Memorandum

To	Joe Metcalfe
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From	Mark Gregory and Xavier Meurier
Office	Christchurch
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Subject	SH30, Huna Road Whakatane subdivision_intersection capacity analysis

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EXECUTIVE SUMMARY

This memo details investigation into potential effects of development on the efficient operations of Pacific Coast Highway (SH30) and Huna Road intersection. The conclusions consider safety implications also, where they are connected to capacity outcomes.

Modelling included different scales of development and speed management on the State Highway, considering how the intersection would perform under different demands from the subdivision at the AM and PM peak hour times.

The results from the SIDRA models shows that increasing demand from the subdivision would cause significantly more delays to the Huna Road approach. The modelling results predict morning peak delays in the exiting models, with a worst movement (Huna Road right turn) delay of 139 seconds, increasing to 320 and 662 seconds when demand is added representing 90 and 150 dwellings, respectively.

These large delays are likely to impact on the outcome of drivers choosing suitable gaps and may reasonably be expected to result in a decreased level of safety at the intersection.

Modelling has also tested different signed speeds on SH30, at 100km/h (existing), 80km/h and 60km/h. Outcomes suggest decreasing the speed limit would have negligible effects on the delay times for the Huna Roads movements. However, there may be some safety benefits associated with the lower speed limit, with crashes less likely (to some extent) to result in serious injury.

Based on the modelling, we would advise an intersection and / or network improvement would better support the development, from a transport efficiency and safety perspective.

1 Methodology

1.1 Synopsis

The SH30 / Huna Road stop sign intersection was modelled as part of a desktop study, using Sidra intersection v9, to investigate the possible effects of added demand from development on the safe and efficient operation.

The demand data was supplied by the Whakatane District Council and can be found in Appendix A.

1.1.1 Huna Rd / SH30 Intersection Layout

The intersection layout used in the SIDRA model for all scenarios can be seen in Figure 1-1 below.

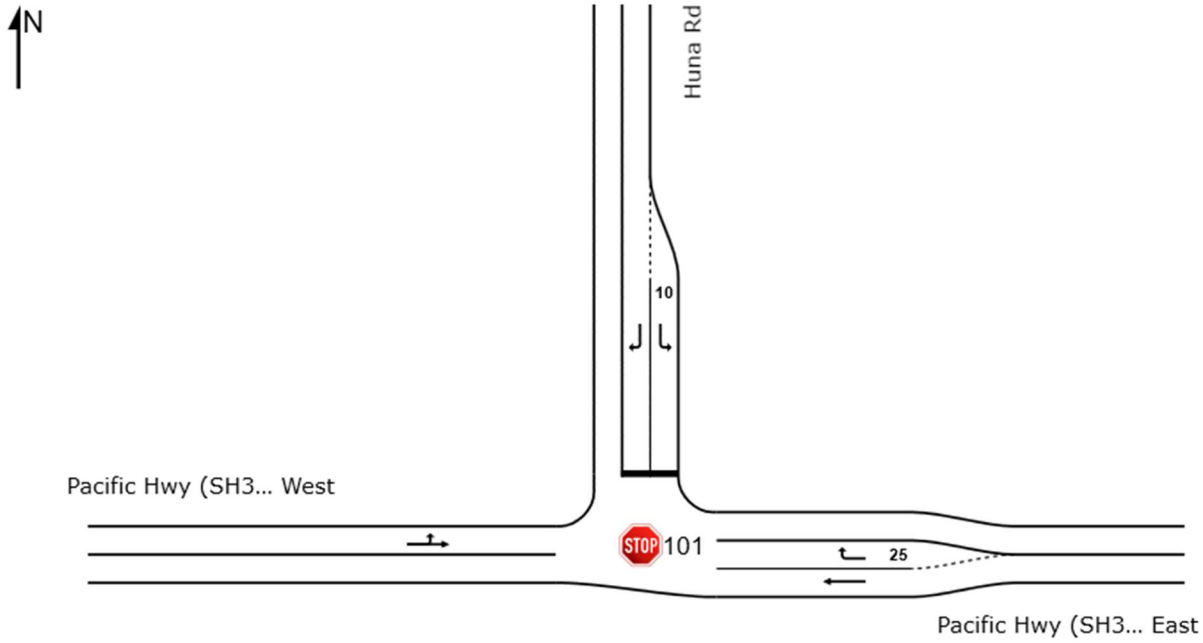

Figure 1-1: Huna Road / Pacific Highway (SH30) Intersection used in the SIDRA model

Arial photography was used to inform geometric calibration. A 10 m short left lane on Huna Rd was added to replicate the wide approach to the intersection which was assumed to be sufficient to allow for two vehicles to turn left and right simultaneously on SH30. Investigation of detailed outputs of the base show expected operating speeds, and a robust model on which to base investigation.

1.1.2 Scenarios

There were six different demands that were modelled using SIDRA which were the: Base (current) demands, '90 Lots' in the subdivision (year 3) demands, and '150 Lots' in the subdivision (year 5) demand. For each of the demands were 3 scenarios that were modelled based on the speed limit of SH30: 100km/h, 80km/h, and 60km/h.

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1.1.3 Volumes

The volumes for the different load cases used in the SIDRA model were the volumes that were provided by you in the 'Traffic Forecasting and modelling'. The demands were based off peak AM and PM traffic volumes, meaning that a total of 18 models were The AM and PM peak hour traffic volumes for SH30 were flipped compared to what was already provided (so more traffic goes to Whakatane in the AM peak) as mentioned in Thursdays (29th June) meeting.

