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Memorandum

To	**Port of Newcastle**	From	**Aurecon Australasia**
Copy		Reference	Project number
Date	**2020-05-13**	Pages (including this page)	**10**
Subject	**Mayfield Cargo Storage Facility – DA Modification – Traffic Impact Assessment Update**		

1 Introduction

It is understood that Port of Newcastle intends to modify the Development Consent (DA 8137) for an existing hardstand laydown area to be used as part of port facilities. This is in relation to the Mayfield Cargo Storage Facility which seeks to increase the approved laydown footprint of the site from 12 hectares to 18.6 hectares.

The purpose of this memo is to explore the traffic implications of the extension in site area and provide an update to the existing traffic impact assessment for the Cargo Storage Facility (AECOM 2016), hereafter referred to as 'the original TIA'. Specifically, an update to the Industrial Drive & George Street SIDRA model (AECOM 2016) was made to address comments from the Department of Planning, Industry and Environment (DPIE) to account for the traffic impacts of background traffic growth and modification traffic growth, to ensure that the intersection will remain operating at an acceptable level of service.

2 Traffic Volumes

2.1 Background Traffic Uplift

Intersection counts for the Industrial Drive & George Street intersection were conducted by Matrix on behalf on AECOM on Thursday 15th September 2016 for both AM and PM peaks. A summary of the 2016 surveyed volumes is provided in Table 2-1.

Table 2-1 2016 Surveyed and 2020 Calculated Traffic Movements Along Industrial Drive & George Street

Approach		2016 Surveyed			
		AM		PM	
		LV	HV	LV	HV
Industrial Drive North	L	18	9	23	2
	T	1501	78	1134	36
	R	73	2	31	1
George Street East	L	16	1	20	0
	T	3	0	8	0
	R	8	12	7	1
Industrial Drive South	L	92	6	97	5
	T	1024	106	1598	29
	R	19	3	5	3
George Street West	L	69	3	55	1
	T	7	0	2	0
	R	134	5	79	2

As conducting 2020 traffic surveys is not representative due to the impact of COVID19, it has been agreed with DPIE and Newcastle City Council that an increase of 2% per annum be applied to the survey volumes to bring them in line with expected traffic movements in 2020. However, it is noted that the original TIA grew the 2016 surveyed traffic by 1.94% and 2.4% for the AM and PM respectively to estimate 2017 volumes. Thus, it is proposed that the estimated 2020 volumes be calculated by the following procedure:

- Apply growth of 1.94% and 2.4% per annum for the AM and PM surveyed volumes respectively to obtain 2017 volumes
- Apply growth of 2% per annum to AM and PM 2017 volumes to obtain 2020 volumes.

A summary of estimated 2017 and 2020 volumes is shown in Table 2-2.

Table 2-2 2017 and 2020 Estimated Traffic Movements Along Industrial Drive & George Street

Approach		2017 AECOM Growth				2020 2% Growth			
		AM		PM		AM		PM	
		LV	LV	HV	LV	HV	HV	LV	HV
Industrial Drive North	L	18	9	24	2	19	10	25	2
	T	1530	79	1161	37	1623	84	1232	39
	R	74	2	32	1	79	2	34	1
George Street East	L	16	1	20	0	17	1	22	0
	T	3	0	8	0	3	0	9	0
	R	8	12	27	1	9	13	28	1
Industrial Drive South	L	94	6	99	5	99	6	105	5
	T	1043	108	1636	30	1107	115	1737	32
	R	19	3	5	3	21	3	5	3
George Street West	L	70	3	56	1	75	3	60	1
	T	7	0	2	0	8	0	2	0
	R	137	5	81	2	145	5	86	2

2.2 Modification Traffic Impacts

2.2.1 Impact Traffic generation

The proposal to increase the existing hardstand laydown area from 12 hectares to 18.6 hectares corresponds to an increase of 55% of total area. In a 'worst-case' scenario, this could result in a 55% increase in heavy vehicle movements. Light vehicle movements remain unchanged, as total staff numbers would not increase.

The original Traffic Impact Assessment concluded that the proposed 12-hectare open air cargo storage area could generate up to 200 truck movements a day (in and out) and up to 30 light vehicle movements, based on a maximum of 30 site personnel. On a larger 18.6ha site, truck movements are assumed to increase by 55%, proportional to the increase in area. Light vehicle movements remain unchanged, as total staff numbers would not increase.

This corresponds to up to 110 additional truck movements per day as a result of the increase in storage land area, compared to the original 12-hectare site, of which would result in 8 additional truck movements during AM and PM peak hours (Table 2-3).

Table 2-3 Traffic Volume Changes Due to Mayfield Cargo Storage Facility (2016)

	Vehicle movements (IN + OUT) per day			Vehicle movements in AM/PM peak hour		
	12 Ha	18.6 Ha	Difference	12 Ha	18.6 Ha	Difference
Heavy Vehicle Movements	200	310	110	14	22	8
Light Vehicle Movements	60	60	0	16	16	0
Total Vehicle Movements	260	370	110	74	82	8

2.2.2 Impact Traffic flows intersection Industrial Drive/ George Street

All assumptions regarding hourly distribution and trip distribution of heavy and light vehicles generated by the development in the original Traffic Impact Assessment were assumed to remain consistent for the modification. Specifically, the assumptions made regarding vehicle generation and distribution are:

- 14 heavy vehicle movements will occur during peak hours
- 75% of heavy vehicle movements (11) will travel to/from Industrial Drive North
- 25% of heavy vehicle movements (3) will travel to/from Industrial Drive South
- 15 light vehicle movements will occur during peak hours
- 50% of light vehicle movements (8) will travel to/from Industrial Drive North
- 50% of light vehicle movements (8) will travel to/from Industrial Drive South

Based on the 'worst-case' scenario of a 55% increase in heavy vehicle movements and unchanged light vehicle movements. The total hourly traffic movements on intersection Industrial Drive/ George Street generated by the development in this scenario is shown in Table 2-4, with changes from the original TIA shown in brackets:

Table 2-4 'Worst-Case' Scenario Development Peak Hour Traffic Generation on intersection Industrial Drive/ George Street

Approach		AM		PM	
		LV	HV	LV	HV
Industrial Drive North	**L**	8	17 (+6)	-	17 (+6)
George Street East	**R**	-	5 (+2)	8	5 (+2)
Industrial Drive South	**R**	8	17 (+6)	-	17 (+6)
George Street West	**L**	-	5 (+2)	8	5 (+2)

Table 2-5 Traffic implications of project (12ha) and relative impact of site extension (18.6ha) for intersection of Industrial Drive and George Street

Year	2020		2030	
Period	**Traffic Volume (veh/h)[1]**	**% Growth**	**Traffic Volume (veh/h)[3]**	**% Growth**
AM peak flow without project	3,448	-	4,204	-
AM peak flow with project (12 ha)	3,492	1.3%	4,248	1.1%
AM peak flow with project (18.6 ha)	3,508	0.5%	4,264	0.4%
PM peak flow without project	3,432	-	4,183	-
PM peak flow with project (12 ha)	3,476	1.3%	4,227	1.1%
PM peak flow with project (18.6 ha)	3,492	0.5%	4,243	0.4%

The 55% increase in generated traffic leads to 8 additional traffic movements during peak hours (refer Table 2-3), corresponding to a maximum of 0.5% increase in traffic flows (Table 2-5) when compared to the original 12ha scenario. This is likely to have a negligible impact on the operation of the intersection of Industrial Drive and George Street.

