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24 April 2023

Ross Closter
Urban Land Developments
Level 1, 237 Ryrie Street
GEELONG VIC 3220

Dear Ross

RE: ADDENDUM TO TRAFFIC ENGINEERING REPORT
C103 – HOPETOUN PARK NORTH REZONING

SALT has reviewed its previous addendum to the traffic engineering report (SALT Ref# 20338LET002F01, dated 1st December, 2022) in consideration of additional correspondence received by Moorabool Shire Council from the Department of Transport and Planning via e-mail dated 13th February, 2023.

These comments seek, amongst other things, an assessment of the Old Western Highway / Hopetoun Park Road intersection under a 10-year growth scenario.

The Department of Transport had previously stated in September 2020 that *"subject to detail design, we agree in principle to the layout for the T-intersection with Old Western Highway submitted."*

This was reiterated in November 2021 when DoT indicated it was *"generally satisfied that previous feedback provided from Regional Roads Victoria (and appended to the Traffic Engineering Report prepared by Salt3) regarding arterial road impacts have been resolved."*

Notwithstanding, the following assessment for a 10-year growth scenario is provided.

It is also important to note that the proposed rezoning is now for the western side of Hopetoun Park Road only, which is anticipated to yield approximately 400 lots.

The eastern side of Hopetoun Park Road has not been included in the proposed rezoning for a number of reasons including but not limited to significant ecological considerations and issues associated with infrastructure delivery due to land fragmentation.

Notwithstanding, Urban Land Developments has agreed with Council that whilst it is uncertain as to whether any development will eventuate on the eastern side, a provision of 200 lots should accommodated for on this side of the road.

Accordingly, the analysis yield of the rezoning has been reduced from 850 lots to 600 lots.

The following sub-sections summarise the additional analysis and provide direct responses to the items raised by the Department of Transport and Planning in its February, 2023 correspondence.

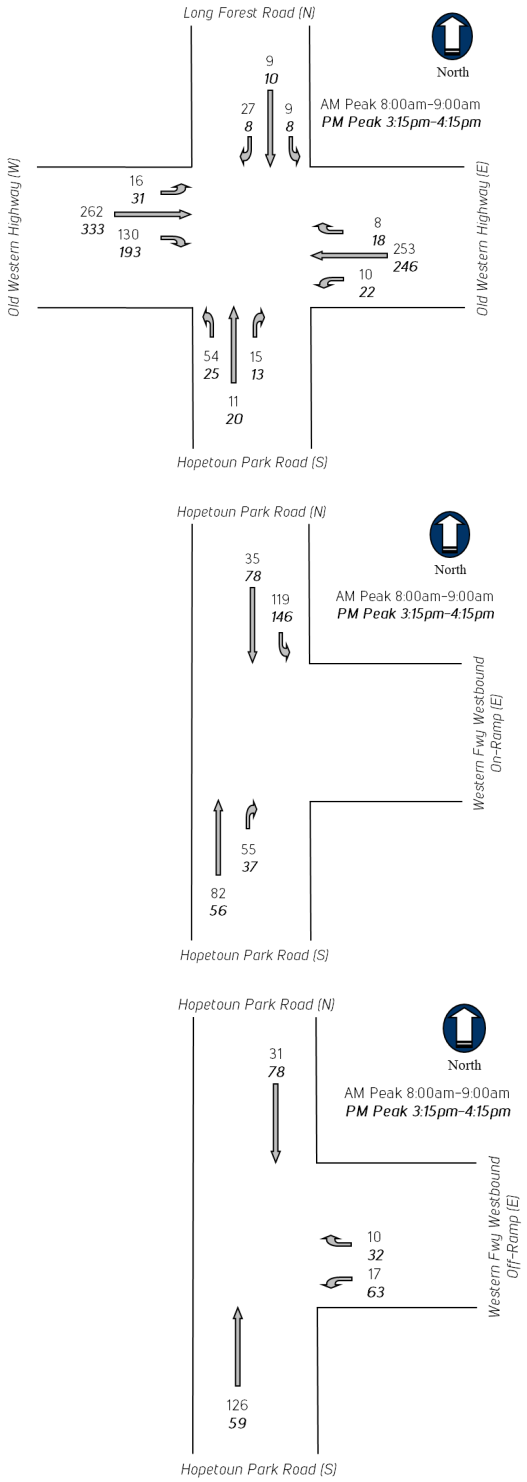
1 UPDATED TRAFFIC SURVEYS

The peak 1-hour periods of traffic activity surveyed at the Hopetoun Park Road / Western Freeway Half Diamond Interchange and Hopetoun Park Road / Long Forest Road / Old Western Highway Intersection in October 2022 are reproduced at Figure 1, overleaf.

In addition to the above, the surveyed average weekday trip generation rates and distributions from the existing Hopetoun Park residential development are reproduced as follows

- *Daily* — *8.24 vpd per dwelling*
- *AM Peak Hour* — *0.79 vph per dwelling*
  - 74% outbound
  - 26% inbound
- *PM Peak Hour* — *0.76 vph per dwelling*
  - 67% inbound
  - 33% outbound

Figure 1 Surveyed Peak Hour Traffic Volumes – Thursday 13th October, 2022



2 UPDATED TRAFFIC ANALYSIS

2.1 GENERAL

The modelling process for the Old Western Highway / Hopetoun Park Road intersection is based on the two stage approach recommended by *SIDRA Solutions* (the developer of the software program used to model intersections).

The Level of Service rating has been based on the 'Average Delay' parameter as per the AustRoads Guidelines, Department of Transport modelling guidelines, and the previous assessment.

These measures are consistent with the previous assessment.

2.2 EXISTING INTERSECTION OPERATION

The three (3) surveyed intersections have been assessed using SIDRA9 software based on their existing layout configurations.

The key outputs for each intersection are summarised in the table below.

Full SIDRA outputs are appended to this addendum.

Table 1 Key SIDRA Outputs – Existing Conditions

Approach	AM Peak				PM Peak			
	DOS	95th Q (m)	Avg Delay (s)	LOS	DOS	95th Q (m)	Avg Delay (s)	LOS
Old Western Highway / Hopetoun Park Road – Stage 1								
Old Western Highway (SE)	0.070	0.0	0.3	-	0.071	0.0	0.5	-
Median Storage (NE)	0.156	5.4	1.8	A	0.227	8.1	2.0	A
Hopetoun Park Road (SW)	0.083	2.4	9.4	A	0.063	1.8	9.8	A
Intersection	***0.156***	***5.4***	***2.2***	***-***	***0.227***	***8.1***	***2.0***	***-***
Old Western Highway / Hopetoun Park Road – Stage 2								
Old Western Highway (NW)	0.085	-	2.4	-	0.134	0.0	2.6	-
Median Storage (SW)	0.014	A	1.6	A	0.013	0.3	1.7	A
Intersection	***0.085***	***-***	***2.4***	***-***	***0.134***	***0.3***	***2.6***	***-***
Hopetoun Park Road / Western Freeway ON RAMP								
Hopetoun Park Road (S)	0.045	1.1	2.3	-	0.032	0.8	2.3	-
Hopetoun park Road (N)	0.084	2.7	4.6	A	0.102	3.3	3.8	A
Intersection	***0.084***	***2.7***	***3.5***	***-***	***0.102***	***3.3***	***3.4***	***-***
Hopetoun Park Road / Western Freeway OFF RAMP								
Hopetoun Park Road (S)	0.068	0.0	0.0	-	0.033	0.0	0.0	-
Western Freeway Off Ramp (E)	0.013	0.4	6.2	A	0.045	1.3	6.0	A
Hopetoun Park Road (N)	0.018	0.0	0.0	-	0.042	0.0	0.0	-
Intersection	***0.068***	***0.4***	***0.9***	***-***	***0.045***	***1.3***	***2.5***	***-***

The above table indicates that the intersections all operate below capacity with minimal queue lengths and delays.

2.3 10-YEAR GROWTH SCENARIO OPERATION

The Department of Transport has noted the following:

1. *Traffic modelling has not allowed for general growth for the future, particularly when Moorabool Shire Council has multiple development areas, as does City of Ballarat, and general growth to the Western Highway corridor. CoB VITM predicts growth of 14.7% (2031) and 28% (2041) on 2021 year figures. We agreed that these figures need to be considered when reviewing gap/safety at the Old Western Highway access in particular.*

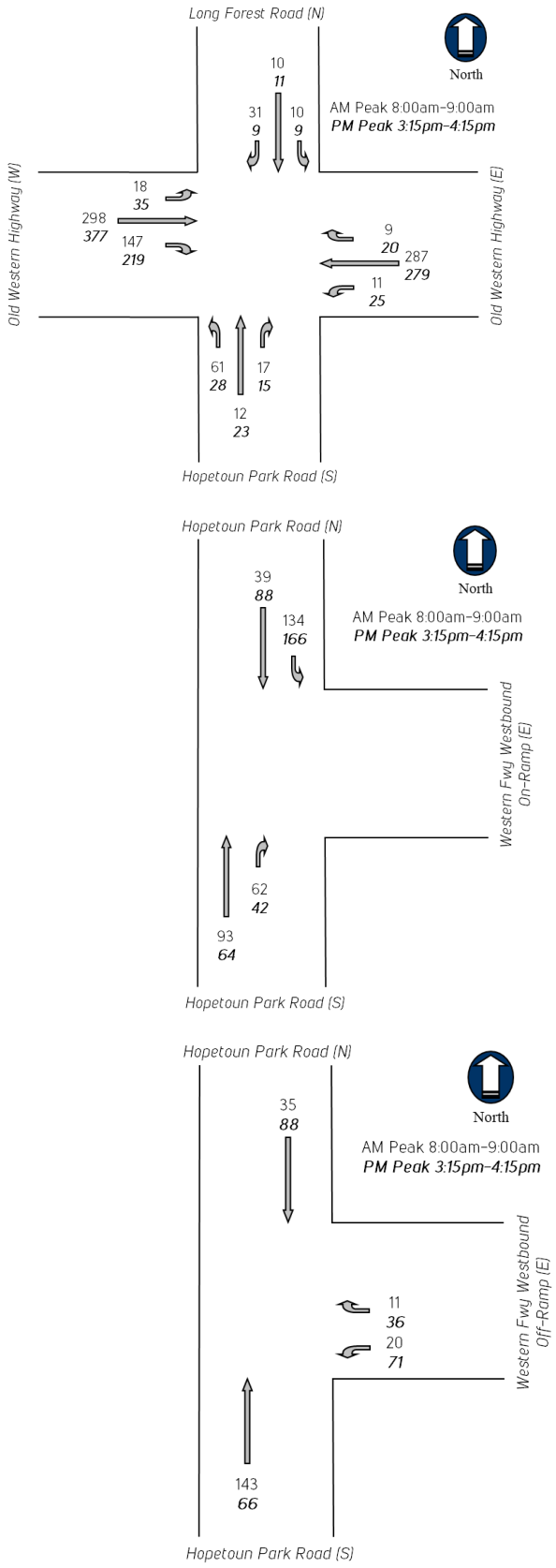
The predicted 10-year growth of 14.7% on 2021 traffic volumes is equivalent to a compounding growth rate of 14.7^(1/10) = 1.308% per annum.

