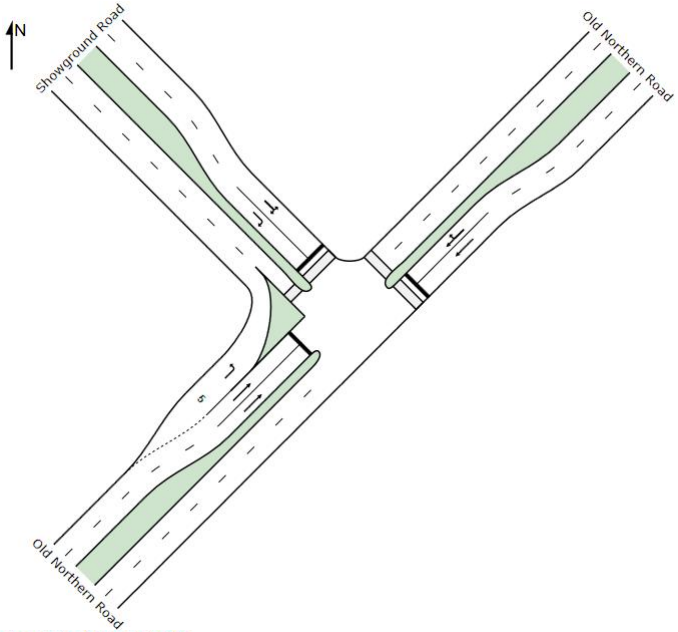
Showground Road/Old Northern Road – “Do Nothing”



PHASING SUMMARY

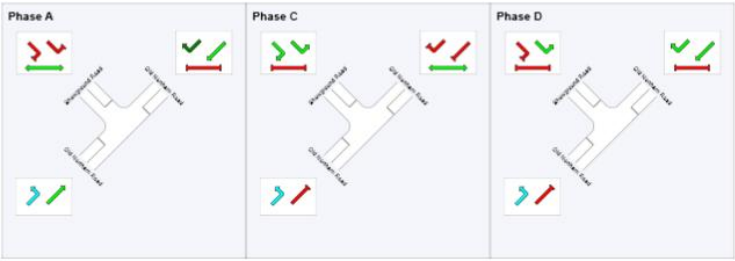
Site: AM Peak - 2016 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	19	27	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	25	33	12
Phase Split	36 %	47 %	17 %



LANE SUMMARY

Site: AM Peak - 2016 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	45	2.0	861	0.053	30[5]	11.9	LOS A	0.9	6.2	Full	500	0.0	0.0
Lane 2	79	0.0	446	0.177	100	22.4	LOS B	1.7	11.9	Full	500	0.0	0.0
Approach	124	0.7		0.177		18.6	LOS B	1.7	11.9				
NorthWest: Showground Road													
Lane 1	484	5.2	791	0.612	100	25.0	LOS B	13.0	94.7	Full	500	0.0	0.0
Lane 2	435	1.0	711	0.612	100	26.8	LOS B	12.1	85.7	Full	500	0.0	0.0
Approach	919	3.2		0.612		25.8	LOS B	13.0	94.7				
SouthWest: Old Northern Road													
Lane 1	714	3.0	1979	0.361	100	7.6	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	110	2.0	520	0.211	100	21.6	LOS B	2.9	20.9	Full	500	0.0	0.0
Lane 3	108	2.0	514	0.211	100	21.6	LOS B	2.9	20.7	Full	500	0.0	0.0
Approach	932	2.8		0.361		10.9	LOS A	2.9	20.9				
Intersection	1975	2.8		0.612		18.3	LOS B	13.0	94.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

5 Lane underutilisation determined by program

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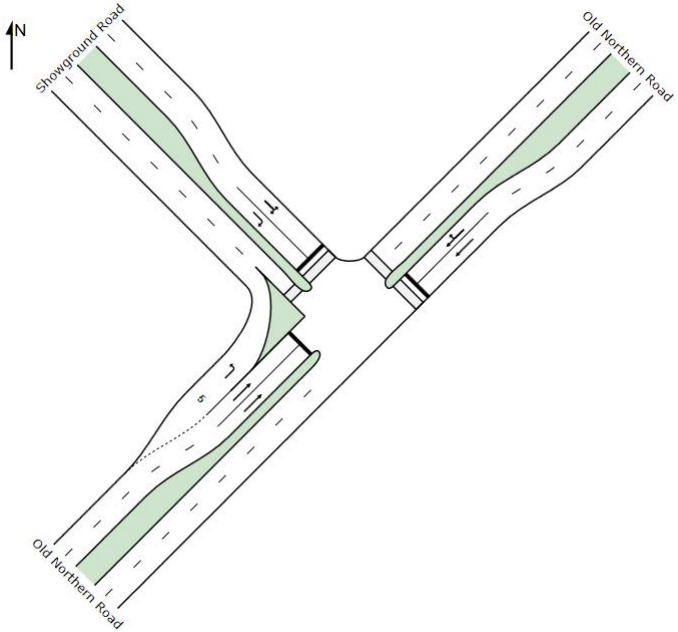
SIDRA INTERSECTION 6

Showground Road/Old Northern Road – "Do Nothing"



PHASING SUMMARY

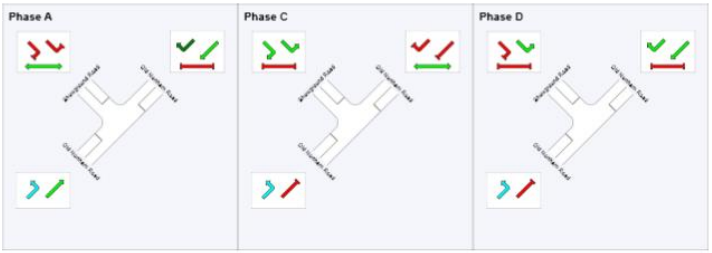
Site: PM Peak - 2016 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	19	27	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	25	33	12
Phase Split	36 %	47 %	17 %



LANE SUMMARY

Site: PM Peak - 2016 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	134	2.0	861	0.155	32[5]	12.5	LOS A	2.7	19.4	Full	500	0.0	0.0
Lane 2	233	0.0	487	0.478	100	23.7	LOS B	5.6	39.1	Full	500	0.0	0.0
Approach	366	0.7		0.478		19.6	LOS B	5.6	39.1				
NorthWest: Showground Road													
Lane 1	510	2.1	794	0.642	100	25.3	LOS B	13.9	99.1	Full	500	0.0	0.0
Lane 2	457	1.0	711	0.642	100	27.1	LOS B	13.0	91.4	Full	500	0.0	0.0
Approach	967	1.6		0.642		26.1	LOS B	13.9	99.1				
SouthWest: Old Northern Road													
Lane 1	869	0.0	2021	0.430	100	7.6	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	77	0.0	527	0.147	100	21.1	LOS B	2.0	14.2	Full	500	0.0	0.0
Lane 3	76	0.0	521	0.147	100	21.1	LOS B	2.0	14.1	Full	500	0.0	0.0
Approach	1023	0.0		0.430		9.7	LOS A	2.0	14.2				
Intersection	2357	0.8		0.642		18.0	LOS B	13.9	99.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

5 Lane underutilisation determined by program

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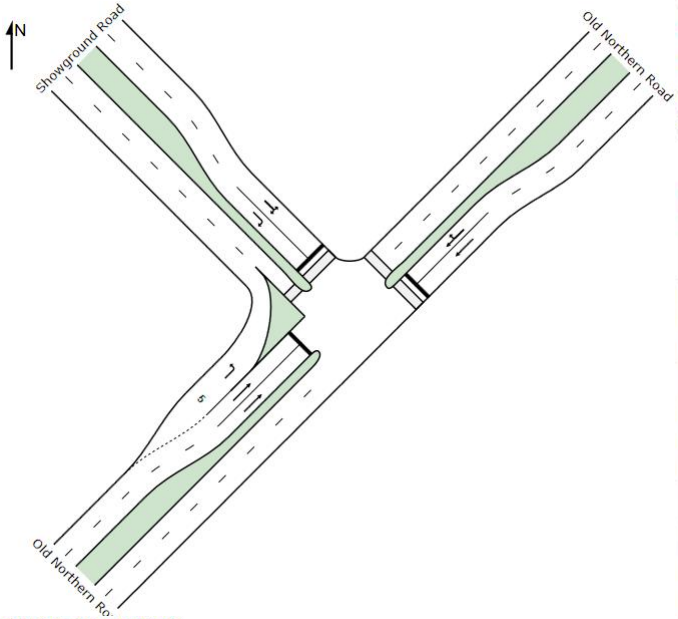
SIDRA INTERSECTION 6

Showground Road/Old Northern Road – "Do Nothing"



PHASING SUMMARY

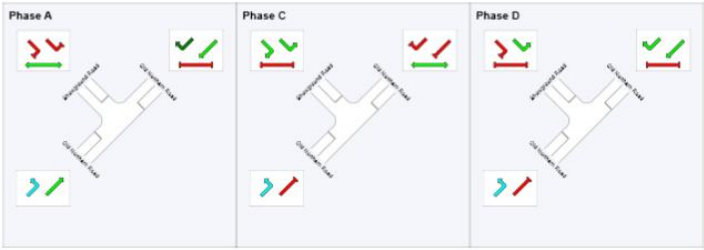
Site: Saturday Peak - 2016 Base

Old Northern Road / Showground Road SAT Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	19	27	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	25	33	12
Phase Split	36 %	47 %	17 %



LANE SUMMARY

Site: Saturday Peak - 2016 Base

Old Northern Road / Showground Road SAT Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	186	2.0	861	0.216	47[5]	12.9	LOS A	3.9	27.9	Full	500	0.0	0.0
Lane 2	227	2.0	498	0.456	100	23.7	LOS B	5.5	38.9	Full	500	0.0	0.0
Approach	414	2.0		0.456		18.8	LOS B	5.5	38.9				
NorthWest: Showground Road													
Lane 1	624	1.0	785	0.795	100	30.8	LOS C	20.6	145.4	Full	500	0.0	0.0
Lane 2	566	1.0	711	0.795	100	32.3	LOS C	19.1	134.6	Full	500	0.0	0.0
Approach	1189	1.0		0.795		31.5	LOS C	20.6	145.4				
SouthWest: Old Northern Road													
Lane 1	868	1.0	2007	0.433	100	7.6	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	65	1.0	523	0.124	100	20.9	LOS B	1.7	12.0	Full	500	0.0	0.0
Lane 3	64	1.0	518	0.124	100	21.0	LOS B	1.7	11.9	Full	500	0.0	0.0
Approach	998	1.0		0.433		9.4	LOS A	1.7	12.0				
Intersection	2601	1.2		0.795		21.0	LOS B	20.6	145.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

5 Lane underutilisation determined by program

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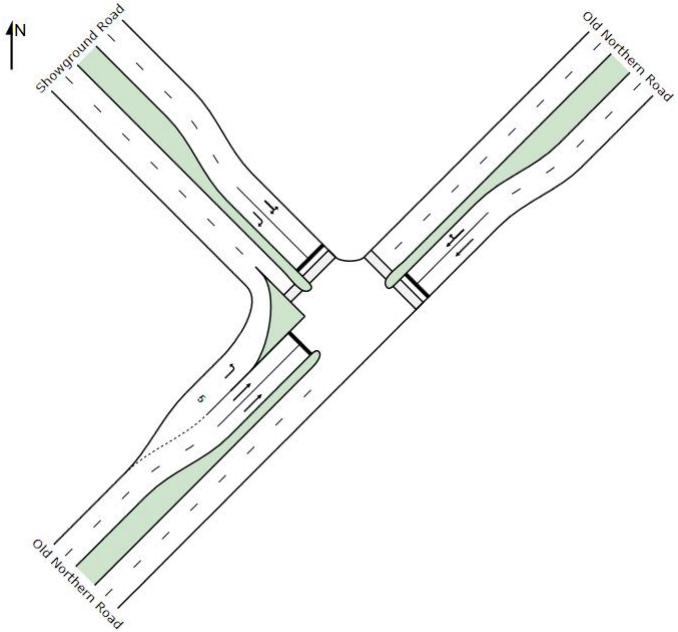
SIDRA INTERSECTION 6

Showground Road/Old Northern Road – "Do Nothing"



PHASING SUMMARY

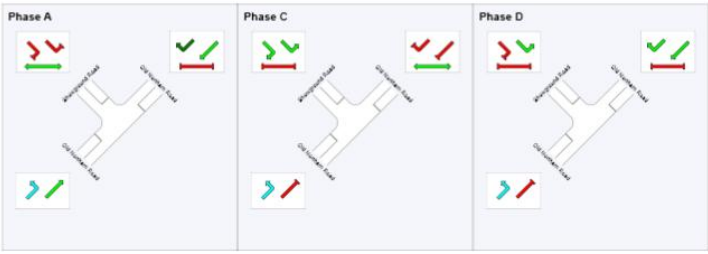
Site: AM Peak - 2026 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	20	26	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	26	32	12
Phase Split	37 %	46 %	17 %



LANE SUMMARY

Site: AM Peak - 2026 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	114	2.0	889	0.128	27[5]	11.7	LOS A	2.2	15.9	Full	500	0.0	0.0
Lane 2	153	0.0	326	0.468	100	24.5	LOS B	3.4	23.7	Full	500	0.0	0.0
Approach	266	0.9		0.468		19.0	LOS B	3.4	23.7				
NorthWest: Showground Road													
Lane 1	537	5.3	770	0.697	100	26.1	LOS B	15.3	111.8	Full	500	0.0	0.0
Lane 2	478	1.0	685	0.697	100	28.8	LOS C	14.3	100.9	Full	500	0.0	0.0
Approach	1015	3.3		0.697		27.4	LOS B	15.3	111.8				
SouthWest: Old Northern Road													
Lane 1	956	3.0	1979	0.483	100	7.6	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	65	2.0	94[1]	0.692	100	25.1	LOS B	1.9	13.5	Full	500	0.0	0.0
Lane 3	375	2.0	541	0.692	100	25.3	LOS B	11.9	85.1	Full	500	0.0	0.0
Approach	1396	2.7		0.692		13.2	LOS A	11.9	85.1				
Intersection	2677	2.7		0.697		19.2	LOS B	15.3	111.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program

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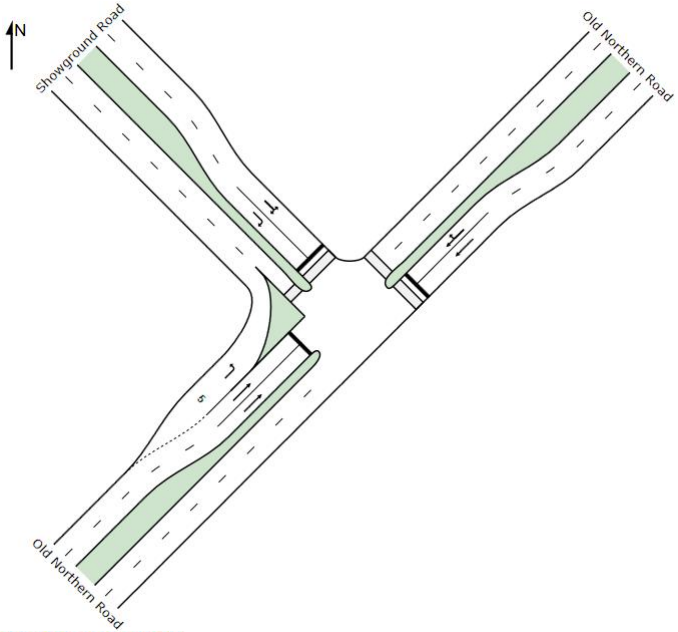
SIDRA INTERSECTION 6

Showground Road/Old Northern Road – “Do Nothing”



PHASING SUMMARY

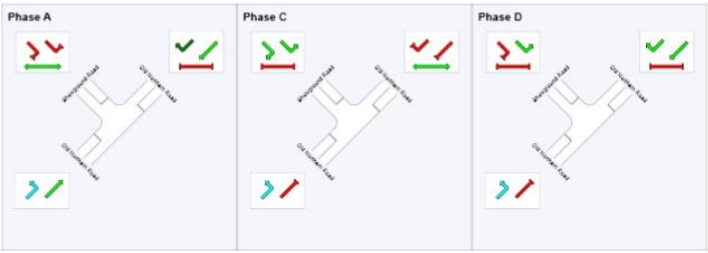
Site: PM Peak - 2026 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	19	27	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	25	33	12
Phase Split	36 %	47 %	17 %



LANE SUMMARY

Site: PM Peak - 2026 Base

Old Northern Road / Showground Road AM Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	78	2.0	861	0.090	20[5]	12.1	LOS A	1.5	10.9	Full	500	0.0	0.0
Lane 2	193	0.0	429	0.449	100	23.7	LOS B	4.5	31.5	Full	500	0.0	0.0
Approach	271	0.6		0.449		20.3	LOS B	4.5	31.5				
NorthWest: Showground Road													
Lane 1	562	2.1	800	0.702	100	26.1	LOS B	16.0	113.9	Full	500	0.0	0.0
Lane 2	499	1.0	711	0.702	100	28.2	LOS B	14.8	104.7	Full	500	0.0	0.0
Approach	1061	1.6		0.702		27.1	LOS B	16.0	113.9				
SouthWest: Old Northern Road													
Lane 1	1264	0.0	2021	0.625	100	7.7	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	56	0.0	99[1]	0.564	100	22.0	LOS B	1.5	10.5	Full	500	0.0	0.0
Lane 3	294	0.0	521	0.564	100	24.2	LOS B	8.9	62.0	Full	500	0.0	0.0
Approach	1614	0.0		0.625		11.2	LOS A	8.9	62.0				
Intersection	2945	0.6		0.702		17.8	LOS B	16.0	113.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program

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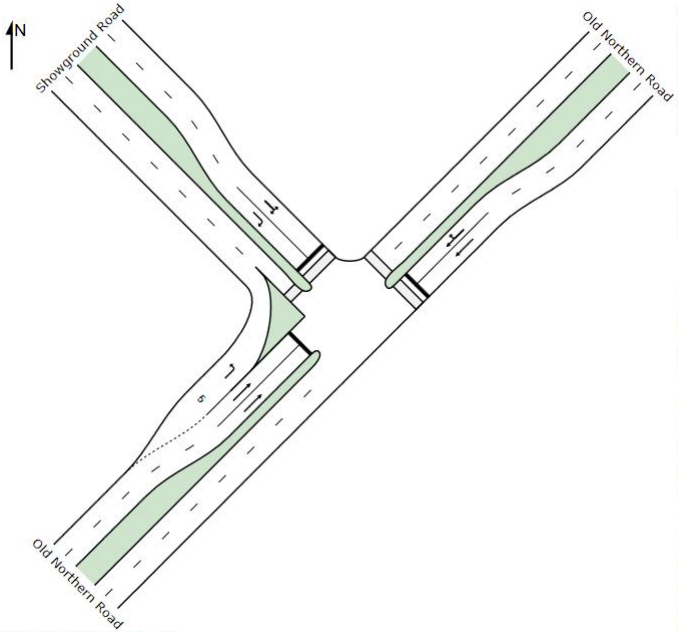
SIDRA INTERSECTION 6

Showground Road/Old Northern Road – “Do Nothing”



PHASING SUMMARY

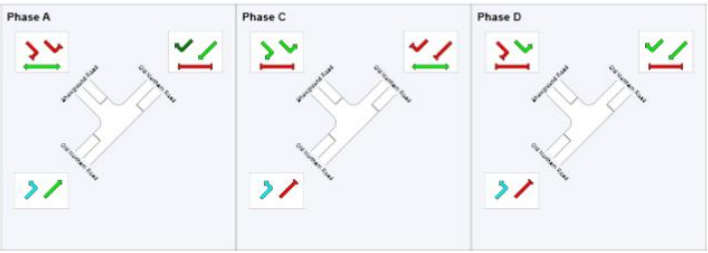
Site: Saturday Peak - 2026 Base

Old Northern Road / Showground Road SAT Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing (phase reduction applied)
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, C, D

Phase Timing Results

Phase	A	C	D
Green Time (sec)	19	27	6
Yellow Time (sec)	3	3	3
All-Red Time (sec)	3	3	3
Phase Time (sec)	25	33	12
Phase Split	36 %	47 %	17 %



LANE SUMMARY

Site: Saturday Peak - 2026 Base

Old Northern Road / Showground Road SAT Peak Existing
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
NorthEast: Old Northern Road													
Lane 1	146	2.0	861	0.170	38[5]	12.6	LOS A	3.0	21.4	Full	500	0.0	0.0
Lane 2	188	2.0	424	0.444	100	23.7	LOS B	4.4	31.4	Full	500	0.0	0.0
Approach	335	2.0		0.444		18.8	LOS B	4.4	31.4				
NorthWest: Showground Road													
Lane 1	673	1.0	789	0.853	100	35.5	LOS C	24.9	175.6	Full	500	0.0	0.0
Lane 2	606	1.0	711	0.853	100	36.9	LOS C	22.8	160.8	Full	500	0.0	0.0
Approach	1279	1.0		0.853		36.2	LOS C	24.9	175.6				
SouthWest: Old Northern Road													
Lane 1	1294	1.0	2007	0.645	100	7.7	LOS A	0.0	0.0	Short	5	0.0	0.0
Lane 2	54	1.0	96[1]	0.564	100	22.1	LOS B	1.5	10.4	Full	500	0.0	0.0
Lane 3	292	1.0	518	0.564	100	24.2	LOS B	8.8	62.2	Full	500	0.0	0.0
Approach	1640	1.0		0.645		11.1	LOS A	8.8	62.2				
Intersection	3254	1.1		0.853		21.8	LOS B	24.9	175.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program

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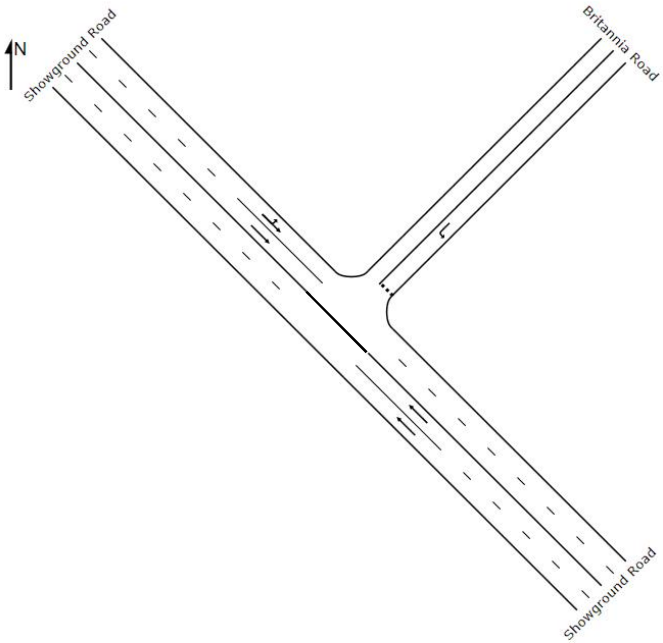
SIDRA INTERSECTION 6

2016 and 2026 “Upgrade” Scenario

SIDRA Outputs

Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: AM Peak - 2016 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	767	1.0	1937	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	767	1.0	1937	0.396	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1535	1.0		0.396		0.1	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	38	0.0	500	0.076	100	13.4	LOS A	0.3	1.8	Full	500	0.0	0.0
Approach	38	0.0		0.076		13.4	LOS A	0.3	1.8				
NorthWest: Showground Road													
Lane 1	1032	0.9	1932	0.534	100	0.7	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1035	1.0	1937	0.534	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2066	1.0		0.534		0.4	NA	0.0	0.0				
Intersection	3639	1.0		0.534		0.4	NA	0.3	1.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

Processed: Friday, 4 October 2013 10:58:02 AM
SIDRA INTERSECTION 6.0.14.4193
Project: G:\21\22830\Technical\Traffic\Technical\SIDRA\Proposed Layouts\2 Britannia Rd_Showground Rd (Proposed Layout).sip6
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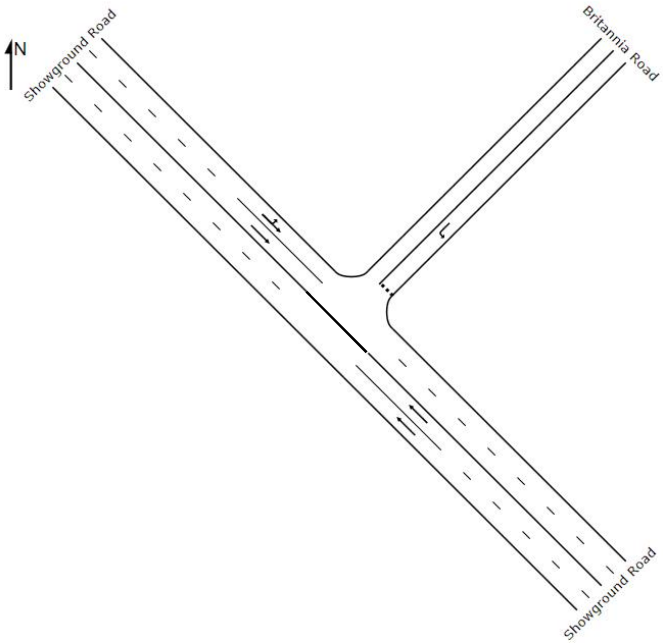
SIDRA INTERSECTION 6

Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: PM Peak - 2016 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	937	1.0	1937	0.484	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	937	1.0	1937	0.484	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1875	1.0		0.484		0.1	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	13	0.0	485	0.026	100	13.5	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	13	0.0		0.026		13.5	LOS A	0.1	0.6				
NorthWest: Showground Road													
Lane 1	1141	0.9	1926	0.593	100	1.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1148	1.0	1937	0.593	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2289	0.9		0.593		0.7	NA	0.0	0.0				
Intersection	4177	1.0		0.593		0.5	NA	0.1	0.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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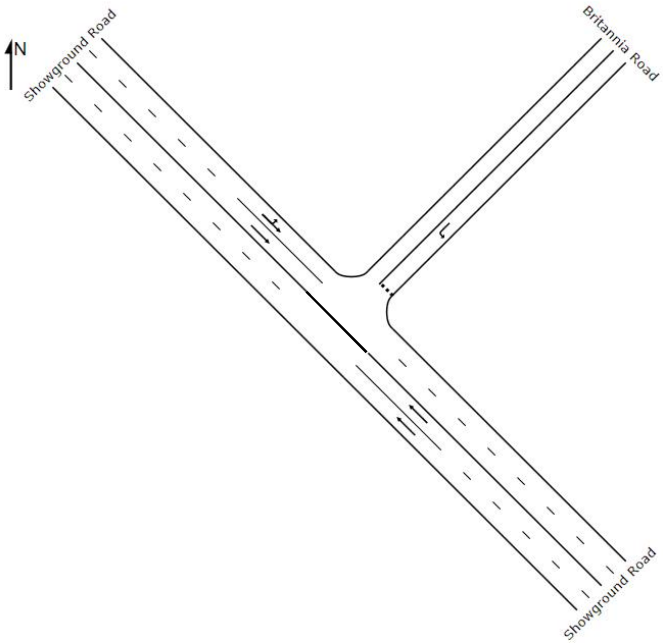
SIDRA INTERSECTION 6

Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: Saturday Peak - 2016 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1065	1.0	1937	0.550	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1065	1.0	1937	0.550	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2131	1.0		0.550		0.1	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	25	0.0	420	0.060	100	14.9	LOS B	0.2	1.4	Full	500	0.0	0.0
Approach	25	0.0		0.060		14.9	LOS B	0.2	1.4				
NorthWest: Showground Road													
Lane 1	1172	0.9	1929	0.608	100	1.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1177	1.0	1937	0.608	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2349	0.9		0.608		0.6	NA	0.0	0.0				
Intersection	4505	1.0		0.608		0.4	NA	0.2	1.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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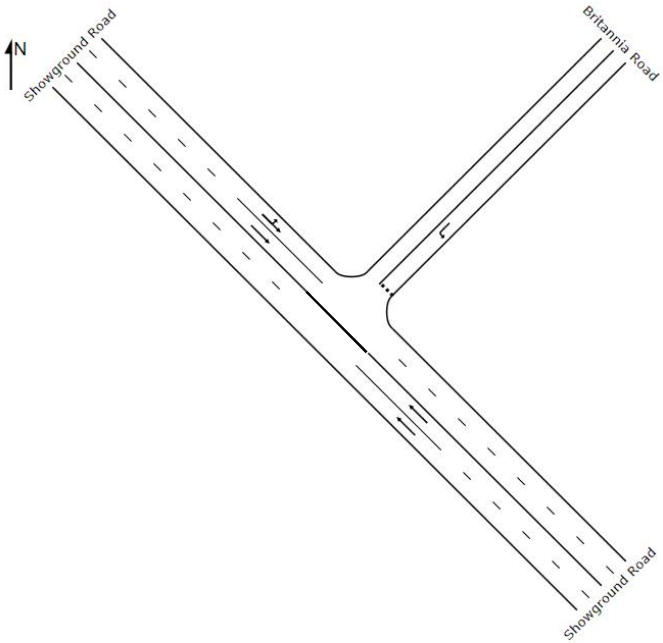
SIDRA INTERSECTION 6

Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: AM Peak - 2026 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	847	1.0	1937	0.437	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	847	1.0	1937	0.437	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1694	1.0		0.437		0.1	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	38	0.0	448	0.085	100	14.4	LOS A	0.3	2.0	Full	500	0.0	0.0
Approach	38	0.0		0.085		14.4	LOS A	0.3	2.0				
NorthWest: Showground Road													
Lane 1	1091	0.9	1932	0.564	100	0.7	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1094	1.0	1937	0.564	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2184	1.0		0.564		0.4	NA	0.0	0.0				
Intersection	3916	1.0		0.564		0.4	NA	0.3	2.0				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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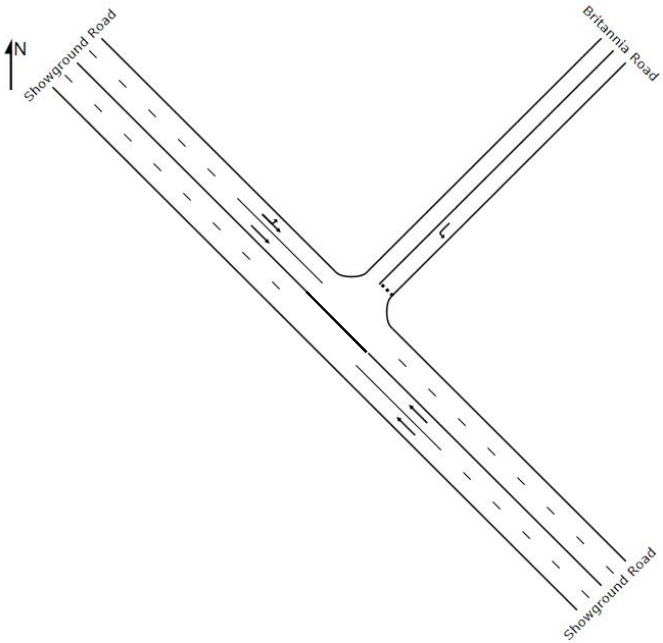
Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: PM Peak - 2026 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1036	1.0	1937	0.535	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1036	1.0	1937	0.535	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2073	1.0		0.535		0.1	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	13	0.0	417	0.030	100	14.8	LOS B	0.1	0.7	Full	500	0.0	0.0
Approach	13	0.0		0.030		14.8	LOS B	0.1	0.7				
NorthWest: Showground Road													
Lane 1	1227	0.9	1926	0.637	100	1.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1234	1.0	1937	0.637	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2461	0.9		0.637		0.7	NA	0.0	0.0				
Intersection	4546	1.0		0.637		0.5	NA	0.1	0.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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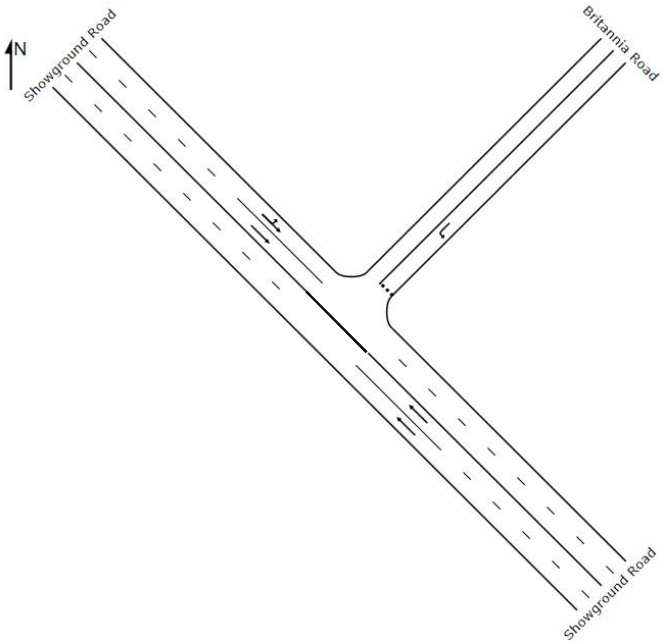
SIDRA INTERSECTION 6

