

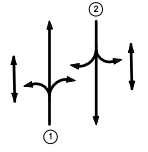
APPENDIX B

INTERSECTION DETAILS

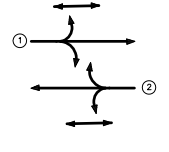
7263.259.W.4263

DRAWN BY CADD
DO NOT AMEND MANUALLY

DATE IN SERVICE : 05/05/10



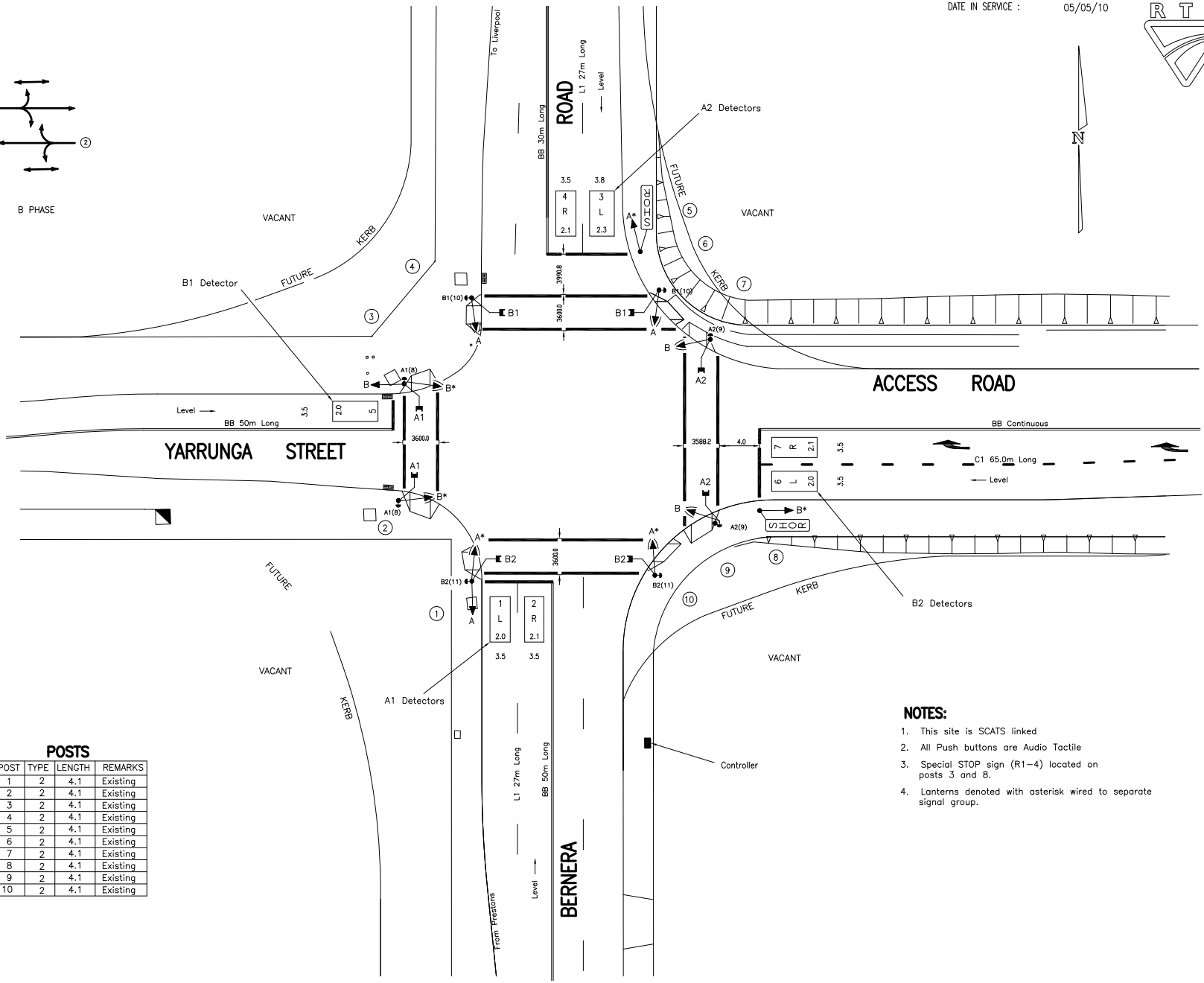
A PHASE



B PHASE

MOVEMENTS

POSTS			
POST	TYPE	LENGTH	REMARKS
1	2	4.1	Existing
2	2	4.1	Existing
3	2	4.1	Existing
4	2	4.1	Existing
5	2	4.1	Existing
6	2	4.1	Existing
7	2	4.1	Existing
8	2	4.1	Existing
9	2	4.1	Existing
10	2	4.1	Existing



- NOTES:
- 1. This site is SCATS linked
 - 2. All Push buttons are Audio Tactile
 - 3. Special STOP sign (R1-4) located on posts 3 and 8.
 - 4. Lanterns denoted with asterisk wired to separate signal group.

A ORIGINAL ISSUE

Issue - New Site WFE equipment

CN 29/4/09

PUBLIC UTILITY LEGEND	REFERENCE PLANS	U.S.D. Ref 2000 Map 287 P11
HYDRANT	SYMBOLS/ABBS	VD003-6
STOP VALVE	STP. POST	VD001-5
GAS VALVE	DET. SCHED EXP	VD018-10
SEWER MANHOLE	PRES. DETECT	VD005-17
TELECOM PIT	SIG. DIS. SIG.	VD018-9
ELECT. LIGHT POLE	CABLE INSTALLATION	SHEET 2
POWER POLE	CABLE CHART	SHEET 3
STAY POLE		
TELEPHONE BOX	SURVEYOR/Stubbsbury Jacques P/L	
TELECOM PILLAR	DATE	2007

DESIGN APPROVAL

APPROVED

ROSS NETTLE

POSITION DIRECTOR

DATE 27.08

DESIGN PREPARED BY

TRANSPORT AND TRAFFIC PLANNING ASSOCIATES

DATE 5.7.08

RTA ACCEPTANCE

RECOMMENDED

7.5.08

DATE 4.7.08

ACCEPTED

R.N. May

DATE 5.7.08

Roads and Traffic Authority, N.S.W

LIVERPOOL CITY COUNCIL AREA

TRAFFIC SIGNALS AT THE INTERSECTION OF

BERNERA RD, YARRUNGA STREET & ACCESS RD

PRESTONS

TCS No 4263

EXISTING

PROPOSED

CADD FILE: W4263_2B.dgn

SCALE 5 0 5 10

FILE 000 TS 000

RECN

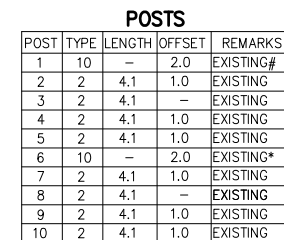
7263.259.W.4263

ISSUE B

SHEET 2

© COPYRIGHT ROADS AND TRAFFIC AUTHORITY

0620.259.VV.3957



Denotes type 10 mast arm with a 11.0m outreach.
* Denotes type 10 mast arm with a 11.5m outreach.

Detector	Specifications			
Bus 1	FN	A(BUS)(PR)		
	SG/PS	$\overline{V9}$		
	DS	—		
Bus 2	FN	A(BUS)(PR)		
	SG/PS	$\overline{V10}$		
	DS	—		

SHARED BICYCLE/PEDESTRIAN PATH

(M.R.620)

WAY

To LIVERPOOL

CAMDEN VALLEY

SIGNAL GROUP	PHASE DURING WHICH GREEN DISPLAYED												OVERLAPS PERMITTED	OVERLAP CONDITIONS	DURATION OF R.A.
	A	B	C	D	D1	D2	E	F1	F2	G	G1	G2			
V1	X	X										X	G1/A,B,B/A, A/G1	*P1 NOT RUNNING	
V2	X		X									X	G2/A,C/C/A, A/G2	*P2 NOT RUNNING	
V3		X									X	X	G/G1,B/G		ARROW TIME
V4			X								X	X	G/G2,C/G		ARROW TIME
V5					X		X	X					D1/E/F1		
V6					X	X	X	X					D2/E/F2		
V7				X	X			X					D/D1		
V8				X		X			X				D/D2		
V9	X	X									X				
V10	X		X									X			
P1	X	X								X			G1/A/B		
P2	X		X								X		G2/A/C		
P3					X		X	X					D1/E		
P4					X	X	X	X					D2/F		

- Push button on post 9 extends R.A. subject to timer.
- Push button on post 4 extends R.A. subject to timer.

SIGNAL GROUP	TABLE TYPE	REMARKS
V1	—	Red for time V9 is displayed.
V9	—	—Introduction in A,B or G1 phase by A1 detector —whichever phase occurs first in sequence. —Displayed for special timer —Off at expiry of special timer.
V2	—	Red for time V10 is displayed.
V10	—	—Introduction in A,C or G2 phase by A2 detector —whichever phase occurs first in sequence. —Displayed for special timer —Off at expiry of special timer

1. This site is SCATS linked.
2. Special stop sign (R1-4) placed on posts 3,4,8 and 9.
3. Audio tactile push buttons are placed on posts 1,2,4,5,6,7,9 and 10. Push buttons on post 3 and 4 are tactile only.
4. Phasing for this drawing is in accordance with standard drawing for double diamond VD018-6 with the right turn filter option in accordance with VD018-15.
5. Provision to be made in ducting and cabling for future signalisation of left turn slip lane north-western,north-eastern and south-eastern corners of the intersection.
6. "BUS ONLY LANE" is coloured red, refer to RTA specification R110 and Technical Direction No.99/9.
7. Detectors 14,15,16 and 17 is separately timed and no software diode between them.

A. ORIGINAL ISSUE From Mr. Project Manager To: Mr. Project Manager PROJECT NO. 3567 SHEET NO. 1 DATE: 13/12/04	B. REVISIONS NO. / M. / D. 1. / 13/12/04 2. / 15/05/05 3. / 16/09/07	C. LOCATION Location of project 15.5.05 MAIN ROAD MAIN ROAD LOCATION CAPTIVE & DATE CHANGES 25/11/2004	PUBLIC UTILITY LEGEND HYDRANT ☐ SYMBOLS/ABBS. V0003-6 STOP VALVE ☒ STIL POST V0018-10 GAS VALVE ☒ SET SIGNED EXP V0018-10 POWER MANDIBLE ☒ PRESS. PICTET V0018-10 TELECOM FST ☒ SSC DIS. SEP. V0018-8 ELECT LIGHT POLE ☐ POWER POLE ☐ STAY POLE ☐ TELEPHONE BOX ☐ TELECOM PILAR ☐ SUPERVISOR: N/A PROJECT DESIGN SERVICES DATE: 25/11/2004 RECOMMENDED DATE: 8/11/2004	U.S.D. Ref. Map 287 N2 S.C. E1 287 334 CO-ORDS N 241 371 DESIGNED: A. JEDUNDI CHECKED: K. RONDINE A. STANUN, D. STEFANOVSKI DATE: 25/11/2004 PROJECT DESIGN SERVICES DATE: 8/11/2004 RECOMMENDED DATE: 8/11/2004	DESIGN APPROVAL APPROVED POSITION: PROJECT DESIGN SERVICES DATE: 25/11/2004 DESIGN PREPARED BY PROJECT DESIGN SERVICES DATE: 8/11/2004 RECOMMENDED DATE: 8/11/2004	RTA ACCEPTANCE RECOMMENDED POSITION: NETWORK OPERATIONS DATE: 25/11/2004 ACCEPTED POSITION: ROAD NETWORK DATE: 25/11/2004	Roads and Traffic Authority,N.S.W LIVERPOOL COUNCIL AREA TRAFFIC SIGNALS AT M.R. 620 CAMDEN VALLEY WAY AND BERNERA ROAD, PRESTONS DESIGN LAYOUT TCS No. 3567	EXISTING ☒ PROPOSED ☐ CADD FILE: W3957_10.dgn SCALE: 1:200 FILE: 250 TS 371 REGN. 0620.259.VV.3957 TCS No. 3567	ISSUE SUPERSEDES SHEET/ISSUE 1C SHEET 1
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DRAWN BY CADD
DO NOT AMEND MANUALLY

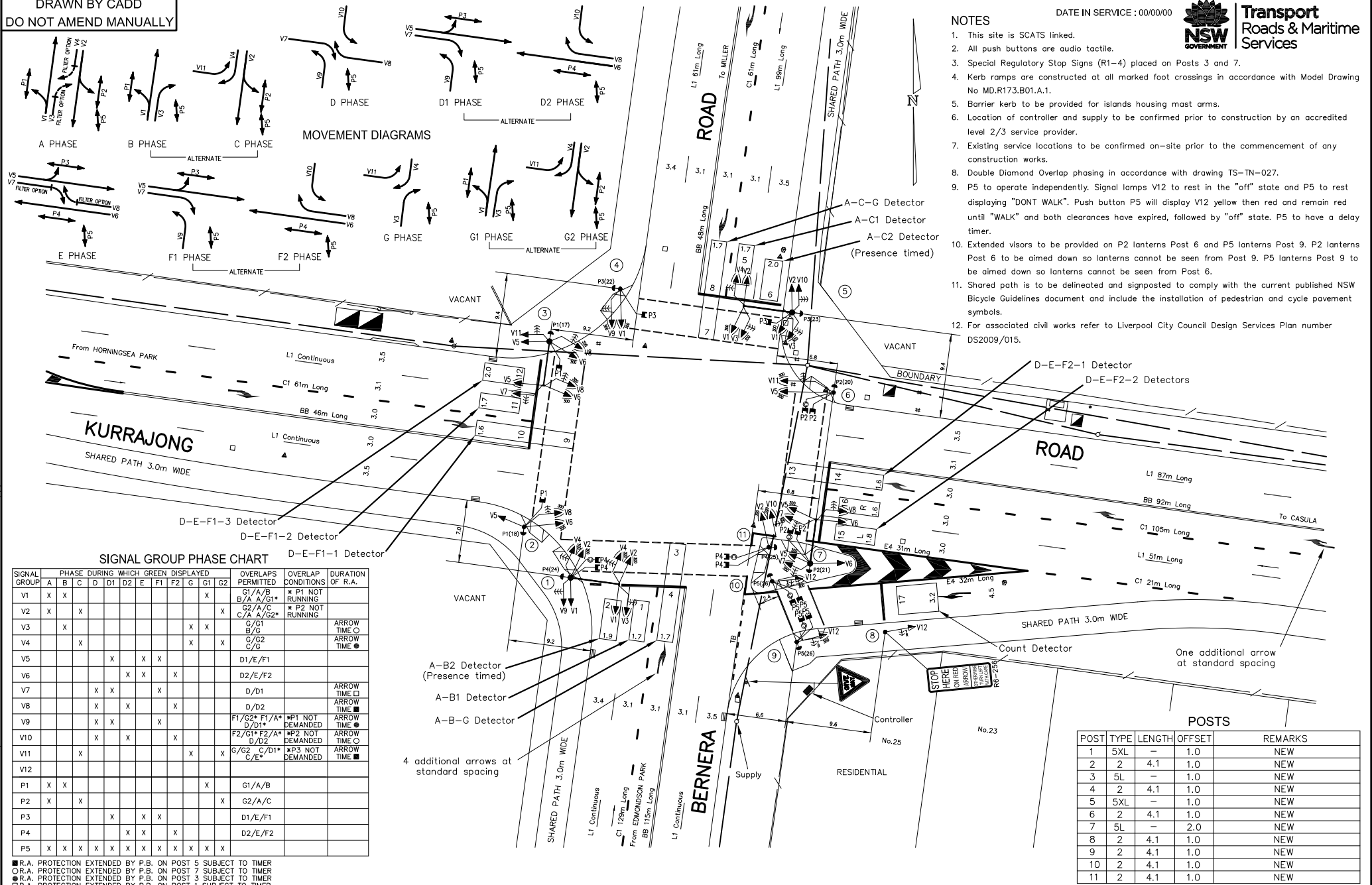
DATE IN SERVICE : 00/00/00



Transport
Roads & Maritime
Services

NOTES

- This site is SCATS linked.
- All push buttons are audio tactile.
- Special Regulatory Stop Signs (R1-4) placed on Posts 3 and 7.
- Kerb ramps are constructed at all marked foot crossings in accordance with Model Drawing No MD.R173.B01.A.1.
- Barrier kerb to be provided for islands housing mast arms.
- Location of controller and supply to be confirmed prior to construction by an accredited level 2/3 service provider.
- Existing service locations to be confirmed on-site prior to the commencement of any construction works.
- Double Diamond Overlap phasing in accordance with drawing TS-TN-027.
- P5 to operate independently. Signal lamps V12 to rest in the "off" state and P5 to rest displaying "DONT WALK". Push button P5 will display V12 yellow then red and remain red until "WALK" and both clearances have expired, followed by "off" state. P5 to have a delay timer.
- Extended visors to be provided on P2 lanterns Post 6 and P5 lanterns Post 9. P2 lanterns Post 6 to be aimed down so lanterns cannot be seen from Post 9. P5 lanterns Post 9 to be aimed down so lanterns cannot be seen from Post 6.
- Shared path is to be delineated and signposted to comply with the current published NSW Bicycle Guidelines document and include the installation of pedestrian and cycle pavement symbols.
- For associated civil works refer to Liverpool City Council Design Services Plan number DS2009/015.