The traffic surveys at Figure 1 were undertaken in late 2022, which is 1-year into the predicted growth of 14.7% on existing 2021 traffic volumes. Therefore, the predicted growth on these volumes over the remaining 9 years is 1.308^9 = 13.4%.

To allow an assessment of the three surveyed intersections under a 10-year growth scenario, all vehicle movements presented in the traffic surveys at Figure 1 have been increased by 13.4%.

These volumes are presented at Figure 2. Conservatively, these figures have included growth on the existing Hopetoun Park generated vehicle movements.

Figure 2 10-Year Growth Scenario (2031) Traffic Volumes



The three (3) intersections have been assessed using SIDRA9 software based on the 10-year growth scenario volumes and their existing layout configurations.

The key outputs for each intersection are summarised in the table below.

Full SIDRA outputs are appended to this addendum.

Table 2 Key SIDRA Outputs – 10-Year Growth Scenario (2031) Traffic Volumes

Approach	AM Peak				PM Peak			
	DOS	95th Q (m)	Avg Delay (s)	LOS	DOS	95th Q (m)	Avg Delay (s)	LOS
Old Western Highway / Hopetoun Park Road – Stage 1								
Old Western Highway (SE)	0.079	0.0	0.3	-	0.080	0.0	0.5	-
Median Storage (NE)	0.184	6.5	2.2	A	0.270	9.8	2.4	A
Hopetoun Park Road (SW)	0.098	2.9	9.7	A	0.081	2.4	10.3	B
Intersection	***0.184***	***6.5***	***2.3***	-	***0.270***	***9.8***	***2.3***	-
Old Western Highway / Hopetoun Park Road – Stage 2								
Old Western Highway (NW)	0.099	0.0	2.4	-	0.164	0.0	2.6	-
Median Storage (SW)	0.017	0.4	1.7	A	0.015	0.3	1.9	A
Intersection	***0.099***	***0.4***	***2.4***	-	***0.164***	***0.3***	***2.6***	-
Hopetoun Park Road / Western Freeway ON RAMP								
Hopetoun Park Road (S)	0.051	1.3	2.3	-	0.036	0.9	2.3	-
Hopetoun park Road (N)	0.095	3.0	4.6	A	0.116	3.8	3.8	A
Intersection	***0.095***	***3.0***	***3.5***	-	***0.116***	***3.8***	***3.4***	-
Hopetoun Park Road / Western Freeway OFF RAMP								
Hopetoun Park Road (S)	0.077	0.0	0.0	-	0.036	0.0	0.0	-
Western Freeway Off Ramp (E)	0.015	0.5	6.2	A	0.051	1.5	6.0	A
Hopetoun Park Road (N)	0.020	0.0	0.0	-	0.048	0.0	0.0	-
Intersection	***0.077***	***0.5***	***0.9***	-	***0.051***	***1.5***	***2.5***	-

The above table indicates there at the intersections will continue to operate below capacity with incremental increases to queue lengths and delays.

2.4 TRAFFIC GENERATION ESTIMATE

2.4.1 TRAFFIC VOLUME

The previous traffic assessment was based on a potential development yield of 850 lots across both sides of Hopetoun Park Road.

However, the proposed rezoning is now for the western side of Hopetoun Park Road only, which is anticipated to yield approximately 400 lots. The eastern side of Hopetoun Park Road has not been included in the proposed rezoning for a number of reasons including but not limited to significant ecological considerations and issues associated with infrastructure delivery due to land fragmentation.

Notwithstanding, Urban Land Developments has agreed with Council that whilst it is uncertain as to whether any development will eventuate on the eastern side, a provision of 200 lots should accommodated for on this side of the road.

Accordingly, the analysis yield of the rezoning has been reduced from 850 lots to 600 lots.

The surveyed traffic generation rates have been adopted to estimate the volume of traffic generated by the sought rezoning and eventual subdivision of land.

This estimate is presented against the previous development yield for comparison at Table 3, below.

Table 3 Traffic Generation Estimate

Yield	Daily		AM Peak		PM Peak	
	Rate	Estimate	Rate	Estimate	Rate	Estimate
850 Lots	8.24 trips / dwelling	7,004 vpd	0.79 trips / dwelling	673 vph	0.76 trips / dwelling	644 vph
600 lots	8.24 trips / dwelling	4,943 vpd	0.79 trips / dwelling	475 vph	0.76 trips / dwelling	454 vph
Net Change		***-2,061 vpd***		***-198 vph***		***-190 vph***

Based on the above, the subject proposal is forecast to generate in the order of 4,943 vehicle movements per day, inclusive of around 475 movements during the AM peak period and 454 movements during the PM peak period.

This is a significant reduction in forecast trip generation on the previously sought development yield that was given "in-principle support" from the Department of Transport.

For analysis purposes and in the interests of conservatism, a peak hour trip generation rate of 0.8 vehicle movements per dwelling will be adopted. This equates to a peak hour traffic volume of 480 vehicle movements per hour during both peak periods.

This peak hour trip generation rate is consistent with the previous assessments undertaken by both Cardno and SALT.

2.4.2 TRAFFIC DISTRIBUTION

The surveyed traffic volumes at Figure 1 have been used to estimate the distribution of site-generated traffic movements to and from the site.

The percentage splits of site-generated turning movements are derived as follows:

Outbound Distribution

- All outbound traffic passes through (south to north) the HP Road / W'Fwy Exit Ramp intersection;
- At the HP Road / W'Fwy Entry Ramp intersection, all right-turn (south to east) movements are generated by Hopetoun Park.

  The only other vehicles this movement could serve are those using the interchange to u-turn (east to east) on Western Freeway. This volume is considered negligible.

  The remaining traffic will continue to Old Western Highway;
- At the HP Road / Old Western Highway intersection, vehicle movements have been split to the west (towards Bacchus Marsh and Long Forest Road) and east (towards Melton West) in accordance with the observed turning volumes.

Inbound Distribution

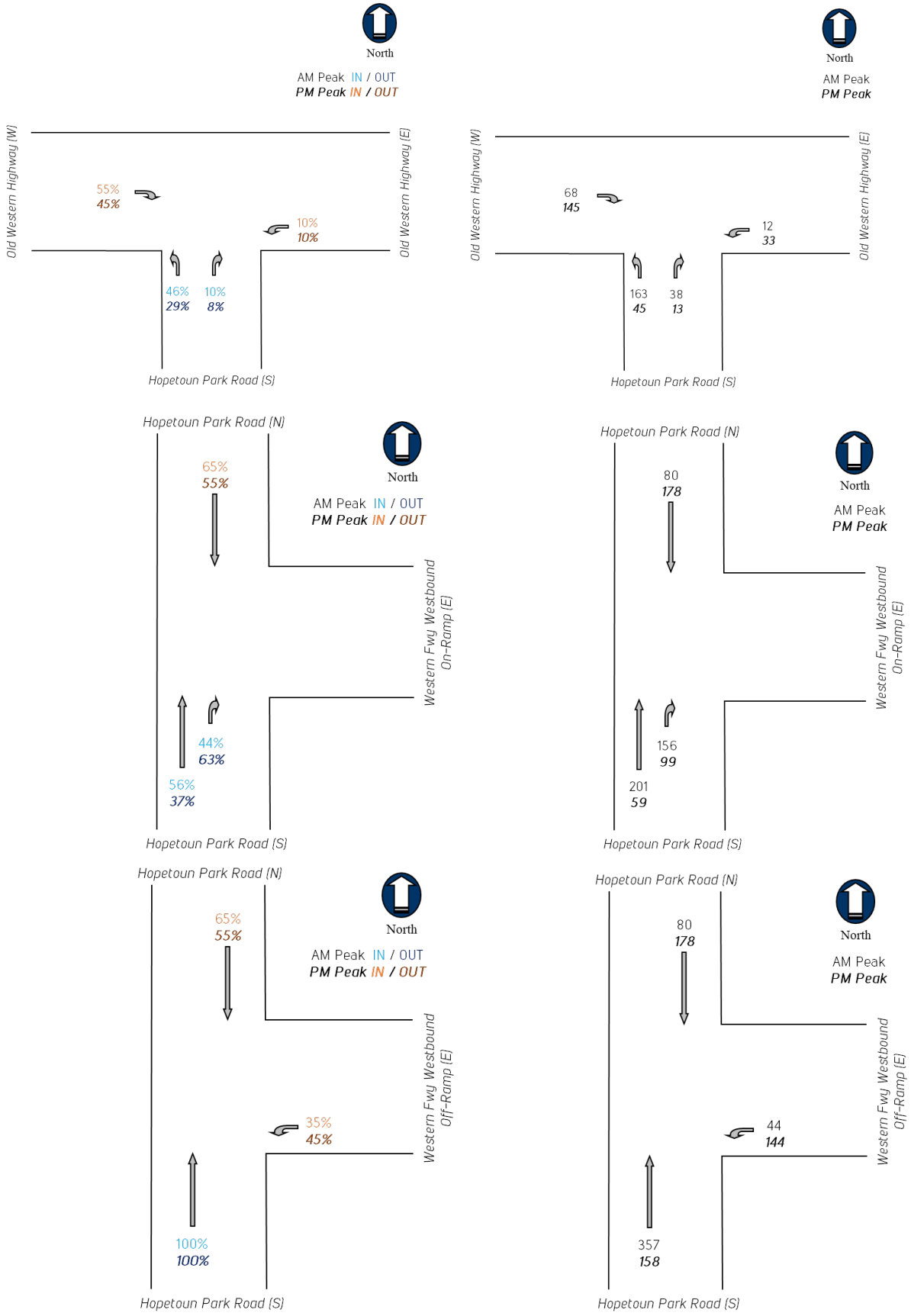
- All traffic turning left (east to south) from Western Freeway to HP Road is generated by Hopetoun Park,

  The remaining traffic arrives from Old Western Freeway.
- At the HP Road / Old Western Highway intersection, vehicle movements have been split generally in accordance with the arrival flows from both directions. A small redistribution of vehicle movements arriving from the west (from Bacchus Marsh) has been made to the east (from Melton West) to account for freeway bound traffic arriving to the intersection from Bacchus Marsh Road.