Showground Road/Britannia Road – Upgrade



LANE SUMMARY

Site: Saturday Peak - 2026 + Development

Britannia Rd / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1174	1.0	1937	0.606	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1174	1.0	1937	0.606	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2347	1.0		0.606		0.2	NA	0.0	0.0				
NorthEast: Britannia Road													
Lane 1	25	0.0	355	0.071	100	16.6	LOS B	0.2	1.6	Full	500	0.0	0.0
Approach	25	0.0		0.071		16.6	LOS B	0.2	1.6				
NorthWest: Showground Road													
Lane 1	1258	0.9	1929	0.652	100	1.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1263	1.0	1937	0.652	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2521	0.9		0.652		0.6	NA	0.0	0.0				
Intersection	4894	1.0		0.652		0.5	NA	0.2	1.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

Processed: Tuesday, 5 November 2013 10:41:33 AM
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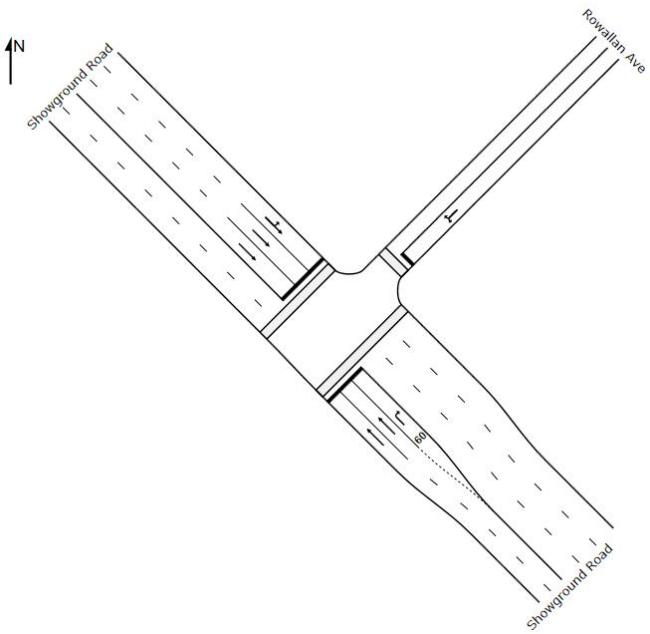
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

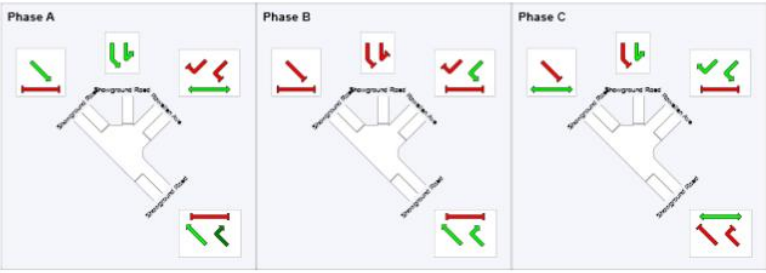
Site: AM Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	101	9	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	107	15	28
Phase Split	71 %	10 %	19 %



LANE SUMMARY

Site: AM Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	997	4.0	1470	0.678	100	8.5	LOS A	33.9	245.4	Full	500	0.0	0.0
Lane 2	490	4.0	722[1]	0.678	100	5.4	LOS A	10.6	77.0	Full	500	0.0	0.0
Lane 3	126	0.0	188	0.670	100	65.6	LOS E	9.7	68.0	Short	60	0.0	16.3
Approach	1614	3.7		0.678		12.0	LOS A	33.9	245.4				
NorthEast: Rowallan Ave													
Lane 1	231	1.2	347	0.664	100	68.0	LOS E	15.7	111.4	Full	500	0.0	0.0
Approach	231	1.2		0.664		68.0	LOS E	15.7	111.4				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	146	11.7	1112	0.132	100	15.4	LOS B	3.2	24.8	Full	500	0.0	0.0
Approach	146	11.7		0.132		15.4	LOS B	3.2	24.8				
NorthWest: Showground Road													
Lane 1	945	3.0	1335	0.708	100	16.1	LOS B	42.1	302.2	Full	500	0.0	0.0
Lane 2	945	3.0	1335	0.708	100	16.1	LOS B	42.1	302.2	Full	500	0.0	0.0
Approach	1889	3.0		0.708		16.1	LOS B	42.1	302.2				
Intersection	3880	3.5		0.708		17.5	LOS B	42.1	302.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

Processed: Thursday, 10 October 2013 11:05:37 AM
SIDRA INTERSECTION 6.0.14.4193
Project: G:\21\22830\Technical\Traffic\Technical\SIDRA\Proposed Layouts\3 Rowallan Ave_Showground Rd (Proposed Layout) V2.sip6
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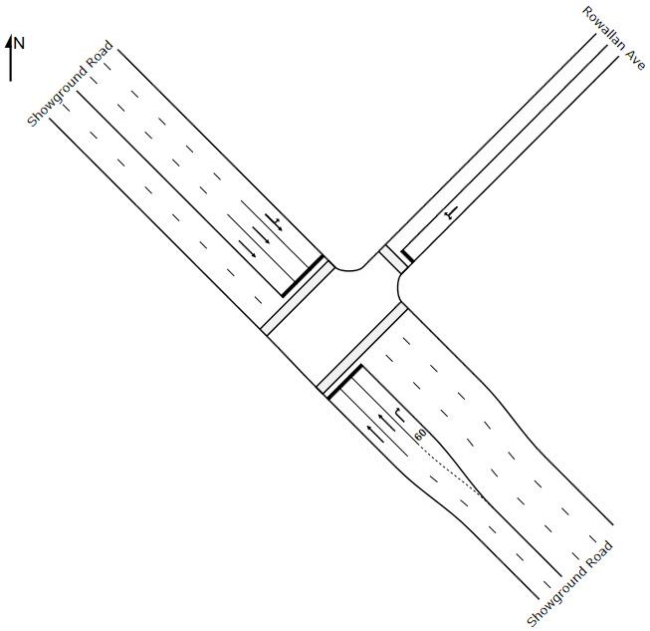
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

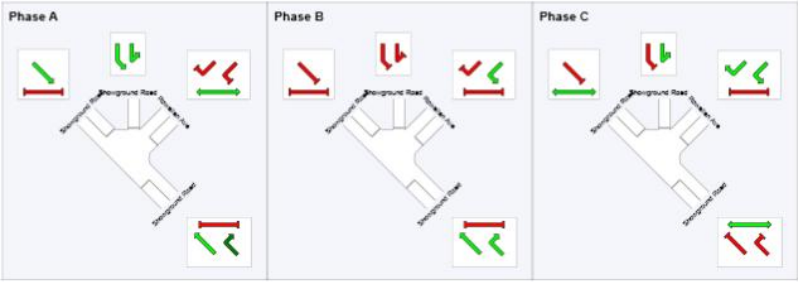
Site: PM Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	82	28	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	88	34	28
Phase Split	59 %	23 %	19 %



LANE SUMMARY

Site: PM Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	919	1.0	1498	0.613	100	7.7	LOS A	28.2	199.2	Full	500	0.0	0.0
Lane 2	919	1.0	1498	0.613	100	7.7	LOS A	28.2	199.2	Full	500	0.0	0.0
Lane 3	315	0.0	412	0.764	100	72.1	LOS F	21.2	148.7	Short	60	0.0	90.3
Approach	2153	0.9		0.764		17.1	LOS B	28.2	199.2				
NorthEast: Rowallan Ave													
Lane 1	148	1.5	342	0.434	100	65.6	LOS E	9.7	68.6	Full	500	0.0	0.0
Approach	148	1.5		0.434		65.6	LOS E	9.7	68.6				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	317	5.0	955	0.332	100	24.7	LOS B	11.3	82.8	Full	500	0.0	0.0
Approach	317	5.0		0.332		24.7	LOS B	11.3	82.8				
NorthWest: Showground Road													
Lane 1	912	1.0	1098	0.830	100	29.8	LOS C	54.3	383.2	Full	500	0.0	0.0
Lane 2	912	1.0	1098	0.830	100	29.8	LOS C	54.3	383.2	Full	500	0.0	0.0
Approach	1823	1.0		0.830		29.8	LOS C	54.3	383.2				
Intersection	4441	1.2		0.830		24.5	LOS B	54.3	383.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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SIDRA INTERSECTION 6.0.14.4193
Project: G:\21\22830\Technical\Traffic\Technical\SIDRA\Proposed Layouts\3 Rowallan Ave_Showground Rd (Proposed Layout) V2.sip6
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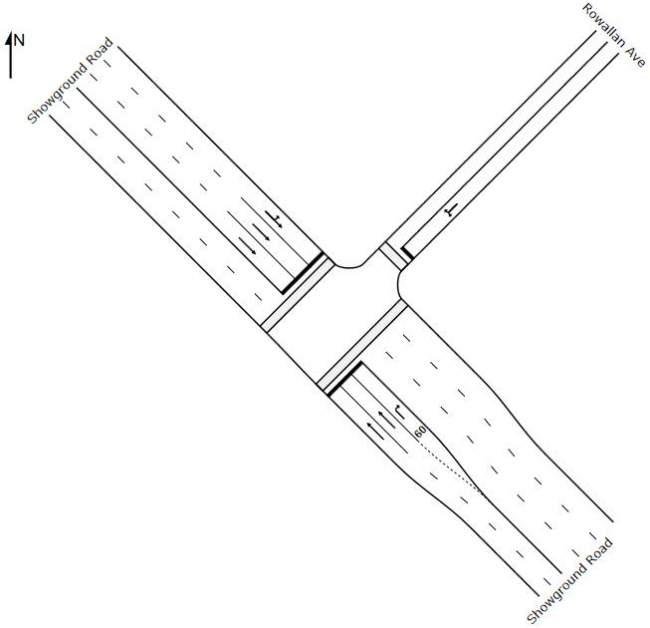
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

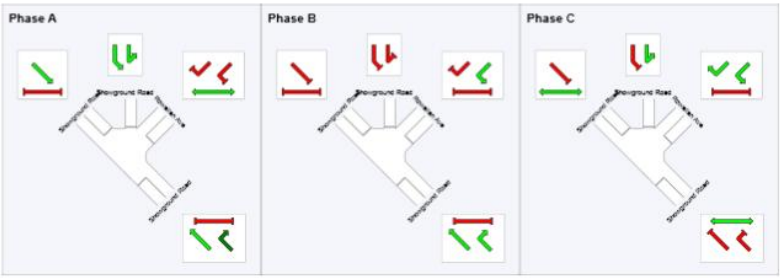
Site: Saturday Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	86	24	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	92	30	28
Phase Split	61 %	20 %	19 %



LANE SUMMARY

Site: Saturday Peak - 2016 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1405	1.0	1498	0.938	100	21.9	LOS B	91.2	643.5	Full	500	0.0	28.0
Lane 2	654	1.0	697[1]	0.938	100	44.1	LOS D	32.9	232.3	Full	500	0.0	0.0
Lane 3	285	0.0	356	0.801	100	80.1	LOS F	20.7	145.0	Short	60	0.0	87.9
Approach	2344	0.9		0.938		35.2	LOS C	91.2	643.5				
NorthEast: Rowallan Ave													
Lane 1	187	0.0	310	0.604	100	69.5	LOS E	12.8	89.7	Full	500	0.0	0.0
Approach	187	0.0		0.604		69.5	LOS E	12.8	89.7				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	253	6.3	990	0.255	100	21.9	LOS B	8.0	59.2	Full	500	0.0	0.0
Approach	253	6.3		0.255		21.9	LOS B	8.0	59.2				
NorthWest: Showground Road													
Lane 1	1008	1.0	1151	0.876	100	30.0	LOS C	62.9	444.3	Full	500	0.0	0.0
Lane 2	1008	1.0	1151	0.876	100	30.0	LOS C	62.9	444.3	Full	500	0.0	0.0
Approach	2017	1.0		0.876		30.0	LOS C	62.9	444.3				
Intersection	4801	1.2		0.938		33.6	LOS C	91.2	643.5				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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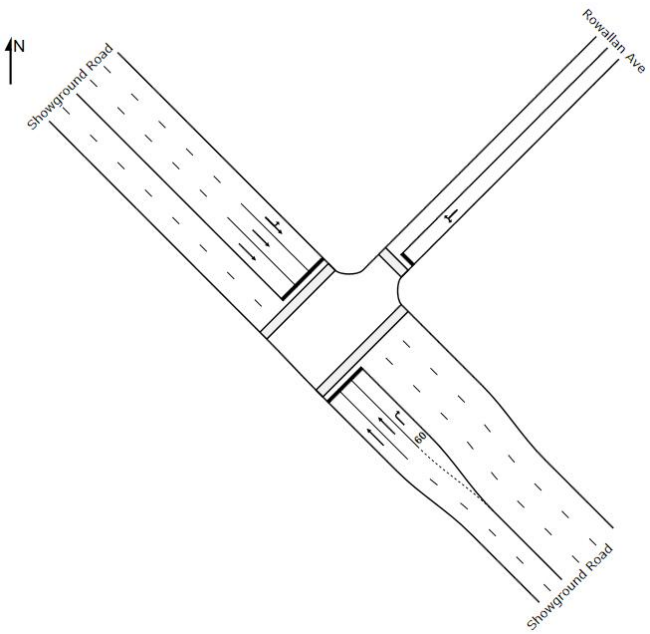
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

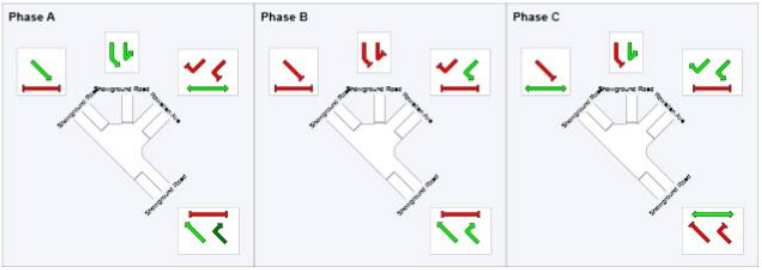
Site: AM Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	100	10	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	106	16	28
Phase Split	71 %	11 %	19 %



LANE SUMMARY

Site: AM Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1074	4.0	1470	0.731	100	9.3	LOS A	39.9	289.1	Full	500	0.0	0.0
Lane 2	568	4.0	777[1]	0.731	100	5.7	LOS A	13.0	94.4	Full	500	0.0	0.0
Lane 3	146	0.0	192	0.762	100	80.6	LOS F	12.0	84.2	Short	60	0.0	35.9
Approach	1788	3.7		0.762		14.0	LOS A	39.9	289.1				
NorthEast: Rowallan Ave													
Lane 1	242	1.3	348	0.696	100	68.7	LOS E	16.7	118.3	Full	500	0.0	0.0
Approach	242	1.3		0.696		68.7	LOS E	16.7	118.3				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	151	11.4	1103	0.136	100	15.8	LOS B	3.4	26.1	Full	500	0.0	0.0
Approach	151	11.4		0.136		15.8	LOS B	3.4	26.1				
NorthWest: Showground Road													
Lane 1	1000	3.0	1322	0.757	100	17.7	LOS B	48.0	344.9	Full	500	0.0	0.0
Lane 2	1000	3.0	1322	0.757	100	17.7	LOS B	48.0	344.9	Full	500	0.0	0.0
Approach	2000	3.0		0.757		17.7	LOS B	48.0	344.9				
Intersection	4181	3.5		0.762		19.0	LOS B	48.0	344.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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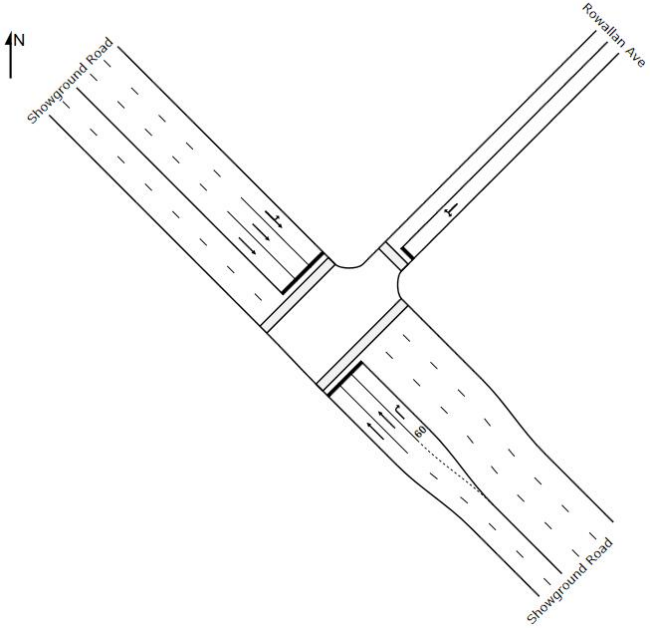
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

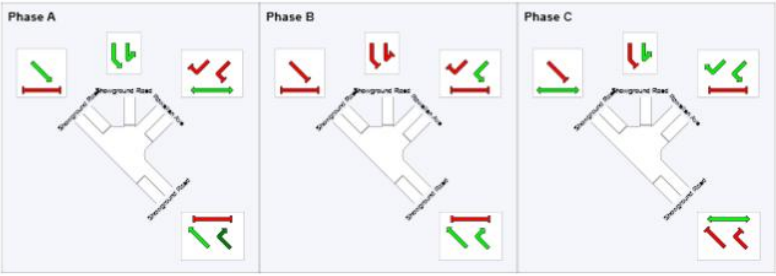
Site: PM Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	82	28	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	88	34	28
Phase Split	59 %	23 %	19 %



LANE SUMMARY

Site: PM Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1336	1.0	1498	0.892	100	13.0	LOS A	69.6	491.2	Full	500	0.0	3.4
Lane 2	700	1.0	785[1]	0.892	100	22.9	LOS B	26.9	189.6	Full	500	0.0	0.0
Lane 3	336	0.0	405	0.829	100	80.0	LOS F	24.0	168.1	Short	60	0.0	100.0
Approach	2372	0.9		0.892		25.4	LOS B	69.6	491.2				
NorthEast: Rowallan Ave													
Lane 1	148	1.5	342	0.434	100	65.6	LOS E	9.7	68.6	Full	500	0.0	0.0
Approach	148	1.5		0.434		65.6	LOS E	9.7	68.6				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	338	4.7	957	0.353	100	25.0	LOS B	12.3	89.5	Full	500	0.0	0.0
Approach	338	4.7		0.353		25.0	LOS B	12.3	89.5				
NorthWest: Showground Road													
Lane 1	981	1.0	1098	0.894	100	36.6	LOS C	66.5	469.4	Full	500	0.0	0.0
Lane 2	981	1.0	1098	0.894	100	36.6	LOS C	66.5	469.4	Full	500	0.0	0.0
Approach	1962	1.0		0.894		36.6	LOS C	66.5	469.4				
Intersection	4820	1.2		0.894		31.2	LOS C	69.6	491.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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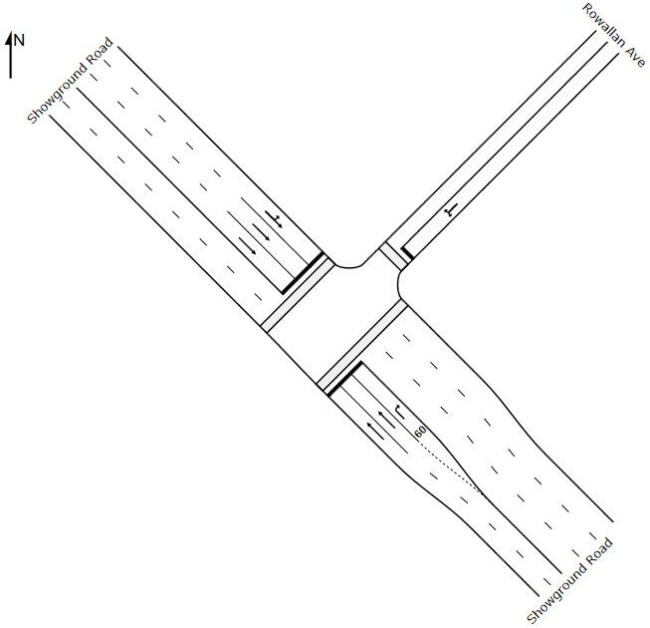
SIDRA INTERSECTION 6

Showground Road/Rowallan Avenue – Upgrade



PHASING SUMMARY

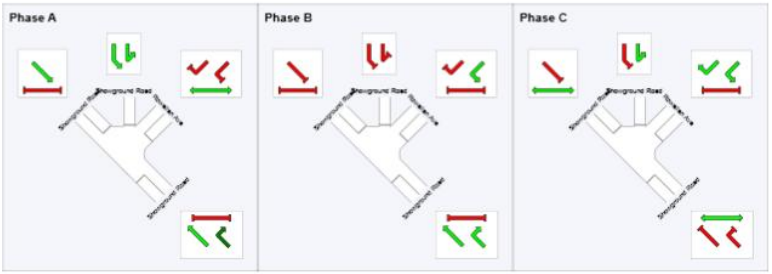
Site: Saturday Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	85	25	22
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	91	31	28
Phase Split	61 %	21 %	19 %



LANE SUMMARY

Site: Saturday Peak - 2026 With Development

Rowallan Ave / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1416	1.0	1498	0.945	100	25.0	LOS B	96.3	680.2	Full	500	0.0	33.1
Lane 2	860	1.0	910[1]	0.945	100	38.9	LOS C	44.0	310.8	Full	500	0.0	0.0
Lane 3	297	0.0	364	0.815	100	80.8	LOS F	21.2	148.5	Short	60	0.0	90.2
Approach	2573	0.9		0.945		36.1	LOS C	96.3	680.2				
NorthEast: Rowallan Ave													
Lane 1	187	0.0	310	0.604	100	69.5	LOS E	12.8	89.7	Full	500	0.0	0.0
Approach	187	0.0		0.604		69.5	LOS E	12.8	89.7				
North: Showground Road (NW) Bus Lane and left turn only													
Lane 1	269	5.9	981	0.275	100	22.6	LOS B	8.8	64.9	Full	500	0.0	0.0
Approach	269	5.9		0.275		22.6	LOS B	8.8	64.9				
NorthWest: Showground Road													
Lane 1	1073	1.0	1138	0.943	100	48.9	LOS D	85.3	602.2	Full	500	0.0	21.9
Lane 2	1073	1.0	1138	0.943	100	48.9	LOS D	85.3	602.2	Full	500	0.0	21.9
Approach	2145	1.0		0.943		48.9	LOS D	85.3	602.2				
Intersection	5175	1.2		0.945		41.9	LOS C	96.3	680.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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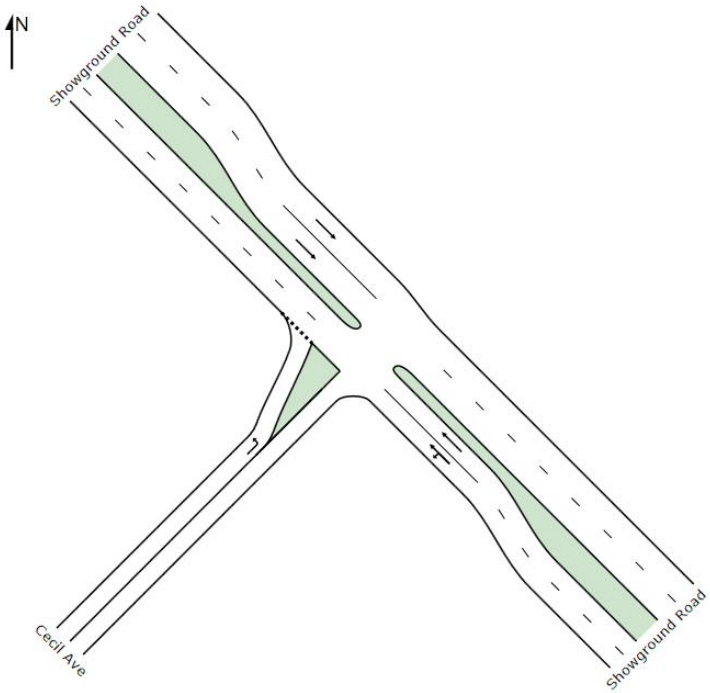
SIDRA INTERSECTION 6

Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: AM Peak - 2016 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	759	4.0	1900	0.400	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	760	4.0	1901	0.400	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1519	4.0		0.400		0.1	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	1044	3.0	2082	0.502	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1044	3.0	2082	0.502	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2088	3.0		0.502		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	100	0.0	520	0.192	100	12.5	LOS A	0.7	4.6	Full	500	0.0	0.0
Approach	100	0.0		0.192		12.5	LOS A	0.7	4.6				
Intersection	3707	3.3		0.502		0.4	NA	0.7	4.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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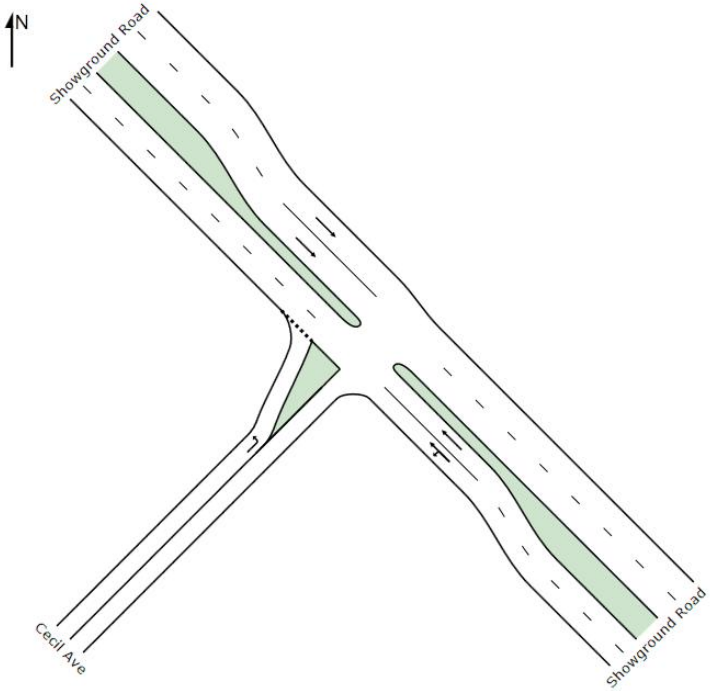
SIDRA INTERSECTION 6

Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: PM Peak - 2016 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1020	1.0	1937	0.527	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1021	1.0	1937	0.527	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2041	1.0		0.527		0.1	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	975	1.0	2109	0.463	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	975	1.0	2109	0.463	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1951	1.0		0.463		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	114	0.0	315	0.361	100	19.9	LOS B	1.3	9.4	Full	500	0.0	0.0
Approach	114	0.0		0.361		19.9	LOS B	1.3	9.4				
Intersection	4105	1.0		0.527		0.6	NA	1.3	9.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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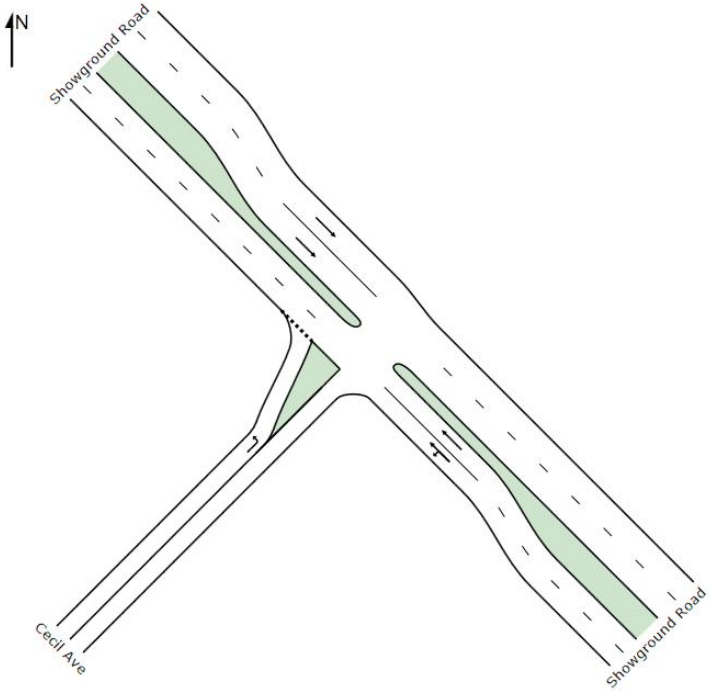
SIDRA INTERSECTION 6

Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: Saturday Peak - 2026 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1105	1.0	1937	0.570	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1105	1.0	1937	0.570	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2209	1.0		0.570		0.2	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	1066	1.0	2109	0.505	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1066	1.0	2109	0.505	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2132	1.0		0.505		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	142	0.0	260	0.546	100	26.4	LOS B	2.2	15.6	Full	500	0.0	0.0
Approach	142	0.0		0.546		26.4	LOS B	2.2	15.6				
Intersection	4483	1.0		0.570		1.0	NA	2.2	15.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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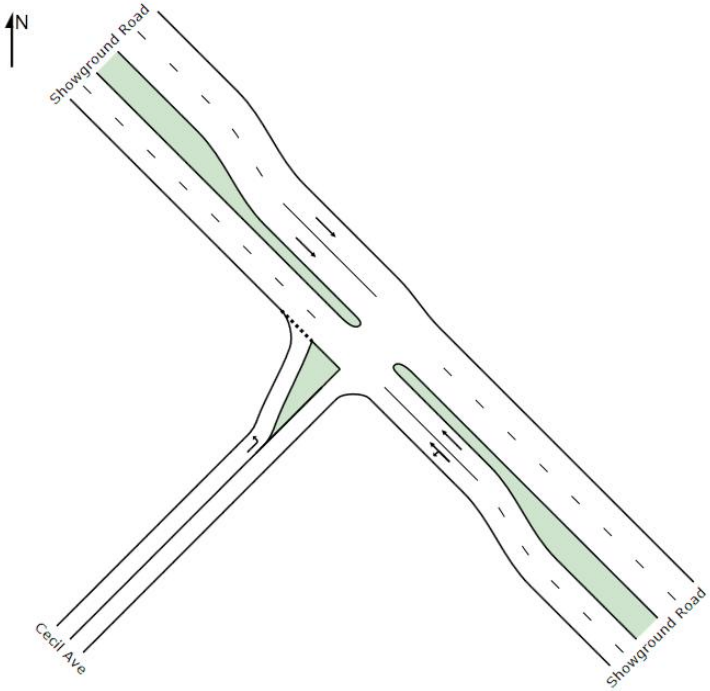
SIDRA INTERSECTION 6

Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: AM Peak - 2026 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	814	4.0	1900	0.428	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	814	4.0	1901	0.428	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1628	4.0		0.428		0.1	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	1104	3.0	2082	0.530	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1104	3.0	2082	0.530	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2207	3.0		0.530		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	165	0.0	470	0.352	100	14.9	LOS B	1.5	10.2	Full	500	0.0	0.0
Approach	165	0.0		0.352		14.9	LOS B	1.5	10.2				
Intersection	4001	3.3		0.530		0.7	NA	1.5	10.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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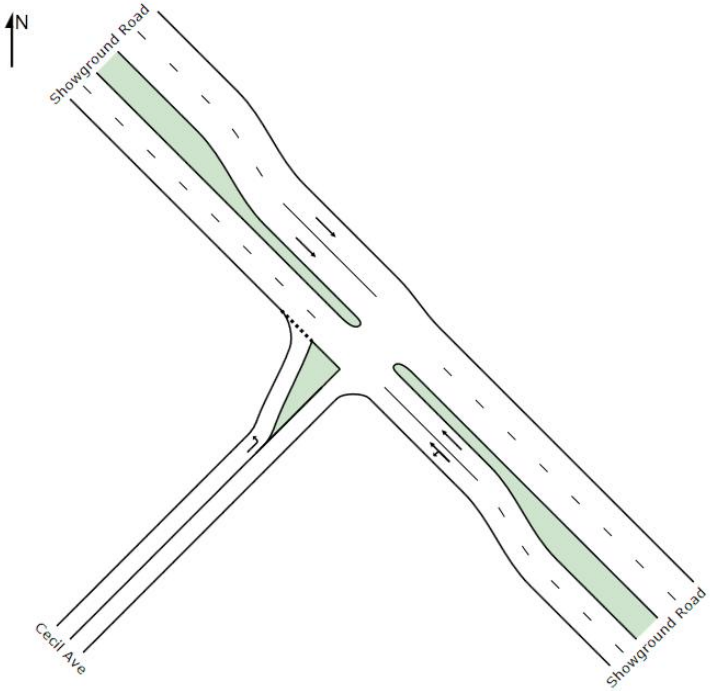
Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: PM Peak - 2026 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1128	1.0	1937	0.582	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1128	1.0	1937	0.582	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2256	1.0		0.582		0.1	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	1045	1.0	2109	0.495	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1045	1.0	2109	0.495	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2089	1.0		0.495		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	117	0.0	242	0.483	100	26.5	LOS B	1.8	12.9	Full	500	0.0	0.0
Approach	117	0.0		0.483		26.5	LOS B	1.8	12.9				
Intersection	4462	1.0		0.582		0.8	NA	1.8	12.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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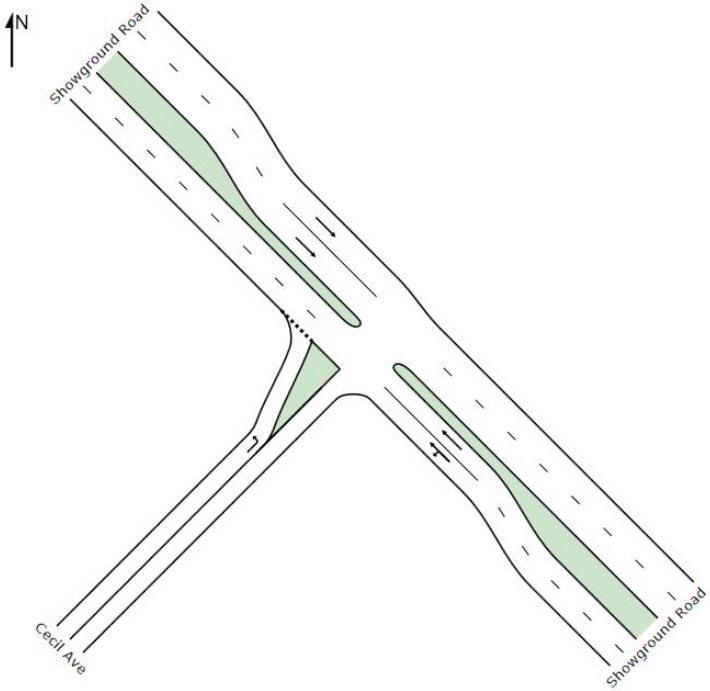
SIDRA INTERSECTION 6

Showground Road/Cecil Avenue – Upgrade



LANE SUMMARY

Site: Saturday Peak - 2026 With Development

Cecil Ave / Showground Rd AM Peak Existing
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	1215	1.0	1937	0.627	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1215	1.0	1937	0.627	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2431	1.0		0.627		0.2	NA	0.0	0.0				
NorthWest: Showground Road													
Lane 1	1138	1.0	2109	0.540	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	1138	1.0	2109	0.540	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	2276	1.0		0.540		0.1	NA	0.0	0.0				
SouthWest: Cecil Ave													
Lane 1	149	0.0	193	0.775	100	45.6	LOS D	3.7	26.0	Full	500	0.0	0.0
Approach	149	0.0		0.775		45.6	LOS D	3.7	26.0				
Intersection	4856	1.0		0.775		1.5	NA	3.7	26.0				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
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.