2.2.3 Traffic Impact – Actual measured generated traffic by the development (12ha)

As result of the original TIA, a Traffic Monitoring and Review Plan (TMRP) has been implemented. One of the objectives of the TMRP is to monitor whether the actual traffic flows generated by the development are within the expected ranges of the predicted traffic flows.

The actual traffic flow generated by the development (12ha) is depicted in Figure 2-1. The peak flow was 350 truck movements per month, in May 2018. On average, daily truck flow does not exceed 10 vehicle movements and since the start of operations in 2017, not a single day generated more than 20 truck movements. This is well below the 200 truck movements per day, that was predicted as worst-case traffic flow generated by the development (12ha). It is understood that the site was fully operational during this period.

It should also be recognised that part of the expansion site (approximately 2.3ha) identified in Figure 2-2 was used temporarily (under schedule 1 of Three Ports SEPP) as a port facility in late 2019, which resulted in negligible variances to the overall vehicle movement per month.

Given the results of actual traffic data provided, even with the additional traffic movements which would be generated by the expansion area, it is likely that total traffic movements would remain considerably lower than predicted traffic movements identified in the original TIA.

[1] Traffic volumes are based on all traffic generated at the intersection of Industrial Drive and George Street

Figure 2-1 Actual measured generated truck movements by the development (12ha) (2017-2019), truck movements per month (source: traffic monitoring data Rex J Andrews)

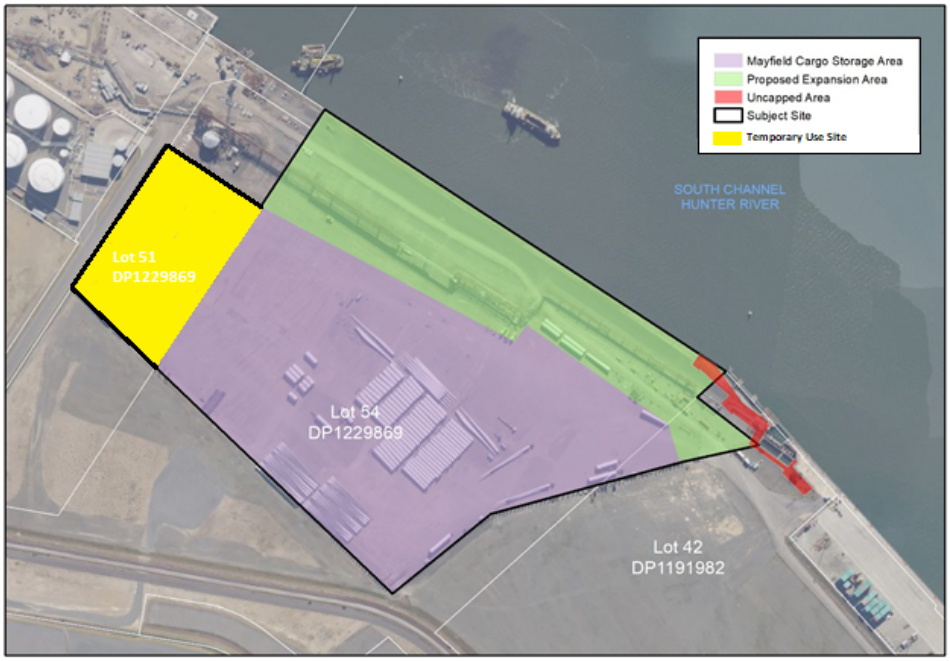


Figure 2-2: Temporary Use of part of expansion site

3 Traffic Modelling

3.1 Introduction

In addition to the analysis presented in section 2, DPIE requested to justify the initial assessment of 'negligible impact on the operation of the intersection of Industrial Drive and George Street' with an additional traffic microsimulation study. SIDRA Intersection 7.0 was used, a computer-based modelling package designed for calculating isolated intersection performance.

The intersection layout remained unchanged from the modelling undertaken in the original TIA, and is shown in Figure 3-1.

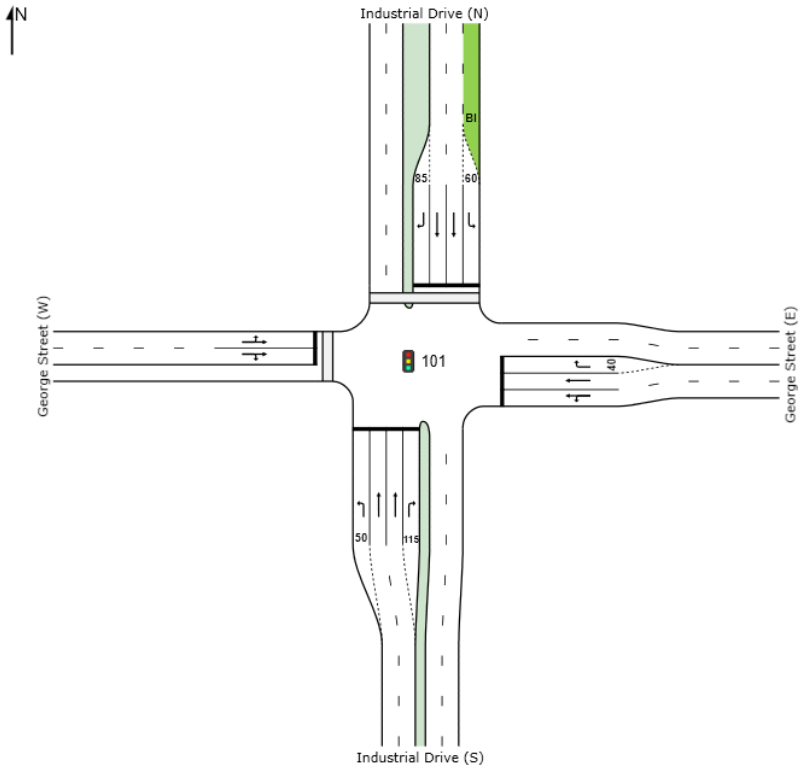


Figure 3-1 Model Layout

3.2 Traffic Modelling Results

3.2.1 2020 Existing Scenario

The SIDRA modelling results outlined in Table 3-1 indicate that with the 2020 calculated background traffic only, intersection would perform at LoS C and LoS B during the AM and PM peak hour periods respectively.

Table 3-1 2020 Existing Scenario Results

	Volume	Degree of Saturation	Average Delay (s)	Level of Service	95% Back of Queue (m)
2020 Existing AM					
Industrial Drive (S)	1351	0.578	15.7	LOS B	162
George Street (E)	43	0.14	45.1	LOS D	11.9
Industrial Drive (N)	1817	0.791	20	LOS B	260.3
George Street (W)	236	0.608	48.4	LOS D	57.7
Intersection	**3447**	**0.791**	**20.6**	**LOS C**	**260.3**
2020 Existing PM					
Industrial Drive (S)	1887	0.689	11.3	LOS B	219.4
George Street (E)	60	0.217	56	LOS E	12.1
Industrial Drive (N)	1333	0.48	10.5	LOS B	121.5
George Street (W)	151	0.542	57.8	LOS E	37
Intersection	**3431**	**0.689**	**13.8**	**LOS B**	**219.4**

3.2.2 2020 Existing + Development Worst Case Scenario

The SIDRA modelling results shown in Table 3-2 indicate that when additional traffic as a result of the 'worse case' scenario of the modification is included, the intersection would perform at LoS C and LoS B during the AM and PM peak hour periods respectively. Key intersection performance metrics are comparable with existing 2020 conditions. These results indicate that the project will have no material impact on the intersection's operation.

