

15 June 2010

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Ministry of Transportation and Infrastructure
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Southern Interior Region
#231 – 447 Columbia Street
Kamloops BC V2C 2T3



H-90065

Dear Shawn:

Pincushion Ponderosa Traffic Impact Study – 2015 and 2020 Requirements

Opus International Consultants (Canada) Limited (Opus) have been working closely with the Ministry of Transportation and Infrastructure (MoTI), the District of Peachland (District), and the District's transportation consultants, Urban Systems, in developing a feasible road network solution to address future background traffic growth and the additional development traffic growth resulting from the build-out of the Pincushion-Ponderosa Golf Course development in Peachland to the year 2020. Opus originally submitted analysis results for the Ministry's and District's review on June 10, 2010.

1.0 Background

Based on the Ministry's and District's review of the analysis, the following comments were generally offered:

- The consolidation of 13th Street and Ponderosa Drive would be required by 2015, providing a signalized intersection to Highway 97;
- The intersection of Clements Crescent and Highway 97 fails to operate sufficiently to the satisfaction of the Ministry in the weekday PM and weekend peak periods by 2015;
- In testing several potential intersection configurations at Clements Crescent and Highway 97, it was determined that signalization of Clements Crescent would be necessary by 2015;
- Provided that a signals will be provided by 2015 at Clements Crescent, the new consolidated intersection of 13th Street and Ponderosa, and at the site access, coordination of the signals is key to achieving themobility objectives of Highway 97; and,

- While the improvements should allow for the road network to operate sufficiently by 2020, the ultimate plan for improvements should be further refined in the near future to determine improvement requirements in 2025 and 2035.

To date, several traffic impact studies and associated revisions have been developed; however, both MoTI and the District still have concerns regarding highway cross-connectivity. While the most recent Traffic Impact Study, dated June 4, documents all improvement requirements should the area road network remain unchanged outside of the provision of an additional signalized access for the development, the District has indicated that the prohibition of left turns at Ponderosa Drive and Highway 97 would not be an acceptable mitigation option and should not be considered. Furthermore, the District has indicated their willingness to move forward the consolidation of intersections to avoid the need to restrict left turn movements to Highway 97.

Following a teleconference between the Ministry of Transportation and Infrastructure (MoTI), the developer, the District of Peachland (District), and the District's engineer on June 8, it was decided that further traffic analysis would be required to aid in the decision making process of the preferred road network scenario to accommodate both site traffic and future background growth. A subsequent letter report dated June 10 was completed summarizing the results of the analysis. Following a review of the analysis, Opus has been requested to revise the analysis to reflect the acceptable improvement option for 2015 and 2020.

The general objective of this further analysis is to provide the following planning input:

- To determine whether the option of consolidating Ponderosa Drive and 13th Avenue to achieve cross-connectivity is feasible in the 2015 and 2020 horizon years, notwithstanding property acquisition and topographical challenges;
- To determine requirements for Clements Crescent at Highway 97 provided the consolidation of Ponderosa Drive and 13th Avenue to 2015 and 2020;
- To develop a realistic improvement strategy for the 2015 to 2020 time periods.

2.0 Intersection Consolidation Parameters

The following starting parameters were considered for the current analysis:

- With the consolidation of Ponderosa Drive and 13th Avenue, a traffic control signal at a location between the current intersection of Ponderosa Drive and Highway 97 and 13th Street and Highway 97 would be required;
- Clements Crescent would be required to operate as a signalized intersection; and,
- Development access to be moved at least 100 metres to the south.
- A growth factor of 3 percent per annum for all base traffic would continue to be used, with the exception of turning movements in and out of Clements Crescent as it was determined that the growth potential of Clements Crescent would be limited.

3.0 Base Traffic Conditions

The previous traffic impact study had already noted that the signalized intersection of Highway 97 and Princeton Avenue operates at an overall Level of Service B during the weekday peak hours and during the Sunday peak hour. Based on these results, the intersection of Highway 97 and Princeton Avenue can sufficiently accommodate base traffic volumes.

However, at the remaining three unsignalized intersections, where Highway 97 is oriented east-west, the minor approaches onto Highway 97 were found to be operating at levels of service F for many of the study periods (base, 2015, 2020, 2025, and 2035), particularly during the Sunday peak. Although capacity concerns exist at the intersections of Highway 97 with Ponderosa Avenue and 13th Street, the signal warrant analysis indicates that the intersections do not warrant the need for a traffic signal. Traffic signals are currently warranted under base conditions at Clements Crescent, which serves an adjacent commercial plaza.