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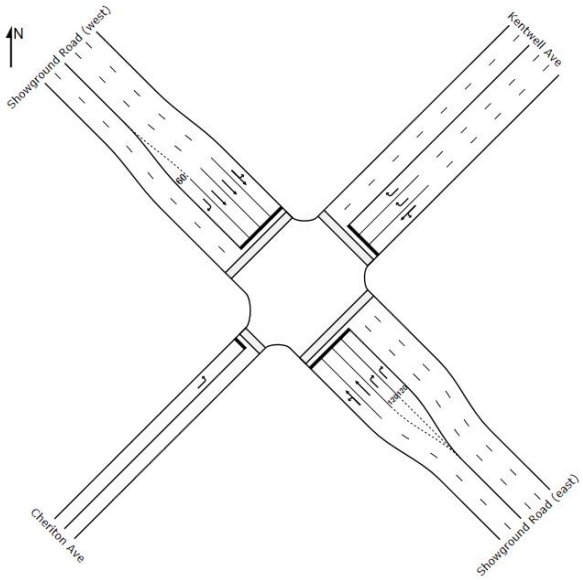
Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

Site: AM Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	75	15	19	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	81	21	25	23
Phase Split	54 %	14 %	17 %	15 %

LANE SUMMARY

Site: AM Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	717	3.5	956	0.750	100	32.9	LOS C	41.2	297.3	Full	500	0.0	0.0
Lane 2	697	4.0	930[1]	0.750	100	31.1	LOS C	39.3	284.7	Full	500	0.0	0.0
Lane 3	76	0.0	183	0.417	100	77.4	LOS F	5.4	37.7	Short	120	0.0	0.0
Lane 4	76	0.0	183	0.417	100	77.4	LOS F	5.4	37.7	Short	120	0.0	0.0
Approach	1566	3.4		0.750		36.4	LOS C	41.2	297.3				
NorthEast: Kentwell Ave													
Lane 1	51	0.0	683	0.074	100	38.5	LOS C	2.3	16.3	Full	500	0.0	0.0
Lane 2	67	0.0	235	0.284	100	71.8	LOS F	4.5	31.5	Full	500	0.0	0.0
Lane 3	67	0.0	235	0.284	100	71.8	LOS F	4.5	31.5	Full	500	0.0	0.0
Approach	184	0.0		0.284		62.7	LOS E	4.5	31.5				
North: Bus Lane and Left Turn													
Lane 1	727	2.2	998	0.729	100	21.8	LOS B	22.4	159.5	Full	500	0.0	0.0
Approach	727	2.2		0.729		21.8	LOS B	22.4	159.5				
NorthWest: Showground Road (west)													
Lane 1	741	4.0	960	0.772	100	32.3	LOS C	43.4	314.4	Full	500	0.0	0.0
Lane 2	413	4.0	535[1]	0.772	100	27.0	LOS B	19.6	141.6	Full	500	0.0	0.0
Lane 3	206	0.0	274	0.754	100	75.3	LOS F	15.1	106.0	Short	60	0.0	57.5
Approach	1361	3.4		0.772		37.2	LOS C	43.4	314.4				
SouthWest: Cheriton Ave													
Lane 1	80	2.0	391	0.205	100	40.0	LOS C	3.6	26.0	Full	500	0.0	0.0
Approach	80	2.0		0.205		40.0	LOS C	3.6	26.0				
Intersection	3919	3.0		0.772		35.3	LOS C	43.4	314.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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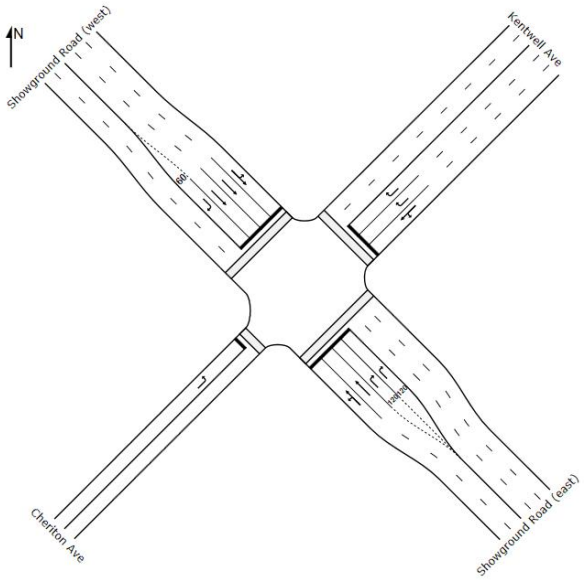
Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

Site: PM Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	71	7	31	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	77	13	37	23
Phase Split	51 %	9 %	25 %	15 %

LANE SUMMARY

Site: PM Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	740	0.9	922	0.803	100	36.5	LOS C	45.3	319.3	Full	500	0.0	0.0
Lane 2	721	1.0	897[1]	0.803	100	34.8	LOS C	43.2	305.2	Full	500	0.0	0.0
Lane 3	65	1.0	85	0.770	100	91.2	LOS F	5.2	36.5	Short	120	0.0	0.0
Lane 4	65	1.0	85	0.770	100	91.2	LOS F	5.2	36.5	Short	120	0.0	0.0
Approach	1592	0.9		0.803		40.2	LOS C	45.3	319.3				
NorthEast: Kentwell Ave													
Lane 1	135	0.0	812	0.166	100	33.7	LOS C	5.8	40.8	Full	500	0.0	0.0
Lane 2	318	0.0	384	0.830	100	74.1	LOS F	23.9	167.0	Full	500	0.0	0.0
Lane 3	318	0.0	384	0.830	100	74.1	LOS F	23.9	167.0	Full	500	0.0	0.0
Approach	772	0.0		0.830		67.1	LOS E	23.9	167.0				
North: Bus Lane and Left Turn													
Lane 1	527	3.0	1034	0.510	100	17.2	LOS B	12.9	92.6	Full	500	0.0	0.0
Approach	527	3.0		0.510		17.2	LOS B	12.9	92.6				
NorthWest: Showground Road (west)													
Lane 1	783	1.0	927	0.845	100	37.9	LOS C	50.4	355.6	Full	500	0.0	0.0
Lane 2	554	1.0	655[1]	0.845	100	36.9	LOS C	32.2	227.3	Full	500	0.0	0.0
Lane 3	102	0.0	164	0.623	100	73.6	LOS F	7.6	53.2	Short	60	0.0	0.0
Approach	1439	0.9		0.845		40.1	LOS C	50.4	355.6				
SouthWest: Cheriton Ave													
Lane 1	36	0.0	297	0.120	100	40.8	LOS C	1.6	11.0	Full	500	0.0	0.0
Approach	36	0.0		0.120		40.8	LOS C	1.6	11.0				
Intersection	4365	1.0		0.845		42.1	LOS C	50.4	355.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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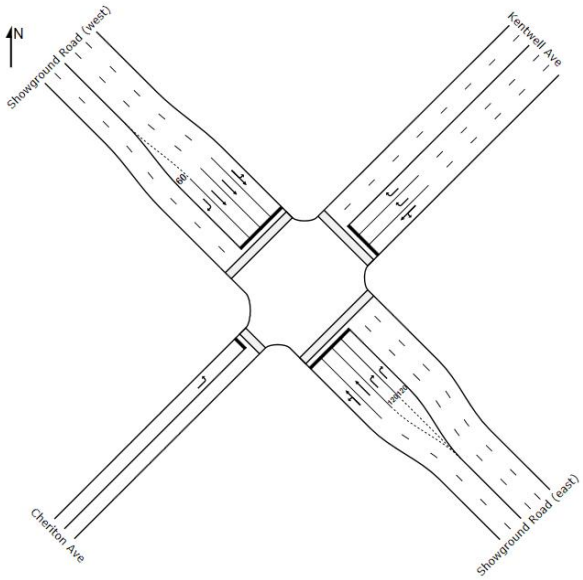
Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

Site: Saturday Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	72	6	31	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	78	12	37	23
Phase Split	52 %	8 %	25 %	15 %

LANE SUMMARY

Site: Saturday Peak - 2016 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	828	0.9	934	0.887	100	44.9	LOS D	58.5	412.7	Full	500	0.0	0.0
Lane 2	803	1.0	906[1]	0.887	100	43.5	LOS D	55.8	393.8	Full	500	0.0	0.0
Lane 3	64	0.0	73	0.871	100	96.6	LOS F	5.2	36.7	Short	120	0.0	0.0
Lane 4	64	0.0	73	0.871	100	96.6	LOS F	5.2	36.7	Short	120	0.0	0.0
Approach	1759	0.9		0.887		48.0	LOS D	58.5	412.7				
NorthEast: Kentwell Ave													
Lane 1	136	0.0	813	0.167	100	33.9	LOS C	5.9	41.1	Full	500	0.0	0.0
Lane 2	334	0.0	384	0.869	100	78.6	LOS F	26.1	182.8	Full	500	0.0	0.0
Lane 3	334	0.0	384	0.869	100	78.6	LOS F	26.1	182.8	Full	500	0.0	0.0
Approach	803	0.0		0.869		71.0	LOS F	26.1	182.8				
North: Bus Lane and Left Turn													
Lane 1	634	2.5	1057	0.599	100	17.4	LOS B	16.7	119.2	Full	500	0.0	0.0
Approach	634	2.5		0.599		17.4	LOS B	16.7	119.2				
NorthWest: Showground Road (west)													
Lane 1	797	1.0	940	0.848	100	37.5	LOS C	51.2	361.6	Full	500	0.0	0.0
Lane 2	593	1.0	699[1]	0.848	100	36.5	LOS C	34.7	245.0	Full	500	0.0	0.0
Lane 3	107	0.0	137	0.786	100	88.1	LOS F	8.6	60.0	Short	60	0.0	5.1
Approach	1497	0.9		0.848		40.7	LOS C	51.2	361.6				
SouthWest: Cheriton Ave													
Lane 1	32	0.0	285	0.111	100	41.6	LOS C	1.4	9.9	Full	500	0.0	0.0
Approach	32	0.0		0.111		41.6	LOS C	1.4	9.9				
Intersection	4724	0.9		0.887		45.5	LOS D	58.5	412.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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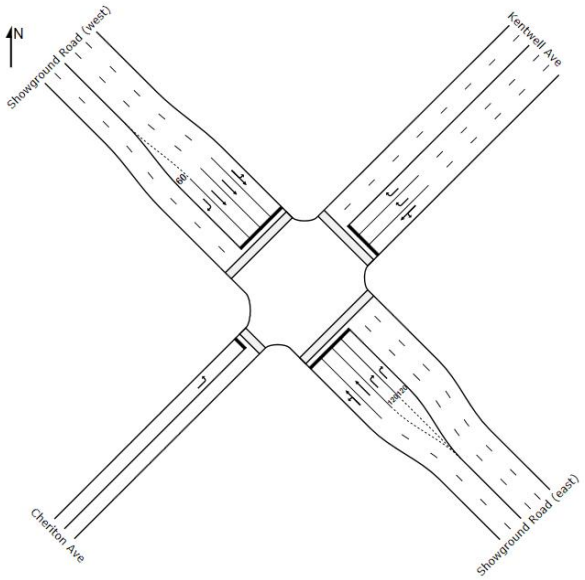
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

Site: AM Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	77	15	17	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	83	21	23	23
Phase Split	55 %	14 %	15 %	15 %

LANE SUMMARY

Site: AM Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	802	3.5	981	0.818	100	33.6	LOS C	48.4	348.7	Full	500	0.0	0.0
Lane 2	776	4.0	949[1]	0.818	100	31.5	LOS C	45.5	329.7	Full	500	0.0	0.0
Lane 3	74	0.0	183	0.406	100	77.3	LOS F	5.2	36.6	Short	120	0.0	0.0
Lane 4	74	0.0	183	0.406	100	77.3	LOS F	5.2	36.6	Short	120	0.0	0.0
Approach	1726	3.4		0.818		36.4	LOS C	48.4	348.7				
NorthEast: Kentwell Ave													
Lane 1	44	0.0	669	0.066	100	39.8	LOS C	2.1	14.5	Full	500	0.0	0.0
Lane 2	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Lane 3	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Approach	178	0.0		0.318		65.6	LOS E	4.6	32.1				
North: Bus Lane and Left Turn													
Lane 1	728	2.2	1002	0.727	100	22.5	LOS B	23.5	167.6	Full	500	0.0	0.0
Approach	728	2.2		0.727		22.5	LOS B	23.5	167.6				
NorthWest: Showground Road (west)													
Lane 1	849	4.0	986	0.861	100	35.8	LOS C	54.9	397.2	Full	500	0.0	0.0
Lane 2	416	4.0	483[1]	0.861	100	38.6	LOS C	23.3	168.9	Full	500	0.0	0.0
Lane 3	214	0.0	258	0.829	100	87.1	LOS F	16.8	117.9	Short	60	0.0	67.7
Approach	1479	3.4		0.861		44.0	LOS D	54.9	397.2				
SouthWest: Cheriton Ave													
Lane 1	51	2.0	391	0.129	100	40.2	LOS C	2.3	16.4	Full	500	0.0	0.0
Approach	51	2.0		0.129		40.2	LOS C	2.3	16.4				
Intersection	4162	3.0		0.861		38.0	LOS C	54.9	397.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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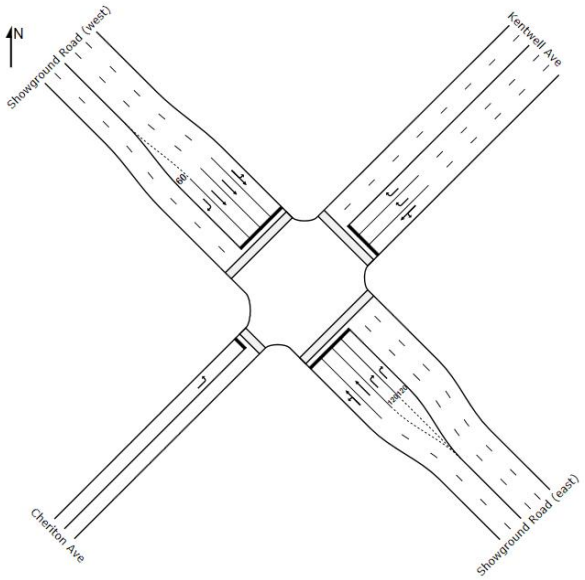
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

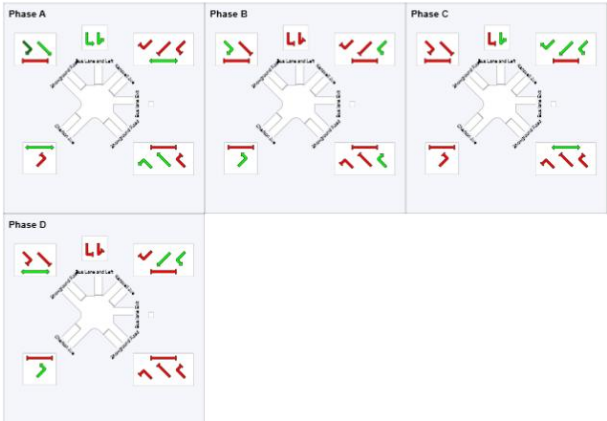
Site: PM Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	71	7	31	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	77	13	37	23
Phase Split	51 %	9 %	25 %	15 %



LANE SUMMARY

Site: PM Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	740	0.9	922	0.803	100	36.5	LOS C	45.3	319.3	Full	500	0.0	0.0
Lane 2	721	1.0	897[1]	0.803	100	34.8	LOS C	43.2	305.2	Full	500	0.0	0.0
Lane 3	65	1.0	85	0.770	100	91.2	LOS F	5.2	36.5	Short	120	0.0	0.0
Lane 4	65	1.0	85	0.770	100	91.2	LOS F	5.2	36.5	Short	120	0.0	0.0
Approach	1592	0.9		0.803		40.2	LOS C	45.3	319.3				
NorthEast: Kentwell Ave													
Lane 1	135	0.0	812	0.166	100	33.7	LOS C	5.8	40.8	Full	500	0.0	0.0
Lane 2	318	0.0	384	0.830	100	74.1	LOS F	23.9	167.0	Full	500	0.0	0.0
Lane 3	318	0.0	384	0.830	100	74.1	LOS F	23.9	167.0	Full	500	0.0	0.0
Approach	772	0.0		0.830		67.1	LOS E	23.9	167.0				
North: Bus Lane and Left Turn													
Lane 1	527	3.0	1034	0.510	100	17.2	LOS B	12.9	92.6	Full	500	0.0	0.0
Approach	527	3.0		0.510		17.2	LOS B	12.9	92.6				
NorthWest: Showground Road (west)													
Lane 1	773	1.0	927	0.835	100	36.7	LOS C	48.7	344.0	Full	500	0.0	0.0
Lane 2	548	1.0	656[1]	0.835	100	35.5	LOS C	31.2	219.9	Full	500	0.0	0.0
Lane 3	102	0.0	164	0.623	100	73.6	LOS F	7.6	53.2	Short	60	0.0	0.0
Approach	1423	0.9		0.835		38.9	LOS C	48.7	344.0				
SouthWest: Cheriton Ave													
Lane 1	36	0.0	297	0.120	100	40.8	LOS C	1.6	11.0	Full	500	0.0	0.0
Approach	36	0.0		0.120		40.8	LOS C	1.6	11.0				
Intersection	4349	1.0		0.835		41.8	LOS C	48.7	344.0				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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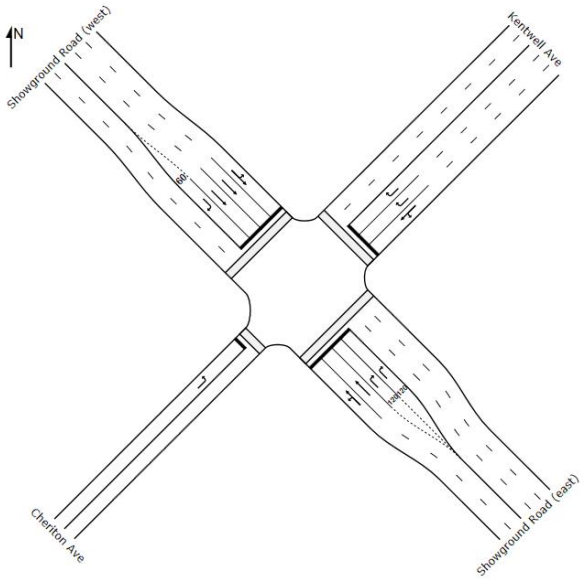
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade



PHASING SUMMARY

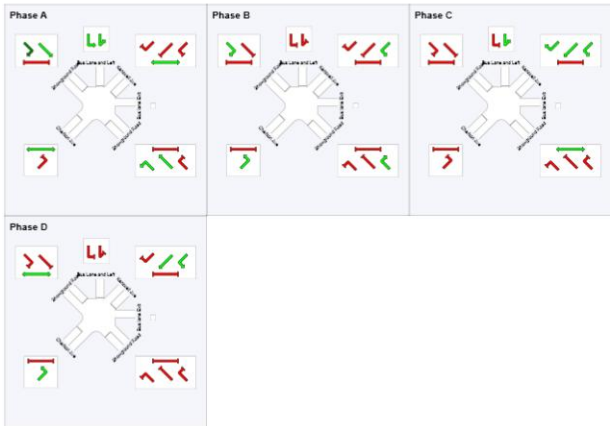
Site: Saturday Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	75	6	28	17
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	81	12	34	23
Phase Split	54 %	8 %	23 %	15 %



LANE SUMMARY

Site: Saturday Peak - 2026 With Development - 4 Phases Diamond

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	958	0.9	973	0.985	100	79.9	LOS F	91.9	647.9	Full	500	0.0	28.6
Lane 2	927	1.0	941[1]	0.985	100	78.4	LOS F	87.1	614.7	Full	500	0.0	23.8
Lane 3	62	0.0	73	0.849	100	95.3	LOS F	5.1	35.5	Short	120	0.0	0.0
Lane 4	62	0.0	73	0.849	100	95.3	LOS F	5.1	35.5	Short	120	0.0	0.0
Approach	2009	0.9		0.985		80.2	LOS F	91.9	647.9				
NorthEast: Kentwell Ave													
Lane 1	136	0.0	776	0.175	100	35.8	LOS C	6.1	42.7	Full	500	0.0	0.0
Lane 2	334	0.0	347	0.963	100	103.0	LOS F	30.7	214.6	Full	500	0.0	0.0
Lane 3	334	0.0	347	0.963	100	103.0	LOS F	30.7	214.6	Full	500	0.0	0.0
Approach	803	0.0		0.963		91.6	LOS F	30.7	214.6				
North: Bus Lane and Left Turn													
Lane 1	635	2.5	1067	0.595	100	17.1	LOS B	16.2	115.8	Full	500	0.0	0.0
Approach	635	2.5		0.595		17.1	LOS B	16.2	115.8				
NorthWest: Showground Road (west)													
Lane 1	792	1.0	979	0.809	100	33.3	LOS C	47.8	337.6	Full	500	0.0	0.0
Lane 2	734	1.0	907[1]	0.809	100	31.7	LOS C	42.2	298.0	Full	500	0.0	0.0
Lane 3	116	0.0	126	0.917	100	99.0	LOS F	9.5	66.3	Short	60	0.0	14.1
Approach	1642	0.9		0.917		37.2	LOS C	47.8	337.6				
SouthWest: Cheriton Ave													
Lane 1	14	0.0	285	0.048	100	42.0	LOS C	0.6	4.3	Full	500	0.0	0.0
Approach	14	0.0		0.048		42.0	LOS C	0.6	4.3				
Intersection	5103	1.0		0.985		60.2	LOS E	91.9	647.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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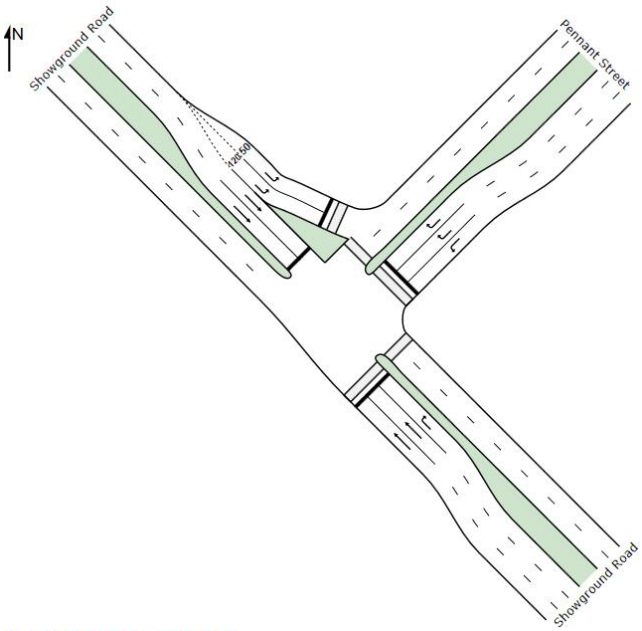
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

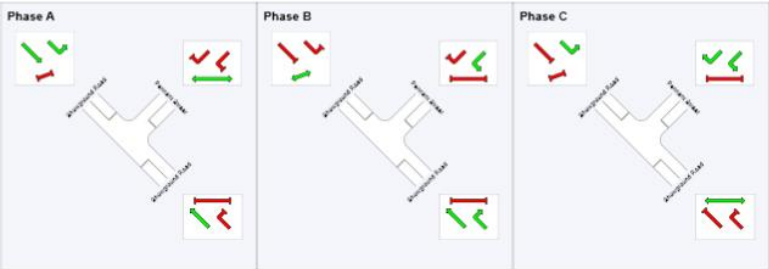
Site: AM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	22	33	37
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	28	39	43
Phase Split	25 %	35 %	39 %



LANE SUMMARY

Site: AM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	230	4.0	1054	0.218	100	13.1	LOS A	6.1	44.5	Full	150	0.0	0.0
Lane 2	230	4.0	1054	0.218	100	13.1	LOS A	6.1	44.5	Full	150	0.0	0.0
Lane 3	512	0.0	557	0.918	100	65.7	LOS E	32.9	230.6	Full	100	0.0	83.2
Approach	972	1.9		0.918		40.8	LOS C	32.9	230.6				
NorthEast: Pennant Street													
Lane 1	243	1.0	1274	0.191	100	14.6	LOS B	4.5	32.1	Full	500	0.0	0.0
Lane 2	553	3.0	612	0.904	100	60.3	LOS E	34.4	247.0	Full	500	0.0	0.0
Lane 3	553	3.0	612	0.904	100	60.3	LOS E	34.4	247.0	Full	500	0.0	0.0
Approach	1349	2.6		0.904		52.1	LOS D	34.4	247.0				
NorthWest: Showground Road													
Lane 1	265	4.0	1067	0.249	100	19.3	LOS B	6.7	48.6	Short	50	0.0	2.4
Lane 2	265	4.0	1067	0.249	100	19.3	LOS B	6.7	48.6	Short	120	0.0	0.0
Lane 3	341	3.0	383	0.892	100	58.5	LOS E	20.9	150.4	Full	500	0.0	0.0
Lane 4	341	3.0	383	0.892	100	58.5	LOS E	20.9	150.4	Full	500	0.0	0.0
Approach	1213	3.4		0.892		41.3	LOS C	20.9	150.4				
Intersection	3534	2.7		0.918		45.3	LOS D	34.4	247.0				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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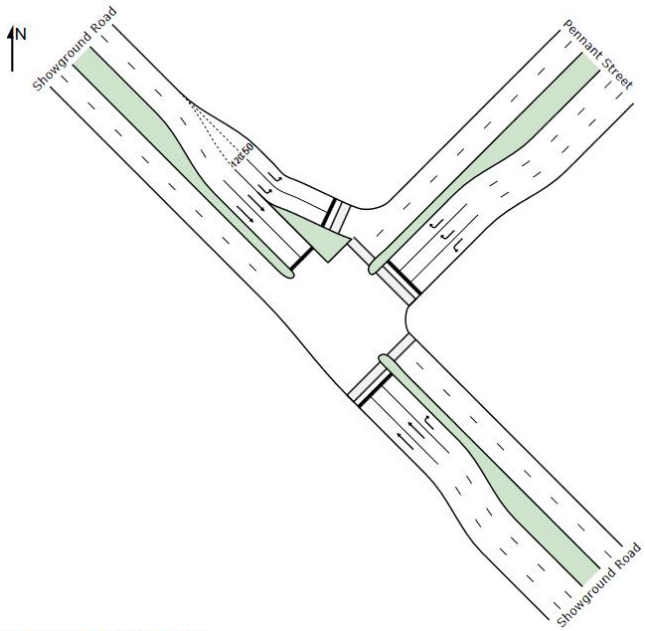
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

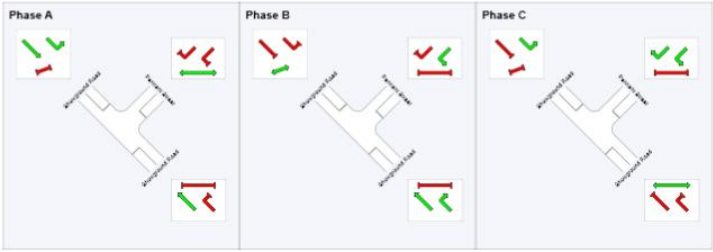
Site: AM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	22	33	37
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	28	39	43
Phase Split	25 %	35 %	39 %



