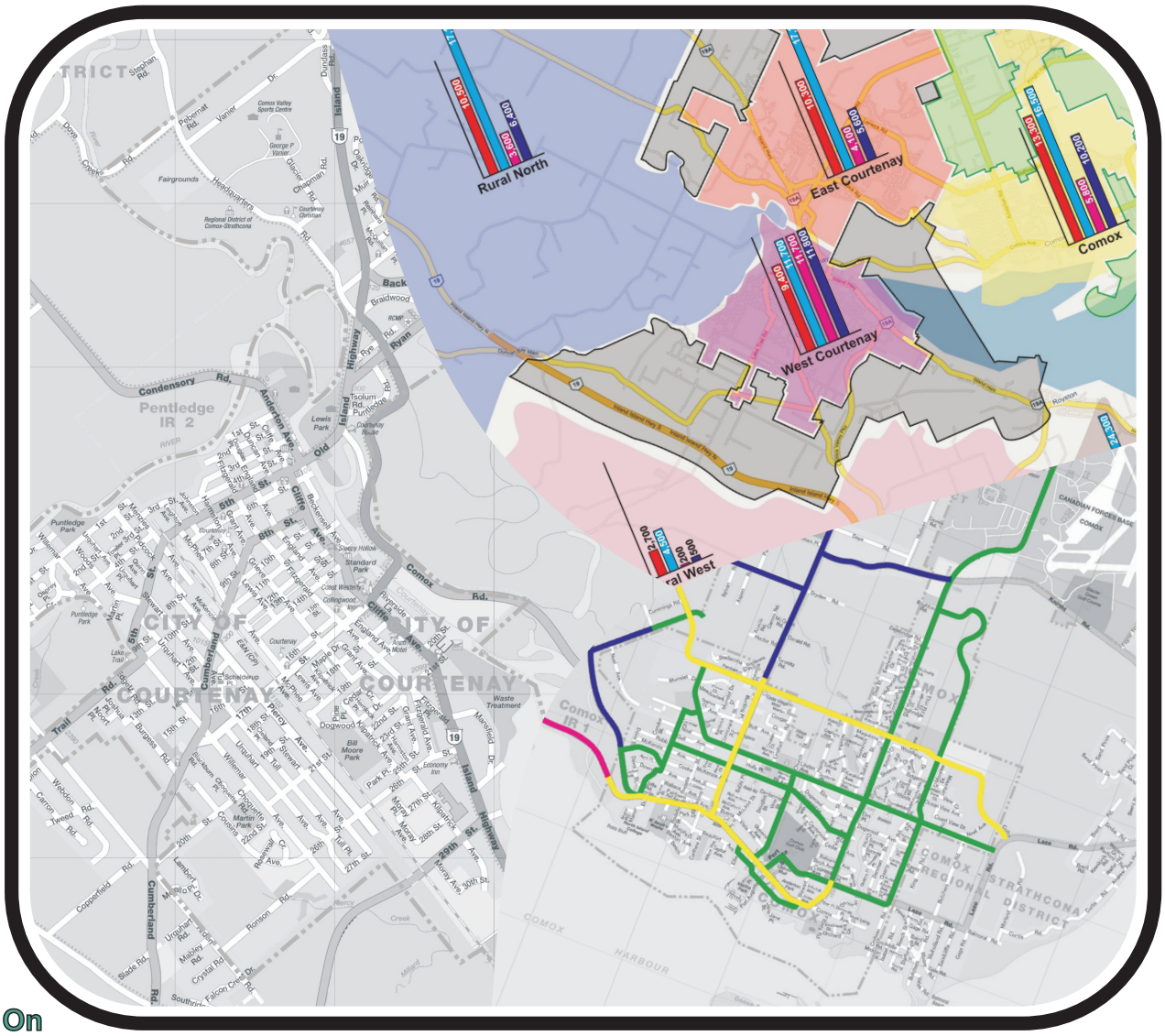
Report to

CITY OF COURTENAY



On

2005 TRANSPORTATION STUDY

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- Traffic Impact
- Parking
- Transportation Planning
- Corridor Studies
- Traffic Operations
- Transit
- Trucking
- Network Modelling
- Bicycles/Pedestrians

June 5, 2006

City of Courtenay
Operational Services Department
830 Cliffe Avenue
Courtenay, BC V9N 2J7

Attention: Mr. Kevin Lagan, P. Eng.
Director of Operational Services

Dear Kevin:

Re: 2005 Courtenay Transportation Study

In response to your request, we have now completed our work on the 2005 Courtenay Transportation Study. The work undertaken, including a summary of the analysis, together with the conclusions and recommendations, is provided in the attached final draft report which now incorporates comments received from the Steering Committee on the earlier draft report. This study addresses the current traffic conditions on the road network and prepares recommended plans for the future 2025 transportation network for the City and its surrounds, including the suggested phasing of the improvements.

I trust this provides the information you require at this time. Please feel free to contact us with any comments or questions that you may have.

Yours truly,

T. J. WARD CONSULTING GROUP INC.

Mark Merlo, M.A.Sc., P.Eng.
Traffic/Transportation Engineer

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TABLE OF CONTENTS

TABLES:

EXHIBITS:

EXHIBITS:

1.0 INTRODUCTION

1.1 Background to Study

The City of Courtenay is strategically located on the East Coast of Vancouver Island in the Comox Valley with an area population of approximately 65,000. At the present time there are four highway links, a ferry route from Powell River, and the Comox Valley Airport that provide access to and from Courtenay. The Ministry of Transportation completed the new four lane divided Inland Island Highway (Highway 19) that passes around the west side of the municipality, and the former Island Highway, Highway 19A, still passes through the City as a separate facility. Whilst the new highway carries much of the long haul traffic on the island, the original two lane highway, which follows the coast and skirts around the edge of the City's downtown, is still used by much of the tourist traffic and regional traffic from the Comox Valley. Passenger traffic through the airport has been increasing at a very high rate and this airport is now the sixth busiest in British Columbia. A map of the existing road network is shown in Exhibit 1.1.

There has been a constant growth in population over the last few decades. In the last 10 years in particular it has grown at approximately 4% per annum and it is expected that this rate will continue, at least for the next 10 years. This growth has placed a significant stress on the road network, especially on the roads that lead into and out of the downtown and the commercial area around the junction of Ryan Road and Highway 19A. The form of the municipality's road network has been influenced significantly by a number of factors including topography, Indian reserve boundaries, Agricultural Land Reserve (ALR) designation, and highway corridors. All of these play a significant role in selecting any new roads to augment the existing network.

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 increased car ownership, increased recreational time, increased tourists and visitors, and increased spending powers. Congestion on the existing roads is compounded by 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.

Along with the construction of the new Inland Island Highway, the Ministry provided a very limited number of access points to the municipality. In addition, the City's Road network does not have an extensive arterial grid network and has relied upon Ministry of Transportation roads, namely Highway 19A and Ryan Road which are both heavily used by local traffic. This has put pressure on the municipality to make some changes to the road network. In order to ensure that the City develops 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, the City has initiated the preparation of a Transportation Plan. With the recommendations of the study in place, the

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EXHIBIT 1.1 EXISTING ROAD NETWORK

City 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 Study Objectives

The primary objectives of the study are:

- to establish a 20 year Master Multi-Modal Transportation Plan for the City together with an indication of the schedule for implementing the various features of this plan at each five year horizon;

- to undertake an operational level review of the existing road network addressing a number of specific issues that the City has recognized; and

- to assess the need for a new crossing of the Courtenay River.

In essence, the study will create a planning tool that will assist the City in identifying, prioritising, and implementing needed improvements to its transportation network over the next 20 years.

2.0 EXISTING CONDITIONS

2.1 Road Network

The City of Courtenay and the Town of Comox have a well established road network as is illustrated in Exhibit 2.1. The key roads are summarized as follows:

(a) Highways:

- Highway 19/Inland Island Highway: The Ministry of Transportation has jurisdiction over the Inland Island Highway which runs north-south along the eastern side of Vancouver Island. In the Comox Valley this highway is a four lane divided highway with a speed limit of 110 km/h. To the southwest of Courtenay there is an interchange with the Comox Valley Parkway while at the northwest end of Courtenay there is a signalized intersection connecting to Piercy Road. Further to the northwest there is another signalized intersection at Dove Creek Road with a connection to Strathcona Parkway which services Mount Washington.

- Highway 19A: Highway 19A runs through Courtenay and the Comox Valley and was once Highway 19 which has now been replaced by the new Inland Island Highway. Its width varies between two lanes and four lanes and the cross-section also varies between urban and rural as the route passes through Courtenay. Highway 19A follows Cliffe Avenue on the west side of the City. The key link on this route is the 17th Street Bridge which crosses the Courtenay River. This bridge is four lanes wide and carries a high volume of traffic. The intersections at each end of this bridge operate at capacity, limiting the amount of traffic that can cross the bridge. This bridge is a drawbridge, and can be open for 15 minutes at a time to allow for boats to pass under it. This opening, which occurs approximately 25 times per year, creates queuing problems and delays for motorists. Highway 19A is under the jurisdiction of the Ministry of Transportation outside of the City of Courtenay as well as between 29th Street and Ryan Road inside the City.

- Ryan Road: This road runs east-west from just west of Highway 19A at Old Island Highway through to the Canadian Forces Base Comox in the east. It varies in width from a four lane urban cross-section between Old Island Highway and Back Road to a two lane rural cross-section at the eastern end. The speed limit on this road varies between 50 km/h at the western end, increasing to 60 km/h then 80 km/h, and then returning to 50 km/h at the eastern end. East of Highway 19A this road is under the jurisdiction of the Ministry of Transportation as it provides access to the Little River Ferry Terminal.

- Comox Valley Parkway: The Comox Valley Parkway connects the Inland Island Highway southwest of Courtenay through to Cliffe Avenue in the City of Courtenay. This road is also known as 29th Street near its eastern end. It is a four lane undivided road under the jurisdiction of the Ministry of Transportation as it links Highway 19 to

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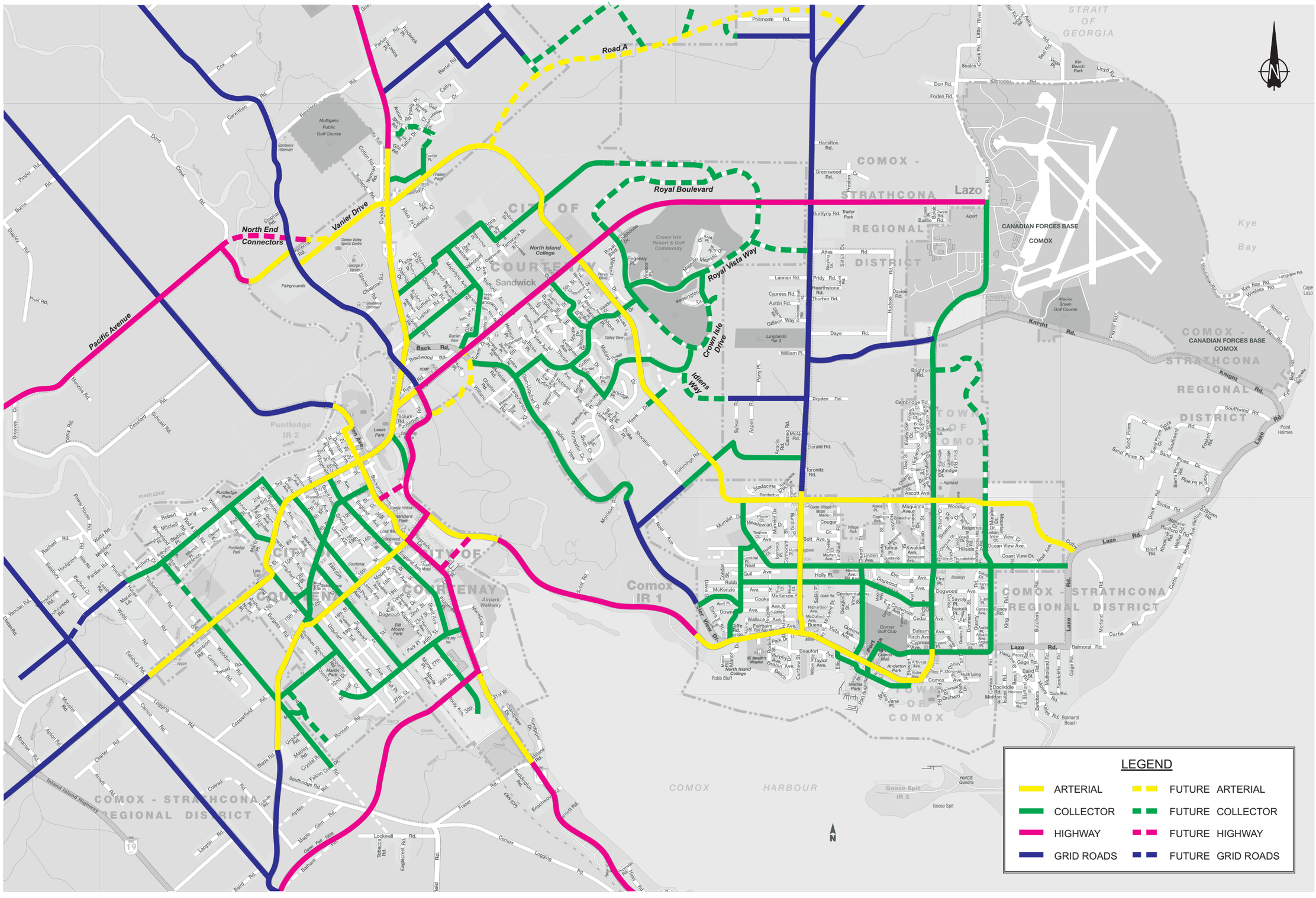
EXHIBIT 2.1
EXISTING ROAD CLASSIFICATION



Highway 19A. It has a speed limit ranging from 80 km/h at the western end at the Highway 19 interchange to 50 km/h at the eastern end in the urban area approaching Highway 19A.

(b) Arterial Roads:

The City has a network of arterial roads. The primary purpose of these roads is to move high volumes of traffic with access having a lower priority. The key arterial roads are:

- Piercy Road/Dove Creek Road/Headquarters Road/Vanier Drive: These roads provide a continuous connection between the Inland Island Highway (Highway 19) in the west and Highway 19A in the east. All these roads have a two lane rural cross-section and the speed limit varies between 50 km/h and 80 km/h. There is a temporary one lane two-way Rees Bridge across the Tsolum River which will likely become the critical point on the route as traffic volumes increase. This bridge is controlled by a traffic signal. Outside the City of Courtenay, this route is under the jurisdiction of the Ministry of Transportation, while inside the City it is classified as an arterial road.

- Cliffe Avenue: This arterial road runs north-south on the west side of Courtenay. South of 17th Street it is also known as Highway 19A. This road runs north through to Downtown Courtenay where it connects with 1st Street which in turn connects through to Anderton Avenue which provides a crossing of the Puntlege River (referred to as the Condensory Bridge) to the north. Cliffe Avenue north of 17th Street is a two lane road for most of its length. South of 17th Street through to Anfield Drive it is in general a four lane road with a two-way left turn lane, with a three lane segment (two northbound lanes and one southbound lane) between 18th Street and 21st Street.

- 17th Street: This road runs east-west from the 17th Street Bridge through to Willemar Avenue in the west where it ends. It has one marked lane in each direction plus parking west of Fitzgerald Avenue and two lanes in each direction east of Fitzgerald Avenue. The pavement width west of Fitzgerald Avenue is very wide, enough for four travel lanes.

- Cumberland Road: This road runs from Downtown Courtenay in a southwest direction through to the Comox Valley Parkway. West of Willemar Avenue it is classified as an arterial road. It is two lanes wide along its length while east of Willemar Avenue it is classified as a collector road.

- 5th Street/Lake Trail Road: This street runs west from Downtown Courtenay through to Willemar Avenue where 5th Street curves into Willemar Avenue which then travels south through to Lake Trail Road. The designated arterial route then continues west on Lake Trail Road through to the City boundary.

- Lerwick Road/Veterans Memorial Parkway: This road runs from the Town of Comox in the south through to Highway 19A in the north. The portion south of Mission Road is known as Lerwick Road, while north of Mission Road it is known as Veterans Memorial Parkway. This road will ultimately be a four lane road along the entire length with the recently completed segment north of Ryan Road being built to that standard.

(c) Collector Roads:

Courtenay also has a number of collector roads serving the residential and commercial areas of Courtenay. Some key collector roads are Back Road, Cumberland Road, 26th Street, Fitzgerald Avenue, and Valley View Drive. These collector roads supplement the arterial routes in some case providing parallel routes and in other cases connecting to the arterial roads. All of these roads are shown in Exhibit 2.1.

(d) Future Roads:

A number of future roads are shown in the City of Courtenay's road classification map and some of these key roads are summarized below and included in Exhibit 2.1 as broken lines.

(a) Road A: This new road will connect Veterans Memorial Parkway to Eleanor Road through the proposed Block 71 development. It will then provide an alternate route between Veterans Memorial Parkway and Highway 19A through to the ferry terminal at the north end of Eleanor Road. A number of collector roads are proposed off of Road A connecting to existing roads of Willis Way, Quenville Road, Huband Road, and south to Philmonte Road.

(b) North West Connector (Piercy Avenue/Vanier Drive): An upgraded arterial road is proposed connecting Vanier Drive east of Headquarters Road to Piercy Avenue via a new bridge over the Tsolum River. This will replace the existing single lane two-way bridge and will provide a more direct routing.

(c) Idiens Way: This collector road will be extended east from its current termination at Norfolk Way through to the existing Idiens Way west of Anderton Road, north of the Town of Comox. This will provide another connection between Courtenay and Comox.

(d) Crown Isle Drive: This is to be extended south through the Crown Isle development to provide a loop road serving the south segment of this development. It will also connect to Norfolk Way. As the Crown Isle development is built, Crown Isle Drive will be extended. A connection is also possible east to Atlas Road.

(e) Royal Vista Way: This road will be extended eastward to connect through to Ryan Road just west of Anderton Road. It will continue on the north side of Ryan Road traveling west through to the existing segment of Crown Isle Boulevard running

north of Ryan Road just east of Lerwick Road. There will also be a connection from Royal Boulevard to Atlas Road which will in turn connect to Anderton Road south of Ryan Road.

(f) Courtenay River Crossings: Two potential river crossings are shown on the City's Official Community Plan Road Network, one at 11th Street and one at 20th Street. These crossings would connect Cliffe Avenue to Comox Road.

It will be noted that Exhibit 2.1 also includes "Grid Roads" – these are roads outside of the two municipalities that have been designated as major roads.

2.2 Traffic Controls

There are 25 signalized intersections within the City of Courtenay, of which 11 are under the control of the Ministry of Transportation and the remainder under City control. Most of these signals are located in Downtown Courtenay, along Highway 19A, Cliffe Avenue, and Fitzgerald Avenue as well as on Ryan Road. The locations of these signals are shown in Exhibit 2.2.

All the remaining unsignalized intersections are under at least two-way stop-control with a number of four-way stop controlled intersections throughout the City. Typically traffic on arterial roads has the through priority over traffic on all intersecting streets. There is also one roundabout which was recently installed in November 2003, located at the intersection of Cumberland Road and Willemar Avenue.

2.3 Traffic Volumes

Traffic volumes at a selected number of intersections were established through turning movement counts undertaken as part of this study. In addition, count data was obtained from other studies, the City of Courtenay, and the Ministry of Transportation. The resultant 2005 p.m. peak hour traffic volumes on many road links are shown in Exhibit 2.3. As can be seen from this exhibit, the high volume routes through Courtenay are Highway 19A, Ryan Road, Lerwick Road, 29th Street, and Comox Road as well as 5th Street Bridge and Cliffe Avenue, all with volumes of 1,000 or more two-way in the peak hour.

The traffic volumes across the two Courtenay River bridges are also high with a two-way volumes of approximately 3,100 veh/h on the 17th Street Bridge and 1,900 veh/h on the 5th Street Bridge in the p.m. peak hour. The 17th Street Bridge has the highest volume on any link in the Courtenay area. Traffic volumes on other arterial and collector roads throughout Courtenay are much lower, typically 500 veh/h or less two-way. From these volumes it can be clearly seen that the high volume roads resulting in congestion are concentrated in a relatively small area and outside of this area there are lower volumes and thus lower levels of congestion.

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EXHIBIT 2.2
EXISTING TRAFFIC SIGNAL LOCATIONS

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EXHIBIT 2.3
EXISTING PM PEAK HOUR VOLUMES

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 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, the worse is the level of service. Table 2.1 shows the relationship between level of service and delay.

Table 2.1
Level of Service vs. Delay

LoS	Signalized Intersection Stopped Delay/Vehicle (s/veh)	Delays	Unsignalized Intersection 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 analyzing 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. Using this and the demand volume the volume to capacity ratio can be calculated. Delay for a movement is calculated based on the volume and capacity. From this delay a level of service is assigned.

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.

The overall intersection level of service at key intersections is shown in Exhibit 2.4 for the p.m. peak hour and v/c ratios and levels of service are shown in Table 2.2. As can be seen, most of the intersections in the area operate at a good Level of Service A, B, or C. The signalized

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EXHIBIT 2.4

OVERALL INTERSECTION LEVEL OF SERVICE - 2005 PM PEAK HOUR

intersections of Ryan Road/Highway 19A, Ryan Road/Sandwick Road, and Ryan Road/Back Road operate at Level of Service F, D, and D respectively and these three intersections are located on the most congested section of Ryan Road. The unsignalized intersection of Ryan Road/Little River Road in front of the Comox Air Force Base operates at Level of Service F in the p.m. peak hour primarily due to a surge of traffic leaving this base just after 3:30 p.m. In the a.m. peak hour when traffic is arriving at the base, the congestion is less severe as there is less traffic on Little River Road. Outside of this time the intersection operates well. The other areas of congestion are 17th Street/Comox Road and 17th Street/Cliffe Avenue with these two signalized intersections operating at Level of Service E and F. This is not surprising since as mentioned previously, the 17th Street Bridge has the highest volume of traffic of any road link in the Courtenay area.

Table 2.2
Intersection Analysis Results

	Intersection	Signals?		a.m. peak		p.m. peak	
				v/c	LoS	v/c	LoS
1	5th St/Fitzgerald	Y		0.75	C	0.65	C
2	20th St/Cumberland	N		0.10	B	0.16	B
3	26th St/Kilpatrick	N		0.46	B	0.58	B
4	5th St/Cliffe	Y		0.86	C	0.89	C
5	8th St/England	N		0.12	C	0.76	F
6	27th St/Kilpatrick	N		0.20	A	0.31	C
7	Ryan/Cowichan	N		0.47	E	0.38	F
8	Lerwick/Malahat	N		0.78	F	0.35	E
9	17th St/McPhee	N		0.48	B	0.61	B
10	6th St/Cliffe	Y		0.37	A	0.88	C
11	4th St/Cliffe	N		0.09	A	0.14	A
12	1st St/Anderton	N		0.06	A	0.17	B
13	17th St/Fitzgerald	Y		0.57	B	0.83	B
14	17th St/England	N		0.24	D	0.47	E
15	Mission/Lerwick	N		0.46	F	0.50	F
16	Lake Trail/Willemar	N		0.35	A	0.45	B
17	Ryan/Back	Y		0.84	C	0.95	D
18	Ryan/Sandwick	Y		0.49	B	0.77	D
19	Ryan/Hwy 19A	Y		0.76	C	0.93	F
20	Ryan/Old Island Hwy	Y		0.83	B	0.81	B
21	Hwy 19A/Veterans Mem.	Y		0.57	B	0.52	B
22	17th Street/Comox	Y		0.95	C	1.21	E
23	17th Street/Cliffe	Y		0.86	D	1.41	F
25	Lerwick/McDonald	N		0.19	C	0.23	C
26	Rees Bridge	Y		0.33	C	0.56	C
27	Ryan/Lerwick	Y		0.65	B	0.72	C
28	29th St/Cliffe	Y		0.41	A	0.76	B
29	Knight/Pritchard	N		0.18	B	0.17	B
29A	Knight/Pritchard	N	airport arrival peak	0.14	B	0.15	B
29B	Knight/Pritchard	N	airport departure peak	0.15	B	0.21	B
30	Ryan/Little River	N		0.50	C	3.32	F
30A	Ryan/Little River	N	Peak 15 min.	0.53	C	2.35	F
31	Ryan Old Island	Y		0.38	B	0.81	B

Note: v/c and LoS for unsignalized intersections are for the worst movement

At some of the busier stop-controlled intersections the overall level of service may be A, B, or C; however, individual movements from the minor streets may have a level of service that is much worse. For example, at Malahat Drive/Lerwick Road where the overall intersection level of service is A, the level of service for the westbound movement is E and this is what is included in the table.

All the analysis results given in Table 2.2 were based on one hour volumes. It is acknowledged that the Air Force Base and Airport generated traffic passing through the intersections of Knight Road/Pritchard Road and Ryan Road/Little River Road have very short peaks. In order to capture conditions during these peak times, the peak 15 minute volumes were factored up to one hour volumes. These results indicated that there is little difference in operation at Knight Road/Pritchard Road, except in the p.m. peak hour when outbound traffic from the airport peaks. This takes the v/c ratio to 0.21, up from 0.17 for the p.m. peak hour given in Table 2.2. At Ryan Road/Little River Road the v/c ratio is lower in the peak 15 minutes in the p.m. peak hour as a peak hour factor has not been applied to all movements and the only high volume movement is the westbound through movement.

2.5 Traffic Accidents

The RCMP and ICBC crash data was available for the intersections within the City of Courtenay. This data is summarized in Exhibit 2.5 and shows the highest crash locations throughout the City based on the number of accidents occurring in the five year period from 2000 to 2004 from the RCMP data. From this it can be seen that the highest number of accidents occur at 17th Street/Cliffe Avenue with a total of 79 accidents. This is a very busy intersection with high volumes of turning movements and this in part is the explanation for the high number of accidents; however, it also has the highest number of accidents per million vehicles entering the intersection.

Table 2.3
Summary of Accident Data

		Number	No./Yr	Rank	Accidents/Million Entering Vehicles
17th Street	Cliffe Ave	79	15.8	1	1.45
Ryan Road	Highway 19A	39	7.8	2	0.61
Ryan Rd	Lerwick Rd	38	7.6	3	0.98
Ryan Rd	Back Rd	32	6.4	4	0.63
Ryan Rd	Old Island Highway	30	6.0	5	1.06
29th Street	Cliffe Ave	26	5.2	6	0.83
Highway 19A	Headquarters Rd	25	5.0	7	0.98
Ryan Rd	Sandwick Rd	21	4.2	8	0.37
17th Street	Comox Rd	18	3.6	9	0.38
17th Street	Fitzgerald Ave	17	3.4	10	0.63

Based on RCMP data (5 years)

The second highest accident location is Ryan Road/Highway 19A, also another busy intersection with high turning volumes. This is much "safer" in terms of number of accidents per million vehicles entering. The third highest accident location is the intersection of Ryan Road/Lerwick

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EXHIBIT 2.5
RCMP CRASH DATA
- NUMBER OF CRASHES FROM 2000 TO 2004

1628

Road which has recently been upgraded with the opening of the Home Depot store. This intersection had 38 accidents over the five year period or about seven accidents per year. It should be noted that almost all of these high accident intersections are signalized intersections indicating that the lack of signals is not the reason for the high number of accidents. A summary of the number of accidents and accident rates are shown in Table 2.3 for the top 10 accident locations. Rates for intersection accidents are normally in the range 0.15 to 0.31 accidents per million entering vehicles. All of the intersections listed in Table 2.3 have rates higher than this range. Since these are the highest accident locations in the City, this result is not unexpected. It should be noted that the typical accident rates vary by road classification and volumes.

2.6 Transit

The Comox Valley has a transit service with nine routes which cover the majority of the City of Courtenay and the Town of Comox as well as the Village of Cumberland. All of these routes travel to and from Downtown Courtenay at 4th Street and Cliffe Avenue. The service is funded by the Regional District of Comox-Strathcona and BC Transit. The routes are summarized briefly below and shown in Exhibit 2.6.

(a) *Route 1: Town Shuttle:* This service runs from Downtown Courtenay through most of the west Courtenay area including Driftwood Mall and Anfield Centre. Service is provided approximately every 30 minutes Monday to Friday during the day as well as every 60 minutes on Saturday morning and every 30 minutes on Saturday afternoons.

(b) *Route 2: Cumberland:* This route travels between Cumberland and Downtown Courtenay via Cumberland Road, the Comox Valley Parkway and Driftwood Mall. Service is provided every hour Monday to Saturday during the day.

(c) *Route 3: Via Ryan Road:* This route runs from Downtown Courtenay along Ryan Road to Lerwick Road, then south on Lerwick Road through to the Town of Comox. This route then loops back to Downtown Courtenay via Comox Road with a stop at the Anfield Centre. Service is provided hourly Monday to Saturday.