SIGNAL GROUP PHASE CHART

SIGNAL GROUP	PHASE	DURING WHICH GREEN DISPLAYED	OVERLAPS PERMITTED	OVERLAP CONDITIONS	DURATION OF R.A.
V1	X	X			
V2	X	X			
V3	X	X			
V4		X			
V5		X			
V6		X			
V7		X			
V8		X			
V9		X			
V10		X			
V11		X			
V12		X			
P1	X	X			
P2	X	X			
P3		X			
P4		X			
P5	X	X			

■ R.A. PROTECTION EXTENDED BY P.B. ON POST 5 SUBJECT TO TIMER
 ● R.A. PROTECTION EXTENDED BY P.B. ON POST 7 SUBJECT TO TIMER
 ○ R.A. PROTECTION EXTENDED BY P.B. ON POST 3 SUBJECT TO TIMER
 □ R.A. PROTECTION EXTENDED BY P.B. ON POST 1 SUBJECT TO TIMER

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND	REFERENCE PLANS	U.L.D. Ref.
HYDRANT	SYMBOLS/ABBS, V0003-6	L.S.G. E: 287 630
STOP VALVE	STD POST, V0001-4	CO-ORDS N: 1 242 775
GAS VALVE	PRES. DETECT, V0005-17	DESIGNED: USA TULAU
SEWER MANHOLE	VSIL GROUP OP, TS-TN-018	CHECKED: TERRY LAWRENCE
TELECOM PIT	DET LOGIC OP, TS-TN-020	SITE CHECKED: TERRY LAWRENCE
ELECT LIGHT POLE	PED. MOVEMENT OP, TS-TN-021	
POWER POLE		
STAY POLE		
TELEPHONE BOX	SURVEYOR LOC Design Services	
TELECOM PILLAR	DATE: 26.11.07	

DESIGN APPROVAL	RMS ACCEPTANCE
APPROVED Terry Lawrence	RECOMMENDED Terry Lawrence
POSITION: V0003-6	POSITION: V0003-6
DATE: 26.11.07	DATE: 26.11.07
DESIGN PREPARED BY: TERRY LAWRENCE	ACCEPTED Terry Lawrence
TRANSPORT AND URBAN PLANNING	POSITION: V0003-6
	DATE: 26.11.07

ROADS AND MARITIME SERVICES

LIVERPOOL COUNCIL AREA
TRAFFIC SIGNALS AT
KURRAJONG ROAD AND BERNERA ROAD
PRESTONS

DESIGN LAYOUT

TCS No 4477

EXISTING	PROPOSED
☐	☒
CADD FILE: K:\Signals\TCS\...VV4477_1A.dgn	ISSUE
SCALE: 1:500 (1:200) 10	A
FILE: 259 TS 392	SUPERSEDES SHEET/ISSUE
REGN.	SHEET
7000.259.VV.4477	1



APPENDIX C

TRAFFIC SURVEY RESULTS



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : T.T.P.A

Job No/Name : 5789 PRESTONS Bernera Rd

Day/Date : Thursday / 1st October 2015

All Vehicles	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Yarrunga St			Bernera Rd			Yato Rd			
Time Per	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	
0700 - 0715	17	99	8	2	1	2	3	131	2	1	0	10	276
0715 - 0730	23	103	11	0	0	0	3	135	2	0	0	9	286
0730 - 0745	15	77	4	2	0	2	0	158	6	4	0	17	285
0745 - 0800	20	107	2	0	1	2	1	160	3	1	1	5	303
0800 - 0815	26	86	4	1	1	2	2	177	7	1	1	15	323
0815 - 0830	21	74	4	0	0	2	4	170	5	2	0	12	294
0830 - 0845	13	90	8	1	0	2	3	192	10	4	0	11	334
0845 - 0900	31	87	5	0	0	4	8	154	9	3	0	20	321
Period End	166	723	46	6	3	16	24	1277	44	16	2	99	2422

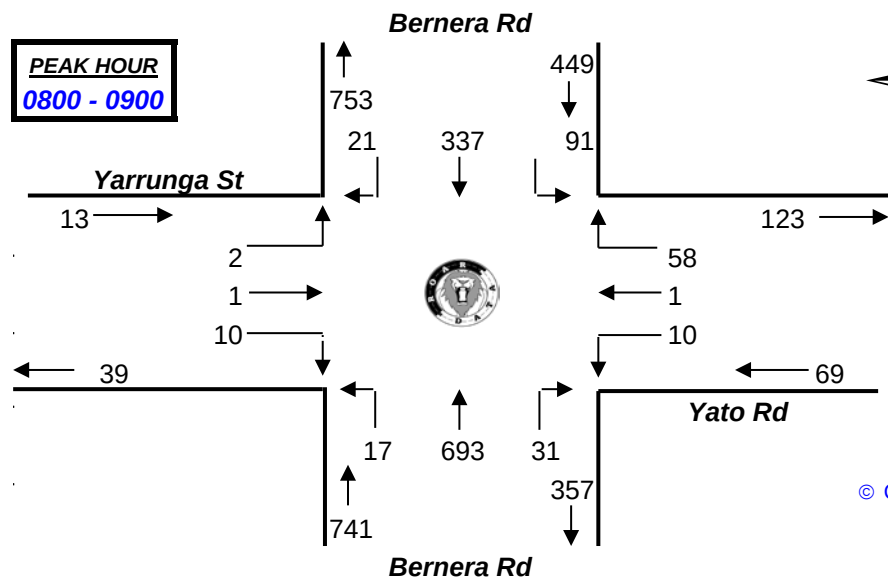
All Vehicles	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Yarrunga St			Bernera Rd			Yato Rd			
Time Per	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	TOT
1600 - 1615	6	187	2	2	0	4	0	148	4	8	0	24	385
1615 - 1630	3	220	2	12	0	0	2	154	2	2	0	22	419
1630 - 1645	6	174	2	0	0	1	1	172	2	12	0	15	385
1645 - 1700	10	162	0	3	0	2	0	148	1	3	0	12	341
1700 - 1715	4	198	1	15	1	11	0	163	3	9	0	16	421
1715 - 1730	13	230	1	10	0	3	0	174	10	8	0	22	471
1730 - 1745	13	216	1	3	0	3	0	149	15	7	0	13	420
1745 - 1800	13	198	1	3	0	4	2	154	8	5	0	7	395
Period End	68	1585	10	48	1	28	5	1262	45	54	0	131	3237

	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Yarrunga St			Bernera Rd			Yato Rd			
Peak Time	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	TOT
0700 - 0800	75	386	25	4	2	6	7	584	13	6	1	41	1150
0715 - 0815	84	373	21	3	2	6	6	630	18	6	2	46	1197
0730 - 0830	82	344	14	3	2	8	7	665	21	8	2	49	1205
0745 - 0845	80	357	18	2	2	8	10	699	25	8	2	43	1254
0800 - 0900	91	337	21	2	1	10	17	693	31	10	1	58	1272

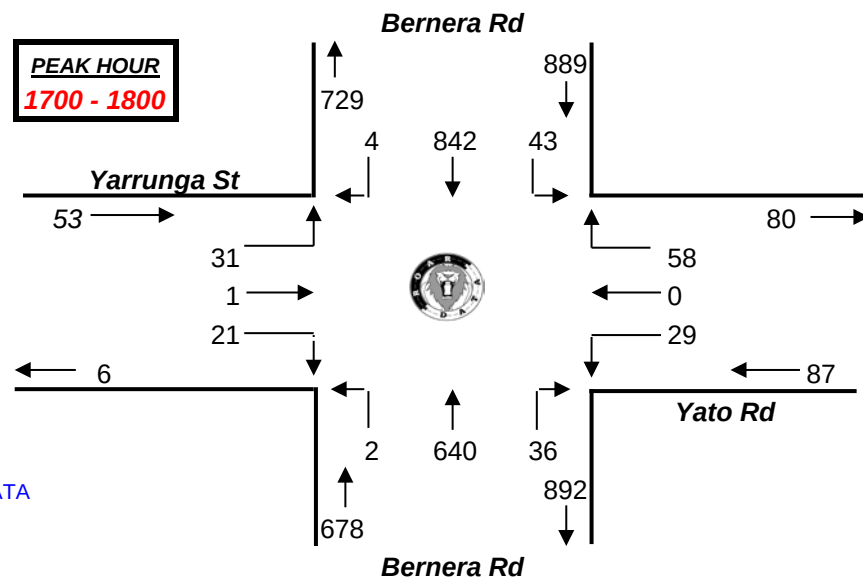
	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Yarrunga St			Bernera Rd			Yato Rd			
Peak Time	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	TOT
1600 - 1700	25	743	6	17	0	7	3	622	9	25	0	73	1530
1615 - 1715	23	754	5	30	1	14	3	637	8	26	0	65	1566
1630 - 1730	33	764	4	28	1	17	1	657	16	32	0	65	1618
1645 - 1745	40	806	3	31	1	19	0	634	29	27	0	63	1653
1700 - 1800	43	842	4	31	1	21	2	640	36	29	0	58	1707

PEAK HOUR	91	337	21	2	1	10	17	693	31	10	1	58	1272
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PEAK HOUR	43	842	4	31	1	21	2	640	36	29	0	58	1707
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© Copyright ROAR DATA





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

Intersection Layout

Obtained via satellite

May be incorrect

AM PEAK HOUR
0800 - 0900



Bernera Rd

Yarrunga St

AM	PM	
2	31	L
1	1	T
10	21	R

R	T	L	
21	337	91	AM
4	842	43	PM

R	T	L	
58	58		AM
0	1		PM
29	10		

PM	AM	
2	640	36
17	693	31
L	T	R

Yato Rd

PM PEAK HOUR
1700 - 1800

Weather >>>



Bernera Rd



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : T.T.P.A

Job No/Name : 5789 PRESTONS Bernera Rd

Day/Date : Thursday / 1st October 2015

All Vehicles	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Camden Valley			Croatia Ave			Camden Valley			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	
0700 - 0715	52	21	23	37	339	17	18	14	10	5	145	30	711
0715 - 0730	71	19	19	37	331	39	12	12	1	4	166	34	745
0730 - 0745	62	32	24	28	320	40	16	31	9	5	180	24	771
0745 - 0800	49	11	22	42	272	26	19	17	4	4	175	39	680
0800 - 0815	51	14	20	41	293	30	15	10	6	4	129	38	651
0815 - 0830	51	12	31	23	273	22	8	14	4	5	146	39	628
0830 - 0845	46	15	15	44	314	20	15	14	5	4	143	33	668
0845 - 0900	74	10	28	26	249	16	19	12	1	5	160	43	643
Period End	456	134	182	278	2391	210	122	124	40	36	1244	280	5497

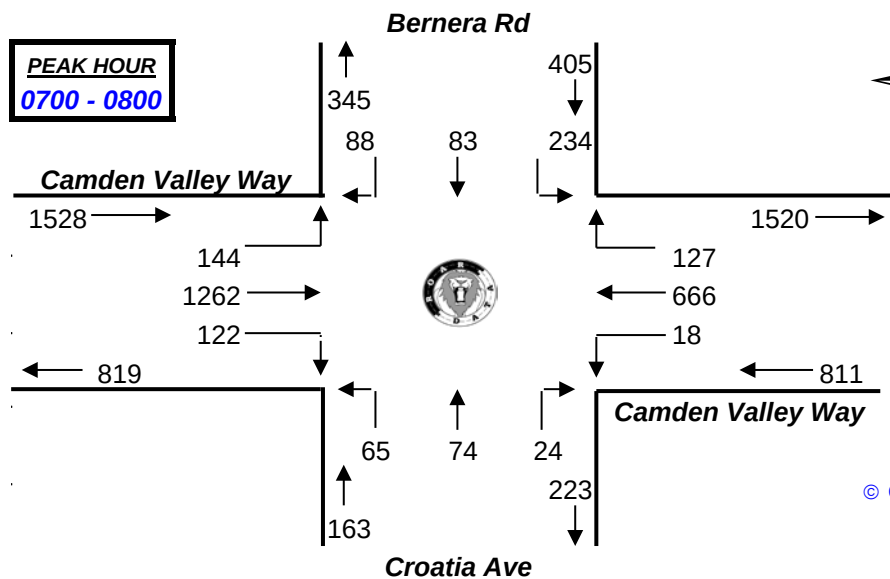
All Vehicles	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Camden Valley			Croatia Ave			Camden Valley			
Time Per	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	
1600 - 1615	46	17	67	17	225	18	17	16	3	7	342	46	821
1615 - 1630	53	18	71	28	222	14	18	22	8	8	392	55	909
1630 - 1645	54	16	42	25	253	18	22	12	6	4	369	60	881
1645 - 1700	46	9	64	25	215	9	32	23	2	3	360	62	850
1700 - 1715	63	24	59	33	239	17	21	14	5	5	340	60	880
1715 - 1730	71	24	82	32	224	12	32	22	4	2	375	63	943
1730 - 1745	62	22	56	35	235	18	17	22	5	9	406	62	949
1745 - 1800	55	17	57	23	235	23	29	25	9	6	392	60	931
Period End	450	147	498	218	1848	129	188	156	42	44	2976	468	7164

Peak Time	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Camden Valley			Croatia Ave			Camden Valley			
	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	
0700 - 0800	234	83	88	144	1262	122	65	74	24	18	666	127	2907
0715 - 0815	233	76	85	148	1216	135	62	70	20	17	650	135	2847
0730 - 0830	213	69	97	134	1158	118	58	72	23	18	630	140	2730
0745 - 0845	197	52	88	150	1152	98	57	55	19	17	593	149	2627
0800 - 0900	222	51	94	134	1129	88	57	50	16	18	578	153	2590

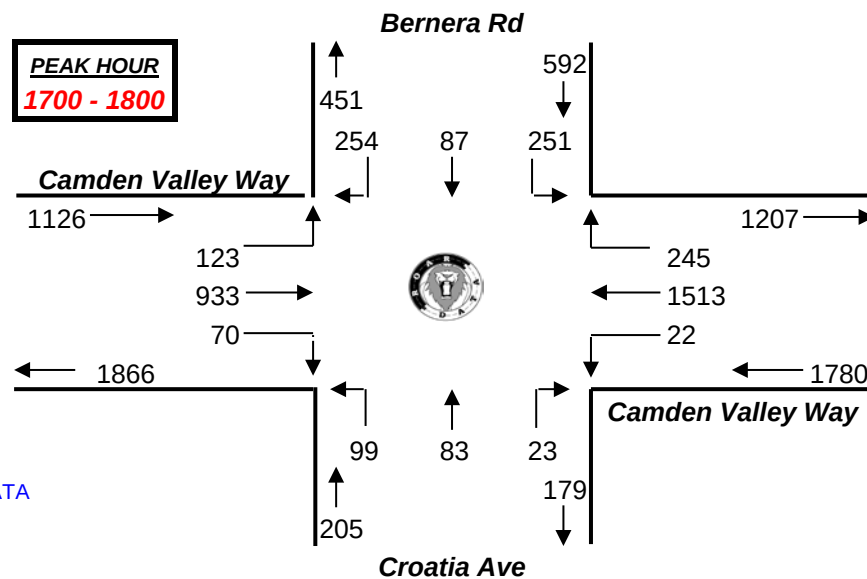
Peak Time	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Camden Valley			Croatia Ave			Camden Valley			
	Ⓐ	Ⓑ	Ⓒ	Ⓐ	Ⓑ	Ⓒ	Ⓐ	Ⓑ	Ⓒ	Ⓐ	Ⓑ	Ⓒ	
1600 - 1700	199	60	244	95	915	59	89	73	19	22	1463	223	3461
1615 - 1715	216	67	236	111	929	58	93	71	21	20	1461	237	3520
1630 - 1730	234	73	247	115	931	56	107	71	17	14	1444	245	3554
1645 - 1745	242	79	261	125	913	56	102	81	16	19	1481	247	3622
1700 - 1800	251	87	254	123	933	70	99	83	23	22	1513	245	3703

PEAK HOUR	234	83	88	144	1262	122	65	74	24	18	666	127	2907
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PEAK HOUR	251	87	254	123	933	70	99	83	23	22	1513	245	3703
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R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