While the Ministry has originally indicated that the signalization of a single location may be feasible, both the District and Ministry recognize that achieving cross-connectivity is a key criterion for the consideration of a signal. In light of the need to consider a traffic signal based on future background conditions, all parties have generally agreed that in conjunction with the development, achieving an overall implementation strategy at this time which considers cross-connectivity would be in the best interest of all parties. However, it is now also apparent that an additional traffic signal would be required at Clements Crescent, which is already warranted based on current traffic conditions, and

as such, the coordinability of the new signals along the Highway 97 corridor would be a key consideration as the phasing of improvements is further refined.

4.0 Future Total Traffic - 2015

Based on the previous traffic impact study, the development would generate at most the following trips by the first phase in 2015:

- During the morning peak period, the proposed development will generate 520 two-way trips, of which 138 are inbound and 382 are outbound.
- During the afternoon peak period, the proposed development will generate 630 two-way trips, of which 393 are inbound and 236 are outbound.
- During the weekend peak period, the proposed development will generate 616 two-way trips of which 317 are inbound and 300 are outbound.

By Phase One in 2015, it is recognized that a traffic signal will be provided for the development access. In order for the other intersections to Highway 97 at the new consolidated intersection of 13th Street and Ponderosa Drive and Clements Crescent to function, it was decided collectively that signals are also required at these locations. The concept for the consolidated intersection is shown in the report District of Peachland Roadway Network Plan, (Urban Systems, 2004); however, the feasibility of this connection is not further developed in this report. It is expected that further detailed study would be required in the design of the consolidated intersection.

Regarding the new consolidated intersection, the traffic impacts were estimated by diverting all turning movements from Ponderosa Drive to 13th, and conducting Synchro modelling. FIGURE 1 and FIGURE 2 show the resultant volumes with Ponderosa Drive traffic diverted to 13th Avenue. At Clements Crescent, where a signal is actually warranted under existing conditions, the model was adjusted to test operations with Clements Crescent signalized.