Based on the preceding, the adopted distributions for peak hour traffic generated by Hopetoun Park are presented at Figure 3 (left).

The surveyed inbound and outbound traffic splits from the tube counter survey at Section 1 have been adopted to estimate the site-generated traffic volume at each intersection at Figure 3 (right).

Figure 3 Estimated Site Generated Traffic Splits and Volumes



2.5 FUTURE INTERSECTION OPERATION

The estimated traffic volumes presented at Figure 3 have been combined with the 10-year growth volumes at Figure 2 for assessment with the SIDRA9 software.

Given the residential nature of the proposed rezoning, the additional vehicle movements have assumed a 98% light vehicle / 2% heavy vehicle split.

The following models have been assessed:

1. Old Western Highway / Hopetoun Park Road (with additional HP Road approach lane)
2. Hopetoun Park Road / Western Freeway ON RAMP (roundabout)
3. Hopetoun Park Road / Western Freeway OFF RAMP (existing layout)

Models 1 and 2 have been assessed as these intersection arrangements have been previously negotiated with Regional Roads Victoria.

The key outputs for each intersection are summarised in the table below. Full SIDRA outputs are appended to this addendum.

Table 4 Key SIDRA Outputs – 10-Year Growth + 600 Lots Scenario

Approach	AM Peak				PM Peak			
	DOS	95th Q (m)	Avg Delay (s)	LOS	DOS	95th Q (m)	Avg Delay (s)	LOS
Old Western Highway / Hopetoun Park Road – Stage 1 (with additional HP Road lane)								
Old Western Highway (SE)	0.079	0.0	0.6	-	0.080	0.0	1.2	-
Median Storage (NE)	0.264	9.5	2.4	A	0.453	17.4	4.1	A
Hopetoun Park Road (SW)	0.204	6.5	10.0	B	0.112	3.0	11.5	B
Intersection	***0.264***	***9.5***	***4.4***	***-***	***0.453***	***17.4***	***4.0***	***-***
Old Western Highway / Hopetoun Park Road – Stage 2								
Old Western Highway (NW)	0.158	0.0	3.0	-	0.221	6.9	3.4	-
Median Storage (SW)	0.053	1.2	1.7	A	0.034	0.8	2.0	A
Intersection	***0.158***	***1.2***	***2.8***	***-***	***0.221***	***6.9***	***3.4***	***-***
Hopetoun Park Road / Western Freeway ON RAMP (Roundabout)								
Hopetoun Park Road (S)	0.308	0.0	5.8	A	0.160	0.0	6.6	A
Hopetoun park Road (N)	0.231	9.3	4.8	A	0.351	15.8	4.7	A
Intersection	***0.308***	***9.3***	***5.5***	***A***	***0.351***	***15.8***	***5.4***	***A***
Hopetoun Park Road / Western Freeway OFF RAMP (Roundabout)								
Hopetoun Park Road (S)	0.269	0.0	0.1	-	0.122	0.0	0.0	-
Western Freeway Off Ramp (E)	0.048	1.5	6.6	A	0.182	5.6	6.9	A
Hopetoun Park Road (N)	0.063	0.0	0.0	-	0.144	0.0	0.0	-
Intersection	***0.269***	***1.5***	***0.8***	***-***	***0.182***	***5.6***	***2.4***	***-***

The above table indicates there at the intersections will continue to operate below capacity with incremental increases to queue lengths and delays.

With regard to the operation of the Old Western Highway / Hopetoun Park Road intersection, the *SIDRA Intersection 9 User Guide* states the following with regard to the outputs of staged crossing intersections:

> The degree of saturation, average delay level of service values for the two stages need to be considered in assessing the overall conditions of the staged crossing movement:
>
> - The degree of saturation is the higher of the values for the two stages.
> - The overall average delay is the sum of the average delay values for the two stages.
> - The level of service for the staged crossing could be assessed using the average delay calculated as the sum of the delays at the two stages of crossing.

A review of the detailed SIDRA outputs with regard to the staged movements at the intersection is provided for both the 'Existing Conditions' scenario and '10-Year Growth + 600 Lots' scenario as follows:

Table 5 Review of Staged Turn Movements – Existing Conditions Scenario

Approach	AM Peak			PM Peak		
	DOS	Avg Delay (s)	LOS	DOS	Avg Delay (s)	LOS
Right-turn from Old Western Highway to Hopetoun Park Road (NW to SW)						
Stage 2	0.085	7.1		0.134	7.0	
Stage 1	0.156	1.8		0.227	2.0	
Total	***0.156***	***8.9***	***A***	***0.227***	***9.1***	***A***
Right-turn from Old Hopetoun Park Road to Old Western Highway (SW to SE)						
Stage 1	0.083	13.1		0.063	13.6	
Stage 2	0.014	1.6		0.013	1.7	
Total	***0.083***	***14.7***	***B***	***0.063***	***15.3***	***C***

Table 6 Review of Staged Turn Movements – 10-Year Growth + 600 Lots Scenario

Approach	AM Peak			PM Peak		
	DOS	Avg Delay (s)	LOS	DOS	Avg Delay (s)	LOS
Right-turn from Old Western Highway to Hopetoun Park Road (NW to SW)						
Stage 2	0.158	7.0		0.221	7.0	
Stage 1	0.264	2.4		0.453	4.1	
Total	***0.264***	***9.4***	***A***	***0.453***	***11.1***	***B***
Right-turn from Old Hopetoun Park Road to Old Western Highway (SW to SE)						
Stage 1	0.132	15.2		0.112	18.8	
Stage 2	0.053	1.7		0.034	2.8	
Total	***0.132***	***16.9***	***C***	***0.112***	***21.6***	***C***

Based on the above:

- There will be minor increases to the average delay of staged right-turn movements under the '10-Years Growth + 600 Lots' scenario';
- Under the '10-Year Growth + 600 Lots scenario':
  - The right-turn movement from Old Western Highway to Hopetoun Park Road would operate well below capacity during both peak periods with a Level of Service 'A' during the AM peak period and Level of Service 'B' during the PM peak period;
  - The right-turn movement from Hopetoun Park Road to Old Western Highway would operate well below capacity during both peak periods with a Level of Service 'C' during both peak periods;

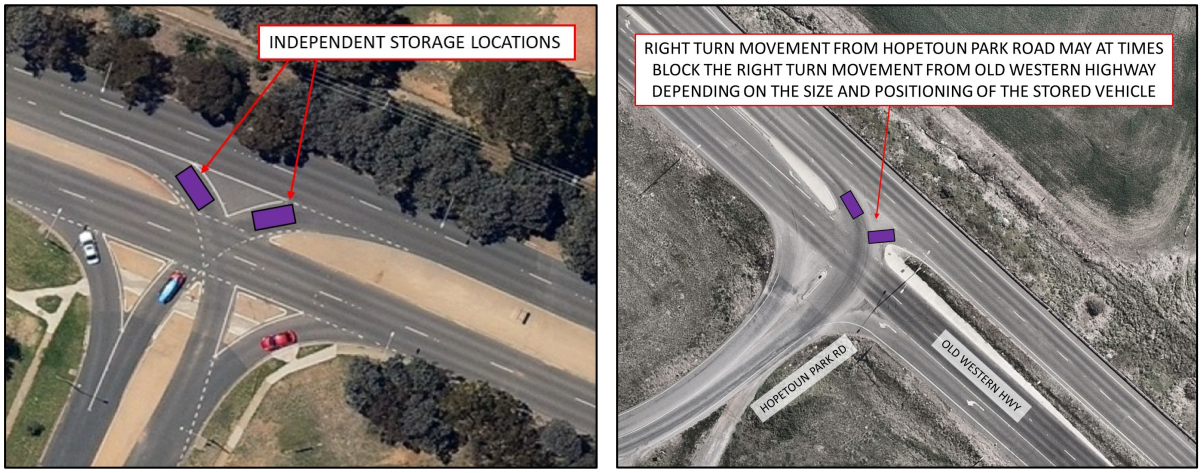
3 POTENTIAL BLOCKAGE EFFECT

As noted in the previous analysis, there is a potential blockage effect on right-turn movements from Old Western Highway to Hopetoun Park Road due to the narrow width of the opening in the central median.

This creates the potential for a motorist turning right from Hopetoun Park Road to Old Western Highway to block the other movement, and may occur at times depending on the size of the vehicle and how the driver positions the vehicle in the median.

This is illustrated at Figure 4.

Figure 4 Opposing Right Turn Movements



A review of Table 6 indicates that vehicles turning right from Hopetoun Park Road to Old Western Highway store in the central median for an average 1.7 seconds during the AM peak period and 2.8 seconds during the PM peak period.

These average delays are short due to the low traffic volumes on the Old Western Highway eastbound carriageway into which the stored vehicle is required to merge, even under 2031 Growth scenario volumes.