1.1.4 Assumptions

- The speed limit of Huna Rd would be decreased 60km/h due to the addition of the subdivision.
- Two Way Sign Calibration (TWSC) was turned on consistently for every model to replicate the real-life operations of the intersection more accurately.

2 Results

2.1 Delays and LOS of the Intersection Movements

2.1.1 Intersection overview

The raw results generated from all the models can be found in Appendix B. The delays and LOS for the movements for the Base, 90 Lots and 150 Lots demands can be found in Table 2-1, Table 2-2 and Table 2-3, respectively.

Table 2-1: Movement delays (s) and LOS for the Base load case

Base												
Approaches	**Movements**	**100km/h**				**80km/h**				**60km/h**			
		AM		**PM**		**AM**		**PM**		**AM**		**PM**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
Pacific Hwy East	Through	0	LOS A	0.1	LOS A	0.1	LOS A	0.2	LOS A	0.1	LOS A	0.3	LOS A
	Right	18.2	LOS C	10.3	LOS B	17.4	LOS C	9.4	LOS A	16.1	LOS C	8.1	LOS A
	Overall	0.2	NA	0.2	NA	0.2	NA	0.3	NA	0.2	NA	0.4	NA
Huna Rd	Left	24.4	LOS C	11.4	LOS B	24.4	LOS C	11.4	LOS B	24.4	LOS C	11.4	LOS B
	Right	138.4	LOS F	131.3	LOS F	138.4	LOS F	131.3	LOS F	138.4	LOS F	131.3	LOS F
	Overall	49.7	LOS E	35.4	LOS E	49.7	LOS E	35.4	LOS E	49.7	LOS E	35.4	LOS E
Pacific Hwy West	Left	7.9	LOS A	7.9	LOS A	7.1	LOS A	7	LOS A	5.8	LOS A	5.6	LOS A
	Through	0.1	LOS A	0	LOS A	0.2	LOS A	0.1	LOS A	0.3	LOS A	0.1	LOS A
	Overall	0.1	NA	0.1	NA	0.2	NA	0.1	NA	0.3	NA	0.1	NA

Table 2-2: Movement delays (s) and LOS for the 90 Lots load case

90 Lots													
Approaches	**Movements**	**100km/h**				**80km/h**				**60km/h**			
		AM		**PM**		**AM**		**PM**		**AM**		**PM**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
Pacific Hwy East	Through	0	LOS A	0.1	LOS A	0.1	LOS A	0.2	LOS A	0.1	LOS A	0.4	LOS A
	Right	19.9	LOS C	10.7	LOS B	19.1	LOS C	9.8	LOS A	17.8	LOS C	8.5	LOS A
	Overall	0.5	NA	0.7	NA	0.5	NA	0.7	NA	0.5	NA	0.8	NA
Huna Rd	Left	31.3	LOS D	11.7	LOS B	31.3	LOS D	11.7	LOS B	31.3	LOS D	11.7	LOS B
	Right	320.1	LOS F	197.2	LOS F	320.1	LOS F	197.2	LOS F	320.1	LOS F	197.2	LOS F

	Overall	88.3	LOS F	50.8	LOS F	88.3	LOS F	50.8	LOS F	88.3	LOS F	50.8	LOS F
Pacific Hwy West	Left	7.9	LOS A	7.9	LOS A	7.1	LOS A	7	LOS A	5.8	LOS A	5.6	LOS A
	Through	0.1	LOS A	0	LOS A	0.2	LOS A	0.1	LOS A	0.4	LOS A	0.1	LOS A
	Overall	0.2	NA	0.2	NA	0.3	NA	0.2	NA	0.4	NA	0.2	NA

Table 2-3: Movement delays (s) and LOS for the 150 Lots load case

150 Lots													
Approaches	**Movements**	**100km/h**				**80km/h**				**60km/h**			
		AM		**PM**		**AM**		**PM**		**AM**		**PM**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
Pacific Hwy East	Through	0	LOS A	0.1	LOS A	0.1	LOS A	0.3	LOS A	0.1	LOS A	0.4	LOS A
	Right	21.2	LOS C	11	LOS B	20.3	LOS C	10.1	LOS B	19	LOS C	8.8	LOS A
	Overall	0.8	NA	1	NA	0.8	NA	1	NA	0.8	NA	1	NA
Huna Rd	Left	40.4	LOS B	11.9	LOS B	40.4	LOS E	11.9	LOS B	40.4	LOS E	11.9	LOS B
	Right	661.8	LOS F	296.7	LOS F	661.8	LOS F	296.7	LOS F	661.8	LOS F	296.7	LOS F
	Overall	163.6	LOS F	70.8	LOS F	163.6	LOS F	70.8	LOS F	163.6	LOS F	70.8	LOS F
Pacific Hwy West	Left	7.9	LOS A	7.9	LOS A	7.2	LOS A	7	LOS A	5.9	LOS A	5.6	LOS A
	Through	0.1	LOS A	0	LOS A	0.3	LOS A	0.1	LOS A	0.4	LOS A	0.1	LOS A
	Overall	0.2	NA	0.3	NA	0.3	NA	0.3	NA	0.4	NA	0.3	NA

The tables above show that the movement with the significantly highest delay is the Huna Road right turn, which is expected as it requires assessing gaps in traffic on both directions of SH30. Other movements of potential concern are Huna Road left turn and the Pacific Highway right turn onto Huna Rd as they are the only movements with LOS greater than A, which is again expected as these are the only movement which must give way to other movements.