Table 3-2 2020 Existing + Development Worse Case Scenario Results

	Volume	Degree of Saturation	Average Delay (s)	Level of Service	95% Back of Queue (m)
2020 Existing + Development Worse Case AM					
Industrial Drive (S)	1364	0.578	16.2	LOS B	162
George Street (E)	65	0.263	47.7	LOS D	23.8
Industrial Drive (N)	1842	0.802	20	LOS B	254
George Street (W)	236	0.623	49.1	LOS D	58.3
Intersection	**3507**	**0.802**	**21**	**LOS C**	**254**
2020 Existing + Development Worse Case PM					
Industrial Drive (S)	1892	0.691	11.5	LOS B	218.2
George Street (E)	98	0.455	58.5	LOS E	29.1
Industrial Drive (N)	1350	0.482	10.5	LOS B	122.1
George Street (W)	151	0.582	58.6	LOS E	37.5
Intersection	**3491**	**0.691**	**14.5**	**LOS B**	**218.2**

3.2.3 2030 Existing + Development Worse Case Scenario

Similar to the original TIA, a model of the intersection 10 years after commencement of the modification was tested, based on the same annual growth rate of 2% identified previously. The result of the modelling is shown in Table 3-3.

With minor modifications to phase timings in the AM peak (whilst keeping total cycle time the same), the results show that the intersection would perform at LoS C and LoS B during the AM and PM peak hour periods respectively. Whilst the intersection experiences worsening performance metrics overall, as expected of the higher background volumes, the overall performance of the intersection is deemed acceptable.

Table 3-3 2030 Existing + Development Worse Case Scenario Results

	Volume	Degree of Saturation	Average Delay (s)	Level of Service	95% Back of Queue (m)
2030 Existing + Development Worse Case AM					
Industrial Drive (S)	1661	0.663	14.6	LOS B	202.2
George Street (E)	75	0.383	52.2	LOS D	28.2
Industrial Drive (N)	2242	0.914	32.9	LOS C	419.4
George Street (W)	288	0.911	63.3	LOS E	89
Intersection	**4266**	**0.914**	**28.2**	**LOS C**	**419.4**
2030 Existing + Development Worse Case PM					
Industrial Drive (S)	2306	0.85	14.4	LOS B	338.7
George Street (E)	110	0.538	59.4	LOS E	32.1
Industrial Drive (N)	1641	0.606	11.5	LOS B	166.6
George Street (W)	185	0.729	60.5	LOS E	48.2
Intersection	**4242**	**0.85**	**16.4**	**LOS B**	**338.7**

3.2.4 Conclusion

Table 3-4 summarises the level of service results from the SIDRA modelling.

Table 3-4 Level of Service Summary

Level of service intersection of Industrial Drive and George Street'	AM	PM
2020 current	C	B
2020 with project	C	B
2030 with project	C	B

Based on the modelling results, Aurecon concludes that proposed modification, which seeks to increase the hardstand laydown area from 12 to 18.6 ha, will have no material impact on the operational performance of the Industrial Drive and George Street intersection in both AM and PM peaks.

4 Conclusion

Conservatively, the modification has the potential to increase heavy vehicle volumes generated by the Mayfield Cargo Storage Facility by 55%. This represents an increase from 14 to 22 additional heavy vehicle trips during the AM and PM peaks. Light vehicle movements are expected to remain unchanged from the original TIA as staff numbers have not been changed as part of the modification.

Aurecon's conclusion is that the proposed development, increasing the hardstand laydown area from 12 to 18.6 ha, would have a negligible traffic impact. This conclusion is based on:

- The conclusion formed in the original TIA, that the initial project of the 12ha hardstand laydown area would have a negligible traffic impact.
- The Traffic Monitoring and Review Plan demonstrates that the actual daily truck movements generated by the original development (12ha) appears to be less than 10% of the predicted worst-case truck movements predicted in the TIA.
- The maximum predicted increase of traffic flow due to the proposed development of an additional 6.6ha hardstand laydown area to a total of 18.6ha, corresponds with maximum of 0.5% growth of total traffic at the main intersection from the strategic road network during peak flow when compared to the original 12ha scenario.
- Intersection modelling indicates that the modification will have no material impact on the current and future operation of the Industrial Drive and George Street intersection, and will perform similarly to existing conditions.

Therefore, the traffic implications of the proposed development are likely to be negligible and the conclusion from the original TIA is still valid. As a result, no further infrastructure upgrades or traffic calming measures will need to be undertaken as part of the modification.

The original TIA also concluded that the PON existing traffic management practices are considered suitable to continue managing operational traffic associated with the Project. Traffic management measures would be incorporated into an Operational Environmental Management Plan (OEMP) for the Project. This OEMP would include consideration of the requirements of the Mayfield Concept Plan (MCP) Traffic Management Plan[2] where applicable, including:

- Minimising heavy vehicle movements during peak times;
- Restricting heavy vehicle movements to approved routes outside residential areas;
- Preventing heavy vehicle movements on residential streets; and
- Require that the appropriate permits are obtained for the haulage of oversized or over mass loads and that the requirements of these permits (e.g. vehicle escorts) are fully implemented.

[2] MCP Traffic Management Plan (TMP) (AECOM, 2016)