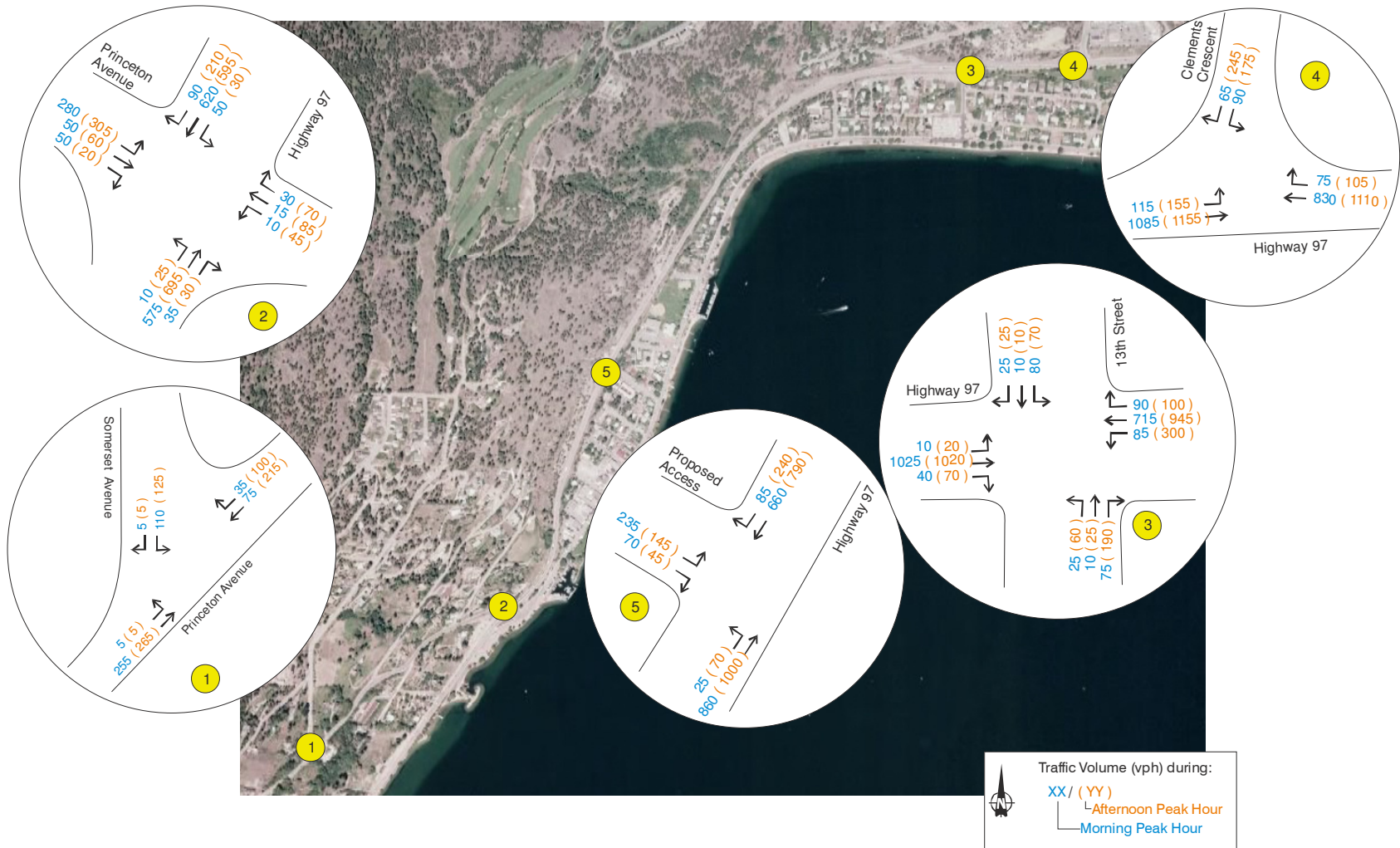


FIGURE 1. FUTURE TOTAL TRAFFIC (WEEKDAY) – 2015 (Consolidated 13th Street and Ponderosa)