2.1.2 Huna Rd right turn

Table 2-4 highlights the delays and LOS for the Huna Rd right turn for all the scenarios.

Table 2-4: Huna Rd right turn delays (s) and LOS for all scenarios and peak times

		AM			**PM**		
		100km/h	**80km/h**	**60km/h**	**100km/h**	**80km/h**	**60km/h**
Base	**Delay**	138.4	138.4	138.4	131.3	131.3	131.3
	LOS	LOS F	LOS F	LOS F	LOS F	LOS F	LOS F
90 Lots	**Delay**	320.1	320.1	320.1	197.2	197.2	197.2
	LOS	LOS F	LOS F	LOS F	LOS F	LOS F	LOS F

150 Lots	**Delay**	661.8	661.8	661.8	296.7	296.7	296.7
	LOS	LOS F	LOS F	LOS F	LOS F	LOS F	LOS F

The delays shown in the table above indicate significant increases in delay for this movement with increased demand due to the addition of the subdivision, leading to an estimated 5- and 11-minute delay in the AM peak for the 90 Lots and 150 Lots load cases, respectively, across all speed limits for SH30. There is a notable difference in delays in the AM peaks compared to the PM peaks, which increases exponentially with increased demand as there are estimated to be higher right turn demands in the AM peak compared to the PM peak as there are more vehicles leaving the subdivision in the morning. Also, because the left turn has been modelled as a short 10 metre left turn delay the vehicles queuing to turn left will also affect the vehicles turning right when the queue length exceeds 10 metres. Table 2-4 also shows that there is no change in delay times when the speed limit of SH30 changes.

However, a reduction in speed limit could reduce the severity of potential crashes.

2.1.3 Huna Rd left turn

Table 2-5Table 2-4 highlights the delays and LOS for the Huna Rd left turn for all the scenarios.

Table 2-5: Huna Rd left turn delays (s) and LOS for all scenarios and peak times

		AM			PM		
		100km/h	**80km/h**	**60km/h**	**100km/h**	**80km/h**	**60km/h**
Base	**Delay**	24.4	24.4	24.4	11.4	11.4	11.4
	LOS	LOS C	LOS C	LOS C	LOS B	LOS B	LOS B
90 Lots	**Delay**	31.3	31.3	31.3	11.7	11.7	11.7
	LOS	LOS D	LOS D	LOS D	LOS B	LOS B	LOS B
150 Lots	**Delay**	40.4	40.4	40.4	11.9	11.9	11.9
	LOS	LOS E	LOS E	LOS E	LOS B	LOS B	LOS B

The delays shown in the table above show that there are significant increases in delay for this movement with increased demand due to the addition of the subdivision, leading to an estimated 25- and 40-second delay in the AM peak for the 90 Lots and 150 Lots load cases, respectively, across all speed limits for SH30. Also, because the left turn has been modelled as a short 10 metre left turn delay the vehicles queuing to turn right will also affect the vehicles turning left when the queue length exceeds 10 metres. There is a notable difference in delays in the AM peak compared to the PM peaks, which increases with increasing demand as there are estimated to be higher right turn demands in the AM peak compared to the PM peak as more vehicles will leave the subdivision in the morning. Table 2-5 also shows that there is no change in delay times when the speed limit of SH30 changes.

2.1.4 Pacific Highway Right turn

Table 2-6Table 2-4 highlights the delays and LOS for the SH30 right turn for all the scenarios.

Table 2-6: SH30 right turn delays (s) and LOS for all scenarios and peak times

		AM			PM		
		100km/h	**80km/h**	**60km/h**	**100km/h**	**80km/h**	**60km/h**
Base	**Delay**	18.2	17.4	16.1	10.3	9.4	8.1
	LOS	LOS C	LOS C	LOS C	LOS B	LOS A	LOS A
90 Lots	**Delay**	19.9	19.1	17.8	10.7	9.8	8.5
	LOS	LOS C	LOS C	LOS C	LOS B	LOS A	LOS A
150 Lots	**Delay**	21.2	20.3	19	11	10.1	8.8
	LOS	LOS C	LOS C	LOS C	LOS B	LOS B	LOS A

The delays shown in the table above shows that there are limited increases in delay for this movement with increased demand due to the addition of the subdivision, resulting in the delays ranging between 16-21 seconds and 8-11 seconds for the AM and PM peaks, respectively, across all speed limits for SH30. There is a notable difference in delays in the AM peak compared to the PM peaks. This is due to the higher volume of vehicles travelling Eastbound to Whakatane in the AM peak, while the PM peak had higher volumes travelling westbound out of Whakatane. Table 2-5 also shows that there are slight decreases in delay times when the speed limit of SH30 decreases.