LANE SUMMARY

Site: AM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	230	4.0	1054	0.218	100	13.1	LOS A	6.1	44.5	Full	150	0.0	0.0
Lane 2	230	4.0	1054	0.218	100	13.1	LOS A	6.1	44.5	Full	150	0.0	0.0
Lane 3	512	0.0	557	0.918	100	65.7	LOS E	32.9	230.6	Full	100	0.0	83.2
Approach	972	1.9		0.918		40.8	LOS C	32.9	230.6				
NorthEast: Pennant Street													
Lane 1	243	1.0	1274	0.191	100	14.6	LOS B	4.5	32.1	Full	500	0.0	0.0
Lane 2	553	3.0	612	0.904	100	60.3	LOS E	34.4	247.0	Full	500	0.0	0.0
Lane 3	553	3.0	612	0.904	100	60.3	LOS E	34.4	247.0	Full	500	0.0	0.0
Approach	1349	2.6		0.904		52.1	LOS D	34.4	247.0				
NorthWest: Showground Road													
Lane 1	265	4.0	1067	0.249	100	19.3	LOS B	6.7	48.6	Short	50	0.0	2.4
Lane 2	265	4.0	1067	0.249	100	19.3	LOS B	6.7	48.6	Short	120	0.0	0.0
Lane 3	341	3.0	383	0.892	100	58.5	LOS E	20.9	150.4	Full	500	0.0	0.0
Lane 4	341	3.0	383	0.892	100	58.5	LOS E	20.9	150.4	Full	500	0.0	0.0
Approach	1213	3.4		0.892		41.3	LOS C	20.9	150.4				
Intersection	3534	2.7		0.918		45.3	LOS D	34.4	247.0				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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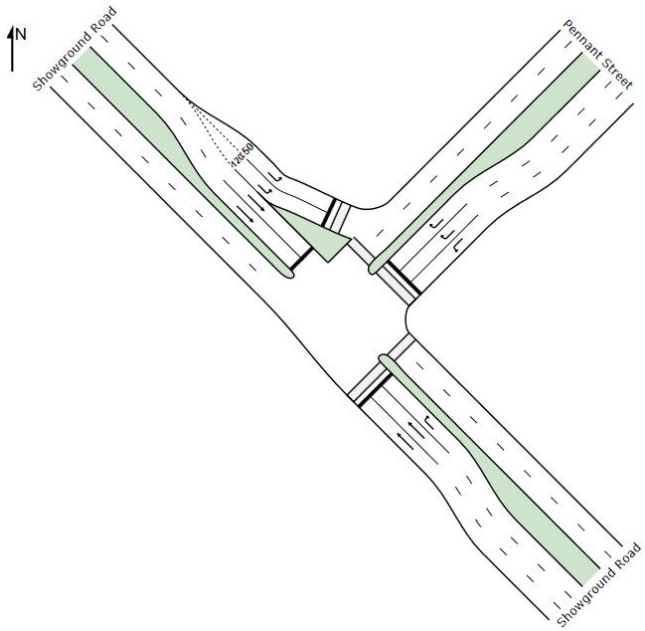
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

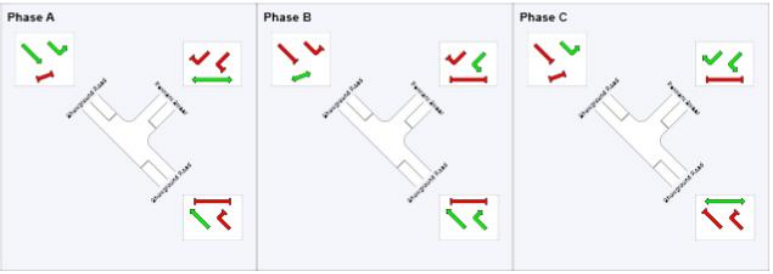
Site: PM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	41	30
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	47	36
Phase Split	25 %	43 %	33 %



LANE SUMMARY

Site: PM Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	324	1.0	1198	0.271	100	10.2	LOS A	7.8	55.2	Full	150	0.0	0.0
Lane 2	324	1.0	1198	0.271	100	10.2	LOS A	7.8	55.2	Full	150	0.0	0.0
Lane 3	645	0.0	692	0.932	100	64.9	LOS E	42.8	299.3	Full	100	0.0	100.0
Approach	1294	0.5		0.932		37.4	LOS C	42.8	299.3				
NorthEast: Pennant Street													
Lane 1	357	0.0	1300	0.274	100	14.6	LOS B	7.0	48.7	Full	500	0.0	0.0
Lane 2	472	1.0	503	0.939	100	73.0	LOS F	32.1	226.3	Full	500	0.0	0.0
Lane 3	472	1.0	503	0.939	100	73.0	LOS F	32.1	226.3	Full	500	0.0	0.0
Approach	1301	0.7		0.939		57.0	LOS E	32.1	226.3				
NorthWest: Showground Road													
Lane 1	429	0.0	962	0.446	100	25.5	LOS B	14.3	99.9	Short	50	0.0	69.3
Lane 2	429	0.0	962	0.446	100	25.5	LOS B	14.3	99.9	Short	120	0.0	0.0
Lane 3	305	2.0	367	0.829	100	52.4	LOS D	17.3	123.3	Full	500	0.0	0.0
Lane 4	305	2.0	367	0.829	100	52.4	LOS D	17.3	123.3	Full	500	0.0	0.0
Approach	1468	0.8		0.829		36.7	LOS C	17.3	123.3				
Intersection	4063	0.7		0.939		43.4	LOS D	42.8	299.3				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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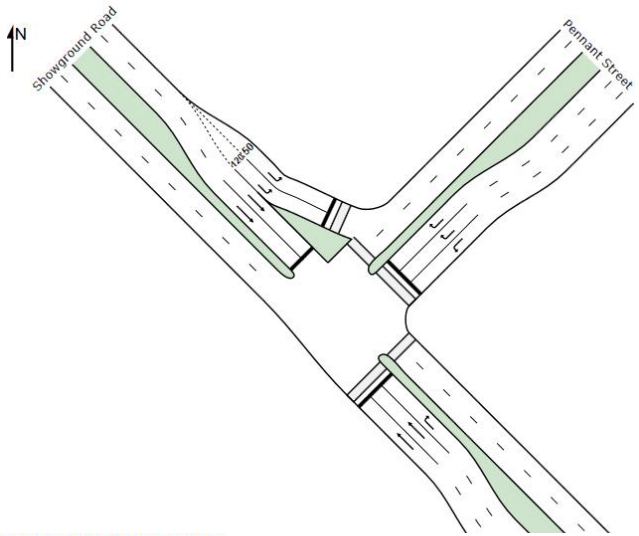
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

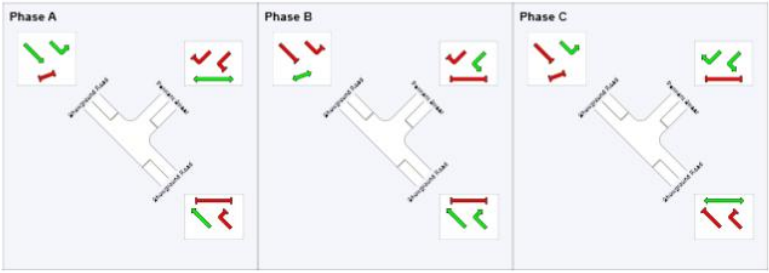
Site: Saturday Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	42	29
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	48	35
Phase Split	25 %	44 %	32 %



LANE SUMMARY

Site: Saturday Peak - 2016 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	431	1.0	1215	0.355	100	10.4	LOS A	10.9	76.9	Full	150	0.0	0.0
Lane 2	431	1.0	1215	0.355	100	10.4	LOS A	10.9	76.9	Full	150	0.0	0.0
Lane 3	821	1.0	704	1.166	100	221.5	LOS F	104.7	739.2	Full	100	0.0	100.0
Approach	1683	1.0		1.166		113.4	LOS F	104.7	739.2				
NorthEast: Pennant Street													
Lane 1	556	1.0	1291	0.431	100	15.7	LOS B	12.6	88.8	Full	500	0.0	0.0
Lane 2	574	1.0	486	1.180	100	237.2	LOS F	74.1	523.5	Full	500	0.0	9.1
Lane 3	574	1.0	486	1.180	100	237.2	LOS F	74.1	523.5	Full	500	0.0	9.1
Approach	1703	1.0		1.180		164.9	LOS F	74.1	523.5				
NorthWest: Showground Road													
Lane 1	475	0.0	945	0.502	100	26.8	LOS B	16.6	116.4	Short	50	0.0	84.1
Lane 2	475	0.0	945	0.502	100	26.8	LOS B	16.6	116.4	Short	120	0.0	2.2[8]
Lane 3	361	1.0	370	0.976	100	81.8	LOS F	26.6	188.1	Full	500	0.0	0.0
Lane 4	361	1.0	370	0.976	100	81.8	LOS F	26.6	188.1	Full	500	0.0	0.0
Approach	1672	0.4		0.976		50.6	LOS D	26.6	188.1				
Intersection	5058	0.8		1.180		110.0	LOS F	104.7	739.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

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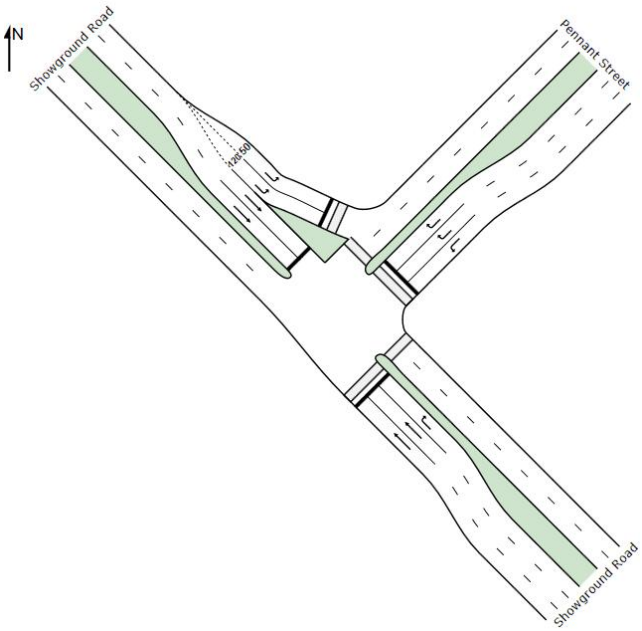
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

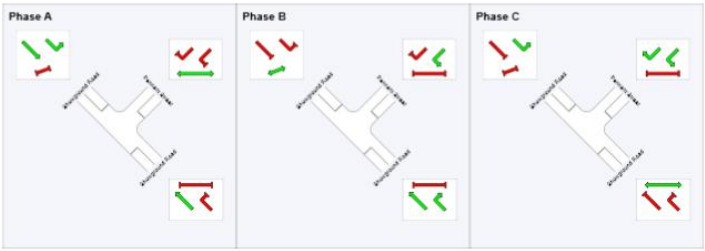
Site: AM Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	38	33
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	44	39
Phase Split	25 %	40 %	35 %



LANE SUMMARY

Site: AM Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	307	4.0	1123	0.273	100	11.6	LOS A	7.9	57.1	Full	150	0.0	0.0
Lane 2	307	4.0	1123	0.273	100	11.6	LOS A	7.9	57.1	Full	150	0.0	0.0
Lane 3	657	0.0	642	1.024	100	111.1	LOS F	57.8	404.5	Full	100	0.0	100.0
Approach	1271	1.9		1.024		63.0	LOS E	57.8	404.5				
NorthEast: Pennant Street													
Lane 1	264	1.0	1291	0.205	100	14.3	LOS A	4.9	34.3	Full	500	0.0	0.0
Lane 2	556	3.0	545	1.020	100	110.7	LOS F	48.1	345.7	Full	500	0.0	0.0
Lane 3	556	3.0	545	1.020	100	110.7	LOS F	48.1	345.7	Full	500	0.0	0.0
Approach	1377	2.6		1.020		92.2	LOS F	48.1	345.7				
NorthWest: Showground Road													
Lane 1	281	4.0	985	0.285	100	22.1	LOS B	8.0	57.9	Short	50	0.0	18.3
Lane 2	281	4.0	985	0.285	100	22.1	LOS B	8.0	57.9	Short	120	0.0	0.0
Lane 3	378	3.0	365	1.036	100	115.9	LOS F	33.4	239.5	Full	500	0.0	0.0
Lane 4	378	3.0	365	1.036	100	115.9	LOS F	33.4	239.5	Full	500	0.0	0.0
Approach	1319	3.4		1.036		76.0	LOS F	33.4	239.5				
Intersection	3966	2.7		1.036		77.4	LOS F	57.8	404.5				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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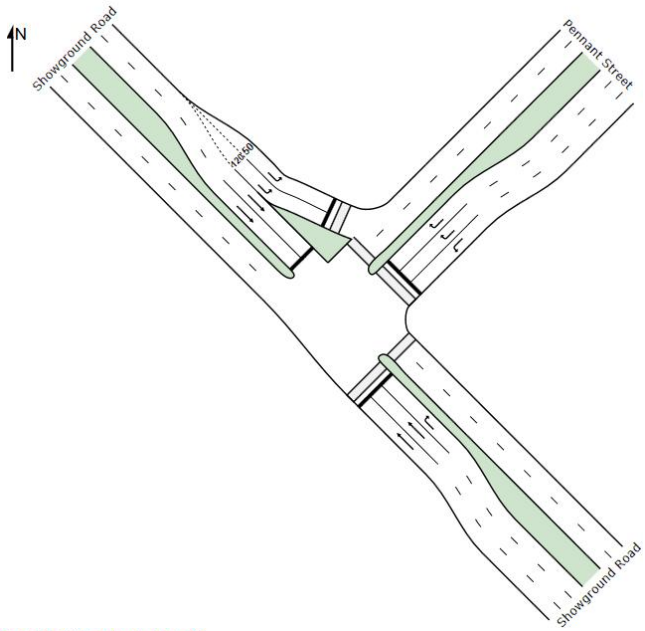
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

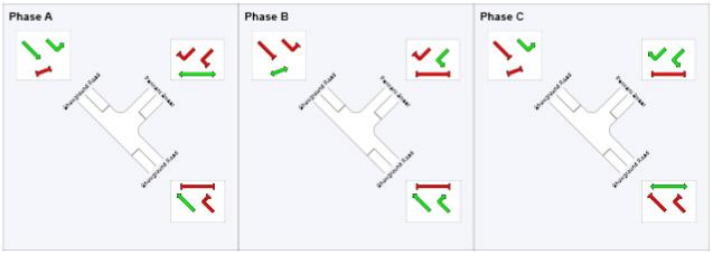
Site: PM Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	44	27
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	50	33
Phase Split	25 %	45 %	30 %



LANE SUMMARY

Site: PM Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	403	1.0	1251	0.322	100	9.2	LOS A	9.5	67.1	Full	150	0.0	0.0
Lane 2	403	1.0	1251	0.322	100	9.2	LOS A	9.5	67.1	Full	150	0.0	0.0
Lane 3	831	0.0	743	1.118	100	180.1	LOS F	95.2	666.3	Full	100	0.0	100.0
Approach	1637	0.5		1.118		95.9	LOS F	95.2	666.3				
NorthEast: Pennant Street													
Lane 1	377	0.0	1300	0.290	100	14.7	LOS B	7.5	52.2	Full	500	0.0	0.0
Lane 2	510	1.0	453	1.127	100	192.7	LOS F	58.4	412.3	Full	500	0.0	0.0
Lane 3	510	1.0	453	1.127	100	192.7	LOS F	58.4	412.3	Full	500	0.0	0.0
Approach	1397	0.7		1.127		144.7	LOS F	58.4	412.3				
NorthWest: Showground Road													
Lane 1	458	0.0	912	0.503	100	28.0	LOS B	16.5	115.3	Short	50	0.0	83.2
Lane 2	458	0.0	912	0.503	100	28.0	LOS B	16.5	115.3	Short	120	0.0	1.4[8]
Lane 3	341	2.0	367	0.928	100	66.0	LOS E	22.4	159.3	Full	500	0.0	0.0
Lane 4	341	2.0	367	0.928	100	66.0	LOS E	22.4	159.3	Full	500	0.0	0.0
Approach	1599	0.9		0.928		44.2	LOS D	22.4	159.3				
Intersection	4633	0.7		1.127		92.8	LOS F	95.2	666.3				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

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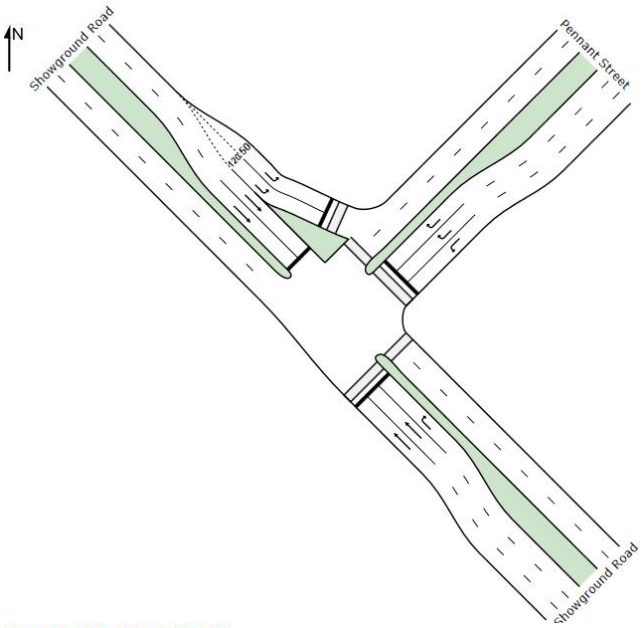
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade



PHASING SUMMARY

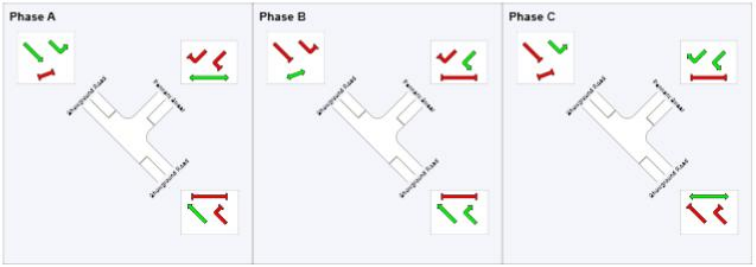
Site: Saturday Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	21	42	29
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	27	48	35
Phase Split	25 %	44 %	32 %



LANE SUMMARY

Site: Saturday Peak - 2026 With Development

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (Practical Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	431	1.0	1215	0.355	100	10.4	LOS A	10.9	76.9	Full	150	0.0	0.0
Lane 2	431	1.0	1215	0.355	100	10.4	LOS A	10.9	76.9	Full	150	0.0	0.0
Lane 3	821	0.0	709	1.158	100	214.3	LOS F	102.8	719.9	Full	100	0.0	100.0
Approach	1683	0.5		1.158		109.9	LOS F	102.8	719.9				
NorthEast: Pennant Street													
Lane 1	556	0.0	1300	0.428	100	15.6	LOS B	12.5	87.7	Full	500	0.0	0.0
Lane 2	574	1.0	486	1.180	100	237.2	LOS F	74.1	523.5	Full	500	0.0	9.1
Lane 3	574	1.0	486	1.180	100	237.2	LOS F	74.1	523.5	Full	500	0.0	9.1
Approach	1703	0.7		1.180		164.9	LOS F	74.1	523.5				
NorthWest: Showground Road													
Lane 1	475	0.0	945	0.502	100	26.8	LOS B	16.6	116.4	Short	50	0.0	84.1
Lane 2	475	0.0	945	0.502	100	26.8	LOS B	16.6	116.4	Short	120	0.0	2.2[8]
Lane 3	361	2.0	367	0.982	100	84.8	LOS F	27.1	193.3	Full	500	0.0	0.0
Lane 4	361	2.0	367	0.982	100	84.8	LOS F	27.1	193.3	Full	500	0.0	0.0
Approach	1672	0.9		0.982		51.9	LOS D	27.1	193.3				
Intersection	5058	0.7		1.180		109.2	LOS F	102.8	719.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

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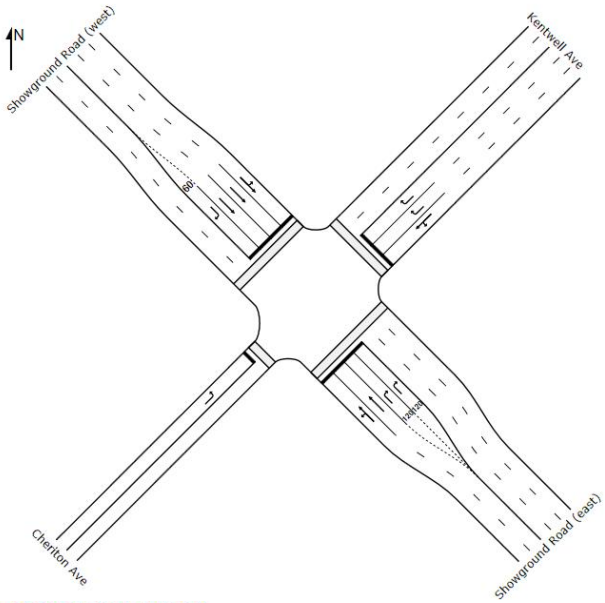
SIDRA INTERSECTION 6

2016 and 2026 “Upgrade” Scenario
Additional Intersection Improvements

SIDRA Outputs

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



PHASING SUMMARY

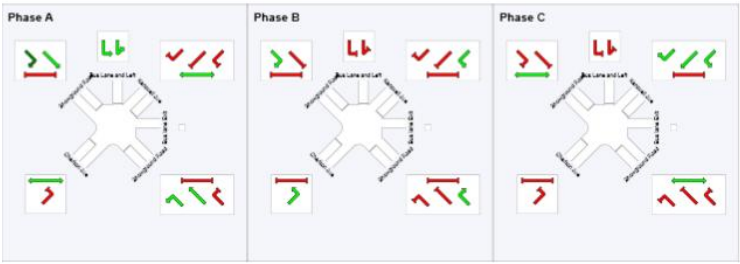
Site: AM Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	102	13	17
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	108	19	23
Phase Split	72 %	13 %	15 %



LANE SUMMARY

Site: AM Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	705	3.5	1300	0.543	100	13.9	LOS A	25.5	184.0	Full	500	0.0	0.0
Lane 2	709	4.0	1306	0.543	100	12.8	LOS A	25.6	185.6	Full	500	0.0	0.0
Lane 3	76	0.0	158	0.482	100	80.0	LOS F	5.5	38.5	Short	120	0.0	0.0
Lane 4	76	0.0	158	0.482	100	80.0	LOS F	5.5	38.5	Short	120	0.0	0.0
Approach	1566	3.4		0.543		19.8	LOS B	25.6	185.6				
NorthEast: Kentwell Ave													
Lane 1	51	0.0	363	0.139	100	59.5	LOS E	3.0	21.2	Full	500	0.0	0.0
Lane 2	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Lane 3	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Approach	184	0.0		0.318		70.1	LOS E	4.6	32.1				
North: Bus Lane and Left Turn													
Lane 1	727	2.2	1093	0.665	100	23.9	LOS B	30.5	217.4	Full	500	0.0	0.0
Approach	727	2.2		0.665		23.9	LOS B	30.5	217.4				
NorthWest: Showground Road (west)													
Lane 1	577	4.0	1306	0.442	100	11.5	LOS A	18.8	136.3	Full	500	0.0	0.0
Lane 2	577	4.0	1306	0.442	100	11.5	LOS A	18.8	136.3	Full	500	0.0	0.0
Lane 3	206	0.0	309	0.669	100	44.5	LOS D	14.2	99.2	Short	60	0.0	51.2
Approach	1361	3.4		0.669		16.5	LOS B	18.8	136.3				
SouthWest: Cheriton Ave													
Lane 1	80	2.0	159	0.504	100	80.0	LOS F	5.8	41.2	Full	500	0.0	0.0
Approach	80	2.0		0.504		80.0	LOS F	5.8	41.2				
Intersection	3919	3.0		0.669		23.0	LOS B	30.5	217.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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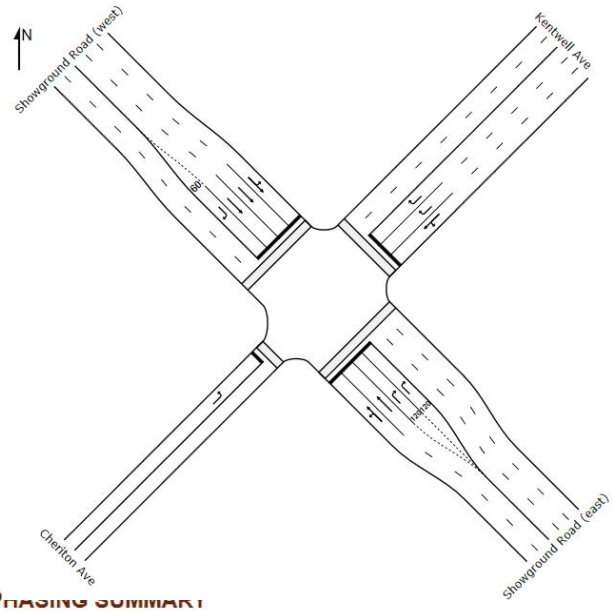
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



PHASING SUMMARY

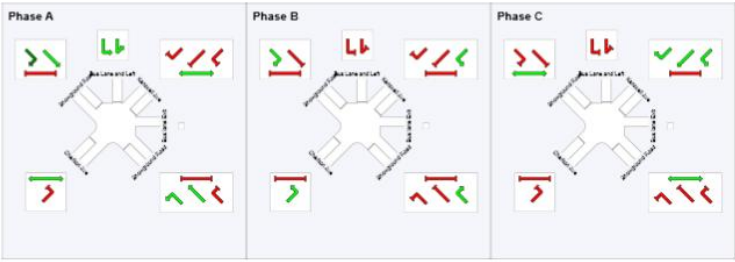
Site: PM Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	87	8	37
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	93	14	43
Phase Split	62 %	9 %	29 %



LANE SUMMARY

Site: PM Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	734	0.9	1129	0.650	100	23.3	LOS B	35.5	250.1	Full	500	0.0	0.0
Lane 2	727	1.0	1117[1]	0.650	100	22.1	LOS B	34.7	245.3	Full	500	0.0	0.0
Lane 3	65	1.0	97	0.674	100	87.9	LOS F	5.0	35.5	Short	120	0.0	0.0
Lane 4	65	1.0	97	0.674	100	87.9	LOS F	5.0	35.5	Short	120	0.0	0.0
Approach	1592	0.9		0.674		28.1	LOS B	35.5	250.1				
NorthEast: Kentwell Ave													
Lane 1	135	0.0	611	0.220	100	45.1	LOS D	7.0	49.0	Full	500	0.0	0.0
Lane 2	318	0.0	458	0.695	100	62.4	LOS E	21.2	148.4	Full	500	0.0	0.0
Lane 3	318	0.0	458	0.695	100	62.4	LOS E	21.2	148.4	Full	500	0.0	0.0
Approach	772	0.0		0.695		59.4	LOS E	21.2	148.4				
North: Bus Lane and Left Turn													
Lane 1	527	3.0	929	0.568	100	29.9	LOS C	23.8	170.5	Full	500	0.0	0.0
Approach	527	3.0		0.568		29.9	LOS C	23.8	170.5				
NorthWest: Showground Road (west)													
Lane 1	804	1.0	1135	0.708	100	23.6	LOS B	41.0	289.7	Full	500	0.0	0.0
Lane 2	533	1.0	752[1]	0.708	100	19.1	LOS B	22.0	155.2	Full	500	0.0	0.0
Lane 3	102	0.0	210	0.487	100	49.7	LOS D	6.7	46.9	Short	60	0.0	0.0
Approach	1439	0.9		0.708		23.8	LOS B	41.0	289.7				
SouthWest: Cheriton Ave													
Lane 1	36	0.0	99	0.361	100	84.8	LOS F	2.7	18.6	Full	500	0.0	0.0
Approach	36	0.0		0.361		84.8	LOS F	2.7	18.6				
Intersection	4365	1.0		0.708		32.9	LOS C	41.0	289.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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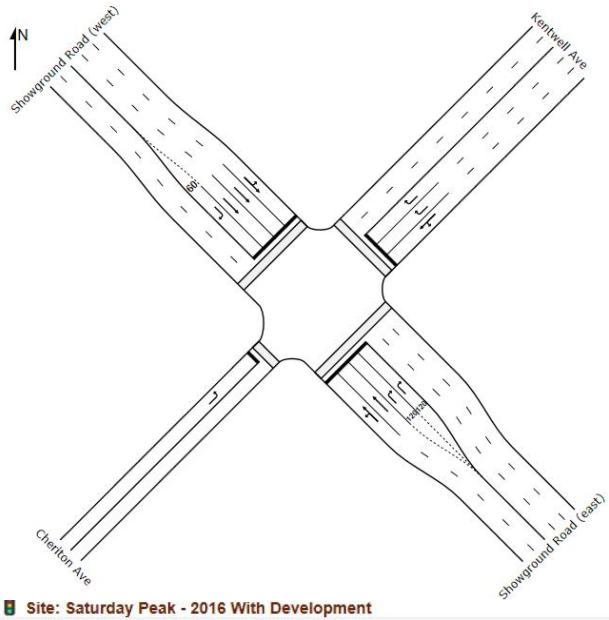
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



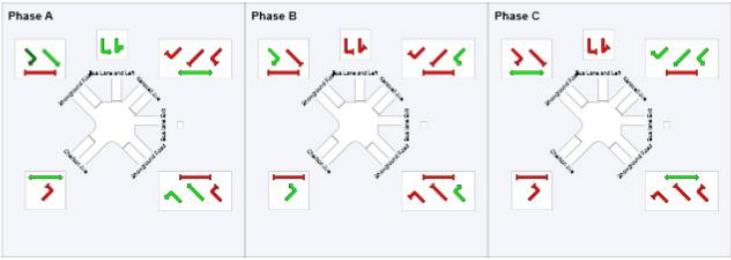
Site: Saturday Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	88	7	37
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	94	13	43
Phase Split	63 %	9 %	29 %



LANE SUMMARY

Site: Saturday Peak - 2016 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	823	0.9	1141	0.721	100	24.5	LOS B	42.3	297.9	Full	500	0.0	0.0
Lane 2	808	1.0	1121[1]	0.721	100	23.0	LOS B	40.7	287.7	Full	500	0.0	0.0
Lane 3	64	0.0	85	0.746	100	90.5	LOS F	5.0	35.1	Short	120	0.0	0.0
Lane 4	64	0.0	85	0.746	100	90.5	LOS F	5.0	35.1	Short	120	0.0	0.0
Approach	1759	0.9		0.746		28.6	LOS C	42.3	297.9				
NorthEast: Kentwell Ave													
Lane 1	136	0.0	614	0.221	100	45.3	LOS D	7.0	49.3	Full	500	0.0	0.0
Lane 2	334	0.0	458	0.728	100	63.1	LOS E	22.5	157.5	Full	500	0.0	0.0
Lane 3	334	0.0	458	0.728	100	63.1	LOS E	22.5	157.5	Full	500	0.0	0.0
Approach	803	0.0		0.728		60.1	LOS E	22.5	157.5				
North: Bus Lane and Left Turn													
Lane 1	634	2.5	942	0.673	100	31.5	LOS C	31.1	222.6	Full	500	0.0	0.0
Approach	634	2.5		0.673		31.5	LOS C	31.1	222.6				
NorthWest: Showground Road (west)													
Lane 1	859	1.0	1148	0.748	100	24.0	LOS B	45.3	319.9	Full	500	0.0	0.0
Lane 2	530	1.0	709[1]	0.748	100	18.5	LOS B	21.5	151.7	Full	500	0.0	0.0
Lane 3	107	0.0	174	0.617	100	62.5	LOS E	8.0	55.9	Short	60	0.0	0.0
Approach	1497	0.9		0.748		24.8	LOS B	45.3	319.9				
SouthWest: Cheriton Ave													
Lane 1	32	0.0	87	0.364	100	86.2	LOS F	2.4	16.6	Full	500	0.0	0.0
Approach	32	0.0		0.364		86.2	LOS F	2.4	16.6				
Intersection	4724	0.9		0.748		33.5	LOS C	45.3	319.9				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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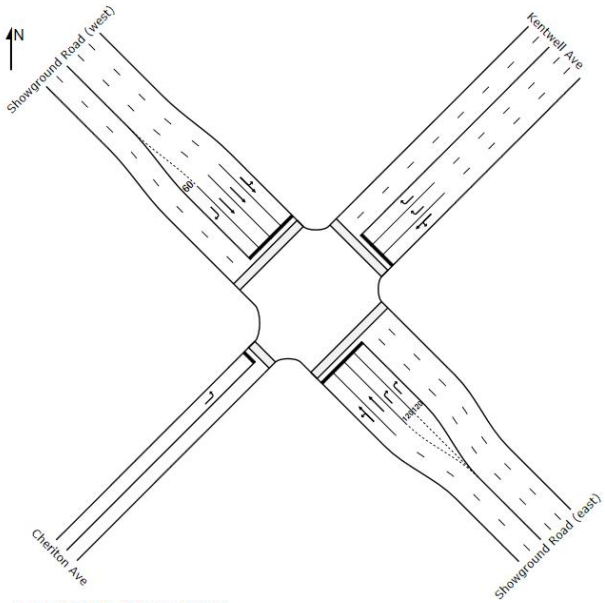
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