(d) *Route 4: Comox via Comox Road:* This essentially follows the same route as *Route 3* but in the opposite or counterclockwise direction. Service is also provided hourly Monday to Saturday during the day.

(e) *Route 5: Vanier Loop:* This service is only provided on a limited basis with five trips on Mondays to Fridays and three trips on Saturdays. It connects Downtown Courtenay to the Comox Valley Sports Centre with some trips also operating from Driftwood Mall.

(f) *Route 6: Uplands:* This route connects Downtown Courtenay to the East Courtenay area including North Island College. Service is provided hourly Monday to Saturday during the day.

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EXHIBIT 2.6

TRANSIT ROUTES

22 HUBAND/ SEAL BAY SERVICE AREA

21 CAPE LAZO/ POINT HOLMES SERVICE AREA

LIMITED SERVICE

LEGEND

- 01 - TOWN SHUTTLE
- 02 - CUMBERLAND
- 03 - COMOX via RYAN & LERWICK
- 04 - COMOX via COMOX ROAD
- 05 - VANIER
- 06 - UPLANDS
- 10 - ROYSTON-BUCKLEY BAY
- 11 - LITTLE RIVER
- COMMUNITY BUS ROUTE

(g) *Route 10: Royston Buckley Bay:* This route connects Downtown Courtenay to Royston via Driftwood Mall and Anfield Centre. Seven trips are provided Mondays through Fridays and six trips on Saturdays.

(h) *Route 11: Little River:* This route connects Downtown Courtenay to the Little River Ferry Terminal and the Comox Airport. Five trips are provided Mondays to Fridays and four trips on Saturday.

(i) *Route 99: School Special:* Two trips per day are provided on this route: one before school and one after school. The route serves Courtenay Middle School, Mark Isfield School, G. P. Vanier Secondary, and Highland Secondary School.

There are also two community bus services: *Route 22 – Huband/Seal Bay* which serves the Huband Road and Seal Bay area as well as *Route 21 – Cape Lazo/Point Homes* which serves the very eastern end of Comox. Both of these routes operate a door-to-door pick-up and drop-off service for residents of the areas not served by the fixed route systems. These services pick-up in these two areas between 9:00 and 10:00 a.m., 1:00 and 2:00 p.m., and 4:00 and 5:00 p.m. with the last pick-up window being for travel between the two service areas only and not outside of the service area.

Transit data for the conventional Comox Valley transit system was available for the period of 1999/2002 to 2004/2005. This data shows that the annual ridership for 2004/2005 was 361,000 boarding passengers in the year, up from 186,000 in 1999/2000. This is a significant increase in a five year period amounting to an almost doubling of transit ridership, i.e., 14% per year. Based on the ridership data provided, the largest proportion of bus riders are students followed by adults. After this there are transferring passengers, passengers with passes, and seniors. This breakdown is based on ridership data between April and October. In the summer the number of student riders is significantly lower.

2.7 Bicycles

The City of Courtenay has a number of designated bicycle routes as detailed on Exhibit 2.7. Most of these routes are actually provided using shared vehicle/bicycle lanes with the exception of Lerwick Road between Mission Road and Hawk Drive which has marked bicycle lanes in both directions. Most of these designated routes do not have additional pavement widening to accommodate bicycles. Notable exceptions are Highway 19A, Lerwick Road and Ryan Road between Highway 19A and Back Road. The Town of Comox has a number of bicycle routes as shown in Exhibit 2.7 and some of these, particularly along Guthrie Road, are marked while others are not. Some route have additional widths while others do not. Roads with additional pavement width include Guthrie Road, Noel Drive, Balmoral Avenue, and Pritchard Road.

2.8 Stakeholder Input

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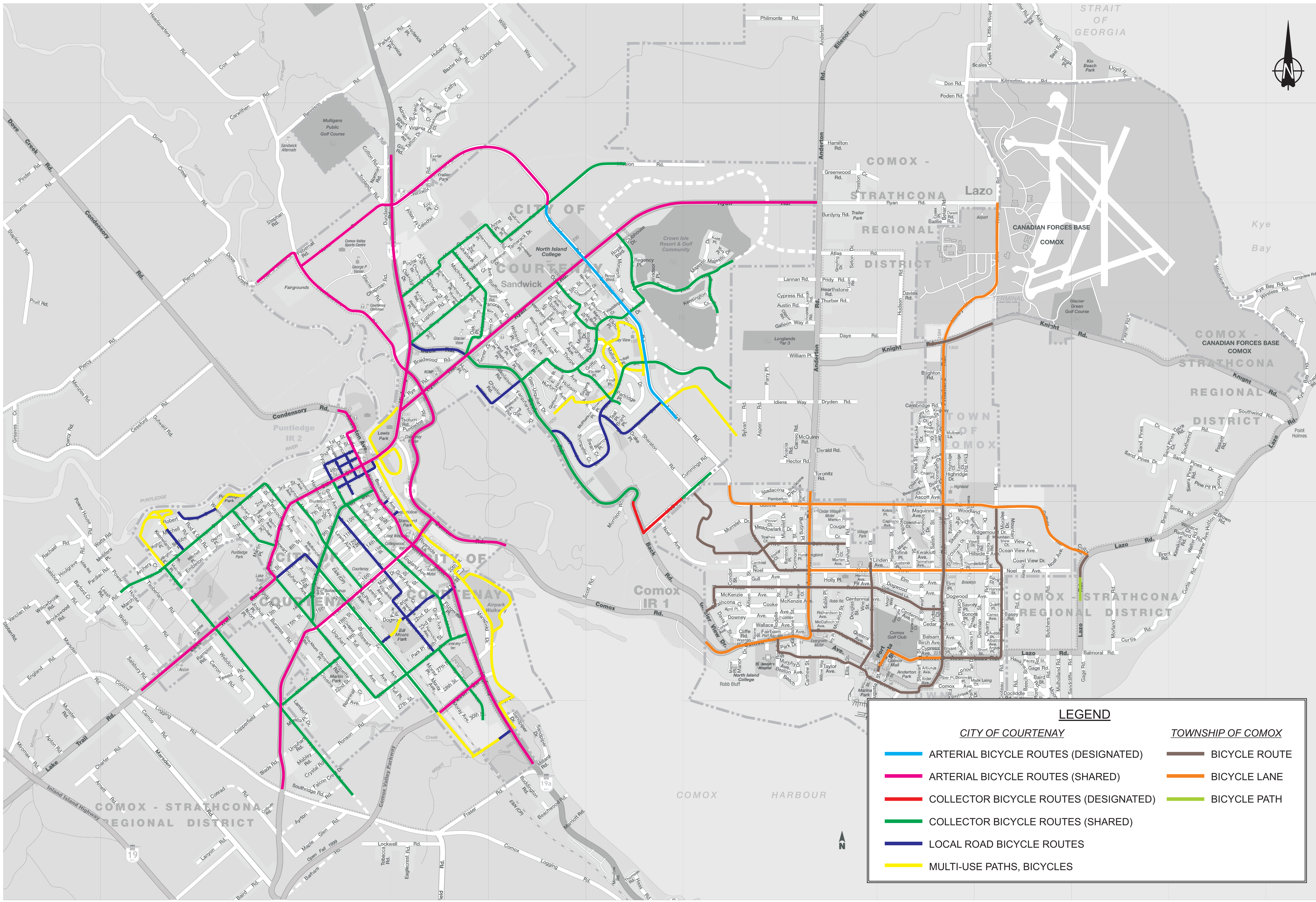
EXHIBIT **2.7**

CITY OF COURTENAY AND TOWN OF COMOX EXISTING DESIGNATED BICYCLE ROUTES



As part of this study, stakeholders and other interested parties were consulted to obtain their input on the existing conditions of the City's road network. These include the School District, RCMP, the transit operator, the Ministry of Transportation, Comox Airport, and the Comox Indian Band.

The following stakeholders were contacted and a summary of their comments are detailed below.

(a) Watson & Ash (Transit Operator for BC Transit) - No concerns other than traffic volumes.

(b) RCMP – Problems noted include:

- Ryan Road at Hwy 19A and Sandwick Road (rear end accidents, heavy congestion and blocked intersections);
- Ryan Road/Cowichan Road due to lack of crosswalks;
- Pavement marking at Ryan Road/Lerwick Road are difficult to see when raining/dark;
- At Kilpatrick/26th Street the stop bars are set far back and vehicles do not follow the 3 way stop procedure;
- On Fitzgerald Avenue between 5th Street and 19th Street there are many accidents including a number involving pedestrians and bicycles;
- At 8th Street/England Avenue the road is wide and the visibility for left turns from England Avenue can be blocked by large parked vehicles; and
- Merging problem on Cliffe Avenue between 18th Street and 21st Street where two lanes merge into one.

(c) School District No. 71 – No issues at this time. In 2008/2009, Grade 6 students will be moved to middle school and Grade 9 students to senior school. This would increase the amount of busing.

(d) Cardinal School Bus Service – Cardinal indicated that they have the usual problem of vehicles not stopping for flashing red lights. One problem area noted was on Highway 19A between 17th Street and Ryan Road where two lanes merge to one. At these two locations, some drivers do not allow buses to merge.

(e) Regional District of Comox Strathcona – There is the potential for an 800 acres, 1,600 lot development in Union Bay which would affect traffic patterns in Courtenay.

(f) Comox Indian Band – The only concern identified by the Band is traffic volumes in general and the need for an additional crossing of the Courtenay River. A lack of transit service was also a concern.

(g) Comox Valley Economic Development – The main concern raised is the new developments located outside of Courtenay that will generate a lot of traffic coming into Courtenay; and hence congestion. These developments are detailed in Section 5.10. Congestion on the 5th Street Bridge and the 17th Street Bridge was also a concern.

(h) Comox Valley Airport – The airport is concerned about the skewed intersection at Knight Road/Pritchard Road and delays at Ryan Road/Little River Road. About one-third of Westjet traffic is destined to points north of Courtenay and one-third to points south of Courtenay; as a result links to Highway 19 and 19A are important. The airport would like improvements to the connection to Highway 19 north.

2.9 Public Input

During the study, the public was given the opportunity to provide input into the City's road network through attendance at a Public Open House held on January 26, 2006 as well as through a mail-out questionnaire. A total of 500 questionnaires were mailed to residents of the city, with 27 returned due to the addressee having moved. A total of 153 completed surveys were returned to the City of Courtenay, a return rate of 31%. A summary of the key results is given below.

- An average of 2.37 people lived in each dwelling of which 1.93 were over 15.
- A total of 1.82 cars, trucks, or motorcycles were available at each of these households. This means that 94% of adults had access to a vehicle, assuming at most one vehicle per person. If some residents had more than one vehicle, for example a car and a motorcycle, then this percentage would be reduced.
- An average of 1.6 bicycles were available for each household, meaning that about 64% of residents of all ages had a bicycle.
- An average of 1.95 trips were taken per household in the period of 3 p.m. to 6 p.m., which equated to about 0.70 trips per household per hour.
- 86% of trips made between 3 p.m. and 6 p.m. were made by car (as a driver).
- 4% of trips were made by car as a passenger.
- 5% of trips were walk trips.
- 3% of trips were by bicycle.
- 1% of trips were by bus; and
- 1% by taxi.

Respondents were asked to rank a number of factors that influence their decision on which modes to use, with 1 as not important and 5 as most important. Results are summarized below with the respondent's average rating given:

- congestion on the road network 3.6
- followed by cost of driving 3.5

- availability of other modes 3.3
- availability of parking 3.2
- Weather conditions 3.2
- Price of parking 2.9

In ranking those things that would reduce reliance on cars, the following is the ranking (1 is least effective, 5 is most effective average result shown):

- more frequent transit service 4.0
- more transit routes 3.9
- better pedestrian facilities 3.5
- more bike lanes/route 3.5
- increased fuel costs 2.6
- preferred parking for carpoolers 2.6
- allow congestion to increase 2.3
- reduce parking availability 2.3
- increase/introduce parking fees 2.3

The 5th and 17th Street Bridges and their approaches, as well as Ryan Road from Old Island Highway to Back Road were identified as the most congested locations in the city, with relatively few comments about other areas.

When asked to identify the top transportation issues, the bus service was commented on frequently, including limited routes and limited frequency, as well as the need for an additional bridge crossing over the Courtenay river, and lack of safe routes for pedestrians and bicycles.

A second open house was held on March 21, 2006, and further feedback was received. Comments included concern over the proposed Arden Road crossing over the Puntledge River as well as positive comment regarding the future bicycle network.

2.10 Current Issues

Based on a review of existing conditions as well as input from staff, stakeholders, and the public, the following is a summary of issues and concerns with the District's existing road network. These are shown in Exhibit 2.8.

- Lack of Continuous North-South Roads in West Courtenay: On the west side of Courtenay the only continuous north-south route is Highway 19A/Cliffe Avenue which runs from the south end of the City through to 1st Street in the north. Cumberland Road also provides a diagonal north-south link; however, beyond these two roads there are no other continuous routes to connect the north and south end of the west side of the City and drivers must use two or more routes to make the connection.

- Lack of Continuous East-West Routes in East Courtenay: The main east-west route is Ryan Road and further to the south there is Comox Road. There is no other east-west

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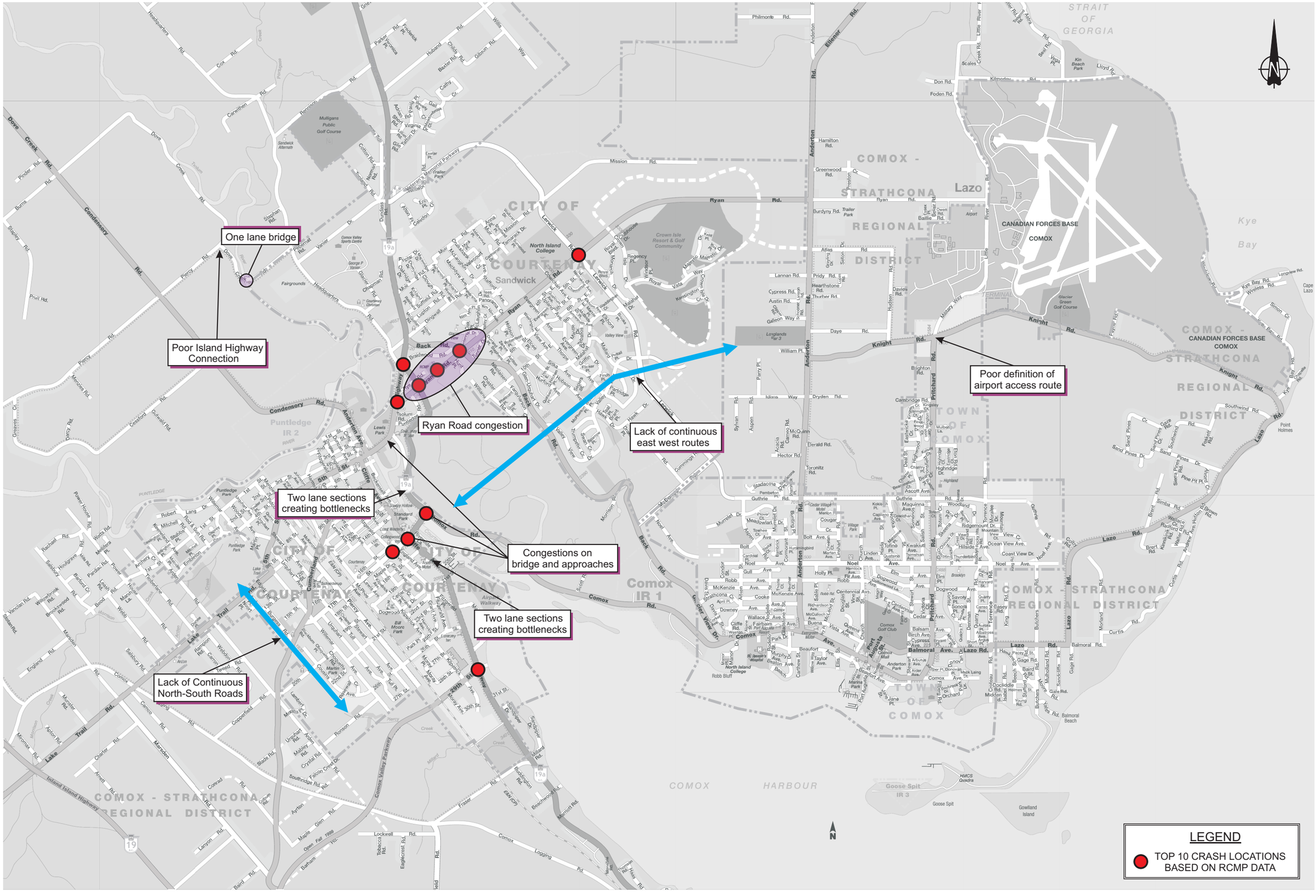
EXHIBIT 2.8
CURRENT ISSUES



road connecting Highway 19A/Comox Road through to Anderton Road. However, Back Road and Lerwick Road do provide more circuitous alternate routes.

- Two Lane Sections on Highway 19A: Highway 19A is a very busy road through Courtenay. However, a number of sections have only one travel lane per direction, namely in the southbound direction in the vicinity of 19th Street as well as both northbound and southbound between 17th Street and Ryan Road. This creates merging problems and delays for traffic on these sections of road.

- Congestion on Bridge Approaches: The two main bridges, 5th Street and 17th Street, across the Courtenay River carry high volumes of traffic. The 17th Street Bridge is constrained at either end by traffic signals while the 5th Street Bridge has a signal at the west end. Due to the fact that these are the only two crossing, volumes are high which also results in delays accessing these bridges during peak hours.

- Congestion on Ryan Road: Ryan Road between Highway 19A and Back Road is a very busy section of road which provides access to a number of commercial properties. In addition, Ryan Road functions as a longer distance road taking traffic to the airport, ferry, and other residential areas further east. The only other alternative route is Comox Road to the south, due to the large section of ALR land between Back Road and Comox Road. As a result of this, volumes are high on Ryan Road; resulting in congestion at the signalized intersections on this portion of Ryan Road.

- One Lane Rees Bridge: The Rees Bridge over the Tsolum River is a one lane two-way bridge with a traffic signal to regulate traffic in each direction. This creates delays of about half a minute during peak hours, as well as limits the capacity of the bridge; however traffic volumes are currently relatively low.

- Indirect Island Highway Connection to/from the North: In order to travel between Highway 19 and Highway 19A, one must use Piercy Road, Dove Creek Road, Headquarters Road, and Vanier Drive. An improved route would reduce travel times and improve connections between the airport, the ferry and the residential areas of East Courtenay and Comox to the Island Highway, Mount Washington, and Campbell River in the north. It should be noted that some Campbell River traffic uses Highway 19 and some Highway 19A depending on its destination in Campbell River.

- Local Operational Issues: A number of operation issues at intersection throughout Courtenay were identified by the City of Courtenay as needing examination as to potential remedial measures. These are summarized in Section 5.4.

- Airport Access Route: Currently traffic travelling to and from the airport there are two main routes they can take. From the airport travelling via Knight Road, Military Way, and Ryan Road to the west or via Knight Road, Anderton Road, and Ryan Road. The Knight Road route is shorter; however, Knight Road is a narrow road with many driveways and ditches on either side. Military Way is a longer route; however, it is a

higher standard. This second route is the currently signed route and is typically used by visitors; however, local traffic does use Knight Road.

- Roads passing through Native Lands: Comox Road passes through Comox Indian Reserve #1 and Condensory Road passes through Puntledge Indian Reserve #2. Consultation will be needed with the appropriate native bands if changes are proposed.

2.11 Pedestrian Facilities

There are a number of pedestrian crosswalks provided in the City of Courtenay both at signalized and unsignalized intersections. Exhibit 2.9 shows all intersections in the City of Courtenay that have crosswalks along with the number of crosswalks at each. An intersection with four crosswalks would have a crosswalk on each of the four legs of the intersections. Only marked crosswalks were counted, whether they be at signalized or unsignalized intersections.

2.12 Truck Routes

The existing truck routes in the City of Courtenay are shown in Exhibit 2.10. As can be seen from this exhibit and when compared to the road classification map, all arterial routes as well as Ministry of Transportation routes are specifically classified as truck routes. In addition, all industrial/commercial collectors are also truck routes. However, residential collectors as well as most local roads are not classified as truck routes.

There are also designated truck route areas in which trucks can travel on any road. One area is located in south Courtenay bounded by Anfield Road to the south, 26th Street to the north, the E&N Railway to the west, and Highway 19A/Cliffe Avenue on the east. The second area is the downtown truck area bounded by approximately 11th Street in the south, 3rd Street in the north, Fitzgerald Avenue in the west, and Anderton Avenue in the east. The last truck route area is located on the east side of the Courtenay River bounded by the Courtenay River, Dingwall Road, Highway 19A, Braidwood Road, Back Road, and the western extension of Tunner Drive through to Highway 19A and then along Highway 19A. These three truck route areas are shown in Exhibit 2.10. It should be noted that trucks are by permit only from 8:00 a.m. to 6:00 p.m. on 5th Street between Cliffe Avenue and Fitzgerald Avenue.

2.13 17th Street Bridge

The current 17th Street Bridge, which runs approximately east-west, is constrained by the intersections at either end, i.e., Cliffe Avenue to the west and Comox Road to the east. Improvements to these intersections could increase the volume of traffic travelling over this bridge. An analysis was undertaken at the two signals at either end of the bridge using the average of traffic counts taken by Ward Consulting Group and those shown in the McElhanney report on the Highway 19A/Comox Road corridor.

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EXHIBIT 2.9
MARKED PEDESTRIAN CROSSWALKS - CITY OF COURTENAY

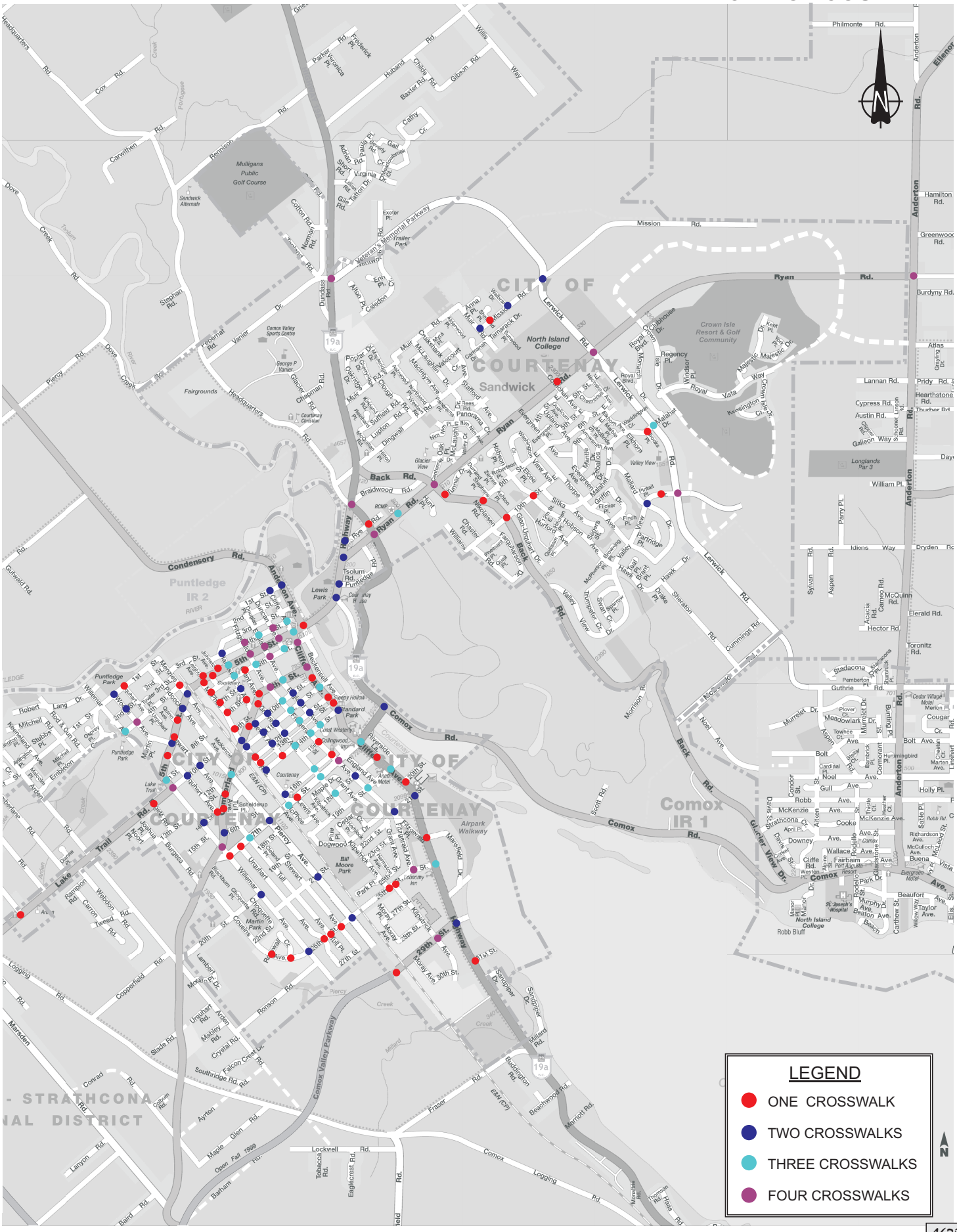

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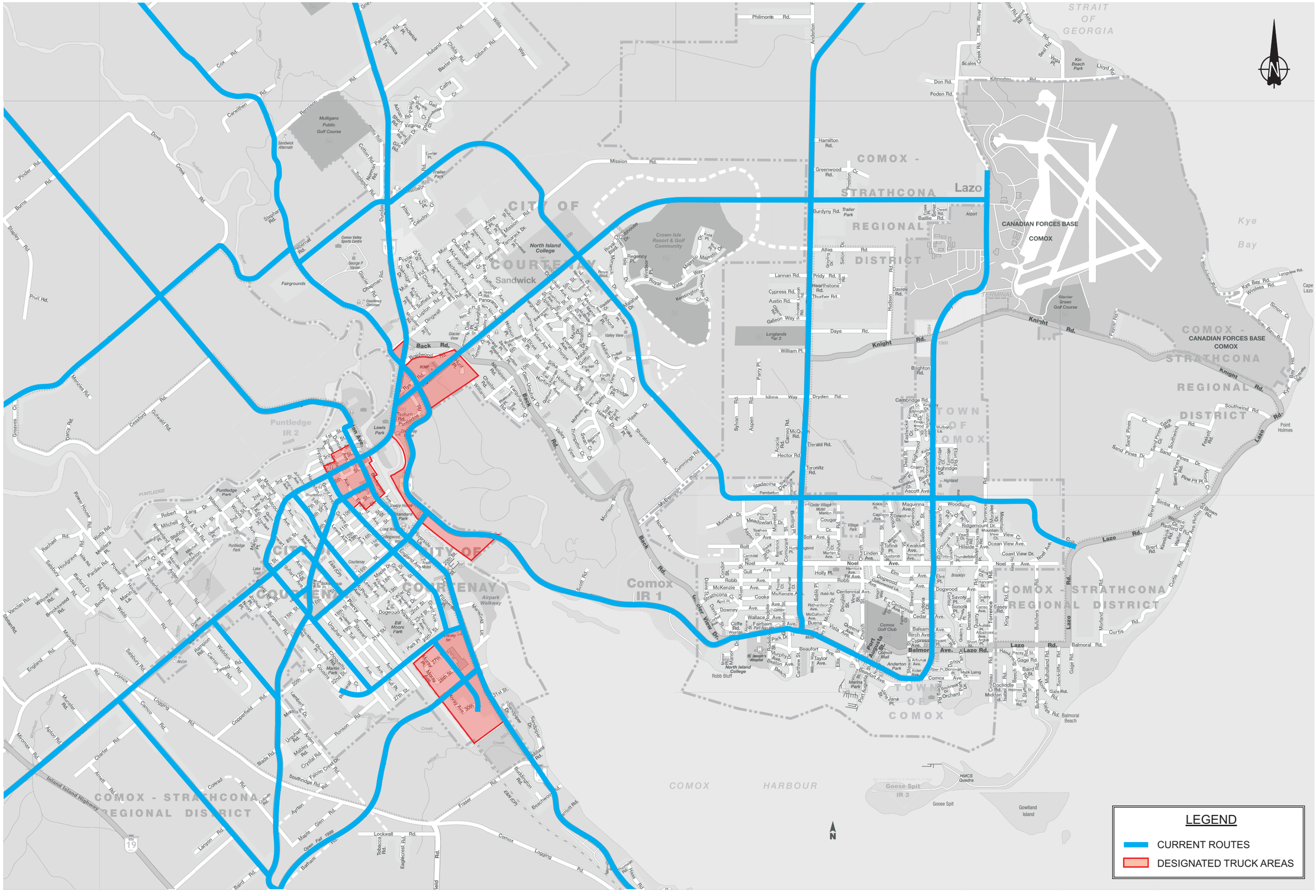
EXHIBIT 2.10
CURRENT TRUCK ROUTE MAP



At the intersection of 17th Street/Comox Road, adding a parallel eastbound right turn lane for the bridge traffic turning towards Comox would increase the capacity of the bridge in the eastbound direction. Due to the distance between the bridge and Comox Road, approximately 60 metres, only a short right turn lane could be built. In order to encourage traffic to use both left turn lanes to make the eastbound left turn towards Ryan Road, the two northbound lanes on the north leg of the intersection, i.e. Highway 19A, could be continued further north by moving the merge further north. This would be in line with future plans which call for the segment of Highway 19A to be four lanes between 17th Street and Ryan Road. This widening may encroach on ALR land on the east side of Comox Road. Adding a second northbound left turn lane and a second southbound right turn lane, both on Comox Road, would increase the capacity accessing the bridge from the east side. This would necessitate signalizing the double southbound right turn movement, and the northbound left turn movement would need a protected only phase. The additional advantage of this arrangement is that weaving on the bridge would be reduced as each stream of traffic would operate on a separate phase. Again, this may encroach on ALR lands.