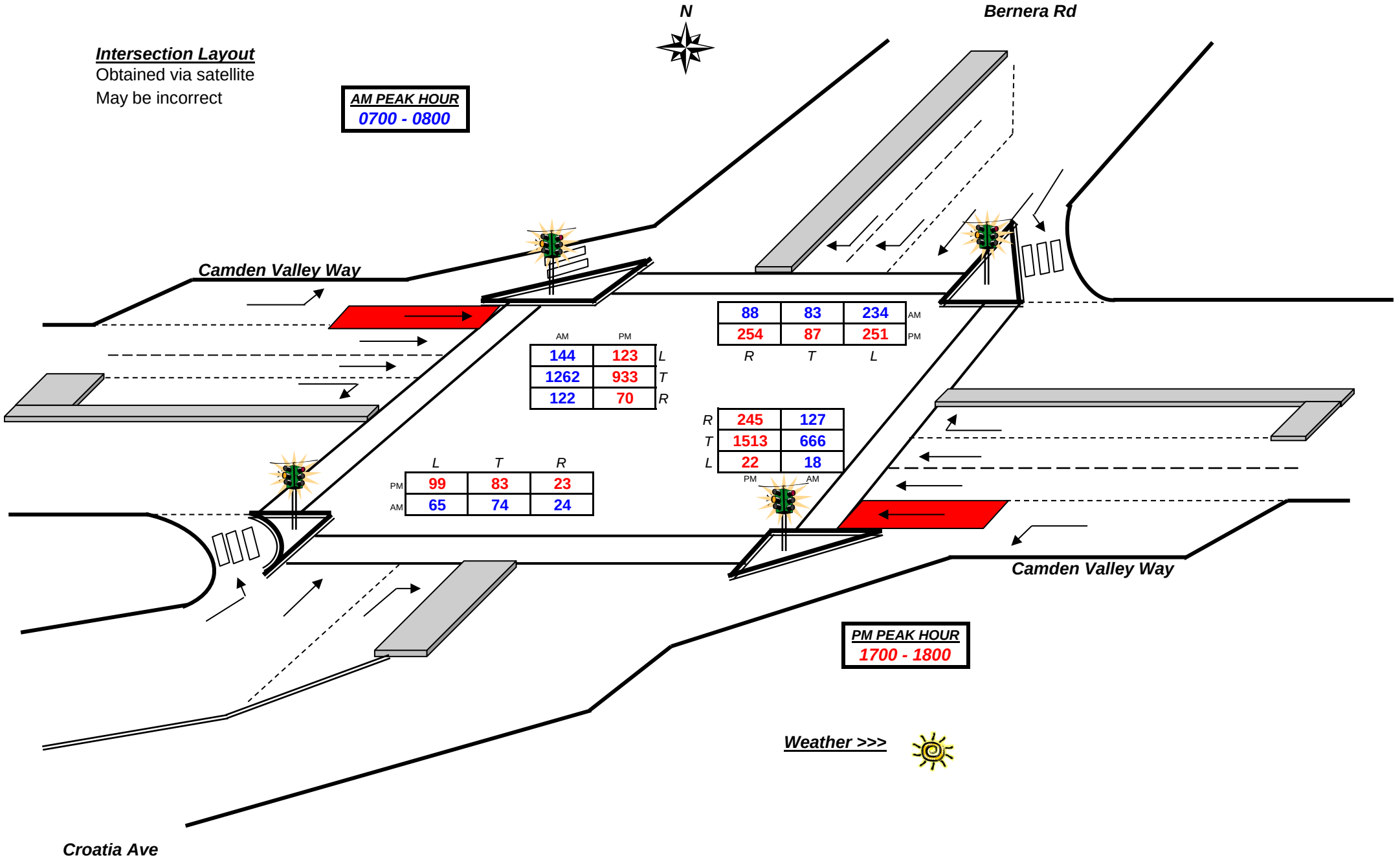
Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

Intersection Layout

Obtained via satellite

May be incorrect

AM PEAK HOUR
0700 - 0800





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : T.T.P.A

Job No/Name : 5789 PRESTONS Bernera Rd

Day/Date : Thursday / 1st October 2015

All Vehicles	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Kurrajong Rd			Bernera Rd			Kurrajong Rd			
Time Per	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	
0700 - 0715	28		4	19	14	1	3		17	11	3	41	141
0715 - 0730	39		5	23	17	1	3		15	7	9	34	153
0730 - 0745	19		5	25	14	0	0		12	10	7	32	124
0745 - 0800	33		10	32	9	2	0		24	5	5	50	170
0800 - 0815	29		5	28	11	2	1		14	6	5	47	148
0815 - 0830	29		1	23	12	1	3		18	11	3	41	142
0830 - 0845	28		5	41	15	0	2		14	6	2	71	184
0845 - 0900	36		14	32	17	1	3		14	5	10	48	180
Period End	241	0	49	223	109	8	15	0	128	61	44	364	1242

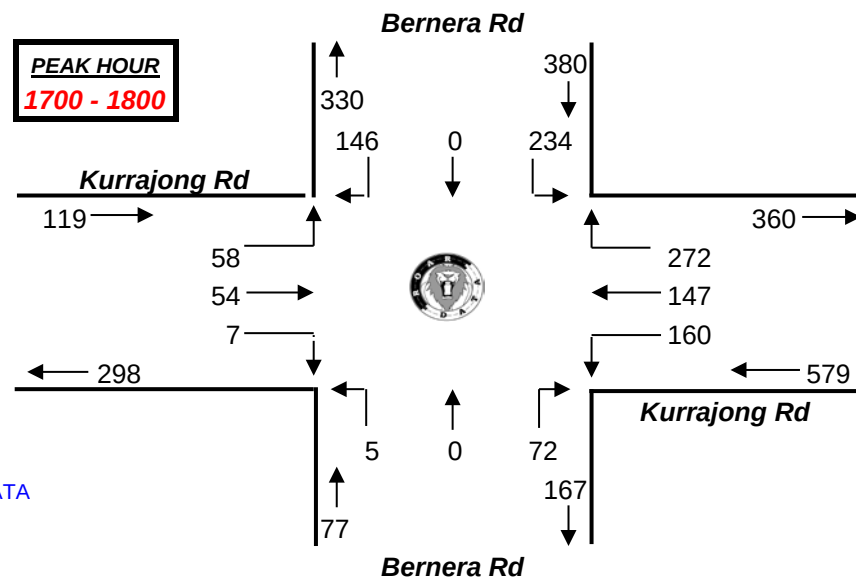
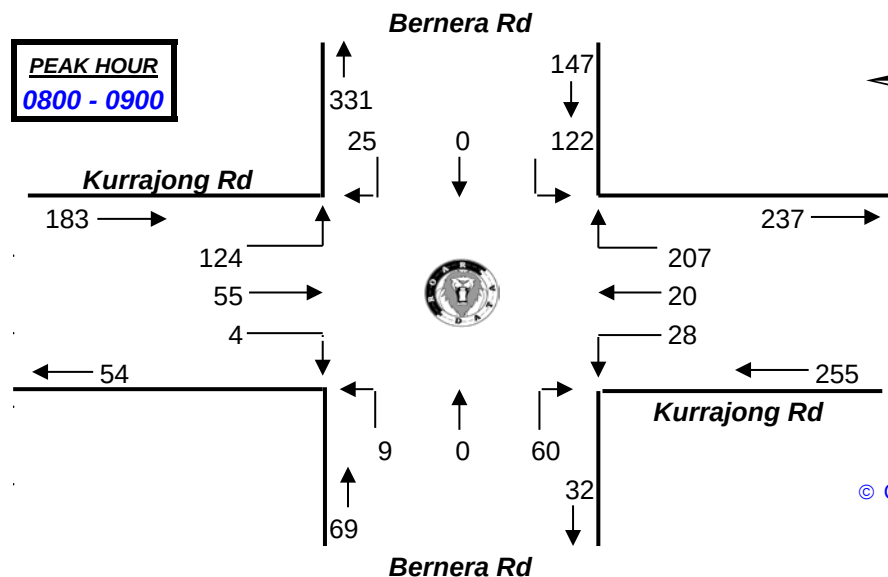
All Vehicles	NORTH			WEST			SOUTH			EAST			TOT
	Bernera Rd			Kurrajong Rd			Bernera Rd			Kurrajong Rd			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	
1600 - 1615	50		25	23	11	2	1		17	45	28	77	279
1615 - 1630	81		35	23	14	1	1		17	37	23	82	314
1630 - 1645	106		41	14	8	0	0		23	38	8	38	276
1645 - 1700	45		27	15	7	1	1		10	37	25	50	218
1700 - 1715	55		32	14	8	1	2		17	46	42	72	289
1715 - 1730	65		45	17	14	1	2		29	34	42	83	332
1730 - 1745	59		28	12	21	2	0		17	41	35	57	272
1745 - 1800	55		41	15	11	3	1		9	39	28	60	262
Period End	516	0	274	133	94	11	8	0	139	317	231	519	2242

	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Kurrajong Rd			Bernera Rd			Kurrajong Rd			
Peak Time	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>L</u>	<u>T</u>	<u>R</u>	TOT
0700 - 0800	119	0	24	99	54	4	6	0	68	33	24	157	588
0715 - 0815	120	0	25	108	51	5	4	0	65	28	26	163	595
0730 - 0830	110	0	21	108	46	5	4	0	68	32	20	170	584
0745 - 0845	119	0	21	124	47	5	6	0	70	28	15	209	644
0800 - 0900	122	0	25	124	55	4	9	0	60	28	20	207	654

	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Kurrajong Rd			Bernera Rd			Kurrajong Rd			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1700	282	0	128	75	40	4	3	0	67	157	84	247	1087
1615 - 1715	287	0	135	66	37	3	4	0	67	158	98	242	1097
1630 - 1730	271	0	145	60	37	3	5	0	79	155	117	243	1115
1645 - 1745	224	0	132	58	50	5	5	0	73	158	144	262	1111
1700 - 1800	234	0	146	58	54	7	5	0	72	160	147	272	1155

PEAK HOUR	122	0	25	124	55	4	9	0	60	28	20	207	654
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PEAK HOUR	234	0	146	58	54	7	5	0	72	160	147	272	1155
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R.O.A.R. DATA

Reliable, Original & Authentic Results

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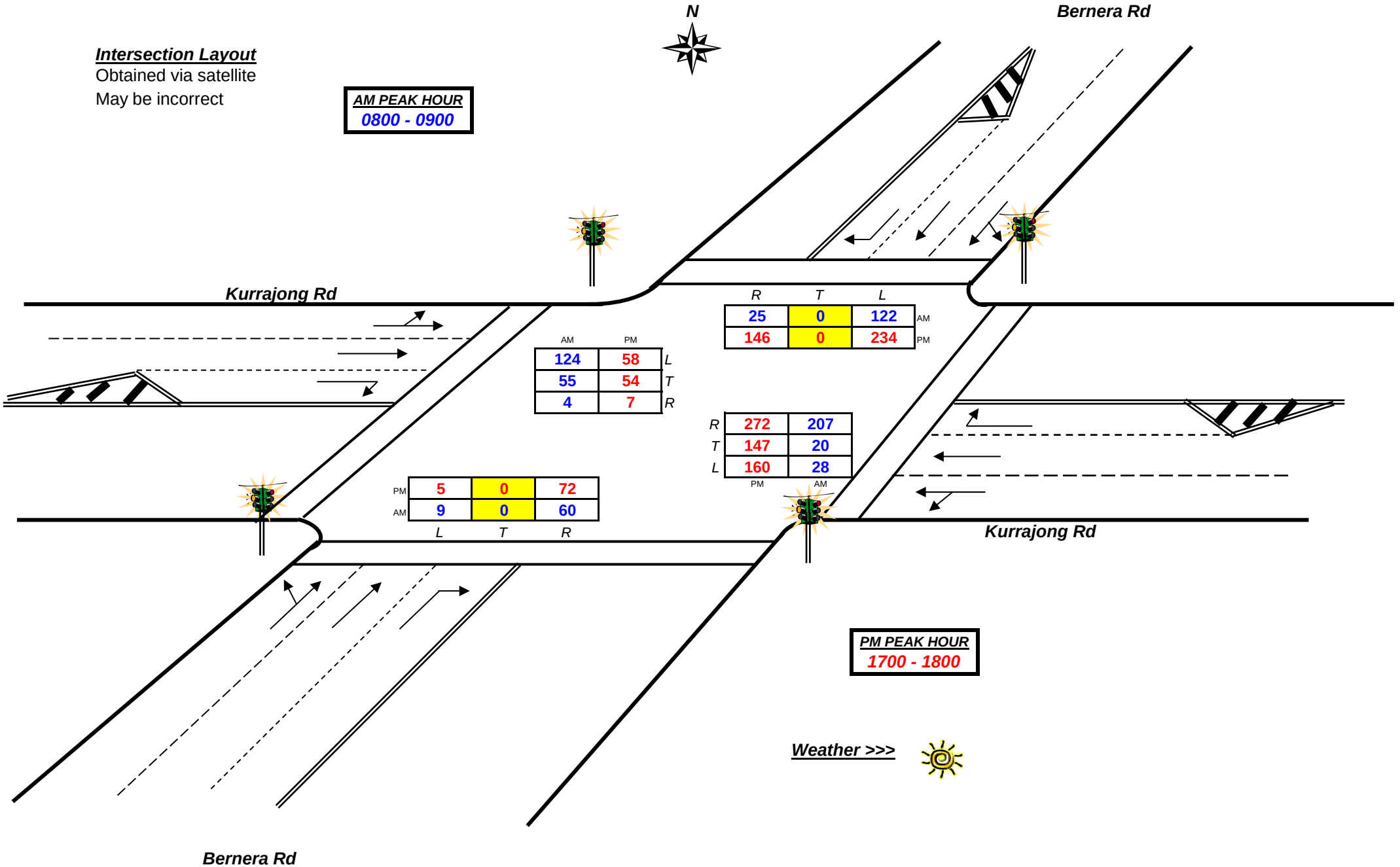
Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

Intersection Layout

Obtained via satellite

May be incorrect

AM PEAK HOUR
0800 - 0900



PM PEAK HOUR
1700 - 1800

Weather >>>





R.O.A.R. DATA

Reliable, Original & Authentic Results

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PM

Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

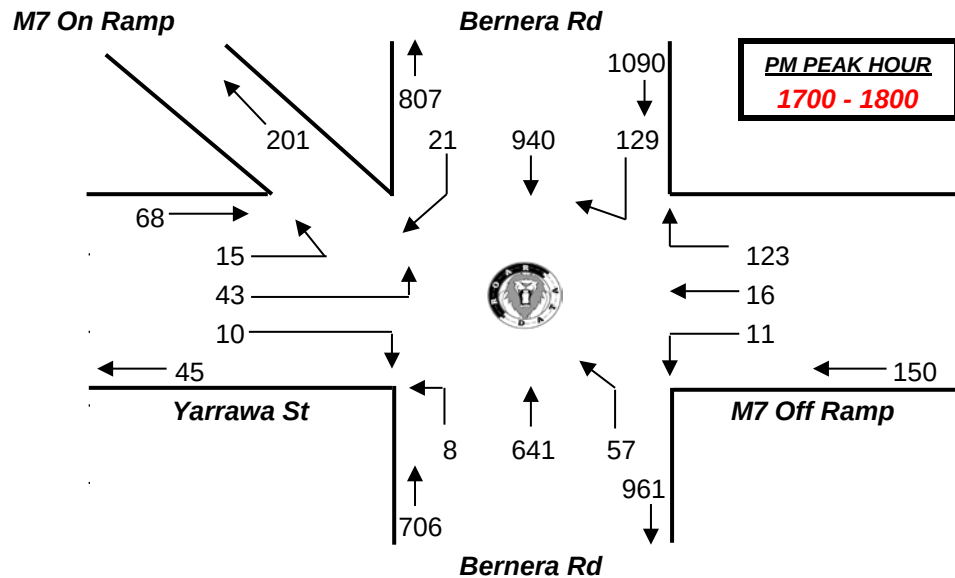
All Vehicles

All Vehicles	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Yarrawa St			Bernera Rd			M7 Off Ramp			
Time Per	HR	I	R	HL	L	R	HL	I	L	L	I	R	TOT
1600 - 1615	26	182	12	2	8	3	3	157	18	3	5	25	444
1615 - 1630	32	197	14	3	9	2	2	162	17	4	6	28	476
1630 - 1645	51	180	16	9	12	1	2	169	16	2	4	31	493
1645 - 1700	26	133	12	1	6	2	1	151	18	4	2	30	386
1700 - 1715	35	232	8	4	4	2	1	168	18	1	1	34	508
1715 - 1730	34	279	4	3	12	2	2	189	12	4	4	32	577
1730 - 1745	34	224	6	6	20	4	3	140	13	2	6	26	484
1745 - 1800	26	205	3	2	7	2	2	144	14	4	5	31	445
Period End	264	1632	75	30	78	18	16	1280	126	24	33	237	3813

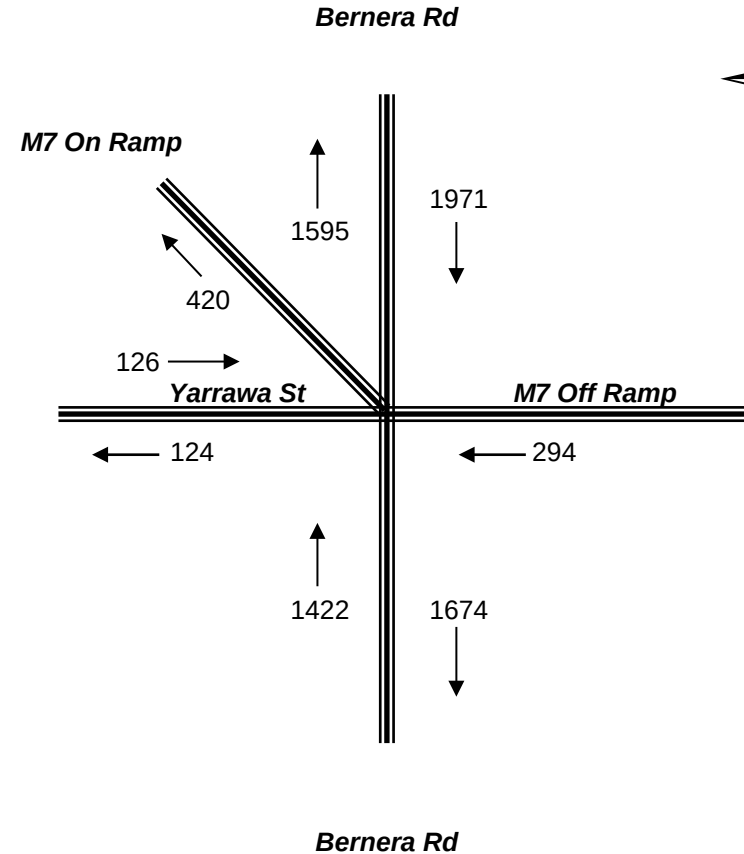
All Vehicles

All Vehicles	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			Yarrawa St			Bernera Rd			M7 Off Ramp			
Peak Time	<u>HR</u>	<u>I</u>	<u>R</u>	<u>HL</u>	<u>L</u>	<u>R</u>	<u>HL</u>	<u>I</u>	<u>L</u>	<u>L</u>	<u>I</u>	<u>R</u>	TOT
1600 - 1700	135	692	54	15	35	8	8	639	69	13	17	114	1799
1615 - 1715	144	742	50	17	31	7	6	650	69	11	13	123	1863
1630 - 1730	146	824	40	17	34	7	6	677	64	11	11	127	1964
1645 - 1745	129	868	30	14	42	10	7	648	61	11	13	122	1955
1700 - 1800	129	940	21	15	43	10	8	641	57	11	16	123	2014