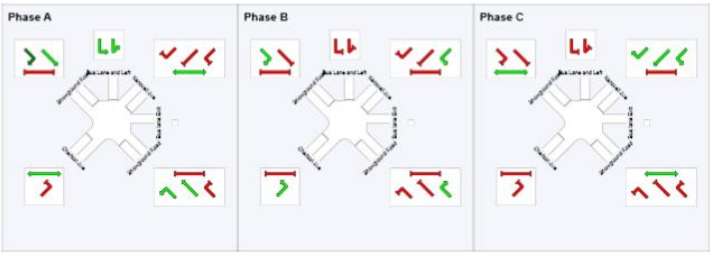
Site: AM Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	98	17	17
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	104	23	23
Phase Split	69 %	15 %	15 %



LANE SUMMARY

Site: AM Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	793	3.5	1248	0.635	100	17.5	LOS B	33.6	241.9	Full	500	0.0	0.0
Lane 2	785	4.0	1237[1]	0.635	100	16.0	LOS B	32.9	238.2	Full	500	0.0	0.0
Lane 3	74	0.0	207	0.358	100	74.8	LOS F	5.1	35.9	Short	120	0.0	0.0
Lane 4	74	0.0	207	0.358	100	74.8	LOS F	5.1	35.9	Short	120	0.0	0.0
Approach	1726	3.4		0.635		21.7	LOS B	33.6	241.9				
NorthEast: Kentwell Ave													
Lane 1	44	0.0	394	0.112	100	57.5	LOS E	2.6	18.1	Full	500	0.0	0.0
Lane 2	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Lane 3	67	0.0	210	0.318	100	74.1	LOS F	4.6	32.1	Full	500	0.0	0.0
Approach	178	0.0		0.318		70.0	LOS E	4.6	32.1				
North: Bus Lane and Left Turn													
Lane 1	728	2.2	1050	0.694	100	26.5	LOS B	33.2	236.4	Full	500	0.0	0.0
Approach	728	2.2		0.694		26.5	LOS B	33.2	236.4				
NorthWest: Showground Road (west)													
Lane 1	872	4.0	1255	0.695	100	17.4	LOS B	39.6	286.8	Full	500	0.0	0.0
Lane 2	393	4.0	565[1]	0.695	100	11.9	LOS A	12.2	88.3	Full	500	0.0	0.0
Lane 3	214	0.0	318	0.672	100	56.6	LOS E	14.6	102.1	Short	60	0.0	53.9
Approach	1479	3.4		0.695		21.6	LOS B	39.6	286.8				
SouthWest: Cheriton Ave													
Lane 1	51	2.0	208	0.243	100	73.6	LOS F	3.4	24.4	Full	500	0.0	0.0
Approach	51	2.0		0.243		73.6	LOS F	3.4	24.4				
Intersection	4162	3.0		0.695		25.2	LOS B	39.6	286.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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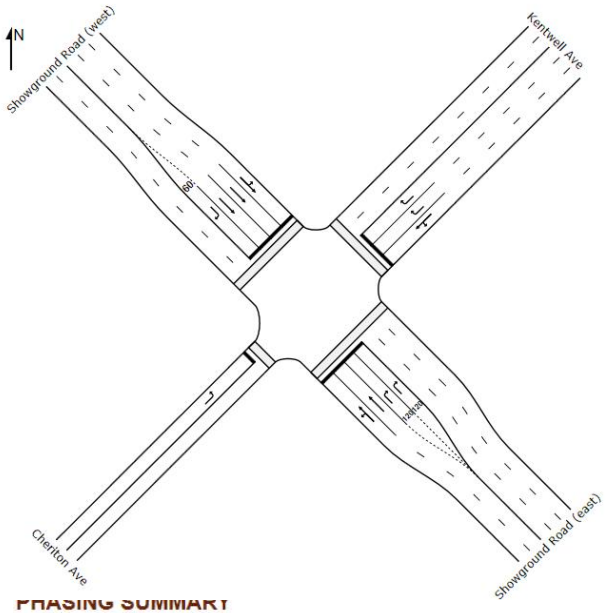
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



PHASING SUMMARY

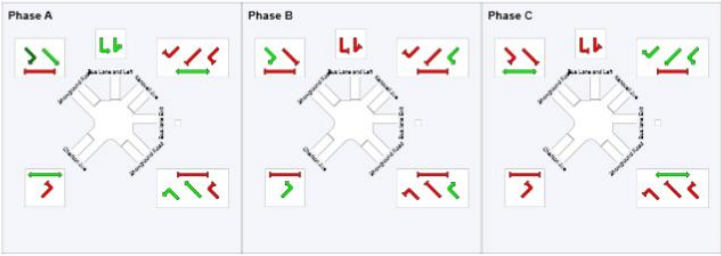
Site: PM Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	87	8	37
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	93	14	43
Phase Split	62 %	9 %	29 %



LANE SUMMARY

Site: PM Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	734	0.9	1129	0.650	100	23.3	LOS B	35.5	250.1	Full	500	0.0	0.0
Lane 2	727	1.0	1117[1]	0.650	100	22.1	LOS B	34.7	245.3	Full	500	0.0	0.0
Lane 3	65	1.0	97	0.674	100	87.9	LOS F	5.0	35.5	Short	120	0.0	0.0
Lane 4	65	1.0	97	0.674	100	87.9	LOS F	5.0	35.5	Short	120	0.0	0.0
Approach	1592	0.9		0.674		28.1	LOS B	35.5	250.1				
NorthEast: Kentwell Ave													
Lane 1	135	0.0	611	0.220	100	45.1	LOS D	7.0	49.0	Full	500	0.0	0.0
Lane 2	318	0.0	458	0.695	100	62.4	LOS E	21.2	148.4	Full	500	0.0	0.0
Lane 3	318	0.0	458	0.695	100	62.4	LOS E	21.2	148.4	Full	500	0.0	0.0
Approach	772	0.0		0.695		59.4	LOS E	21.2	148.4				
North: Bus Lane and Left Turn													
Lane 1	527	3.0	929	0.568	100	29.9	LOS C	23.8	170.5	Full	500	0.0	0.0
Approach	527	3.0		0.568		29.9	LOS C	23.8	170.5				
NorthWest: Showground Road (west)													
Lane 1	793	1.0	1135	0.699	100	23.4	LOS B	40.1	283.1	Full	500	0.0	0.0
Lane 2	528	1.0	756[1]	0.699	100	19.0	LOS B	21.7	153.2	Full	500	0.0	0.0
Lane 3	102	0.0	210	0.487	100	49.7	LOS D	6.7	46.9	Short	60	0.0	0.0
Approach	1423	0.9		0.699		23.7	LOS B	40.1	283.1				
SouthWest: Cheriton Ave													
Lane 1	36	0.0	99	0.361	100	84.8	LOS F	2.7	18.6	Full	500	0.0	0.0
Approach	36	0.0		0.361		84.8	LOS F	2.7	18.6				
Intersection	4349	1.0		0.699		32.9	LOS C	40.1	283.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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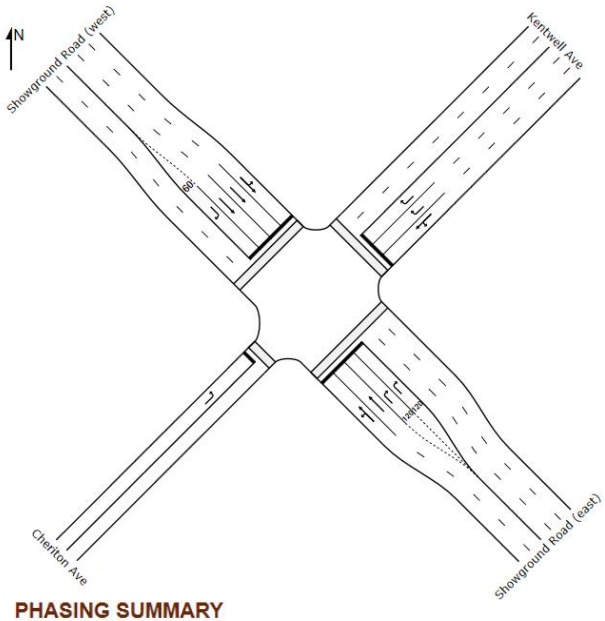
SIDRA INTERSECTION 6

Showground Road/Kentwell Avenue – Upgrade (3 Phases)



PHASING SUMMARY

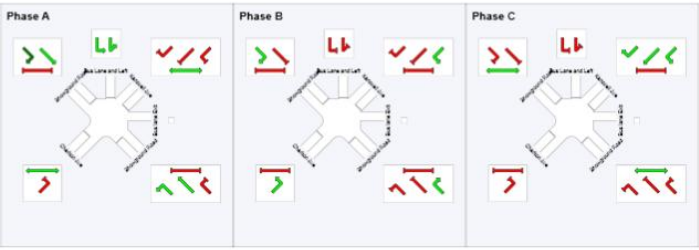
Site: Saturday Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Opposed Turns
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	92	7	33
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	98	13	39
Phase Split	65 %	9 %	26 %



LANE SUMMARY

Site: Saturday Peak - 2026 With Development

Kentwell Ave / Showground Rd AM Peak 2016
Signals - Fixed Time Cycle Time = 150 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road (east)													
Lane 1	954	0.9	1193	0.799	100	24.2	LOS B	51.8	365.2	Full	500	0.0	0.0
Lane 2	932	1.0	1165[1]	0.799	100	22.5	LOS B	49.2	347.2	Full	500	0.0	0.0
Lane 3	62	0.0	85	0.728	100	90.1	LOS F	4.9	34.1	Short	120	0.0	0.0
Lane 4	62	0.0	85	0.728	100	90.1	LOS F	4.9	34.1	Short	120	0.0	0.0
Approach	2009	0.9		0.799		27.5	LOS B	51.8	365.2				
NorthEast: Kentwell Ave													
Lane 1	136	0.0	565	0.240	100	48.5	LOS D	7.4	51.5	Full	500	0.0	0.0
Lane 2	334	0.0	409	0.817	100	71.5	LOS F	24.5	171.8	Full	500	0.0	0.0
Lane 3	334	0.0	409	0.817	100	71.5	LOS F	24.5	171.8	Full	500	0.0	0.0
Approach	803	0.0		0.817		67.7	LOS E	24.5	171.8				
North: Bus Lane and Left Turn													
Lane 1	635	2.5	984	0.645	100	28.7	LOS C	29.2	208.6	Full	500	0.0	0.0
Approach	635	2.5		0.645		28.7	LOS C	29.2	208.6				
NorthWest: Showground Road (west)													
Lane 1	975	1.0	1201	0.812	100	23.5	LOS B	53.8	379.8	Full	500	0.0	0.0
Lane 2	551	1.0	679[1]	0.812	100	19.4	LOS B	22.7	160.0	Full	500	0.0	0.0
Lane 3	116	0.0	155	0.748	100	80.8	LOS F	9.4	65.9	Short	60	0.0	13.5
Approach	1642	0.9		0.812		26.2	LOS B	53.8	379.8				
SouthWest: Cheriton Ave													
Lane 1	14	0.0	87	0.158	100	84.7	LOS F	1.0	7.1	Full	500	0.0	0.0
Approach	14	0.0		0.158		84.7	LOS F	1.0	7.1				
Intersection	5103	1.0		0.817		33.7	LOS C	53.8	379.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

1 Reduced capacity due to a short lane effect

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SIDRA INTERSECTION 6.0.14.4193
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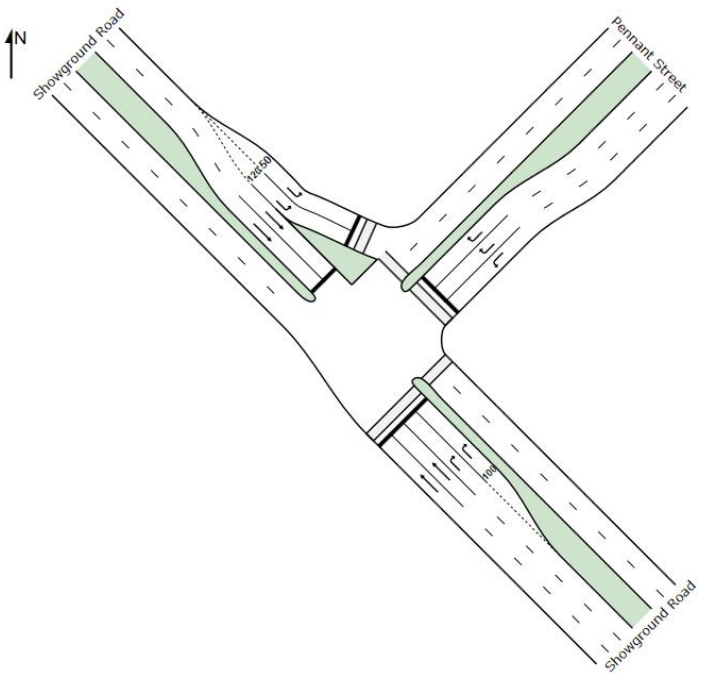
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

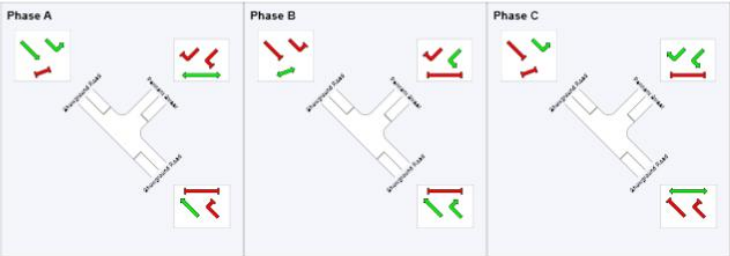
Site: AM Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	26	21	45
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	32	27	51
Phase Split	29 %	25 %	46 %



LANE SUMMARY

Site: AM Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	230	4.0	916	0.251	100	17.8	LOS B	7.2	51.9	Full	150	0.0	0.0
Lane 2	230	4.0	916	0.251	100	17.8	LOS B	7.2	51.9	Full	150	0.0	0.0
Lane 3	256	0.0	355	0.721	100	55.3	LOS D	13.5	94.2	Full	100	0.0	0.0
Lane 4	256	0.0	355	0.721	100	55.3	LOS D	13.5	94.2	Short	100	0.0	0.0
Approach	972	1.9		0.721		37.5	LOS C	13.5	94.2				
NorthEast: Pennant Street													
Lane 1	243	1.0	1207	0.201	100	16.2	LOS B	5.1	35.9	Full	500	0.0	0.0
Lane 2	553	3.0	744	0.744	100	37.6	LOS C	25.2	180.7	Full	500	0.0	0.0
Lane 3	553	3.0	744	0.744	100	37.6	LOS C	25.2	180.7	Full	500	0.0	0.0
Approach	1349	2.6		0.744		33.7	LOS C	25.2	180.7				
NorthWest: Showground Road													
Lane 1	265	4.0	1264	0.210	100	14.0	LOS A	4.9	35.5	Short	50	0.0	0.0
Lane 2	265	4.0	1264	0.210	100	14.0	LOS A	4.9	35.5	Short	120	0.0	0.0
Lane 3	341	3.0	452	0.754	100	44.3	LOS D	17.8	127.6	Full	500	0.0	0.0
Lane 4	341	3.0	452	0.754	100	44.3	LOS D	17.8	127.6	Full	500	0.0	0.0
Approach	1213	3.4		0.754		31.1	LOS C	17.8	127.6				
Intersection	3534	2.7		0.754		33.9	LOS C	25.2	180.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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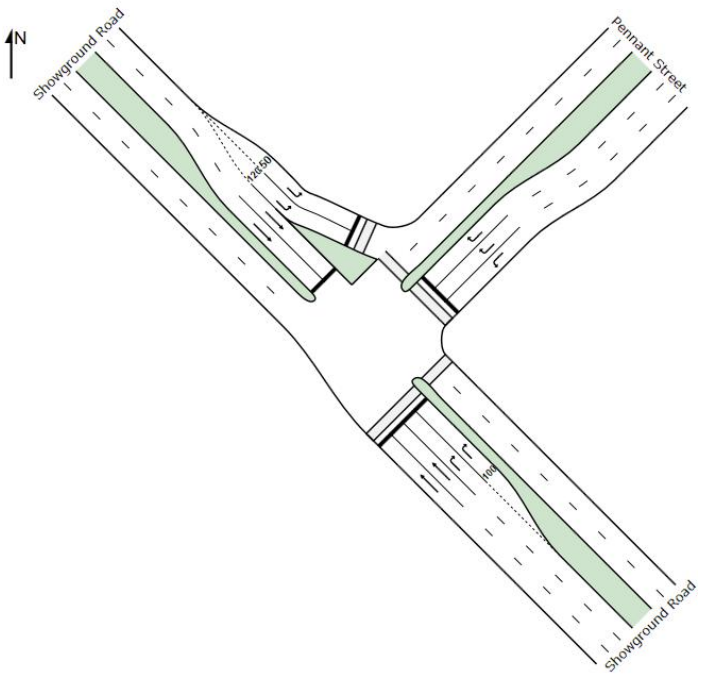
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

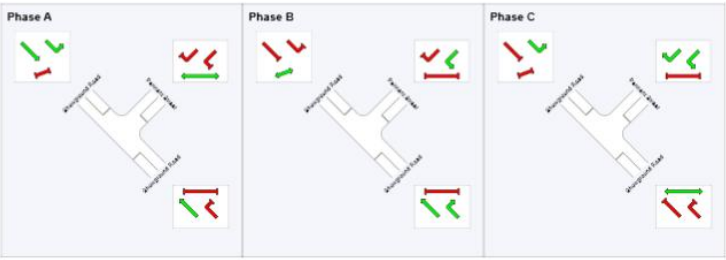
Site: PM Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	25	27	40
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	31	33	46
Phase Split	28 %	30 %	42 %



LANE SUMMARY

Site: PM Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	324	1.0	1022	0.317	100	15.6	LOS B	9.7	68.7	Full	150	0.0	0.0
Lane 2	324	1.0	1022	0.317	100	15.6	LOS B	9.7	68.7	Full	150	0.0	0.0
Lane 3	323	0.0	456	0.708	100	49.9	LOS D	16.2	113.3	Full	100	0.0	16.3[8]
Lane 4	323	0.0	456	0.708	100	49.9	LOS D	16.2	113.3	Short	100	0.0	16.3
Approach	1294	0.5		0.708		32.8	LOS C	16.2	113.3				
NorthEast: Pennant Street													
Lane 1	357	0.0	1232	0.290	100	16.3	LOS B	7.8	54.7	Full	500	0.0	0.0
Lane 2	472	1.0	671	0.704	100	40.2	LOS C	21.7	153.1	Full	500	0.0	0.0
Lane 3	472	1.0	671	0.704	100	40.2	LOS C	21.7	153.1	Full	500	0.0	0.0
Approach	1301	0.7		0.704		33.6	LOS C	21.7	153.1				
NorthWest: Showground Road													
Lane 1	429	0.0	1199	0.358	100	17.4	LOS B	10.4	73.1	Short	50	0.0	39.7
Lane 2	429	0.0	1199	0.358	100	17.4	LOS B	10.4	73.1	Short	120	0.0	0.0
Lane 3	305	2.0	437	0.697	100	43.0	LOS D	15.3	109.2	Full	500	0.0	0.0
Lane 4	305	2.0	437	0.697	100	43.0	LOS D	15.3	109.2	Full	500	0.0	0.0
Approach	1468	0.8		0.697		28.0	LOS B	15.3	109.2				
Intersection	4063	0.7		0.708		31.3	LOS C	21.7	153.1				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

Processed: Thursday, 10 October 2013 11:23:15 AM
SIDRA INTERSECTION 6.0.14.4193
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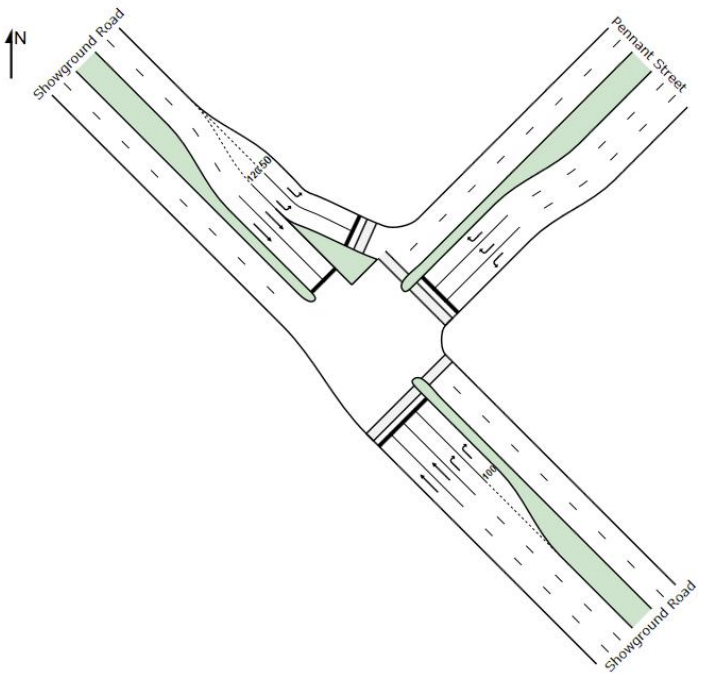
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

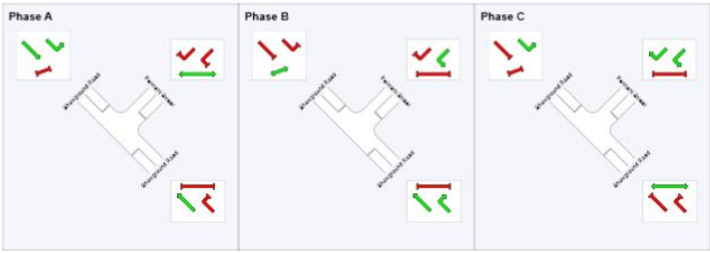
Site: Saturday Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	24	28	40
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	30	34	46
Phase Split	27 %	31 %	42 %



LANE SUMMARY

Site: Saturday Peak - 2016 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	431	1.0	1022	0.422	100	16.8	LOS B	13.9	97.9	Full	150	0.0	0.0
Lane 2	431	1.0	1022	0.422	100	16.8	LOS B	13.9	97.9	Full	150	0.0	0.0
Lane 3	411	1.0	469	0.875	100	60.8	LOS E	24.4	172.4	Full	100	0.0	55.2[8]
Lane 4	411	1.0	469	0.875	100	60.8	LOS E	24.4	172.4	Short	100	0.0	55.2
Approach	1683	1.0		0.875		38.2	LOS C	24.4	172.4				
NorthEast: Pennant Street													
Lane 1	556	1.0	1241	0.448	100	17.1	LOS B	13.7	96.9	Full	500	0.0	0.0
Lane 2	574	1.0	671	0.856	100	50.0	LOS D	31.8	224.8	Full	500	0.0	0.0
Lane 3	574	1.0	671	0.856	100	50.0	LOS D	31.8	224.8	Full	500	0.0	0.0
Approach	1703	1.0		0.856		39.3	LOS C	31.8	224.8				
NorthWest: Showground Road													
Lane 1	475	0.0	1182	0.402	100	18.2	LOS B	12.2	85.7	Short	50	0.0	54.6
Lane 2	475	0.0	1182	0.402	100	18.2	LOS B	12.2	85.7	Short	120	0.0	0.0
Lane 3	361	1.0	423	0.854	100	52.4	LOS D	20.9	147.7	Full	500	0.0	0.0
Lane 4	361	1.0	423	0.854	100	52.4	LOS D	20.9	147.7	Full	500	0.0	0.0
Approach	1672	0.4		0.854		33.0	LOS C	20.9	147.7				
Intersection	5058	0.8		0.875		36.9	LOS C	31.8	224.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

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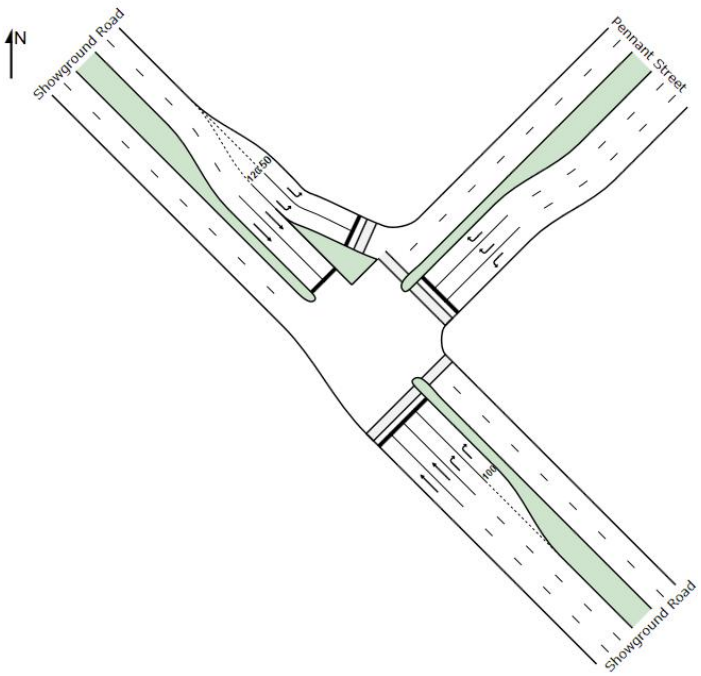
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

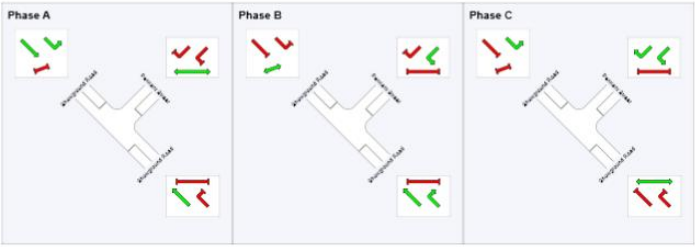
Site: AM Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	27	24	41
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	33	30	47
Phase Split	30 %	27 %	43 %



LANE SUMMARY

Site: AM Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	307	4.0	985	0.312	100	16.2	LOS B	9.3	67.5	Full	150	0.0	0.0
Lane 2	307	4.0	985	0.312	100	16.2	LOS B	9.3	67.5	Full	150	0.0	0.0
Lane 3	328	0.0	405	0.811	100	57.2	LOS E	18.2	127.4	Full	100	0.0	27.0[8]
Lane 4	328	0.0	405	0.811	100	57.2	LOS E	18.2	127.4	Short	100	0.0	27.0
Approach	1271	1.9		0.811		37.4	LOS C	18.2	127.4				
NorthEast: Pennant Street													
Lane 1	264	1.0	1190	0.222	100	16.7	LOS B	5.8	40.6	Full	500	0.0	0.0
Lane 2	556	3.0	678	0.821	100	45.7	LOS D	29.0	208.3	Full	500	0.0	0.0
Lane 3	556	3.0	678	0.821	100	45.7	LOS D	29.0	208.3	Full	500	0.0	0.0
Approach	1377	2.6		0.821		40.1	LOS C	29.0	208.3				
NorthWest: Showground Road													
Lane 1	281	4.0	1215	0.231	100	15.2	LOS B	5.7	41.5	Short	50	0.0	0.0
Lane 2	281	4.0	1215	0.231	100	15.2	LOS B	5.7	41.5	Short	120	0.0	0.0
Lane 3	378	3.0	469	0.806	100	46.4	LOS D	20.6	147.6	Full	500	0.0	0.0
Lane 4	378	3.0	469	0.806	100	46.4	LOS D	20.6	147.6	Full	500	0.0	0.0
Approach	1319	3.4		0.806		33.1	LOS C	20.6	147.6				
Intersection	3966	2.7		0.821		36.9	LOS C	29.0	208.3				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

8 Probability of Blockage has been set on the basis of a queue that overflows from an adjacent short lane.

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SIDRA INTERSECTION 6.0.14.4193
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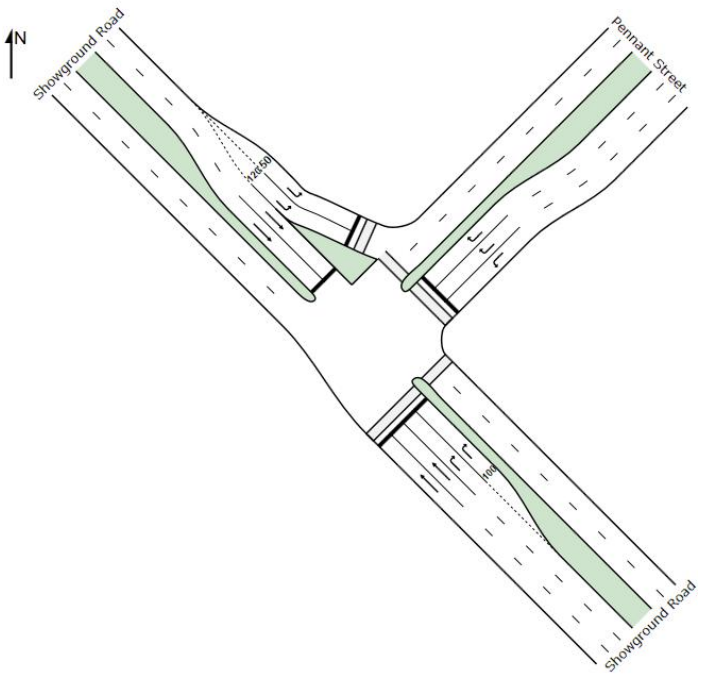
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

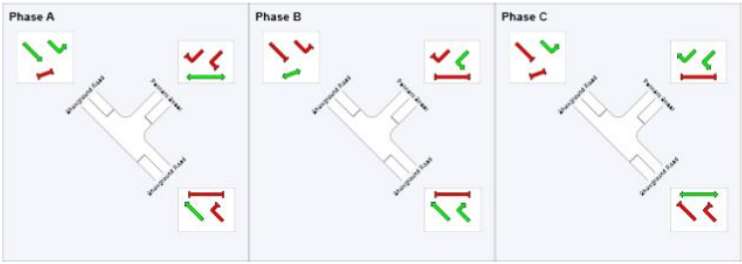
Site: PM Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	26	21	45
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	32	27	51
Phase Split	29 %	25 %	46 %



LANE SUMMARY

Site: PM Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	230	4.0	916	0.251	100	17.8	LOS B	7.2	51.9	Full	150	0.0	0.0
Lane 2	230	4.0	916	0.251	100	17.8	LOS B	7.2	51.9	Full	150	0.0	0.0
Lane 3	256	0.0	355	0.721	100	55.3	LOS D	13.5	94.2	Full	100	0.0	0.0
Lane 4	256	0.0	355	0.721	100	55.3	LOS D	13.5	94.2	Short	100	0.0	0.0
Approach	972	1.9		0.721		37.5	LOS C	13.5	94.2				
NorthEast: Pennant Street													
Lane 1	243	1.0	1207	0.201	100	16.2	LOS B	5.1	35.9	Full	500	0.0	0.0
Lane 2	553	3.0	744	0.744	100	37.6	LOS C	25.2	180.7	Full	500	0.0	0.0
Lane 3	553	3.0	744	0.744	100	37.6	LOS C	25.2	180.7	Full	500	0.0	0.0
Approach	1349	2.6		0.744		33.7	LOS C	25.2	180.7				
NorthWest: Showground Road													
Lane 1	265	4.0	1264	0.210	100	14.0	LOS A	4.9	35.5	Short	50	0.0	0.0
Lane 2	265	4.0	1264	0.210	100	14.0	LOS A	4.9	35.5	Short	120	0.0	0.0
Lane 3	341	3.0	452	0.754	100	44.3	LOS D	17.8	127.6	Full	500	0.0	0.0
Lane 4	341	3.0	452	0.754	100	44.3	LOS D	17.8	127.6	Full	500	0.0	0.0
Approach	1213	3.4		0.754		31.1	LOS C	17.8	127.6				
Intersection	3534	2.7		0.754		33.9	LOS C	25.2	180.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