Appendix A – SIDRA Movements

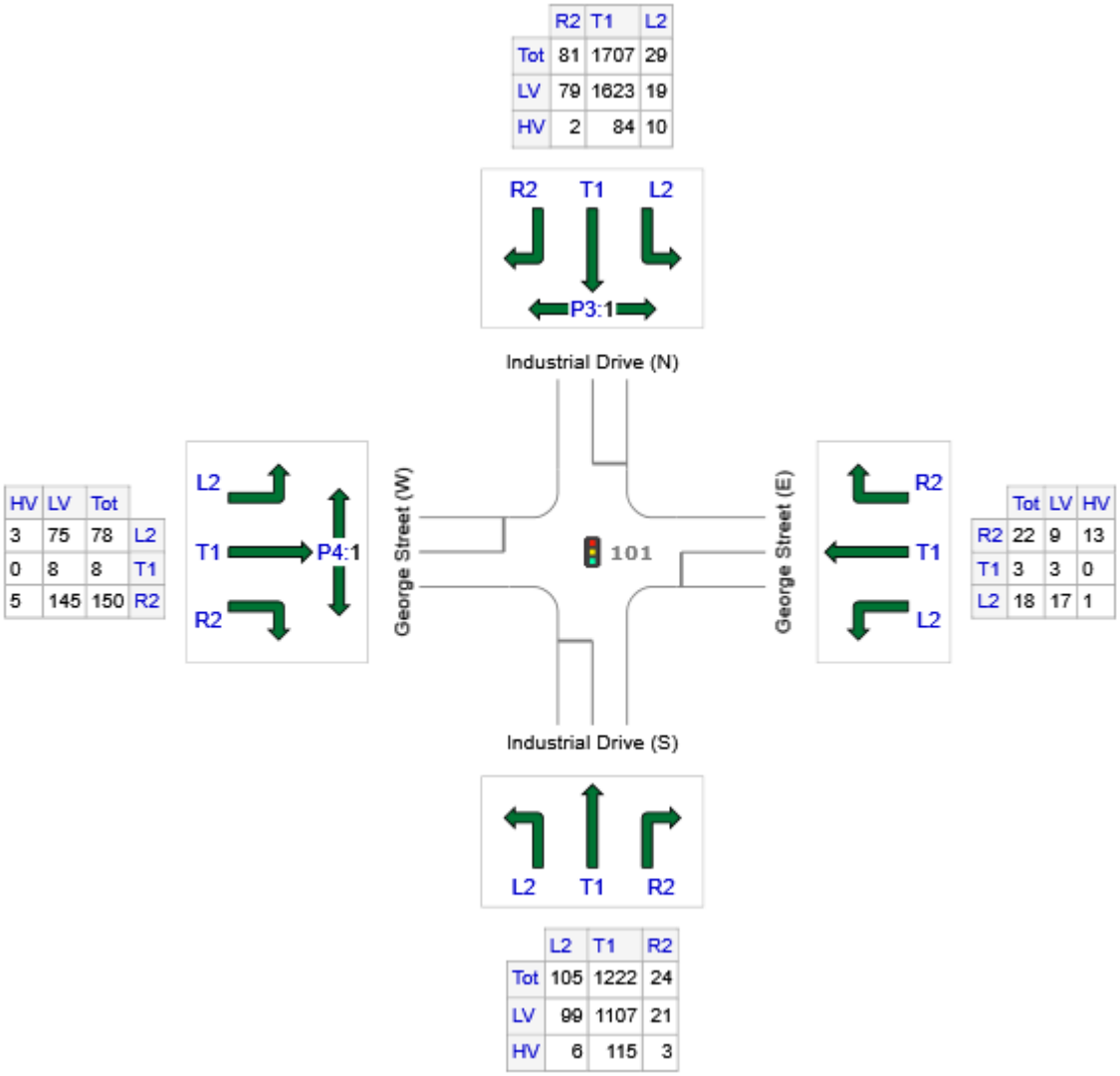
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex - 2020 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	1351	1227	124
E: George Street (E)	43	29	14
N: Industrial Drive (N)	1817	1721	96
W: George Street (W)	236	228	8
Total	3447	3205	242

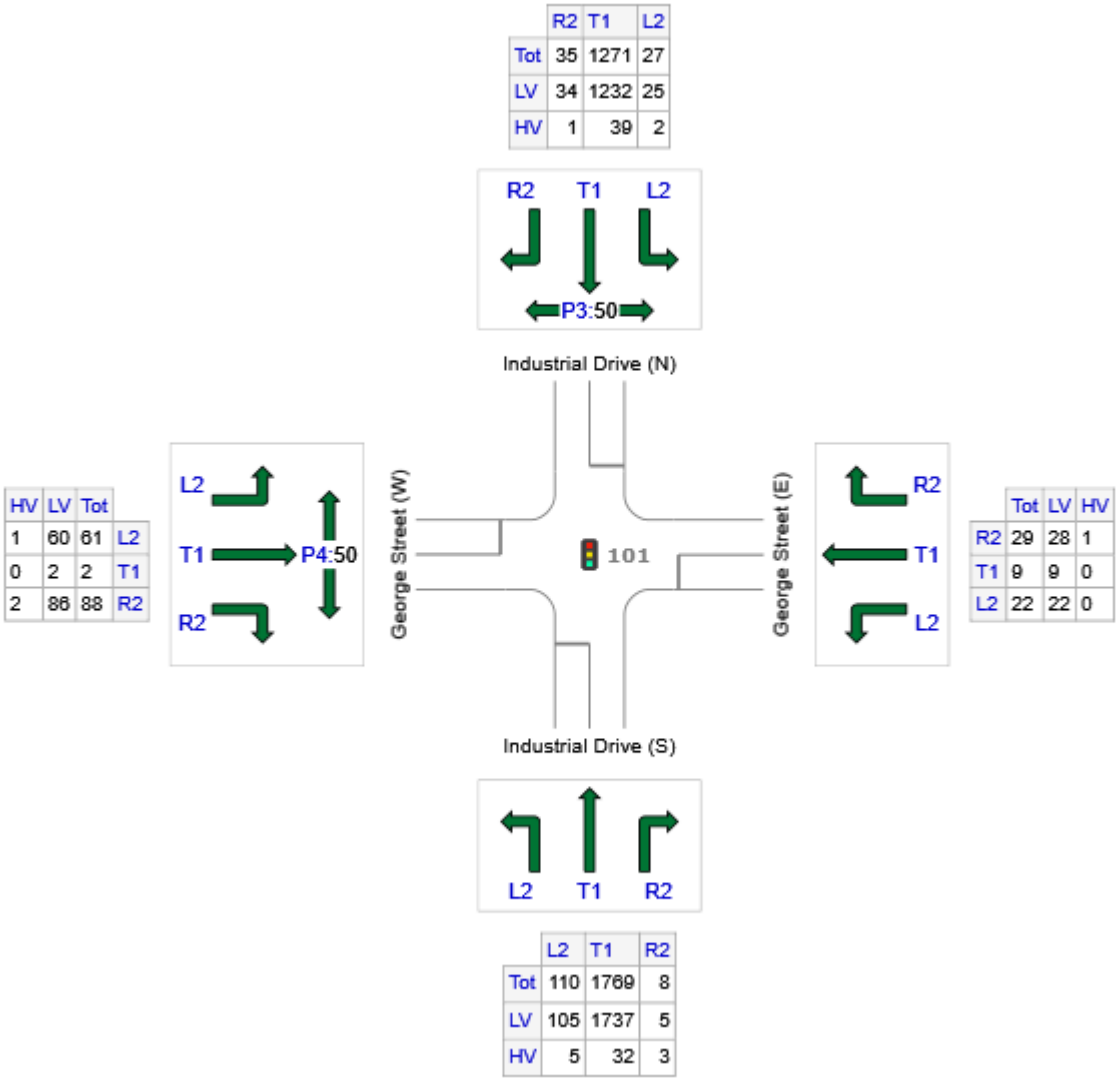
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex - 2020 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	1887	1847	40
E: George Street (E)	60	59	1
N: Industrial Drive (N)	1333	1291	42
W: George Street (W)	151	148	3
Total	3431	3345	86