At the west end of the bridge, at 17th Street/Cliffe Avenue, adding a second northbound right turn lane would increase the capacity of this movement. In the westbound direction, extending the westbound right turn lane would also be beneficial and would improve operations of the westbound right turn movement as well as the westbound through movement. Extending the second southbound lane on Cliffe Avenue south through to the existing four lane section south of 21st Street would encourage traffic to use both westbound left turn lanes at 17th Street/Cliffe Avenue and would thus improve intersection operations at this location. Without this improvement, traffic tends not to use the right hand left turn lane due to the fact that this lane ends just after 18th Street, requiring traffic to merge into the left lane. At this intersection property will be needed for the second northbound right turn lane; however, the Ministry owns the land for the westbound right turn lane.

Beyond these improvements, there would not be any way to significantly increase the capacity of this bridge. With these improvements, it is anticipated that this bridge could operate at an acceptable level through to approximately 2010.

Other improvements at these two intersections are possible, such as adding second northbound or southbound through lanes at either intersection, although these movements are not related to bridge traffic. These improvements would provide some benefit for bridge traffic in that, with an additional lane, less green time would be needed for these movements and this green time could be allocated to other bridge related movements. These improvements would allow the intersection to operate at an acceptable level for another few years. It should be noted that these are significant intersection improvements, and, at least at 17th Street/Cliffe Avenue, would likely require additional right-of-way.

A detailed study will be needed to determine the feasibility and cost of the various improvements.

3.0 TRANSPORTATION MODEL

3.1 Model Development

The TModel software was used to update the transportation planning model for use in projecting future traffic volumes on alternative road networks. This model was based on the previous model developed for the Comox Valley Transportation Study in 1995. The 66 zones in the previous model were increased to 81 zones so that those areas of the study area generating a high volume of trips could have their zones split into smaller zones. The zone structure for this new model is shown in Exhibits 3.1A and 3.1B. For each zone, population and employment related statistics were established, initially for the calibration year of 2005 and then later for the future horizon years of 2010, 2015, and 2025. All of the key roads in the Comox Valley – arterial and collector roads as well as some local roads – were incorporated into the model which included road length, speed, number of lanes, capacity, as well as intersection controls. For each of the zones, the location of one or more suitable centroid connectors were identified and connected to the road network at strategic points, generally away from intersections.

This transportation planning model uses the following steps 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 number of residential units and employment related land use in square metres of building floor area such as retail, commercial, and industrial in each zone. This is done using 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 travel time and distance on the road network between the zones. The model first calculates the travel time and distance between all zone pairs using the coded road network, and then uses the result 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 Courtenay model does not include the modal split capability, as transit service is currently limited.

(d) Step 4: Trip Assignment – The auto trips between each zone in the trip table are then assigned to the road network based on the distances and travel times along the various routes connecting the zones. The model takes into account the fact that as volumes increase, the speed decreases and travel times increase.

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EXHIBIT **3.1A**

REGIONAL ZONE MAP

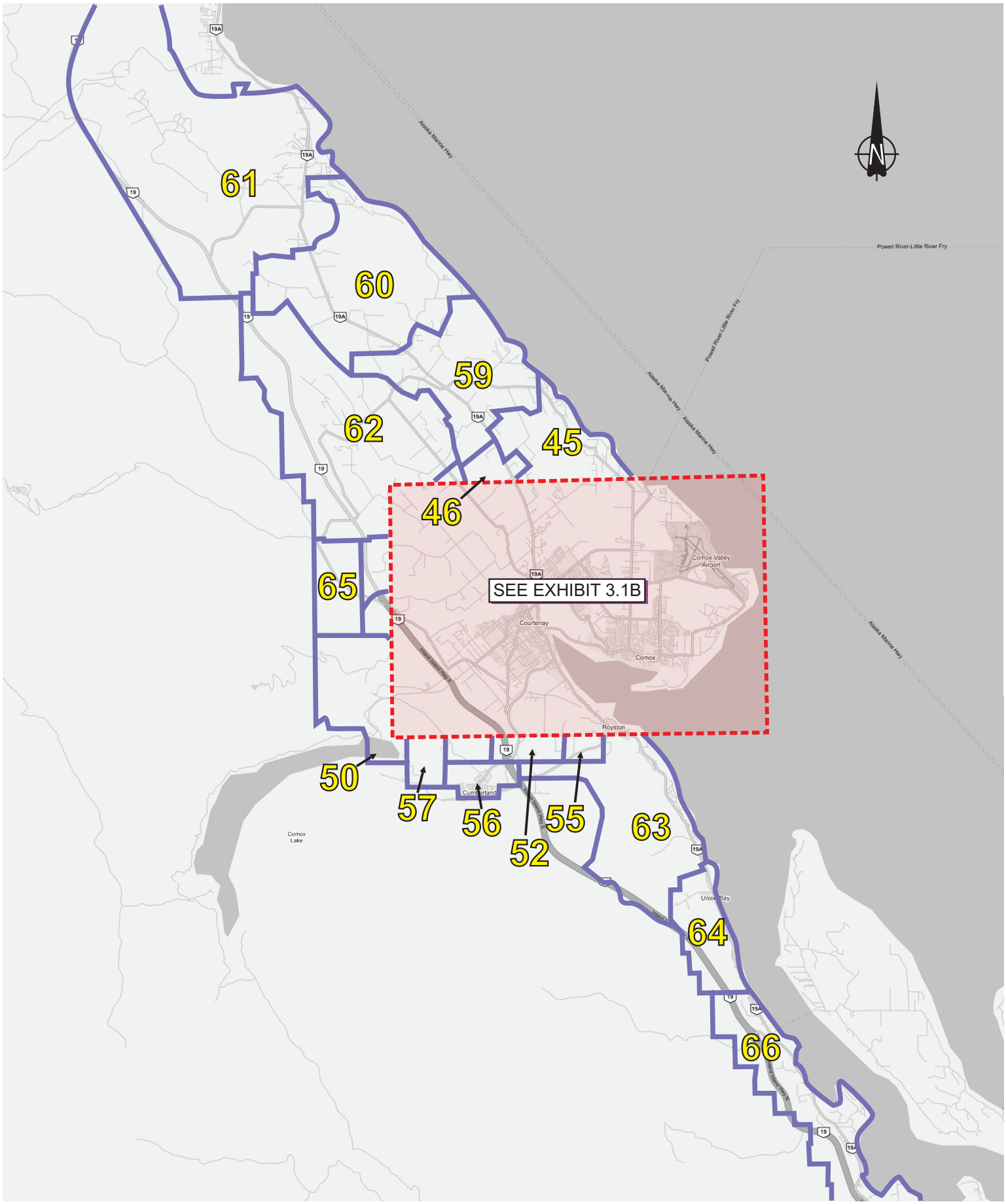

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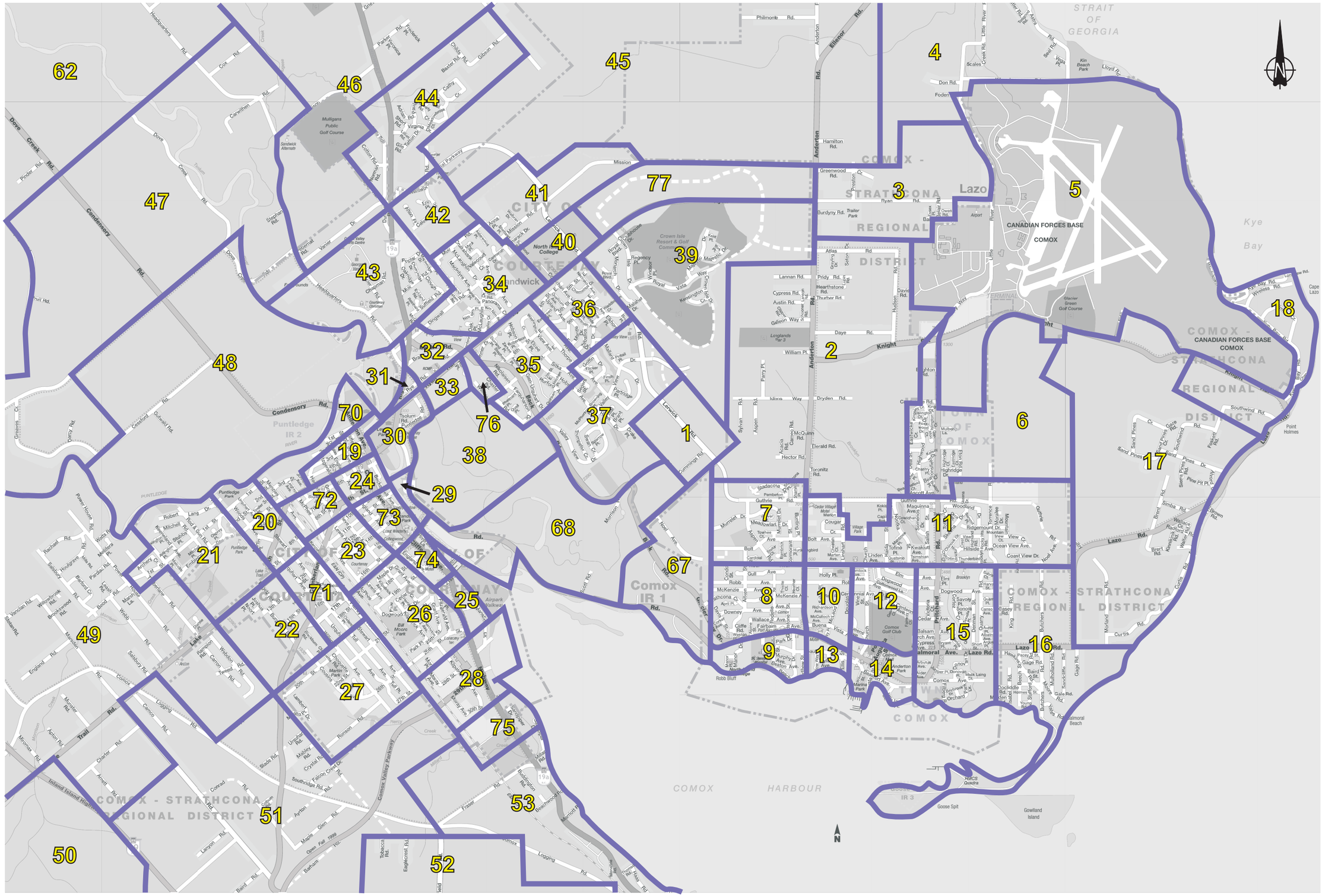
EXHIBIT **3.1B**

REGIONAL ZONE MAP



Steps two and four are done iteratively with increments of the trip table. The model also includes 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 2005 Population and Employment

The estimated residential and employment for each of the zones was established for 2005 based on data provided by the Town of Comox, the City of Courtenay, as well as in the previous Comox Valley Transportation Plan. For areas in the City and Town, as well as potential annexation areas, the data provided by these two municipalities was used, while outside of these areas the 2005 data was calculated by interpolation using the 1994 and 2012 land use data from the previous Comox Valley Transportation Plan. The employment numbers are split into a number of categories. These are:

- Civic/Institutional
- Light Industrial
- Office
- Retail
- Service Commercial
- Base/Airport
- College

The residential land use components are split into:

- Single-family dwellings
- Urban single-family dwellings
- Multi-family dwellings

Table 3.1
Population and Employment Data

	----------Population----------		----------Employment----------	
	2005	**2025**	**2005**	**2025**
West Courtenay	9,369	11,681	11,676	11,774
East Courtenay	10,344	17,146	4,063	5,562
Courtenay Annexation	6,685	12,185	1,009	7,048
Comox	13,312	16,506	5,767	10,220
Comox Annexation	5,056	17,023	1,170	4,385
Cumberland	5,519	11,106	2,336	4,912
Rural – N	10,467	17,146	3,553	6,357
Rural – S	9,589	24,275	585	1,163
Rural – W	2,671	4,527	230	464
Total	**73,014**	**131,594**	**30,390**	**51,884**

The resulting estimates for the population and employment on a municipal or area basis for 2005 are provided in Table 3.1 and this data is shown graphically in Exhibit 3.2. The employment numbers shown are estimated from the floor areas given by the City and Town for the non-residential categories of land use used in the model and are not used directly in the model. Similarly the number of dwelling units are used in the model, not population. Included in the data for the rural south is an allowance for the Kensington development at Union Bay. This is discussed further in Section 5.10.

3.3 Model Calibration

The model was calibrated based on 2005 traffic conditions using 2005 land use data. Various screenlines were established in the Courtenay and Comox area and the model's predicted results crossing these screenlines were compared to the actual volumes. Volumes were also compared on key links in the road network and where significant differences were observed, the model was adjusted by changing speeds or capacities to try and better match the actual traffic counts. In general, the model calibrated very well with individual screenlines being within 10% of the actual counts, with the variation being higher for individual links. In general those links with smaller volumes had higher percentages of error than those with higher volumes.

3.4 Population and Employment Growth

The population and employment growth over the period 2005 to 2025 for the City of Courtenay and the Town of Comox as well as their proposed annexation areas were provided by the City and Town respectively. For all other areas, the future land use and growth was based on the previous model extrapolating beyond 2012 to 2025. The 2025 land use is also summarized in Table 3.1 and show in Exhibit 3.2.

3.5 Future Use of the Model

With the model satisfactorily calibrated, it can be used to examine traffic related issues throughout the municipality in future horizon years. Whilst the land use data prepared for this study was at the 2025 horizon year, any horizon year can be selected. The land use data can be interpolated between 2005 and 2025, as was done for the 2010 and 2015 time horizons in this study, or it can be determined by other means. The disadvantage of interpolating is that it assumes growth occurs proportionately in all zones over the time period 2005 to 2025 and does not take into account the fact that some areas of 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 zones can take a significant amount of time and effort. Because of this, the growth predicted by the City of Courtenay and the Town of Comox in five year increments was used instead of direct interpolation.

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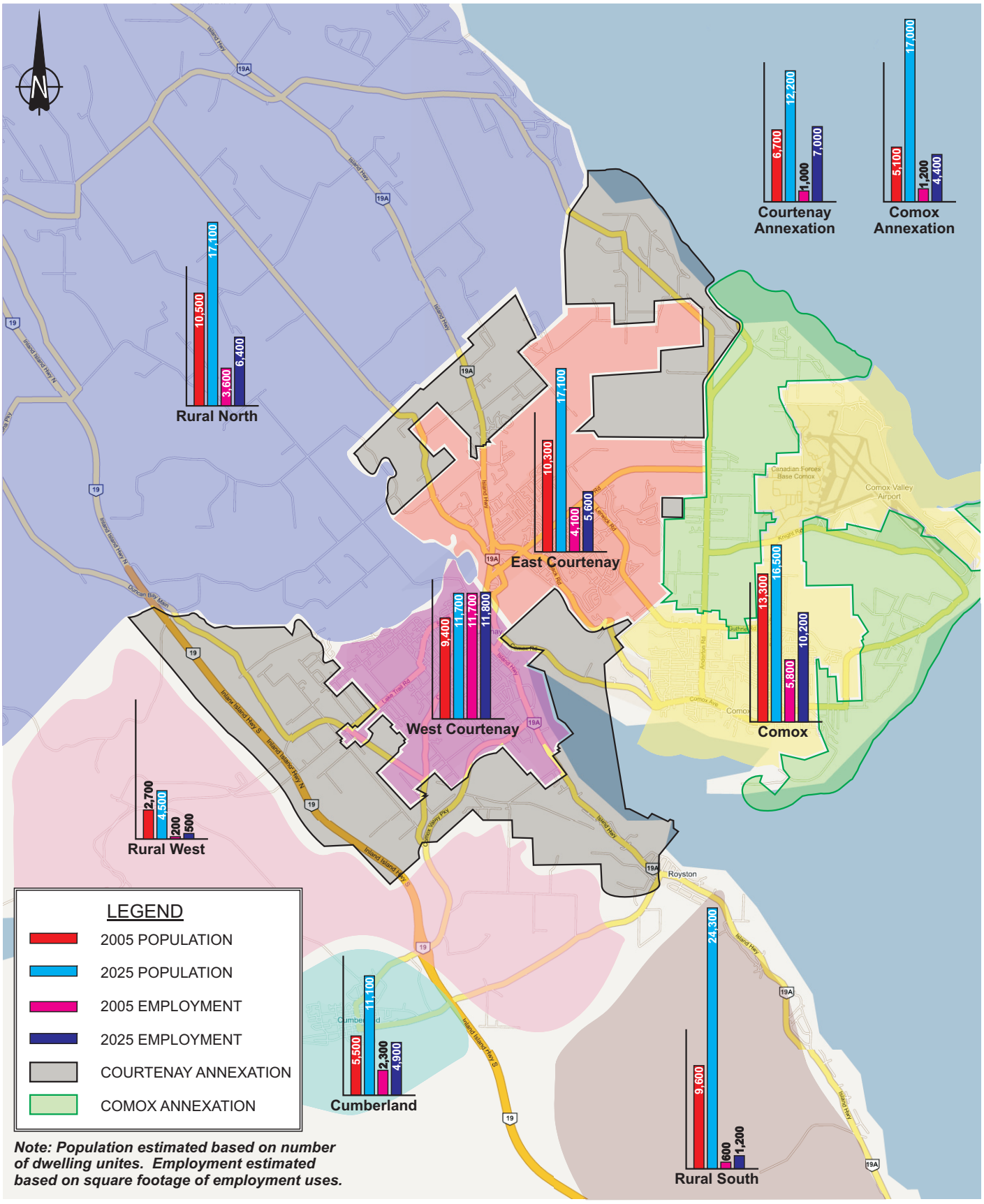
EXHIBIT **3.2**

POPULATION AND EMPLOYMENT PROJECTIONS



Note: Population estimated based on number of dwelling unites. Employment estimated based on square footage of employment uses.

1628

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:

(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:

- X upgrading existing roads from two to four lanes;
- X adding in new road network links;
- X modifying existing road network links to reflect realignment, e.g., Back Road.

(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 trip generation rates given in the Institute of Transportation Engineers (ITE) or Ministry of Transportation (MoT) trip generation rates manuals. 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, in general, 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.

3.6 Future Traffic on Existing Network

The 2005 model was run using the 2025 land use but with the existing road network in order to gauge which links will become congested if no road improvements are made. The highest volume roads in general are Highway 19A and Ryan Road with volumes on segments of these road exceeding the typical capacity of a four lane urban road, i.e., 1,600 veh/h per direction when signals are taken into account. Other roads in the City of Courtenay that would need to be four

lanes in order to accommodate future volumes include Lerwick Road, Comox Road, Comox Valley Connector which is already four lanes, as well as 17th Street, Fitzgerald Avenue, and various segments of downtown streets, in particular 5th Street. These results indicate that additional capacity is needed in the future 2025 horizon year in these critical areas.

In the Town of Comox, high volumes are noted on Anderton Road, Knight Road, and Pritchard Road in a north-south direction, on Comox Avenue in the east-west direction, as well as various other key links such as Lazo Road.

4.0 ANALYSIS OF NETWORK IMPROVEMENT OPTIONS

4.1 Goals and Objectives

The primary objectives of this project are to establish a 20 year multi-modal transportation plan for the City together with an indication of the schedule for implementing the various features of this plan at five year horizons, to undertake an operational level review of existing road network addressing a number of specific issues that the City has identified, and to assess the need for a new crossing of the Courtenay River. In essence this study will create a planning tool that will assist the City in identifying, prioritizing, and implementing needed improvements to its transportation network over the next 20 years.

The objective of this study is also to support the goals of the transportation section of the OCP. The goals identified and listed are as follows:

1. Integrate land use changes with transportation planning to coordinate changes and increases to traffic patterns.

2. Development of a transportation system that provides choices for different modes of travel including vehicle, transit, pedestrian, cycling, and people with mobility impairments.

3. Protect the integrity of the road classification system to facilitate the purpose and function of these specified road types.

4. Support and integrated transportation system that works towards reducing travel distances and congestion.

5. Support a transportation system that recognizes the importance of the character and overall appearance of the City.

6. Provide an effective transportation system that facilitates the movement of vehicles throughout the community and the Comox Valley to major regional services such as the Little River Ferry system and the Comox Valley airport.

4.2 Constraints

There are a number of significant constraints that currently affect the operation of the transportation network, and these are summarized as follows and shown graphically in Exhibit 4.1.

- Courtenay River – This river splits the City of Courtenay and surrounding area into two parts. On the east side of the river is Highway 19A to the north, the Town of Comox, the airport and the Little River Ferry Terminal, while on the west side of the river there is

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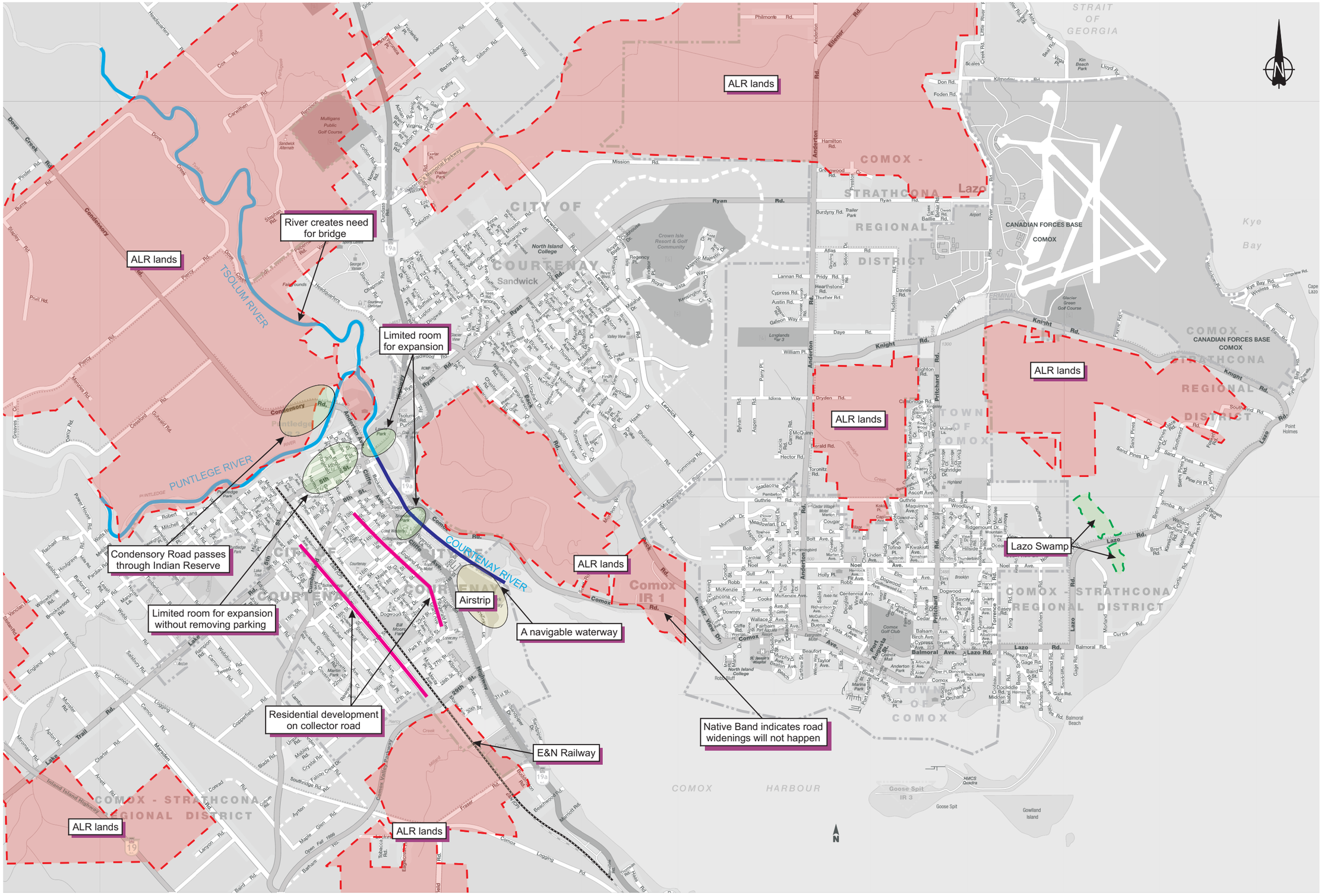
EXHIBIT 4.1
CONSTRAINTS



downtown Courtenay, Highway 19A to the south and the Inland Island Highway. The residential and commercial areas are split on both sides of the river. This situation makes any river crossings a bottleneck and the signalized intersections on either side of the two existing river crossings are very congested as a result. This river is classified as a navigable waterway north to 5th Street, and as a result, shipping clearances must be provided. This means that any new crossing would have to be a drawbridge similar to the existing 17th Street Bridge, a swing bridge, a high level bridge, or possibly a tunnel. Consequently any new crossing would be expensive.

- Tsolum River and Puntledge River – These two rivers to the north end of Courtenay are crossed by one bridge each, with the Rees Bridge, which is a "temporary" one lane two-way bridge over the Tsolum River, and the Condensory Road Bridge over the Puntlege River. Current volumes on these two bridges are not high, but with further development, this may change. These two bridges also provide a convenient connection to and from the Inland Island Highway to the north.

- Agricultural Land Reserve – Various lands in the Comox Valley are part of the Agricultural Land Reserve (ALR), including some lands adjacent to developed areas. This restricts the building of roads through these lands.

- Indian Reserve Lands – Comox Indian Reserve Number 1 on Comox Road between the City of Courtenay and the Town of Comox is bisected by Comox Road. Any widening of this road would require cooperation from the Comox Indian Band. They have indicated that any such widening of the existing right-of-way is unlikely to happen.

- E&N Railway – This railroad runs in a north-south direction west of Highway 19A/Cliffe Avenue to about 5th Street. Adding any additional crossings of this rail line would be difficult due to railway regulations. If this railway were abandoned in the future, it could provide a good north-south transportation link on the west side of the City of Courtenay.

- Courtenay Air Park – This small airport is located on the east side of Highway 19A between about 26th Street and 29th Street. Due to flight paths, any bridges across the Courtenay River would have to be carefully designed to avoid the flight paths.

- Fifth Street – This road through the downtown is one of the major shopping streets in Courtenay, and as a result there is a demand for parking, while at the same time 5th Street is an access route to the 5th Street Bridge creating a high traffic demand. Widening 5th Street could not be done unless parking is removed which would affect the businesses in the area.

- Residential Development – Some key roads through Courtenay that are continuous, such as Fitzgerald Avenue and Piercy Avenue, have residential development along them and this means on-street parking and many driveways. These conditions would have a negative impact on increasing traffic volumes.

4.3 Identification of Options

Various road network options were established and tested using the transportation planning model developed for the study. These network options were established based on:

- the existing road network plan including potential future network options;
- results from the modelling;
- results of discussions with City and Ministry staff; and
- results from previous reports and network studies.

The various road network options considered are shown in Exhibit 4.2. These options include upgrading of existing roads as well as construction of new roads or extension of existing roads. The fact that these options are tested does not imply that they are feasible or recommended options. The purpose of testing them is to determine the volume of traffic that will use them as well as the affect they will have on the volume of traffic using other routes. These individual options are summarized below.

(a) Road A: This road connecting the new Veterans Memorial Parkway through to the north end of Anderton Road through Block 71 and shown as 'A' in Exhibit 4.2 will provide a connection to the Block 71 development as well as a through route for traffic travelling along the north end of Courtenay/Comox particularly to the ferry. This can be used as an alternative to Ryan Road.

