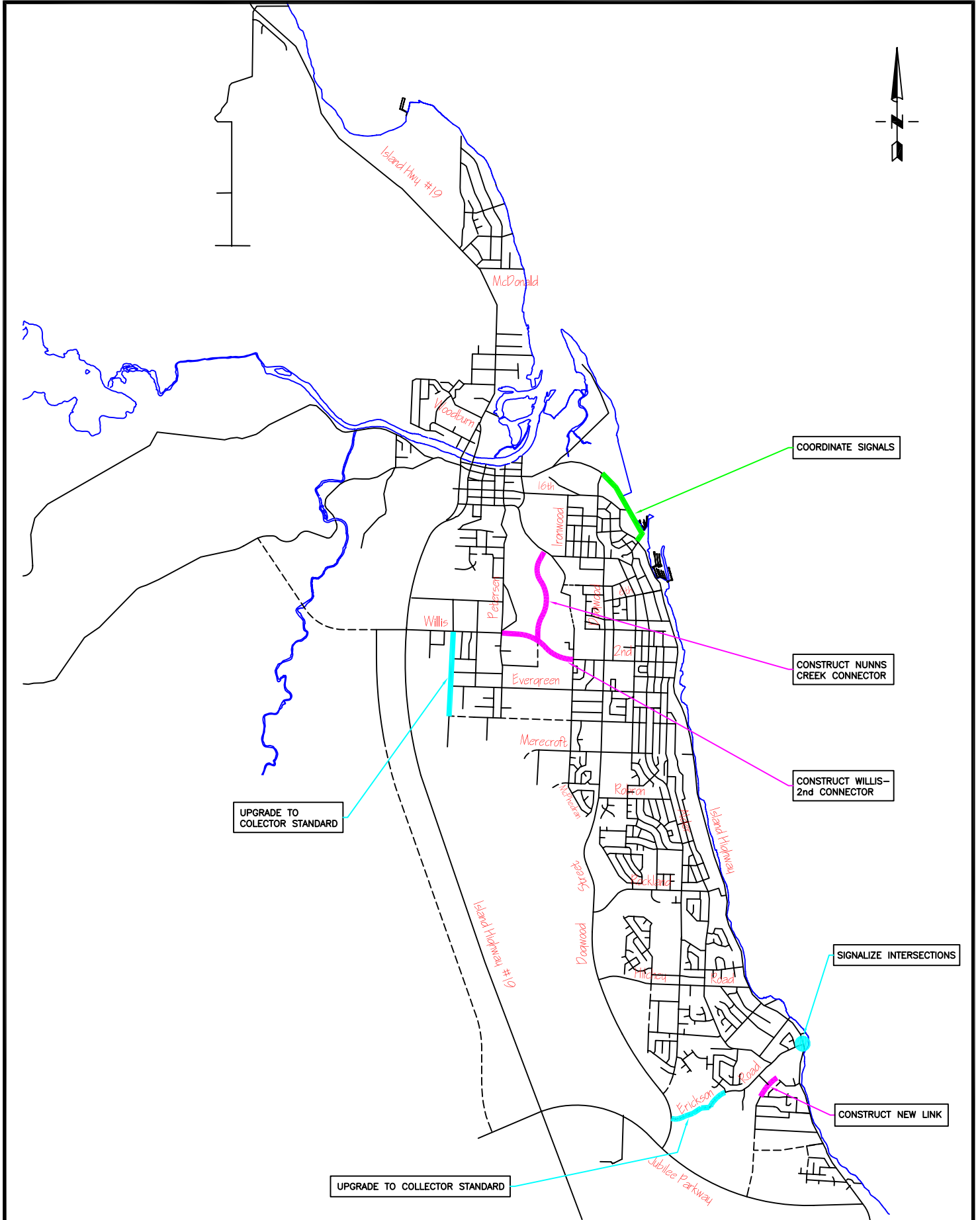
RECOMMENDED PHASING OF IMPROVEMENTS

- Phase 1, 2004 - 2007



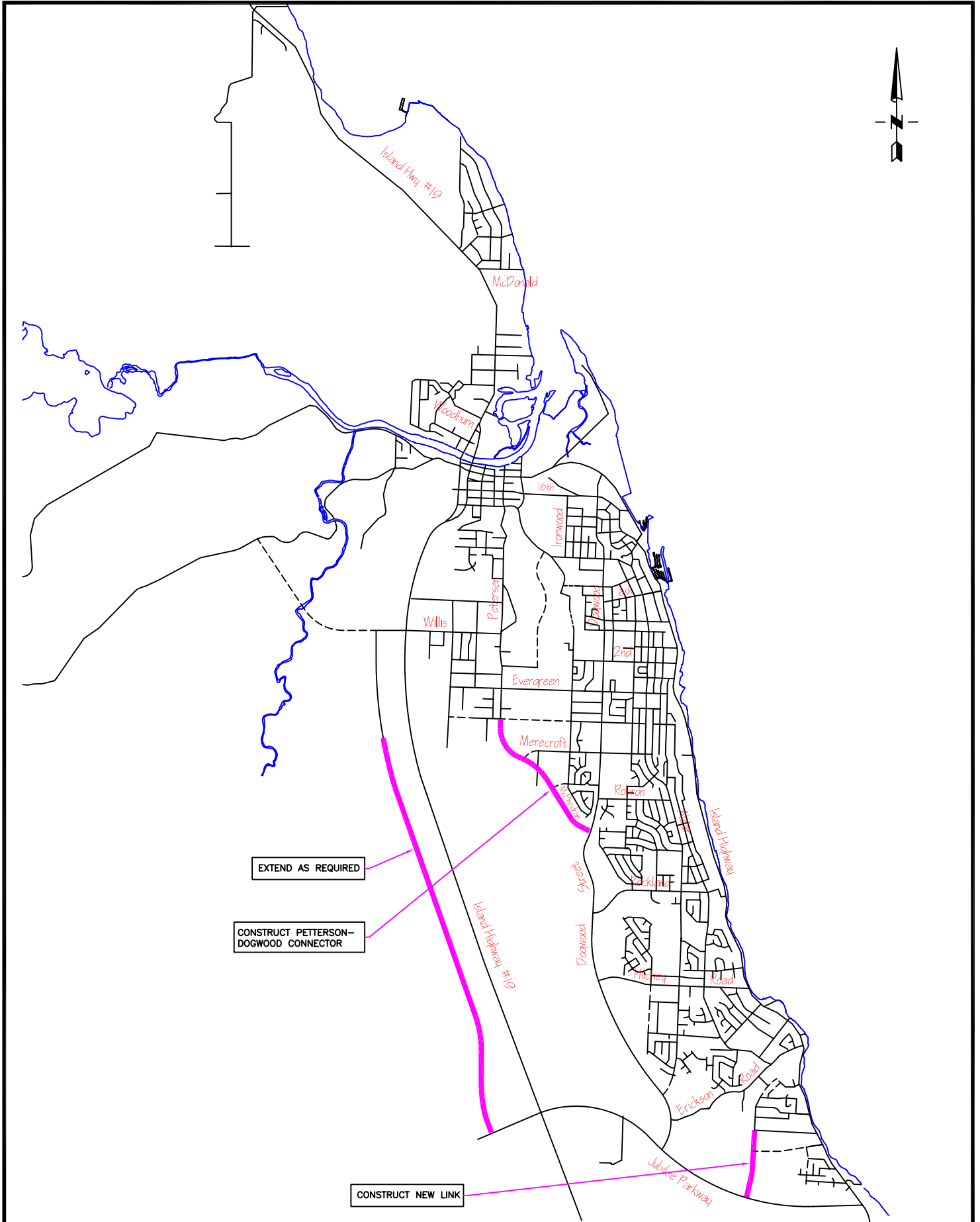
RECOMMENDED PHASING OF IMPROVEMENTS

- Phase 2, 2008 - 2014



RECOMMENDED PHASING OF IMPROVEMENTS

- Phase 3, 2015 - 2023



particular problem. The District should therefore actively pursue a program of implementing such regulatory signs at all intersections over a three year time period working from the Downtown out.