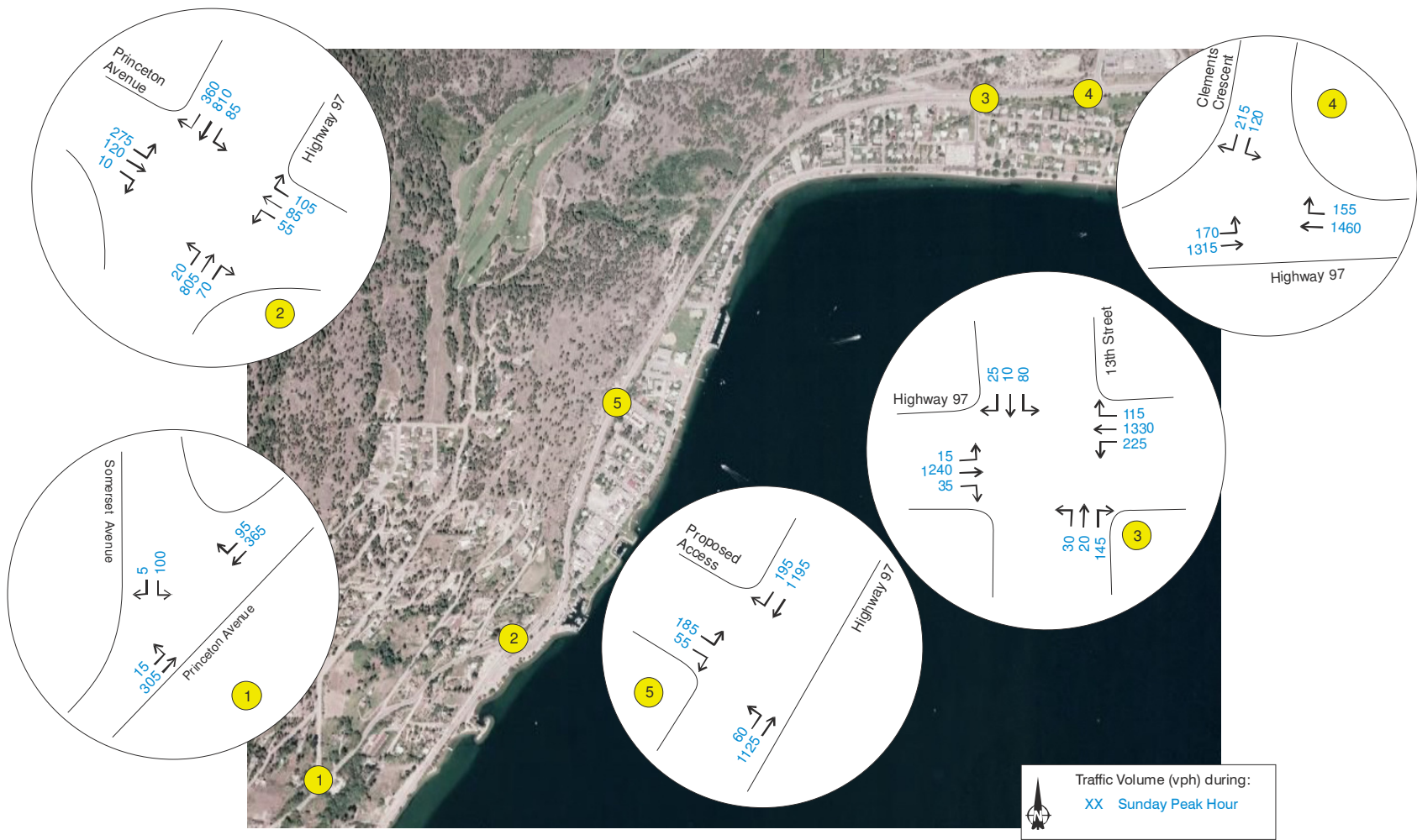


FIGURE 2. FUTURE TOTAL TRAFFIC (SUNDAY) – 2015, (Consolidated 13th Street and Ponderosa)

Note that the demand for cross-connected traffic north and south of the highway is currently estimated to be relatively low. Higher level network analysis, outside of the scope of this addendum, would be required to confirm the demand and assignment of trips.

Capacity analysis for the subject intersections under 2015 future total conditions was performed. The results of the analysis are summarized in TABLE 1 and TABLE 2 for the signalized and unsignalized intersections respectively.

TABLE 1. FUTURE TOTAL TRAFFIC – 2015 (SIGNALIZED)

Intersection	AM Peak Hour					PM Peak Hour					Sunday Peak Hour				
	Average Control Delay (s)	LOS	Characteristics			Average Control Delay (s)	LOS	Characteristics			Average Control Delay (s)	LOS	Characteristics		
			Lane Group	Delays (s)	LOS			Lane Group	Delays (s)	LOS			Lane Group	Delays (s)	LOS
Highway 97 and Princeton Avenue	16.6	B	EBL	37.2	D	23.8	C	EBL	48.6	D	47.8	D	EBL	99.6	F
			EBT	19.6	B			EBT	18.8	B			EBT	29.9	C
			EBR	19.1	B			EBR	18.2	B			EBR	27.5	C
			WBL	19.2	B			WBL	18.9	B			WBL	29.1	C
			WBT	19.1	B			WBT	19.1	B			WBT	29.1	C
			WBR	19.1	B			WBR	18.4	B			WBR	28.0	C
			NBL	7.5	A			NBL	12.1	B			NBL	13.4	B
			NBT	12.9	B			NBT	17.3	B			NBT	14.7	B
			NBR	7.0	A			NBR	7.6	A			NBR	6.1	A
			SBL	8.4	B			SBL	10.2	A			SBL	15.0	B
SBTR	12.2	B	SBTR	22.9	C	SBTR	70.0	E							
Highway 97 and Proposed Access	12.1	B	EBL	33.0	C	10.5	B	EBL	28.9	C	23.8	B	EBL	44.6	D
			EBR	22.8	C			EBR	24.6	C			EBR	32.3	C
			NBL	4.2	A			NBL	5.9	A			NBL	41.3	D
			NBT	10.5	B			NBT	12.7	B			NBT	20.6	C
			SBT	7.4	A			SBT	6.9	A			SBT	25.6	C
			SBR	0.9	A			SBR	1.2	A			SBR	4.0	A
Highway 97 and Consolidated Street	16.0	B	EBL	8.1	A	19.0	B	EBL	13.2	B	19.4	B	EBL	19.4	B
			EBT	15.5	B			EBT	24.1	B			EBT	28.5	C
			EBR	9.3	A			EBR	6.7	A			EBR	22.6	C
			WBL	40.2	D			WBL	39.2	C			WBL	25.0	C
			WBT	13.6	B			WBT	7.8	B			WBT	8.6	A
			WBR	29.4	C			WBR	11.9	C			WBR	16.5	B
			NBL	12.4	B			NBL	34.5	B			NBL	25.1	C
			NBTR	12.6	B			NBTR	34.8	B			NBTR	25.7	C
			SBL	13.0	B			SBL	41.4	C			SBL	26.7	C
SBTR	12.2	B	SBTR	32.8	B	SBTR	24.3	C							
Highway 97 and Clements Crescent	18.8	B	EBL	25.1	C	14.4	B	EBL	27.3	C	15.0	B	EBL	41.9	D
			EBT	18.4	B			EBT	5.6	A			EBT	1.8	A
			WBT	19.4	B			WBT	19.1	B			WBT	20.4	C
			WBR	13.9	B			WBR	11.5	B			WBR	10.3	B
			SBL	16.3	B			SBL	23.6	C			SBL	33.8	C
			SBR	15.2	B			SBR	21.1	C			SBR	30.6	C