Based on the projected number of vehicles expected to make this movement during the respective AM and PM peak periods, the right-turn movement from Old Western Highway into Hopetoun Park Road would be blocked for:

- (53 vehicles x 1.7 seconds) = 90 of 3600 seconds during the AM peak 1-hour period; and
- (34 vehicles x 2.8) seconds = 95 of 3600 seconds during the PM peak 1-hour period.

This blockage effect will have no significant impacts on the right-turn movement from Old Western Highway to Hopetoun Park Road, which is projected to have a 95th percentile queue length of less than 2 vehicles during the AM peak period and 3 vehicles during the PM peak period.

Generally speaking, the Sidra outputs presented for the "10-Year Growth + 600 Lots" scenario are similar to those presented in the previous analysis for the "Existing Conditions + 850 Lots" scenario.

This is largely due to the reduction in potential development yield offsetting the increases in traffic at the intersection due to growth.

4 RESPONSE TO OTHER MATTERS IN DOT CORRESPONDENCE

The following comments are provided in response to the other matters raised in the additional correspondence received by Moorabool Shire Council from the Department of Transport and Planning via e-mail dated 13th February, 2023.

1. ***Traffic modelling has not allowed for general growth for the future, particularly when Moorabool Shire Council has multiple development areas, as does City of Ballarat, and general growth to the Western Highway corridor. CoB VITM predicts growth of 14.7% (2031) and 28% (2041) on 2021 year figures.***

   We agreed that these figures need to be considered when reviewing gap/safety at the Old Western Highway access in particular.

   The Department of Transport (DoT) previously stated in September 2020 that *"subject to detail design, we agree in principle to the layout for the T-intersection with Old Western Highway submitted."*

   This feedback was reiterated in November 2021 when DoT indicated it was *"generally satisfied that previous feedback provided from Regional Roads Victoria (and appended to the Traffic Engineering Report prepared by Salt3) regarding arterial road impacts have been resolved."*

   Given the above, it is not clear why DoT is now requesting a growth scenario assessment when it has had several opportunities to do so prior to having provided it's in principle support.

Notwithstanding, the analysis provided in this correspondence includes an assessment of all three salient intersections under three scenarios:

- Existing Conditions;
- A '10-Year Growth' scenario; and
- A '10-Year Growth + 600 Lots' scenario.

The analysis indicates that the intersections will operate satisfactorily under all three scenarios.

A 20-year growth scenario (i.e. 2041) would not typically be prepared for a single residential subdivision of this scale.

2. *The Sidra modelling assumptions for right turn entry from Hopetoun Park onto Old Western Highway was based on a 2 stage approach using the median as a refuge. Whilst we understand the theory, the reality is that most wait for a gap in traffic flow in both directions before committing to the movement. Observations on site last week confirmed that over 90% do wait for a gap and this results in actual delay that also impacts all traffic on Hopetoun Park Road.*

There is currently little traffic in both directions on Old Western Highway, and opportunities for motorists to undertake the right-turn movement from Hopetoun Park Road to Old Western Freeway are frequent.

Accordingly, most motorists are provided with the opportunity to undertake the right-turn movement in a single manoeuvre and there is little need or desire for a motorist to stage their movement.

If there is increased traffic growth and delays, more motorists would be expected to stage their movement, as per the intersection design.

3. *The requirement for B-Double access at the roundabout being proposed on Hopetoun Park Rd with the on ramp to Western Highway was questioned if this was a mandatory or desirable requirement. This needs to be mandatory to ensure freeway access provision for movements through and entering the on ramp. I note the letter DOC/21/163370 (dated 12/11/2021) includes the wording 'may', which appears to have caused confusion. Apologies for that.*

Noted – The Millar Merrigan Swept Paths appended to the SALT Traffic Impact Assessment (SALT Ref# 20338REP001F03, dated 19th April, 2022) show B-Doubles u-turning from both the north and south.

These have also been appended to this letter for reference.

As discussed, Darren planned to visit the location to get a more informed understanding. He did this on 9th Feb in the morning and noted the following:

a) that the majority do turn left as suggested in traffic survey, and that those that turn right wait for a gap, which can vary up to over 1 minute. This affects all traffic on Hopetoun Rd.

Extending the local road to have more storage is suggested. Right turn traffic turning onto Hopetoun Road is quite dominant in the morning and impacts opportunity for right traffic out of the local road. This may make travel to the east from Hopetoun Road less favourable with increasing traffic demands.

It is agreed that the majority of traffic does turn left at Old Western Highway. This was observed in the traffic surveys and in turn, formed the basis of the traffic distribution from the subject proposal.

It is agreed that additional storage would be beneficial. The "2031 Growth + 600 Lots" scenario is based on an additional stand-up lane being provided on the Hopetoun Park Road approach, as per the Concept Layout Plan prepared by Cardno (Cardno Ref#V190737-TR-SK-004, dated 28th August, 2020) upon which DoT's September 2022 "in-principle approval" was provided.

It is agreed that right-turn movements from Hopetoun Park Road to Old Western Highway are less favoured to motorists travelling eastward than utilising the Western Freeway (eastbound) On-Ramp.

This is also evident in the 2022 traffic surveys and in turn, formed the basis of the traffic distribution for eastbound vehicles from the site. This route provides more convenient access to arterial connections and is even a quicker route for nearby eastward destinations, such as Woodgrove Shopping Centre in Melton.

b) *there is considerable freight that turns right from Old Western Highway into Hopetoun Rd (truck and trailer). Long rigids, semis, and A doubles and B doubles.*

The traffic surveys recorded 15 and 16 Heavy Vehicles making this movement in the respective AM and PM peak periods.

The "2031 Growth scenario" volumes have factored up the light and heavy vehicles in accordance with these observed splits.

c) *School bus movements were observed in all directions.*

Noted.

Example pictures of video stills below

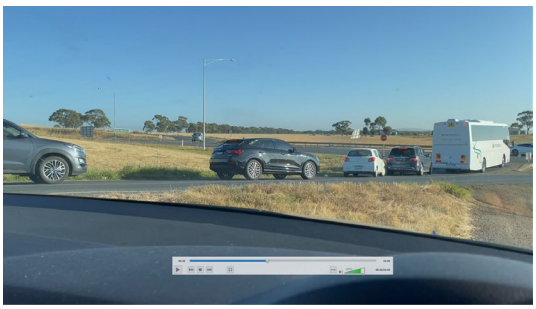
The video stills show various examples of queueing and/or delays at the Hopetoun Park Road / Old Western Highway intersection.

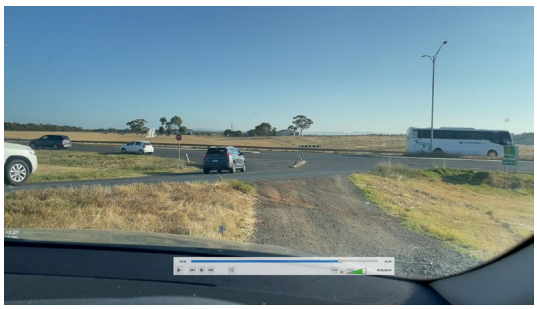
It is accepted that some right-turning vehicles at the intersection (to or from Old Western Highway) may have longer delays. Intersection analysis / traffic theory considers "average delay" as a performance measure, which is the average delay (in seconds) of all vehicles making a particular manoeuvre.

Accordingly, if an occasional right-turning vehicle has an extended delay, but most right-turning vehicles have little to no delay, the average delay will be much lower than the highest recorded delay.

Notably, in the stills presented for a right-turning school bus from Hopetoun Park Road to Old Western Highway, there are four vehicles queued behind the school bus at timestamp 26 seconds (below left)

At timestamp 52 seconds (below right) the bus has only just turned eastwards and is left of frame. Three vehicles have immediately turned left and the fourth vehicle is approaching the hold line.





The average delay for each vehicle is not the same as the delay experienced by the bus, as the vehicles will have approached the control point at different times and experienced less delay.

Notably this arrangement will be avoided in the post-development scenario once an additional stand-up lane has been constructed.

5 SUMMARY

In summary, the operation of the Old Western Highway / Hopetoun Park Road intersection under the '10-year growth with 600 lot development' scenario will be similar to that presented by SALT in December, 2022 for the 'existing conditions with 850 lot development' scenario.

This is largely due to the reduction in potential development yield offsetting the increase in traffic due to growth.

Importantly, it will operate better than the single stage crossing arrangement that was previously assessed by Cardno in 2020 for which 'in principle approval' was originally provided.

SIDRA SUMMARIES – EXISTING CONDITIONS

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp AM Ex (Site Folder: Existing Conditions)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	126	1	133	0.8	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		126	1	133	0.8	0.068	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
East: Western Freeway Off Ramp (E)														
4	L2	17	4	18	23.5	0.013	5.9	LOS A	0.0	0.4	0.10	0.54	0.10	52.3
6	R2	10	2	11	20.0	0.011	6.6	LOS A	0.0	0.3	0.24	0.59	0.24	51.3
Approach		27	6	28	22.2	0.013	6.2	LOS A	0.0	0.4	0.16	0.56	0.16	51.9
North: Hopetoun Park Road (N)														
8	T1	31	3	33	9.7	0.018	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		31	3	33	9.7	0.018	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		184	10	194	5.4	0.068	0.9	NA	0.0	0.4	0.02	0.08	0.02	58.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp AM Ex (Site Folder: Existing Conditions)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	82	2	86	2.4	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	55	2	58	3.6	0.034	5.7	LOS A	0.2	1.1	0.12	0.57	0.12	52.5
Approach		137	4	144	2.9	0.045	2.3	NA	0.2	1.1	0.05	0.23	0.05	56.7
North: Hopetoun Park Road (N)														
7	L2	119	11	125	9.2	0.084	5.9	LOS A	0.4	2.7	0.15	0.52	0.15	53.4
8	T1	35	3	37	8.6	0.020	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		154	14	162	9.1	0.084	4.6	LOS A	0.4	2.7	0.11	0.40	0.11	54.8
All Vehicles		291	18	306	6.2	0.084	3.5	NA	0.4	2.7	0.08	0.32	0.08	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 AM Ex (Site Folder: Existing Conditions)]