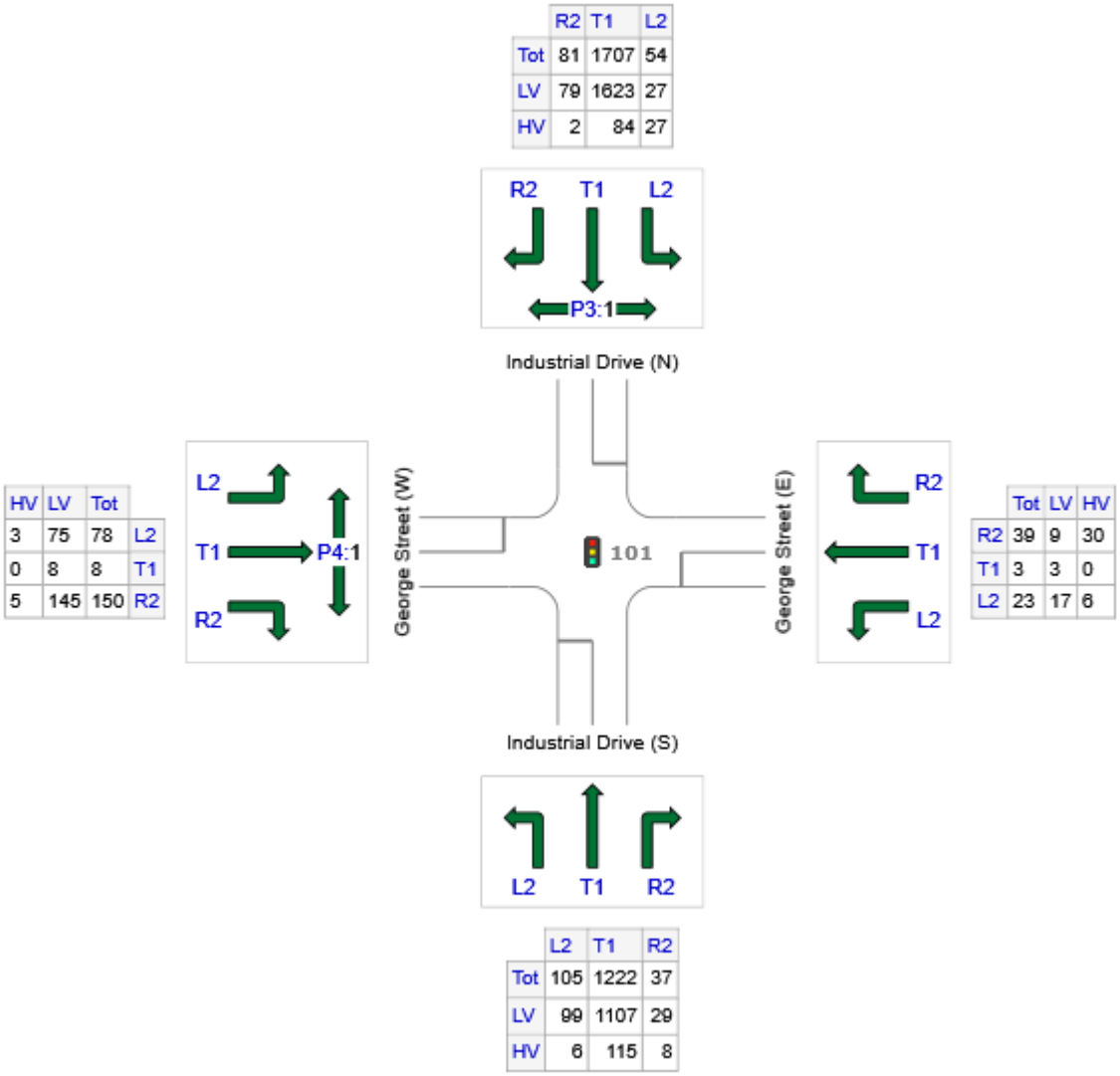
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex+D - 2020 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	1364	1235	129
E: George Street (E)	65	29	36
N: Industrial Drive (N)	1842	1729	113
W: George Street (W)	236	228	8
Total	3507	3221	286

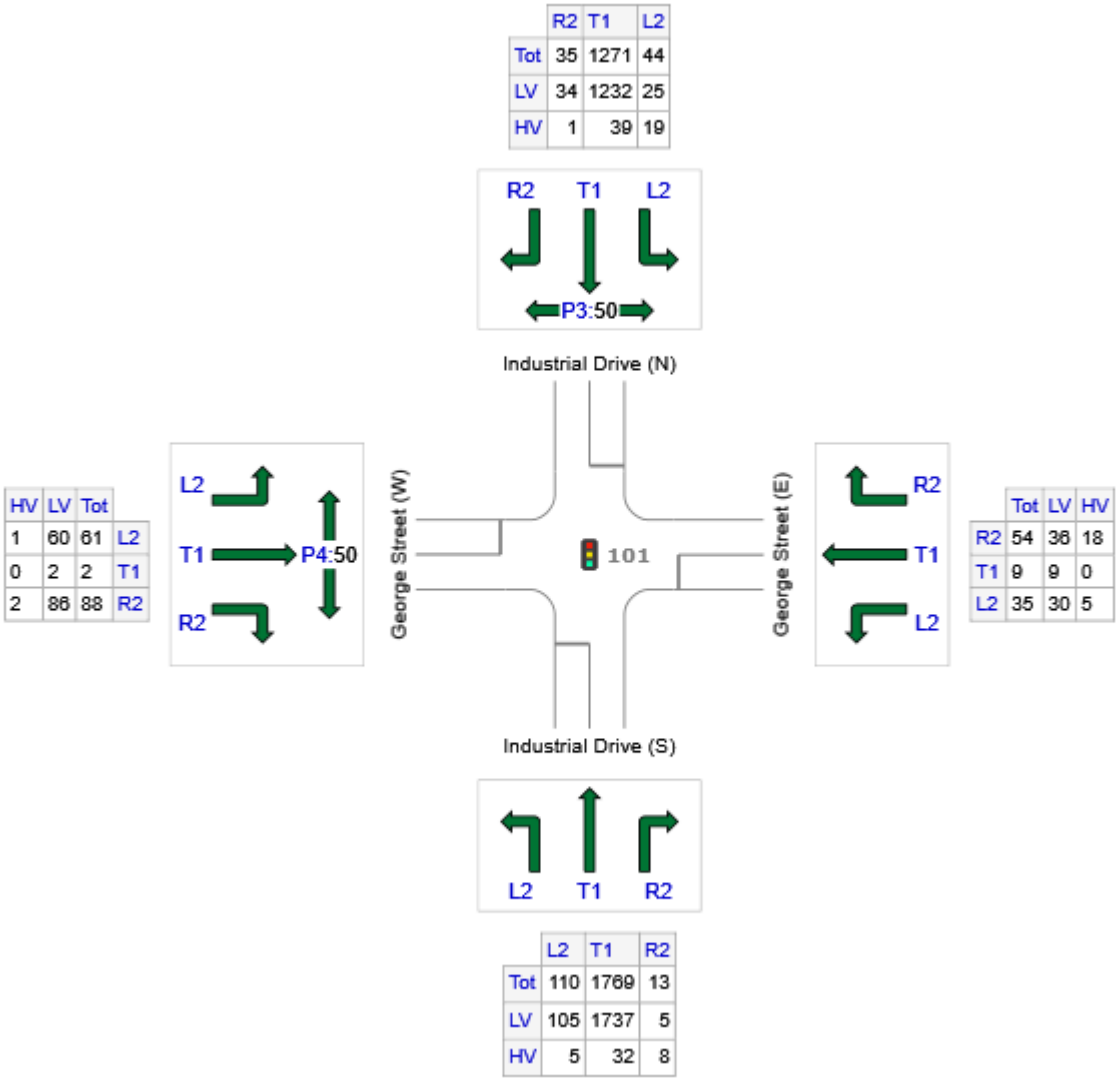
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex+D - 2020 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	1892	1847	45
E: George Street (E)	98	75	23
N: Industrial Drive (N)	1350	1291	59
W: George Street (W)	151	148	3
Total	3491	3361	130