PEAK HOUR	129	940	21	15	43	10	8	641	57	11	16	123	2014
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TOTAL VOLUMES
FOR COUNT
PERIODS





R.O.A.R. DATA

Reliable, Original & Authentic Results

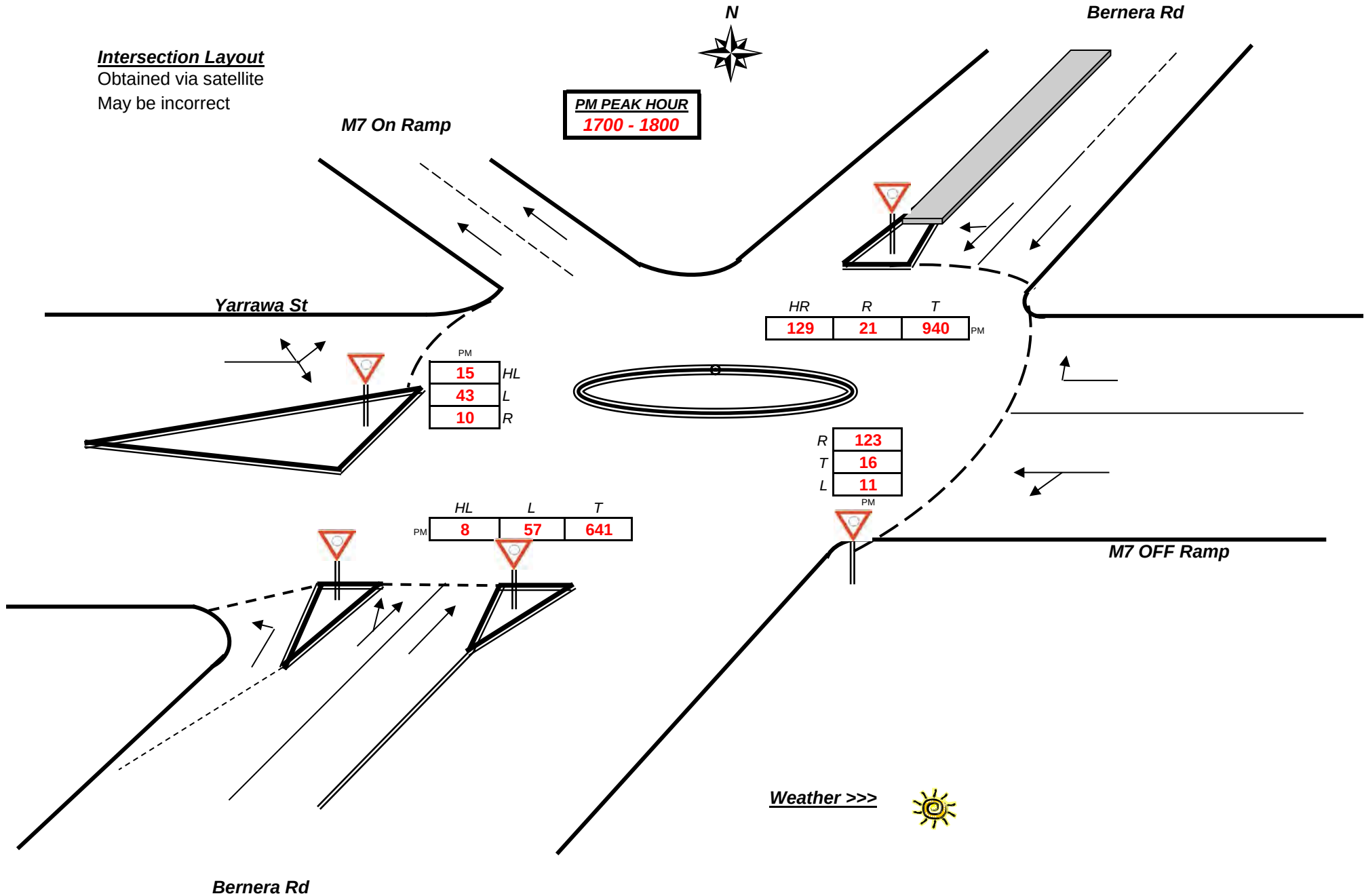
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Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

Intersection Layout

Obtained via satellite

May be incorrect





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

AM

Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

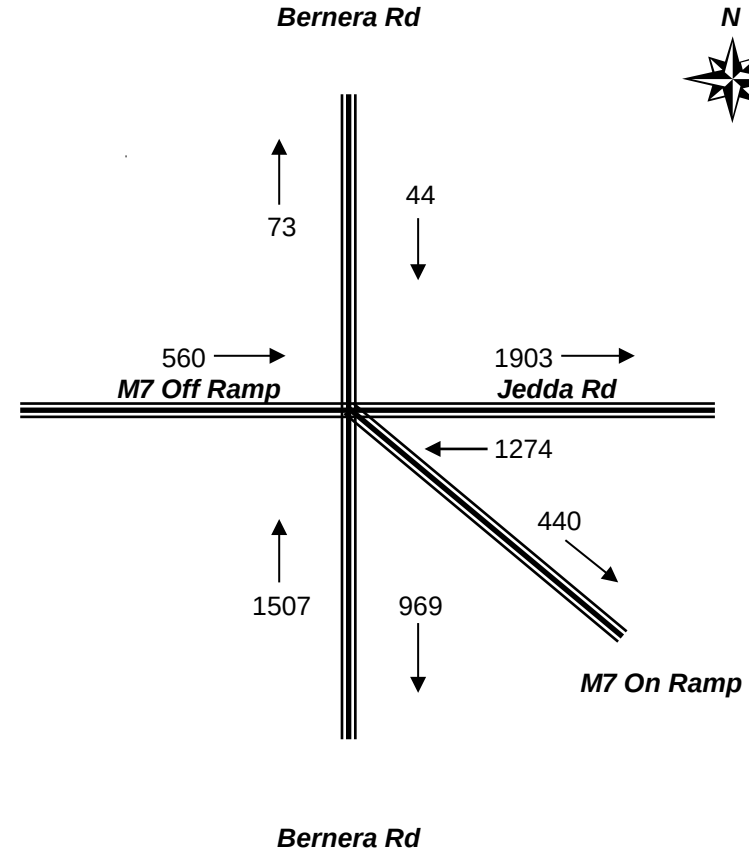
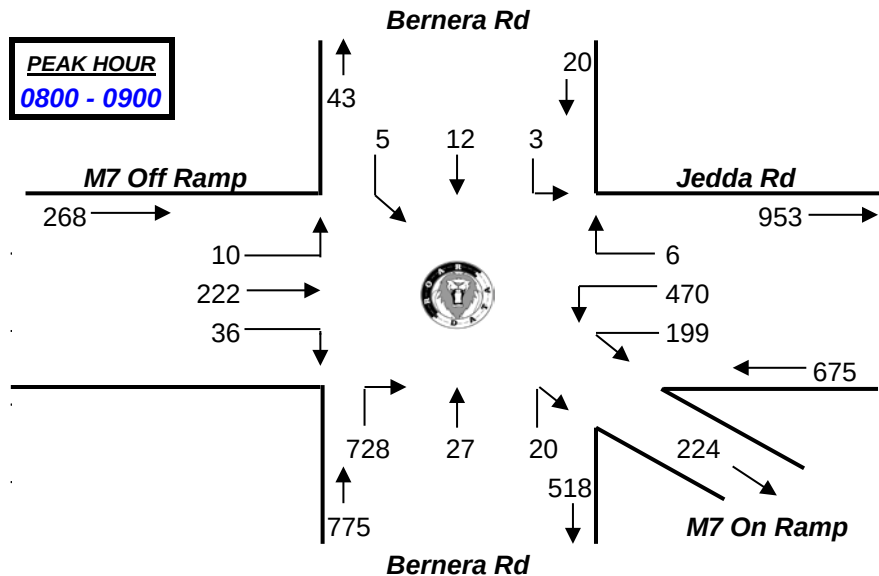
All Vehicles

All Vehicles	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			M7 Off Ramp			Bernera Rd			Jedda Rd			
Time Per	HL	T	L	L	T	R	R	T	HR	HL	L	R	TOT
0700 - 0715	1	3	4	2	65	11	136	2	6	31	81	3	345
0715 - 0730	3	3	4	3	68	5	187	3	7	44	130	0	457
0730 - 0745	2	2	1	3	49	12	179	4	6	62	112	1	433
0745 - 0800	0	0	1	2	67	5	193	7	2	48	87	0	412
0800 - 0815	0	3	0	5	42	7	165	8	2	54	121	0	407
0815 - 0830	0	0	1	2	70	9	192	6	8	45	124	1	458
0830 - 0845	1	5	2	1	59	9	191	7	3	43	101	5	427
0845 - 0900	2	4	2	2	51	11	180	6	7	57	124	0	446
Period End	9	20	15	20	471	69	1423	43	41	384	880	10	3385

All Vehicles

All Vehicles	NORTH			WEST			SOUTH			EAST			
	Bernera Rd			M7 Off Ramp			Bernera Rd			Jedda Rd			
Peak Time	<u>HL</u>	<u>T</u>	<u>L</u>	<u>L</u>	<u>T</u>	<u>R</u>	<u>R</u>	<u>T</u>	<u>HR</u>	<u>HL</u>	<u>L</u>	<u>R</u>	TOT
0700 - 0800	6	8	10	10	249	33	695	16	21	185	410	4	1647
0715 - 0815	5	8	6	13	226	29	724	22	17	208	450	1	1709
0730 - 0830	2	5	3	12	228	33	729	25	18	209	444	2	1710
0745 - 0845	1	8	4	10	238	30	741	28	15	190	433	6	1704
0800 - 0900	3	12	5	10	222	36	728	27	20	199	470	6	1738

PEAK HOUR	3	12	5	10	222	36	728	27	20	199	470	6	1738
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R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

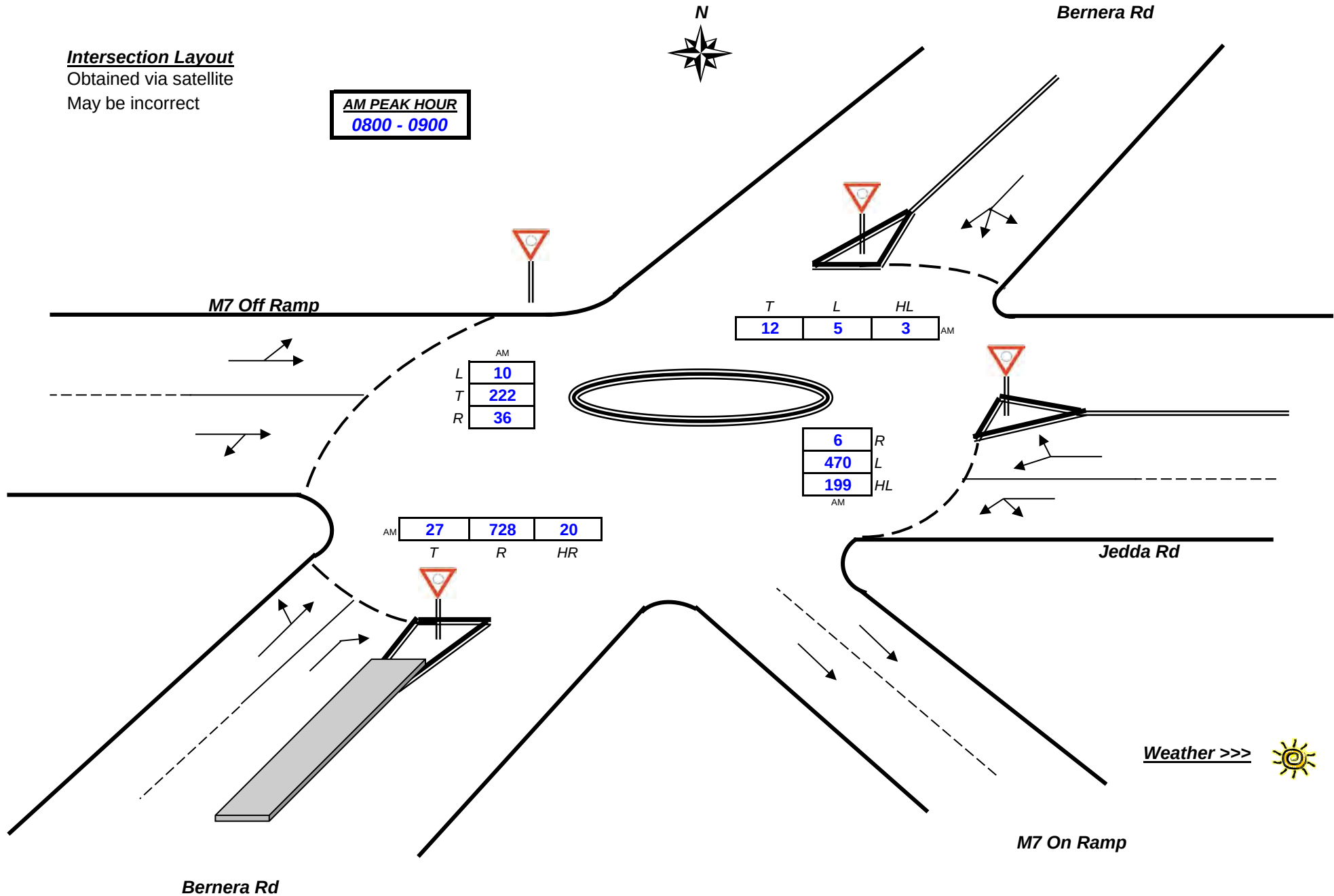
Client : T.T.P.A
Job No/Name : 5789 PRESTONS Bernera Rd
Day/Date : Thursday / 1st October 2015

Intersection Layout

Obtained via satellite

May be incorrect

AM PEAK HOUR
0800 - 0900



APPENDIX D

SIDRA RESULTS

MOVEMENT SUMMARY



Site: Bernera Road / Yarrunga Street / Yato Road EXISTING AM

Bernera Road / Yarrunga Street / Yato Road

Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	17	5.0	0.109	10.3	LOS A	2.1	15.1	0.34	0.33	52.9
2	T1	693	5.0	0.525	6.3	LOS A	12.1	88.7	0.45	0.43	53.0
3	R2	31	5.0	0.525	12.2	LOS A	12.1	88.7	0.48	0.45	48.9
Approach		741	5.0	0.525	6.6	LOS A	12.1	88.7	0.45	0.43	52.8
East: Yato Road											
4	L2	10	5.0	0.041	42.6	LOS D	0.4	3.2	0.87	0.67	29.2
5	T1	1	5.0	0.041	37.0	LOS C	0.4	3.2	0.87	0.67	31.9
6	R2	58	5.0	0.247	45.5	LOS D	2.5	18.0	0.92	0.75	28.4
Approach		69	5.0	0.247	45.0	LOS D	2.5	18.0	0.92	0.74	28.5
North: Bernera Road											
7	L2	91	5.0	0.074	10.9	LOS A	1.4	10.0	0.35	0.66	45.8
8	T1	337	5.0	0.304	6.3	LOS A	6.5	47.6	0.43	0.40	52.9
9	R2	21	5.0	0.304	11.9	LOS A	6.5	47.6	0.43	0.40	51.7
Approach		449	5.0	0.304	7.5	LOS A	6.5	47.6	0.41	0.45	51.4
West: Yarrunga Street											
10	L2	2	5.0	0.056	43.0	LOS D	0.5	3.8	0.88	0.68	33.5
11	T1	1	5.0	0.056	37.4	LOS C	0.5	3.8	0.88	0.68	31.7
12	R2	10	5.0	0.056	43.0	LOS D	0.5	3.8	0.88	0.68	33.0
Approach		13	5.0	0.056	42.5	LOS D	0.5	3.8	0.88	0.68	33.0
All Vehicles		1272	5.0	0.525	9.4	LOS A	12.1	88.7	0.47	0.45	50.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	41.8	LOS E	0.1	0.1	0.94	0.94	
P2	East Full Crossing	50	6.5	LOS A	0.0	0.0	0.37	0.37	
P3	North Full Crossing	50	41.8	LOS E	0.1	0.1	0.94	0.94	
P4	West Full Crossing	50	5.7	LOS A	0.0	0.0	0.35	0.35	
All Pedestrians		200	23.9	LOS C			0.65	0.65	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Yarrunga Street / Yato Road EXISTING PM