(b) North West Connector: The current Dove Creek Road (Rees) Bridge is a one lane two-way bridge. In addition, the routing between Highway 19A/Vanier Drive and the Inland Island Highway is not direct. Building a new link 'B' as shown in Exhibit 4.2 would eliminate this restriction and provide a more direct route. The remainder of this corridor may need minor upgrades to provide a good connection between Highway 19A at Veterans Memorial Parkway and the Inland Island Highway and beyond to Campbell River and Mount Washington.

(c) Idiens Way: This connection ('C') would connect Valley View Drive at Lerwick Road through to the existing Idiens Way at Anderton Road and would provide another east-west route at the east end of Courtenay connecting through to Comox. This road will also connect into the Crown Isle lands to the north via a new link, and provide an additional access to the Crown Isle development.

(d) Knight Road Connector: This new link ('D') would connect Knight Road west of Pritchard Road through to Dryden Road and Idiens Way as a continuous route. It is likely that airport traffic would find this route attractive if traveling to destinations in east Courtenay such as Crown Isle (via Idiens Way) or destinations along Anderton Road. It may not be possible to build this link and in such a case traffic would continue to travel along Knight Road to Anderton then south to Idiens Way. In this case, Knight Road could be upgraded as could Anderton Road between Knight Road and Idiens Way.

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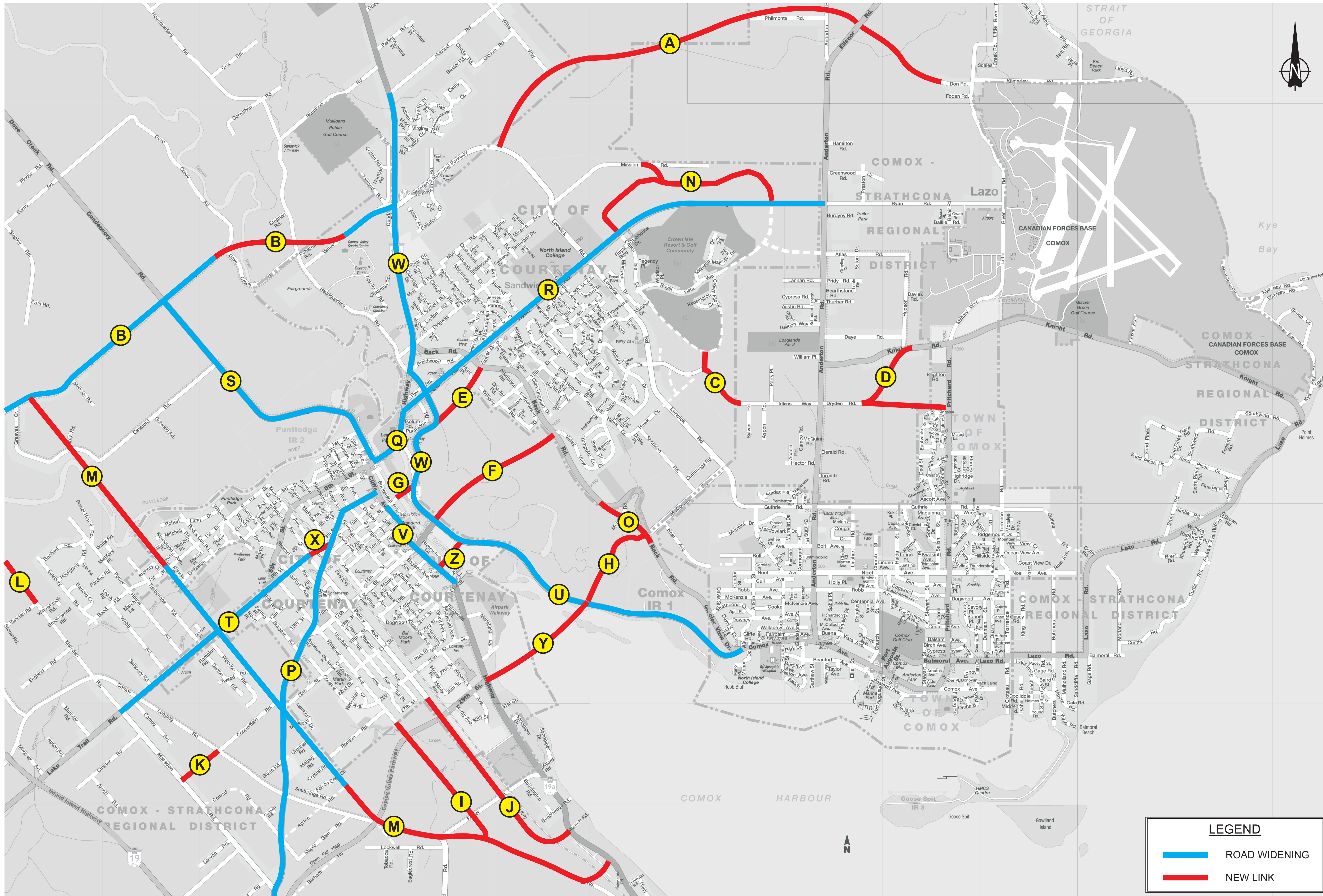
EXHIBIT **4.2**

POTENTIAL NETWORK OPTIONS



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Another alternative is to extend Dryden Road (opposite Idiens Way) east to Pritchard Road.

(e) Back Road Connector: This new route ('E') would connect Highway 19A south of Ryan Road to Back Road south of Ryan Road and would provide a parallel route to the congested section of Ryan Road between Highway 19A and Back Road. It would also provide a back access to the various developments on the south side of Ryan Road. In addition, traffic travelling between Highway 19A to the south and Back Road to the south could use this route as opposed to Ryan Road. The main objective of building this road is to reduce volumes on the congested segment of Ryan Road between Highway 19A and Back Road.

(f) 17th Street Extension: This extension of 17th Street to Back Road ('F') will provide a missing link and will eliminate the need for traffic to travel north to Ryan Road or south along Comox Road to Glacier View Road. It is acknowledged that this link would be very difficult to build as it cuts straight through ALR and wetlands.

(g) 11th Street Bridge: A new crossing of the Courtenay River has been proposed for many years and the only currently available location north of 17th Street is 11th Street. This crossing ('G') would provide relief to the existing 5th Street Bridge to the north and 17th Street Bridge to the south. It is likely that this bridge would have to be four lanes wide. It could possibly operate as a one-way bridge with 17th Street operating as one-way in the opposite direction. Queuing would also need to be examined. The intersection of 11th Street/Highway 19A would need to be created and the geometrics of this would need to be investigated in detail.

(h) McDonald Road Extension: This option ('H'), which is an extension of McDonald Road through to Comox Road, will allow traffic crossing the 17th Street Bridge and using Comox Road to use McDonald Road to access developments along both Back Road and Lerwick Road without having to go all the way into Comox.

(i) Willemar Avenue Extension: Extending Willemar Avenue south to Highway 19A ('I') will provide a parallel route to Highway 19A in the north-south direction on the west side of Courtenay and reduce traffic volumes on Highway 19A. This would necessitate a new intersection on the Comox Valley Parkway.

(j) Piercy Road Extension: This road ('J') will provide another north-south route, parallel to Highway 19A by extending Piercy Avenue south through to Highway 19A. A new intersection would also be required along the Comox Valley Parkway.

(k) Copperfield Road Extension: This route ('K'), an extension of Copperfield Road to Marsden Road, will provide an additional east-west route in the western portion of Courtenay. It would provide a connection to the extended Marsden Road detailed below.

(l) Marsden Road Extension: This extension of Marsden Road ('L') would run north across the Puntlege River to connect to Piercy Avenue. To the south it would follow the

existing routing to Cumberland Road and from there connect back to Highway 19A. The purpose of this link is to provide a continuous north-south route that could also function as a bypass of the developed areas of Courtenay.

(m) Arden Road Extension: The extension of Arden Road north over the Puntlege River to Piercy Avenue ('M') and in the south connecting it to Comox Logging Road and Highway 19A will provide what is essentially a bypass of the western area of Courtenay and at the same time a new crossing of the Puntlege River. This is similar to Option L, but closer to the developed areas of Courtenay.

(n) Royal Boulevard: Royal Boulevard connecting Ryan Road at Crown Isle Drive to Ryan Road just west of Anderton Road at the future extension of Royal Vista Way on the south side of Ryan Road ('N') would provide an access route to the proposed Crown Isle developments and would also connect to Mission Road. This is essentially a local road network element to serve the Crown Isle development. On the south side of Ryan Road, Royal Vista Way will be extended to Ryan Road with a possible extension to Atlas Road and Anderton Road.

(o) Back Road Straightening: This option ('O') will shorten the travel distance for vehicles and also hopefully improve operations as a result of the elimination of the hairpin turn in Back Road between Valley View Drive and McDonald Road. It is unclear if this could be built as it crosses over a ravine.

(p) Cumberland Road Widening: Cumberland Road connects the Comox Valley Parkway just east on the Inland Island Highway through to Downtown Courtenay and is an alternative route to the Comox Valley Parkway and Cliffe Avenue between these two points and is in fact a shorter route; however, it is only one lane in each direction and relatively windy. Upgrading this road by either widening it and/or straightening it ('P') could add additional capacity between these two points.

(q) 5th Street Bridge Widening: Widening the 5th Street Bridge and the approach along the Old Island Highway ('Q') would provide additional capacity over the Courtenay River. The 5th Street Bridge will eventually need to be replaced as it is aging. Along with widening of the bridge, improvements will need to be made to the approaches so that traffic can access the widened bridge.

(r) Ryan Road Widening: Ryan Road ('R') is a busy road in the City of Courtenay and it is predicted to have very high volumes on it in the future and in fact has high traffic volumes now. Widening it from Old Island Highway through Anderton Road would accommodate this additional future volume. Between Highway 19A and Back Road it could be widened to a six lane cross-section while to the east, it would be widened to four lanes. Widening of Ryan Road between Cowichan Avenue and Back Road will be difficult due to topography, namely the steep drop off on the south side of the road and to a lesser extent the north side.

(s) Condensory Road Widening: Widening Condensory Road and the Condensory Road bridge over the Puntlege River ('S') would provide a north-south route out of downtown and potentially reduce volumes on 5th Street Bridge and Old Island Highway heading to the north. This road passes through Puntledge Indian Reserve #2 and the band would need to be consulted if this option were to proceed. Condensory Road currently connects to Cliffe Avenue via Anderton Avenue/1st Street.

(t) Lake Trail Road Widening: This is an east-west arterial road ('T') running west from Piercy Avenue through to the western edge of Courtenay and beyond. It could also potentially connect to the Inland Island Highway via a new interchange. Widening of this road was tested to see how attractive it would be.

(u) Comox Road Widening: Comox Road ('U') carries a high volume of traffic to the Town of Comox and as such one option is to widen it to four lanes between 17th Street and the Town of Comox. This road passes through Comox Indian Band lands and the band has indicated in the past that they oppose widening. There is also the issue of impact on ALR lands, and impact on adjacent wetlands that would make construction expensive.

(v) Cliffe Avenue Widening: Cliffe Avenue south of 17th Street ('V') is primarily a four lane road through to Anfield Road with a small section that is only three lanes wide. This option would entail widening this section to four lanes as well as widening the existing two lane section between 11th Street and 17th Street to four lanes from the existing two. This would be especially beneficial if Option G – the 11th Street bridge – were built.

(w) Highway 19A Widening: This option ('W') has Highway 19A widened to a full four lane standard from 17th Street north through to Huband Road. This is a heavily used section of road particularly south of Headquarters Road and as such four laning would provide additional capacity, reduced delays, and provide corridor consistency.

(x) Lake Trail/11th Street Connection: This connection ('X') would provide a continuous east-west route between Lake Trail Road in the west and 11th Street in the east without requiring circuitous routings and without forcing traffic along 5th Street through to Downtown Courtenay.

(y) 29th Street Bridge: A crossing of the mouth of the Courtenay River in the line of 29th Street ('Y') is another network possibility as an alternative to the 11th Street crossing. The advantage of this crossing is that it would line up with 29th Street/Comox Valley Parkway and would connect to Comox Road on the east side of the River and line up with a potential McDonald Road Extension. Traffic traveling between Comox in the east and the southern end of Courtenay, including both Highway 19 and Highway 19A to the south, would not need to travel north to 17th Street, thus causing a reduction of volume to the north. The greatest disadvantage of this option is that the crossing distance is long, resulting in a significantly higher cost, and there would be greater environmental impacts.

(z) 19th Street Bridge: Another possible crossing is 19th Street, two blocks south of the existing 17th Street Bridge ('Z'). As with the 29th Street crossing, this bridge would allow

traffic traveling between Comox and the southern area of Courtenay to no longer have to travel to the 17th Street Bridge. Whilst it would be a longer crossing than the 11th Street Bridge, it is significantly shorter than one at 29th Street. Queuing on the bridge would also need to be examined.

4.4 Future Network Scenarios

A number of model runs were made incorporating various combinations of the network improvement options identified in Section 4.3. The options included in each of these network scenarios are as follows and summarized in Table 4.1.

(a) Scenario I: This scenario includes the Road A and the Northwest Connector (Option B) along the north end of Courtenay to provide a continuous east-west route. Also included in this Scenario was Option J, the extension of Piercy Avenue south through to Highway 19A.

(b) Scenario II: This scenario includes Option C: Idiens Way, Option D: Knight Road Extension, and Option F: 17th Street Extension. These three links along with Valley View Drive would provide an additional east-west route through East Courtenay and Comox. Also included in this scenario is the straightening of Back Road (Option O) which is likely to experience increased traffic with Option F in place.

(c) Scenario III: This item includes Option M, Arden Road extension, Option N, Royal Boulevard in the east end of Courtenay, Option T, the widening of Lake Trail, and Option X, the extension of Lake Trail into Downtown Courtenay. These three components in the west would provide additional grid roads and provide an alternative north-south route to Cliffe Avenue/Highway 19A. Royal Boulevard would be primarily local access.

(d) Scenario IV: This scenario includes the Willemar Avenue extension, (Option I), Copperfield Road extension, (Option K), and Marsden Road extension (Option L) over the Puntlege River. These links provide an additional although not entirely straight route in the western area of Courtenay.

(e) Scenario V: This scenario includes widening and improving of Condensory Road, (Option S), 5th Street Bridge (Option Q), and Ryan Road (Option R) respectively, to provide additional east-west capacity through eastern Courtenay and north-south capacity over the Puntlege River.

(f) Scenario VI: This scenario includes the Back Road extension (Option E), the new 11th Street bridge (Option G), as well as Comox Road widening (Option U), Cliffe Avenue widening (Option V), and Highway 19A widening (Option W). These improvements include widening or upgrading the most congested routes in the city.

(g) Scenario VII: This scenario is similar to in that it has the Back Road connector (Option F) and the 11th Street bridge (Option G) in place. However, Cumberland Road has been

widened (Option P) as opposed to widening along Cliffe Avenue (Option V) to encourage traffic to use this route to travel to the west.

(h) Scenario VIII: This scenario is similar to Scenario II, except that Option F has been replaced with an extension of MacDonald Road (Option H), so that a road does not cut through the ALR.

(i) Scenario IX: This scenario includes a potential 29th Street crossing (Option Y) as well as a widening of Comox Road (Option U) and the McDonald Road Extension (Option H).

(j) Scenario X: The 19th Street Bridge (Option Z) is included in this scenario instead of the 11th Street Bridge (Option G); otherwise it is essentially the same as Scenario VI.

Table 4.1
Options Included in Network Scenarios Tested

		Scenario									
	Improvement Option	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
A	Road A	X									
B	NW Connector	X									
C	Idiens Way		X						X		
D	Knight Rd Connector		X						X		
E	Back Road Connector						X	X			X
F	17th Street Extension		X								
G	11th Street Bridge						X	X			
H	MacDonald Road Extension								X	X	
I	Willemar Ave Extension				X						
J	Piercy Ave Extension	X									
K	Copperfield Road				X						
L	Marsden Road Extension				X						
M	Arden Road Extension			X							
N	Royal Blvd			X							
O	Back Rd Straightening		X								
P	Cumberland Rd Widening							X			
Q	5th Street Bridge Widening					X					
R	Ryan Road Widening					X					
S	Condensory Widening					X					
T	Lake Trail Widening			X							
U	Comox Road Widening						X			X	X
V	Cliffe Avenue Widening						X				X
W	Highway 19A N Widening						X				X
X	Lake Trail – 11th Street Connector			X							
Y	29th Street Bridge									X	
Z	19th Street Bridge										X

4.5 Discussion of 2025 PM Peak Hour Results

Summarized below is a brief description of the results of each road network option based on the volumes of traffic projected in the 2025 horizon year. The results are shown graphically in Exhibit 4.3. It should also be noted that the volumes on any given link will vary according to what other options are built. Therefore these results represent the volume in a single scenario.

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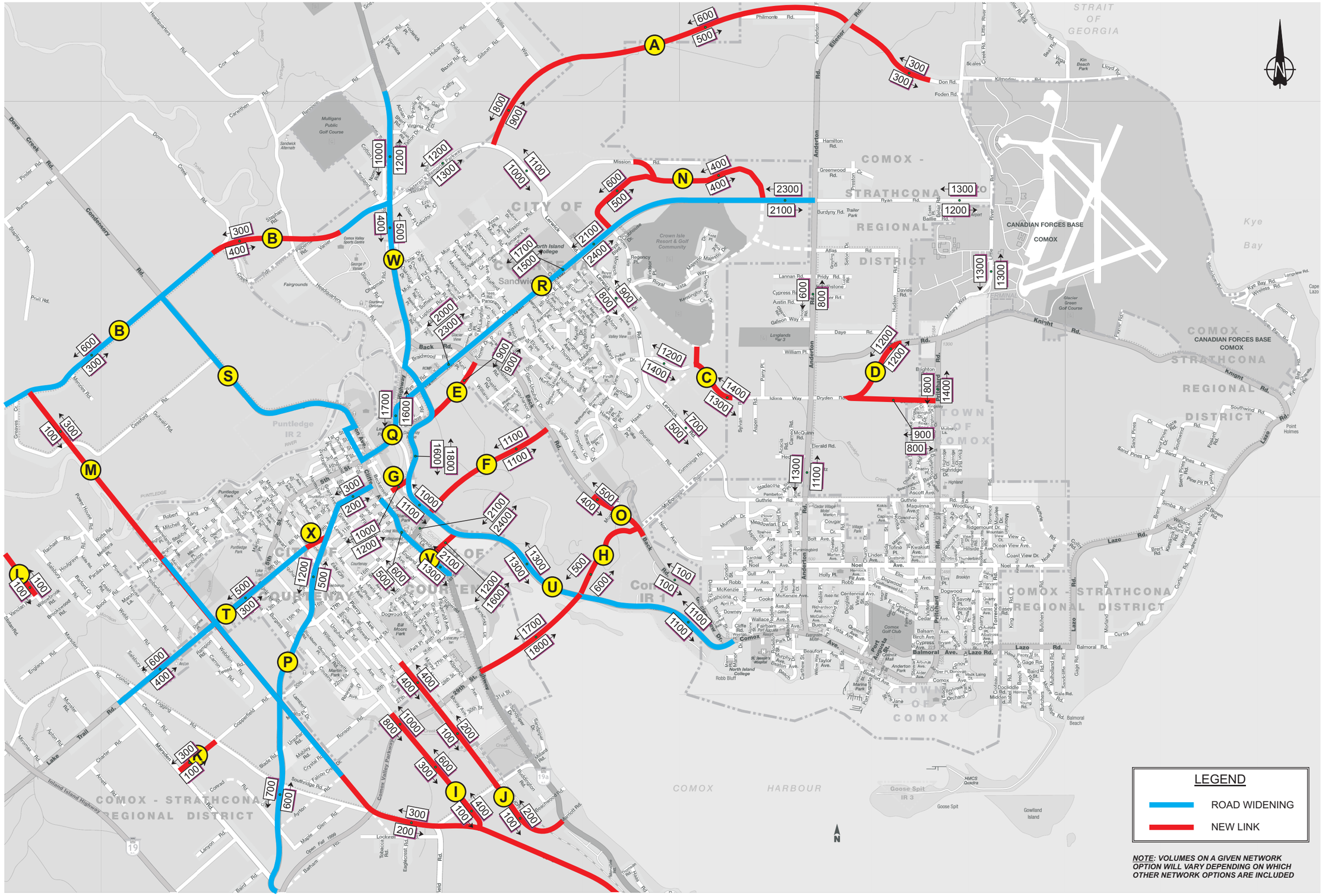
EXHIBIT **4.3**

POTENTIAL VOLUMES ON KEY LINKS - 2025 PM PEAK HOUR



Resultant volumes on selected links for all scenarios are shown in Table 4.2 at the end of this section.

(a) Road A: This east-west road through the Block 71 development, show as 'A' in Exhibit 4.3, will have a volume of 800 to 900 vehicles per direction at the west end dropping to 500 to 600 vehicles per direction at the east end. This indicates that the western portion will ultimately need to be four lanes wide while in the eastern portion two lanes would suffice through to beyond 2025. This makes logical sense as most of the traffic from this Block 71 area will want to be travelling west to the central areas of Courtenay.

(b) North West Connector (Option B): This connector will attract volumes of 300 to 600 veh/h westbound and 300 to 400 veh/h eastbound along its various segments. These volumes could easily be accommodated on a two lane road, meaning that a four lane road would not be needed. A cost-benefit analysis of the upgrades to the route will be needed, as well as a detailed analysis, in order to take this route to the next level of consideration.

(c) Idiens Way (Option C): This connection carries a high volume of traffic, up to 1,400 veh/h per direction, indicating a need for a four lane road. Part of this demand is due to the anticipated growth in the industrial and warehouse base in Comox, including residential, industrial, and airport growth, as well as the increased number of passengers expected to be handled by the airport itself. A significant amount of this traffic also comes from the Crown Isle development. If this connection is not built, then traffic will be diverted north to Ryan Road and south to Lerwick Road/Guthrie Road.

(d) Knight Road Connector (Option D): This connector carries a projected 1,200 veh/h in each direction. This volume would require a four lane road. Again the high volumes are due in part to the expansion at the airport and related industrial uses as well as other residential developments. If this connection is not built, then traffic will be diverted north to Ryan Road and south to Lerwick Road/Guthrie Road. Another alternative to this link would be to extend Dryden Road east from Anderton Road to Pritchard Road.

(e) Back Road Connector (Option E): It is predicted that 900 veh/h per direction would use the Back Road connector. This is just over the capacity of a two lane road and as a result a four lane connector by 2025 is recommended. This link will reduce traffic volumes on Ryan Road by 1,500 to 1,700 veh/hr two-way.

(f) 17th Street Extension (Option F): The extension of 17th Street east from Comox Road through to Back Road would attract 1,100 veh/h per direction, a significant volume of which would require two lanes in each direction. With such a link, upgrading would also be needed on Back Road to accommodate this traffic. Changes to Valley View Drive will also likely be necessary although it can remain a two lane road.

(g) 11th Street Bridge (Option G): This bridge would attract a peak direction volume of 1,200 veh/h indicating that this bridge would need to be four lanes wide. Also in conjunction with building this bridge, improvements to the approaches would be needed so that capacity constraints at each end can be reduced.

(h) McDonald Road Extension (Option H): Extending McDonald Road southwest through to Comox Road would attract up to 600 veh/h in the peak direction. This road would warrant only two lanes by the 2025 horizon year.

(i) Willemar Avenue Extension (Option I): This road would attract a significant volume of traffic particularly north of 29th Street as an additional access to the currently developed West Courtenay area. North of 29th Street the volume exceeds 800 veh/h indicating a high demand and the potential for a four lane road while to the south the peak volume is 600 veh/h indicating only one lane would be needed in each direction south of 29th Street.

(j) Piercy Avenue Extension (Option J): Extending Piercy Avenue south through Highway 19A would not attract as much traffic as the Willemar Avenue extension; however, volumes would reach 400 veh/h per direction north of 29th Street and 200 veh/h per direction to the south.

(k) Copperfield Road Extension (Option K): This extension would attract 400 veh/h two-way. This is a relatively low volume and as such is not a high priority network option.

(l) Marsden Road Extension (Option L): This extension would attract only 100 veh/h per direction and again is not a high priority network option. It would however qualify as a future network option to support a grid road for future development.

(m) Arden Road Extension (Option M): The Arden Road overpass over the Puntlege River will attract 400 veh/h two-way, while at the southern end south of the Comox Valley Parkway it would attract 500 veh/h two-way. These are not high volumes and as such this link would not likely be required by 2025; however, it would be desirable to make provision for this link as it provides a bypass around the western area of Courtenay which could accommodate future growth beyond 2025.

(n) Royal Boulevard (Option N): Royal Boulevard provides access to the Crown Isle developments north of Ryan Road and attracts up to 600 veh/h per direction. As a result, a two lane road would be sufficient to serve this local area. This road would be a collector road. At the western end, a connection would be made to Crown Isle Boulevard, while at the eastern end it will connect to Royal Vista Way which serves the south side of Ryan Road.

(o) Back Road Straightening (Option O): With the 17th Street extension in place and the current kink in Back Road north of McDonald Road straightened Back Road would attract 500 veh/h per direction. The resulting volume still can be accommodated with a two lane road. Without this extension, these volumes would be lower.

(p) Cumberland Road Widening (Option P): A widened and upgraded Cumberland Road would attract a significant volume at its eastern end east of Willemar Avenue and in fact four lanes would be needed; however, further to the west, and further away from the

downtown, volumes are lower reaching a maximum of 700 veh/h indicating that a two lane road would be sufficient.

(q) 5th Street Bridge Widening (Option Q): A widened 5th Street Bridge with four lanes of traffic would attract a significant volume of traffic – up to 1,700 veh/h in the peak direction – indicating that a four lane bridge is required if no other river crossing is built. Improvements to the road network at each end of the bridge would be needed to accommodate this additional traffic. Traffic congestion of 5th Street through downtown would need to be addressed.

(r) Ryan Road Widening (Option R): Widening Ryan Road to six lanes west of Back Road and four lanes east of Back Road would attract a significant volume of traffic, up to 2,300 veh/h in the six lane section and up to 1,900 veh/h in the four lane section just east of Crown Isle Boulevard. These high volumes indicate that a four lane section at the east end may not be sufficient and either six lanes would be needed or other parallel routes such as Option A through Block 71 or Options C and D along Idiens Way will be needed.

(s) Condensory Road Widening (Option S): The traffic volumes on this link are approximately 400 veh/h in a peak direction indicating that a two lane road would be sufficient. There is not a high demand for traffic travelling to the north as there is little development proposed in this area through to 2025.

(t) Lake Trail Widening (Option T): The resulting volumes on Lake Trail Road with the road widened to four lanes reach a maximum of 600 veh/h in the peak direction indicating that this is not a high demand route, and a two lane road will be adequate. This is in part due to the lack of significant development at the west end of this road.

(u) Comox Road Widening (Option U): Widening Comox Road between 17th Street and the Town of Comox would attract 1,300 veh/h in both directions in the p.m. peak hour. This clearly shows that a four lane road is needed. This road carries the highest volume of traffic into the Downtown area of Comox as compared to other roads such as Back Road, Anderton Road, and Guthrie Road.

(v) Cliffe Avenue Widening (Option V): Widening Cliffe Avenue to four lanes south of 11th Street would attract a very high volume of traffic, 1,300 veh/h southbound and 2,100 veh/h northbound with the new bridge in place. This is the main approach route to the current 17th Street Bridge and to a potential new 11th Street bridge, if built, and as a result these high volumes would be expected. In order to reduce this volume, other road network options such as the Willemar Avenue Extension (Option I), the Piercy Avenue Extension (Option J), or the Arden Road Extension (Option M) would need to be built to move traffic away from Cliffe Avenue.

(w) Highway 19A Widening (Option W): This route will attract a high volume of traffic particularly between 17th Street and Ryan Road with 1,800 veh/h northbound and 1,600 veh/h southbound. The section between Headquarters Road and Veterans Memorial Parkway attracts less traffic, 400 veh/h southbound and 500 veh/h northbound, while

volumes then increase again north of Veterans Memorial Parkway to 1,200 veh/h northbound and 1,100 veh/h southbound. This indicates that the section between 17th Street and Ryan Road should receive the highest priority. If Road A and the north-west connector were built, then the volumes on the segment between Ryan Road and Veterans Memorial Parkway would be increased.

(x) Lake Trail/11th Street Connection (Option X): This connection would attract approximately 500 veh/hr in each direction and would provide a continuous route east-west along the north area of Courtenay and connect to the 11th Street Bridge via a more direct routing.

(y) 29th Street Bridge (Option Y): The 29th Street Bridge, when run with a widened Comox Road and an extension of McDonald Road, will attract a volume of 3,500 veh/h, with 1,800 veh/h in the peak direction. This clearly shows that this would be a high volume route and a four lane bridge will be needed. If the McDonald Road connection were not built, then volumes on the bridge would be lower.