TABLE 2. FUTURE TOTAL TRAFFIC – 2015 (UNSIGNALIZED)

Intersection	Weekday AM Peak Hour					Weekday PM Peak Hour					Sunday Peak Hour				
	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service
Somerset Avenue and Princeton Avenue	SBLR	123	623	12.2	B	SBLR	137	473	15.7	C	C	114	352	20.1	C
	EBLT	280	1470	0.1	A	EBLT	291	1214	0.2	A	A	349	1063	0.5	A

The results of the capacity analysis are summarized below:

- The consolidation of Ponderosa and 13th by 2015 achieves acceptable levels of service for the signalized intersection for all time periods. The minor approaches, being Ponderosa and 13th, can operate as a shared movement approach.
- The signalized intersection of Clements Crescent and Highway 97 operates with acceptable levels of service in the AM, PM, and weekend peak hours.
- The eastbound left turn movement at the existing signalized intersection of Princeton Avenue and Highway 97 operates with constraint; although the condition is no worse than operations under future base conditions and the overall intersection LOS is acceptable.
- More detailed analysis should be completed at the design stage to determine proper storage requirements and the signal coordination requirements.

5.0 Future Total Traffic - 2020

Based on the previous traffic impact study, the development would generate at most the following trips by the second phase in 2020:

- During the morning peak period, the proposed development will generate 1,040 two-way trips, of which 323 are inbound and 716 are outbound. Compared to Phase 1 of the development, this is an increase of 530 two-way trips.
- During the afternoon peak period, the proposed development will generate 1,170 two-way trips, of which 716 are inbound and 454 are outbound. Compared to Phase 1 of the development, this is an increase of 540 two-way trips.
- During the weekend peak period, the proposed development will generate 1,124 two-way trips, of which 574 are inbound and 551 are outbound. Compared to Phase 1 of the development, this is an increase of 508 two-way trips.

By Phase Two in 2020, it is recognized that the approach to the site access from both directions of Highway 97 will need to be two-laned. The initial road network scenario tested for 2020 initially reflects the same base conditions tested in 2015. Again, the traffic from Ponderosa Drive was diverted to 13th Avenue and the approach of Clements Crescent to Highway 97 was tested with operations under signalized traffic control. FIGURE 3 and FIGURE 4 display the resultant volumes.