Bernera Road / Yarrunga Street / Yato Road

Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	2	5.0	0.113	10.3	LOS A	2.2	15.9	0.34	0.29	53.4
2	T1	640	5.0	0.545	7.7	LOS A	12.1	88.6	0.49	0.45	51.8
3	R2	36	5.0	0.545	14.1	LOS A	12.1	88.6	0.54	0.50	47.0
Approach		678	5.0	0.545	8.0	LOS A	12.1	88.6	0.49	0.45	51.5
East: Yato Road											
4	L2	29	5.0	0.113	43.4	LOS D	1.2	8.9	0.89	0.72	28.8
5	T1	1	5.0	0.113	37.8	LOS C	1.2	8.9	0.89	0.72	31.5
6	R2	58	5.0	0.255	45.7	LOS D	2.5	18.1	0.92	0.75	28.3
Approach		88	5.0	0.255	44.8	LOS D	2.5	18.1	0.91	0.74	28.5
North: Bernera Road											
7	L2	43	5.0	0.141	10.4	LOS A	2.7	20.0	0.35	0.38	49.9
8	T1	842	5.0	0.595	6.7	LOS A	15.3	111.4	0.48	0.45	52.7
9	R2	4	5.0	0.595	12.6	LOS A	15.3	111.4	0.51	0.47	51.4
Approach		889	5.0	0.595	6.9	LOS A	15.3	111.4	0.48	0.45	52.6
West: Yarrunga Street											
10	L2	31	5.0	0.223	44.5	LOS D	2.2	16.2	0.91	0.75	32.9
11	T1	1	5.0	0.223	38.9	LOS C	2.2	16.2	0.91	0.75	31.1
12	R2	21	5.0	0.223	44.5	LOS D	2.2	16.2	0.91	0.75	32.4
Approach		53	5.0	0.223	44.4	LOS D	2.2	16.2	0.91	0.75	32.7
All Vehicles		1708	5.0	0.595	10.4	LOS A	15.3	111.4	0.52	0.48	49.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	41.8	LOS E	0.1	0.1	0.94	0.94	
P2	East Full Crossing	50	6.5	LOS A	0.0	0.0	0.37	0.37	
P3	North Full Crossing	50	41.8	LOS E	0.1	0.1	0.94	0.94	
P4	West Full Crossing	50	5.7	LOS A	0.0	0.0	0.35	0.35	
All Pedestrians		200	23.9	LOS C			0.65	0.65	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Bernera Road / Kurrajong Road EXISTING AM

Bernera Road / Kurrajong Road

Signals - Fixed Time Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	9	5.0	0.231	27.4	LOS B	3.2	23.4	0.82	0.67	46.4
2	T1	410	5.0	0.602	25.3	LOS B	9.9	72.5	0.90	0.75	45.2
3	R2	60	5.0	0.154	21.4	LOS B	1.4	10.3	0.78	0.71	46.2
Approach		479	5.0	0.602	24.8	LOS B	9.9	72.5	0.88	0.75	45.3
East: Kurrajong Road											
4	L2	28	5.0	0.038	13.9	LOS A	0.5	3.6	0.55	0.64	50.5
5	T1	20	5.0	0.038	21.4	LOS B	0.5	3.7	0.76	0.56	43.2
6	R2	207	5.0	0.509	24.0	LOS B	5.5	40.4	0.88	0.78	40.1
Approach		255	5.0	0.509	22.7	LOS B	5.5	40.4	0.83	0.75	41.6
North: Bernera Road											
7	L2	122	5.0	0.320	23.2	LOS B	4.3	31.7	0.81	0.74	41.2
8	T1	210	5.0	0.320	22.6	LOS B	4.8	35.2	0.84	0.70	46.0
9	R2	25	5.0	0.077	22.0	LOS B	0.6	4.2	0.83	0.69	42.3
Approach		357	5.0	0.320	22.8	LOS B	4.8	35.2	0.83	0.71	44.4
West: Kurrajong Road											
10	L2	124	5.0	0.225	22.7	LOS B	3.1	22.4	0.78	0.75	41.7
11	T1	55	5.0	0.115	23.4	LOS B	1.6	11.4	0.80	0.61	42.4
12	R2	4	5.0	0.008	20.7	LOS B	0.1	0.7	0.71	0.62	47.2
Approach		183	5.0	0.225	22.8	LOS B	3.1	22.4	0.79	0.71	42.1
All Vehicles		1274	5.0	0.602	23.5	LOS B	9.9	72.5	0.84	0.73	44.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	31.8	LOS D	0.1	0.1	0.92	0.92	
P2	East Full Crossing	50	30.9	LOS D	0.1	0.1	0.91	0.91	
P2S	East Slip/Bypass Lane Crossing	50	21.7	LOS C	0.1	0.1	0.76	0.76	
P3	North Full Crossing	50	31.8	LOS D	0.1	0.1	0.92	0.92	
P4	West Full Crossing	50	30.9	LOS D	0.1	0.1	0.91	0.91	
All Pedestrians		250	29.4	LOS C			0.88	0.88	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: Bernera Road / Kurrajong Road EXISTING PM**

Bernera Road / Kurrajong Road

Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	5	5.0	0.166	26.0	LOS B	2.7	19.6	0.76	0.61	47.0
2	T1	348	5.0	0.433	22.9	LOS B	8.0	58.6	0.82	0.68	46.3
3	R2	72	5.0	0.259	23.1	LOS B	1.7	12.5	0.88	0.74	45.5
Approach		425	5.0	0.433	23.0	LOS B	8.0	58.6	0.83	0.69	46.1
East: Kurrajong Road											
4	L2	160	5.0	0.272	18.8	LOS B	4.2	30.8	0.70	0.72	48.1
5	T1	147	5.0	0.272	24.9	LOS B	4.2	30.8	0.83	0.69	41.2
6	R2	272	5.0	0.650	30.3	LOS C	8.2	59.6	0.92	0.89	37.1
Approach		579	5.0	0.650	25.7	LOS B	8.2	59.6	0.84	0.79	41.5
North: Bernera Road											
7	L2	234	5.0	0.624	29.2	LOS C	12.6	91.9	0.89	0.81	38.4
8	T1	512	5.0	0.624	25.0	LOS B	12.6	91.9	0.90	0.79	44.9
9	R2	146	5.0	0.374	22.1	LOS B	3.7	26.7	0.82	0.76	42.2
Approach		892	5.0	0.624	25.7	LOS B	12.6	91.9	0.88	0.79	43.0
West: Kurrajong Road											
10	L2	58	5.0	0.113	24.3	LOS B	1.5	11.1	0.77	0.72	40.9
11	T1	54	5.0	0.120	26.1	LOS B	1.7	12.2	0.82	0.62	41.0
12	R2	7	5.0	0.017	23.4	LOS B	0.2	1.3	0.76	0.64	46.0
Approach		119	5.0	0.120	25.1	LOS B	1.7	12.2	0.79	0.67	41.3
All Vehicles		2015	5.0	0.650	25.1	LOS B	12.6	91.9	0.85	0.76	43.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	34.3	LOS D	0.1	0.1	0.93	0.93	
P2	East Full Crossing	50	29.0	LOS C	0.1	0.1	0.85	0.85	
P2S	East Slip/Bypass Lane Crossing	50	20.3	LOS C	0.1	0.1	0.71	0.71	
P3	North Full Crossing	50	34.3	LOS D	0.1	0.1	0.93	0.93	
P4	West Full Crossing	50	29.0	LOS C	0.1	0.1	0.85	0.85	
All Pedestrians		250	29.4	LOS C			0.85	0.85	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Camden Valley Way / Croatia Avenue EXISTING AM

Bernera Road / Camden Valley Way / Croatia Avenue

Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Croatia Avenue											
1	L2	65	5.0	0.298	33.5	LOS C	5.0	36.7	0.85	0.75	44.7
2	T1	74	5.0	0.298	27.9	LOS B	5.0	36.7	0.85	0.75	40.6
3	R2	24	5.0	0.268	68.8	LOS E	1.4	10.6	0.99	0.71	32.6
Approach		163	5.0	0.298	36.2	LOS C	5.0	36.7	0.87	0.74	40.6
East: Camden Valley Way											
4	L2	18	5.0	0.015	7.7	LOS A	0.1	0.8	0.18	0.61	58.5
5	T1	666	5.0	0.371	17.1	LOS B	9.2	67.3	0.51	0.45	57.6
6	R2	127	5.0	0.563	25.2	LOS B	3.7	27.2	0.81	0.77	48.1
Approach		811	5.0	0.563	18.2	LOS B	9.2	67.3	0.55	0.50	56.1
North: Bernera Road											
7	L2	234	5.0	0.265	11.1	LOS A	4.8	34.7	0.42	0.68	55.3
8	T1	83	5.0	0.195	40.6	LOS C	3.9	28.8	0.85	0.67	36.7
9	R2	88	5.0	0.491	70.0	LOS E	2.7	19.7	1.00	0.74	32.7
Approach		405	5.0	0.491	29.9	LOS C	4.8	34.7	0.63	0.69	44.5
West: Camden Valley Way											
10	L2	144	5.0	0.125	8.6	LOS A	1.2	8.9	0.27	0.65	57.8
11	T1	1262	5.0	0.744	10.5	LOS A	19.6	142.9	0.51	0.46	61.8
12	R2	122	5.0	0.308	21.5	LOS B	3.6	26.0	0.64	0.73	49.2
Approach		1528	5.0	0.744	11.2	LOS A	19.6	142.9	0.50	0.50	60.4
All Vehicles		2907	5.0	0.744	17.2	LOS B	19.6	142.9	0.55	0.54	55.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	23.5	LOS C	0.1	0.1	0.63	0.63
P2	East Full Crossing	50	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	50	25.4	LOS C	0.1	0.1	0.65	0.65
P4	West Full Crossing	50	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		200	39.4	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Camden Valley Way / Croatia Avenue EXISTING PM

Bernera Road / Camden Valley Way / Croatia Avenue

Signals - Fixed Time Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Croatia Avenue											
1	L2	99	5.0	0.485	52.6	LOS D	9.1	66.3	0.91	0.85	37.6
2	T1	83	5.0	0.485	46.9	LOS D	9.1	66.3	0.91	0.85	33.7
3	R2	23	5.0	0.133	71.5	LOS F	1.5	11.1	0.95	0.71	32.0
Approach		205	5.0	0.485	52.4	LOS D	9.1	66.3	0.92	0.83	35.3
East: Camden Valley Way											
4	L2	22	5.0	0.018	8.2	LOS A	0.2	1.2	0.21	0.62	58.2
5	T1	1513	5.0	0.794	9.4	LOS A	24.5	178.8	0.49	0.45	62.6
6	R2	245	5.0	0.599	29.2	LOS C	8.3	60.9	0.90	0.83	46.3
Approach		1780	5.0	0.794	12.1	LOS A	24.5	178.8	0.54	0.50	60.0
North: Bernera Road											
7	L2	251	5.0	0.244	11.9	LOS A	5.7	41.9	0.39	0.67	54.8
8	T1	87	5.0	0.247	54.3	LOS D	5.3	38.4	0.90	0.71	32.4
9	R2	254	5.0	0.869	86.2	LOS F	9.9	72.0	1.00	0.97	29.4
Approach		592	5.0	0.869	50.0	LOS D	9.9	72.0	0.73	0.81	37.4
West: Camden Valley Way											
10	L2	123	5.0	0.119	10.3	LOS A	1.6	11.7	0.34	0.67	56.7
11	T1	933	5.0	0.725	33.0	LOS C	23.2	169.5	0.75	0.66	49.5
12	R2	70	5.0	0.428	30.4	LOS C	2.3	16.6	0.83	0.76	44.9
Approach		1126	5.0	0.725	30.3	LOS C	23.2	169.5	0.71	0.67	49.8
All Vehicles		3703	5.0	0.869	25.9	LOS B	24.5	178.8	0.64	0.62	50.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	23.8	LOS C	0.1	0.1	0.57	0.57
P2	East Full Crossing	50	66.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	50	36.0	LOS D	0.1	0.1	0.70	0.70
P4	West Full Crossing	50	66.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	48.3	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: Bernera Road / Yarrowa Street / M7 EXISTING AM**

Bernera Road / Yarrowa Street / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1b	L3	6	5.0	0.278	4.8	LOS A	1.1	8.3	0.40	0.47	54.2
1a	L1	103	5.0	0.278	4.2	LOS A	1.1	8.3	0.40	0.47	56.4
2	T1	520	5.0	0.278	4.3	LOS A	1.2	8.5	0.41	0.44	55.0
Approach		629	5.0	0.278	4.3	LOS A	1.2	8.5	0.41	0.45	55.3
NorthEast: M7 Off-Ramp											
24a	L1	20	5.0	0.043	5.4	LOS A	0.1	1.1	0.50	0.58	56.0
25	T1	10	5.0	0.043	5.8	LOS A	0.1	1.1	0.50	0.58	56.9
26b	R3	146	5.0	0.130	12.3	LOS A	0.5	3.6	0.48	0.76	36.6
Approach		176	5.0	0.130	11.2	LOS A	0.5	3.6	0.48	0.73	39.5
North: Bernera Road											
8	T1	450	5.0	0.226	2.9	LOS A	1.3	9.6	0.07	0.33	57.5
9a	R1	61	5.0	0.226	8.2	LOS A	1.3	9.4	0.07	0.59	52.0
9b	R3	210	5.0	0.226	10.7	LOS A	1.3	9.4	0.07	0.59	54.2
Approach		721	5.0	0.226	5.6	LOS A	1.3	9.6	0.07	0.43	55.9
SouthWest: Yarrowa Street											
30	L2	13	5.0	0.057	6.3	LOS A	0.3	1.8	0.61	0.69	53.4
30a	L1	21	5.0	0.057	5.8	LOS A	0.3	1.8	0.61	0.69	52.1
32b	R3	9	5.0	0.057	13.9	LOS A	0.3	1.8	0.61	0.69	56.5
Approach		43	5.0	0.057	7.6	LOS A	0.3	1.8	0.61	0.69	53.5
All Vehicles		1569	5.0	0.278	5.8	LOS A	1.3	9.6	0.26	0.48	52.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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: Thursday, 29 October 2015 9:59:06 AM

SIDRA INTERSECTION 6.0.24.4877

Project: P:\P2293 TTPA Ad Hoc Assistance September 2015\Technical Work\Models\Prestons\Prestons.sip6

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**SIDRA
INTERSECTION 6**

MOVEMENT SUMMARY

 **Site: Bernera Road / Yarrowa Street / M7 EXISTING PM**

Bernera Road / Yarrowa Street / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1b	L3	8	5.0	0.291	4.3	LOS A	1.2	9.1	0.34	0.41	54.4
1a	L1	57	5.0	0.291	3.7	LOS A	1.2	9.1	0.34	0.41	56.7
2	T1	640	5.0	0.291	3.9	LOS A	1.3	9.2	0.35	0.40	55.5
Approach		705	5.0	0.291	3.9	LOS A	1.3	9.2	0.35	0.40	55.6
NorthEast: M7 Off-Ramp											
24a	L1	11	5.0	0.041	6.3	LOS A	0.1	1.1	0.57	0.65	55.4
25	T1	16	5.0	0.041	6.6	LOS A	0.1	1.1	0.57	0.65	56.3
26b	R3	123	5.0	0.121	13.0	LOS A	0.5	3.5	0.56	0.81	36.4
Approach		150	5.0	0.121	11.8	LOS A	0.5	3.5	0.56	0.78	39.5
North: Bernera Road											
8	T1	940	5.0	0.340	2.9	LOS A	2.3	16.5	0.08	0.34	57.4
9a	R1	21	5.0	0.340	8.2	LOS A	2.2	16.1	0.08	0.43	55.7
9b	R3	129	5.0	0.340	10.7	LOS A	2.2	16.1	0.08	0.43	58.2
Approach		1090	5.0	0.340	4.0	LOS A	2.3	16.5	0.08	0.35	57.5
SouthWest: Yarrowa Street											
30	L2	15	5.0	0.087	6.1	LOS A	0.4	2.8	0.60	0.69	53.9
30a	L1	43	5.0	0.087	5.6	LOS A	0.4	2.8	0.60	0.69	52.7
32b	R3	10	5.0	0.087	13.7	LOS A	0.4	2.8	0.60	0.69	57.0
Approach		68	5.0	0.087	6.9	LOS A	0.4	2.8	0.60	0.69	53.7
All Vehicles		2013	5.0	0.340	4.6	LOS A	2.3	16.5	0.23	0.41	54.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Bernera Road / Jedda Road / M7 EXISTING AM**

Bernera Road / Jedda Road / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
2	T1	27	5.0	0.241	3.1	LOS A	1.3	9.6	0.04	0.61	45.4
3	R2	728	5.0	0.241	9.4	LOS A	1.3	9.6	0.05	0.62	48.3
3b	R3	20	5.0	0.241	10.6	LOS A	1.3	9.4	0.05	0.62	53.0
Approach		775	5.0	0.241	9.2	LOS A	1.3	9.6	0.05	0.62	48.4
East: Jedda Road											
4b	L3	199	5.0	0.237	3.8	LOS A	1.0	7.5	0.17	0.45	53.8
4	L2	470	5.0	0.237	3.7	LOS A	1.0	7.5	0.17	0.44	50.8
6	R2	6	5.0	0.237	9.6	LOS A	1.0	7.5	0.18	0.43	42.2
Approach		675	5.0	0.237	3.8	LOS A	1.0	7.5	0.17	0.44	51.9
North: Bernera Road											
7	L2	3	5.0	0.026	5.9	LOS A	0.1	0.7	0.54	0.60	47.0
7a	L1	5	5.0	0.026	5.5	LOS A	0.1	0.7	0.54	0.60	53.4
8	T1	12	5.0	0.026	5.8	LOS A	0.1	0.7	0.54	0.60	48.9
Approach		20	5.0	0.026	5.7	LOS A	0.1	0.7	0.54	0.60	50.3
West: M7 Off-Ramp											
10	L2	10	5.0	0.136	5.3	LOS A	0.5	3.8	0.49	0.51	51.6
11	T1	222	5.0	0.136	5.1	LOS A	0.5	3.8	0.50	0.56	54.0
12	R2	36	5.0	0.136	11.7	LOS A	0.5	3.7	0.51	0.64	47.1
Approach		268	5.0	0.136	6.0	LOS A	0.5	3.8	0.50	0.57	53.0
All Vehicles		1738	5.0	0.241	6.6	LOS A	1.3	9.6	0.17	0.54	50.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Bernera Road / Jedda Road / M7 EXISTING PM**