Network: TSTIC [OWH-HPR AM Ex (Network Folder: Existing Conditions)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	11	0.0	11	0.0	0.006	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
4	T1	275	3.1	275	3.1	0.070	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		285	3.0	285	3.0	0.070	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.3
NorthEast: Median Storage (NE)														
5	T1	146	10.8	146	10.8	0.156	1.8	LOS A	0.7	5.4	0.44	0.32	0.44	49.3
Approach		146	10.8	146	10.8	0.156	1.8	LOS A	0.7	5.4	0.44	0.32	0.44	49.3
SouthWest: Hopetoun Park Road (SW)														
1	L2	68	0.0	68	0.0	0.083	8.6	LOS A	0.3	2.4	0.29	0.88	0.29	55.9
2	T1	16	6.7	16	6.7	0.083	13.1	LOS B	0.3	2.4	0.29	0.88	0.29	46.8
Approach		84	1.3	84	1.3	0.083	9.4	LOS A	0.3	2.4	0.29	0.88	0.29	54.7
All Vehicles		516	4.9	516	4.9	0.156	2.2	NA	0.7	5.4	0.17	0.25	0.17	67.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 AM Ex (Site Folder: Existing Conditions)]

Network: TSTIC [OWH-HPR AM Ex (Network Folder: Existing Conditions)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
NorthWest: Old Western Highway (NW)														
2	T1	285	1.5	285	1.5	0.074	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	146	10.8	146	10.8	0.085	7.1	LOS A	0.0	0.0	0.00	0.67	0.00	61.7
Approach		432	4.6	432	4.6	0.085	2.4	NA	0.0	0.0	0.00	0.23	0.00	75.4
SouthWest: Median Storage (SW)														
1	R2	16	6.7	16	6.7	0.014	1.6	LOS A	0.0	0.3	0.29	0.32	0.29	56.4
Approach		16	6.7	16	6.7	0.014	1.6	LOS A	0.0	0.3	0.29	0.32	0.29	56.4
All Vehicles		447	4.7	447	4.7	0.085	2.4	NA	0.0	0.3	0.01	0.23	0.01	74.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp PM Ex (Site Folder: Existing Conditions)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	59	3	62	5.1	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		59	3	62	5.1	0.033	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
East: Western Freeway Off Ramp (E)														
4	L2	63	3	66	4.8	0.045	5.8	LOS A	0.2	1.3	0.17	0.54	0.17	52.9
6	R2	32	2	34	6.3	0.031	6.3	LOS A	0.1	0.7	0.22	0.60	0.22	52.0
Approach		95	5	100	5.3	0.045	6.0	LOS A	0.2	1.3	0.19	0.56	0.19	52.6
North: Hopetoun Park Road (N)														
8	T1	78	2	82	2.6	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		78	2	82	2.6	0.042	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		232	10	244	4.3	0.045	2.5	NA	0.2	1.3	0.08	0.23	0.08	56.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp PM Ex (Site Folder: Existing Conditions)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	56	4	59	7.1	0.032	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	37	1	39	2.7	0.024	5.8	LOS A	0.1	0.8	0.18	0.56	0.18	52.4
Approach		93	5	98	5.4	0.032	2.3	NA	0.1	0.8	0.07	0.22	0.07	56.7
North: Hopetoun Park Road (N)														
7	L2	146	14	154	9.6	0.102	5.8	LOS A	0.4	3.3	0.12	0.52	0.12	53.5
8	T1	78	2	82	2.6	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		224	16	236	7.1	0.102	3.8	LOS A	0.4	3.3	0.08	0.34	0.08	55.6
All Vehicles		317	21	334	6.6	0.102	3.4	NA	0.4	3.3	0.08	0.30	0.08	55.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 PM Ex (Site Folder: Existing Conditions)]

Network: TSTIC [OWH-HPR PM Ex (Network Folder: Existing Conditions)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	23	0.0	23	0.0	0.012	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
4	T1	278	2.7	278	2.7	0.071	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		301	2.4	301	2.4	0.071	0.5	NA	0.0	0.0	0.00	0.05	0.00	78.6
NorthEast: Median Storage (NE)														
5	T1	214	7.9	214	7.9	0.227	2.0	LOS A	1.1	8.1	0.47	0.36	0.47	49.2
Approach		214	7.9	214	7.9	0.227	2.0	LOS A	1.1	8.1	0.47	0.36	0.47	49.2
SouthWest: Hopetoun Park Road (SW)														
1	L2	44	2.4	44	2.4	0.063	8.7	LOS A	0.3	1.8	0.30	0.88	0.30	55.0
2	T1	14	0.0	14	0.0	0.063	13.6	LOS B	0.3	1.8	0.30	0.88	0.30	46.3
Approach		58	1.8	58	1.8	0.063	9.8	LOS A	0.3	1.8	0.30	0.88	0.30	53.6
All Vehicles		573	4.4	573	4.4	0.227	2.0	NA	1.1	8.1	0.21	0.25	0.21	65.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 PM Ex (Site Folder: Existing Conditions)]

Network: TSTIC [OWH-HPR PM Ex (Network Folder: Existing Conditions)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
NorthWest: Old Western Highway (NW)														
2	T1	359	2.6	359	2.6	0.094	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
3	R2	214	7.9	214	7.9	0.134	7.0	LOS A	0.0	0.0	0.00	0.67	0.00	61.6
Approach		573	4.6	573	4.6	0.134	2.6	NA	0.0	0.0	0.00	0.25	0.00	74.8
SouthWest: Median Storage (SW)														
1	R2	14	0.0	14	0.0	0.013	1.7	LOS A	0.0	0.3	0.33	0.35	0.33	59.9
Approach		14	0.0	14	0.0	0.013	1.7	LOS A	0.0	0.3	0.33	0.35	0.33	59.9
All Vehicles		586	4.5	586	4.5	0.134	2.6	NA	0.0	0.3	0.01	0.25	0.01	74.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA SUMMARIES – 10-YEAR GROWTH SCENARIO

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp AM 2031 (Site Folder: 2031 Growth Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	143	1	151	0.7	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		143	1	151	0.7	0.077	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
East: Western Freeway Off Ramp (E)														
4	L2	20	5	21	25.0	0.015	6.0	LOS A	0.1	0.5	0.11	0.54	0.11	52.2
6	R2	11	2	12	18.2	0.012	6.6	LOS A	0.0	0.3	0.26	0.60	0.26	51.3
Approach		31	7	33	22.6	0.015	6.2	LOS A	0.1	0.5	0.16	0.56	0.16	51.9
North: Hopetoun Park Road (N)														
8	T1	35	3	37	8.6	0.020	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		35	3	37	8.6	0.020	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		209	11	220	5.3	0.077	0.9	NA	0.1	0.5	0.02	0.08	0.02	58.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp AM 2031 (Site Folder: 2031 Growth Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	93	2	98	2.2	0.051	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	62	2	65	3.2	0.038	5.7	LOS A	0.2	1.3	0.12	0.57	0.12	52.5
Approach		155	4	163	2.6	0.051	2.3	NA	0.2	1.3	0.05	0.23	0.05	56.7
North: Hopetoun Park Road (N)														
7	L2	134	12	141	9.0	0.095	5.9	LOS A	0.4	3.0	0.16	0.52	0.16	53.4
8	T1	39	3	41	7.7	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		173	15	182	8.7	0.095	4.6	LOS A	0.4	3.0	0.12	0.40	0.12	54.7
All Vehicles		328	19	345	5.8	0.095	3.5	NA	0.4	3.0	0.09	0.32	0.09	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 AM 2031 (Site Folder: 2031 Growth Scenario)]

Network: TSTIC [OWH-HPR AM 2031 (Network Folder: 2031 Growth Scenario)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	12	0.0	12	0.0	0.006	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
4	T1	312	3.0	312	3.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		323	2.9	323	2.9	0.079	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.3
NorthEast: Median Storage (NE)														
5	T1	165	10.8	165	10.8	0.184	2.2	LOS A	0.8	6.5	0.48	0.37	0.48	48.8
Approach		165	10.8	165	10.8	0.184	2.2	LOS A	0.8	6.5	0.48	0.37	0.48	48.8
SouthWest: Hopetoun Park Road (SW)														
1	L2	77	0.0	77	0.0	0.098	8.6	LOS A	0.4	2.9	0.32	0.88	0.32	55.7
2	T1	18	5.9	18	5.9	0.098	14.1	LOS B	0.4	2.9	0.32	0.88	0.32	46.5
Approach		95	1.1	95	1.1	0.098	9.7	LOS A	0.4	2.9	0.32	0.88	0.32	54.6
All Vehicles		583	4.9	583	4.9	0.184	2.3	NA	0.8	6.5	0.19	0.26	0.19	66.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 AM 2031 (Site Folder: 2031 Growth Scenario)]