(z) 19th Street Bridge (Option Z): This new bridge would carry a volume of 2,800 veh/h, with 1,600 veh/h in the peak direction. Again, these volumes would warrant a four lane bridge. With this bridge located relatively close to the 17th Street Bridge, it would be desirable for the 17th Street Bridge to operate one way westbound and the 19th Street bridge to operate one way eastbound. This would improve the operational efficiency of the bridges.

Table 4.2
Volumes on Key Links
2025 p.m. peak hour two-way

Scenario	I	II	III	IV	V	VI	VII	VIII	IX	X
Options Included	**A/B/J**	**C/D/F/O**	**M/N/T/X**	**I/K/L**	**Q/R/S**	**E/G/U/V/W**	**E/G/P**	**C/D/H/O**	**H/U/Y**	**E/U/V/W/Z**
5th St Bridge	2,600	2,500	2,500	2,500	3,600	2,100	2,300	2,600	2,300	2,300
11th St Bridge	-	-	-	-	-	2,300	2,100	-	-	-
17th St Bridge	4,400	5,100	4,500	4,400	4,000	3,300	3,000	4,500	2,700	2,100
Condensory Bridge	500	400	300	300	500	400	400	400	500	400
Cliffe N of 17th St	1,000	1,300	1,100	1,100	900	1,500	1,100	1,000	1,500	1,500
Ryan E of Sandwick	3,600	2,800	3,900	3,900	4,400	2,300	2,500	3,800	2,600	3,200
Veterans E of 19A	2,500	1,700	1,500	1,600	1,600	1,500	1,600	1,700	1,600	1,600
Comox E of 17th St/19th St	2,000	1,700	2,000	2,000	2,000	2,600	2,000	2,200	1,300	2,000
Ryan W of Lerwick	2,700	2,400	2,800	2,900	3,300	2,900	2,800	2,800	2,200	2,700
Ryan E of Lerwick	3,800	3,300	3,100	4,100	4,500	4,100	4,100	3,400	3,600	3,900
Hwy 19A S of Superstore	2,800	2,000	2,800	2,800	2,400	3,200	3,200	2,800	2,100	2,600
Hwy 19A N of 29th St	2,900	3,200	3,100	2,600	3,000	3,100	3,000	3,100	1,900	3,500
19th Street Bridge	-	-	-	-	-	-	-	-	-	3,600
29th Street Bridge	-	-	-	-	-	-	-	-	3,500	-

4.6 Evaluation of Network Improvement Options

The network improvement options detailed previously were evaluated based on a number of criteria and the results are summarized in Table 4.3 for all options except the river crossings

which are shown separately in Table 4.4. These criteria include such things as impact on safety at the high accident intersections, impact on residential areas, ease of implementation, and construction cost based on the length and number of lanes to be constructed on the various links. Also considered were environmental impacts particularly on streams and ALR lands, and the support of future land use, i.e., building roads to service areas that are likely to grow. Another important consideration is the additional crossing of the Courtenay River as there is limited capacity across the river, yet a very high future demand.

Table 4.3
Evaluation of Network Options

	A	B	C	D	E	F	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y
Volume	o	-	+	+	o	+	o	o	-	-	-	-	o	-	o	+	-	-	+	+	+	o	+
Impact on Safety	o	-	o	-	+	o	-	o	o	-	-	-	-	-	o	+	-	-	o	+	+	-	+
Impact on Residential	+	+	o	o	+	+	+	-	-	o	+	+	+	o	o	+	o	-	+	+	+	o	+
Ease of Implementation	+	+	+	-	o	-	-	o	o	+	o	o	+	o	+	+	+	+	o	o	+	o	-
Construction Costs	-	-	o	+	+	-	o	-	o	+	+	o	o	+	-	-	o	o	-	+	-	+	-
Environmental Impacts	-	o	+	+	o	o	o	-	o	+	o	o	+	+	-	+	+	o	-	+	+	+	-
Support Future Land Use	+	o	o	+	+	-	+	o	o	o	o	+	+	+	+	+	-	o	o	o	-	-	+
Improves River Crossing	o	+	-	-	o	o	o	-	-	-	o	o	-	-	o	o	o	-	o	o	o	o	+
ALR impacts	o	-	+	-	o	-	-	-	o	+	o	-	+	+	+	+	o	+	o	+	+	+	+
Rating	10	8	12	9	13	7	8	4	6	6	9	8	12	10	10	15	8	7	9	15	13	10	12

+ positive o neutral - negative

Table 4.4
Evaluation of River Crossing Options

	G	Q	Y	Z
Volume	+	+	+	+
Impact on Safety	+	+	+	+
Impact on Residential	+	+	+	+
Ease of Implementation	o	o	-	o
Construction Costs	+	o	-	+
Environmental Impacts	+	o	-	o
Support of Future Land Use	o	o	-	+
Improves River Crossing	+	+	+	+
ALR impacts	+	+	+	+
Rating	16	14	12	16

+ positive o neutral - negative

From the rankings it can be seen that those options that include improvements to the bridge crossings over the Courtenay River have relatively high ratings with the 11th Street ('G') and 19th

Street ('Z') Bridge options at 16 points, the 5th Street Bridge ('Q') option at 14, and the 29th Street Bridge ('Y') option at 12. Other options that have high ratings include the Back Road Connector ('E'), widening of Ryan Road ('R'), and widening of Cliffe Avenue ('V') as well as the widening of Highway 19A ('W'). All of these routes are currently high volume routes and in the future will carry even more traffic and therefore widening them is beneficial. Routes with relatively low ratings include the Knight Road Connector ('D'), 17th Street Extension ('F'), Willemar Avenue Extension ('I'), Piercy Avenue Extension ('J'), Copperfield Road ('K'), and the widening of Arden Road. These routes that do not rank well in general have low volumes combined with other potential negative impacts such as environmental impacts or high construction costs.

5.0 RECOMMENDED PLAN

5.1 Road Network

Based on the evaluation of the various road network improvement options, a recommended road network for the 2025 horizon year for the City of Courtenay was established and this is shown in Exhibit 5.1. The major changes to the existing plan are shown in Exhibit 5.2. The number of lanes on each link required by 2025 is shown in Exhibit 5.3. A summary of the key improvements is given below.

(a) Road A (Option A): It is recommended that this connection be built connecting Veterans Memorial Parkway through to Anderton Road north of Ryan Road. This will provide local access to Block 71 as well as an alternate east-west route to Ryan Road reducing volume on Ryan Road. The western portion will ultimately need to be four lanes wide while the eastern portion will be two lanes wide based on the projected 2025 volumes. This is already in the City's plans and in the development proposal for the Block 71 lands. A future extension of this road to Little River Road (beyond 2025) would provide a continuous route to the airport.

(b) North West Connector (Option B): A new bridge across the Tsolum River and a realignment of the Vanier Drive/Piercy Road connection is recommended. This provides a northern access to the Inland Island Highway connecting the highway and Mount Washington to the eastern part of Courtenay, Comox, the Comox Valley Airport, and the Little River Ferry Terminal. Based on the projected volumes, two lanes will be adequate. This connection will reduce travel times between the Airport, Highway 19 and Mount Washington.

(c) Idiens Way Extension (Option C): It is recommended that Idiens Way west of Anderton Road be connected through to Valley View Drive at Lerwick Road with a connection northwards through to the Crown Isle lands. This is already in the City of Courtenay's plans and part of it is built. This will provide an additional east-west route connecting Lerwick Road to Anderton Road and serve the Crown Isle development, the airport and related industrial expansion. Based on the projected volumes, there is a demand for four lanes; however, this is currently classified as a collector road and it is therefore likely that only two lanes will be provided. The traffic that cannot be accommodated would have to divert north to Ryan Road or south to Guthrie Road.

(d) Back Road Connector (Option E): This road connecting Highway 19A to Back Road south of Ryan Road is recommended as it will reduce traffic volumes on Ryan Road between Highway 19A and Back Road, the most congested section, and at the same time provide a back access to the developments on the south side of Ryan Road. This will ultimately be a four lane road. More detailed traffic operation analysis of Back Road between Ryan Road and the connector will be needed. In addition, conceptual plans should also be drawn up for this critical section.

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EXHIBIT 5.1
FUTURE ROAD CLASSIFICATIONS

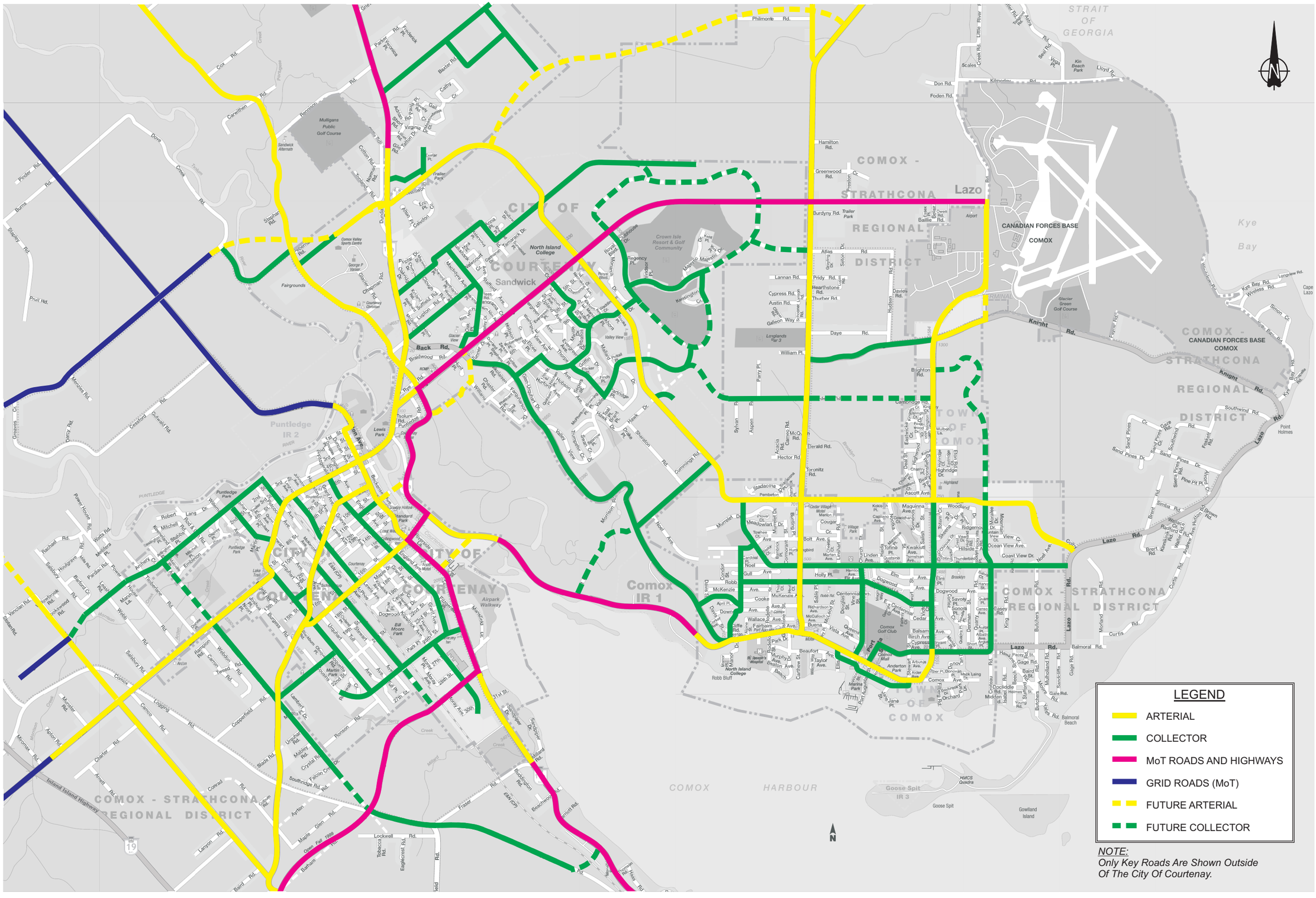

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EXHIBIT 5.2
KEY NETWORK CHANGES

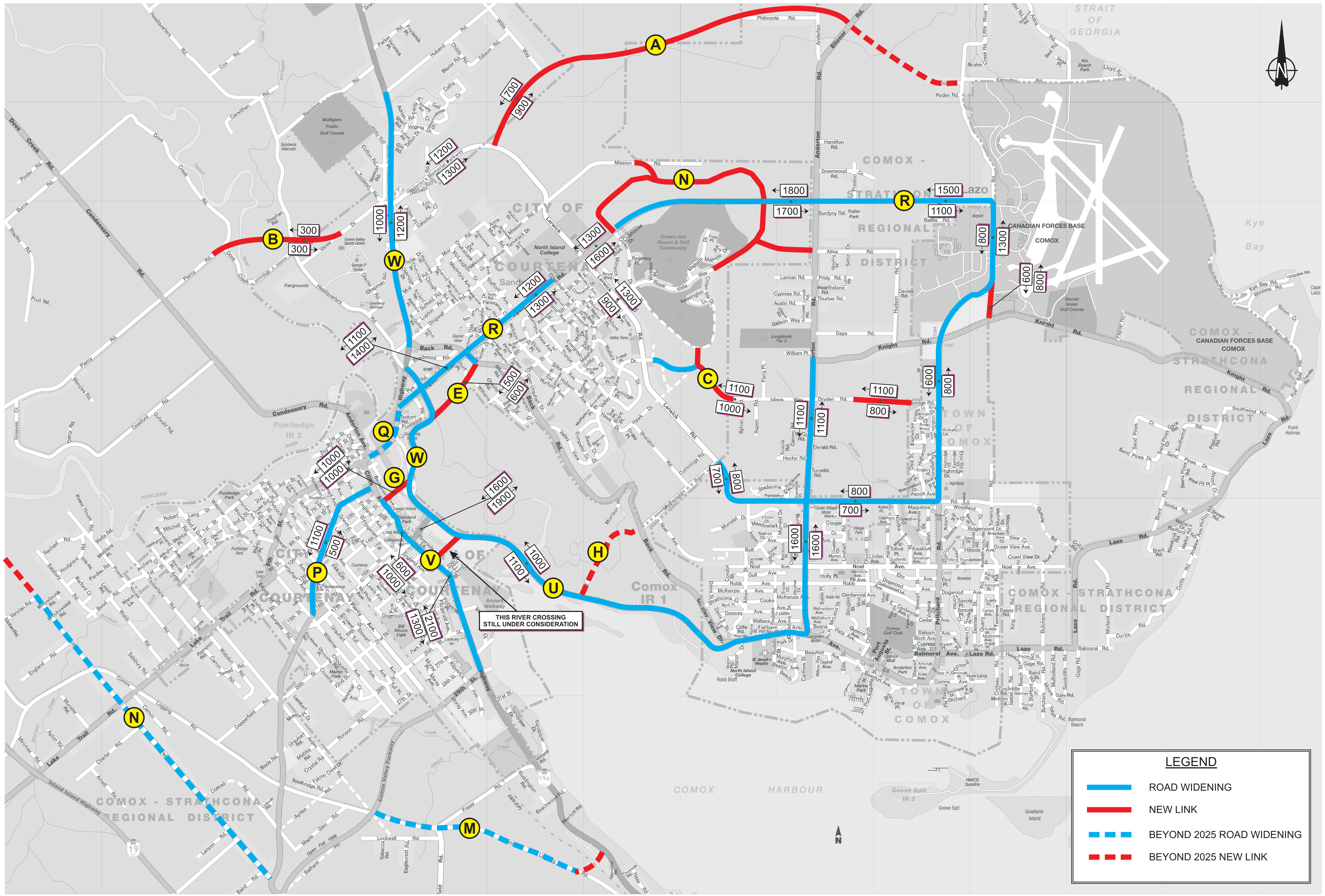

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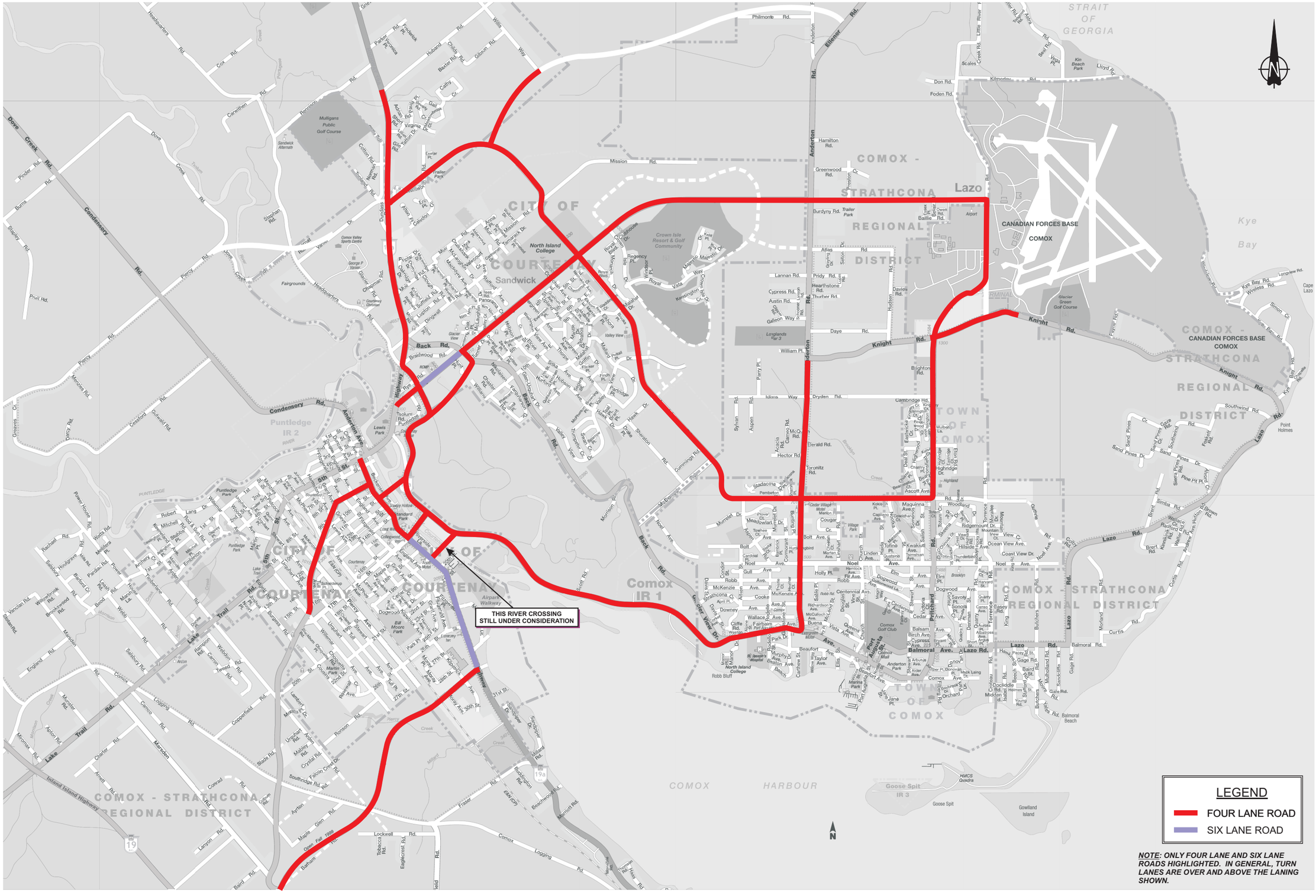
EXHIBIT 5.3
2025 LANING REQUIREMENTS



***NOTE:** ONLY FOUR LANE AND SIX LANE ROADS HIGHLIGHTED. IN GENERAL, TURN LANES ARE OVER AND ABOVE THE LANING SHOWN.*

(e) 11th Street Bridge (Option G): A new crossing across the Courtenay River is needed as the current bridges and approaches will operate well over capacity by the 2025 horizon year. As a result, a four lane 11th Street bridge is recommended if a bridge cannot be built at 19th Street which is the preferred location for a new bridge. Along with this bridge, improvements will need to be made at both approaches so that traffic can flow smoothly to and from the bridge. There is no other confirmed viable location for a new bridge although a 19th Street Bridge is under study. Other locations for crossings are blocked by development, blocked by the Courtenay Airpark, or have very long crossing distances.

(f) Marsden Road (Option N): Extending Marsden Road north through to Piercy Avenue over the Puntlege River and south to Comox Logging Road and Highway 19A would be a long term western bypass route. Based on projected 2025 volumes, this route would need to be only two lanes wide at this horizon year, if built, and in fact would more realistically be needed sometime beyond 2025. This would provide a north-south bypass route to the central area of Courtenay and should be preserved now for it future use. Although Arden Road (M) would carry more traffic, there was significant opposition to this link and it passes through some already developed areas. Marsden Road is the next available option to the west.

(g) Royal Boulevard/Royal Vista Way (Option N): Royal Boulevard will need to be developed as a two lane collector road when the Crown Isle development is built north of Ryan Road. This will provide access to and from this development. Similarly, the extension of Royal Vista Way south of Ryan Road will be needed when more development proceeds. A link to Atlas Road to provide a direct connection to Anderton Road would also be desirable.

(h) Cumberland Road Option P): Widening of Cumberland Road/8th Street would provide an improved link between Willemar Avenue and Cliffe Avenue. This link will be particularly important if the 11th Street Bridge is built.

(i) 5th Street Bridge (Option Q): The 5th Street Bridge is still anticipated to carry a considerable amount of traffic and consideration should be given to widening it. By 2025 the volume projected across this bridge, when modeled as a four lane bridge, is almost 2,000 veh/h in the peak direction indicating that there is a demand for a four lane bridge at this location. When this bridge is replaced due to its age, this will need to be further evaluated; in particular the connections at the west end of the bridge will need to be examined to ensure that the traffic from a four lane bridge can be accommodated in the Downtown.

(j) Ryan Road Widening (Option R): As detailed previously, Ryan Road is a heavily used road along almost its entire length but especially between Highway 19A and Back Road. As a result, it is recommended that in this segment the road be widened to six lanes while the remainder to the east of Back Road to CFB Comox it would ultimately need to be a four lane road were four lanes do not exist. Some sections east of Back Road already

have two lanes in one direction, and there are already four lanes from Cowichan Road to Crown Isle Drive.

(k) Comox Road (Option U): It is recommended that Comox Road be widened between 17th Street and Anderton Road as the demand for travel along this route will reach 1,200 veh/h in the peak direction in 2025. This route provides the main connection from the Town of Comox to Downtown Courtenay as well as the commercial areas of Courtenay and points outside the Comox Valley to the south. As mentioned previously, widening of this road may affect wetlands and ALR lands, and may also be opposed by the Comox Indian Band.

(l) Cliffe Avenue (Option V): It is recommended that Cliffe Avenue be widened to a four lane standard between 21st Street and 11th Street. This will provide two travel lanes in each direction and will also provide additional capacity to serve the existing 17th Street Bridge and the proposed new 11th Street Bridge. Between 17th Street and 29th Street there will certainly be a demand for a six lane road; however, this would be a long term goal due to property constraints. As parcels of land along the corridor develop, land can be acquired for long term widening.

(m) Highway 19A (Option W): Widening of Highway 19A north of 17th Street would provide a continuous four lane route through east Courtenay. The critical section is between 17th Street and Ryan Road and it is recommended that this be widened to four lanes first.

(n) Other Routes: Based on the modeling results, a number of other routes carry significant volumes of traffic and will need to be ultimately upgraded to four lanes. These include Military Way/Pritchard Road, Anderton Road, and Guthrie Road (as an alternative to Idiens Way/Knight Road and Niel Drive to the south).

(o) 19th Street Bridge (Option Z): The feasibility of building this crossing is still being assessed, especially with regards to float plane and airpark operations. If this option is feasible, then this crossing option would be preferred to 11th Street. This option would draw traffic away from the 17th Street Bridge and the busy intersections of each end. In addition, as it is closer to the 17th Street Bridge, there is the potential for the 17th Street and 19th Street Bridges to operate as a couplet with 17th Street operating westbound and 19th Street operating eastbound.

(p) Dryden Road: Extending Dryden Road east to Pritchard Road would provide an alternative to the Knight Road realignment. This would draw traffic away from Guthrie Road and to a lesser extent, Ryan Road.

(q) Military Way: It would be desirable to extend Little River Road directly south to Knight Road. This will provide a more direct routing between Ryan Road and the airport, as well as diverting traffic away from the skewed intersection of Knight Road/Pritchard Road.

5.2 Phasing

The phasing of the recommended road network improvements was determined based on the congestion in various areas both today and in the future as well as the volume of traffic anticipated to use each link and the overall network connectivity that a link provides. The phasing is summarized in Table 5.1 and illustrated in Exhibits 5.4, 5.5, and 5.6. The links to be constructed or widened include some of the various improvements tested as well as a number of other links that, although not anticipated initially to be widened, had very high volumes on them when modeled and thus will need to be widened unless an alternative is provided.

(a) Phase I (2005 to 2010): The new key roads to be built in this time period are:

- Road A connecting Veterans Memorial Parkway to Anderton Road;
- the connection of Idiens Way ('C') (most of which is currently built); and
- the Back Road connector ('E').

All three of these will be built as two lane roads in this time period. The exact timing of Road A will be driven by the development of the Block 71 lands.

The key widenings to be done in this initial phase are:

- Cliffe Avenue ('V') between approximately 18th Street and 22nd Street to provide for two lanes in each direction; and
- Highway 19A ('W') between 17th Street and Ryan Road to provide a full four lane standard and consistency along the corridor.

Royal Boulevard ('N') and the construction of various roads on the Crown Isle lands, particularly Crown Isle Drive and its connection to Idiens Way ('C') will be driven by development on the Crown Isle lands. This connection to Idiens Way is important and beneficial for the Crown Isle development as it will provide a connection to the existing traffic signal on Lerwick Road at Valley View Drive/Idiens Way. A link from Royal Vista Way to Atlas Road would also be desirable.

(b) Phase II (2011 to 2015): In this second phase, the new 11th Street Bridge or 19th Street Bridge over the Courtenay River is recommended along with widening of Cliffe Avenue from 11th Street to 17th Street. Other road widenings recommended during this phase include:

- Highway 19A ('W') north of Ryan Road;
- Ryan Road ('R') east from Back Road to Canadian Forces Base Comox to four lanes where it is not already;
- Comox Road ('U') from 17th Street to Anderton Road;
- Anderton Road to Knight Road; and
- Lerwick Road/Guthrie Road west of Anderton Road.