3 Conclusions and recommendations

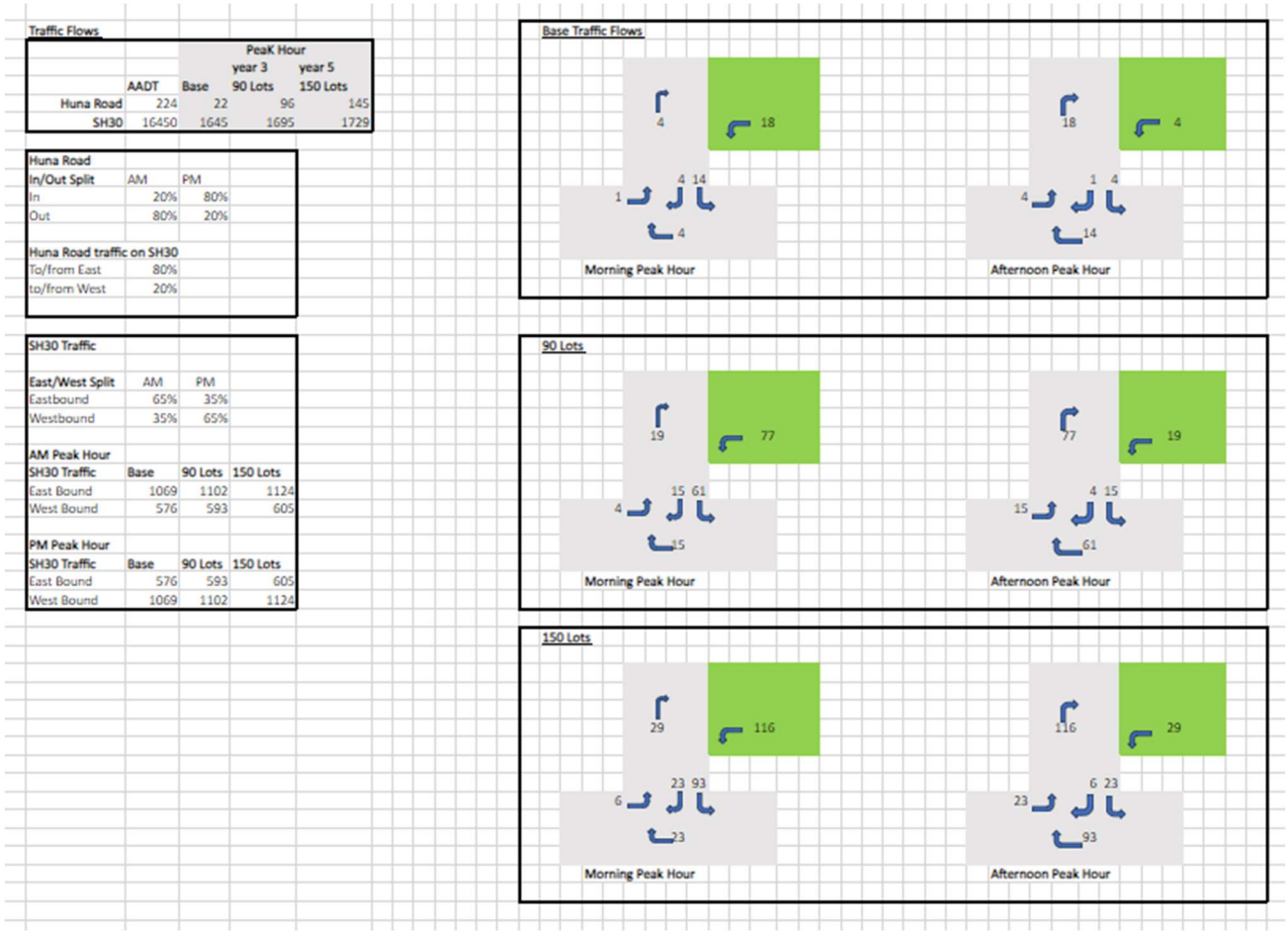
The results from the SIDRA model suggest that effects of subdivision will include more delays to the Huna Road approach. It should be noted that the SIDRA model is a first principal tool and not a behavioural tool, meaning that it does not account for frustration that impatient drivers will experience when delayed for too long. With the potential for delays greater than 11 minutes it is likely that this frustration is going to impact on their gap selection when entering SH30. Poor gap selection could increase the chances of crashes and cause safety implications that need to be accounted for.

It should also be mentioned that though the results indicate that decreasing the speed limit of SH30 will have negligible effects on the delay times for the Huna Roads movements it could possibly reduce the severity of crash outcomes.

It is recommended that improvements be made to the intersection in order to safety and effectively accommodate future traffic growth.

Appendix A

Figure 3-1: Provided demands used for the different scenarios



Traffic Flows

	AADT	Peak Hour Base	year 3 90 Lots	year 5 150 Lots
Huna Road	224	22	96	145
SH30	16450	1645	1695	1729

Huna Road In/Out Split	AM	PM
In	20%	80%
Out	80%	20%
Huna Road traffic on SH30		
To/from East	80%	
to/from West	20%	

SH30 Traffic East/West Split	AM	PM
Eastbound	65%	35%
Westbound	35%	65%

AM Peak Hour SH30 Traffic	Base	90 Lots	150 Lots
East Bound	1069	1102	1124
West Bound	576	593	605

PM Peak Hour SH30 Traffic	Base	90 Lots	150 Lots
East Bound	576	593	605
West Bound	1069	1102	1124

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Appendix B

Full movement summaries

Base load case

Table 0-1: Movement summary for the Base AM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	576	7	606	7	0.325	0	LOS A	0	0	0	0	0	99.8
6	R2	4	0	4	0	0.013	18.2	LOS C	0	0.3	0.83	0.91	0.83	53.1
Approach		580	7	611	7	0.325	0.2	NA	0	0.3	0.01	0.01	0.01	99.2
North: Huna Rd														
7	L2	14	0	15	0	0.072	24.4	LOS C	0.2	1.5	0.87	1	0.87	48.3
9	R2	4	0	4	0	0.161	138.4	LOS F	0.4	2.9	0.98	1	0.99	19.2
Approach		18	0	19	0	0.161	49.7	LOS E	0.4	2.9	0.89	1	0.89	36.2
West: Pacific Hwy (SH30) West														
10	L2	1	0	1	0	0.604	7.9	LOS A	0	0	0	0	0	88.4
11	T1	1069	7	1125	7	0.604	0.1	LOS A	0	0	0	0	0	99.4
Approach		1070	7	1126	7	0.604	0.1	NA	0	0	0	0	0	99.4
All Vehicles		1668	6.9	1756	6.9	0.604	0.7	NA	0.4	2.9	0.01	0.01	0.01	97.5