Network: TSTIC [OWH-HPR AM 2031 (Network Folder: 2031 Growth Scenario)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
NorthWest: Old Western Highway (NW)														
2	T1	324	1.6	324	1.6	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	165	10.8	165	10.8	0.099	7.1	LOS A	0.0	0.0	0.00	0.67	0.00	61.6
Approach		489	4.7	489	4.7	0.099	2.4	NA	0.0	0.0	0.00	0.23	0.00	75.4
SouthWest: Median Storage (SW)														
1	R2	18	5.9	18	5.9	0.017	1.7	LOS A	0.1	0.4	0.32	0.34	0.32	56.6
Approach		18	5.9	18	5.9	0.017	1.7	LOS A	0.1	0.4	0.32	0.34	0.32	56.6
All Vehicles		507	4.8	507	4.8	0.099	2.4	NA	0.1	0.4	0.01	0.23	0.01	74.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp PM 2031 (Site Folder: 2031 Growth Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	66	3	69	4.5	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		66	3	69	4.5	0.036	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
East: Western Freeway Off Ramp (E)														
4	L2	71	3	75	4.2	0.051	5.9	LOS A	0.2	1.5	0.19	0.54	0.19	52.9
6	R2	36	2	38	5.6	0.035	6.3	LOS A	0.1	0.8	0.23	0.60	0.23	52.0
Approach		107	5	113	4.7	0.051	6.0	LOS A	0.2	1.5	0.20	0.56	0.20	52.6
North: Hopetoun Park Road (N)														
8	T1	88	2	93	2.3	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		88	2	93	2.3	0.048	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		261	10	275	3.8	0.051	2.5	NA	0.2	1.5	0.08	0.23	0.08	56.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp PM 2031 (Site Folder: 2031 Growth Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	64	5	67	7.8	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
3	R2	42	1	44	2.4	0.027	5.8	LOS A	0.1	0.9	0.19	0.56	0.19	52.4
Approach		106	6	112	5.7	0.036	2.3	NA	0.1	0.9	0.08	0.22	0.08	56.7
North: Hopetoun Park Road (N)														
7	L2	166	16	175	9.6	0.116	5.9	LOS A	0.5	3.8	0.13	0.52	0.13	53.5
8	T1	88	2	93	2.3	0.048	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		254	18	267	7.1	0.116	3.8	LOS A	0.5	3.8	0.08	0.34	0.08	55.5
All Vehicles		360	24	379	6.7	0.116	3.4	NA	0.5	3.8	0.08	0.30	0.08	55.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 PM 2031 (Site Folder: 2031 Growth Scenario)]

Network: TSTIC [OWH-HPR PM 2031 (Network Folder: 2031 Growth Scenario)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	26	0.0	26	0.0	0.014	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
4	T1	315	2.7	315	2.7	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		341	2.5	341	2.5	0.080	0.5	NA	0.0	0.0	0.00	0.05	0.00	78.6
NorthEast: Median Storage (NE)														
5	T1	242	7.8	242	7.8	0.270	2.4	LOS A	1.3	9.8	0.52	0.42	0.52	48.7
Approach		242	7.8	242	7.8	0.270	2.4	LOS A	1.3	9.8	0.52	0.42	0.52	48.7
SouthWest: Hopetoun Park Road (SW)														
1	L2	54	7.8	54	7.8	0.081	9.0	LOS A	0.3	2.4	0.33	0.88	0.33	53.5
2	T1	16	0.0	16	0.0	0.081	14.9	LOS B	0.3	2.4	0.33	0.88	0.33	46.0
Approach		69	6.1	69	6.1	0.081	10.3	LOS B	0.3	2.4	0.33	0.88	0.33	52.4
All Vehicles		653	4.8	653	4.8	0.270	2.3	NA	1.3	9.8	0.23	0.28	0.23	65.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 PM 2031 (Site Folder: 2031 Growth Scenario)]

Network: TSTIC [OWH-HPR PM 2031 (Network Folder: 2031 Growth Scenario)]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
NorthWest: Old Western Highway (NW)														
2	T1	406	2.6	406	2.6	0.106	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
3	R2	242	7.8	242	7.8	0.164	7.0	LOS A	0.0	0.0	0.00	0.67	0.00	61.6
Approach		648	4.5	648	4.5	0.164	2.6	NA	0.0	0.0	0.00	0.25	0.00	74.8
SouthWest: Median Storage (SW)														
1	R2	16	0.0	16	0.0	0.015	1.9	LOS A	0.0	0.3	0.36	0.37	0.36	59.6
Approach		16	0.0	16	0.0	0.015	1.9	LOS A	0.0	0.3	0.36	0.37	0.36	59.6
All Vehicles		664	4.4	664	4.4	0.164	2.6	NA	0.0	0.3	0.01	0.25	0.01	74.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA SUMMARIES – 10-YEAR GROWTH + 600 LOTS SCENARIO

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp AM 2031 Fu (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	499	8	525	1.6	0.269	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		499	8	525	1.6	0.269	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Western Freeway Off Ramp (E)														
4	L2	64	6	67	9.4	0.048	6.0	LOS A	0.2	1.5	0.22	0.55	0.22	52.5
6	R2	11	2	12	18.2	0.020	9.8	LOS A	0.1	0.5	0.52	0.75	0.52	49.2
Approach		75	8	79	10.7	0.048	6.6	LOS A	0.2	1.5	0.27	0.57	0.27	52.0
North: Hopetoun Park Road (N)														
8	T1	115	5	121	4.3	0.063	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		115	5	121	4.3	0.063	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		689	21	725	3.0	0.269	0.8	NA	0.2	1.5	0.03	0.06	0.03	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp AM 2031 Fu - ROUNDABOUT (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	294	6	309	2.0	0.308	3.4	LOS A	0.0	0.0	0.00	0.52	0.00	56.1
3	R2	218	5	229	2.3	0.308	9.0	LOS A	0.0	0.0	0.00	0.52	0.00	56.3
Approach		512	11	539	2.1	0.308	5.8	LOS A	0.0	0.0	0.00	0.52	0.00	56.1
North: Hopetoun Park Road (N)														
7	L2	134	12	141	9.0	0.231	4.9	LOS A	1.3	9.3	0.42	0.51	0.42	54.4
8	T1	119	5	125	4.2	0.231	4.7	LOS A	1.3	9.3	0.42	0.51	0.42	56.1
Approach		253	17	266	6.7	0.231	4.8	LOS A	1.3	9.3	0.42	0.51	0.42	55.2
All Vehicles		765	28	805	3.7	0.308	5.5	LOS A	1.3	9.3	0.14	0.52	0.14	55.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 AM 2031 Fu - TURN LANE (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

Network: TSTIC [OWH-HPR AM 2031 Fu - TURN LANE (Network Folder: 2031 Growth + Development Scenarios (600 Lots))]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	29	0.0	29	0.0	0.015	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
4	T1	312	3.0	312	3.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		341	2.8	341	2.8	0.079	0.6	NA	0.0	0.0	0.00	0.05	0.00	78.4
NorthEast: Median Storage (NE)														
5	T1	236	8.0	236	8.0	0.264	2.4	LOS A	1.3	9.5	0.51	0.42	0.51	48.7
Approach		236	8.0	236	8.0	0.264	2.4	LOS A	1.3	9.5	0.51	0.42	0.51	48.7
SouthWest: Hopetoun Park Road (SW)														
1	L2	249	1.7	249	1.7	0.204	8.8	LOS A	0.9	6.5	0.30	0.88	0.30	56.0
2	T1	58	3.6	58	3.6	0.132	15.2	LOS C	0.5	3.9	0.64	0.99	0.64	41.5
Approach		307	2.1	307	2.1	0.204	10.0	LOS B	0.9	6.5	0.37	0.90	0.37	54.0
All Vehicles		884	3.9	884	3.9	0.264	4.4	NA	1.3	9.5	0.26	0.45	0.26	61.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 AM 2031 Fu - TURN LANE (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

Network: TSTIC [OWH-HPR AM 2031 Fu - TURN LANE (Network Folder: 2031 Growth + Development Scenarios (600 Lots))]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
NorthWest: Old Western Highway (NW)														
2	T1	324	1.6	324	1.6	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	236	8.0	236	8.0	0.158	7.0	LOS A	0.0	0.0	0.00	0.67	0.00	61.6
Approach		560	4.3	560	4.3	0.158	3.0	NA	0.0	0.0	0.00	0.28	0.00	74.0
SouthWest: Median Storage (SW)														
1	R2	58	3.6	58	3.6	0.053	1.7	LOS A	0.2	1.2	0.32	0.36	0.32	57.8
Approach		58	3.6	58	3.6	0.053	1.7	LOS A	0.2	1.2	0.32	0.36	0.32	57.8
All Vehicles		618	4.3	618	4.3	0.158	2.8	NA	0.2	1.2	0.03	0.29	0.03	72.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF Off Ramp PM 2031 Fu (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	224	6	236	2.7	0.122	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		224	6	236	2.7	0.122	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Western Freeway Off Ramp (E)														
4	L2	215	6	226	2.8	0.182	6.7	LOS A	0.8	5.6	0.38	0.62	0.38	52.3
6	R2	36	2	38	5.6	0.050	8.1	LOS A	0.2	1.2	0.45	0.72	0.45	50.8
Approach		251	8	264	3.2	0.182	6.9	LOS A	0.8	5.6	0.39	0.64	0.39	52.1
North: Hopetoun Park Road (N)														
8	T1	266	6	280	2.3	0.144	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		266	6	280	2.3	0.144	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		741	20	780	2.7	0.182	2.4	NA	0.8	5.6	0.13	0.22	0.13	57.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [HP Road / WF On Ramp PM 2031 Fu - ROUNDABOUT (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	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
South: Hopetoun Park Road (S)														
2	T1	123	6	129	4.9	0.160	3.4	LOS A	0.0	0.0	0.00	0.56	0.00	55.5
3	R2	141	3	148	2.1	0.160	9.0	LOS A	0.0	0.0	0.00	0.56	0.00	55.7
Approach		264	9	278	3.4	0.160	6.4	LOS A	0.0	0.0	0.00	0.56	0.00	55.6
North: Hopetoun Park Road (N)														
7	L2	166	16	175	9.6	0.351	4.5	LOS A	2.2	15.8	0.37	0.46	0.37	54.5
8	T1	266	6	280	2.3	0.351	4.3	LOS A	2.2	15.8	0.37	0.46	0.37	56.3
Approach		432	22	455	5.1	0.351	4.4	LOS A	2.2	15.8	0.37	0.46	0.37	55.6
All Vehicles		696	31	733	4.5	0.351	5.1	LOS A	2.2	15.8	0.23	0.50	0.23	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S1 [OWH-HPR Stage 1 PM 2031 Fu - TURN LANE (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

Network: TSTIC [OWH-HPR PM 2031 Fu - TURN LANE (Network Folder: 2031 Growth + Development Scenarios (600 Lots))]

Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL 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
SouthEast: Old Western Highway (SE)														
3	L2	62	1.7	62	1.7	0.033	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.8
4	T1	315	2.7	315	2.7	0.080	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		377	2.5	377	2.5	0.080	1.2	NA	0.0	0.0	0.00	0.10	0.00	77.0
NorthEast: Median Storage (NE)														
5	T1	395	5.6	395	5.6	0.453	4.1	LOS A	2.4	17.4	0.61	0.73	0.79	46.9
Approach		395	5.6	395	5.6	0.453	4.1	LOS A	2.4	17.4	0.61	0.73	0.79	46.9
SouthWest: Hopetoun Park Road (SW)														
1	L2	102	5.2	102	5.2	0.085	8.9	LOS A	0.3	2.5	0.28	0.88	0.28	55.1
2	T1	36	0.0	36	0.0	0.112	18.8	LOS C	0.4	3.0	0.73	1.00	0.73	38.5
Approach		138	3.8	138	3.8	0.112	11.5	LOS B	0.4	3.0	0.39	0.91	0.39	51.8
All Vehicles		909	4.1	909	4.1	0.453	4.0	NA	2.4	17.4	0.33	0.50	0.40	60.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: S2 [OWH-HPR Stage 2 PM 2031 Fu - TURN LANE (Site Folder: 2031 Growth + Development Scenarios (600 Lots))]

Network: TSTIC [OWH-HPR PM 2031 Fu - TURN LANE (Network Folder: 2031 Growth + Development Scenarios (600 Lots))]

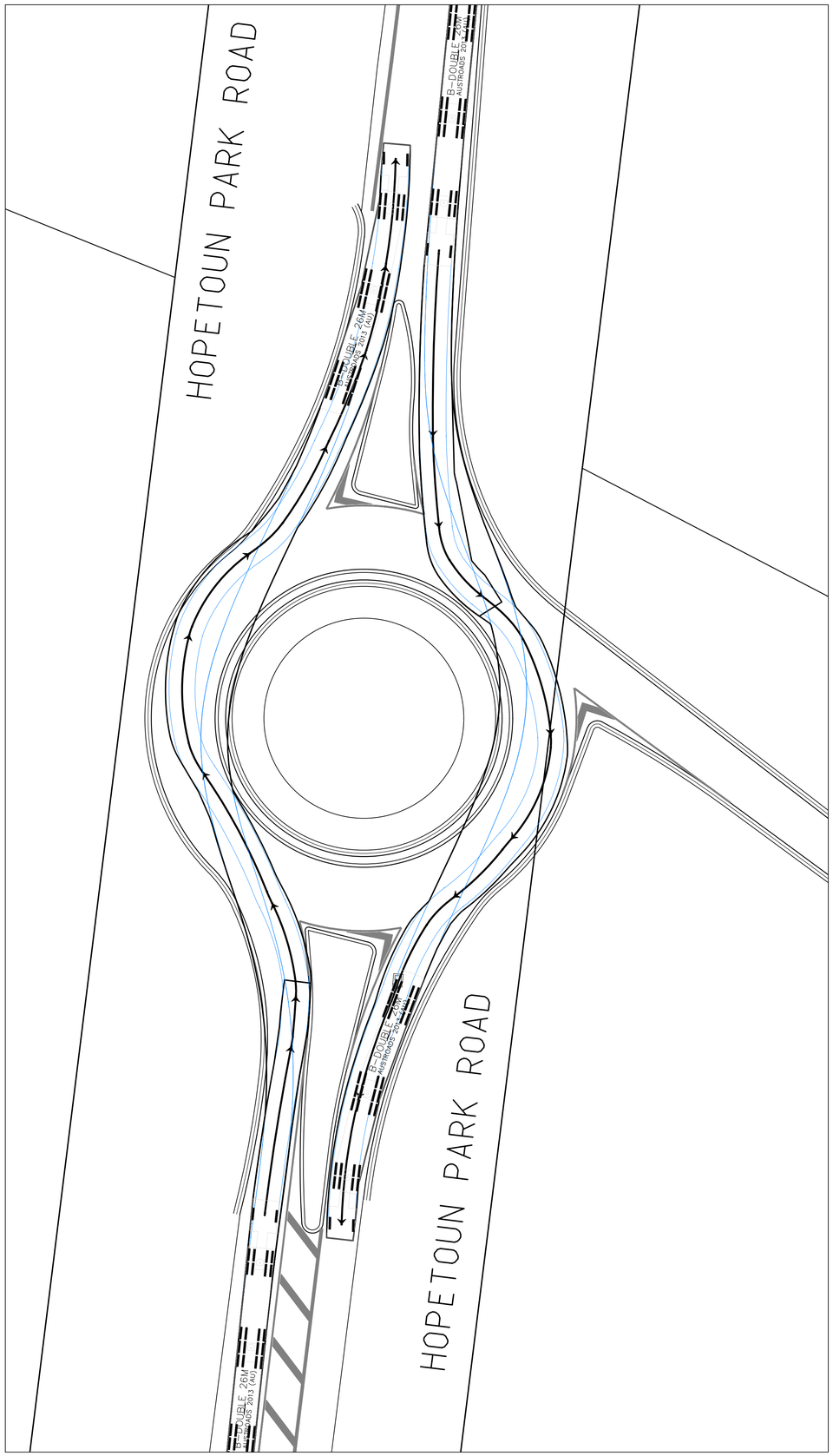
Type B Two-Stage T-Intersection Crossing
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

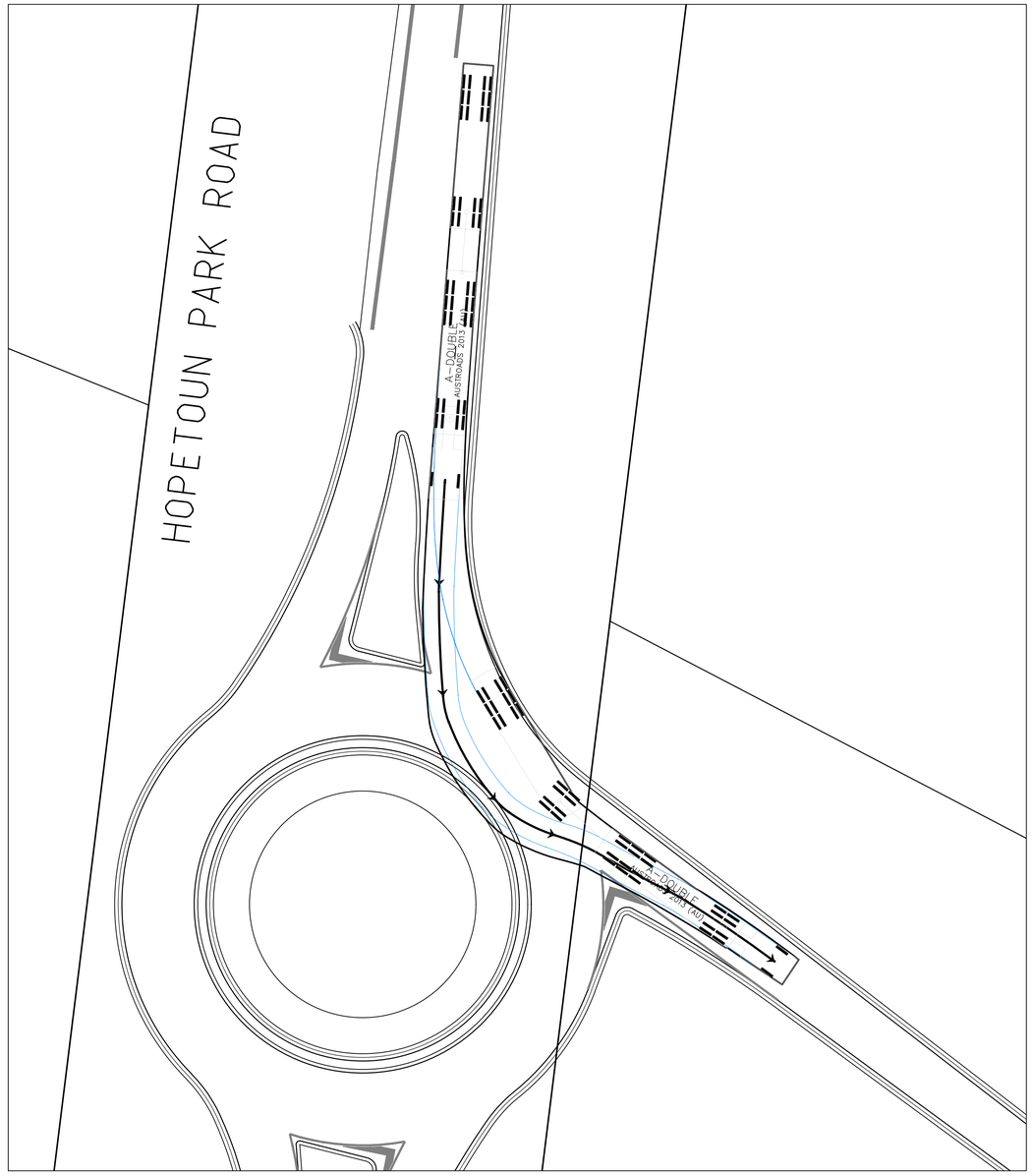
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthWest: Old Western Highway (NW)														
2	T1	406	2.6	406	2.6	0.106	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
3	R2	395	5.6	395	5.6	0.221	7.0	LOS A	0.9	6.9	0.00	0.67	0.00	61.6
Approach		801	4.1	801	4.1	0.221	3.4	NA	0.9	6.9	0.00	0.33	0.00	72.8
SouthWest: Median Storage (SW)														
1	R2	36	0.0	36	0.0	0.034	2.0	LOS A	0.1	0.8	0.36	0.39	0.36	59.5
Approach		36	0.0	36	0.0	0.034	2.0	LOS A	0.1	0.8	0.36	0.39	0.36	59.5
All Vehicles		837	3.9	837	3.9	0.221	3.4	NA	0.9	6.9	0.02	0.33	0.02	72.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