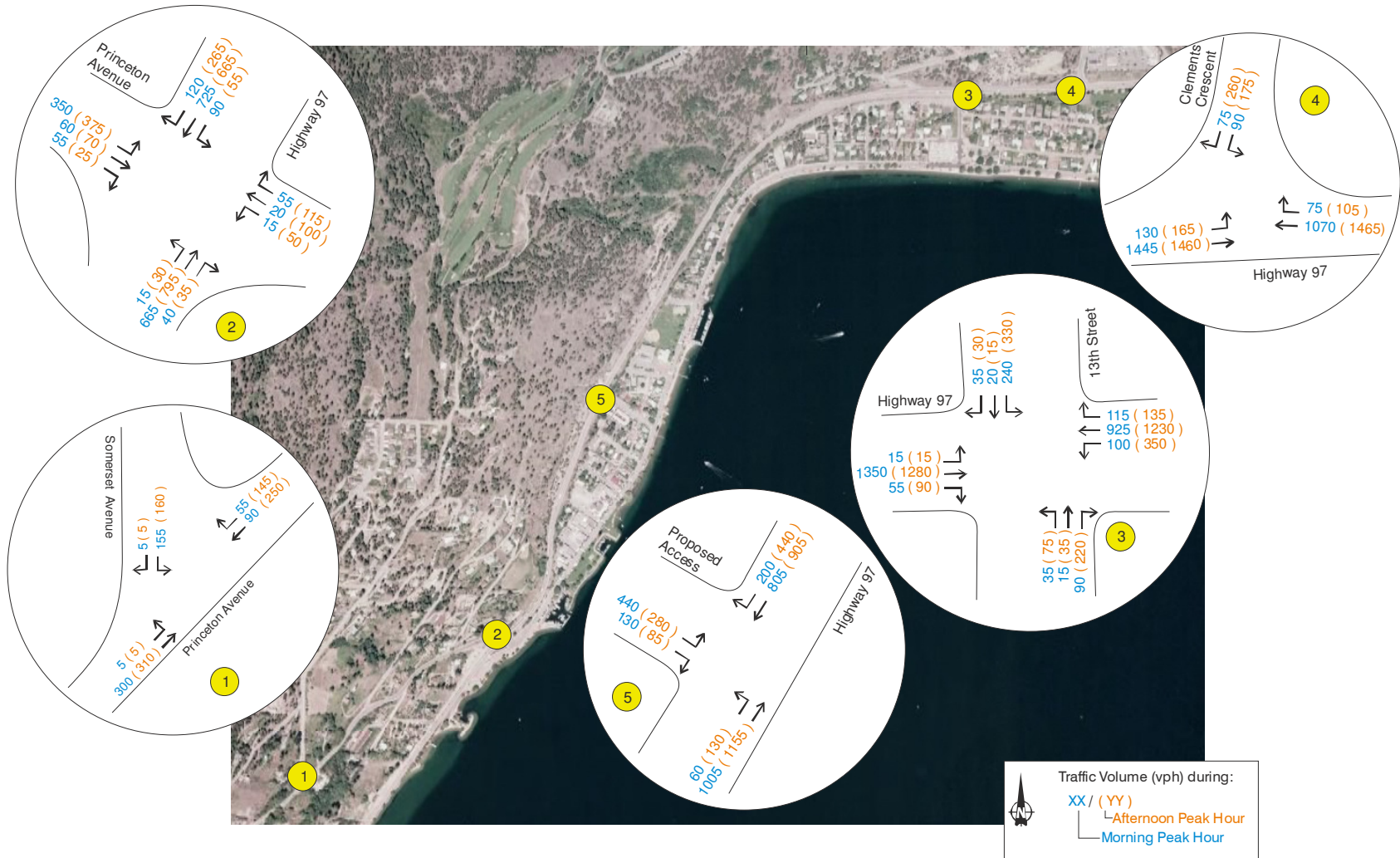


FIGURE 3. FUTURE TOTAL TRAFFIC (WEEKDAY) - 2020

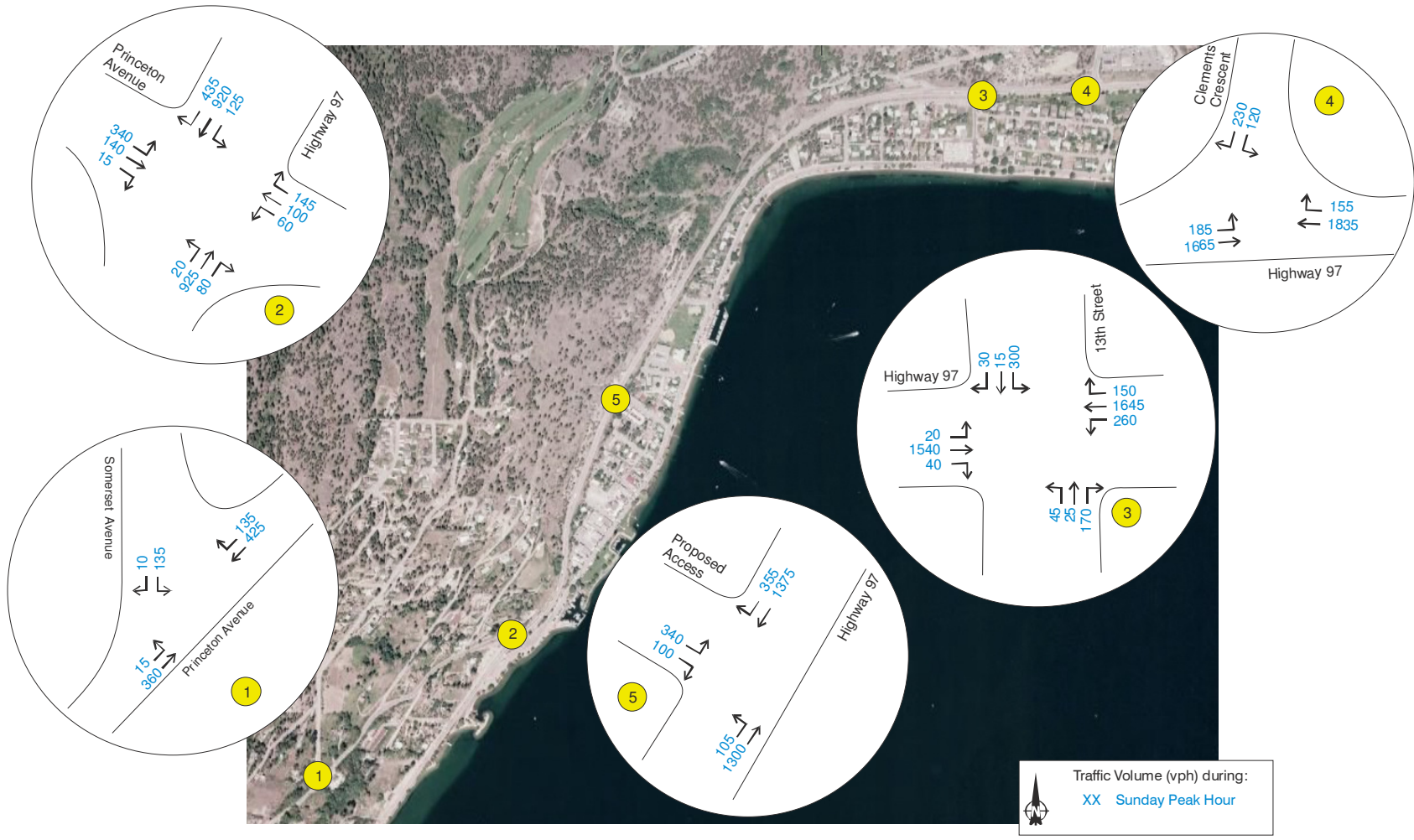


FIGURE 4. FUTURE TOTAL TRAFFIC (SUNDAY) - 2020

Capacity analysis for the subject intersections under 2020 future total conditions was performed. The results of the analysis are summarized in TABLE 3 and TABLE 4 for the signalized and unsignalized intersections respectively.

TABLE 3. FUTURE TOTAL TRAFFIC – 2020 (SIGNALIZED)

Intersection	AM Peak Hour					PM Peak Hour					Sunday Peak Hour				
	Average Control Delay (s)	LOS	Characteristics			Average Control Delay (s)	LOS	Characteristics			Average Control Delay (s)	LOS	Characteristics		
			Lane Group	Delays (s)	LOS			Lane Group	Delays (s)	LOS			Lane Group	Delays (s)	LOS
Highway 97 and Princeton Avenue	30.7	C	EBL	44.9	D	33.1	C	EBL	51.2	D	45.7	D	EBL	177.2	F
			EBT	25.3	C			EBT	24.4	C			EBT	35.2	D
			EBR	24.7	C			EBR	23.5	C			EBR	32.0	C
			WBL	46.2	D			WBL	46.5	D			WBL	60.8	E
			WBT	46.2	D			WBT	54.8	D			WBT	62.6	E
			WBR	44.8	D			WBR	42.2	D			WBR	48.5	D
			NBL	10.2	B			NBL	11.7	B			NBL	9.9	A
			NBT	18.2	B			NBT	25.6	C			NBT	21.0	B
			NBR	9.4	A			NBR	10.0	A			NBR	7.2	A