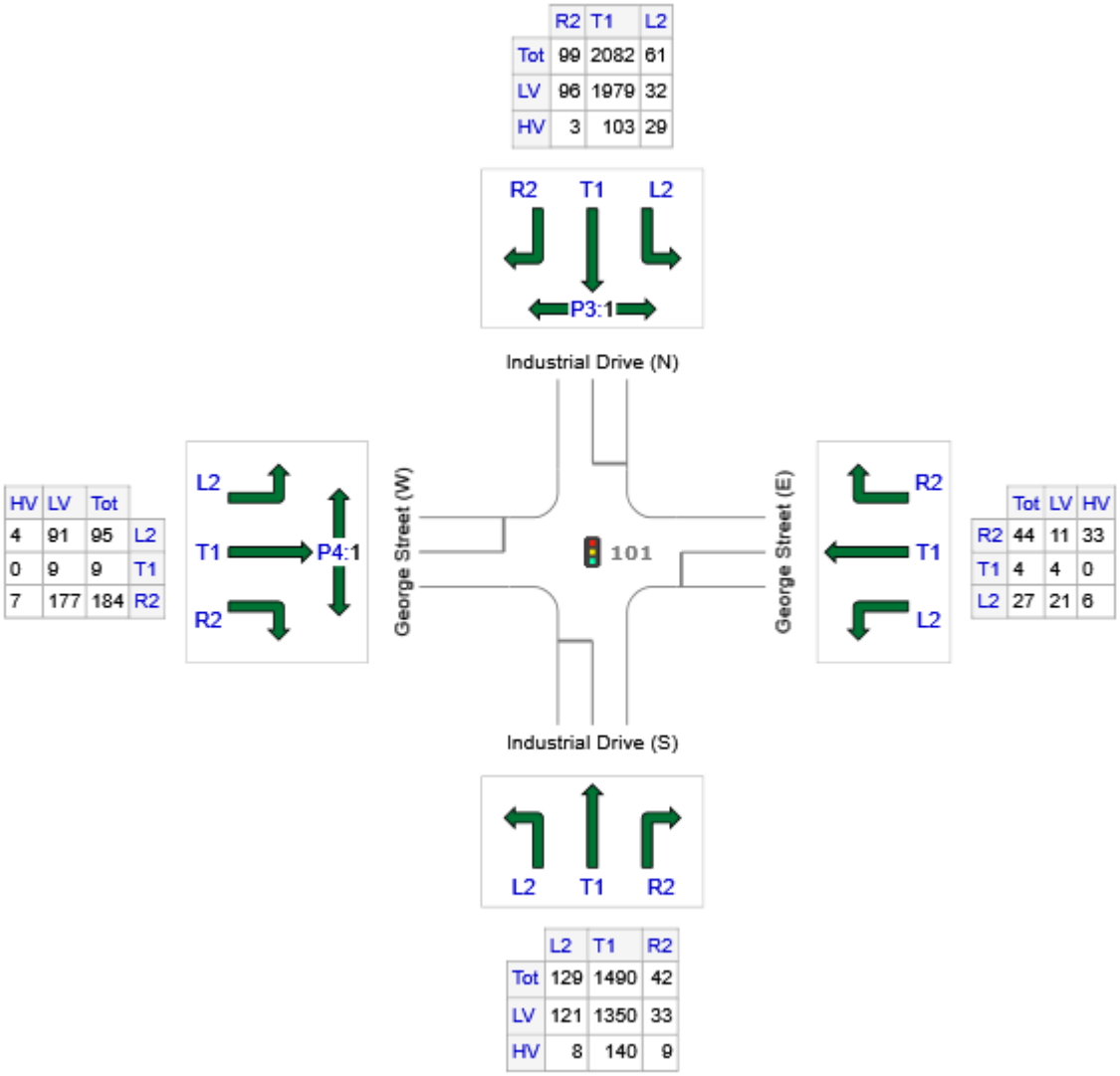
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex+D - 2030 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	1661	1504	157
E: George Street (E)	75	36	39
N: Industrial Drive (N)	2242	2107	135
W: George Street (W)	288	277	11
Total	4266	3924	342

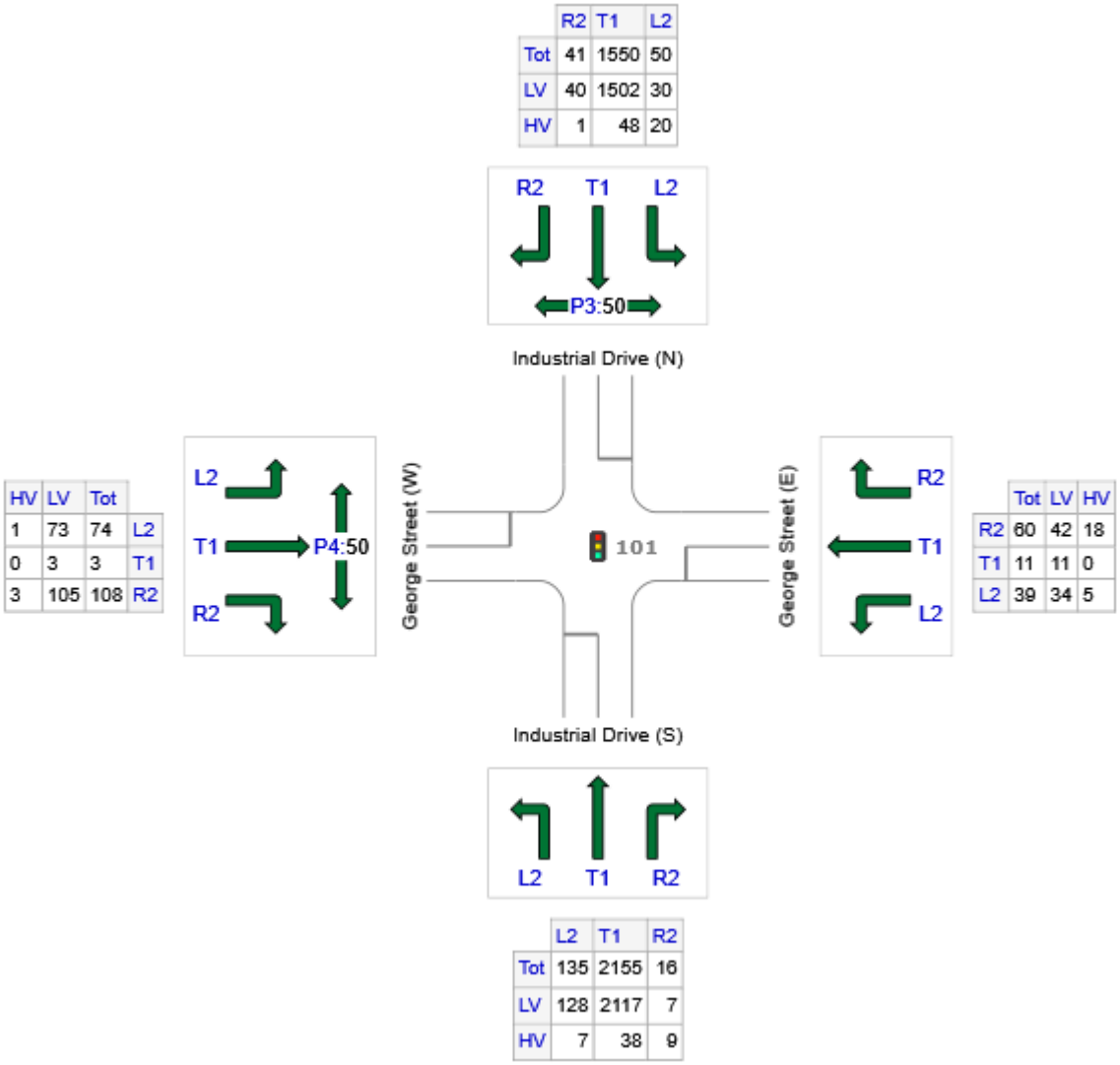
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Industrial Drive with George Street - Ex+D - 2030 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated

Volume Display Method: Separate



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Industrial Drive (S)	2306	2252	54
E: George Street (E)	110	87	23
N: Industrial Drive (N)	1641	1572	69
W: George Street (W)	185	181	4
Total	4242	4092	150

Appendix B – SIDRA Results

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex - 2020 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 114 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	105	5.7	0.099	16.8	LOS B	2.4	18.0	0.45	0.70	49.8
2	T1	1222	9.4	0.578	14.8	LOS B	21.4	162.0	0.65	0.59	54.6
3	R2	24	12.5	0.160	60.5	LOS E	1.3	10.0	0.96	0.71	30.8
Approach		1351	9.2	0.578	15.7	LOS B	21.4	162.0	0.64	0.60	53.5
East: George Street (E)											
4	L2	18	5.6	0.034	34.7	LOS C	0.7	5.1	0.74	0.67	33.7
5	T1	3	0.0	0.009	42.2	LOS D	0.1	1.0	0.85	0.55	31.8
6	R2	22	59.1	0.140	54.1	LOS D	1.1	11.9	0.92	0.71	28.6
Approach		43	32.6	0.140	45.1	LOS D	1.1	11.9	0.84	0.68	30.8
North: Industrial Drive (N)											
7	L2	29	34.5	0.033	17.5	LOS B	0.6	5.9	0.43	0.69	48.1
8	T1	1707	4.9	0.791	18.0	LOS B	35.7	260.3	0.80	0.74	57.5
9	R2	81	2.5	0.506	63.1	LOS E	4.5	32.3	1.00	0.77	32.4
Approach		1817	5.3	0.791	20.0	LOS B	35.7	260.3	0.80	0.74	55.4
West: George Street (W)											
10	L2	78	3.8	0.185	39.6	LOS D	3.7	26.7	0.81	0.73	32.3
11	T1	8	0.0	0.185	35.0	LOS D	3.7	26.7	0.81	0.73	32.6
12	R2	150	3.3	0.608	53.7	LOS D	8.0	57.7	0.98	0.81	28.8
Approach		236	3.4	0.608	48.4	LOS D	8.0	57.7	0.92	0.78	30.0
All Vehicles		3447	7.0	0.791	20.6	LOS C	35.7	260.3	0.75	0.69	51.2

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	1	51.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	12.3	LOS B	0.0	0.0	0.46	0.46
All Pedestrians		2	31.7	LOS D			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex - 2020 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	110	4.5	0.088	11.9	LOS B	2.1	15.0	0.34	0.66	48.9
2	T1	1769	1.8	0.689	11.1	LOS B	30.9	219.4	0.62	0.57	50.8
3	R2	8	37.5	0.073	64.6	LOS E	0.5	4.2	0.96	0.67	28.5
Approach		1887	2.1	0.689	11.3	LOS B	30.9	219.4	0.60	0.58	50.5
East: George Street (E)											
4	L2	22	0.0	0.057	46.8	LOS D	1.0	7.3	0.83	0.70	33.4
5	T1	9	0.0	0.043	52.7	LOS D	0.5	3.4	0.92	0.63	32.3
6	R2	29	3.4	0.217	64.0	LOS E	1.7	12.1	0.97	0.72	29.1
Approach		60	1.7	0.217	56.0	LOS E	1.7	12.1	0.91	0.70	31.0
North: Industrial Drive (N)											
7	L2	27	7.4	0.022	11.6	LOS B	0.5	3.6	0.32	0.63	49.0
8	T1	1271	3.1	0.480	8.9	LOS A	16.9	121.5	0.50	0.45	52.4
9	R2	35	2.9	0.259	65.1	LOS E	2.0	14.6	0.98	0.73	28.6
Approach		1333	3.2	0.480	10.5	LOS B	16.9	121.5	0.50	0.46	51.2
West: George Street (W)											
10	L2	61	1.6	0.175	49.1	LOS D	3.1	22.0	0.87	0.75	32.7
11	T1	2	0.0	0.175	43.6	LOS D	3.1	22.0	0.87	0.75	33.3
12	R2	88	2.3	0.542	64.1	LOS E	5.2	37.0	1.00	0.78	29.0
Approach		151	2.0	0.542	57.8	LOS E	5.2	37.0	0.94	0.77	30.4
All Vehicles		3431	2.5	0.689	13.8	LOS B	30.9	219.4	0.58	0.54	48.8

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	54.8	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	8.0	LOS A	0.1	0.1	0.36	0.36
All Pedestrians		105	31.4	LOS D			0.66	0.66

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex+D - 2020 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 114 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	105	5.7	0.099	16.8	LOS B	2.4	18.0	0.45	0.70	49.8
2	T1	1222	9.4	0.578	14.8	LOS B	21.4	162.0	0.65	0.59	54.6
3	R2	37	21.6	0.262	61.6	LOS E	2.0	16.7	0.97	0.74	29.9
Approach		1364	9.5	0.578	16.2	LOS B	21.4	162.0	0.65	0.60	53.0
East: George Street (E)											
4	L2	23	26.1	0.049	35.2	LOS D	0.9	7.7	0.74	0.68	33.4
5	T1	3	0.0	0.009	42.2	LOS D	0.1	1.0	0.85	0.55	31.8
6	R2	39	76.9	0.263	55.5	LOS E	2.1	23.8	0.94	0.74	28.3
Approach		65	55.4	0.263	47.7	LOS D	2.1	23.8	0.86	0.71	30.0
North: Industrial Drive (N)											
7	L2	54	50.0	0.066	18.1	LOS B	1.2	12.4	0.44	0.70	45.2
8	T1	1707	4.9	0.802	18.0	LOS B	34.8	254.0	0.80	0.74	57.5
9	R2	81	2.5	0.506	63.1	LOS E	4.5	32.3	1.00	0.77	32.4
Approach		1842	6.1	0.802	20.0	LOS B	34.8	254.0	0.80	0.74	55.2
West: George Street (W)											
10	L2	78	3.8	0.185	39.6	LOS D	3.7	26.7	0.81	0.73	32.3
11	T1	8	0.0	0.185	35.0	LOS D	3.7	26.7	0.81	0.73	32.6
12	R2	150	3.3	0.623	54.8	LOS D	8.1	58.3	0.98	0.82	28.6
Approach		236	3.4	0.623	49.1	LOS D	8.1	58.3	0.92	0.79	29.8
All Vehicles		3507	8.2	0.802	21.0	LOS C	34.8	254.0	0.75	0.69	50.7