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EXHIBIT 5.4
PHASE I IMPROVEMENTS - 2006 TO 2010

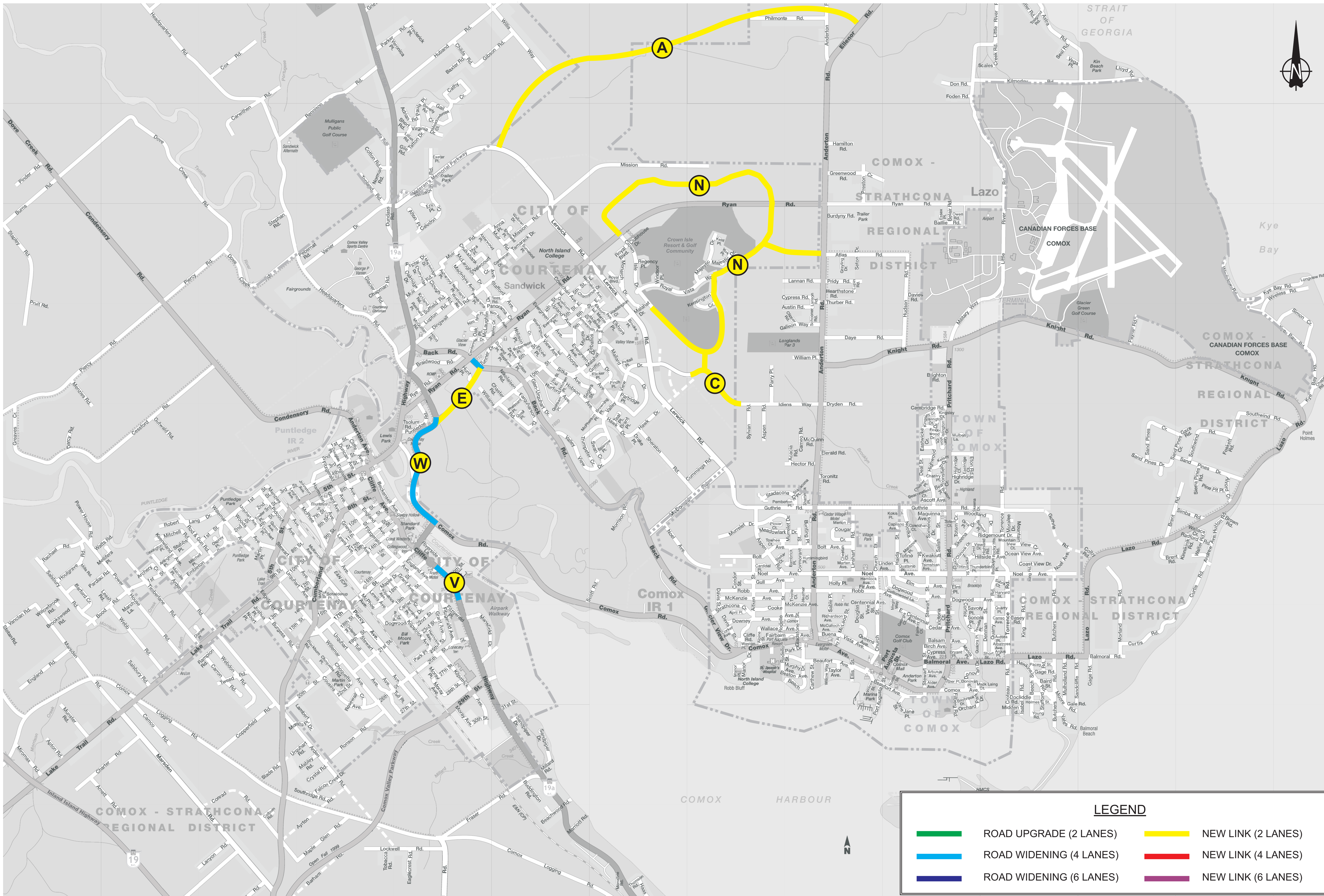

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EXHIBIT **5.5**

PHASE II IMPROVEMENTS - 2010 TO 2015

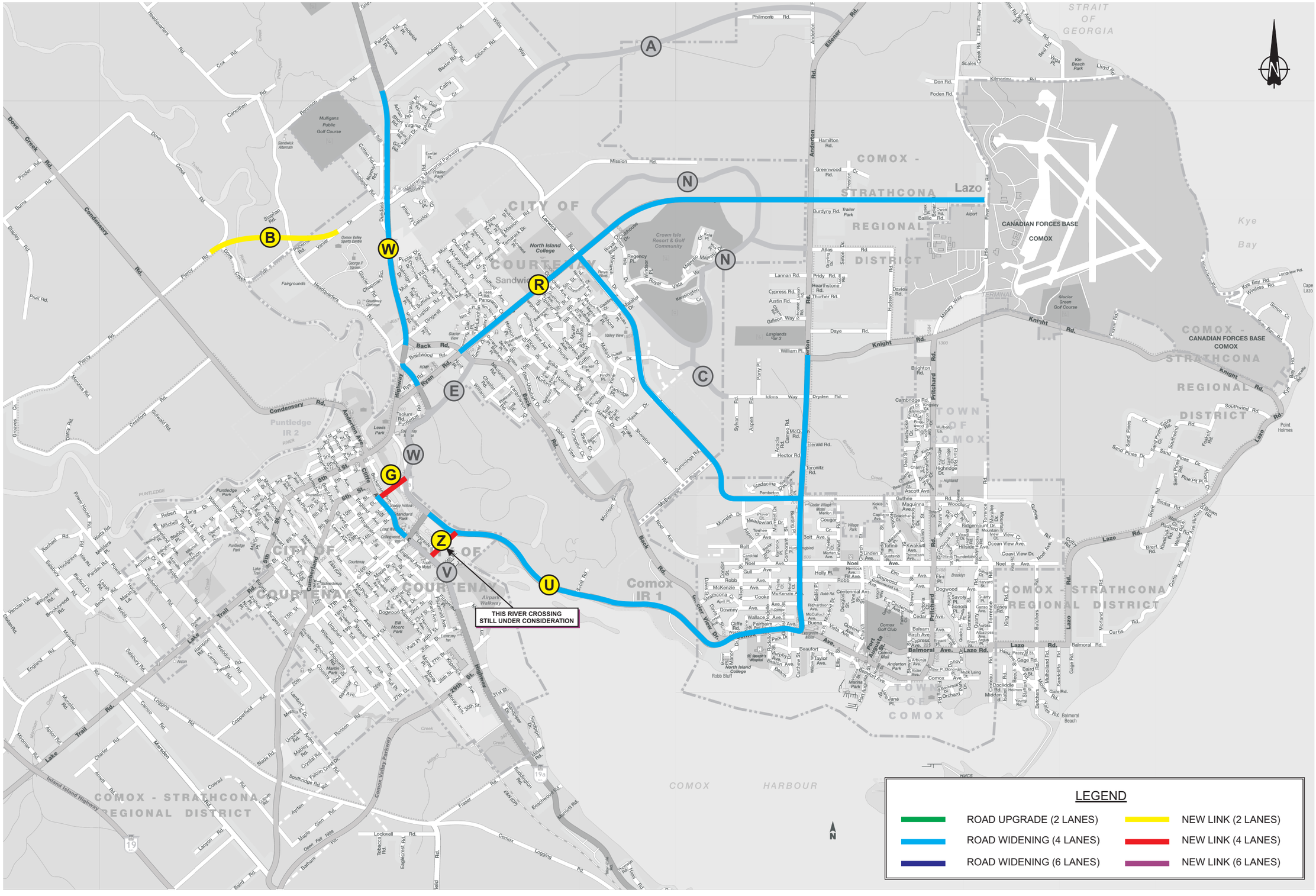

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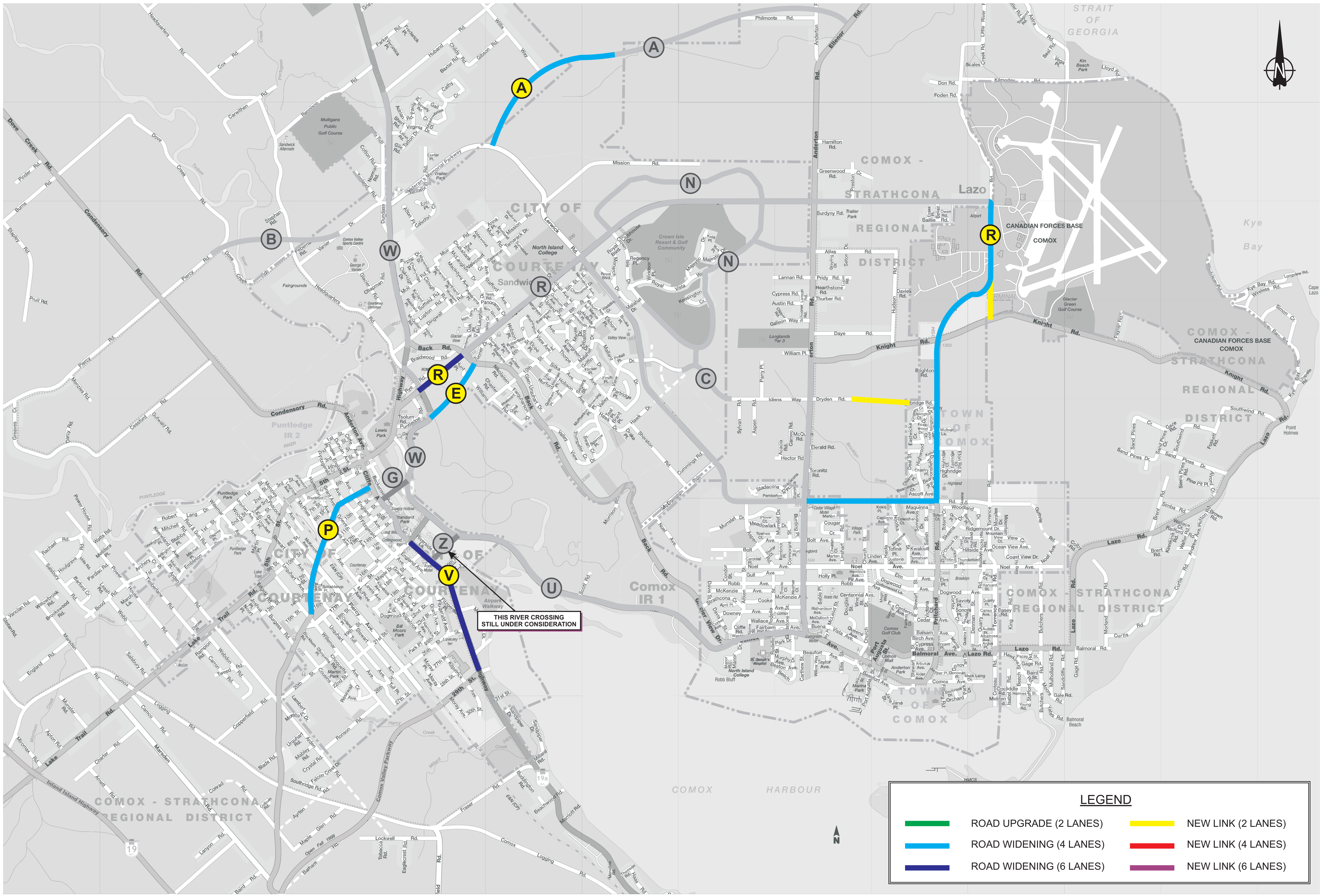
EXHIBIT 5.6
PHASE III IMPROVEMENTS - 2015 TO 2025



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- North West Connector Bridge ('B') across the Tsolum River and approaches to replace this one lane Rees Bridge. Although not required as a result of high volumes, this link nevertheless is a strategically important link that provides a northern connection to Highway 19 and Mount Washington from the Comox Valley Airport, CFB Comox, Crown Isle, and other North Courtenay traffic generators. Replacing the existing one-way bridge with a two-way bridge is highly desirable for such an important link and has the potential to divert traffic away from the congested areas of Courtenay such as the 5th Street Bridge, the 17th Street Bridge, Ryan Road, and Cliffe Avenue.

If the 19th Street crossing is built instead of 11th Street, then the widening of Cliffe Avenue from 11th Street to 17th Street can be delayed.

Table 5.1
Schedule of Improvements

	Facility	Classification	Improvement	Primary Jurisdiction	Year
E	Back Road Conn	Arterial	new connection – 2 lanes	Courtenay	**2007**
V	Cliffe Avenue	Arterial	road widening 18th St. to 22nd St.	MoT	**2007**
N	Royal Boulevard	Collector	new road to service development	Courtenay	**2007***
C	Idiens Way	Arterial	new connection	Courtenay	**2008**
W	Hwy 19A	Arterial	road widening 17th St to Ryan	MoT	**2008**
A	Road A	Arterial	build new 2 lane road	Courtenay	**2009***
U	Comox Road	Arterial	road widening	Courtenay/MoT/Comox	**2011**
V	Cliffe Avenue	Arterial	17th St to 11th St.	Courtenay	**2011**
G	11th St Bridge	Arterial	New bridge	Courtenay/MoT	**2011**
B	North West Connector	Arterial	straighten w new bridge	MoT	**2012**
	Lerwick Rd	Arterial	widen to 4 lanes	Courtenay	**2012**
R	Ryan Road	Arterial	road widening – E of Back	MoT	**2014**
	Anderton Rd		widen to 4 lanes	Comox/MoT	**2014**
W	Hwy 19A	Arterial	road widening N of Ryan Rd	Courtenay	**2015**
	Military Way/Pritchard	Arterial	widen to 4 lanes – S of Knight	Comox	**2015**
	Dryden Road	Collector	Extend to Pritchard	MoT	**2016**
V	Cliffe Avenue	Arterial	29th St. to 17th St. – 6 lanes	MoT	**2017**
	Little River/Military Way	Arterial	widen to 4 lanes – N of Knight	Comox	**2019**
	Military Way to Knight Rd	Arterial	New link to Knight Road	Comox	**2019**
	Guthrie Rd	Arterial	widen to 4 lanes	Comox	**2020**
R	Ryan Road	Arterial	road widening – W of Back	MoT	**2020**
P	Cumberland Road	Arterial	Widen to 4 lanes	Courtenay	**2021**
A	Road A	Arterial	4 laning western section	Courtenay	**2023***
E	Back Road Conn	Arterial	Widen to 4 lanes	Courtenay	**2025**
H	MacDonald Road	Arterial	new link	MoT	**2025+**
N	Marsden Road	Arterial	new bridge & upgrading	Courtenay/MoT	**2025+**
Q	5th Street Bridge	Arterial	New bridge	Courtenay	**2025+**

* subject to timing of development as road services new development
\+ beyond this horizon year
All construction years are approximate. Jurisdiction may change as boundaries change.

(c) Phase III (2016 to 2025): In this phase the widenings recommended are:

- Little River Road/Military Way/Pritchard Road south from Ryan Road to Guthrie Road;
- Road A along its western end just east of Veterans Memorial Parkway;

- Road E, the Back Road Connector, widened to four lanes;
- Ryan Road to six lanes between Highway 19A and Back Road;
- Cliffe Avenue ('V') between 17th Street and 29th Street widened to six lanes;
- Extending Military Way south to Knight Road;
- Extending Dryden Road east to Pritchard Road.
- Guthrie Road widened to four lanes between Anderton Road and Pritchard Road; and
- Widen Cumberland Road between Willemar Avenue and Cliffe Avenue.

The timing for the widening of Military Way, Pritchard Road and Anderton Road is dependent on the amount of development that goes on in the vicinity of the airport, in particular the industrial and warehousing development that is planned.

If a four lane Back Road Connector is built, then there is the potential for delaying the six laning of Ryan Road between Highway 19A and Back Road.

Beyond the 2025 horizon year, the connection from Highway 19A in the south via Comox Valley Logging Road and Marsden Road north over the Puntlege River to the North End Connector ('M') is recommended as is the extension of McDonald Road ('H') through to Comox Road, and a widening of the 5th Street Bridge ('Q').

5.3 Road Classification

The City of Courtenay currently classifies roads as arterials (split into major and minor), collectors (split into industrial/commercial and residential), locals (split into industrial/commercial and residential), and finally lanes. In addition, there are roads which are under the jurisdiction of the Ministry of Transportation. These classifications are summarized below and shown in Exhibit 5.1.

(a) Arterial Roads: The main purpose of arterial roads is to carry higher volumes of traffic over longer distances. Major arterials typically have rigid access controls while minor arterials have some access control. In the City of Courtenay a street such as Lerwick Road or Cliffe Avenue south of Fifth Street is classified as a major arterial while 17th Street and Lake Trail Road are classified as minor arterials. Major arterials can carry up to 30,000 vehicles per day while minor arterials can carry up to 20,000 vehicles per day. Parking is often prohibited, at least during peak hours, on arterial roads. Those roads in the City of Courtenay that are currently classified as major arterials or are Ministry of Transportation roads are clearly the high volume roads in the City. Based on the Transportation Association of Canada (TAC), the recommended intersection spacing on a minor arterial is 200 metres while on a major arterial it is 400 metres.

(b) Collector Roads: The second category is collector roads whose function is to collect traffic from local roads and provide a suitable route to arterials. For collector roads, traffic movement and land access are of equal importance. Residential collector routes carry traffic volumes of up to 8,000 vehicles per day while industrial/commercial

collector routes carry up to 12,000 vehicles per day. The typical minimum intersection spacing is 60 metres. In residential areas sidewalks should be provided on both sides while in industrial/commercial areas, sidewalks on one side would typically be sufficient.

(c) Local Roads: The primary purpose of local roads is to provide land access with the movement of traffic as the secondary function. Typical volumes on a local road are up to 1,000 vehicles per day for local residential roads and 3,000 vehicles per day for local industrial/commercial roads. Typically parking is allowed depending on the width of the roadway and the recommended minimum intersection spacing is 60 metres.

The recommended future road classifications of the City's roads is shown in Exhibit 5.6. Major roads outside of the City of Courtenay or Town of Comox are referenced as "grid roads" and these are also shown in this exhibit.

5.4 Traffic Controls

As traffic volumes build, arterial/arterial intersections will typically meet signal warrants and may be signalized and most of such intersections in the City of Courtenay are signalized. Those that are not would likely need to be signalized in the future. The second priority for signalization would be the intersection of an arterial road with a collector road. Although volumes on collector roads are generally lower than arterials, there can be delays for traffic trying to cross or turn left onto the arterial road with its higher volume. The installation of signals should be guided by the Ministry of Transportation's standard signal warrants and when these warrants are met then a signal should be considered. Intersections that should be considered for future signalization based on the recommended network are shown in Exhibit 5.7.

Roundabouts can possibly be used in place of traffic signals, particularly where volumes are not excessive and/or when approach roads are two lane roads with volumes in the same range. The possibility of roundabouts should be examined in detail at each location. At present, the following intersections are potential candidates for a future roundabout; Cumberland Road/Arden Road, Ryan Road/Little River Road and Knight Road/Pritchard Road.

5.5 Truck Routes

The City of Courtenay currently has a truck route plan and in general all arterial roads as well as industrial/commercial collector roads are truck routes while residential collectors and local roads are not. All roads under the jurisdiction of the Ministry of Transportation are also considered truck routes. The existing routes were shown on Exhibit 2.10.

All newly constructed roads that are arterials should be designated at truck routes as per the current situation in Courtenay. This would mean that the new Road A through Block 71 would be classified as a truck route as well as the new 11th Street bridge and the new Back Road connector. The recommended future truck route network is shown in Exhibit 5.8.

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EXHIBIT **5.7**

POSSIBLE FUTURE TRAFFIC SIGNAL LOCATIONS

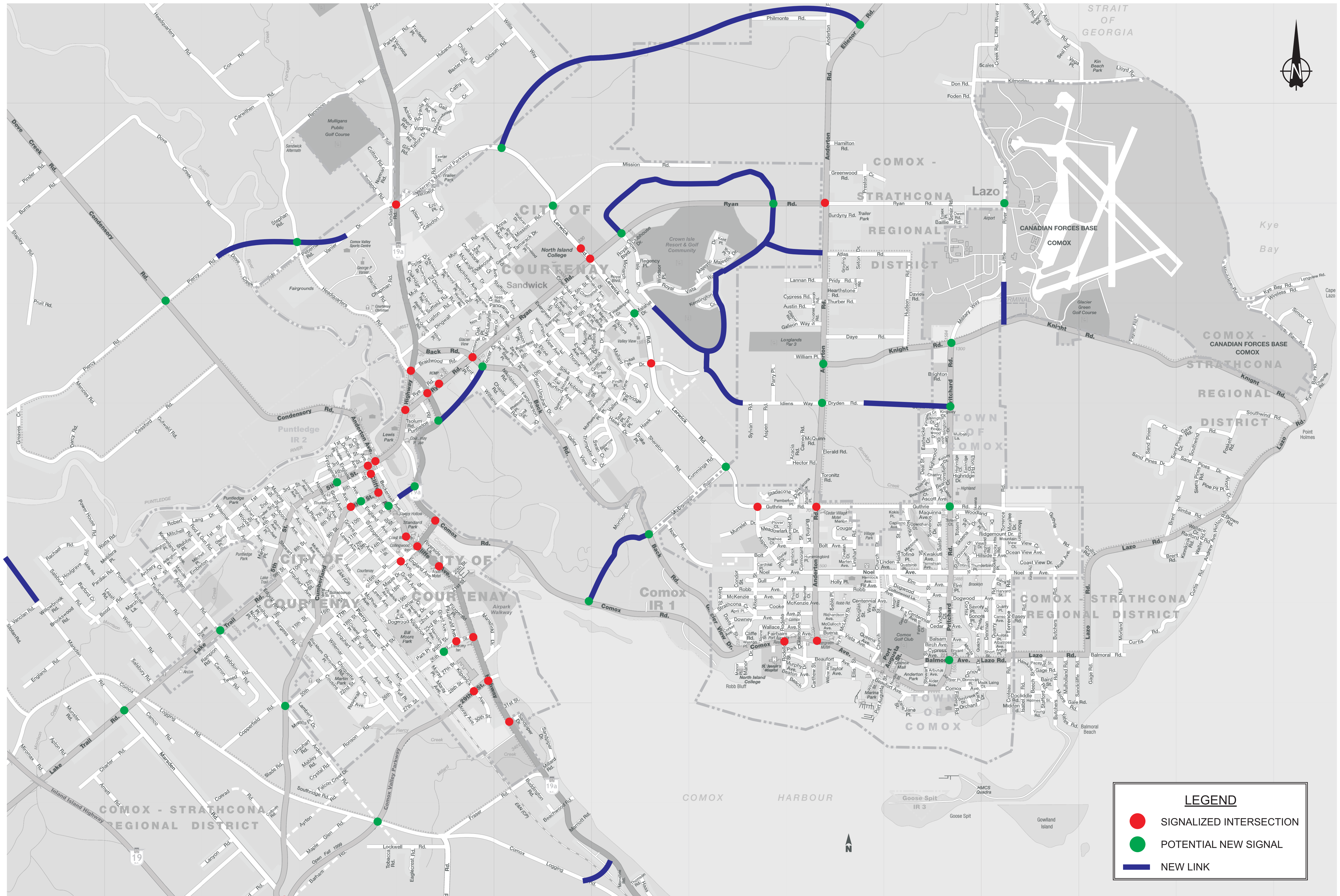

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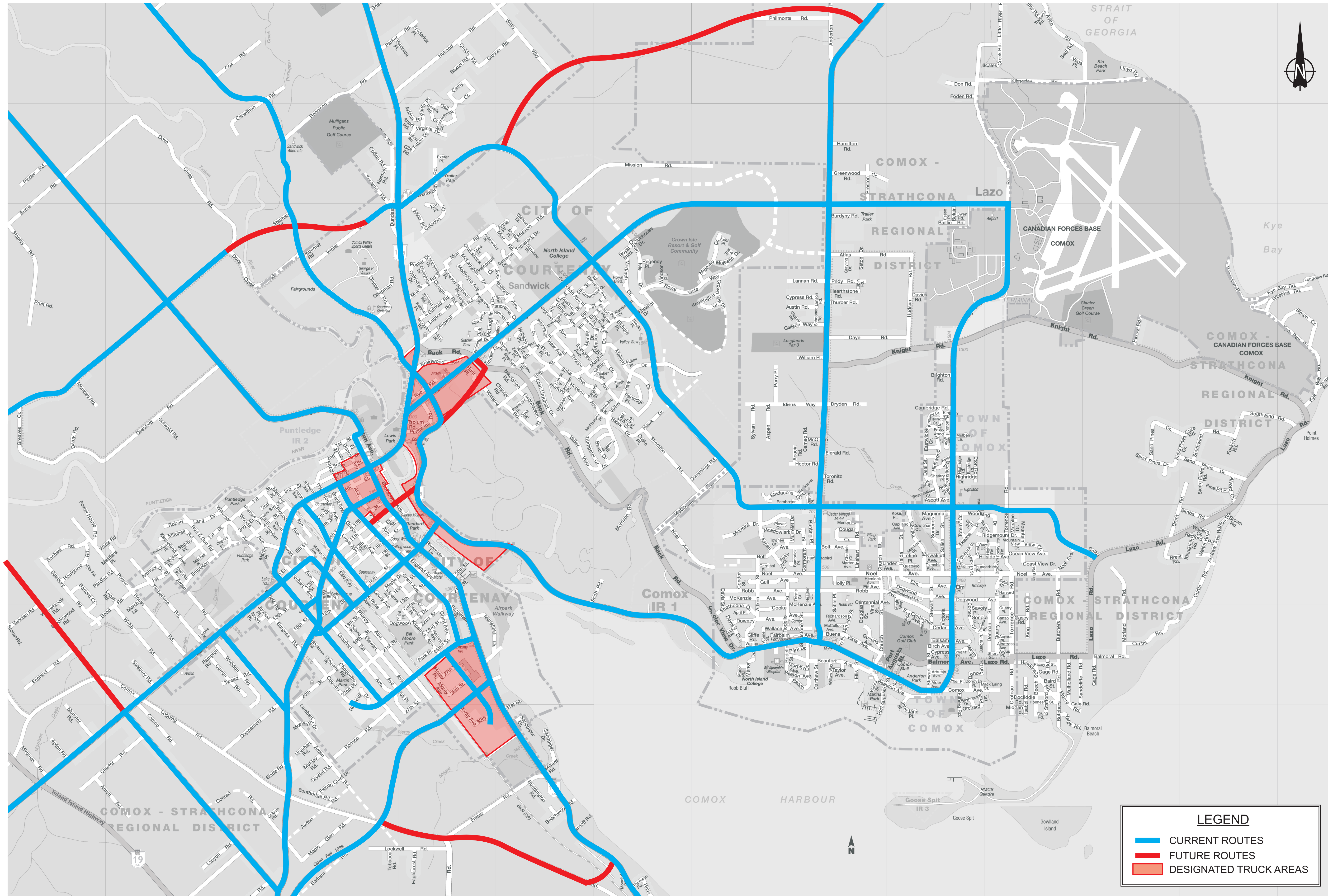
EXHIBIT 5.8
FUTURE TRUCK ROUTES MAP



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5.6 Bicycle Routes

Bicycle routes should be designated on key roads so that bicycles can travel from point to point via relatively direct routes only where adequate facilities exist. It is recommended that this be done on key arterials and collector routes. The best way to do this is to have a widened curb lane with a typical width of 4.3 metres as opposed to the standard 3.5 to 3.6 metres. If parking is provided then adequate width will be needed for a parking lane (2.8 metres), plus a bicycle lane (typically 1.5 to 2.0 metres), plus travel lane (typically 3.6 metres). Bicycle routes should not be merely a designation of a route that may have inadequate width. When a bicycle route has a high volume of bicycle traffic and/or high vehicular volumes, then consideration should be given to marking the bicycle lane with pavement markings and/or signs with the bicycle lane being 1.5 to 2.0 metres wide. The advantage of adding bicycle routes on arterial roads is that parking is generally not permitted and these routes travel longer distances connecting different areas of the city; however, these routes will have higher volumes of traffic and have trucks. The advantage of collector routes as bicycle routes is that there is generally less traffic on them and yet they still provide a reasonably direct route over shorter distances. The disadvantage of using collector routes is that there is often parking on them and thus there is conflict between parked cars, particularly with doors opening, and cyclists. Due to the nature of the road network in the City of Courtenay, it is recommended that a combination of both arterial and collector roads be used in order to provide good routes throughout the city. These routes are shown in Exhibit 5.9, based on the City's Current and Future Bicycle Routes. Exhibit 5.10 shows high priority routes which should be concentrated on first, followed by other routes shown previously in Exhibit 5.9.

All new or upgraded segments of arterial and collector roads should be constructed with provisions for bicycles by providing a wider pavement width than what is used by vehicles only.

5.7 Local Courtenay Issues

A number of local issues were examined as part of this study, the results of which are summarized below. Recommended changes in the short term are shown in Exhibit 5.11.

(a) Fifth Street/Fitzgerald Avenue – Issue: Increased traffic volumes at a four-way stop controlled intersection - are signals needed? Conclusion: The intersection as a four-way stop operates at an acceptable level of service at the present time but will fail within five years, and at that time a signal will be needed. Signal warrants are currently met based on an analysis of the intersection as a two-way stop. Signalizing the intersection would reduce delays and v/c ratios in the peak hours.