Processed: Tuesday, 5 November 2013 5:00:29 PM
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Project: G:\21\22830\Technical\Traffic\Technical\SIDRA\Proposed Layouts\7 Pennant St_Showground Rd.sip6
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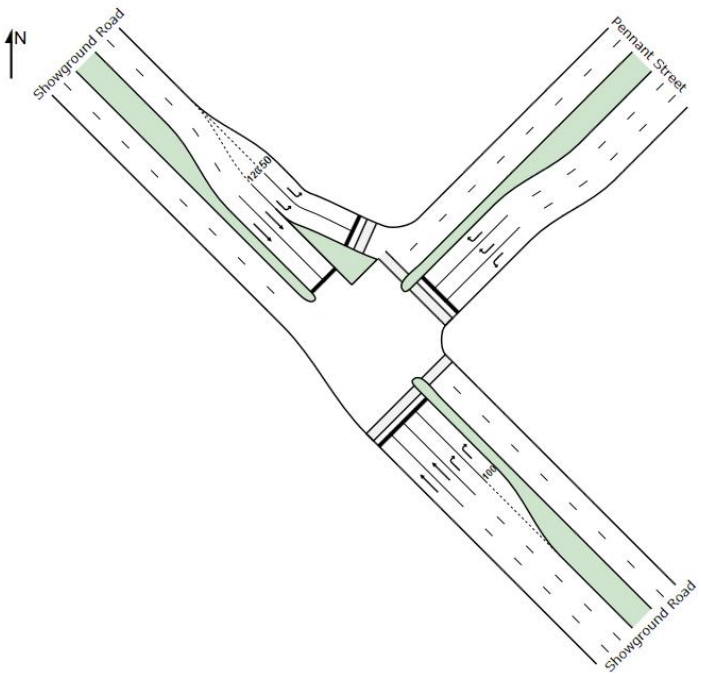
SIDRA INTERSECTION 6

Showground Road/Pennant Street – Upgrade (Double Right Turn)



PHASING SUMMARY

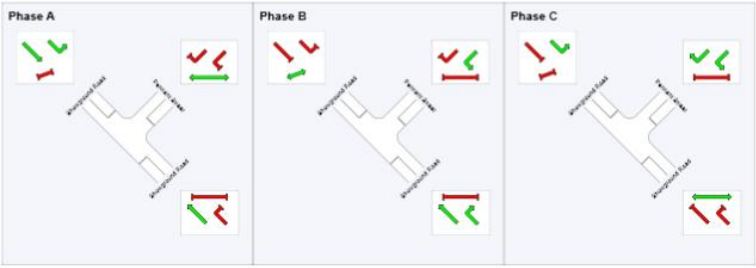
Site: Saturday Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Split Phasing
Movement Class: All Movement Classes
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	24	28	40
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	30	34	46
Phase Split	27 %	31 %	42 %



LANE SUMMARY

Site: Saturday Peak - 2026 With Development - Improvement

Pennant St / Showground Rd AM Peak Existing
Signals - Fixed Time Cycle Time = 110 seconds (User-Given Cycle Time)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
SouthEast: Showground Road													
Lane 1	431	1.0	1022	0.422	100	16.8	LOS B	13.9	97.9	Full	150	0.0	0.0
Lane 2	431	1.0	1022	0.422	100	16.8	LOS B	13.9	97.9	Full	150	0.0	0.0
Lane 3	411	0.0	473	0.868	100	59.9	LOS E	24.2	169.1	Full	100	0.0	53.4
Lane 4	411	0.0	473	0.868	100	59.9	LOS E	24.2	169.1	Short	100	0.0	53.4
Approach	1683	0.5		0.868		37.8	LOS C	24.2	169.1				
NorthEast: Pennant Street													
Lane 1	556	0.0	1249	0.445	100	17.1	LOS B	13.7	95.8	Full	500	0.0	0.0
Lane 2	574	1.0	671	0.856	100	50.0	LOS D	31.8	224.8	Full	500	0.0	0.0
Lane 3	574	1.0	671	0.856	100	50.0	LOS D	31.8	224.8	Full	500	0.0	0.0
Approach	1703	0.7		0.856		39.3	LOS C	31.8	224.8				
NorthWest: Showground Road													
Lane 1	475	0.0	1182	0.402	100	18.2	LOS B	12.2	85.7	Short	50	0.0	54.6
Lane 2	475	0.0	1182	0.402	100	18.2	LOS B	12.2	85.7	Short	120	0.0	0.0
Lane 3	361	2.0	420	0.860	100	53.1	LOS D	21.1	150.1	Full	500	0.0	0.0
Lane 4	361	2.0	420	0.860	100	53.1	LOS D	21.1	150.1	Full	500	0.0	0.0
Approach	1672	0.9		0.860		33.3	LOS C	21.1	150.1				
Intersection	5058	0.7		0.868		36.8	LOS C	31.8	224.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
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.

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Project: G:\21\22830\Technical\Traffic\Technical\SIDRA\Proposed Layouts\7 Pennant St_Showground Rd.sip6
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SIDRA INTERSECTION 6

Appendix E – Proposed intersection layouts

4 / DP258093

3 / DP258093

2 / DP258093

1 / DP258093

213 / DP597104

WALKWAY

133 / DP255043

132 / DP255043

131 / DP255043

0.000

20.000

40.000

47.524 TP

60.000

80.000

BUS ZONE

TIES INTO
EXISTING 2.5m
WIDE PATH

LIMIT OF
SHARED PATH
WORKS

FROM KELLYVILLE

MR157

SHOWGROUND

4.7

LIMIT OF PAVEMENT

WORKS

VAR.

3.3

ROAD

3.3

TO WEST
PENNANT HILLS

PAVEMENT WORKS

3.3

DESIGN CONTROL LINE MC00

3.3

5.0

5.0

LIMIT OF

3.3

3.3

3.8

3.8

ADJOINS SHEET 006

LIMIT OF
FOOTPATH WORKS

TIES INTO
EXISTING FOOTPATH

LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY

1 / DP135696

THE HILLS SHIRE COUNCIL

CARRINGTON ROAD

2 / DP260588

1 / DP260588

111 / DP250610

110 / DP250610

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.

REFER TO SHEETS 034 TO 043 FOR PUBLIC UTILITY DETAILS

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SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

NSW GOVERNMENT Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

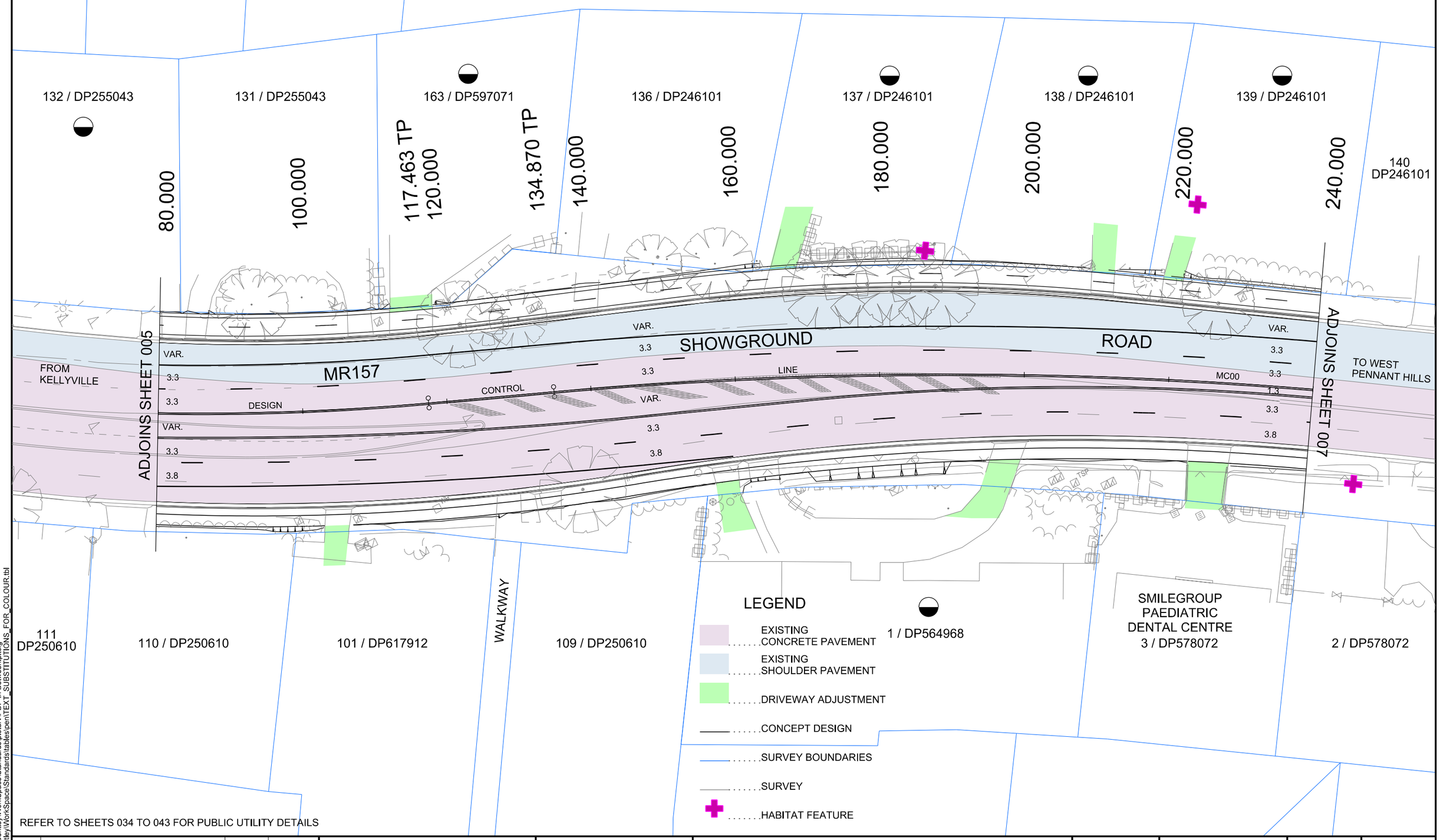
THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.0 - CH.80 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
2013/166348	005.dgn	16/01/2014	005

REGISTRATION NUMBER
DS2013/000926

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.



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SCALES

0 5 10 15 20 25
SCALE 1:500m

Transport Roads & Maritime Services

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REVIEWED. . . . . R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.80 - CH.240 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
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REGISTRATION NUMBER
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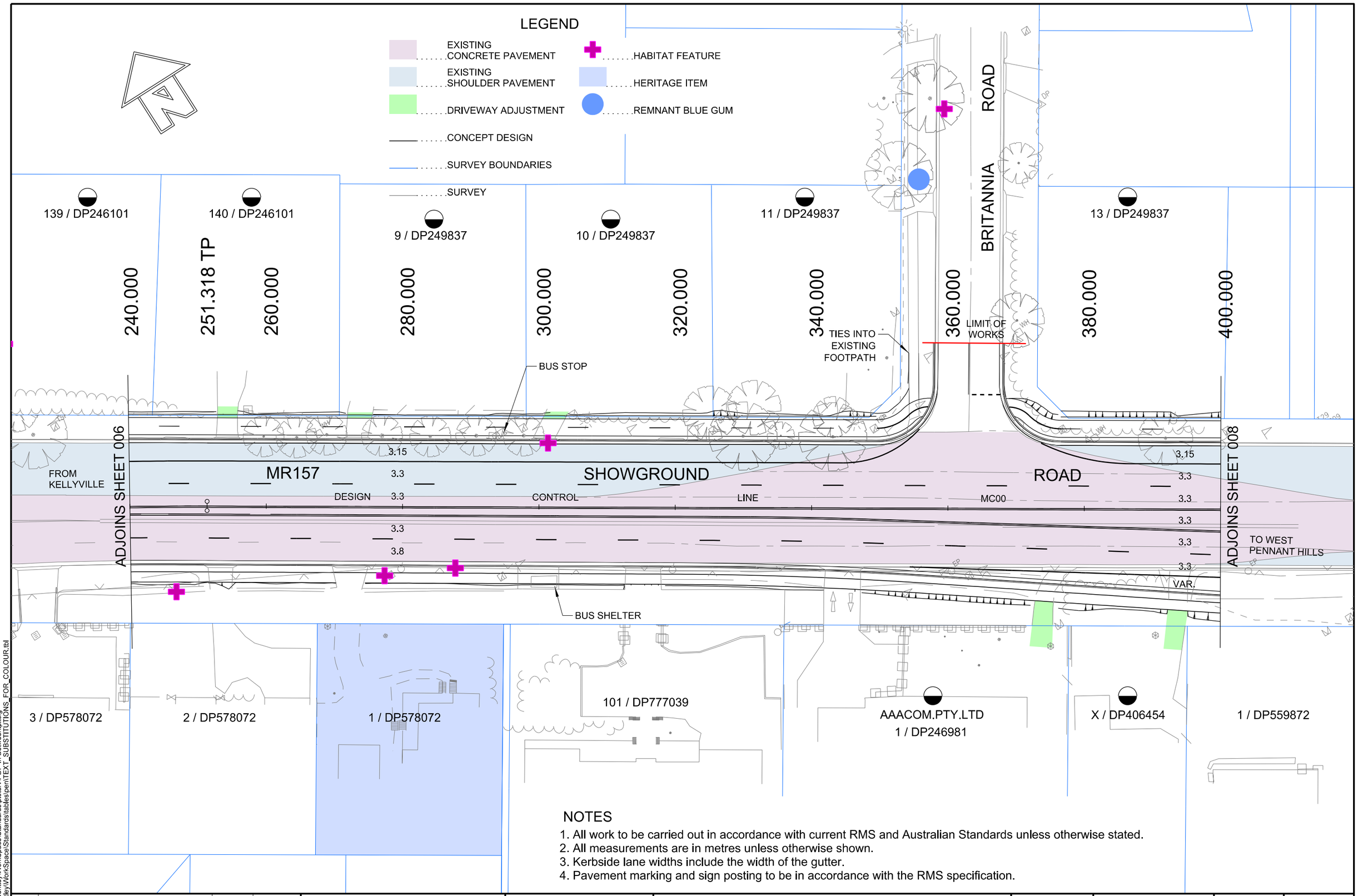

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.

No.	Amendment Description	Initials	Date

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SCALES

0 5 10 15 20 25

SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

Transport Roads & Maritime Services

DESIGNED. V. STANTON

REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.240 - CH.400 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
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REGISTRATION NUMBER

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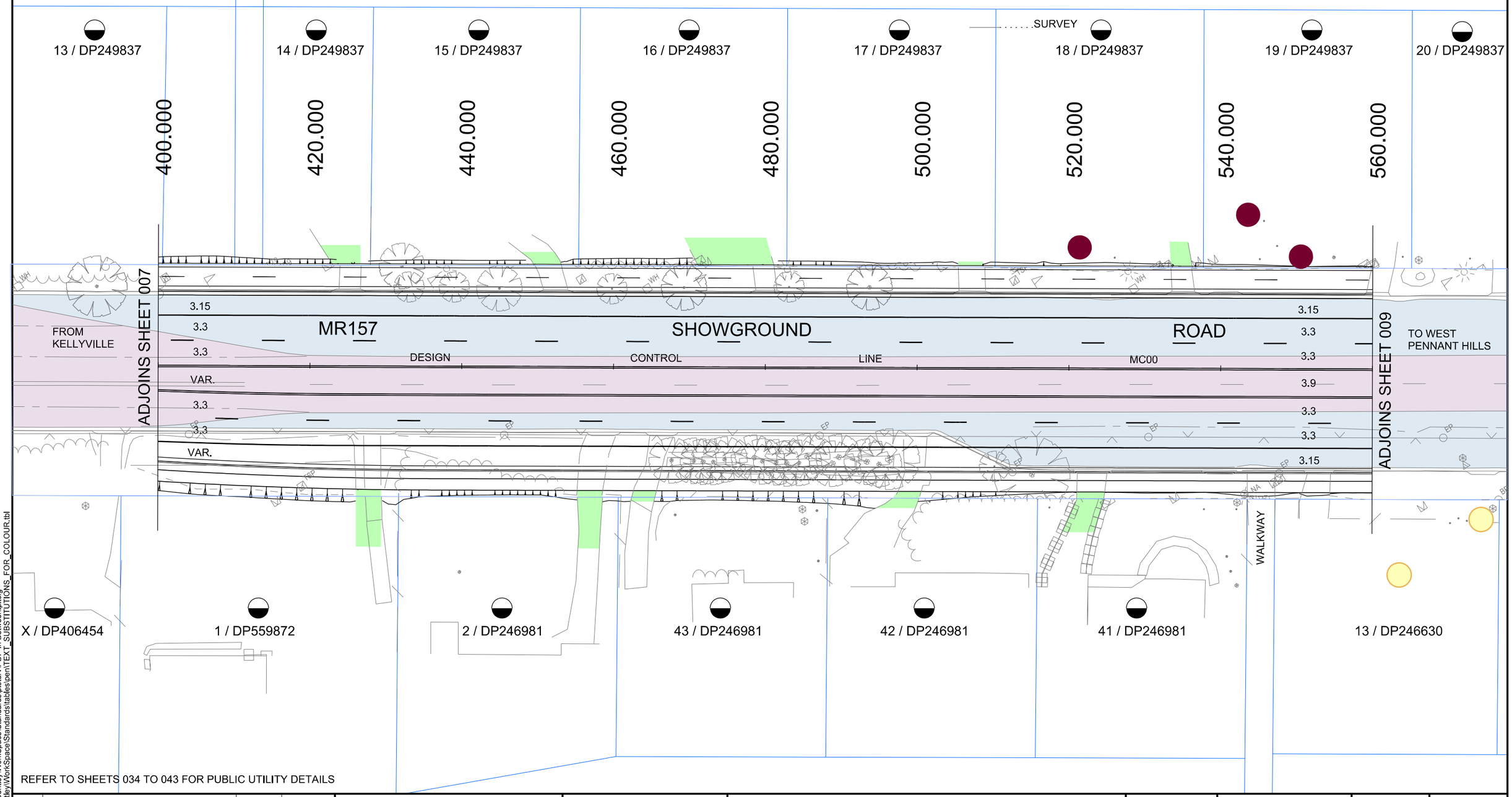
NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.

LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY
- REMNANT BLACKBUTT
- REGENERATING TURPENTINE



REFER TO SHEETS 034 TO 043 FOR PUBLIC UTILITY DETAILS

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No.	Amendment Description	Initials	Date

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SCALES
0 5 10 15 20 25
SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.400 - CH.560 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
2013/166348	008.dgn	16/01/2014	008

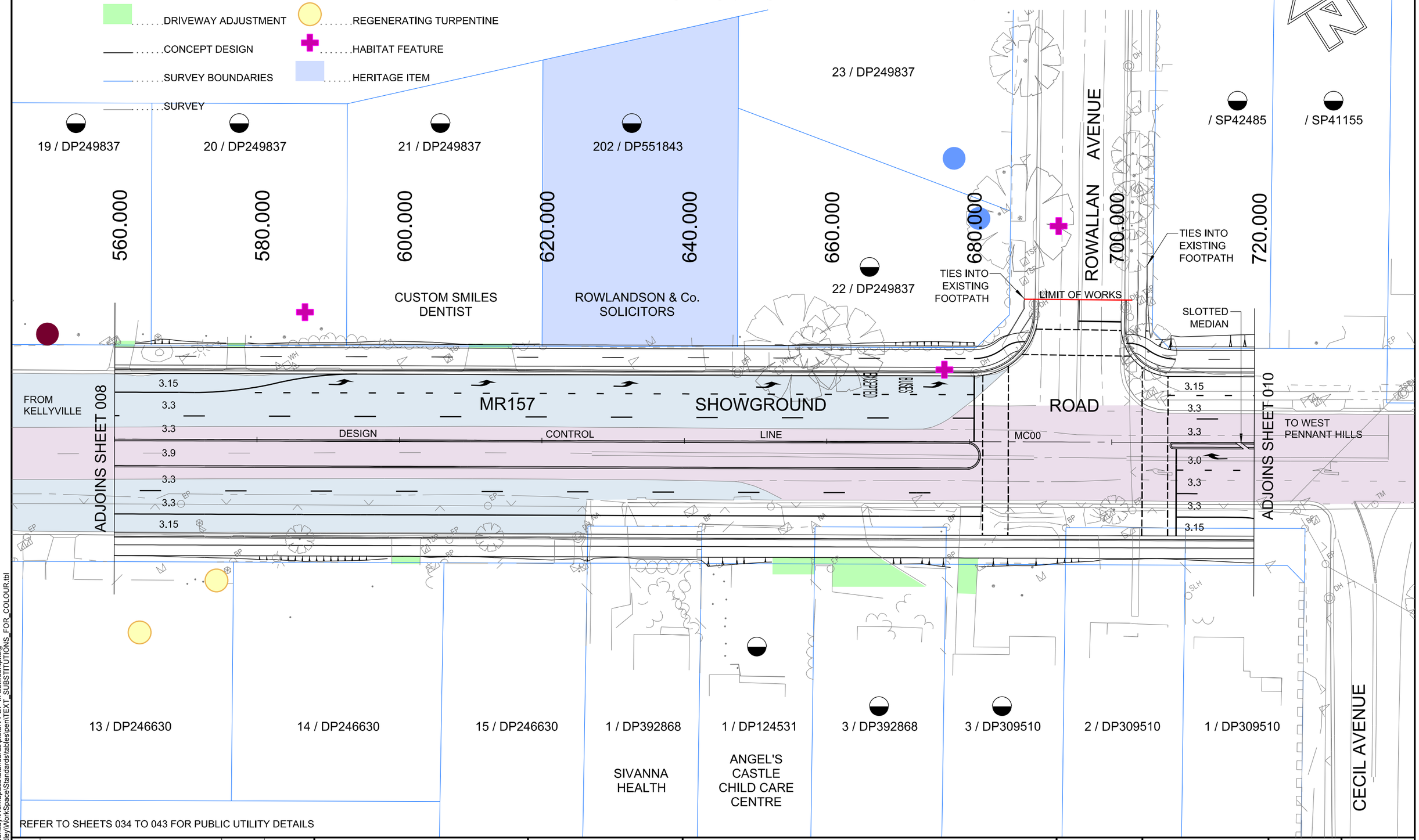
REGISTRATION NUMBER
DS2013/000926

LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY
- REMNANT BLACKBUTT
- REMNANT BLUE GUM
- REGENERATING TURPENTINE
- HABITAT FEATURE
- HERITAGE ITEM

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.



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No.	Amendment Description	Initials	Date

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SCALES

0 5 10 15 20 25
SCALE 1:500m

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REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.560 - CH.720 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
2013/166348	009.dgn	16/01/2014	009

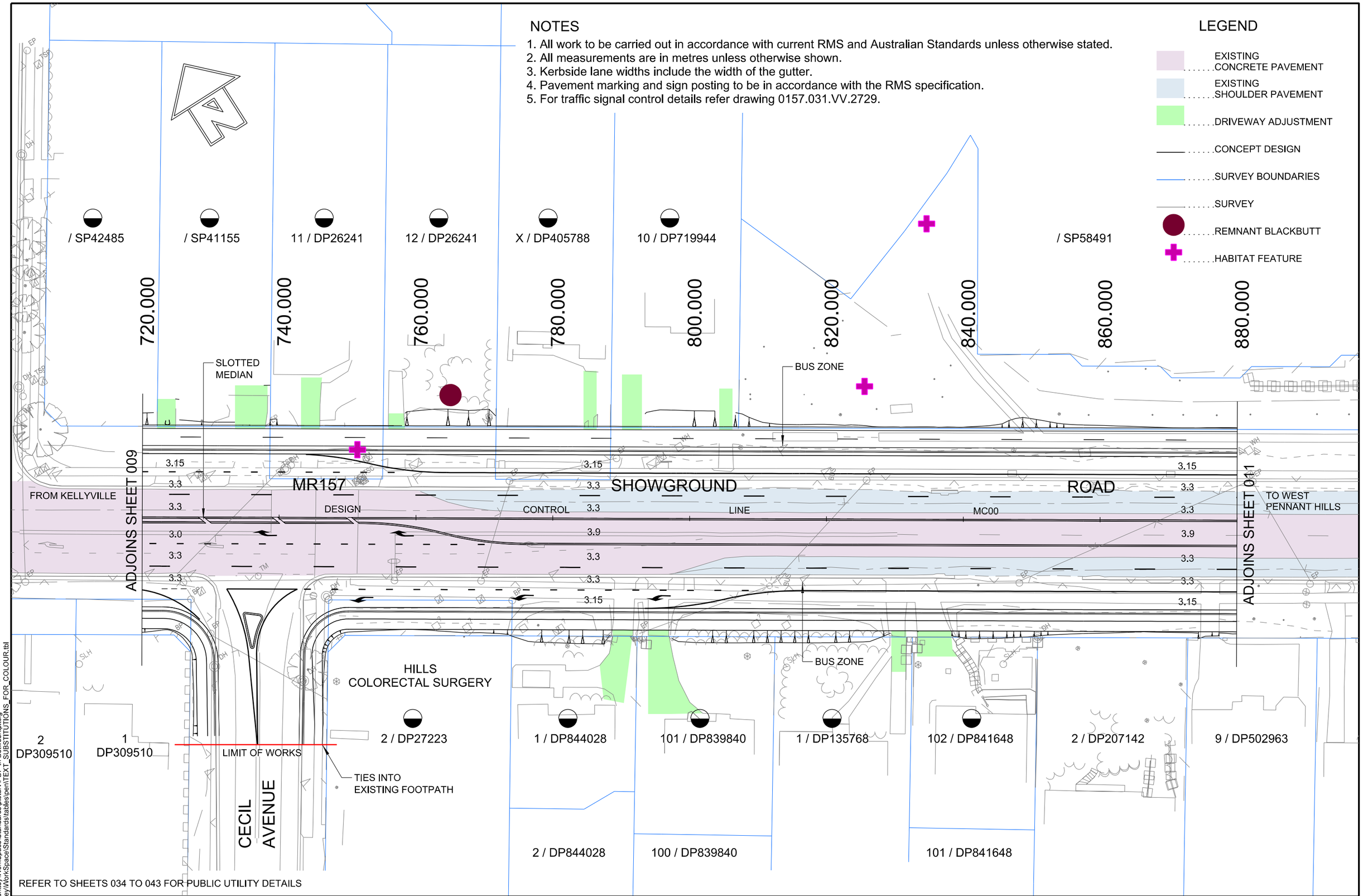
REGISTRATION NUMBER
DS2013/000926

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.
5. For traffic signal control details refer drawing 0157.031.VV.2729.

LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY
- REMNANT BLACKBUTT
- HABITAT FEATURE



REFER TO SHEETS 034 TO 043 FOR PUBLIC UTILITY DETAILS

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Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

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REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.720 - CH.880 (MC00)

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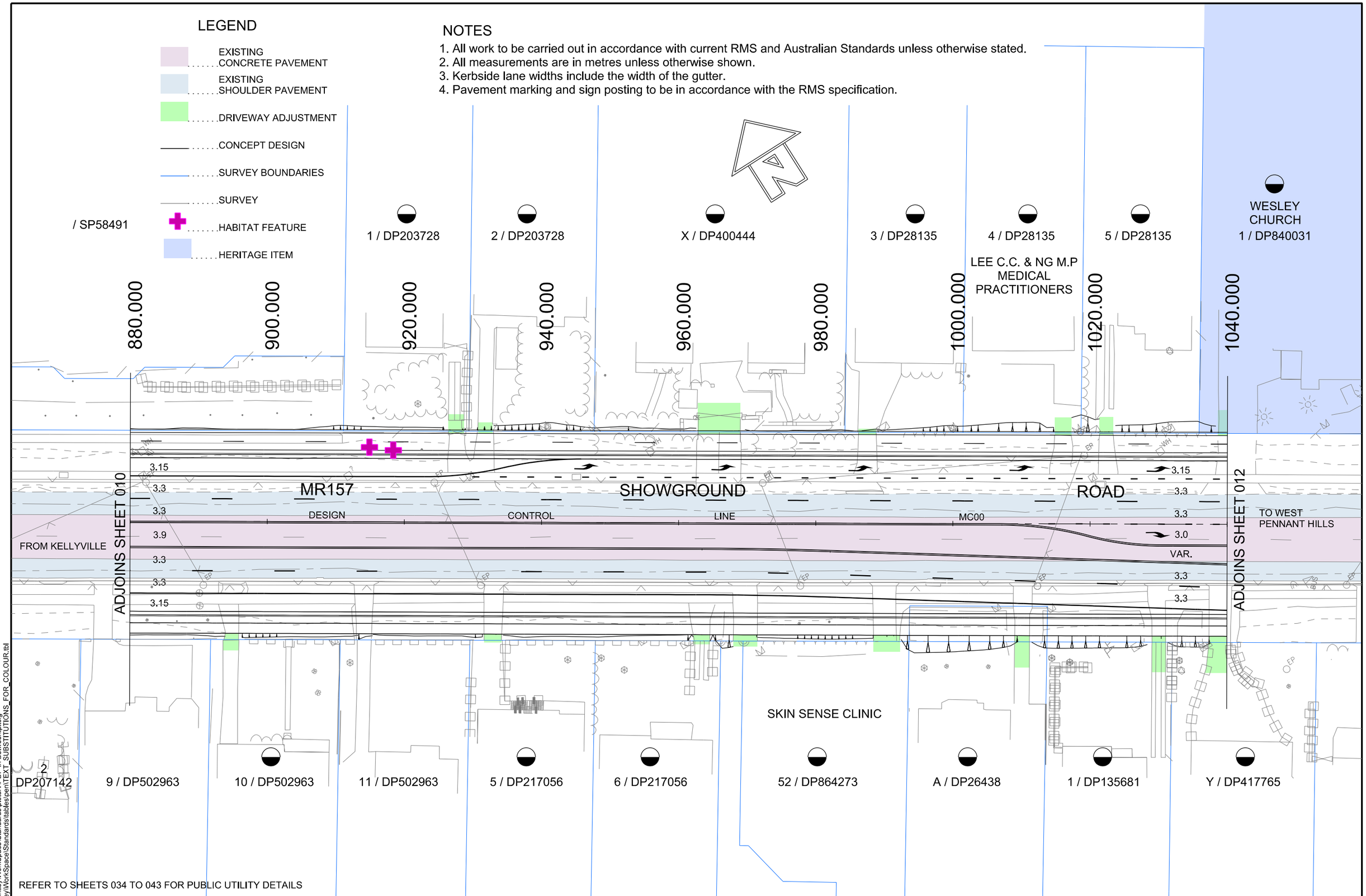
LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY
- HABITAT FEATURE
- HERITAGE ITEM

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.