Table 0-2: Movement summary for the Base AM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	576	7	606	7	0.325	0.1	LOS A	0	0	0	0	0	79.8
6	R2	4	0	4	0	0.013	17.4	LOS C	0	0.3	0.83	0.9	0.83	50.3
Approach		580	7	611	7	0.325	0.2	NA	0	0.3	0.01	0.01	0.01	79.4
North: Huna Rd														
7	L2	14	0	15	0	0.072	24.4	LOS C	0.2	1.5	0.87	1	0.87	46.1
9	R2	4	0	4	0	0.161	138.4	LOS F	0.4	2.9	0.98	1	0.99	18.8
Approach		18	0	19	0	0.161	49.7	LOS E	0.4	2.9	0.89	1	0.89	34.9
West: Pacific Hwy (SH30) West														
10	L2	1	0	1	0	0.604	7.1	LOS A	0	0	0	0	0	74.1
11	T1	1069	7	1125	7	0.604	0.2	LOS A	0	0	0	0	0	79.2
Approach		1070	7	1126	7	0.604	0.2	NA	0	0	0	0	0	79.2
All Vehicles		1668	6.9	1756	6.9	0.604	0.7	NA	0.4	2.9	0.01	0.01	0.01	78.2

Table 0-3: Movement summary for the Base AM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	576	7	606	7	0.325	0.1	LOS A	0	0	0	0	0	59.8
6	R2	4	0	4	0	0.013	16.1	LOS C	0	0.3	0.83	0.89	0.83	46.3
Approach		580	7	611	7	0.325	0.2	NA	0	0.3	0.01	0.01	0.01	59.7
North: Huna Rd														
7	L2	14	0	15	0	0.072	24.4	LOS C	0.2	1.5	0.87	1	0.87	42.9
9	R2	4	0	4	0	0.161	138.4	LOS F	0.4	2.9	0.98	1	0.99	18.2
Approach		18	0	19	0	0.161	49.7	LOS E	0.4	2.9	0.89	1	0.89	33
West: Pacific Hwy (SH30) West														
10	L2	1	0	1	0	0.604	5.8	LOS A	0	0	0	0	0	57.8
11	T1	1069	7	1125	7	0.604	0.3	LOS A	0	0	0	0	0	59.4
Approach		1070	7	1126	7	0.604	0.3	NA	0	0	0	0	0	59.4
All Vehicles		1668	6.9	1756	6.9	0.604	0.8	NA	0.4	2.9	0.01	0.01	0.01	59

Table 0-4: Movement summary for the Base PM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1069	7	1125	7	0.607	0.1	LOS A	0	0	0	0	0	99.4
6	R2	14	0	15	0	0.016	10.3	LOS B	0.1	0.4	0.55	0.71	0.55	60
Approach		1083	6.9	1140	6.9	0.607	0.2	NA	0.1	0.4	0.01	0.01	0.01	98.5
North: Huna Rd														
7	L2	4	0	4	0	0.006	11.4	LOS B	0	0.2	0.55	0.85	0.55	57.7
9	R2	1	0	1	0	0.041	131.3	LOS F	0.1	0.7	0.98	1	0.98	19.9
Approach		5	0	5	0	0.041	35.4	LOS E	0.1	0.7	0.63	0.88	0.63	41.9
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.327	7.9	LOS A	0	0	0	0	0	88.4
11	T1	576	7	606	7	0.327	0	LOS A	0	0	0	0	0	99.6
Approach		580	7	611	7	0.327	0.1	NA	0	0	0	0	0	99.6
All Vehicles		1668	6.9	1756	6.9	0.607	0.3	NA	0.1	0.7	0.01	0.01	0.01	98.5

Table 0-5: Movement summary for the Base PM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1069	7	1125	7	0.607	0.2	LOS A	0	0	0	0	0	79.2
6	R2	14	0	15	0	0.016	9.4	LOS A	0.1	0.4	0.55	0.7	0.55	56.5
Approach		1083	6.9	1140	6.9	0.607	0.3	NA	0.1	0.4	0.01	0.01	0.01	78.8
North: Huna Rd														
7	L2	4	0	4	0	0.006	11.4	LOS B	0	0.2	0.55	0.85	0.55	54.6
9	R2	1	0	1	0	0.041	131.3	LOS F	0.1	0.7	0.98	1	0.98	19.5
Approach		5	0	5	0	0.041	35.4	LOS E	0.1	0.7	0.63	0.88	0.63	40.2
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.327	7	LOS A	0	0	0	0	0	74.4
11	T1	576	7	606	7	0.327	0.1	LOS A	0	0	0	0	0	79.7
Approach		580	7	611	7	0.327	0.1	NA	0	0	0	0	0	79.6
All Vehicles		1668	6.9	1756	6.9	0.607	0.4	NA	0.1	0.7	0.01	0.01	0.01	78.9