			SBL	27.7	C			SBL	30.1	C			SBL	77.2	D
SBT	35.2	D	SBT	28.9	C	SBT	28.8	C							
SBR*	38.2	D	SBR*	34.6	C	SBR*	28.2	C							
Highway 97 and Proposed Access	13.1	B	EBL	41.2	D	10.3	B	EBL	43.0	D	13.1	B	EBL	51.2	D
			EBR	33.2	C			EBR	37.4	D			EBR	42.1	D
			NBL	8.4	A			NBL	7.0	A			NBL	11.3	B
			NBT	9.7	A			NBT	6.7	A			NBT	6.1	A
			SBT	1.7	A			SBT	2.4	A			SBT	7.3	A
			SBR	1.7	A			SBR	10.9	B			SBR	17.5	B
Highway 97 and Consolidated Street	11.8	B	EBL	7.3	A	22.1	C	EBL	19.6	B	19.0	B	EBL	13.2	B
			EBT	16.0	B			EBT	31.2	C			EBT	24.1	C
			EBR	2.6	A			EBR	17.6	B			EBR	6.7	A
			WBL	19.3	B			WBL	34.5	C			WBL	39.2	D
			WBT	1.8	A			WBT	7.1	A			WBT	7.8	A
			WBR	0.8	A			WBR	14.0	B			WBR	11.9	B
			NBT	26.5	C			NBL	30.7	C			NBL	34.5	C
			NBTR	26.3	C			NBT	30.4	C			NBT	34.8	C
			SBL	28.4	C			NBR	35.1	D			NBR	41.4	D
			SBTR	25.7	C			SBL*	27.8	C			SBL*	32.8	C
Highway 97 and Clements Crescent	21.3	C	EBL	35.9	D	17.8	B	EBL	48.1	D	17.9	B	EBL	57.1	E
			EBT	18.4	B			EBT	2.7	A			EBT	1.1	A
			WBT	23.7	C			WBT	24.3	C			WBT	24.3	C
			WBR	15.4	B			WBR	11.8	B			WBR	8.8	A
			SBL	23.8	C			SBL	36.9	D			SBL	48.4	D
			SBR	22.5	C			SBR	34.0	C			SBR	48.0	D