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SCALES

0 5 10 15 20 25
SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

NSW GOVERNMENT Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.880 - CH.1040 (MC00)

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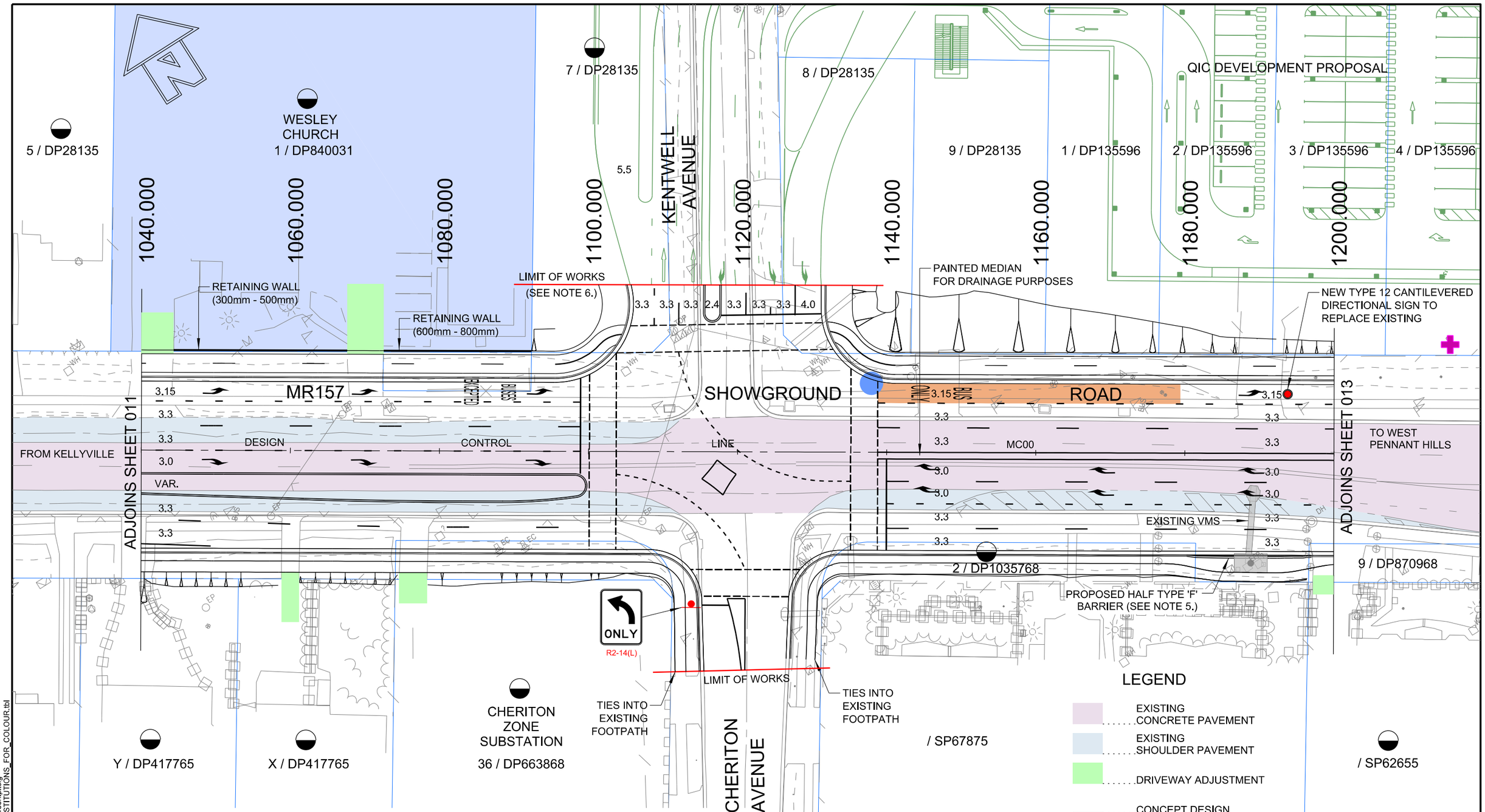

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.
5. Saw cut existing VMS concrete apron to suit proposesd kerb line.
6. QIC development shown in green to be amended by QIC designers to tie in with RMS limit of works.

REFER TO SHEETS 034 TO 043 FOR PUBLIC UTILITY DETAILS

No.	Amendment Description	Initials	Date

A3 original | This sheet may be prepared using colour and may be incomplete if copied

SCALES

0 5 10 15 20 25
SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.1040 - CH.1200 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
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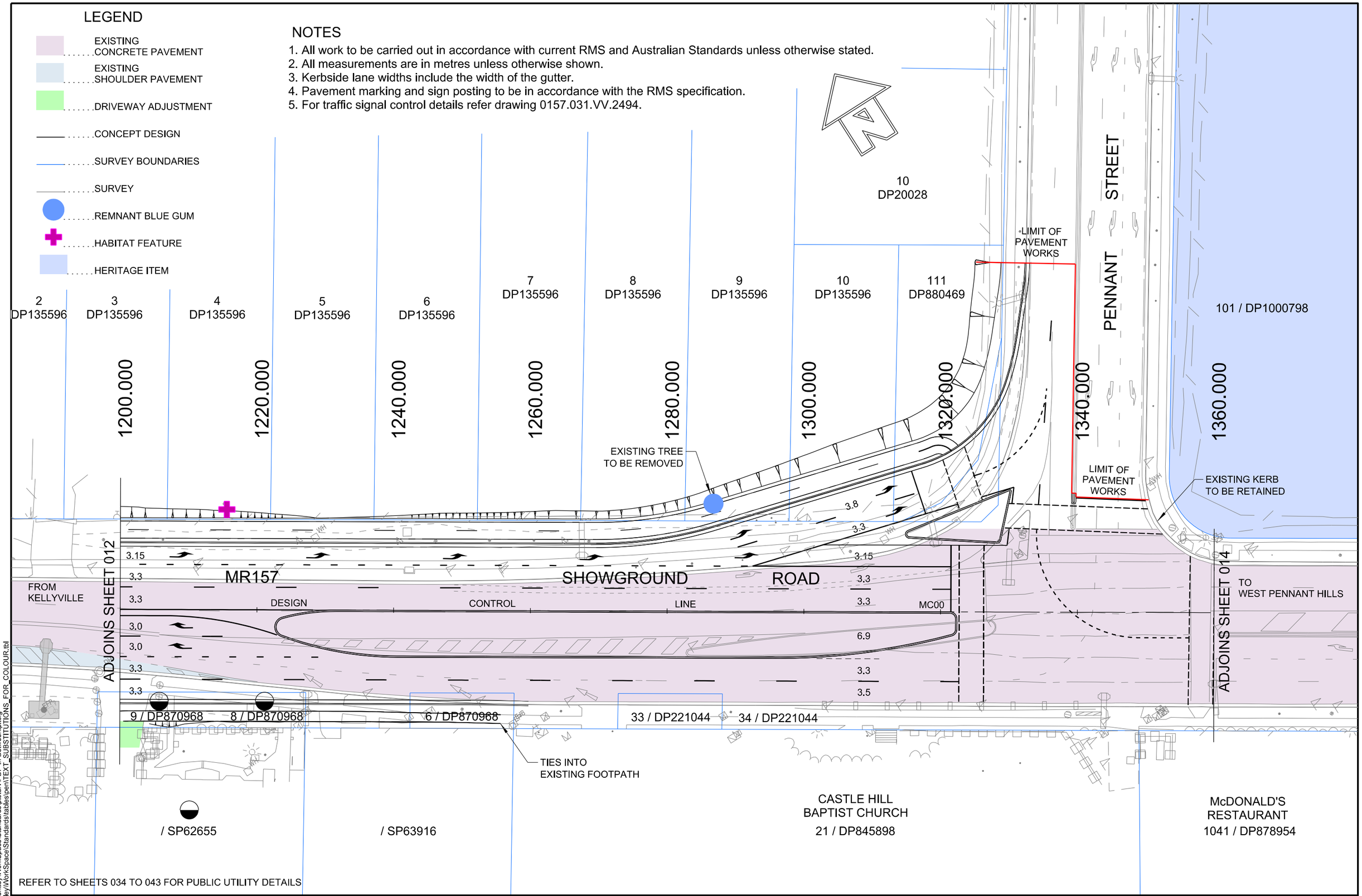
LEGEND

- EXISTING CONCRETE PAVEMENT
- EXISTING SHOULDER PAVEMENT
- DRIVEWAY ADJUSTMENT
- CONCEPT DESIGN
- SURVEY BOUNDARIES
- SURVEY
- REMNANT BLUE GUM
- HABITAT FEATURE
- HERITAGE ITEM

NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.
5. For traffic signal control details refer drawing 0157.031.VV.2494.



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SCALES

0 5 10 15 20 25
SCALE 1:500m

Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.1200 - CH.1360 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
2013/166348	013.dgn	16/01/2014	013

REGISTRATION NUMBER
DS2013/000926

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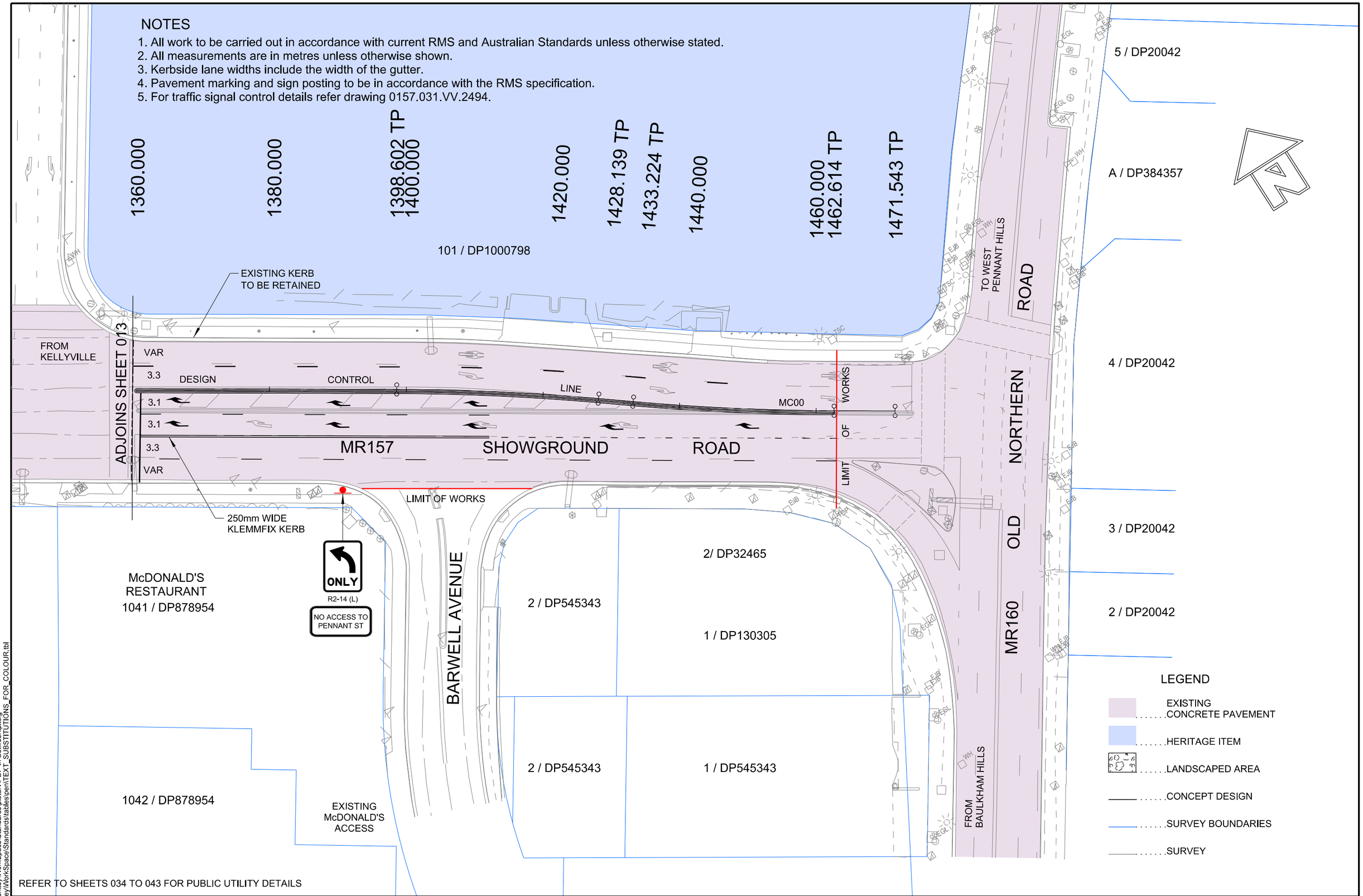
NOTES

1. All work to be carried out in accordance with current RMS and Australian Standards unless otherwise stated.
2. All measurements are in metres unless otherwise shown.
3. Kerbside lane widths include the width of the gutter.
4. Pavement marking and sign posting to be in accordance with the RMS specification.
5. For traffic signal control details refer drawing 0157.031.VV.2494.



REFER TO SHEETS 034 TO 043 FOR PUBLIC UTILITY DETAILS

No.	Amendment Description	Initials	Date

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SCALES

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SCALE 1:500m

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

Transport Roads & Maritime Services

DESIGNED. V. STANTON
REVIEWED. R. TIRICOVSKI

ROADS AND MARITIME SERVICES

THE HILLS SHIRE COUNCIL AREA
MR 157 SHOWGROUND ROAD
PROPOSED ROAD UPGRADE BETWEEN
CARRINGTON ROAD AND OLD NORTHERN ROAD, CASTLE HILL
PLAN CH.1360 - CH.1471.543 (MC00)

FILE No.	DRAWING	PRINTED DATE	SHEET No.
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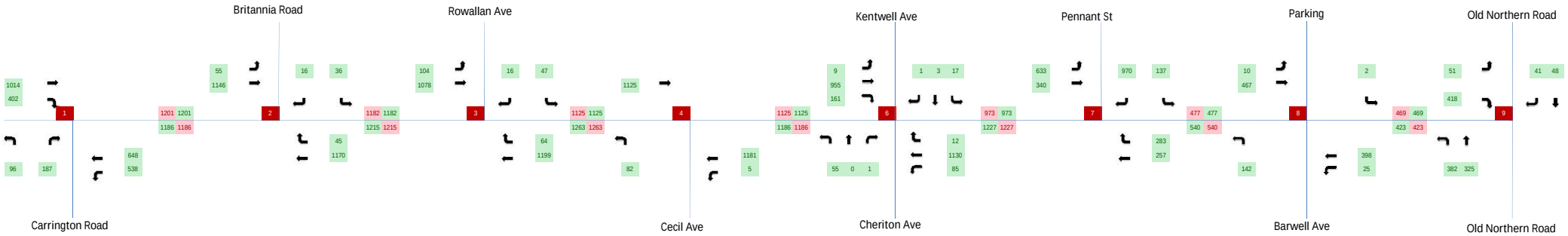
Appendix F – Traffic demands spreadsheet models



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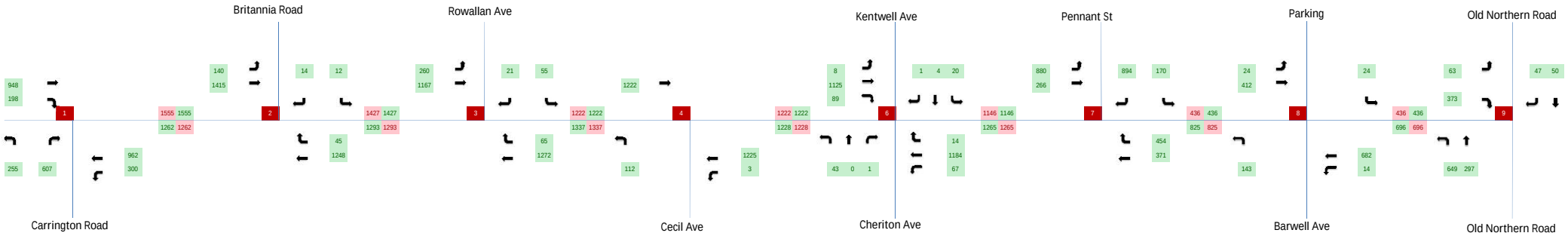
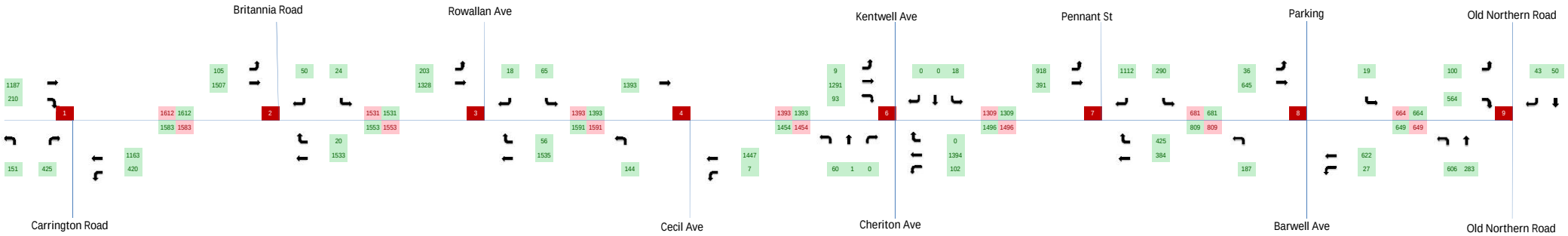
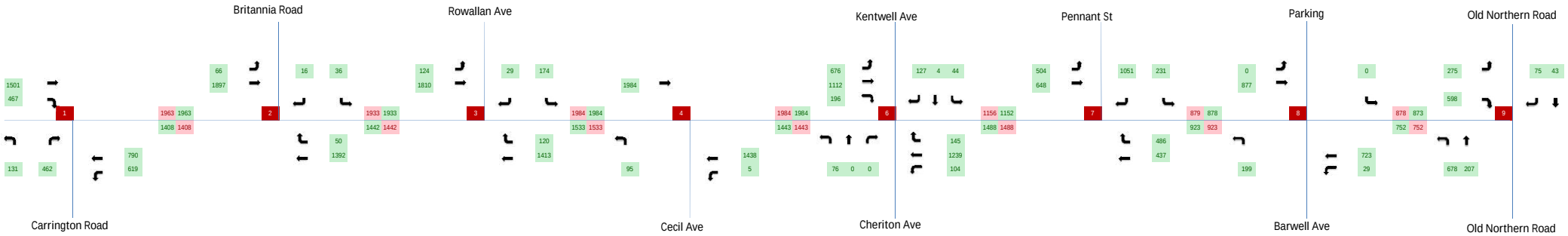
Location:	Showground Road
Scenario:	Existing 2013
Time:	Thursday (8-9am)



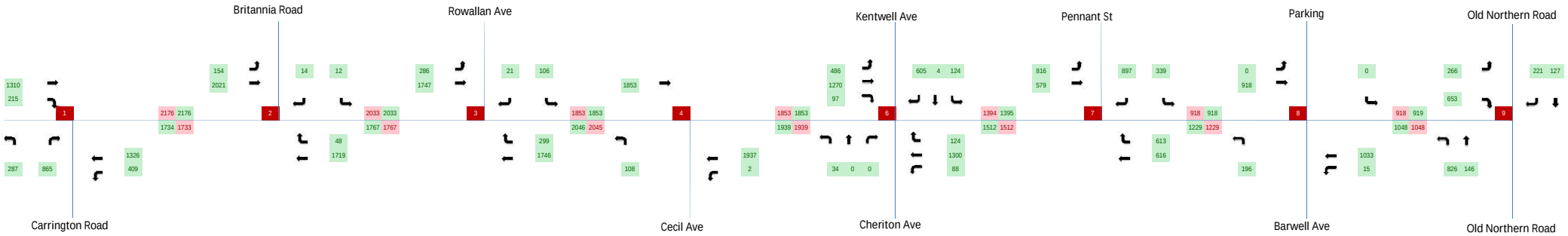
Project:	Showground Road REF
Location:	Showground Road
Scenario:	Existing 2013
Time:	Thursday (5-6pm)



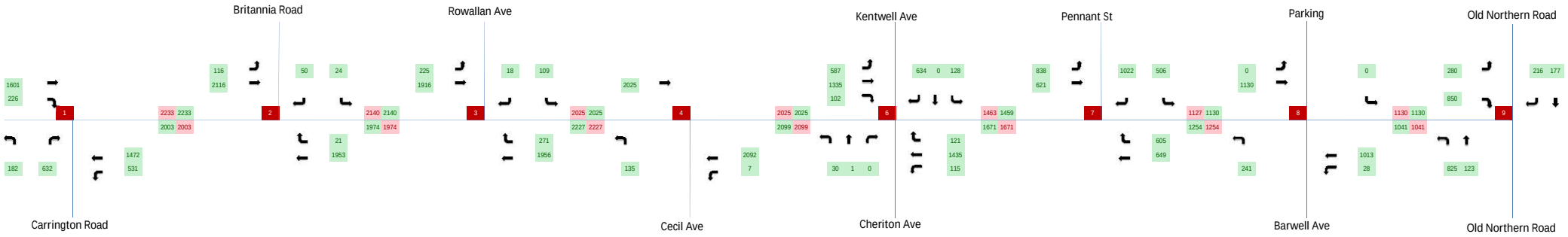
Project:	Showground Road REF
Location:	Showground Road
Scenario:	Existing 2013
Time:	Saturday (12pm-1pm)



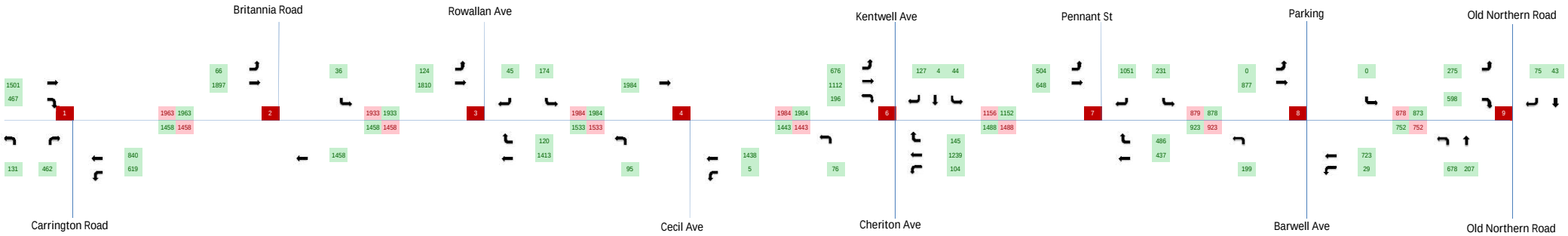
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Do Nothing
Time:	Thursday (8-9am)



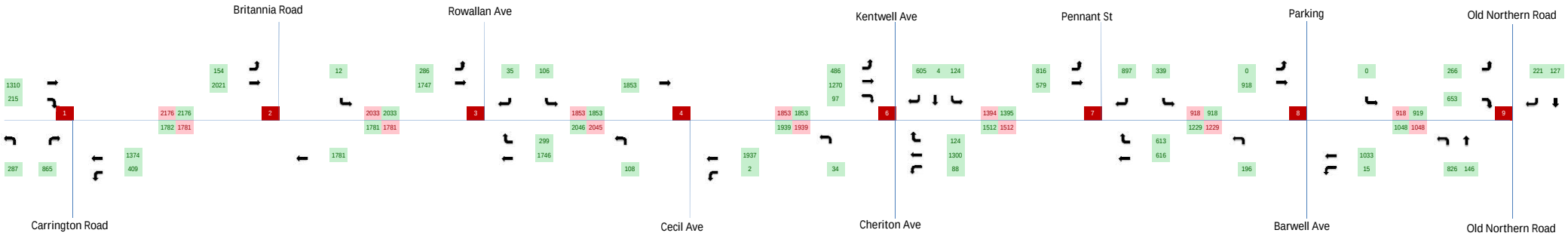
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Do Nothing
Time:	Thursday (5-6pm)



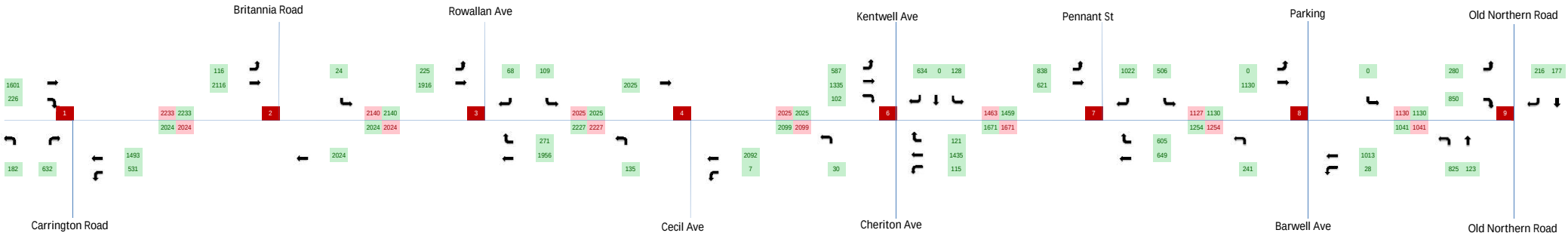
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Do Nothing
Time:	Saturday (12pm-1pm)



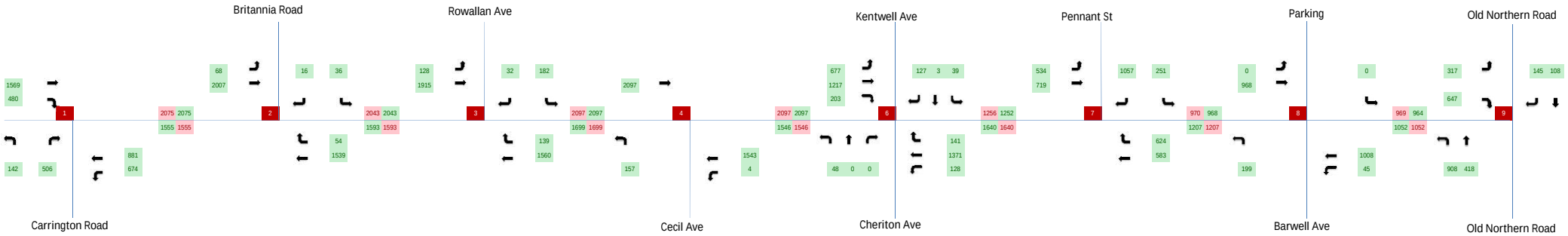
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Upgrade
Time:	Thursday (8-9am)



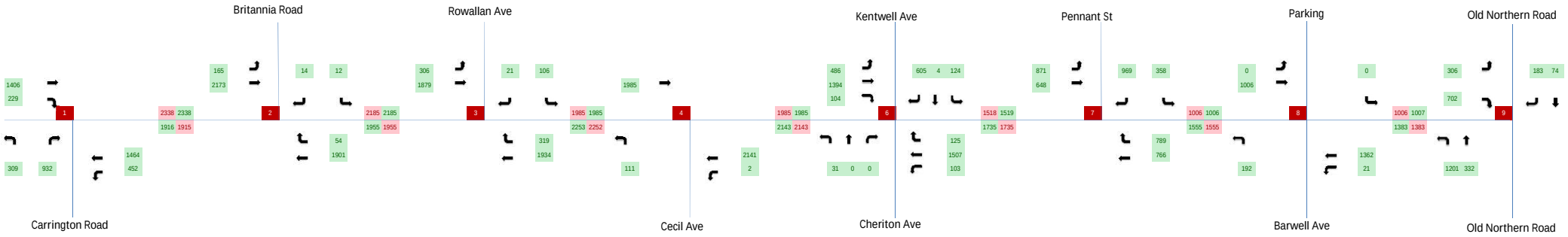
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Upgrade
Time:	Thursday (5-6pm)



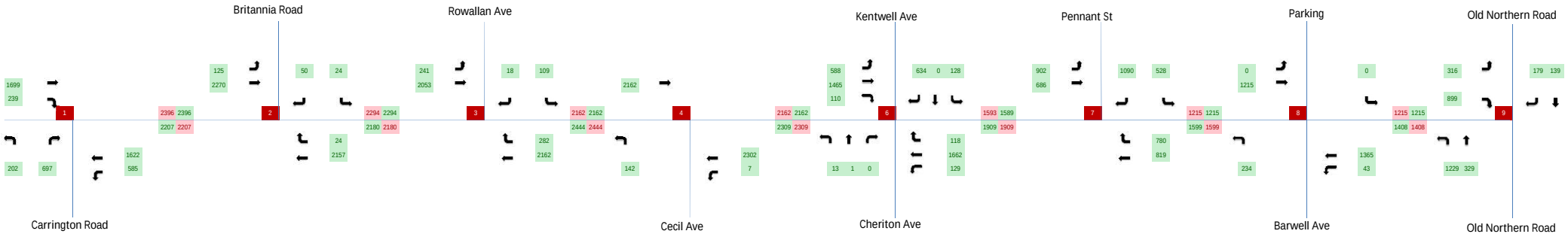
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2016 Upgrade
Time:	Saturday 12pm-1pm



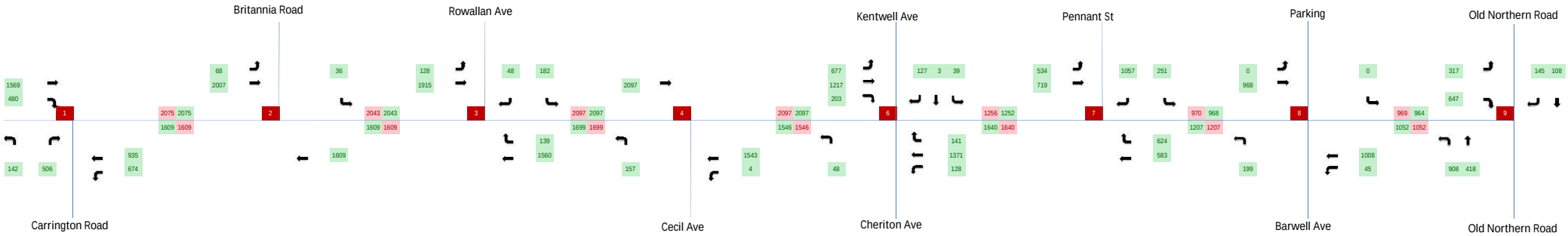
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Do Nothing
Time:	Thursday (8-9am)



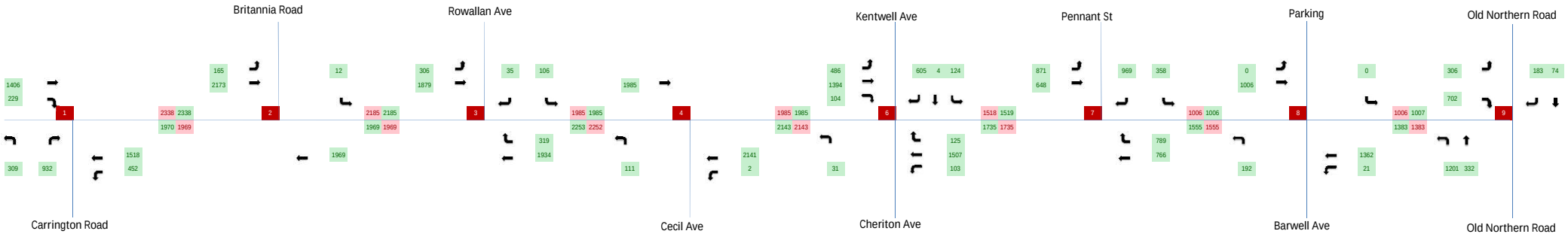
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Do Nothing
Time:	Thursday (5-6pm)



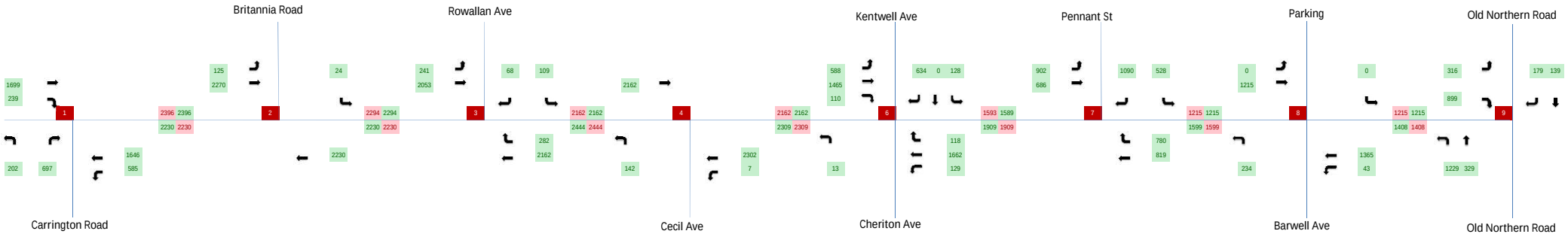
Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Do Nothing
Time:	Saturday (12pm-1pm)



Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Upgrade
Time:	Thursday (8-9am)



Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Upgrade
Time:	Thursday (5-6pm)



Project:	Showground Road REF
Location:	Showground Road
Scenario:	2026 Upgrade
Time:	Saturday 12pm-1pm

Appendix G – Showground Road Paramics model calibration and validation report

Roads and Maritime Services

Showground Road Traffic Modelling Calibration and Validation Report

January 2014

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Appendices

Appendix A – Intersection Turning Movement Comparisons

1. Base Model Development

1.1 Overview

This document outlines the process undertaken in developing a microsimulation traffic model of Showground Road for the proposed widening between Carrington Road and Old Northern Road, which forms part of requirements of the Traffic and Transport Assessment undertaken by GHD.