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	1	51.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	12.3	LOS B	0.0	0.0	0.46	0.46
All Pedestrians		2	31.7	LOS D			0.71	0.71

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex+D - 2020 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	110	4.5	0.088	11.9	LOS B	2.1	15.0	0.34	0.66	48.9
2	T1	1769	1.8	0.691	11.0	LOS B	30.7	218.2	0.62	0.57	50.8
3	R2	13	61.5	0.135	66.0	LOS E	0.8	8.1	0.96	0.69	28.0
Approach		1892	2.4	0.691	11.5	LOS B	30.7	218.2	0.60	0.58	50.4
East: George Street (E)											
4	L2	35	14.3	0.101	47.7	LOS D	1.7	13.2	0.84	0.72	33.0
5	T1	9	0.0	0.043	52.7	LOS D	0.5	3.4	0.92	0.63	32.3
6	R2	54	33.3	0.455	66.5	LOS E	3.2	29.1	0.99	0.76	28.2
Approach		98	23.5	0.455	58.5	LOS E	3.2	29.1	0.93	0.73	30.1
North: Industrial Drive (N)											
7	L2	44	43.2	0.045	12.2	LOS B	0.8	7.7	0.33	0.64	47.7
8	T1	1271	3.1	0.482	8.9	LOS A	17.0	122.1	0.50	0.45	52.4
9	R2	35	2.9	0.259	65.1	LOS E	2.0	14.6	0.98	0.73	28.6
Approach		1350	4.4	0.482	10.5	LOS B	17.0	122.1	0.50	0.46	51.1
West: George Street (W)											
10	L2	61	1.6	0.175	49.1	LOS D	3.1	22.0	0.87	0.75	32.7
11	T1	2	0.0	0.175	43.6	LOS D	3.1	22.0	0.87	0.75	33.3
12	R2	88	2.3	0.582	65.5	LOS E	5.3	37.5	1.00	0.79	28.7
Approach		151	2.0	0.582	58.6	LOS E	5.3	37.5	0.95	0.77	30.2
All Vehicles		3491	3.7	0.691	14.5	LOS B	30.7	218.2	0.59	0.55	48.4

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	54.8	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	8.0	LOS A	0.1	0.1	0.36	0.36
All Pedestrians		105	31.4	LOS D			0.66	0.66

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex+D - 2030 AM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 114 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	129	6.2	0.113	14.8	LOS B	2.7	20.0	0.41	0.70	51.1
2	T1	1490	9.4	0.663	13.2	LOS B	26.7	202.2	0.66	0.60	55.9
3	R2	42	21.4	0.425	66.4	LOS E	2.4	20.1	1.00	0.74	28.8
Approach		1661	9.5	0.663	14.6	LOS B	26.7	202.2	0.65	0.61	54.3
East: George Street (E)											
4	L2	27	22.2	0.066	39.4	LOS D	1.1	9.5	0.79	0.70	32.2
5	T1	4	0.0	0.015	45.3	LOS D	0.2	1.3	0.88	0.57	31.0
6	R2	44	75.0	0.383	60.7	LOS E	2.5	28.2	0.98	0.75	27.2
Approach		75	52.0	0.383	52.2	LOS D	2.5	28.2	0.90	0.72	29.0
North: Industrial Drive (N)											
7	L2	61	47.5	0.069	16.0	LOS B	1.3	12.3	0.40	0.70	46.8
8	T1	2082	4.9	0.914	31.3	LOS C	57.5	419.4	0.87	0.92	47.6
9	R2	99	3.0	0.887	76.2	LOS E	6.3	45.6	1.00	0.93	29.0
Approach		2242	6.0	0.914	32.9	LOS C	57.5	419.4	0.87	0.91	46.2
West: George Street (W)											
10	L2	95	4.2	0.258	43.7	LOS D	4.8	34.6	0.86	0.76	31.2
11	T1	9	0.0	0.258	39.1	LOS D	4.8	34.6	0.86	0.76	31.4
12	R2	184	3.8	0.911	74.5	LOS E	12.3	89.0	1.00	1.06	24.8
Approach		288	3.8	0.911	63.3	LOS E	12.3	89.0	0.95	0.95	26.8
All Vehicles		4266	8.0	0.914	28.2	LOS C	57.5	419.4	0.79	0.80	46.1

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	1	51.2	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	1	10.1	LOS B	0.0	0.0	0.42	0.42
All Pedestrians		2	30.6	LOS D			0.68	0.68

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Industrial Drive with George Street - Ex+D - 2030 PM]

Industrial Drive with George Street
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Industrial Drive (S)											
1	L2	135	5.2	0.109	12.0	LOS B	2.6	18.8	0.35	0.66	48.8
2	T1	2155	1.8	0.850	14.1	LOS B	47.7	338.7	0.76	0.72	48.7
3	R2	16	56.3	0.162	66.1	LOS E	0.9	9.7	0.97	0.70	28.0
Approach		2306	2.3	0.850	14.4	LOS B	47.7	338.7	0.74	0.71	48.5
East: George Street (E)											
4	L2	39	12.8	0.111	47.8	LOS D	1.9	14.6	0.85	0.73	33.0
5	T1	11	0.0	0.053	52.8	LOS D	0.6	4.1	0.92	0.63	32.2
6	R2	60	30.0	0.538	68.1	LOS E	3.7	32.1	1.00	0.77	27.9
Approach		110	20.9	0.538	59.4	LOS E	3.7	32.1	0.94	0.74	29.9
North: Industrial Drive (N)											
7	L2	50	40.0	0.050	12.2	LOS B	0.9	8.6	0.33	0.64	47.8
8	T1	1550	3.1	0.606	10.0	LOS B	23.2	166.6	0.56	0.51	51.5
9	R2	41	2.4	0.302	65.4	LOS E	2.4	17.2	0.98	0.74	28.5
Approach		1641	4.2	0.606	11.5	LOS B	23.2	166.6	0.56	0.52	50.4
West: George Street (W)											
10	L2	74	1.4	0.216	49.6	LOS D	3.8	27.1	0.88	0.75	32.6
11	T1	3	0.0	0.216	44.0	LOS D	3.8	27.1	0.88	0.75	33.2
12	R2	108	2.8	0.729	68.4	LOS E	6.7	48.2	1.00	0.86	28.0
Approach		185	2.2	0.729	60.5	LOS E	6.7	48.2	0.95	0.82	29.8
All Vehicles		4242	3.5	0.850	16.4	LOS B	47.7	338.7	0.68	0.64	47.1

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	53	54.8	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	8.0	LOS A	0.1	0.1	0.36	0.36
All Pedestrians		105	31.4	LOS D			0.66	0.66

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.