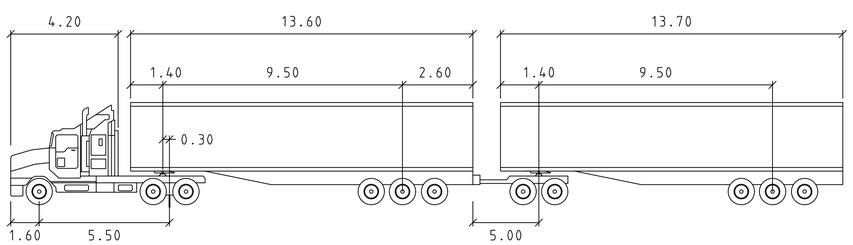
MILLAR MERRIGAN SWEPT PATH DIAGRAMS



B-DOUBLE
THROUGH ROUNDABOUT

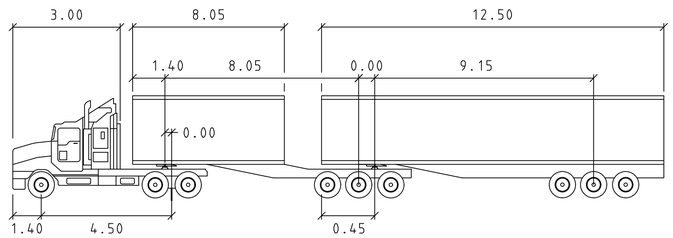


A-DOUBLE
LEFT TURN ONTO HIGHWAY ON-RAMP



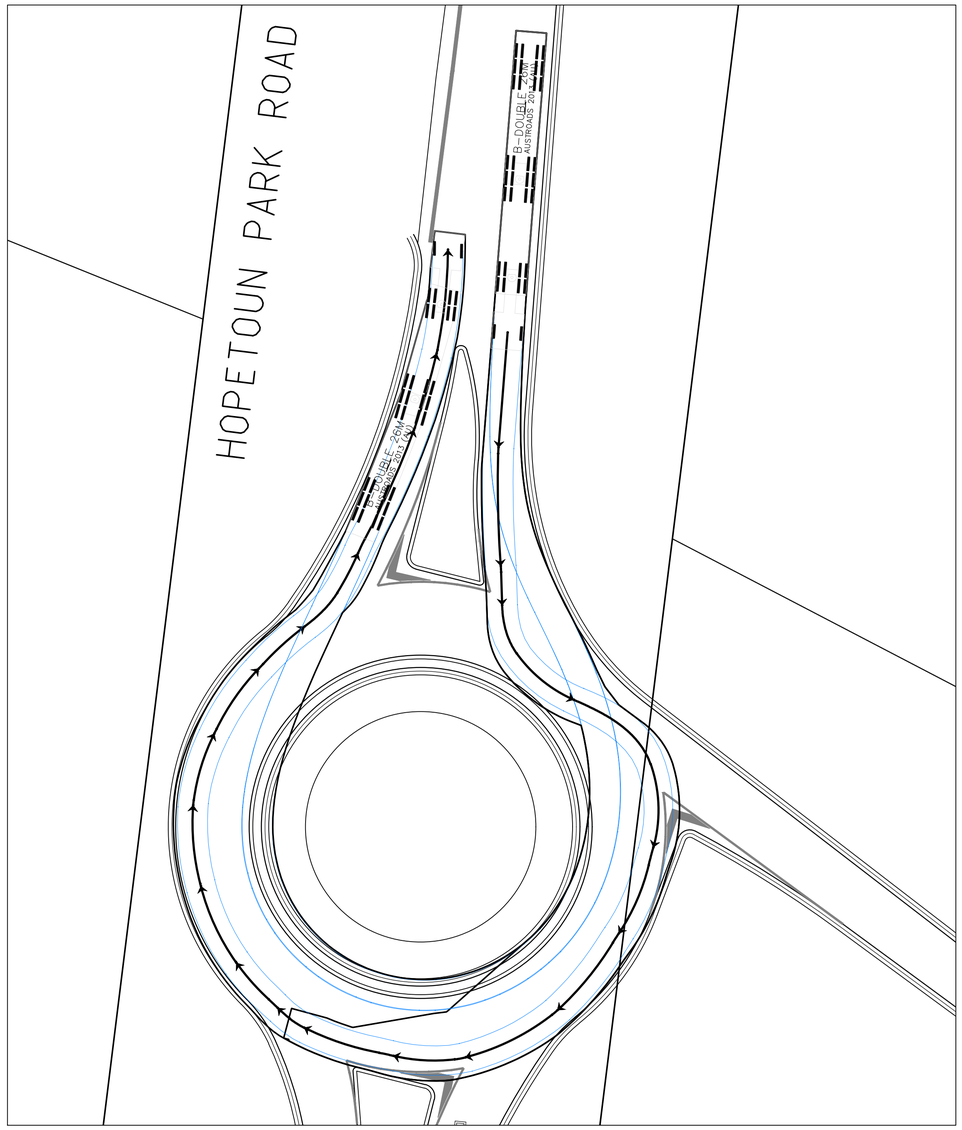
A-DOUBLE

TRACTOR WIDTH	:	2.50m	LOCK TO LOCK TIME	:	6.0
TRAILER WIDTH	:	2.50m	STEERING ANGLE	:	23.4
TRACTOR TRACK	:	2.50m	ARTICULATING ANGLE	:	70.0
TRAILER TRACK	:	2.50m			

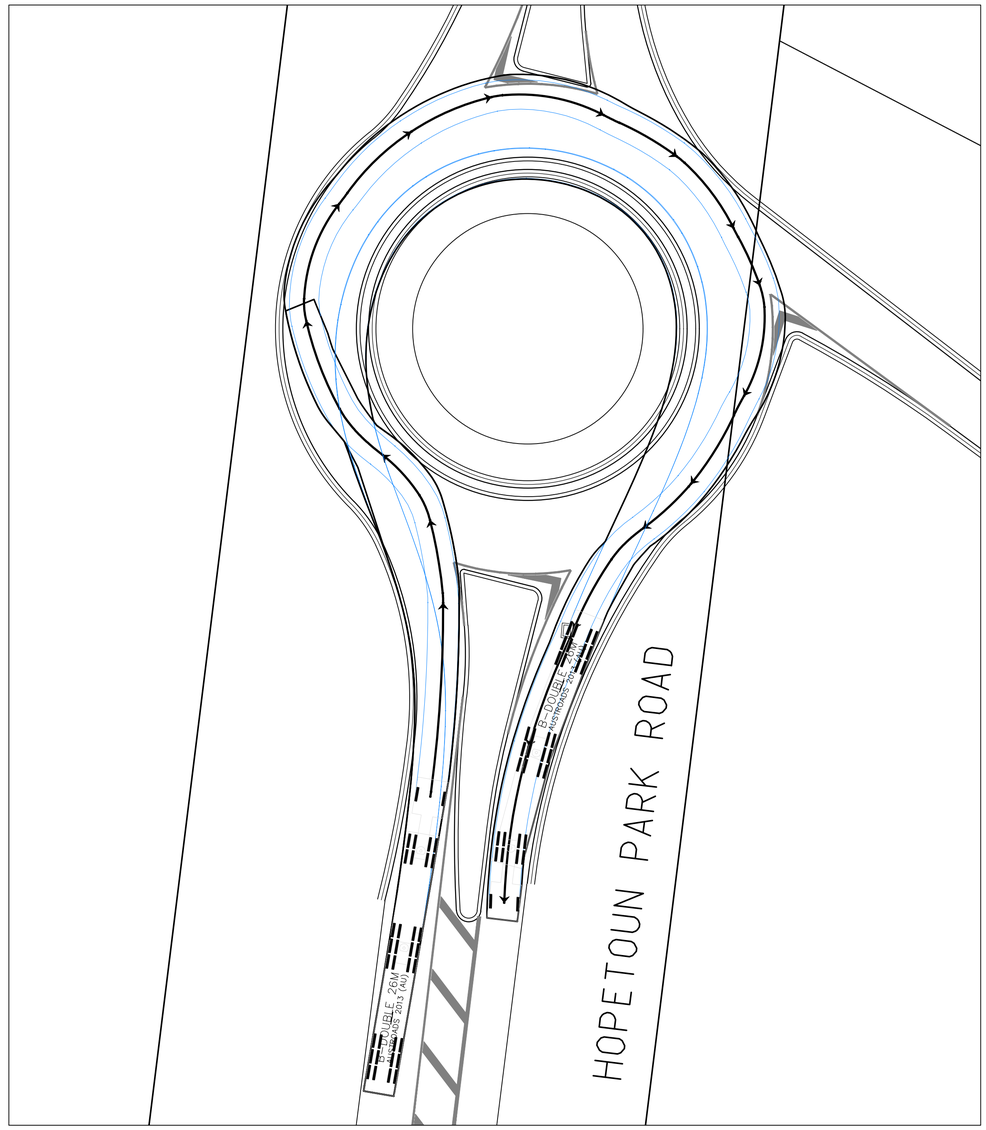


B-DOUBLE 26M

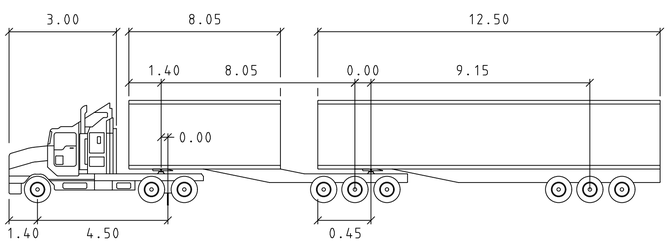
TRACTOR WIDTH	:	2.50m	LOCK TO LOCK TIME	:	6.0
TRAILER WIDTH	:	2.50m	STEERING ANGLE	:	23.4
TRACTOR TRACK	:	2.50m	ARTICULATING ANGLE	:	70.0
TRAILER TRACK	:	2.50m			



B-DOUBLE
U-TURN FROM SOUTH



B-DOUBLE
U-TURN FROM NORTH



B-DOUBLE 26M

TRACTOR WIDTH	:	2.50m	LOCK TO LOCK TIME	:	6.0
TRAILER WIDTH	:	2.50m	STEERING ANGLE	:	23.4
TRACTOR TRACK	:	2.50m	ARTICULATING ANGLE	:	70.0
TRAILER TRACK	:	2.50m			