(b) Cumberland Road/20th Street – Issue: Should this intersection remain open due to the usage of 20th Street as a short cut? Conclusion: Twentieth Street is classified as a collector road and the volumes on it are low at 160 veh/h in the p.m. peak hour or 1,600 veh/day. This daily volume is less than the typical maximum of 8,000 veh/day for a residential collector. This road provides a connection between Cumberland Avenue and Cliffe Avenue without routing traffic north to 17th Street. If 20th Street were closed, then

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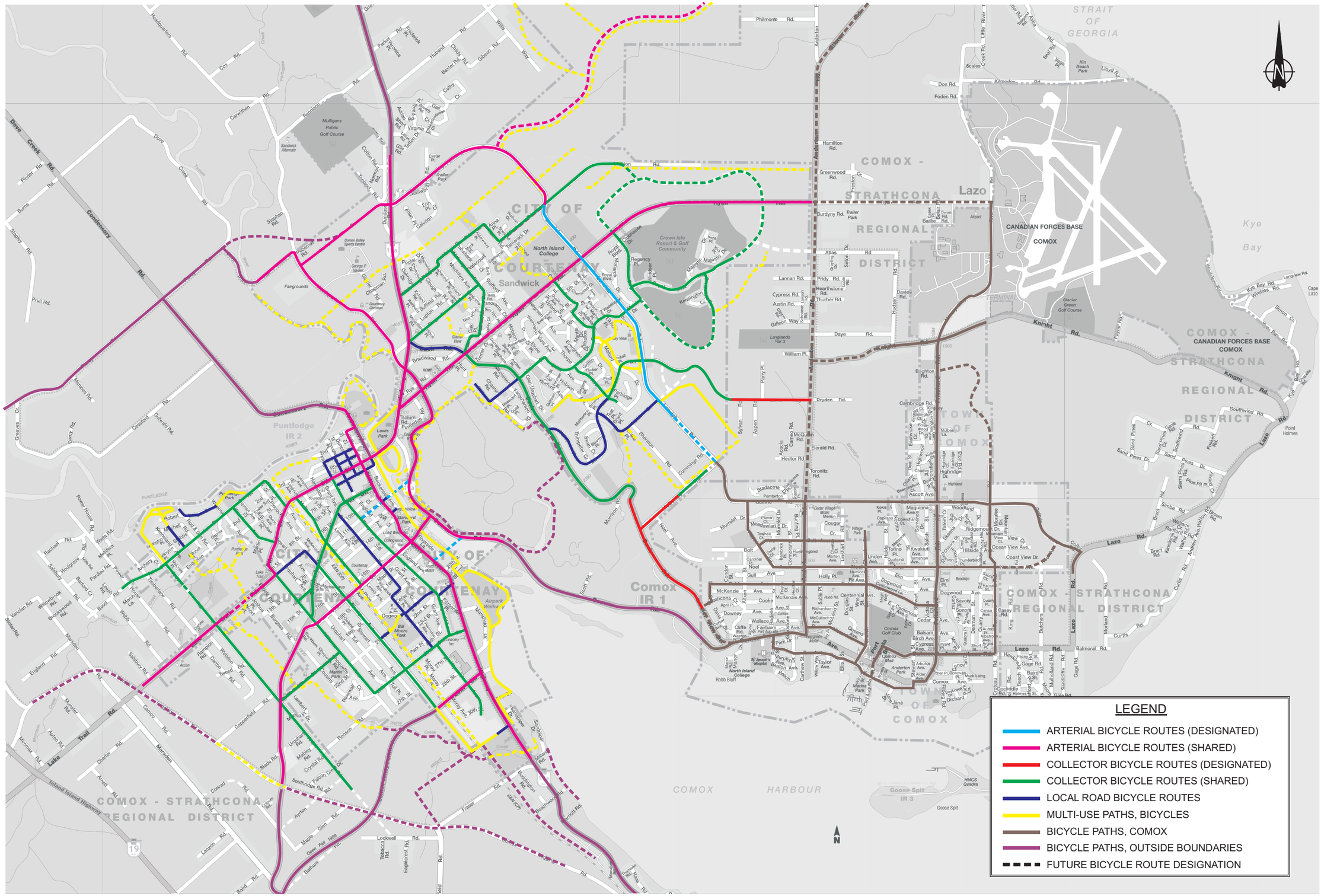
EXHIBIT **5.9**

COURTENAY AND COMOX EXISTING AND FUTURE BICYCLE ROUTES



LEGEND

- ARTERIAL BICYCLE ROUTES (DESIGNATED)
- ARTERIAL BICYCLE ROUTES (SHARED)
- COLLECTOR BICYCLE ROUTES (DESIGNATED)
- COLLECTOR BICYCLE ROUTES (SHARED)
- LOCAL ROAD BICYCLE ROUTES
- MULTI-USE PATHS, BICYCLES
- BICYCLE PATHS, COMOX
- BICYCLE PATHS, OUTSIDE BOUNDARIES
- FUTURE BICYCLE ROUTE DESIGNATION

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EXHIBIT 5.10
ON STREET BICYCLE ROUTE PRIORITIES

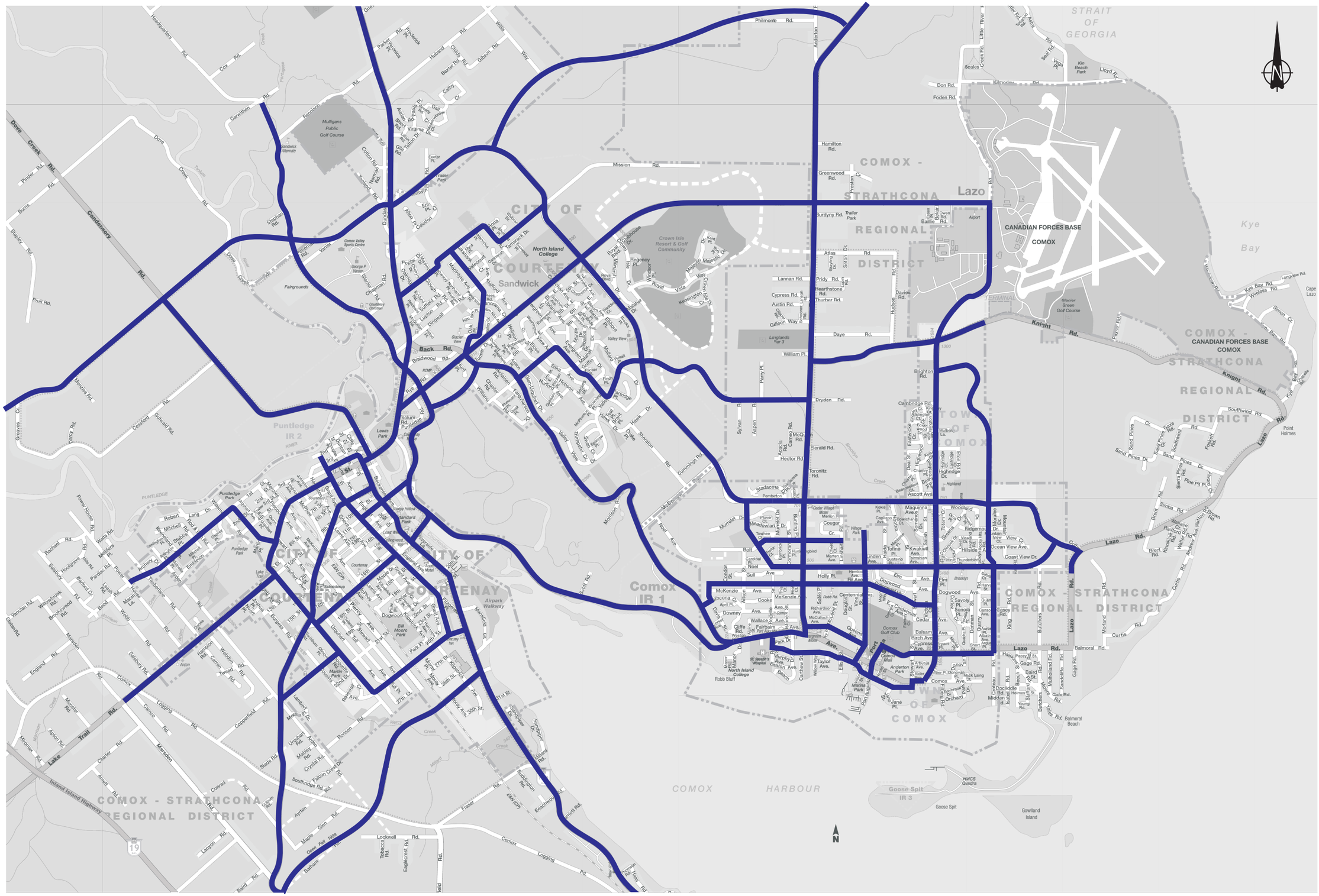

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EXHIBIT 5.11
KEY LOCAL IMPROVEMENTS

1628

more traffic would be diverted along Cumberland Avenue to the north, through the Cumberland Avenue/Willemar Road intersection and down Willemar Avenue, a more circuitous route. As a result it is recommended that this route should remain open. Future realignment is desirable to increase the separation between 20th Street and Arden Road and to allow for an intersection closer to the perpendicular. Options are detailed in a previous traffic impact study for the proposed Mixed Use Development prepared in 2005. This study also recommends keeping 20th Street open

(c) 26th Street/Kilpatrick Avenue – Issue: Low compliance with the three way stop. Conclusion: A signal is warranted based on the Warrant Number 6, combination warrant. The stop bar on the east leg is set back due to truck turning paths, and will need to remain set back when the signal is installed since trucks will still be making the northbound right turn.

(d) 5th Street/Cliffe Avenue – Issue: The need and feasibility for a crosswalk on the east leg of the intersection. Conclusion: Do not add crosswalk as it will increase congestion due to increased conflicts with the northbound right turn.

(e) Eight Street/England Avenue – Issue: Pedestrians crossing England Avenue. Conclusion: A pedestrian signal is warranted now based on traffic conditions during the noon peak hour when 81 pedestrians cross 8th Street. Of these pedestrians, 4 are children and 13 are seniors. A full signal will be warranted in two years based on the Peak Hour Delay warrant.

(f) 27th Street/Kilpatrick Avenue – Issue: Need for signalization or pedestrian signal. Conclusion: No new controls needed. Traffic volumes are below warrant values. Based on the Courtenay growth rate of 4% per year, a signal warrant could be met in 5 years; however, traffic growth on 27th Street is limited since it is not a through road, and Kilpatrick Avenue runs only to 26th Street in the north and to the commercial developments in the south. This will lower the growth rate and push signalization further into the future, if at all.

(g) Ryan Road/Cowichan Avenue – Issue: Pedestrians crossing with no control and delays to minor street traffic. Conclusion: A marked pedestrian crosswalk is technically warranted across Ryan Road as the p.m. peak hour pedestrian demand is 28 equivalent adult hourly units, and volumes on Ryan Road are high creating limited crossing opportunities; however, Ryan Road has relatively high speed traffic. It would be desirable to direct pedestrian traffic to the east to the existing Lerwick Road signal. This could be done by providing a sidewalk on the south side of Ryan Road connecting Cowichan Avenue to Lerwick Road. Many of the pedestrians are destined to the High School to the north and therefore will need to access Lerwick Road further north. These students currently cut through the college and the forest to the north which has safety concerns. The second issue is delays to minor street traffic. Due to the long delays for traffic exiting from Cowichan Avenue to the south and the North Island College Access to the north, it is recommended that exiting movements be restricted to right turns only. The southbound left turn movements and southbound through movements from the

college would be diverted to Lerwick Road via the new signal in front of Home Depot. This traffic would then be able to use the signal at Ryan Road/Lerwick Road to cross or turn onto Lerwick Road. The traffic from the south side of Ryan Road wanting to access the college could do so by turning right onto Ryan Road and then left onto Lerwick Road, then left into the college. Traffic wanting to turn left would need to travel via 6th Street to Back Road and then use Back Road to access Ryan Road. It should be noted that the number of vehicles affected by this change is small – 28 vehicles per hour in the p.m. peak hour.

Recommendation: Prohibit through and left turn movements from Cowichan Avenue and the North Island College access, and build a sidewalk along the south side of Ryan Road between Cowichan Avenue and Lerwick Road. Monitor the effectiveness of this solution.

(h) Lerwick Road/Malahat Drive – Issue: Need for upgraded pedestrian crossing. Conclusion: No change to existing marked crosswalk. It is anticipated that based on current growth rates, a "Special Crosswalk" would be warranted within 5 years. The warrant for a full traffic signal would not be met until significant Crown Isle development occurs that adds traffic to the westbound through and left turn movement. Traffic volumes at this location should be monitored as volumes may increase as the Veterans Memorial Parkway becomes more known, particularly now that directional signage is installed.

(i) 17th Street/McPhee Avenue – Issue: Low compliance for the three way stop, pedestrians crossing. Conclusion: Narrow 17th Street at the intersection with corner bulges. Remove stop signs for 17th Street traffic. Based on the existing crossing distance, a special crosswalk is warranted since in the a.m. peak hour there were a total of 31 children and 18 adults observed crossing. This combined with the 17th Street volume gives a warrant for a special crosswalk with a four lane cross-section on 17th Street but no crosswalk is warranted if the road is narrowed. It is recommended that the road be narrowed as much as possible to still allow for truck and bus turning movements, and as a result, a standard marked crosswalk is recommended.

(j) 6th Street/Cliffe Avenue – Issue: Need for southbound advanced green phase. Conclusion: This phase is not warranted as the volume is low, the delay is low and the product of the left turn volume and the opposing volume does not meet warrants. A warrant may be met in six to seven years based on background traffic volume growth.

(k) 4th Street/Cliffe Avenue – Issue: The need for a crosswalk on the north leg of the intersection. Conclusion: An additional crosswalk is not warranted as traffic volumes and pedestrian volumes are not high enough for a second crosswalk to be practical. Most pedestrian traffic is destined to and from the south with the exception of the pedestrian traffic to the bus stop on the northwest corner of the intersection.

(l) 1st Street/Anderton Avenue – Issue: The need to reconfigure the intersection with respect to traffic controls with upcoming reconstruction. Conclusion: Reconfiguring the

intersection so that the traffic between the west and north has priority is recommended. This would mean that the south leg of Anderton Road would face a stop sign, and the road would curve so that Anderton Avenue to the north and 1st Street to the west would form a continuous route. This configuration would match the major flow of traffic which is between the west and the north. Due to low pedestrian volumes, pedestrian crosswalk warrants are not currently met.

(m) 17th Street/Fitzgerald Avenue – Issue: General intersection operation. Conclusion: Adjust signal timing to allow for more north-south green time. This would allow the intersection to operate at acceptable levels for about five years based on the current traffic growth rate in Courtenay. A northbound right turn lane would be desirable in the long term. The "Right Lane Must Turn Right" sign should be replaced with a standard RB-41R sign for the westbound right turn. An overhead sign would be desirable as this is a trap lane.

(n) 17th Street/England Avenue – Issue: Delay for southbound left turn movement out of the mall. Preliminary Conclusion: No changes needed. If delays for this movement become long, traffic can exit onto Cliffe Avenue to travel south or east. Pedestrians can also use the Fitzgerald signal 85 metres to the west or the Cliffe Avenue Signal 95 metres to the east. The sign on the south leg should be changed to a RB-14R (right turn only) instead of RB-10 (no through traffic) to provide clarity, as only right turns from the south leg are to be permitted.

(o) First Street – Issue: Speeding and traffic volumes along this road, including in front of Puntlege Park. Recommendations: A detailed traffic calming plan is being prepared. Our observation is that this street is relatively wide, has priority over all cross streets, and is flat, all of which make traveling at high speed easier.

(p) Mission Road/Lerwick Road – Issue: Increased traffic volumes on Lerwick Road as a result of the opening of the Veterans Memorial Parkway. Preliminary Conclusions: Signal warrants are not met. For pedestrians, the warrant for a special crosswalk is met based on a.m. peak hour pedestrian volumes. A full signal will be warranted in about 12 to 13 years, assuming a 4% growth rate on all approaches. Traffic volumes at this location should be monitored as volumes may increase as the Veterans Memorial Parkway becomes more known, particularly when directional signage is installed on Ministry of Transportation roads. Signage on City roads has been installed.

(q) Cliffe Avenue – Issue: Comments on design by McElhanney. Preliminary Conclusions: In general the plan to add a two-way left turn lane on Cliffe Avenue between the Safeway signal and 10th Street is reasonable. Revision of lane widths could allow for a shared vehicular/bicycle lane, but this would need to be investigated in detail.

(r) Arden Elementary School Pedestrian Crossing: Issue: Pedestrians, including students, crossing Lake Trail Road. Conclusion: This pedestrian crossing was examined and traffic counts undertaken to assess the need for upgrading. The pedestrian volumes meet the threshold for a pedestrian signal. Based on a 7.5 metre crossing distance, traffic

volumes do not meet the threshold for a crosswalk; however, based on a 14 metre crossing distance, the threshold for a special crosswalk is just met. The crossing width, which includes shoulders, is between these two values of 7.5 and 14 metres. Considering that traffic volumes will continue to increase over time, it is recommended that a special crosswalk be installed. It should be noted that a number of people J-walk just to the east of the crosswalk, particularly in the p.m. peak hour as school lets out. During this time period, most of these J-walkers are adults. Improving the existing crosswalk will encourage some of these pedestrians to use the designated crosswalk.

(s) Lerwick Pedestrian Linkage: Issue: How to accommodate pedestrians crossing Lerwick Road between the Mark Isfled School and the east side of Lerwick Road (including from the proposed 133 units of Crown Isle Development)? This could be done at either Malahat Drive or to the south in line with the access to the Mark Isfled School. Conclusion: Provide a pedestrian crossing at Malahat Drive, since this intersection will be signalized in the future and a pedestrian crossing to the south at the school access will be too close to this intersection – 150 metres. Based on previous analysis, the Malahat Drive intersection should be controlled by a special crosswalk by 2010, and signalized with further development in the area. The proposed next 56 units of the Crown Isle development would bring this special crosswalk date forward. The warrant for a full traffic signal will be met in approximately 2011 based on these 56 units. If a further 77 units were built and all accessed Lerwick Road via Malahat Drive, then a signal would be warranted now; however, with 133 units built, access to the Valleyview Drive signal would be available, and some of the traffic would use this existing Valleyview Drive signal, thus reducing the demand at Malahat Drive and resulting in the signal once again being warranted in about 2011.

5.8 Lerwick Road/McDonald Road Signalization

At the request of the City of Courtenay and the Town of Comox, the intersection of Lerwick Road/Guthrie Road/McDonald Road was examined. The intersection currently operates at a good level of service with a maximum v/c ratio of 0.19 and Level of Service C for the critical northbound McDonald Road movements in the a.m. peak hour, and a v/c ratio of 0.23 and Level of Service C in the p.m. peak hour for these same movements. With the volumes and delay at the present intersection, traffic signals are currently not warranted.

Future traffic volumes for this intersection were estimated by taking the 2010 and 2015 traffic volumes from TMODEL and comparing them to the 2005 volumes and adding this growth to the existing traffic volumes at the intersection. Traffic resulting from developments surrounding the development were taken into account, namely:

- in the northeast corner of this intersection, 55 multi-family and 43 single-family units;
- in the southeast corner 100 multi-family and 130 single-family developments are proposed with access provided onto Guthrie Road via a right-in/right-out access onto McDonald Road where all movements are permitted, and also via connections to Murrelet Drive and Bolt Avenue;

- 5,110 m^2 commercial development on the northeast corner of Guthrie Road/McDonald Road (with a right-in/right-out access to Guthrie Road and an all-movements access to McDonald Road);
- 35 multi-family units behind the commercial (with access to McDonald Road);
- 68 single-family homes along McDonald Road to the north;
- 35 single-family homes on undeveloped land along Inverclyde Way west of McDonald Road; and
- 35 units south of Cummings Road, assuming that Cummings Road is not connected to Lerwick Road as it is today but is instead connected to McDonald Road via Sheraton Road. Traffic volumes are given in Exhibit 5.12.

By the 2016 horizon year, based on the existing lane configurations and traffic controls at the intersection, the maximum v/c ratio at this Lerwick Road/McDonald Road intersection will be greater than 1.00 with a Level of Service F for traffic exiting the stop controlled north and south legs of McDonald Road. With intersection improvements, namely adding left turn lanes on all legs, the intersection v/c ratio will drop slightly, but still be greater than 1.00 with Level of Service F. With Lerwick Road widened to a four lane road plus left turn lanes the northbound left turn v/c ratio will drop to 0.77; however, the southbound left turn v/c ratio will remain greater than 1.00 with a Level of Service F.

A signal warrant analysis was undertaken based on the 2011 and 2016 volumes and a number of the Ministry of Transportation's warrants are met. This is true for the existing intersection, as well as an upgraded intersection with left turn lanes, or left turn lanes and a four lane Lerwick Road/Guthrie Road.

If the northeast leg of the intersection – McDonald Road – were not connected to Lerwick Road then most of the traffic would be diverted to the Guthrie Road/Aspen Road signal, particularly the southbound left turn traffic. Some of the traffic to and from the west may use the proposed Inverclyde Road to access Lerwick Road further to the northwest. The potential closure of the north leg of McDonald Road will mean that signal warrants are not met through to the 2016 horizon year.

With a signal at the intersection of Lerwick Road/McDonald Road, there will be some increase in traffic along Murrelet Drive and Bolt Avenue to McDonald Road; however, since there is already a signal at the Guthrie Road/Aspen Road and the routing between McDonald Road and Aspen Road is circuitous the increase will not be great.

5.9 Comparison of Bridge Options

There are two primary options for a new bridge crossing the Courtenay River: 11th Street north of the existing 17th Street Bridge and 19th Street south of the existing 17th Street Bridge. For each of these two options there are three sub-options:

1. Having both bridges operating as two-way.
2. Having both bridges operating as one-way.

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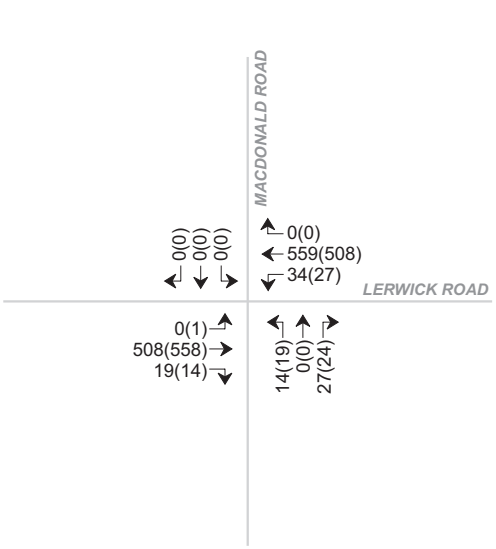
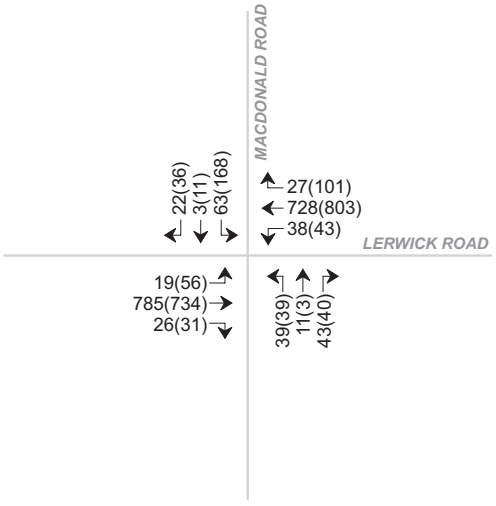
EXHIBIT **5.12**

CURRENT AND FUTURE LERWICK ROAD / MACDONALD ROAD TRAFFIC VOLUMES

2005 TRAFFIC VOLUMES



2016 TRAFFIC VOLUMES WITH DEVELOPMENT



LEGEND	
100	AM PEAK HOUR TRAFFIC
(150)	PM PEAK HOUR TRAFFIC

3. Having both bridges operating as one-way plus have the connecting roads, i.e., Cliffe Avenue and Comox Road operating as one-way streets, in effect making a large roundabout albeit in a square shape.

Network wide travel characteristics statistics for these six options as taken from TMODEL are shown in Table 5.2. It can be seen that in general the 11th Street option has lower travel times, lower vehicle kilometres traveled, and lower vehicle hours traveled than the similar option at 19th Street, although the differences are quite small. Each of these options were also simulated in SimTraffic and similar statistics including fuel consumption calculated – the results are also included in Table 5.2. For the 11th Street option, it can be seen that operating the bridge as one-way with one-way connecting roads clearly has the lowest delay travel time and fuel consumption; however, it has the highest distance traveled. Looking at the 19th Street Bridge crossing, it can be seen that the best option here is again to have the bridges and connecting roads operating as one-way and this will produce the lowest delay, travel time, and fuel consumption.

These results should be considered a first-cut of the analysis and a further detailed study will be needed to determine which bridge should be built and in particular which of the operating assumptions should be used. The feasibility of building the 19th Street Bridge with respect to airport flight paths also needs to be investigated further.

The City of Courtenay has prepared a drawing showing the profile of the Obstacle Limitation Surface for the airport. This surface crosses the proposed 19th Street Bridge so that the western half is not in the obstacle limitation surface and the eastern half is. As a result, the lift span of any bridge should be located on the west side of the bridge. The maximum elevation of the lift structure is estimated at 27.5 metres based on the height of the 17th Street Bridge structure and the 19th Street road elevation. The elevation of the approach alone is 15.2 metres, creating a conflict. It is unclear if this will be acceptable given that this is not a listed airport, and the fact that the bridge is anticipated to only open approximately 25 times per year (based on 17th Street Bridge data from the Ministry of Transportation).

Table 5.2
Bridge Options – Travel Time Comparison

		----------TMODEL----------			----------SimTraffic----------			
		Time	**VKT**	**VHT**	**Delay**	**Distance**	**Time**	**Fuel**
11th Street	Two Way	351,957	417,971	37,977	529	4950	644	2218
	One Way	352,223	417,725	38,056	391	4813	501	1817
	w One Way Cliffe/Comox	352,179	417,908	38,039	56	5437	180	1285
19th Street	Two Way	361,017	418,214	38,149	699	5431	826	2702
	One Way	356,912	417,512	38,148	389	5911	528	2133
	w One Way Cliffe/Comox	356,973	418,070	38,086	74	5400	198	1278

5.10 Farmers' Market

The City has asked for an examination of the impact of the proposed new Courtenay River crossings on the Highway 19A/Comox Road/Farmer's Market intersection proposed. Two locations for a new bridge over the Courtenay River are currently being considered: one at 11th Street and one at 19th Street.

With a bridge at 19th Street, there will be little effect to the proposed Highway 19A/Comox Road/Farmer's Market intersection design, except that traffic volumes on Highway 19A will be increased, and Highway 19A will be widened to four lanes, which is taken into account in the intersection design.

An 11th Street Bridge would be expected to intersect Highway 19A at approximately the driveway to the Hamilton Logging Office (1085 Highway 19A). This is shown conceptually in Exhibit 5.13 and 5.14. This is also located in the taper of the proposed northbound left turn lane on Highway 19A for the turn into Comox Road. This is about 105 metres from the centre of the proposed revised Highway 19A/Comox Road/Farmer's Market intersection and approximately 465 metres north of the 17th Street intersection. If 11th Street is curved to the south to intersect Highway 19A at a right angle, then it will intersect Highway 19A at about the existing northerly access to the Farmers market property on the east side of Highway 19A, approximately 160 metres from the proposed Highway 19A/Comox Road/Farmer's Market intersection. Recommended intersection spacing on arterial roads is 400 metres, and this will clearly not be met.

Based on analysis for the Farmers' Market, the potential queue for the signal in the northbound direction on Highway 19A at the Comox Road/Farmer's Market intersection could be up to approximately 160 metres. In the southbound direction, the queue towards the north could be approximately 160 to 170 metres or more, depending on the operation of the 11th Street Bridge (i.e. one-way or two-way). These queue lengths indicate that these two intersections will not operate independently and queues from one could easily affect the other.

With an 11th Street Bridge in place, there are some options for the intersection of the existing Comox Road and the proposed Farmer's Market access to Highway 19A. These are:

- Highway 19A/Comox Road/Farmers' Market intersection as proposed with 11th Street to the south (Option 1).
- Highway 19A/Comox Road as is with Farmers' Market moved opposite 11th Street to the south (Option 2).
- Close Comox Road and move Farmers' Market opposite 11th Street (Option 3).