Table 0-6: Movement summary for the Base PM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1069	7	1125	7	0.607	0.3	LOS A	0	0	0	0	0	59.4
6	R2	14	0	15	0	0.016	8.1	LOS A	0.1	0.4	0.55	0.67	0.55	51.4
Approach		1083	6.9	1140	6.9	0.607	0.4	NA	0.1	0.4	0.01	0.01	0.01	59.2
North: Huna Rd														
7	L2	4	0	4	0	0.006	11.4	LOS B	0	0.2	0.55	0.85	0.55	50.1
9	R2	1	0	1	0	0.041	131.3	LOS F	0.1	0.7	0.98	1	0.98	18.9
Approach		5	0	5	0	0.041	35.4	LOS E	0.1	0.7	0.63	0.88	0.63	37.7
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.327	5.6	LOS A	0	0	0	0	0	58.2
11	T1	576	7	606	7	0.327	0.1	LOS A	0	0	0	0	0	59.8
Approach		580	7	611	7	0.327	0.1	NA	0	0	0	0	0	59.7
All Vehicles		1668	6.9	1756	6.9	0.607	0.4	NA	0.1	0.7	0.01	0.01	0.01	59.3

90 Lots load case

Table 0-7: Movement summary for the 90 Lots AM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	593	7	624	7	0.336	0	LOS A	0	0	0	0	0	99.8
6	R2	15	0	16	0	0.056	19.9	LOS C	0.2	1.3	0.85	0.95	0.85	51.8
Approach		608	6.8	640	6.8	0.336	0.5	NA	0.2	1.3	0.02	0.02	0.02	97.6
North: Huna Rd														
7	L2	61	0	64	0	0.35	31.3	LOS D	1.2	8.2	0.91	1.04	1.08	44.3
9	R2	15	0	16	0	0.749	320.1	LOS F	2.2	15.4	1	1.06	1.3	9.8
Approach		76	0	80	0	0.749	88.3	LOS F	2.2	15.4	0.93	1.05	1.13	26.2
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.624	7.9	LOS A	0	0	0	0	0	88.3
11	T1	1102	7	1160	7	0.624	0.1	LOS A	0	0	0	0	0	99.3
Approach		1106	7	1164	7	0.624	0.2	NA	0	0	0	0	0	99.2
All Vehicles		1790	6.6	1884	6.6	0.749	4	NA	2.2	15.4	0.05	0.05	0.05	88.2

Table 0-8: Movement summary for the 90 Lots AM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	593	7	624	7	0.336	0.1	LOS A	0	0	0	0	0	79.7
6	R2	15	0	16	0	0.056	19.1	LOS C	0.2	1.3	0.85	0.95	0.85	49.2
Approach		608	6.8	640	6.8	0.336	0.5	NA	0.2	1.3	0.02	0.02	0.02	78.5
North: Huna Rd														
7	L2	61	0	64	0	0.35	31.3	LOS D	1.2	8.2	0.91	1.04	1.08	42.5
9	R2	15	0	16	0	0.749	320.1	LOS F	2.2	15.4	1	1.06	1.3	9.7
Approach		76	0	80	0	0.749	88.3	LOS F	2.2	15.4	0.93	1.05	1.13	25.5
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.624	7.1	LOS A	0	0	0	0	0	74
11	T1	1102	7	1160	7	0.624	0.2	LOS A	0	0	0	0	0	79.1
Approach		1106	7	1164	7	0.624	0.3	NA	0	0	0	0	0	79.1
All Vehicles		1790	6.6	1884	6.6	0.749	4.1	NA	2.2	15.4	0.05	0.05	0.05	72.5

Table 0-9: Movement summary for the 90 Lots AM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	593	7	624	7	0.336	0.1	LOS A	0	0	0	0	0	59.8
6	R2	15	0	16	0	0.056	17.8	LOS C	0.2	1.3	0.85	0.94	0.85	45.3
Approach		608	6.8	640	6.8	0.336	0.5	NA	0.2	1.3	0.02	0.02	0.02	59.3
North: Huna Rd														
7	L2	61	0	64	0	0.35	31.3	LOS D	1.2	8.2	0.91	1.04	1.08	39.7
9	R2	15	0	16	0	0.749	320.1	LOS F	2.2	15.4	1	1.06	1.3	9.5
Approach		76	0	80	0	0.749	88.3	LOS F	2.2	15.4	0.93	1.05	1.13	24.5
West: Pacific Hwy (SH30) West														
10	L2	4	0	4	0	0.624	5.8	LOS A	0	0	0	0	0	57.8
11	T1	1102	7	1160	7	0.624	0.4	LOS A	0	0	0	0	0	59.3
Approach		1106	7	1164	7	0.624	0.4	NA	0	0	0	0	0	59.3
All Vehicles		1790	6.6	1884	6.6	0.749	4.2	NA	2.2	15.4	0.05	0.05	0.05	55.9

Table 0-10: Movement summary for the 90 Lots PM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1102	7	1160	7	0.626	0.1	LOS A	0	0	0	0	0	99.3
6	R2	61	0	64	0	0.074	10.7	LOS B	0.3	2.1	0.58	0.79	0.58	59.6
Approach		1163	6.6	1224	6.6	0.626	0.7	NA	0.3	2.1	0.03	0.04	0.03	96
North: Huna Rd														
7	L2	15	0	16	0	0.024	11.7	LOS B	0.1	0.6	0.56	0.91	0.56	57.4
9	R2	4	0	4	0	0.219	197.2	LOS F	0.6	3.9	0.99	1.01	1.02	14.6
Approach		19	0	20	0	0.219	50.8	LOS F	0.6	3.9	0.65	0.93	0.65	35.6
West: Pacific Hwy (SH30) West														
10	L2	15	0	16	0	0.343	7.9	LOS A	0	0	0	0.02	0	88.1
11	T1	593	7	624	7	0.343	0	LOS A	0	0	0	0.02	0	99.2
Approach		608	6.8	640	6.8	0.343	0.2	NA	0	0	0	0.02	0	98.9
All Vehicles		1790	6.6	1884	6.6	0.626	1.1	NA	0.6	3.9	0.03	0.04	0.03	95.2