Bernera Road / Jedda Road / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
2	T1	6	5.0	0.249	3.1	LOS A	1.5	10.7	0.04	0.62	45.0
3	R2	770	5.0	0.249	9.4	LOS A	1.5	10.7	0.04	0.62	48.2
3b	R3	30	5.0	0.249	10.6	LOS A	1.4	10.4	0.04	0.63	53.0
Approach		806	5.0	0.249	9.3	LOS A	1.5	10.7	0.04	0.62	48.4
East: Jedda Road											
4b	L3	120	5.0	0.407	4.3	LOS A	2.2	16.2	0.34	0.50	53.0
4	L2	920	5.0	0.407	4.3	LOS A	2.2	16.2	0.34	0.50	49.5
6	R2	4	5.0	0.407	10.3	LOS A	2.2	15.7	0.35	0.50	41.2
Approach		1044	5.0	0.407	4.4	LOS A	2.2	16.2	0.34	0.50	50.1
North: Bernera Road											
7	L2	10	5.0	0.046	6.3	LOS A	0.2	1.2	0.57	0.65	46.9
7a	L1	15	5.0	0.046	5.8	LOS A	0.2	1.2	0.57	0.65	53.4
8	T1	10	5.0	0.046	6.2	LOS A	0.2	1.2	0.57	0.65	48.8
Approach		35	5.0	0.046	6.1	LOS A	0.2	1.2	0.57	0.65	50.8
West: M7 Off-Ramp											
10	L2	8	5.0	0.158	5.4	LOS A	0.6	4.4	0.50	0.51	51.5
11	T1	170	5.0	0.158	5.0	LOS A	0.6	4.4	0.50	0.53	54.3
12	R2	131	5.0	0.158	11.8	LOS A	0.6	4.3	0.52	0.79	44.7
Approach		309	5.0	0.158	7.9	LOS A	0.6	4.4	0.51	0.64	49.9
All Vehicles		2194	5.0	0.407	6.7	LOS A	2.2	16.2	0.26	0.57	49.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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: Thursday, 29 October 2015 9:59:19 AM

SIDRA INTERSECTION 6.0.24.4877

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**SIDRA
INTERSECTION 6**

MOVEMENT SUMMARY



Site: Bernera Road / Yarrunga Street / Yato Road FUTURE AM

Bernera Road / Yarrunga Street / Yato Road

Signals - Fixed Time Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	80	5.0	0.133	10.7	LOS A	2.5	18.0	0.36	0.48	51.0
2	T1	693	5.0	0.645	9.4	LOS A	15.8	115.2	0.58	0.55	50.0
3	R2	31	5.0	0.645	15.6	LOS B	15.8	115.2	0.61	0.56	45.8
Approach		804	5.0	0.645	9.8	LOS A	15.8	115.2	0.56	0.55	50.0
East: Yato Road											
4	L2	10	5.0	0.086	39.4	LOS C	1.0	7.3	0.87	0.66	31.5
5	T1	17	5.0	0.086	33.8	LOS C	1.0	7.3	0.87	0.66	34.3
6	R2	58	5.0	0.248	42.9	LOS D	2.3	17.0	0.92	0.75	29.2
Approach		85	5.0	0.248	40.7	LOS C	2.3	17.0	0.90	0.72	30.4
North: Bernera Road											
7	L2	91	5.0	0.143	11.1	LOS A	2.7	20.0	0.38	0.50	47.9
8	T1	337	5.0	0.602	13.7	LOS A	11.1	80.9	0.65	0.65	45.7
9	R2	111	5.0	0.602	22.1	LOS B	11.1	80.9	0.74	0.70	43.9
Approach		539	5.0	0.602	15.0	LOS B	11.1	80.9	0.62	0.64	45.6
West: Yarrunga Street											
10	L2	37	5.0	0.383	42.9	LOS D	4.1	30.2	0.93	0.77	33.9
11	T1	28	5.0	0.383	37.3	LOS C	4.1	30.2	0.93	0.77	32.2
12	R2	37	5.0	0.383	42.9	LOS D	4.1	30.2	0.93	0.77	33.4
Approach		102	5.0	0.383	41.4	LOS C	4.1	30.2	0.93	0.77	33.3
All Vehicles		1530	5.0	0.645	15.4	LOS B	15.8	115.2	0.63	0.60	45.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	39.3	LOS D	0.1	0.1	0.94	0.94	
P2	East Full Crossing	50	6.8	LOS A	0.0	0.0	0.39	0.39	
P3	North Full Crossing	50	39.3	LOS D	0.1	0.1	0.94	0.94	
P4	West Full Crossing	50	6.1	LOS A	0.0	0.0	0.37	0.37	
All Pedestrians		200	22.9	LOS C			0.66	0.66	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Yarrunga Street / Yato Road FUTURE PM

Bernera Road / Yarrunga Street / Yato Road

Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	29	5.0	0.141	11.2	LOS A	2.9	21.5	0.36	0.37	52.0
2	T1	640	5.0	0.679	13.4	LOS A	16.7	122.1	0.63	0.58	46.9
3	R2	36	5.0	0.679	21.4	LOS B	16.7	122.1	0.71	0.64	41.3
Approach		705	5.0	0.679	13.7	LOS A	16.7	122.1	0.62	0.57	46.9
East: Yato Road											
4	L2	29	5.0	0.169	43.5	LOS D	2.3	17.1	0.88	0.71	29.6
5	T1	27	5.0	0.169	37.9	LOS C	2.3	17.1	0.88	0.71	32.4
6	R2	58	5.0	0.321	51.0	LOS D	2.7	19.8	0.95	0.76	26.7
Approach		114	5.0	0.321	46.0	LOS D	2.7	19.8	0.92	0.73	28.7
North: Bernera Road											
7	L2	43	5.0	0.191	11.4	LOS A	4.2	30.4	0.38	0.39	49.2
8	T1	842	5.0	0.804	15.4	LOS B	24.3	177.2	0.65	0.63	45.6
9	R2	39	5.0	0.804	23.9	LOS B	24.3	177.2	0.73	0.71	43.7
Approach		924	5.0	0.804	15.5	LOS B	24.3	177.2	0.64	0.63	45.6
West: Yarrunga Street											
10	L2	121	5.0	0.810	54.9	LOS D	11.7	85.4	1.00	0.94	29.9
11	T1	17	5.0	0.810	49.3	LOS D	11.7	85.4	1.00	0.94	28.0
12	R2	84	5.0	0.810	54.9	LOS D	11.7	85.4	1.00	0.94	29.5
Approach		222	5.0	0.810	54.5	LOS D	11.7	85.4	1.00	0.94	29.6
All Vehicles		1965	5.0	0.810	21.1	LOS B	24.3	177.2	0.69	0.65	42.0

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	41.5	LOS E	0.1	0.1	0.91	0.91	
P2	East Full Crossing	50	7.2	LOS A	0.1	0.1	0.38	0.38	
P3	North Full Crossing	50	41.5	LOS E	0.1	0.1	0.91	0.91	
P4	West Full Crossing	50	6.5	LOS A	0.1	0.1	0.36	0.36	
All Pedestrians		200	24.2	LOS C			0.64	0.64	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Kurrajong Road FUTURE AM

Bernera Road / Kurrajong Road

Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	9	5.0	0.222	26.4	LOS B	3.7	26.7	0.78	0.64	46.8
2	T1	463	5.0	0.579	24.1	LOS B	11.4	82.9	0.86	0.73	45.7
3	R2	60	5.0	0.144	20.6	LOS B	1.4	10.3	0.74	0.71	46.6
Approach		532	5.0	0.579	23.7	LOS B	11.4	82.9	0.85	0.73	45.8
East: Kurrajong Road											
4	L2	28	5.0	0.040	15.8	LOS B	0.6	4.1	0.58	0.65	49.4
5	T1	20	5.0	0.040	23.9	LOS B	0.6	4.1	0.78	0.58	41.9
6	R2	217	5.0	0.577	27.9	LOS B	6.4	46.9	0.91	0.82	38.1
Approach		265	5.0	0.577	26.4	LOS B	6.4	46.9	0.86	0.78	39.8
North: Bernera Road											
7	L2	134	5.0	0.298	22.0	LOS B	4.7	34.0	0.77	0.73	41.7
8	T1	225	5.0	0.298	21.3	LOS B	5.2	38.3	0.79	0.67	46.6
9	R2	25	5.0	0.075	21.5	LOS B	0.6	4.2	0.80	0.69	42.6
Approach		384	5.0	0.298	21.6	LOS B	5.2	38.3	0.78	0.69	45.0
West: Kurrajong Road											
10	L2	124	5.0	0.241	25.2	LOS B	3.4	24.8	0.80	0.75	40.4
11	T1	55	5.0	0.123	26.1	LOS B	1.7	12.5	0.82	0.62	41.0
12	R2	4	5.0	0.009	23.0	LOS B	0.1	0.7	0.73	0.62	46.2
Approach		183	5.0	0.241	25.4	LOS B	3.4	24.8	0.81	0.71	40.8
All Vehicles		1364	5.0	0.579	23.8	LOS B	11.4	82.9	0.83	0.73	43.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	34.3	LOS D	0.1	0.1	0.93	0.93	
P2	East Full Crossing	50	29.0	LOS C	0.1	0.1	0.85	0.85	
P2S	East Slip/Bypass Lane Crossing	50	20.3	LOS C	0.1	0.1	0.71	0.71	
P3	North Full Crossing	50	34.3	LOS D	0.1	0.1	0.93	0.93	
P4	West Full Crossing	50	29.0	LOS C	0.1	0.1	0.85	0.85	
All Pedestrians		250	29.4	LOS C			0.85	0.85	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Kurrajong Road FUTURE PM

Bernera Road / Kurrajong Road

Signals - Fixed Time Cycle Time = 100 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1	L2	5	5.0	0.142	26.3	LOS B	3.1	22.9	0.69	0.57	46.9
2	T1	363	5.0	0.371	23.1	LOS B	9.4	68.3	0.75	0.63	46.2
3	R2	72	5.0	0.274	25.1	LOS B	2.0	14.5	0.84	0.74	44.6
Approach		440	5.0	0.371	23.5	LOS B	9.4	68.3	0.76	0.65	45.9
East: Kurrajong Road											
4	L2	160	5.0	0.333	28.0	LOS B	6.3	45.8	0.79	0.75	44.0
5	T1	147	5.0	0.333	35.4	LOS C	6.3	45.8	0.89	0.73	36.5
6	R2	284	5.0	0.628	32.2	LOS C	10.7	78.3	0.91	0.81	36.2
Approach		591	5.0	0.628	31.8	LOS C	10.7	78.3	0.87	0.78	38.7
North: Bernera Road											
7	L2	254	5.0	0.637	30.7	LOS C	15.6	113.8	0.83	0.79	37.7
8	T1	555	5.0	0.637	25.9	LOS B	15.6	113.8	0.84	0.74	44.5
9	R2	146	5.0	0.351	23.3	LOS B	4.3	31.0	0.77	0.75	41.6
Approach		955	5.0	0.637	26.8	LOS B	15.6	113.8	0.82	0.76	42.6
West: Kurrajong Road											
10	L2	58	5.0	0.141	34.4	LOS C	2.1	15.5	0.83	0.73	36.4
11	T1	54	5.0	0.150	36.8	LOS C	2.2	16.2	0.87	0.66	36.3
12	R2	7	5.0	0.016	27.3	LOS B	0.2	1.6	0.75	0.64	44.4
Approach		119	5.0	0.150	35.1	LOS C	2.2	16.2	0.84	0.69	36.9
All Vehicles		2105	5.0	0.637	28.0	LOS B	15.6	113.8	0.83	0.74	41.9

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	50	28.2	LOS C	0.1	0.1	0.75	0.75
P2S	East Slip/Bypass Lane Crossing	50	20.5	LOS C	0.1	0.1	0.64	0.64
P3	North Full Crossing	50	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	50	28.2	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		250	33.1	LOS D			0.81	0.81

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Camden Valley Way / Croatia Avenue FUTURE AM

Bernera Road / Camden Valley Way / Croatia Avenue

Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Croatia Avenue											
1	L2	65	5.0	0.298	33.5	LOS C	5.0	36.7	0.85	0.75	44.7
2	T1	74	5.0	0.298	27.9	LOS B	5.0	36.7	0.85	0.75	40.6
3	R2	24	5.0	0.268	68.8	LOS E	1.4	10.6	0.99	0.71	32.6
Approach		163	5.0	0.298	36.2	LOS C	5.0	36.7	0.87	0.74	40.6
East: Camden Valley Way											
4	L2	18	5.0	0.015	7.7	LOS A	0.1	0.8	0.18	0.61	58.5
5	T1	666	5.0	0.371	17.1	LOS B	9.2	67.3	0.51	0.45	57.6
6	R2	160	5.0	0.713	30.2	LOS C	5.3	39.0	0.86	0.84	45.9
Approach		844	5.0	0.713	19.4	LOS B	9.2	67.3	0.57	0.52	55.2
North: Bernera Road											
7	L2	244	5.0	0.277	11.5	LOS A	5.2	37.9	0.44	0.69	55.0
8	T1	83	5.0	0.195	40.6	LOS C	3.9	28.8	0.85	0.67	36.7
9	R2	93	5.0	0.519	70.2	LOS E	2.9	20.9	1.00	0.74	32.6
Approach		420	5.0	0.519	30.3	LOS C	5.2	37.9	0.64	0.70	44.4
West: Camden Valley Way											
10	L2	164	5.0	0.152	9.5	LOS A	1.8	13.0	0.33	0.67	57.2
11	T1	1262	5.0	0.751	10.5	LOS A	20.0	146.2	0.51	0.46	61.8
12	R2	122	5.0	0.308	21.5	LOS B	3.6	26.0	0.64	0.73	49.2
Approach		1548	5.0	0.751	11.3	LOS A	20.0	146.2	0.50	0.51	60.3
All Vehicles		2975	5.0	0.751	17.6	LOS B	20.0	146.2	0.56	0.55	55.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	23.5	LOS C	0.1	0.1	0.63	0.63
P2	East Full Crossing	50	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	50	25.4	LOS C	0.1	0.1	0.65	0.65
P4	West Full Crossing	50	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		200	39.4	LOS D			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Bernera Road / Camden Valley Way / Croatia Avenue FUTURE PM

Bernera Road / Camden Valley Way / Croatia Avenue

Signals - Fixed Time Cycle Time = 140 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Croatia Avenue											
1	L2	99	5.0	0.439	54.8	LOS D	8.6	62.7	0.90	0.87	36.9
2	T1	83	5.0	0.439	49.2	LOS D	8.6	62.7	0.90	0.87	33.0
3	R2	23	5.0	0.299	80.3	LOS F	1.6	11.9	1.00	0.71	30.2
Approach		205	5.0	0.439	55.4	LOS D	8.6	62.7	0.91	0.85	34.5
East: Camden Valley Way											
4	L2	22	5.0	0.017	8.1	LOS A	0.2	1.2	0.21	0.62	58.2
5	T1	1513	5.0	0.822	11.4	LOS A	28.4	207.1	0.58	0.53	61.3
6	R2	255	5.0	0.630	30.4	LOS C	8.7	63.8	0.93	0.84	45.7
Approach		1790	5.0	0.822	14.0	LOS A	28.4	207.1	0.63	0.58	58.7
North: Bernera Road											
7	L2	274	5.0	0.257	12.8	LOS A	6.8	49.3	0.43	0.68	54.2
8	T1	87	5.0	0.184	44.1	LOS D	4.6	33.9	0.83	0.66	35.5
9	R2	274	5.0	0.934	96.2	LOS F	11.3	82.4	1.00	1.09	27.7
Approach		635	5.0	0.934	53.1	LOS D	11.3	82.4	0.73	0.86	36.6
West: Camden Valley Way											
10	L2	128	5.0	0.121	9.8	LOS A	1.4	10.3	0.32	0.66	57.0
11	T1	933	5.0	0.782	36.2	LOS C	23.9	174.3	0.79	0.71	48.1
12	R2	70	5.0	0.475	37.4	LOS C	2.5	18.1	0.95	0.78	42.0
Approach		1131	5.0	0.782	33.3	LOS C	23.9	174.3	0.75	0.71	48.5
All Vehicles		3761	5.0	0.934	28.7	LOS C	28.4	207.1	0.70	0.68	49.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	24.7	LOS C	0.1	0.1	0.59	0.59
P2	East Full Crossing	50	56.8	LOS E	0.2	0.2	0.90	0.90
P3	North Full Crossing	50	37.2	LOS D	0.1	0.1	0.73	0.73
P4	West Full Crossing	50	64.3	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		200	45.7	LOS E			0.80	0.80