(a) Option 1: With this option, the critical problem will be queuing between the two intersections, i.e., 11th Street and Comox Road/Farmer's Market with only 100 metres of space. Curving 11th Street to the south to line up with the existing Farmers' Market access could increase the distance between the intersections to 160 metres which would be beneficial; however, this will affect more properties on the west side of Highway 19A and still does not meet intersection spacing recommendations. The advantage of this

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EXHIBIT **5.13**

HIGHWAY 19A / COMOX ROAD

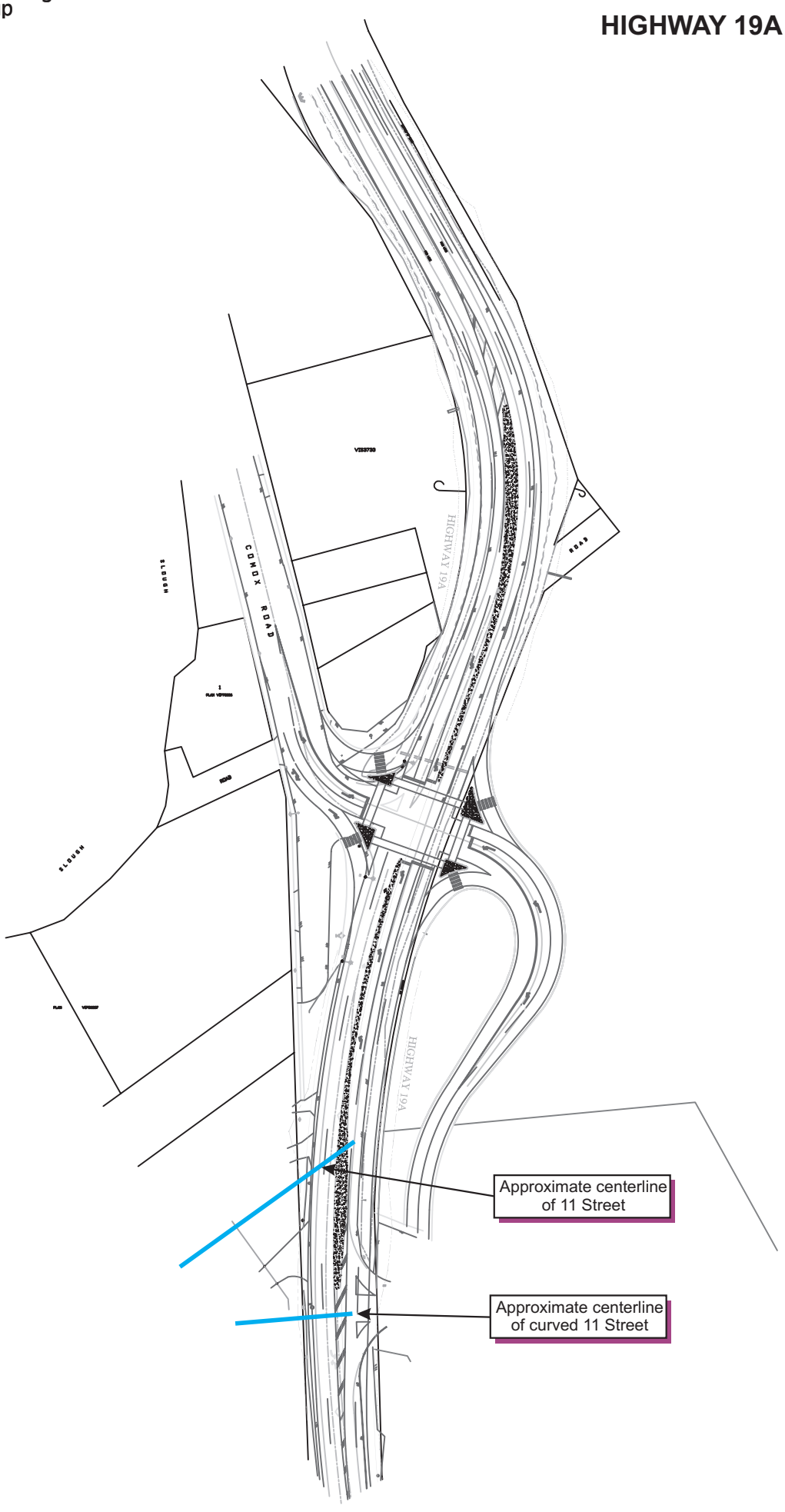

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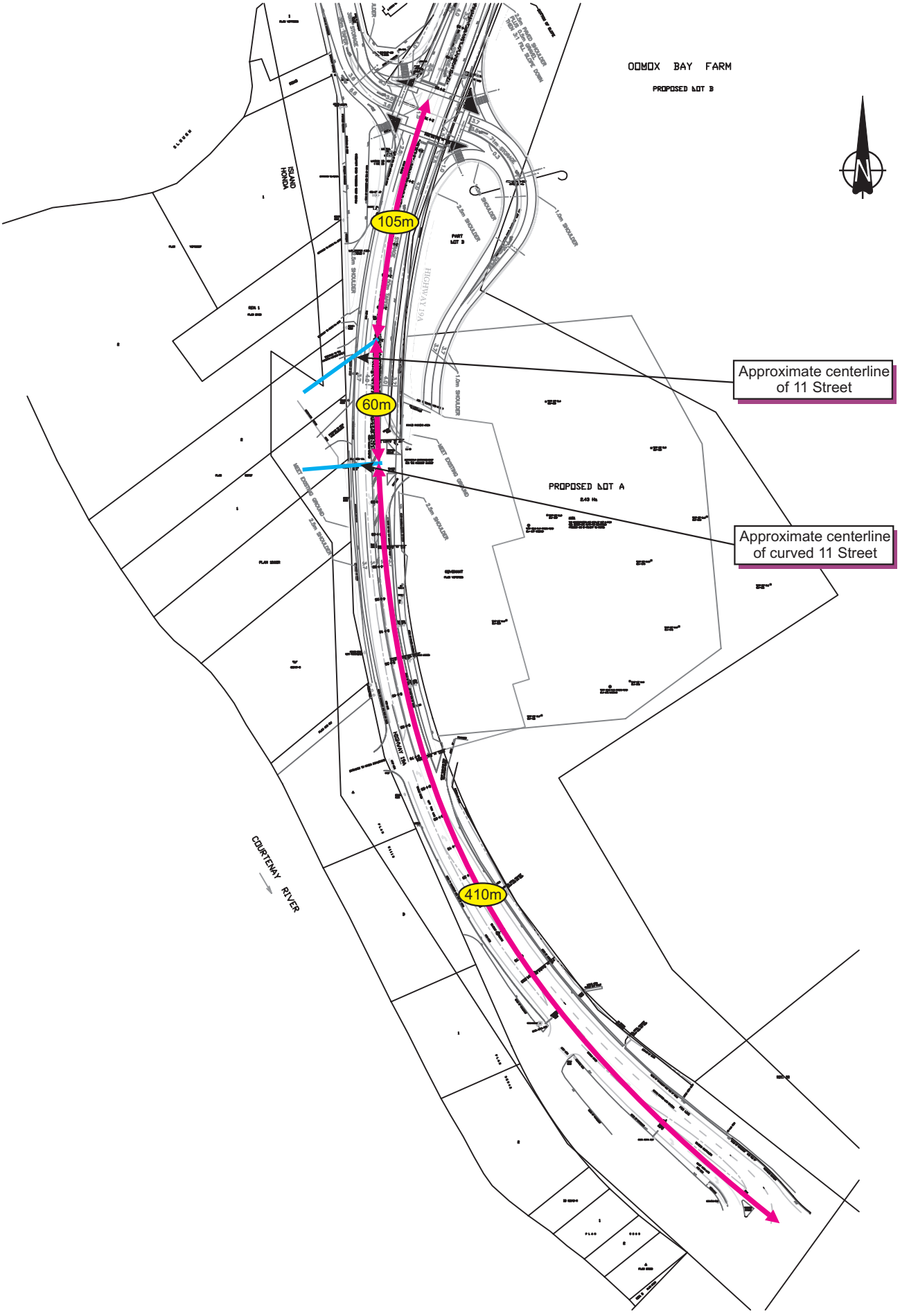
EXHIBIT **5.14**

HIGHWAY 19A / COMOX ROAD to 17 STREET



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option is that the intersection of 11th Street/Highway 19A will be a T-intersection which will operate more efficiently than a four leg intersection. If it is decided to operate Highway 19A as a one way road northbound with the 11th Street Bridge operating as one way westbound, then this intersection may operate without a signal. This would reduce queues in the southbound direction, as all traffic would be turning right onto the bridge. The intersections would still be close together.

(b) Option 2: Aligning 11th Street so that it is opposite the existing Farmers' Market access would allow the proposed Farmers' Market access not to be built and the existing access to be used. This would leave only Comox Road intersecting Highway 19A, further to the north, which would be a T-intersection. This would reduce queues in the northbound direction, as with the elimination of the east leg of this intersection, there will be no southbound left turn movement conflicting with the northbound through movement. With this option, it would be possible to prohibit the left turn movement out of Comox Road, possibly eliminating the need for a future signal here. The disadvantage of this option is that the 11th Street/Highway 19A intersection will become a four leg intersection and would need to be signalized even if the 11th Street Bridge and Highway 19A south of 11th Street were to operate as one-way since traffic will need to enter and exit the Farmers' Market. The intersection of 11th Street and Comox Road will still be close together.

(c) Option 3: This option is similar to Option 2; however, Comox Road is now closed at the highway. This would reduce delays for Highway 19A traffic, and consequently queue lengths on Highway 19A would no longer be a concern. Comox Road traffic would be diverted north to 5th Street and would access Highway 19A at Ryan Road. This would make for a more circuitous routing for Comox Road traffic. As a result, the northbound left turn movement would need to remain at Ryan Road/Highway 19A. The removal of this turn movement was proposed as part of the Ryan Road corridor study.

(d) Conclusion: An 11th Street Bridge would intersect Highway 19A very close to the proposed Comox Road/Farmer's Market intersection, and changes will need to be made in order to allow the intersection to operate acceptably. The ideal option will depend on the proposed 11th Street Bridge operation (one-way or two-way) and the operation of Highway 19A between 17th Street and 11th Street. Curving 11th Street to the south to provide greater spacing between Comox Road and 11th Street, prohibiting some or all movements in and out of Comox Road and/or relocating the Farmer's Market access, could improve operations in the area, although due to the various constraints this will be difficult. Even without the Farmer's Market access, 11th Street and Comox Road will be close together.

5.11 Raven Ridge Cross Section Standards

The alternative road standards proposed for the Raven Ridge development in the City of Courtenay were examined. These standards are proposed to be used for urban low volume local roads, urban single family local roads, urban multi family local roads and urban collector roads.

Some key criteria for these four categories are summarized in Table 5.3 along with the City of Courtenay's current minimum requirements and the Transportation Association of Canada (TAC) guidelines. All of these criteria apply to urban roads.

The proposed low volume local roads would have a right-of-way width of 16.5 to 18.0 metres. This right of way width clearly meets the standard for a lane as defined by the City as six metres and TAC as six to 10 metres. The proposed right-of-way width is less than that of the City's standard for an urban local road of 20 metres but within the TAC guideline of 15 to 22 metres. As this falls in TAC's range, this would appear reasonable. This would also allow for future road widening, if necessary. The proposed pavement width of 6 metres for a low volume road is slightly wider than the City's and TAC's lane standards, but lower than either's local standard. A pavement width of 6.0 metres with parking allowed on one side would allow only one lane of moving traffic. This single lane traffic situation can be seen on many narrow local streets, particularly if they have parking on both sides. In fact TAC/ITE's *Canadian Guide to Neighbourhood Traffic Calming* suggests a minimum pavement width of 6.0 metres and a maximum pavement width of 8.0 metres with parking on one side of the road and one travel lane. Sidewalks or bicycle facilities are not proposed on-street in the development. The proposed cross section appears to be reasonable, as long as these roads remain low volume roads. This can be ensured if they serve only a limited number of properties, for example a cul-de-sac with up to 50 residential units, and will not act as a through route. This is currently the plan, with low volume roads serving cul-de-sac's or routes unlikely to attract significant traffic. The exception is the east end of Road B running north of and parallel to arterial Road A. This will be discussed below.

Table 5.3
Comparison of Raven Ridge Cross Sections

		Urban Local Low Volume	Urban Local Single Family	Urban Local Multi Family	Urban Collector
(a) ROW	Proposed	16.5-18.0	20.0	20.0	20.0
	City	6.0 *	20.0	20.0	20.0
	TAC	6-10 *	15-22	15-22	20-24
(b) Pavement Width	Proposed	6.0	8.5	10.0	11.0
	City	5.5 *	9.0	11.0	12.0
	TAC	4.8 *	10.8 if Parking on both sides	10.8 if Parking on both sides	12.6
(c) Sidewalks	Proposed	none	one side	one side	both sides
	City	one side	one side	one side	both sides
	TAC	none	one side	one side	both sides
(d) Parking	Proposed	one side	both sides	both sides	both sides
	City	n/a	n/a	n/a	n/a
	TAC	some restrictions	one or both sides	one or both sides	possible peak hour restriction
(e) Design Speed	Proposed	30	50	50	60
	City	n/a	50	50	50-70
	TAC	30-40 *	30-50	30-50	50-80
(f) Cyclists	Proposed	no restrictions or facilities	no restrictions or facilities	no restrictions or facilities	no restrictions or facilities
	City	n/a	n/a	n/a	n/a
	TAC	no restrictions or facilities	no restrictions or facilities	no restrictions or facilities	lane widening or special facilities

* based on lane standards as opposed to local road standard

The proposed single family local road right-of-way width of 20 metres meets the City's requirement of 20 metres and also meets TAC's guidelines of 15 to 22 metres. The proposed pavement width of 8.5 metres is 0.5 metres narrower than the City's standard but 2.3 metres narrower than TAC's. With parking on both sides, and a pavement width of 8.5 metres, this leaves a 3.7 metre travel lane, enough for one vehicle to travel, assuming that the parking lanes are 2.4 metres wide as per TAC guidelines. As a result, two way traffic will not be possible simultaneously. TAC/ITE's traffic calming guidelines recommended a minimum pavement width of 7.3 metres and a maximum of 10.0 metres with parking on both sides and one travel lane and this is met. Allowing parking on both sides and providing no special bicycle facilities is in line with the City's requirements and TAC guidelines.

The proposed multi family local road standard is similar to the single family standard, except that the pavement width is widened to 10.0 metres. With parking on both sides, this will leave 5.2 metres for travel, just enough for two cars to just pass although space will be tight. Again there is no bicycle provision, in line with the City's requirements and TAC guidelines. The proposed right-of-way meets the City's requirements and also falls in TAC's range.

Thu urban collector standard has a right of way width of 20 metres which is the same as the City's requirement and also meets the TAC guidelines of 20 to 24 metres. The proposed pavement width of 11.0 metres is one metre less than the City's standard of 12 metres and 1.6 metres less than the TAC guideline of 12.6 metres. With parking on both sides of the street there will be 5.4 metres for vehicles to pass assuming 2.8 metres on each side for parking as per TAC's guidelines for a collector road. If only 2.4 metres of parking is assumed on each side as per a local road, then 6.2 metres of travel width will be available, enough for two way car traffic. Normally it would be desirable on a collector road to provide for at least two way traffic and also for bicycle traffic. It is understood, however, that multi-use urban trails will be provided throughout the Block 71 development, with some being parallel to the collector roads, so that bicycle facilities need not be provided on the collector roads.

It should be noted that, in general, as lane widths are narrowed, the accident rate will increase; however, with narrower lanes, and single lane traffic on the low volume and single family local roads, speeds will be slower and the accident severity should be less.

The proposed cross section standards appear reasonable. It should be noted that drainage, underground services and the cost of maintenance have not been considered.

A preliminary road classification map has been prepared by the Raven Ridge consultant and is shown in Exhibit 5.15. It is recommended that Road B, the road running north of and parallel to the arterial road (Road A), currently classified as a collector road for most of its length, be classified as a collector from end to end, i.e. from west of Willis Way to Road A and east of Quenville Road to Road A. This will provide a continuous alternative route to the arterial road. At the western end where the road curves, this route is shorter than using Road A and Willis Way to access Road B to and from the west, and thus traffic will likely use it anyway.

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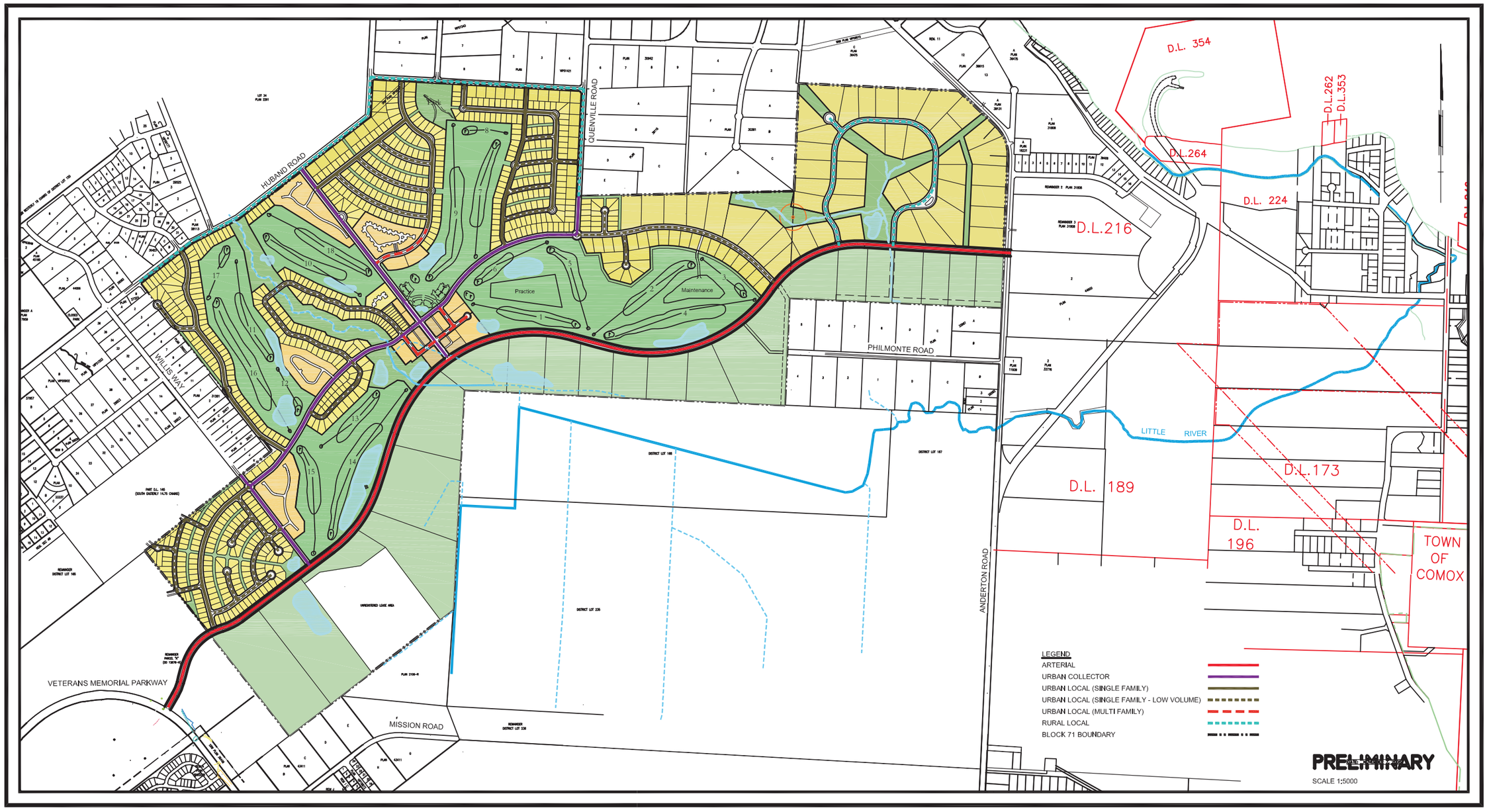
EXHIBIT **5.15**
ROAD NETWORK PLAN

Raven Ridge

Road Network Plan



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All of the local roads, except multi family, have the potential to provide for only one lane of traffic if vehicles are parked on both sides. This type of road should serve up to approximately 50 units. If the road serves more units than 50 units, then parking should be prohibited on one or both sides of the road as needed to provide for two lane two-way traffic. Adequate on-site parking should be provided to minimize on-street parking demand.

5.12 Airport Connections

It is recommended that the designated route between the airport and Downtown Courtenay be via Knight Road, Military Way, and Ryan Road. Based on projected traffic volumes, Military Way and Ryan Road will both ultimately need to be four lanes and they will provide a good connection into Courtenay. This designated route will avoid Knight Road between Pritchard Road and Anderton Road, which as mentioned previously, is narrow with many accesses to adjacent properties and deep ditches on either side, and without street lighting. This road would therefore be very expensive to upgrade. Traffic signals or possibly roundabouts will be needed at the intersection of Ryan Road/Military Way and Knight Road/Pritchard Road in the future, with the timing of the installation of these signals depending on airport and other growth. If the developments proceed as planned, these signals could be required within five years. When signals are warranted at the Knight Road/Pritchard Road intersection, it is recommended that this intersection be realigned to correct the current skew at the intersection. With a roundabout, correcting the skew is not quite so important.

It is further recommended that the designated route into the Town of Comox be via Knight Road and Pritchard Road with traffic accessing Pritchard Road via Guthrie Road and Noel Avenue as opposed to using Knight Road to and from Anderton Road. It is also important to direct traffic leaving the airport and wanting to travel north on Highway 19A to the Veterans Memorial Parkway in order to keep this traffic away from the Ryan Road/Highway 19A area. The same is true in the opposite direction. This signage is now in place towards the airport. In the long term, it may be possible to connect Road A through to Little River Road to provide an alternative routing for traffic travelling between the airport and the north.

5.13 Ferry Connections

The ferry connects to the road network at the north end of Eleanor Road which in turn connects to Anderton Road. Most ferry traffic will travel south on Eleanor Road and Anderton Road to Ryan Road where traffic travels west along Ryan Road into the City of Courtenay. The reverse is true for traffic travelling to the ferry terminal. The construction of Road A will greatly improve access to the ferry terminal for traffic traveling to and from the northwest portion of Courtenay or Highway 19A to the north as this traffic can use this road as opposed to using Ryan Road or the local roads immediately to the northwest of the ferry terminal.

5.14 Transit Service

Based on the predicted growth in Courtenay there will be additional transit demand to and from the proposed industrial areas at the south end of the City off of Highway 19A south of Anfield Centre which would mean that additional service may be needed on *Route 10 – Royston Buckley Bay*. In addition, a significant amount of development is going to occur in the Comox area, particularly in the vicinity of the airport and as such increased frequency on *Route 11* would be desirable. This route could also be diverted to serve the Crown Isle development which is also expected to grow significantly over the coming years.

A new route that would be beneficial would be to provide service between Ryan Road in the east via Highway 19A through to Driftwood Mall and Anfield Centre without routing via downtown. Currently passengers wishing to travel between east Courtenay area and the south Courtenay area must do so via downtown Courtenay or via Comox which adds significant time to the trips.

The developments at Kensington in Union Bay to the south on Highway 19A as well as the potential commercial development in Cumberland will also produce transit demand travelling to and from Courtenay. Increased service on *Route 10* to the Kensington development and increased service on *Route 2* to Cumberland would help serve some of this demand. *Route 2* could also be extended down the new Inland Island Highway to connect to the new Sage University development to be located just off the Inland Island Highway. This route would thus connect the university to services at the potential new Cumberland commercial area as well as to the existing services in Courtenay.

5.15 Effect of External Developments

Three major external developments are contemplated outside of the boundaries of the City of Courtenay: one is the Kensington development at Union Bay, the second is the Sage University development, and the third is the Cumberland Commercial development. The locations of these developments are shown in Exhibit 5.16. The affect of these developments were examined using the transportation model developed for use in the study to determine what additional road improvements may be needed as a result of the building of these developments.

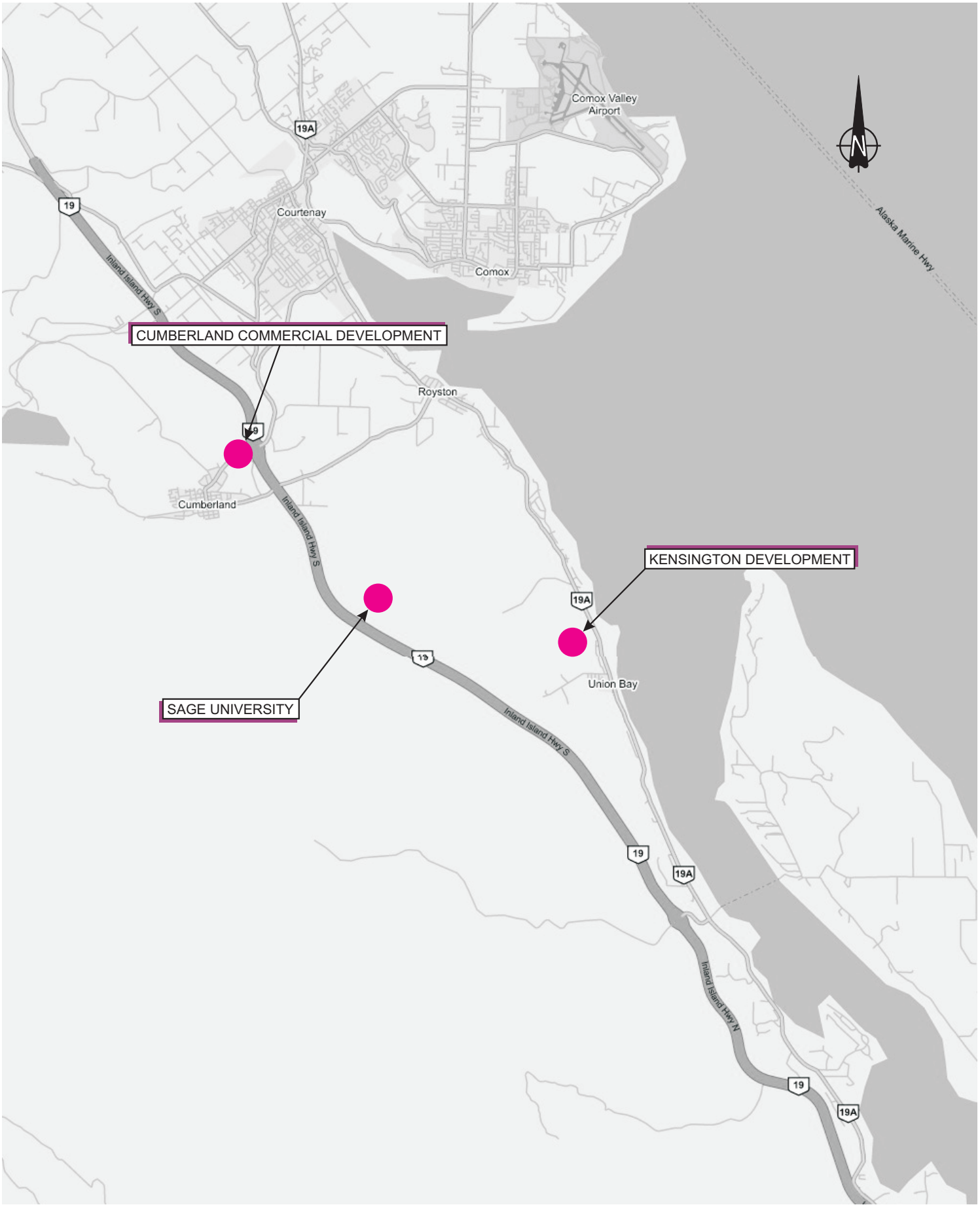
The Union Bay development is to consist of:

- 1,240 residential units;
- 450 seniors units;
- 27-hole golf course;
- 95 vacation units;
- 165-unit hotel;
- 15,000 m^2 of commercial area; and
- 100 unit marina.

ward consulting group

EXHIBIT **5.16**

POTENTIAL DEVELOPMENTS OUTSIDE COURTENAY



The traffic study for this development indicated that approximately 1,000 trips in the p.m. peak hour will travel to and from the development. This trip generation was used in assessing the impact of this development.

No traffic study has been done yet on the Sage University development which is tentatively expected to consist of:

- 3,000 single-family residential units;
- 450 multi-family residential units;
- 36-hole golf course;
- 200-unit hotel;
- 18,600 m^2 of commercial (200,000 ft^2);
- 1,000 pupil school;
- 5,000 student university; and
- a major sports facility.

The trip generation rate for this development was calculated using the Institute of Transportation Engineers (ITE) rates and then discounting the number of trips that are likely to remain internal to the development, i.e., between the residential component and the university, or the golf course and the hotel. The gross trip generation is estimated at 4,900 trips in the p.m. peak hour of which approximately 3,500 could exit the development. When a more detailed traffic impact study is done with a finalized plan, this number can be further refined.

The Cumberland commercial development is to consist of up to 93 hectares of commercial development. If this is developed at a full 25% floor space ratio, this could accommodate up to 2,500,000 ft^2 of floor area, which is a very large amount of commercial space in any municipality, and more so in Cumberland given its relatively small population base. For the purpose of analyzing its impact, it was assumed that this development will have a floor space ratio of 0.10 or 10% resulting in about 93,000 m^2 or 1,000,000 ft^2 of commercial development. This is still very large and would generate approximately 2,900 trips in the p.m. peak hour, again based on ITE rates.

These three developments together would add 7,300 veh/hr to the road network, many of these heading to and from the services in Courtenay. As a result, one would expect the volumes would increase on Highway 19A which connects the Union Bay development to Courtenay as well as on the Comox Valley Parkway and Cumberland Road connecting the Sage University and the Cumberland developments to Downtown Courtenay. When these developments are entered into the transportation planning model, this is indeed the case.

Based on modeled results, increases in traffic volumes can be observed on the Piercy Connector with volumes going up by approximately 150 veh/hr eastbound and 250 veh/hr westbound as traffic from the Cumberland and Sage University development use the Inland Island Highway and then Piercy Road to access developments in the northern area of Courtenay. Traffic volumes on Cumberland Road go up by approximately 350 veh/hr northbound and 250 veh/hr southbound for a total increase of 600 veh/hr two-way. Traffic volumes on the Comox Valley Parkway increased by approximately 750 veh/hr two-way. Other roads that see significant increases are

Highway 19A at approximately 200 veh/hr per direction north of 26th Street and the 17th Street Bridge with 200 veh/hr per direction.

Traffic volumes on the south end of Highway 19A would increase and this would necessitate widening Highway 19A south of Courtenay through to Royston Road to four lanes as traffic volumes are expected to rise to approximately 1,600 veh/hr in the peak direction which is northbound in the p.m. peak hour and the traffic volume in the opposite direction is expected to be about 800 veh/hr just at the threshold of going from one lane to two per direction. Traffic volumes on the Comox Valley Parkway will exceed 800 veh/hr the threshold for widening to four lanes; however, this road is already two lanes in each direction and no widening will be needed. Traffic volumes on Cumberland Road would increase to approximately 750 veh/hr per direction and this is approaching the limit of a two-lane road. In fact, in the short segment between Comox Valley Parkway and Arden Road the volumes will reach 900 southbound and 1,100 veh/hr northbound and this section will need to be widened.