Concern has been raised over traffic unnecessarily using McPhedran Road and this problem was investigated by the Boulevard Transportation Group in their report *South McPhedran Road Traffic Calming Report (Evergreen Road South to Dogwood Street)* of February 4, 2003. Although this is a collector road, it does intersect other collector roads, e.g., Evergreen Road, Pinecrest Road, and Mercroft Road. It should therefore have stop signs at some or all of these collector roads. This would reduce the travel speed and increase the travel time of vehicles that use this route, thereby making it less attractive to those wishing to avoid congestion on Dogwood Street. It will also improve safety for local residents.

Other features that can be introduced in residential neighbourhoods in order to calm or slow down traffic include the following:

(a) Speed reduction

- raised crosswalk
- traffic circle
- raised intersection
- sidewalk extension
- raised median island

(b) Volume reduction

- chicane-one-lane
- diverter
- one-way
- directional closure
- full closure
- raised median through intersection

Traffic circles, raised intersections, and sidewalk extensions have been introduced in a number of municipalities in British Columbia and are considered the preferred techniques for calming traffic in residential neighbourhoods. Raised medians, chicanes, diverters, etc. mean more significant changes to existing patterns and affect local residents.

5.10 Funding Sources

Typically the three sources of funding for new or upgraded roads are the Ministry of Transportation, the municipality, and developers. Developers are normally expected to pay for the construction of new roads within or immediately adjacent to their property in conjunction with their development. They are also expected to pay for the upgrading of roads both adjacent to and beyond their properties when land is being rezoned.

The Ministry typically pays for all improvements on the provincial highways – providing they agree to do the improvement. They may also contribute to an improvement on a municipal road if such an improvement will benefit the flow of traffic on the nearby highway. This would certainly apply to the Island Highway. The Willis Road/2nd Avenue connector is a strategically important road and does have the potential to provide some relief to both the Inland Island Highway and Island Highway.

Municipal funding for roading projects is obtained either through property taxes or via the roading portion of development cost charges (DCC's).

5.11 Road Design Standards

- (a) Road Cross-Sections: The District's cross-section standards were reviewed and found to be similar to the Transport Association of Canada (TAC) standards. It is therefore concluded that the current standards should be maintained. The only modification is that the District's local road standard of 9.0 metres should be designated for parking on one side only. If there is to be no parking, then this can be reduced to 6.6 metres whilst with parking on both sides the width should be 11.4 metres. For collector roads, the District's standard is also for parking on one side only.

Left turn lanes at intersections shall be a minimum length of 30 metres with a minimum taper length of 35 metres.

A width of 2.4 metres is required if on-street parking is to be provided.

Retro-reflective paint should be used for road markings on all arterial and collector roadways.

- (b) Grades: Maximum longitudinal grades on road shall be:

- | | |
|--|-----|
| • Local roads in residential areas | 12% |
| • Cul-de-sac bulbs | 8% |
| • Collector roads and local roads in industrial and commercial areas | 8% |
| • Arterial Roads | 7% |

- (c) Bicycles: Separate bicycle lanes on arterial roads should be 1.5 metres in width. A shared bicycle/vehicle lane should be 4.3 metres.

- (d) Sidewalks: Sidewalks shall be required as follows:

- | | |
|------------------------------------|--|
| • Arterials | - both sides |
| • Commercial/Industrial Collectors | - both sides in commercial areas and the north or
or east side only in industrial areas |
| • Residential Collectors | - north or east side only |

- Local - north or east side only
- Cul-de-sac - not required

Sidewalks on arterial and collector roads should be separated from the curb by a minimum of 1.0 metres wherever there is sufficient right-of-way.