Table 0-11: Movement summary for the 90 Lots PM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1102	7	1160	7	0.626	0.2	LOS A	0	0	0	0	0	79.2
6	R2	61	0	64	0	0.074	9.8	LOS A	0.3	2.1	0.58	0.78	0.58	56.2
Approach		1163	6.6	1224	6.6	0.626	0.7	NA	0.3	2.1	0.03	0.04	0.03	77.5
North: Huna Rd														
7	L2	15	0	16	0	0.024	11.7	LOS B	0.1	0.6	0.56	0.91	0.56	54.4
9	R2	4	0	4	0	0.219	197.2	LOS F	0.6	3.9	0.99	1.01	1.02	14.4
Approach		19	0	20	0	0.219	50.8	LOS F	0.6	3.9	0.65	0.93	0.65	34.4
West: Pacific Hwy (SH30) West														
10	L2	15	0	16	0	0.343	7	LOS A	0	0	0	0.02	0	74.2
11	T1	593	7	624	7	0.343	0.1	LOS A	0	0	0	0.02	0	79.4
Approach		608	6.8	640	6.8	0.343	0.2	NA	0	0	0	0.02	0	79.3
All Vehicles		1790	6.6	1884	6.6	0.626	1.1	NA	0.6	3.9	0.03	0.04	0.03	77.1

Table 0-12: Movement summary for the 90 Lots PM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1102	7	1160	7	0.626	0.4	LOS A	0	0	0	0	0	59.3
6	R2	61	0	64	0	0.074	8.5	LOS A	0.3	2.1	0.58	0.76	0.58	51.1
Approach		1163	6.6	1224	6.6	0.626	0.8	NA	0.3	2.1	0.03	0.04	0.03	58.8
North: Huna Rd														
7	L2	15	0	16	0	0.024	11.7	LOS B	0.1	0.6	0.56	0.91	0.56	49.9
9	R2	4	0	4	0	0.219	197.2	LOS F	0.6	3.9	0.99	1.01	1.02	14.1
Approach		19	0	20	0	0.219	50.8	LOS F	0.6	3.9	0.65	0.93	0.65	32.6
West: Pacific Hwy (SH30) West														
10	L2	15	0	16	0	0.343	5.6	LOS A	0	0	0	0.01	0	58
11	T1	593	7	624	7	0.343	0.1	LOS A	0	0	0	0.01	0	59.6
Approach		608	6.8	640	6.8	0.343	0.2	NA	0	0	0	0.01	0	59.6
All Vehicles		1790	6.6	1884	6.6	0.626	1.1	NA	0.6	3.9	0.03	0.04	0.03	58.6

150 Lots load case

Table 0-13: Movement summary for the 150 Lots AM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	605	7	637	7	0.344	0	LOS A	0	0	0	0	0	99.8
6	R2	23	0	24	0	0.092	21.2	LOS C	0.3	2.1	0.87	0.95	0.87	50.9
Approach		628	6.7	661	6.7	0.344	0.8	NA	0.3	2.1	0.03	0.03	0.03	96.4
North: Huna Rd														
7	L2	93	0	98	0	0.579	40.4	LOS E	2.2	15.1	0.95	1.1	1.36	40
9	R2	23	0	24	0	1.34	661.8	LOS F	7.7	53.6	1	1.35	2.64	4.8
Approach		116	0	122	0	1.34	163.6	LOS F	7.7	53.6	0.96	1.15	1.62	16.3
West: Pacific Hwy (SH30) West														
10	L2	6	0	6	0	0.638	7.9	LOS A	0	0	0	0	0	88.3
11	T1	1124	7	1183	7	0.638	0.1	LOS A	0	0	0	0	0	99.2
Approach		1130	7	1189	7	0.638	0.2	NA	0	0	0	0	0	99.1
All Vehicles		1874	6.5	1973	6.5	1.34	10.5	NA	7.7	53.6	0.07	0.08	0.11	74.8

Table 0-14: Movement summary for the 150 Lots AM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	605	7	637	7	0.344	0.1	LOS A	0	0	0	0	0	79.7
6	R2	23	0	24	0	0.092	20.3	LOS C	0.3	2.1	0.87	0.95	0.87	48.4
Approach		628	6.7	661	6.7	0.344	0.8	NA	0.3	2.1	0.03	0.03	0.03	77.9
North: Huna Rd														
7	L2	93	0	98	0	0.579	40.4	LOS E	2.2	15.1	0.95	1.1	1.36	38.5
9	R2	23	0	24	0	1.34	661.8	LOS F	7.7	53.6	1	1.35	2.64	4.8
Approach		116	0	122	0	1.34	163.6	LOS F	7.7	53.6	0.96	1.15	1.62	16
West: Pacific Hwy (SH30) West														
10	L2	6	0	6	0	0.638	7.2	LOS A	0	0	0	0	0	73.9
11	T1	1124	7	1183	7	0.638	0.3	LOS A	0	0	0	0	0	79.1
Approach		1130	7	1189	7	0.638	0.3	NA	0	0	0	0	0	79
All Vehicles		1874	6.5	1973	6.5	1.34	10.6	NA	7.7	53.6	0.07	0.08	0.11	63.3