* Analyzed as a separate right turn lane

TABLE 4. FUTURE TOTAL TRAFFIC – 2020 (UNSIGNALIZED)

Intersection	Weekday AM Peak Hour					Weekday PM Peak Hour					Sunday Peak Hour				
	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service	Lane Group	Volume (vph)	Movement Capacity (vph)	Control Delay	Level of Service
Somerset Avenue and Princeton Avenue	SBLR	172	562	14.2	B	SBLR	179	404	20.8	C	SBLR	155	286	31.6	D
	EBLT	328	1418	0.1	A	EBLT	343	1129	0.2	A	EBLT	410	972	0.6	A

The results of the capacity analysis are summarized below:

- Synchro results indicate that the signalized intersections of Clements Crescent, the site access, and the consolidated intersection of 13th Street and Ponderosa Drive will operate at acceptable levels of service in 2020.
- The eastbound left turn movement at the existing signalized intersection of Princeton Avenue and Highway 97 operates with constraint; although the condition is no worse than operations under future base conditions and the overall intersection LOS is acceptable.
- An additional southbound right turn lane at Princeton Avenue and Highway 97 is likely required by 2020. A shared southbound through-right lane operates sufficiently in 2015 and for the weekday AM and PM peak hours in 2020, but operates at unacceptable levels of service for the weekend unless a separate southbound exclusive right turn lane is provided.
- To reduce queuing, the analysis indicates that dual turn lanes from the site access to the Highway are required. The Ministry has indicated that they concur with this finding.
- More detailed analysis should be completed at the design stage to determine proper storage requirements and the signal coordination requirements.
- All other intersections operate satisfactorily in 2020.

6.0 List of Improvements

As a result of the analysis, the suggested improvement plan for the 2015 and 2020 timeframes will be:

Horizon Year 2015

Princeton and Highway 97

- Eastbound left-turn phase

Development Access and Highway 97

- Single eastbound left-turn lane is sufficient ($v/c < 1.0$; $LOS < E$)
- Provision of a traffic signal

Ponderosa / 13th and Highway 97

- Consolidation of access
- NB / SB approaches can operate in a shared laning configuration
- Localized four laning to accommodate separate single EB / WB left and right turn lanes
- Signalization of Ponderosa / 13th and Highway 97

Clements and Highway 97

- Traffic signal at Clements Crescent at Highway 97, which is required under existing base conditions

Highway 97 from Ponderosa to Clements

- Widening of Highway 97 to four lanes from about 200 metres west of Ponderosa to 300 metres east of Clements.

Horizon Year 2020

Princeton and Highway 97

- Southbound right-turn lane of approximately 50 metres
- Eastbound left-turn phase (assumed to be already completed for 2015)
- Eastbound left turn storage extended to approximately 200 metres

Development Access and Highway 97

- Dual eastbound left-turn lanes
- Localized four lane on Highway 97 of approximately 300 metres both for north and south

Ponderosa / 13th and Highway 97

- Consolidation of access (assumed to be already completed for 2015)
- NB / SB approaches should both operate with dedicated lanes for each movement.
- Localized four laning to accommodate separate single EB / WB left and right turn lanes (assumed to be already completed for 2015)
- Signalization at Ponderosa / 13th and Highway 97 (assumed to be already completed for 2015).

Clements and Highway 97

- Traffic signal at Clements Crescent at Highway 97 (assumed to be already completed for 2015).
- Highway 97 from Ponderosa to Clements
- Widening of Highway 97 to four lanes from about 200 metres west of Ponderosa to 300 metres east of Clements (assumed to be already completed for 2015).

7.0 Next Steps

- Refine coordination analysis of signalized intersections along Highway 97;
- Determine details for improvement requirements in the 2025 and 2035 timeframes;
- Develop an overall network improvement strategy to 2035; and,
- Produce a consolidated revised draft Traffic Impact Study report.

We trust that our findings document the outcome the Ministry of Transportation and Infrastructure and the District of Peachland are willing to accept for the 2015 and 2020 horizon years. Following up on this analysis, Opus' next step will be to determine the strategy moving forward to the years 2025 and 2035. Please do not hesitate to contact us if you would like to discuss the results of this analysis in more detail.