- (e) Intersections: The minimum spacing between adjacent intersections shall be 400 metres on a major arterial road, 250 metres on a minor arterial road, 60 metres on a collector road, and 50 metres on a local road.

Intersections shall be at right angles, with a maximum variation of 15° for extraordinary circumstances. Intersections proposed on curves or near the crest of hills are to be avoided. These proposed intersections are subject to sight line analysis in accordance with TAC.

Where T-intersections are staggered along any roadway, the minimum spacing between them shall be 60 metres as measured between near property lines of the staggered intersecting streets.

- (f) Driveways: All driveways shall be at right angles to the roadway. Exceptions to this shall be gas stations located on or near arterial or collector roads, or right-in/right-out only configurations (45° to 60°).

All driveways shall be designed to incorporate a landing area. Landing area is defined as a six metre length of driveway, at a maximum grade of 5%, from property line into the site. The maximum grade on the remainder of the driveway should be 15% along local streets and 10% along collector and arterials. Driveway grade changes are to be designed so that vehicles will not “hang up” or “bottom out.”

Major driveway crossings (accommodating more than 100 vehicles per hour) should be by curb return rather than driveway let down.

- (g) Bus Stops: All bus stops shall allow a 3.0 metre width and 15 metres in length for the bus. A pull-out after the stop shall be 10 metres in length where the speed is 50 kph or less, and 25.0 metres if above this speed. The length of pull-in should be 18.0 or 25.0 metres respectively.

5.12 Access Guidelines

Access to properties should be taken from the lowest hierarchy road where there is a choice. New accesses to existing arterial roads should be restricted to commercial properties of more than 50,000 ft² in floor area or to multi-family developments with more than 12 units. Access to new major arterial roads should be prohibited.

Any access on a major arterial road should be a minimum of 50 metres from an intersection and 35 metres from another access. On a minor arterial road, these distances can be reduced to 40 metres and 30 metres respectively.

Any access on a collector road should be a minimum of 30 metres from the nearest intersection and 15 metres from an access to an adjacent non-single family property.

The minimum separation between accesses on a local road should be five metres.

5.13 Road Network Related Policies

The following policies should be adopted by the District of Campbell River in conjunction with the recommended plan.

(a) Road Network:

- The District's road classification system shall be adhered to when determining right-of-way requirements for new developments, establishing pavement widths when designing roads, approving access locations, etc.
- The District's road classification system shall distinguish between "major" and "minor" arterials and between "residential" and "commercial/industrial" collectors.
- The District shall work towards upgrading all collector roads in residential areas to a full standard with curb, gutter, and sidewalks along one or both sides as appropriate.
- The Master Transportation Plan shall be updated every five years.
- The District shall enact a by-law to designate the recommended truck route and hazardous goods networks to minimize the intrusion of trucks through residential areas.
- All new segments of arterial roadways shall be constructed with provision for bicycle lanes.
- In all single family residential areas, length of the cul-de-sac as measured along the centerline from the edge of the intersecting highway shall not exceed 220 metres in length. In multi-family, industrial and commercial zones, two accesses are required when the road exceeds 100 metres.

(b) Traffic Controls:

- All intersecting arterial roadways shall be signalized.
- All collector roadways intersecting with arterial roadways shall be signalized provided BC Ministry of Transportation warrants are satisfied.
- Traffic and pedestrian signals at all other intersecting roadways shall be implemented if volumes meet the BC Ministry of Transportation warrants.
- All traffic signal controllers shall be traffic activated, i.e., not fixed time.
- All signalized intersections along an arterial corridor shall be coordinated unless the distance between adjacent signals is sufficient as to prevent any benefits from such coordination.