Table 0-15: Movement summary for the 150 Lots AM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	605	7	637	7	0.344	0.1	LOS A	0	0	0	0	0	59.8
6	R2	23	0	24	0	0.092	19	LOS C	0.3	2.1	0.87	0.94	0.87	44.6
Approach		628	6.7	661	6.7	0.344	0.8	NA	0.3	2.1	0.03	0.03	0.03	59
North: Huna Rd														
7	L2	93	0	98	0	0.579	40.4	LOS E	2.2	15.1	0.95	1.1	1.36	36.2
9	R2	23	0	24	0	1.34	661.8	LOS F	7.7	53.6	1	1.35	2.64	4.7
Approach		116	0	122	0	1.34	163.6	LOS F	7.7	53.6	0.96	1.15	1.62	15.6
West: Pacific Hwy (SH30) West														
10	L2	6	0	6	0	0.638	5.9	LOS A	0	0	0	0	0	57.7
11	T1	1124	7	1183	7	0.638	0.4	LOS A	0	0	0	0	0	59.2
Approach		1130	7	1189	7	0.638	0.4	NA	0	0	0	0	0	59.2
All Vehicles		1874	6.5	1973	6.5	1.34	10.6	NA	7.7	53.6	0.07	0.08	0.11	50.5

Table 0-16: Movement summary for the 150 Lots PM peak 100km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1124	7	1183	7	0.64	0.1	LOS A	0	0	0	0	0	99.3
6	R2	93	0	98	0	0.116	11	LOS B	0.5	3.3	0.59	0.83	0.59	59.4
Approach		1217	6.5	1281	6.5	0.64	1	NA	0.5	3.3	0.05	0.06	0.05	94.4
North: Huna Rd														
7	L2	23	0	24	0	0.037	11.9	LOS B	0.1	0.9	0.57	0.93	0.57	57.3
9	R2	6	0	6	0	0.409	296.7	LOS F	1	7.3	0.99	1.02	1.07	10.5
Approach		29	0	31	0	0.409	70.8	LOS F	1	7.3	0.65	0.95	0.67	29.8
West: Pacific Hwy (SH30) West														
10	L2	23	0	24	0	0.354	7.9	LOS A	0	0	0	0.03	0	87.9
11	T1	605	7	637	7	0.354	0	LOS A	0	0	0	0.03	0	98.9
Approach		628	6.7	661	6.7	0.354	0.3	NA	0	0	0	0.03	0	98.5
All Vehicles		1874	6.5	1973	6.5	0.64	1.8	NA	1	7.3	0.04	0.06	0.04	92.6

Table 0-17: Movement summary for the 150 Lots PM peak 80km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1124	7	1183	7	0.64	0.3	LOS A	0	0	0	0	0	79.1
6	R2	93	0	98	0	0.116	10.1	LOS B	0.5	3.3	0.59	0.81	0.59	55.9
Approach		1217	6.5	1281	6.5	0.64	1	NA	0.5	3.3	0.05	0.06	0.05	76.7
North: Huna Rd														
7	L2	23	0	24	0	0.037	11.9	LOS B	0.1	0.9	0.57	0.93	0.57	54.2
9	R2	6	0	6	0	0.409	296.7	LOS F	1	7.3	0.99	1.02	1.07	10.3
Approach		29	0	31	0	0.409	70.8	LOS F	1	7.3	0.65	0.95	0.67	28.9
West: Pacific Hwy (SH30) West														
10	L2	23	0	24	0	0.354	7	LOS A	0	0	0	0.02	0	74
11	T1	605	7	637	7	0.354	0.1	LOS A	0	0	0	0.02	0	79.3
Approach		628	6.7	661	6.7	0.354	0.3	NA	0	0	0	0.02	0	79
All Vehicles		1874	6.5	1973	6.5	0.64	1.9	NA	1	7.3	0.04	0.06	0.04	75.5

Table 0-18: Movement summary for the 150 Lots PM peak 60km/h scenario

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pacific Hwy (SH30) East														
5	T1	1124	7	1183	7	0.64	0.4	LOS A	0	0	0	0	0	59.3
6	R2	93	0	98	0	0.116	8.8	LOS A	0.5	3.3	0.59	0.79	0.59	50.9
Approach		1217	6.5	1281	6.5	0.64	1	NA	0.5	3.3	0.05	0.06	0.05	58.5
North: Huna Rd														
7	L2	23	0	24	0	0.037	11.9	LOS B	0.1	0.9	0.57	0.93	0.57	49.8
9	R2	6	0	6	0	0.409	296.7	LOS F	1	7.3	0.99	1.02	1.07	10.2
Approach		29	0	31	0	0.409	70.8	LOS F	1	7.3	0.65	0.95	0.67	27.6
West: Pacific Hwy (SH30) West														
10	L2	23	0	24	0	0.354	5.6	LOS A	0	0	0	0.02	0	58
11	T1	605	7	637	7	0.354	0.1	LOS A	0	0	0	0.02	0	59.6
Approach		628	6.7	661	6.7	0.354	0.3	NA	0	0	0	0.02	0	59.5
All Vehicles		1874	6.5	1973	6.5	0.64	1.9	NA	1	7.3	0.04	0.06	0.04	57.8