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: Bernera Road / Yarrowa Street / M7 FUTURE AM**

Bernera Road / Yarrowa Street / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1b	L3	6	5.0	0.294	4.8	LOS A	1.2	8.9	0.41	0.47	54.1
1a	L1	123	5.0	0.294	4.2	LOS A	1.2	8.9	0.41	0.47	56.4
2	T1	535	5.0	0.294	4.3	LOS A	1.2	9.1	0.41	0.44	55.0
Approach		664	5.0	0.294	4.3	LOS A	1.2	9.1	0.41	0.45	55.3
NorthEast: M7 Off-Ramp											
24a	L1	50	5.0	0.076	5.2	LOS A	0.3	1.9	0.51	0.59	56.1
25	T1	10	5.0	0.076	5.5	LOS A	0.3	1.9	0.51	0.59	57.0
26b	R3	146	5.0	0.132	12.4	LOS A	0.5	3.7	0.49	0.77	36.6
Approach		206	5.0	0.132	10.3	LOS A	0.5	3.7	0.50	0.72	41.6
North: Bernera Road											
8	T1	510	5.0	0.244	2.9	LOS A	1.5	10.7	0.07	0.34	57.3
9a	R1	61	5.0	0.244	8.2	LOS A	1.4	10.4	0.07	0.58	52.4
9b	R3	210	5.0	0.244	10.7	LOS A	1.4	10.4	0.07	0.58	54.7
Approach		781	5.0	0.244	5.4	LOS A	1.5	10.7	0.07	0.42	56.1
SouthWest: Yarrowa Street											
30	L2	13	5.0	0.058	6.5	LOS A	0.3	1.9	0.62	0.70	53.3
30a	L1	21	5.0	0.058	5.9	LOS A	0.3	1.9	0.62	0.70	52.0
32b	R3	9	5.0	0.058	14.0	LOS A	0.3	1.9	0.62	0.70	56.4
Approach		43	5.0	0.058	7.8	LOS A	0.3	1.9	0.62	0.70	53.5
All Vehicles		1694	5.0	0.294	5.6	LOS A	1.5	10.7	0.27	0.48	53.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Bernera Road / Yarrowa Street / M7 FUTURE PM**

Bernera Road / Yarrowa Street / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
1b	L3	8	5.0	0.328	4.3	LOS A	1.5	10.6	0.35	0.42	54.4
1a	L1	97	5.0	0.328	3.7	LOS A	1.5	10.6	0.35	0.42	56.7
2	T1	690	5.0	0.328	3.9	LOS A	1.5	10.7	0.36	0.40	55.4
Approach		795	5.0	0.328	3.9	LOS A	1.5	10.7	0.36	0.41	55.6
NorthEast: M7 Off-Ramp											
24a	L1	21	5.0	0.055	6.2	LOS A	0.2	1.4	0.57	0.66	55.5
25	T1	16	5.0	0.055	6.5	LOS A	0.2	1.4	0.57	0.66	56.4
26b	R3	123	5.0	0.121	13.1	LOS A	0.5	3.5	0.56	0.81	36.4
Approach		160	5.0	0.121	11.5	LOS A	0.5	3.5	0.56	0.78	40.4
North: Bernera Road											
8	T1	965	5.0	0.348	2.9	LOS A	2.4	17.2	0.08	0.34	57.4
9a	R1	21	5.0	0.348	8.2	LOS A	2.3	16.8	0.09	0.43	55.7
9b	R3	129	5.0	0.348	10.7	LOS A	2.3	16.8	0.09	0.43	58.3
Approach		1115	5.0	0.348	3.9	LOS A	2.4	17.2	0.08	0.35	57.5
SouthWest: Yarrowa Street											
30	L2	15	5.0	0.091	6.4	LOS A	0.4	3.0	0.63	0.71	53.7
30a	L1	43	5.0	0.091	5.9	LOS A	0.4	3.0	0.63	0.71	52.5
32b	R3	10	5.0	0.091	14.0	LOS A	0.4	3.0	0.63	0.71	56.8
Approach		68	5.0	0.091	7.2	LOS A	0.4	3.0	0.63	0.71	53.5
All Vehicles		2138	5.0	0.348	4.6	LOS A	2.4	17.2	0.24	0.41	54.6

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Bernera Road / Jedda Road / M7 FUTURE AM**

Bernera Road / Jedda Road / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
2	T1	27	5.0	0.246	3.1	LOS A	1.4	10.1	0.05	0.61	45.4
3	R2	733	5.0	0.246	9.4	LOS A	1.4	10.1	0.05	0.62	48.3
3b	R3	30	5.0	0.246	10.6	LOS A	1.4	9.9	0.05	0.62	53.0
Approach		790	5.0	0.246	9.2	LOS A	1.4	10.1	0.05	0.62	48.5
East: Jedda Road											
4b	L3	199	5.0	0.258	4.0	LOS A	1.2	8.6	0.23	0.47	53.5
4	L2	490	5.0	0.258	3.9	LOS A	1.2	8.6	0.24	0.46	50.3
6	R2	6	5.0	0.258	9.9	LOS A	1.2	8.4	0.24	0.45	41.8
Approach		695	5.0	0.258	4.0	LOS A	1.2	8.6	0.24	0.46	51.5
North: Bernera Road											
7	L2	3	5.0	0.026	6.1	LOS A	0.1	0.7	0.56	0.61	46.8
7a	L1	5	5.0	0.026	5.6	LOS A	0.1	0.7	0.56	0.61	53.3
8	T1	12	5.0	0.026	5.9	LOS A	0.1	0.7	0.56	0.61	48.7
Approach		20	5.0	0.026	5.9	LOS A	0.1	0.7	0.56	0.61	50.1
West: M7 Off-Ramp											
10	L2	10	5.0	0.157	5.3	LOS A	0.6	4.4	0.50	0.51	51.5
11	T1	222	5.0	0.157	5.1	LOS A	0.6	4.4	0.51	0.57	53.7
12	R2	76	5.0	0.157	11.8	LOS A	0.6	4.3	0.52	0.71	46.1
Approach		308	5.0	0.157	6.8	LOS A	0.6	4.4	0.51	0.60	51.7
All Vehicles		1813	5.0	0.258	6.8	LOS A	1.4	10.1	0.20	0.56	50.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: Bernera Road / Jedda Road / M7 FUTURE PM**

Bernera Road / Jedda Road / M7
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Bernera Road											
2	T1	6	5.0	0.264	3.1	LOS A	1.6	11.6	0.04	0.62	45.0
3	R2	795	5.0	0.264	9.4	LOS A	1.6	11.6	0.04	0.62	48.1
3b	R3	55	5.0	0.264	10.6	LOS A	1.6	11.3	0.04	0.63	52.9
Approach		856	5.0	0.264	9.4	LOS A	1.6	11.6	0.04	0.62	48.5
East: Jedda Road											
4b	L3	120	5.0	0.425	4.6	LOS A	2.3	17.1	0.38	0.52	52.8
4	L2	930	5.0	0.425	4.6	LOS A	2.3	17.1	0.38	0.53	49.3
6	R2	4	5.0	0.425	10.6	LOS A	2.3	16.6	0.39	0.53	41.0
Approach		1054	5.0	0.425	4.6	LOS A	2.3	17.1	0.38	0.53	49.8
North: Bernera Road											
7	L2	10	5.0	0.048	6.5	LOS A	0.2	1.3	0.58	0.66	46.7
7a	L1	15	5.0	0.048	6.0	LOS A	0.2	1.3	0.58	0.66	53.3
8	T1	10	5.0	0.048	6.3	LOS A	0.2	1.3	0.58	0.66	48.6
Approach		35	5.0	0.048	6.2	LOS A	0.2	1.3	0.58	0.66	50.7
West: M7 Off-Ramp											
10	L2	8	5.0	0.167	5.5	LOS A	0.6	4.7	0.52	0.53	51.4
11	T1	170	5.0	0.167	5.1	LOS A	0.6	4.7	0.52	0.53	54.4
12	R2	146	5.0	0.169	12.0	LOS A	0.6	4.6	0.54	0.82	44.3
Approach		324	5.0	0.169	8.2	LOS A	0.6	4.7	0.52	0.66	49.5
All Vehicles		2269	5.0	0.425	6.9	LOS A	2.3	17.1	0.28	0.58	49.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

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.

APPENDIX E

EXTRACT FROM RMS TDT



in association with
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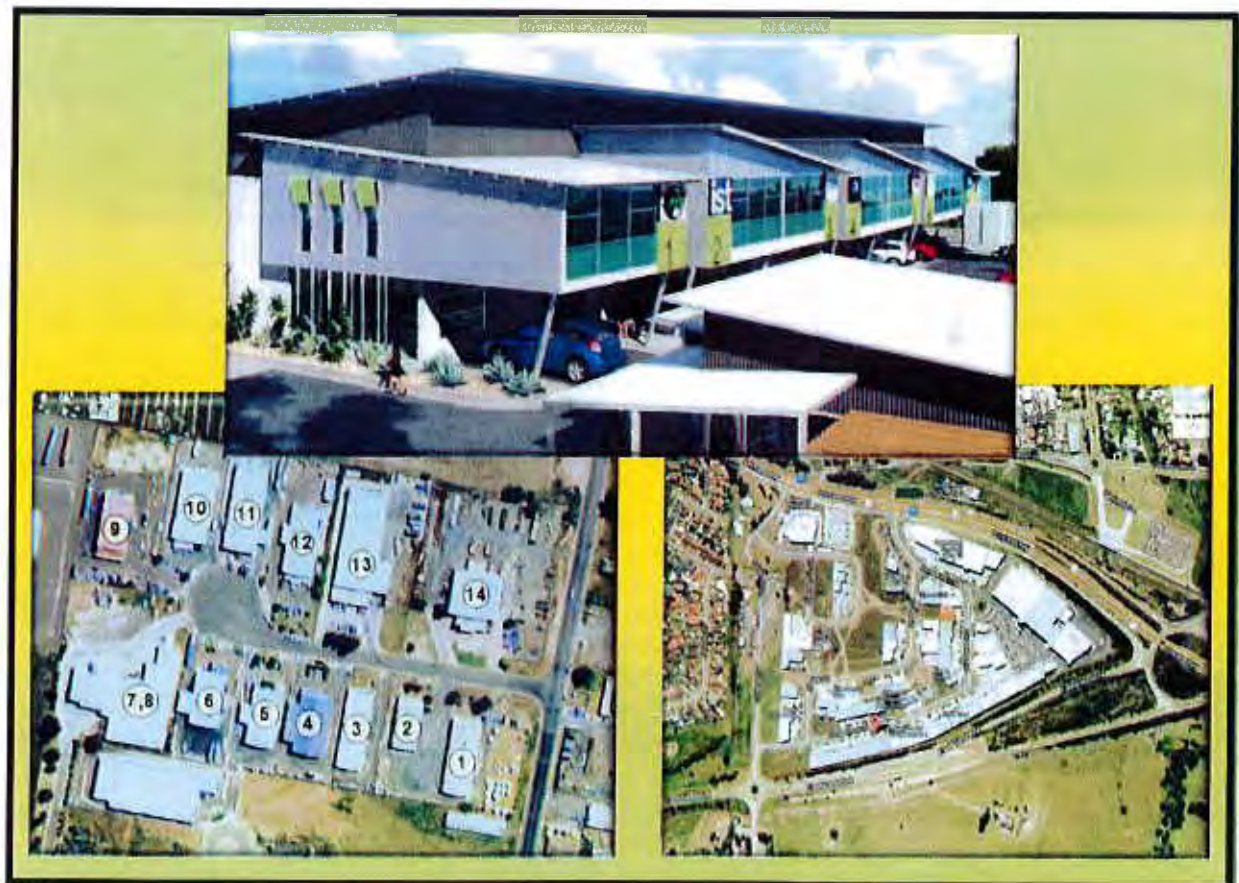
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ROADS AND MARITIME SERVICES

TRIP GENERATION SURVEYS

BUSINESS PARKS AND INDUSTRIAL ESTATES

ANALYSIS REPORT



3 SURVEY ANALYSIS

3.1 Survey Output Requirements

The data was analysed with the key parameters needing to be established being

- Weekday survey site peak hourly generation AM & PM
- Weekday hourly generation in adjacent network AM & PM peak
- Weekday daily trip generation

3.2 Average Trip Rates for Business Parks and Industrial Estates

The trip generation calculation that was to be performed would depend upon the variable that was interrogated, in this case the total floor area by type of land use.

The summary of the survey data for each of the surveyed areas is shown in Table 3.1. Average trip generation rates for sites in the Sydney area are summarised in Table 3.2 together with those for non-Sydney area. The detailed results are contained in a separate "Data Report".

Table 3.1 Traffic survey results summary.

Site ID	Sydney areas				Non-Sydney areas							
	Site 1 Enkino Park Industrial Estate, Enkino Park, Helensburgh	Site 2 Helensburgh Business Park, Helensburgh	Site 3 Wonderland Business Park, Eastern Creek	Site 4 Riverwood Business Park, Riverwood	Site 5 Tuggerah Business Park, Tuggerah	Site 6 Central Business Park, Albion Park Rail	Site 7 Anambah Business Park, Ruthven	Site 8 Freeway Business Park, Beresfield	Site 9 Shearwater Business Park, Taylors Beach	Site 10 Port Stephens Industrial Estate, Taylors Beach	Site 11 Johnson Street Business Park, Dubbo	
Gross Floor Area in estate m ²	683,005	1,065	406,650	29,583	136,737	47,699	28,795	88,281	18,922	19,881	14,415	
Person-based trips												
Site AM peak hour	1148	28	885	173	1416	294	168	575	244	94	120	
Trips per 100 m ² of GFA	0.17	1.74	0.22	0.58	1.04	0.69	0.56	0.64	1.52	0.47	0.83	
Site PM peak hour	1294	29	927	157	1458	519	204	555	285	97	149	
Trips per 100 m ² of GFA	0.19	1.81	0.23	0.52	1.07	1.21	0.69	0.62	1.78	0.49	1.03	
Vehicle network AM peak hour	976	24	743	173	1408	270	123	575	176	93	120	
Trips per 100 m ² of GFA	0.14	1.50	0.18	0.58	1.03	0.63	0.41	0.64	1.10	0.47	0.83	
Vehicle network PM peak hour	1073	7	822	94	1060	477	160	396	258	54	136	
Trips per 100 m ² of GFA	0.15	0.44	0.20	0.31	0.78	1.11	0.54	0.44	1.61	0.27	0.94	
Daily total person trips:												
During Survey Times	0600 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0600 to 1900	0700 to 1900	0600 to 1900	0600 to 1900	0600 to 1900	
24 hours	11750	144	7654	1344	10796	3396	1893	1230	2253	911	1227	
Trips per 100 m ² of GFA (24hrs)	14056	144	9919	1410	12066	4205	2064	6398	2389	975	1316	
Trips per 100 m ² of GFA (24hrs)	2.03	10.49	2.44	4.70	8.82	9.81	6.93	7.17	14.91	4.90	9.13	
Vehicle-based trips												
Site AM peak hour	1048	21	820	129	1256	268	143	504	193	64	108	
Trips per 100 m ² of GFA	0.15	1.31	0.20	0.43	0.92	0.62	0.40	0.56	1.20	0.32	0.73	
Site PM peak hour	1118	24	861	123	1,222	418	173	481	209	78	116	
Trips per 100 m ² of GFA	0.16	1.50	0.19	0.41	0.89	0.97	0.58	0.54	1.30	0.39	0.80	
Network AM peak hour	929	19	679	129	1256	246	111	495	147	64	108	
Trips per 100 m ² of GFA	0.13	1.18	0.17	0.43	0.92	0.57	0.37	0.55	0.92	0.32	0.73	
Network PM peak hour	965	20	803	69	794	382	127	354	187	42	116	
Trips per 100 m ² of GFA	0.14	0.31	0.17	0.23	0.58	0.89	0.43	0.40	1.17	0.21	0.80	
Daily total vehicle trips												
During Survey Times	0600 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0700 to 1900	0600 to 1900	0700 to 1900	0600 to 1900	0600 to 1900	0600 to 1900	
24 hours	11036	186	7527	1294	9271	2822	1640	4831	1813	714	1164	
Trips per 100 m ² of GFA (24hrs)	13125	168	9264	1160	10383	5151	1793	5676	1931	751	1240	
Trips per 100 m ² of GFA (24hrs)	1.89	10.47	2.31	3.72	7.59	7.81	6.02	6.58	11.99	3.78	8.60	

Table 3.2 Trips rate summary.