- All signals along major arterial roadways shall be fitted with some form of preemption so that emergency vehicles need not be unnecessarily delayed or take unnecessary risks.
- Audible pedestrian signals shall be implemented at all traffic and pedestrian signals.
- To reduce confusion, the District shall ensure that transportation regulatory controls are administered consistently.

(c) Traffic Operations:

- All two lane arterial and collector roads that are used as bus routes shall have provision for buses to stop beyond the travel lanes, i.e., with bus bays or on-street parking prohibitions.
- All signalized intersections shall have a minimum of two approach lanes on all legs to ensure left turning vehicles do not block through traffic.
- All two lane arterial roads shall have left turn lanes at all intersections along them.

(d) Access Control:

- All driveways on arterial roadways within 80 metres of the near side property line of an intersection shall be restricted to right-in/right-out turning movements only. A restrictive covenant shall be provided by the developer.
- On local roads, the near side of the driveway shall be no closer than six metres from the property line at the corner of the intersection street. At major collectors the distance shall be 20 metres and arterial roads shall be 40 metres. If a driveway cannot meet these requirements, a joint access is required if land use is compatible. Alignment to existing driveways on the opposite side of an arterial road is required to avoid conflicting turning movements.
- Queuing or magazine storage, as measured from the property line, is the projection of the driveway into the site with no parking stalls or cross aisles directly accessible to it. This storage must be clear of all obstructions including speed bumps, gates, and fences. Queuing storage shall conform to the following table:

No. Parking Stalls	Length
0-100	6 metres
101-150	12 metres
151-200	18 metres
>200	24 metres

Driveway crossings onto arterial roads shall not be permitted when other means of access is available.

(e) Parking:

- On-street parking shall be prohibited on major arterial roadways.

- On-street parking may be permitted on minor arterial roadways if feasible but maybe prohibited during peak periods. Such parking will not be permitted within 50 metres of either side of a signalized intersection or within 30 metres of an unsignalized intersection with another arterial road.

(f) Traffic Calming:

- Traffic calming and other traffic engineering techniques should be applied to all new residential subdivision developments to minimize the use of local neighbourhood streets by through traffic and reduce speeds – this will also encourage cycling and walking for short local trips.

(g) New Developments:

- Traffic impact studies shall be undertaken for all new or expanded developments that will generate more than 100 trips in a peak hour with the calculation of trips based on either the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (Seventh Edition) or the Ministry of Transportation's *Trip Generation and Parking Rates* manual of January 1996.
- A traffic impact study shall also be required when the number of trips generated is less than 100 and the site is considered by District staff to be located in close proximity to a known existing or potential congested area on a high accident location, or where site access or other safety issues are of concern.

5.14 Data Collection Program

The District should implement a traffic count program that includes recording a.m. and p.m. peak period turning movements at all signalized intersections in the District every second year – this includes signals under the jurisdiction of the Ministry if such information is not available from the Ministry. Up to 25 other unsignalized intersections that are considered to be the busiest in the District should also be monitored by undertaking turning movement counts every two years as well. These counts should include pedestrians and trucks. Through this, potential future signalized intersections can be prioritized. It is recommended that one half of these intersections be counted each year in June with the program undertaken through the use of summer students. These intersections, in descending order of priority are as follows:

- Petersen Road/14th Street
- Petersen Road/Island Highway
- Petersen Road/Willis Road
- Dogwood Street/Alder Street (when connected)
- Island Highway/Rockland Road
- Island Highway/2nd Avenue
- 9th Avenue/Ironwood Street
- Alder Street/2nd Avenue

- Petersen Road/16th Street
- Dogwood Street/Robron Road
- 16th Avenue/Maple Street
- Alder Street/Mercroft Street
- Dogwood Street/Evergreen Road
- Dogwood Street/Erikson Road
- Island Highway/Erikson Road
- Island Highway/6th Avenue
- Petersen Road/Evergreen Road
- Alder Street/6th Avenue
- Alder Street/9th Avenue