The Showground Road microsimulation traffic model has been developed using Q-Paramics Version 6.7.1 with additional functionality provided by the Azalient CeeJazz suite of Plugins. Version 6.7.1.G05 of CeeJazz was used, with the following Plugins active:

- Lane Choice;
- Validator;
- Level of Service;
- Trailmaker; and
- Network Evaluation.

Of these Plugins, only the Lane Choice Plugin has an effect on the model operation, while the other Plugins are only used for reporting purposes

1.2 Model Extents

The extent of the modelled network is shown in Figure 1 below:

Figure 1 Showground Road Model Extents

1.3 Traffic Data

1.3.1 Data Collection

Traffic data collection was commissioned by Roads and Maritime Services (RMS) and undertaken by Skyhigh on Thursday 29th August 2013 and Saturday 31st Augusut 2013, and included the following:

- Classified intersection turning movement counts at the following intersections:
  - Showground Road/Carrington Road;
  - Showground Road/Rowallan Avenue;
  - Showground Road/Kentwell Avenue/Cheriton Avenue;
  - Showground Road/Pennant Street; and
  - Showground Road/Old Northern Road.
- Queue length surveys at the following locations:
  - Showground Road - western approach to Carrington Road intersection;
  - Carrington Road – southern approach to Showground Road intersection;
  - Pennant Street – northern approach to Showground Road intersection;
  - Showground Road - eastern approach to Pennant Street intersection; and
  - Old Northern Rd - southern approach to Showground Road intersection.
- Travel time surveys along Showground Road between Carrington Road and Pennant Street, based on origin-destination methodology.

1.3.2 Data supplied by RMS

RMS also supplied the following data:

- Intersection diagnostic monitor (IDM) data provided for the Thursday morning, evening and Saturday midday peak periods of the dates corresponding to the turning movement counts;
- Signal plans for the following intersections:
  - Showground Road and Carrington Street;
  - Signalised Pedestrian Crossing near Showground Road and Cecil Avenue;
  - Showground Road and Pennant Street; and
  - Showground Road and Old Northern Road.
- Background traffic growth in the study area for 2016 and 2026 AM and PM horizon year peak periods as outputs from the RMS Strategic Highway Assignment Model (EMME).

1.3.3 Data supplied by QIC

The Queensland Investment Corporation (QIC) supplied the following as part of their Section 96 application in 2013:

- Paramics micro simulation models for Thursday evening and Saturday midday peak periods developed based on traffic count data collected in 2011.
- SIDRA Intersection models based on traffic count data collected in 2011 for the following intersections:
    - Showground Road and Carrington Road;
    - Showground Road and Rowallan Avenue;
    - Showground Road and Kentwell Avenue;
    - Showground Road and Pennant Street; and
    - Showground Road and Old Northern Road.

1.4 Temporal Coverage

The Showground Road model covers the following periods:

- Thursday morning peak period (0600 to 0900);
- Thursday evening peak period (1600 to 1900); and
- Saturday midday peak period (1100 to 1400).

Based on analysis of collected traffic count data, these simulation periods provide adequate coverage of the typical hourly peak in each period with “warm-up” time for the model to reach the expected traffic conditions within the peak period.

2. Model Calibration and Validation

The Showground Road Paramics base model has been calibrated and validated according to the standards outlined in the *RMS Traffic Modelling Guidelines, 2013*. The calibration and validation of a model is an essential process required to ensure the model accurately reflects observed traffic conditions.

This subsection provides an overview of the calibration and validation results.

2.1 Model Calibration

Calibration has been undertaken for the Thursday morning, evening and Saturday midday peaks based on a comparison of modelled turning movement flows against the observed for the three peak hourly periods. The GEH statistic is used in the calibration of traffic models to compare the difference between observed and modelled traffic flows. The GEH statistic is defined as follows:

$$GEH = \sqrt{\frac{(V_{Observed} - V_{Modelled})^2}{(0.5 \times (V_{Observed} + V_{Modelled}))}}$$

Based on the calibration and validation guidelines presented in the *RMS Traffic Modelling Guidelines, 2013*, a calibrated model must conform to the following requirements:

- No flow comparisons with GEH greater than 10; and
- At least 85% of flow comparisons with GEH less than 5.

A total of 52 individual turning counts were used in the calibration of the model. Barred turns were omitted from the turning count comparison. Table 1 below shows the turning count comparisons for the Thursday morning and evening, and Saturday midday peak periods.

Table 1 GEH Turning Count Comparisons

Period	Number of Movements with GEH			
	<3	<5	<10	>10
Thursday Morning Peak				
0800 - 0900	52 (100%)	52 (100%)	52 (100%)	0 (0%)
Thursday Evening Peak				
1700 - 1800	52 (100%)	52 (100%)	52 (100%)	0 (0%)
Saturday Midday Peak				
1200 - 1300	51 (98%)	52 (100%)	52 (100%)	0 (0%)

The above shows that the model is well calibrated and conforms to the requirements set out in the *RMS Traffic Modelling Guidelines, 2013*. A detailed list showing the turning movement comparison is supplemented at the end of this appendix.

2.2 Model Validation

The Showground Road base model was validated against observed travel time data collected from the survey for eastbound and westbound directions on both bus and general traffic. Observed traffic conditions based on the site visit and review of the survey video captures, including queuing behaviour and congestion level, was also employed through the validation process.

The travel time validation criteria were adopted from the *RMS Traffic Modelling Guidelines, 2013, Section 11.5*. This standard requires that 95% of modelled travel times be within 15% or one minute (whichever is greater) of observed travel times to be considered valid.

A summary of the modelled and observed general traffic travel times for the Thursday morning and evening, and Saturday midday peak periods is shown in the Table 2. Plots of observed and modelled general traffic travel times, along with observed minimum and maximum travel times are shown in Figure 2 to Figure 4.

Table 2 Base Model Travel Time Comparison – General Vehicles

Period	Westbound Travel Time (mm:ss)			Eastbound Travel Time (mm:ss)		
	Observed (Avg.)	Modelled (Avg.)	Difference	Observed (Avg.)	Modelled (Avg.)	Difference
Thursday Morning Peak						
0600 – 0700	01:22	01:24	00:02 (2%)	01:22	01:44	00:22 (27%)
0700 – 0800	01:33	01:33	00:00 (0%)	01:33	01:54	00:21 (23%)
0800 – 0900	02:03	01:48	-00:15 (-12%)	02:03	02:09	00:06 (5%)
Thursday Evening Peak						
1600 – 1700	01:49	02:01	00:12 (11%)	01:53	02:23	00:30 (26%)
1700 – 1800	01:42	01:58	00:16 (16%)	02:01	02:29	00:28 (24%)
1800 – 1900	01:43	01:48	00:05 (5%)	02:05	02:34	00:29 (23%)
Saturday Midday Peak						
1100 – 1200	01:41	01:53	00:12 (12%)	02:10	02:33	00:23 (18%)
1200 – 1300	01:37	01:52	00:15 (15%)	02:12	02:39	00:27 (21%)
1300 – 1400	01:43	01:50	00:07 (7%)	02:04	02:50	00:46 (37%)

Figure 2 General Traffic Travel Time Comparison – Thursday Morning

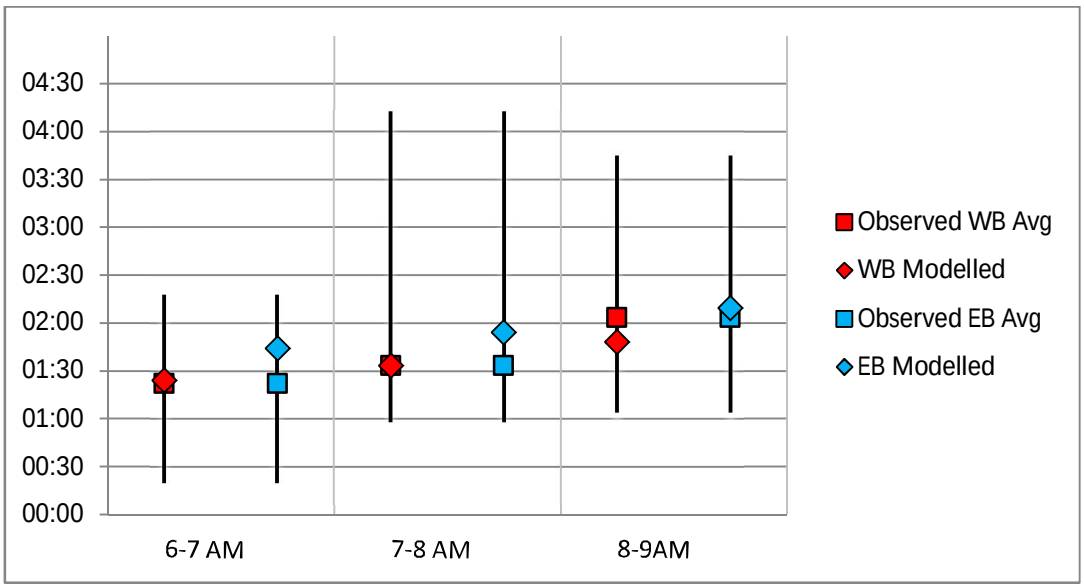


Figure 3 General Traffic Travel Time Comparison – Thursday Evening

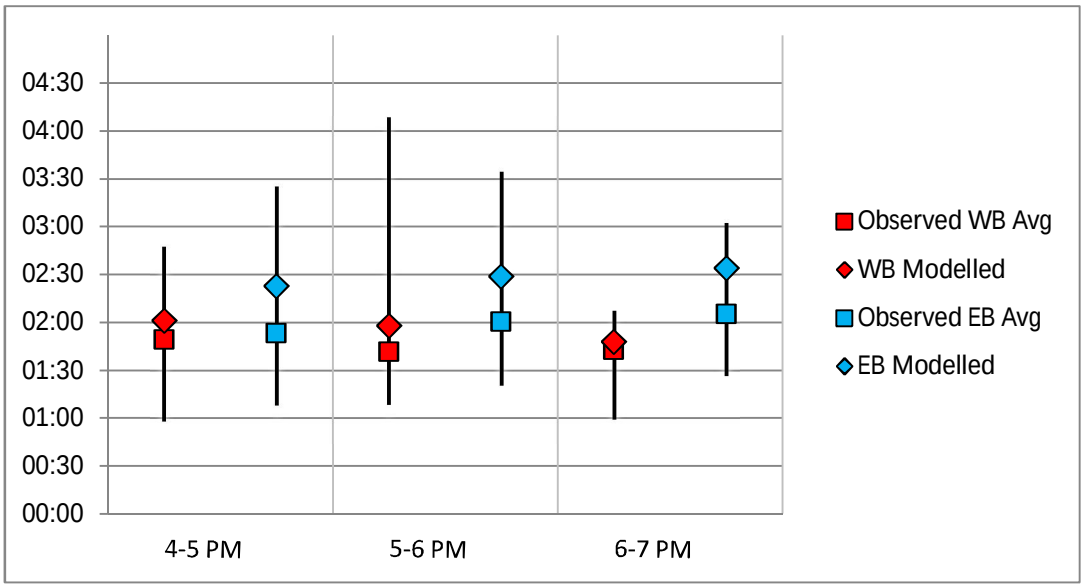
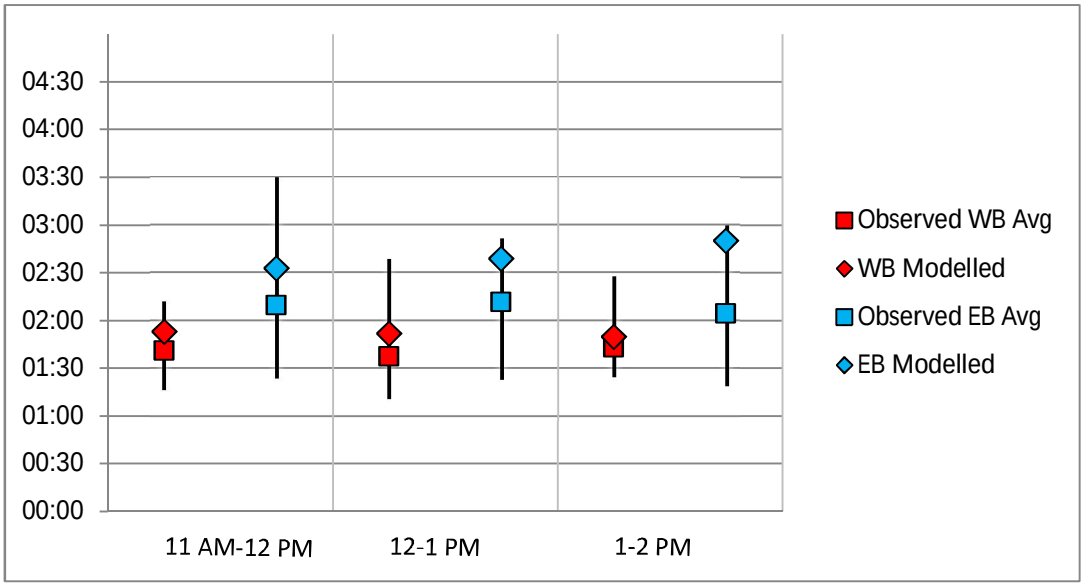


Figure 4 General Traffic Travel Time Comparison – Saturday Midday



Comparisons of bus travel times from the model were also undertaken. A summary of bus travel times is shown in Table 3. Plots of observed and modelled bus travel times, along with observed minimum and maximum bus travel times are shown in Figure 5 to Figure 7.

Table 3 Base Model Travel Time Comparison – Buses

Period	Westbound			Eastbound		
	Observed (Avg.)	Modelled (Avg.)	Difference	Observed (Avg.)	Modelled (Avg.)	Difference
Thursday Morning Peak						
0600 – 0700	01:52	02:10	00:18 *(16%)*	01:40	01:59	00:19 *(18%)*
0700 – 0800	01:56	02:19	00:23 *(19%)*	01:42	02:05	00:23 *(23%)*
0800 – 0900	02:12	02:33	00:21 *(16%)*	01:50	02:03	00:13 *(12%)*
Thursday Evening Peak						
1600 – 1700	02:07	02:29	00:22 *(18%)*	01:51	02:24	00:33 *(30%)*
1700 – 1800	01:51	02:22	00:31 *(28%)*	02:06	02:20	00:14 *(11%)*
1800 – 1900	01:46	02:08	00:22 *(21%)*	02:21	02:26	00:05 *(4%)*
Saturday Midday Peak						
1100 – 1200	01:53	02:07	00:14 *(13%)*	02:12	02:35	00:23 *(18%)*
1200 – 1300	01:39	02:14	00:35 *(35%)*	02:13	02:18	00:05 *(4%)*
1300 – 1400	01:42	02:19	00:37 *(36%)*	01:56	02:27	00:31 *(27%)*

Figure 5 Bus Travel Time Comparison – Thursday Morning

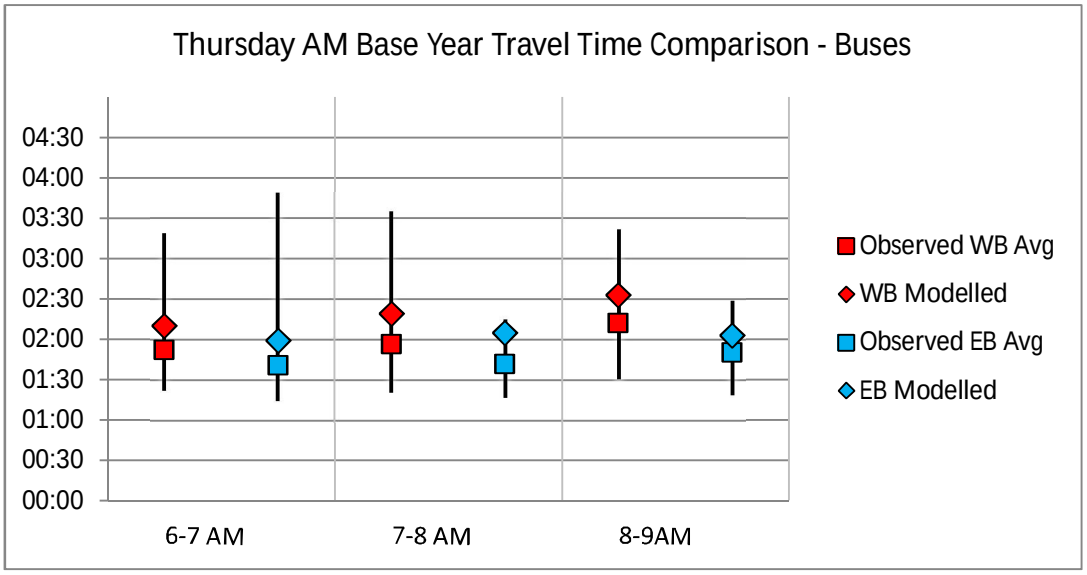


Figure 6 Bus Travel Time Comparison – Thursday Evening

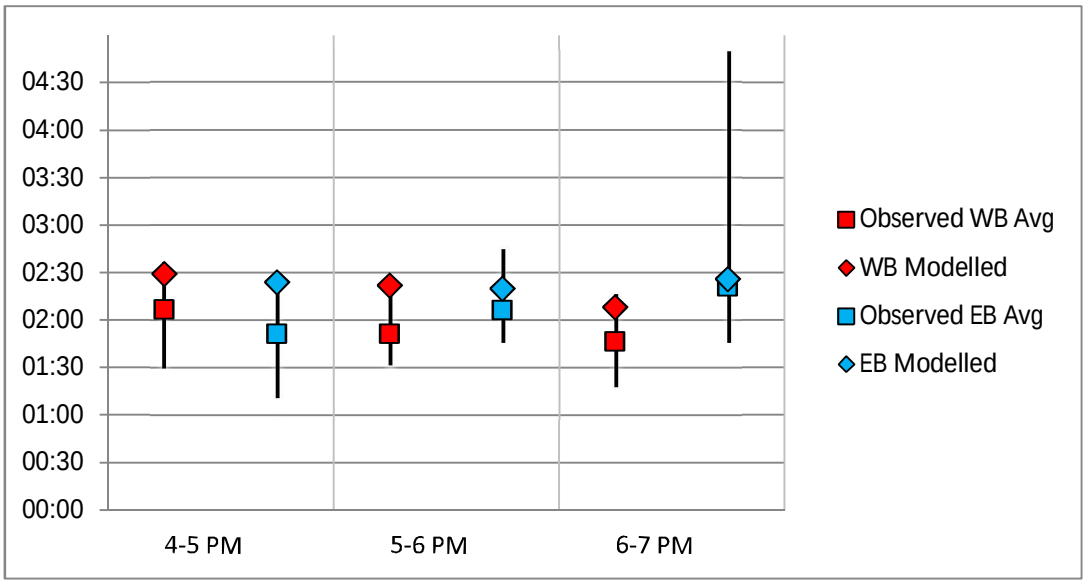
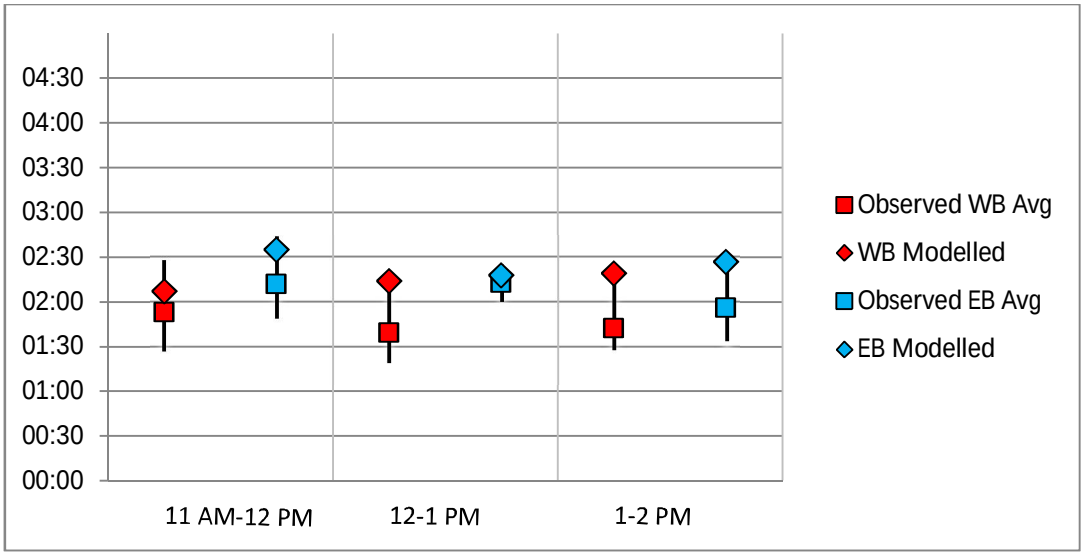


Figure 7 Bus Travel Time Comparison – Saturday Midday



Analysis of the observed and modelled travel times for both general traffic and buses shows that the modelled travel times are within 15% or one minute (whichever is greater) of the observed travel times. This indicates that a good correlation between the modelled and observed traffic conditions on Showground Road has been achieved. Notwithstanding the above, the modelled travel times are marginally higher than the observed travel times. This can be attributed to the following and is considered to be acceptable:

- Signal intersections controlled by SCATS typically adopt dynamic cycle times which are continuously changing through the peak period. As it is not possible to fully replicate this behaviour in Paramics using fixed signal control, a mean cycle time was derived from the IDM data for each peak period. This introduces some marginal differences on the travel time reported from the model.

- Analysis of the observed bus travel times indicated that the majority of buses travelling in both eastbound and westbound directions on Showground Road were not stopping to load or unload passengers at all or even any stops between Carrington Road and Pennant Street. The modelled bus travel times are based on the conservative assumption that buses that travelling along Showground Road dwell at no less than 25% of the available bus stops. As a result, this increases the probability of modelled bus travel times being higher overall than the corresponding observed travel times.

3. Conclusion

GHD were commissioned by RMS to develop a model of Showground Road between Carrington Road and Old Northern Road. The model was developed using Q-Paramics version 6.7.1 with additional functionality provided by CeeJazz Plugins. The model was calibrated and validated to traffic data collection in August 2013.

Comparison of the observed and modelled turning movement volumes showed that the model was well calibrated according to the calibration standards set out in the *RMS Traffic Modelling Guidelines, 2013*.

Furthermore, the models were validated against travel times collected along Showground Road on the Thursday morning, evening and Saturday peak periods and showed good correlation between modelled and observed travel times for bus and general traffic. In both cases, these differences were within 15% or one minute (whichever is greater) of the overall average travel time.

Based on the calibration and validation data presented in this report, the Showground Road microsimulation model is well calibrated and validated according to the guidelines. Therefore, the models can be considered suitable for use in the assessment of future traffic conditions.

Appendices

Appendix A – Intersection Turning Movement Comparisons

Thursday 8-9am Turning Movement Comparison

Turn ID	Observed	Modelled	**Diff**	**%**	**GEH**
4:5:11	402	456	54	13%	2.61
4:5:6	1014	989	-25	-2%	0.79
6:5:4	648	685	37	6%	1.43
6:5:11	538	538	0	0%	0.00
11:5:6	187	205	18	10%	1.29
11:5:4	96	87	-9	-9%	0.94
13:8:9	16	24	8	50%	1.79
9:8:14	1146	1126	-20	-2%	0.59
9:8:13	55	63	8	15%	1.04
13:8:14	36	37	1	3%	0.17
14:8:13	45	40	-5	-11%	0.77
14:8:9	1170	1206	36	3%	1.04
1:54:52	16	17	1	6%	0.25
52:54:51	1078	1066	-12	-1%	0.37
52:54:1	104	98	-6	-6%	0.60
1:54:51	47	53	6	13%	0.85
51:54:1	64	57	-7	-11%	0.90
51:54:52	1199	1235	36	3%	1.03
54:51:172	1125	1118	-7	-1%	0.21
172:51:54	1181	1204	23	2%	0.67
172:51:2	5	4	-1	-20%	0.47
2:51:54	82	87	5	6%	0.54
27:101:21	1	0	-1	-100%	1.41
21:101:3	161	164	3	2%	0.24
21:101:171	955	944	-11	-1%	0.36
21:101:27	9	9	0	0%	0.00
27:101:3	3	2	-1	-33%	0.63
27:101:171	17	12	-5	-29%	1.31
171:101:27	12	10	-2	-17%	0.60
171:101:21	1130	1160	30	3%	0.89
171:101:3	85	78	-7	-8%	0.78
3:101:171	1	1	0	0%	0.00
3:101:27	0	0	0	0%	0.00
3:101:21	55	50	-5	-9%	0.69
128:2494:127	970	1004	34	4%	1.08
127:2494:999	340	320	-20	-6%	1.10
100:127:28	633	639	6	1%	0.24
128:2494:999	137	143	6	4%	0.51
999:2494:128	283	305	22	8%	1.28
999:2494:127	257	247	-10	-4%	0.63
2494:999:125	467	450	-17	-4%	0.79
2494:999:132	10	13	3	30%	0.88
132:999:125	2	2	0	0%	0.00
125:999:2494	398	429	31	8%	1.52
125:999:18	25	25	0	0%	0.00
18:999:2494	142	136	-6	-4%	0.51
186:865:125	41	43	2	5%	0.31
125:865:126	418	409	-9	-2%	0.44
125:865:186	51	43	-8	-16%	1.17
186:865:126	48	53	5	10%	0.70
126:865:186	325	330	5	2%	0.28
126:125:999	382	416	34	9%	1.70

Count	52	100%
>10	0	0%
<5	52	100%
<3	52	100%

Thursday 5-6pm Turning Movement Comparison

Turn ID	Observed	Modelled	**Diff**	**%**	**GEH**
4:5:11	198	226	28	14%	1.92
4:5:6	948	963	15	2%	0.49
6:5:4	962	1010	48	5%	1.53
6:5:11	300	296	-4	-1%	0.23
11:5:6	607	612	5	1%	0.20
11:5:4	255	284	29	11%	1.77
13:8:9	14	15	1	7%	0.26
9:8:14	1415	1442	27	2%	0.71
9:8:13	140	129	-11	-8%	0.95
13:8:14	12	6	-6	-50%	2.00
14:8:13	45	38	-7	-16%	1.09
14:8:9	1248	1284	36	3%	1.01
1:54:52	21	18	-3	-14%	0.68
52:54:51	1167	1193	26	2%	0.76
52:54:1	260	257	-3	-1%	0.19
1:54:51	55	51	-4	-7%	0.55
51:54:1	65	67	2	3%	0.25
51:54:52	1272	1308	36	3%	1.00
54:51:172	1222	1243	21	2%	0.60
172:51:54	1225	1262	37	3%	1.05
172:51:2	3	3	0	0%	0.00
2:51:54	112	112	0	0%	0.00
27:101:21	1	0	-1	-100%	1.41
21:101:3	89	81	-8	-9%	0.87
21:101:171	1125	1155	30	3%	0.89
21:101:27	8	8	0	0%	0.00
27:101:3	4	2	-2	-50%	1.15
27:101:171	20	22	2	10%	0.44
171:101:27	14	5	-9	-64%	2.92
171:101:21	1184	1203	19	2%	0.55
171:101:3	67	76	9	13%	1.06
3:101:171	1	1	0	0%	0.00
3:101:27	0	0	0	0%	0.00
3:101:21	43	49	6	14%	0.88
128:2494:1	894	920	26	3%	0.86
127:2494:9	266	301	35	13%	2.08
100:127:28	880	880	0	0%	0.00
128:2494:9	170	161	-9	-5%	0.70
999:2494:1	454	456	2	0%	0.09
999:2494:1	371	368	-3	-1%	0.16
2494:999:1	412	445	33	8%	1.59
2494:999:1	24	17	-7	-29%	1.55
132:999:12	24	25	1	4%	0.20
125:999:24	682	706	24	4%	0.91
125:999:18	14	19	5	36%	1.23
18:999:249	143	119	-24	-17%	2.10
186:865:12	47	38	-9	-19%	1.38
125:865:12	373	416	43	12%	2.16
125:865:18	63	63	0	0%	0.00
186:865:12	50	43	-7	-14%	1.03
126:865:18	297	307	10	3%	0.58
126:125:99	649	683	34	5%	1.32

Count	52	100%
>10	0	0%
<5	52	100%
<3	52	100%

Saturday 12pm-1pm Turning Movement Comparison

Turn ID	Observed	Modelled	**Diff**	**%**	**GEH**
4:5:11	210	203	-7	-3%	0.49
4:5:6	1187	1191	4	0%	0.12
6:5:4	1163	1114	-49	-4%	1.45
6:5:11	420	427	7	2%	0.34
11:5:6	425	447	22	5%	1.05
11:5:4	151	149	-2	-1%	0.16
13:8:9	50	47	-3	-6%	0.43
9:8:14	1507	1508	1	0%	0.03
9:8:13	105	128	23	22%	2.13
13:8:14	24	22	-2	-8%	0.42
14:8:13	20	19	-1	-5%	0.23
14:8:9	1533	1501	-32	-2%	0.82
1:54:52	18	13	-5	-28%	1.27
52:54:51	1328	1329	1	0%	0.03
52:54:1	203	202	-1	0%	0.07
1:54:51	65	72	7	11%	0.85
51:54:1	56	45	-11	-20%	1.55
51:54:52	1535	1506	-29	-2%	0.74
54:51:172	1393	1401	8	1%	0.21
172:51:54	1447	1427	-20	-1%	0.53
172:51:2	7	6	-1	-14%	0.39
2:51:54	144	124	-20	-14%	1.73
27:101:21	0	0	0	0%	0.00
21:101:3	93	95	2	2%	0.21
21:101:171	1291	1290	-1	0%	0.03
21:101:27	9	9	0	0%	0.00
27:101:3	0	0	0	0%	0.00
27:101:171	18	20	2	11%	0.46
171:101:27	0	0	0	0%	0.00
171:101:21	1394	1374	-20	-1%	0.54
171:101:3	102	102	0	0%	0.00
3:101:171	0	0	0	0%	0.00
3:101:27	1	1	0	0%	0.00
3:101:21	60	55	-5	-8%	0.66
128:2494:1	1112	1111	-1	0%	0.03
127:2494:9	391	365	-26	-7%	1.34
100:127:28	918	945	27	3%	0.88
128:2494:9	290	302	12	4%	0.70
999:2494:1	425	411	-14	-3%	0.68
999:2494:1	384	374	-10	-3%	0.51
2494:999:1	645	630	-15	-2%	0.59
2494:999:1	36	37	1	3%	0.17
132:999:12	19	13	-6	-32%	1.50
125:999:24	622	642	20	3%	0.80
125:999:18	27	24	-3	-11%	0.59
18:999:249	187	145	-42	-22%	3.26
186:865:12	43	47	4	9%	0.60
125:865:12	564	533	-31	-5%	1.32
125:865:18	100	110	10	10%	0.98
186:865:12	50	49	-1	-2%	0.14
126:865:18	283	313	30	11%	1.74
126:125:99	606	614	8	1%	0.32

Count	52	100%
>10	0	0%
<5	52	100%
<3	51	98%

GHD

133 Castlereagh St Sydney NSW 2000
-
T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Owen Peel / Andersen Hui	Iwan Smith		Iwan Smith		5/11/2013
1	Owen Peel / Andersen Hui	Iwan Smith		Iwan Smith		24/01/2014
2	Owen Peel / Andersen Hui	Iwan Smith		Amanda Raleigh		06/02/2014
3	Owen Peel / Andersen Hui	Iwan Smith		Amanda Raleigh		27/02/2014

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