Site ID	Sydney areas				Non-Sydney areas				All survey sites				Avg Non-Sydney / Sydney %
	Site 1 to Site 4				Site 5 to Site 11				Site 1 to Site 11				
Trips per 100 m ² of GFA	Min	Max	Avg	St Dev	Min	Max	Avg	St Dev	Min	Max	Avg	St Dev	
Person-based trips													
Site AM peak hour	0.17	1.74	0.68	0.74	0.47	1.52	0.82	0.36	0.17	1.74	0.77	0.50	122%
Site PM peak hour	0.19	1.81	0.69	0.76	0.49	1.78	0.98	0.44	0.19	1.81	0.88	0.56	143%
Vehicle network AM peak hour	0.14	1.50	0.60	0.63	0.41	1.10	0.73	0.27	0.14	1.50	0.68	0.41	122%
Vehicle network PM peak hour	0.15	0.52	0.32	0.19	0.27	1.61	0.83	0.45	0.15	1.61	0.65	0.44	259%
Daily total person trips	2.03	10.49	4.92	3.90	4.90	14.91	8.81	3.16	2.03	14.91	7.39	3.79	179%
Vehicle-based trips													
Site AM peak hour	0.15	1.31	0.52	0.54	0.32	1.20	0.70	0.29	0.15	1.31	0.63	0.38	133%
Site PM peak hour	0.16	1.50	0.56	0.63	0.39	1.30	0.78	0.31	0.16	1.50	0.70	0.43	139%
Network AM peak hour	0.13	1.18	0.48	0.49	0.32	0.92	0.63	0.24	0.13	1.18	0.57	0.34	132%
Network PM peak hour	0.14	0.41	0.25	0.13	0.21	1.17	0.66	0.32	0.14	1.17	0.51	0.33	263%
Daily total vehicle trips	1.89	10.47	4.60	3.99	3.78	11.99	7.49	2.53	1.89	11.99	6.44	3.28	163%

Table 2.1 Details of the selected survey sites.

Traffic results summary											
Survey area ID	Sydney areas				Non-Sydney areas						
	Site 1 Erskine Park Industrial Estate, Erskine	Site 2 Helensburgh Business Park, Helensburgh	Site 3 Wonderland Business Park, Eastern Creek	Site 4 Riverwood Business Park, Riverwood	Site 5 Tuggerah Business Park, Tuggerah	Site 6 Central Business Park, Albion Park Rail	Site 7 Altona Business Park, Rutherford	Site 8 Freeway Business Park, Glenfield	Site 9 Shepparton Business Park, Taylors Beach	Site 10 Port Stephens Industrial Estate, Taylors	Site 11 Johnson Street Business Park, Bulbin
Date of survey	23/03/2012	26/03/2012	27/03/2012	29/03/2012	1/05/2012	9/05/2012	20/05/2012	1/06/2012	2/05/2012	2/05/2012	10/05/2012
Day of survey	Thursday	Wednesday	Tuesday	Wednesday	Tuesday	Tuesday	Wednesday	Tuesday	Wednesday	Wednesday	Thursday
Duration of survey	06:00-18:00	07:00-18:00	07:00-18:00	07:00-18:00	07:00-18:00	07:00-18:00	08:00-18:00	07:00-18:00	06:00-18:00	06:00-18:00	06:00-18:00
Surrounding area characteristics:											
Surrounding landuse (eg residential, commercial, open space, etc)	Commercial	Residential	Residential	Residential	Commercial	Residential	Open space	Commercial	Open space	Open space	Residential
Indicative Public Transport Accessibility Score	2	2	4	5	40	10	0	0.5	0.5	0.5	9
Principal adjacent road - AM peak period (weekdays)	8.00 to 9.00 am	8.30 to 9.30 am	7.30 to 8.30 am	8.15 to 9.15 am	8.00 to 9.00 am	8.00 to 9.00 am	8.00 to 9.00 am	7.00 to 8.00 am	8.00 to 9.00 am	8.00 to 9.00 am	8.00 to 9.00 am
Principal adjacent road - PM peak period (weekdays)	3.30 to 4.30 pm	4.30 to 5.30 pm	4.15 to 5.15 pm	3.00 to 4.00 pm	3.00 to 4.00 pm	4.00 to 5.00 pm	4.00 to 5.00 pm	5.00 to 6.00 pm	4.00 to 5.00 pm	4.00 to 5.00 pm	3.00 to 4.00 pm
Principal adjacent road - daily peak period (weekends)	1.00 to 2.00 pm	11.00 am to 12.00 pm	12.15 to 1.15 pm	1.15 to 2.15 pm	11.00 am to 12.00 pm	11.00 am to 12.00 pm	2.00 to 3.00 pm	12.00 to 1.00 pm	11.00 am to 12.00 pm	11.00 am to 12.00 pm	10.00 to 11.00 am
Estate characteristics:											
Year opened	2003	2011	2007	2004	2005	2010-2010	2004-2010	2005	2009-2005	2007-2005	Less 1960s
Total site area (hectares)	328.9	0.6	114.6	4.7	52.2	14.6	17.5	32.5	10.3	3.9	1.3
No. of units/lots (including vacant units/lots)	38	21	26	16	229	79	18	58	93	42	14
No. of occupied units/lots	36	13	22	16	184	66	18	52	44	27	14
Predominant business types within estate:											
no. of factories	5	0	0	0	5	0	1	5	0	0	1
no. of light/warehouses	3	0	0	0	2	0	0	2	0	0	0
no. of warehouses	37	0	20	15	41	13	5	25	5	3	41
no. of offices	1	0	0	0	92	4	3	8	7	1	1
no. of retailers	0	0	0	0	15	25	1	2	10	6	0
no. of workshops	1	0	0	0	0	5	3	7	0	1	0
no. of manufacturers	0	3	2	0	2	0	0	2	0	10	0
no. of other commercial businesses	0	1	0	0	33	0	5	2	12	5	1
Gross Floor Area in estate m ² (occupied)	693,605	1,608	406,000	38,963	136,737	42,991	29,766	86,291	10,022	19,801	14,415
No. of employees	incomplete data from businesses			251	incomplete data from businesses			182	incomplete data from businesses		
Person Trips:											
Peak 1-hour person-trips	1294	29	897	173	1455	518	294	575	285	97	149
Time of peak 1-hour person-trips	14:45-15:45	14:45-15:45	14:00-15:00	08:15-09:15	16:30-17:30	16:15-17:15	18:00-19:00	07:00-08:00	16:15-17:15	15:30-16:30	16:15-17:15
Peak person-trips per business	33.8	2.2	42.1	10.8	8	7.6	11.3	11.1	8.5	3.6	10.0
Peak person-trips per hectare	4	40.4	8.1	37.0	2.6	35.6	11.8	17.7	27.7	16.5	23.8
Peak person-trips per 100 m ² of GFA	0.167	1.877	0.228	0.577	1.065	1.210	0.665	0.644	1.779	0.483	1.033
Peak person-trips per employee	incomplete data from businesses			0.148	incomplete data from businesses			1.121	incomplete data from businesses		
Total daily person-trips	14095	180	9929	1410	12065	4205	2054	6069	2388	376	1316
Total daily person-trips per business	360.4	13.0	451.3	88	56.5	53.7	114.6	123.1	64.3	36.1	94.0
Total daily person-trips per hectare	43.0	287.0	66.6	307.5	231.4	318.7	117.8	197.1	232.3	188.9	208.8
Total daily person-trips per 100 m ² of GFA	2.005	10.492	2.442	4.708	8.624	8.802	8.033	7.167	14.910	4.504	9.129
Total daily person-trips per employee	incomplete data from businesses			6.305	incomplete data from businesses			11.338	incomplete data from businesses		
Person-trips during adjacent road AM peak	970	34	789	173	1406	270	123	575	176	90	120
Person-trips during adjacent road PM peak	1373	7	858	84	1000	478	160	305	259	54	136
Vehicle Trips:											
Peak 1-hour vehicle-trips	1128	24	820	128	1288	415	173	824	209	78	116
Time of peak 1-hour vehicle-trips	14:45-15:45	14:45-15:45	14:00-15:00	08:15-09:15	16:30-17:30	16:15-17:15	18:00-19:00	07:15-08:15	16:15-17:15	15:30-16:30	16:00-17:00
Peak vehicle-trips per business	31	1.8	57.3	8.1	6.8	6.8	9.8	8.7	4.8	2.3	8.3
Peak vehicle-trips per hectare	3.5	40.9	7.2	37.0	24.1	28.7	8.9	15.9	26.3	13.2	18.4
Peak vehicle-trips per 100 m ² of GFA	0.153	1.409	0.202	0.430	0.919	0.974	0.561	0.594	1.304	0.382	0.895
Peak vehicle-trips per employee	incomplete data from businesses			0.358	incomplete data from businesses			0.951	incomplete data from businesses		
Total daily vehicle-trips	13125	188	9384	1116	10383	4619	1793	5078	1921	751	1246
Total daily vehicle-trips per business	344.6	13.9	426.5	69.76	65.4	70.0	30.8	113.0	43.7	27.8	89.0
Total daily vehicle-trips per hectare	40.1	286.3	81.9	238.0	193.1	317.2	102.5	181.0	196.0	127.0	197.7
Total daily vehicle-trips per 100 m ² of GFA	1.897	10.487	2.308	3.722	7.593	10.767	8.324	8.581	11.990	3.777	8.642
Total daily vehicle-trips per employee	incomplete data from businesses			4.83	incomplete data from businesses			9.85	incomplete data from businesses		
Vehicle-trips in adjacent road AM peak (Average)	1165	125	2749	1608	2594	1131	112	1645	670	670	315
Vehicle-trips in adjacent road PM peak (Average)	972	145	2593	1613	2844	1281	150	1788	805	305	341
Vehicle-trips during adjacent road AM peak	929	15	724	128	1258	246	111	486	147	54	101
Vehicle-trips during adjacent road PM peak	1465	5	714	69	794	392	127	354	167	42	116
Average vehicle occupancy	1.30	1.30	1.32	1.16	1.17	1.10	1.17	1.17	1.20	1.19	1.15
% of total trips by principal mode:											
% Car (as driver)	82.0%	81.9%	63.2%	68.8%	79.1%	78.9%	70.0%	69.1%	74.3%	71.1%	56.7%
% Car (as passenger)	8.0%	8.3%	8.3%	12.3%	11.2%	13.4%	13.4%	9.5%	19.5%	14.1%	10.9%
% Commercial Vehicles	36.3%	4.2%	25.9%	12.6%	4.9%	5.2%	15.5%	18.3%	4.3%	8.9%	21.8%
% Bus	0.0%	0.0%	2.1%	0.0%	3.2%	0.0%	0.0%	2.2%	0.0%	0.0%	0.2%
% Cycle	0.1%	0.0%	0.3%	0.1%	0.3%	0.6%	0.2%	0.4%	0.8%	4.3%	0.1%
% Motorcycle	0.7%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%	0.9%	3.8%	0.2%
% On foot	0.1%	5.6%	0.2%	5.7%	1.1%	0.8%	0.6%	0.0%	0.3%	0.9%	0.4%
% Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.4%

APPENDIX F

TTPA PARKING ASSESSMENT

APPENDIX F – WAREHOUSE PARKING

The provision of carparking for large contemporary warehouse developments presents a somewhat 'vexed' issue due to:

- * the wide range of variation between the relative available criteria
- * the disparities between large and small warehouse uses
- * the disparities between earlier uses and contemporary uses.

The RMS Development Guidelines were formulated on the basis of statistical analysis of actual surveys of numerous existing sites (albeit undertaken in the late 1970's). The RMS parking criteria for warehouse use, which does not distinguish office areas, is 1 space per 300m² GFA.

The Institute of Transport Engineers (ITE) publication² has a number of warehouse categories and the following are included:

- * *Warehouse: primarily devoted to the storage of materials but also include office and maintenance areas. Study details: average size 35,000m² and average employees 400.*
- * *Warehouse 'High Cube': used for storage of manufactured goods prior to distribution characterised by small number of employees and high level of mechanisation. Study details: average size 30,000m² and average employees 53.*

The ITE surveyed parking demand for 'warehouse' was 0.41 spaces per 100m² or 1 space per 250m². ITE does not provide parking survey or criteria details for High Cube warehousing, however it is quite apparent due to the much smaller workforce that this demand would be significantly less.

² *Institute of Transport Engineers
Parking Generation 3rd Edition 2004*

In order to provide some practical relevant consideration to this issue TTPA has undertaken surveys and assessment of 4 existing adjacent warehouse developments (ie Gibbon Road Baulkham Hills). This process involved:

- * Establishing the existing floorspace
- * Identifying the number of marked spaces
- * Counting the number of cars parked at midday

Details of the results are aggregated in the following:

Perfection Dairies	37,320m ²	
41 spaces provided		(1 space per 777m ²)
31 occupied		(1 space per 1,200m ²)
Grace Removals	24,000m ²	
131 spaces provided		(1 space per 185m ²)
85 occupied		(1 space per 282m ²)
Golden Food	4,400m ²	
30 spaces provided		(1 per 147m ²)
21 occupied		(1 per 209m ²)
Pacific Hoists	8,580m ²	
46 spaces provided		(1 per 186m ²)
30 occupied		(1 per 286m ²)

Average peak parking demand 1 space per 245m²

Significant development of contemporary warehouses is currently being undertaken in the Erskine Park Employment Area and Penrith City Council carparking criteria for these developments specifies a requirement of:

Warehouse	1 space per 100m ² GFA
Office	1 space per 40m ² GFA

The actual individual needs of end users were assessed during the Development Application process and the outcomes were as follows for the sites assessed by TTPA:

Pickfords 14,208m²

Council Code	142 spaces
Actually provided	63 spaces (1 space per 226m ²)

Strammit 17,366m²

Council Code	201 spaces
Actually provided	100 spaces (1 space per 174m ²)

Motor Parts 27,570m²

Council Code	292 spaces
Actually provided	144 spaces (1 space per 191m ²)

Spec Site 9,200m²

Council Code	95 spaces
Actually provided	31 spaces (1 space per 297m ²)

Corporate Express 47,000m²

Council Code	510 spaces
Actually provided	201 spaces (1 space per 234m ²)
@ BHSC Rate	980 spaces

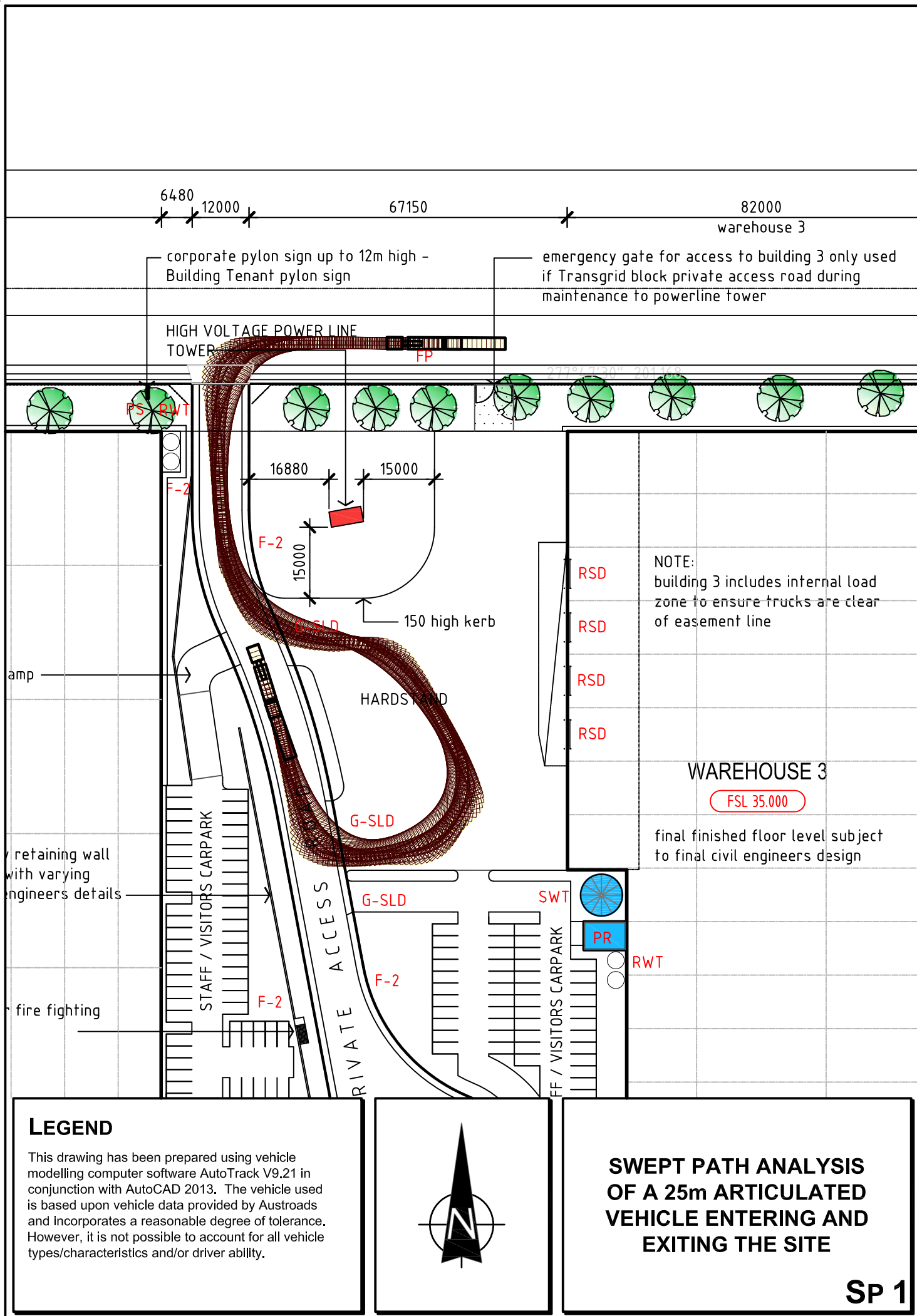
A separate survey and assessment process has been undertaken by Colston Budd Hunt and Kafes of 9 existing warehouse developments (including those identified in the forgoing). The results of the peak parking accumulation surveys are summarised in the following:

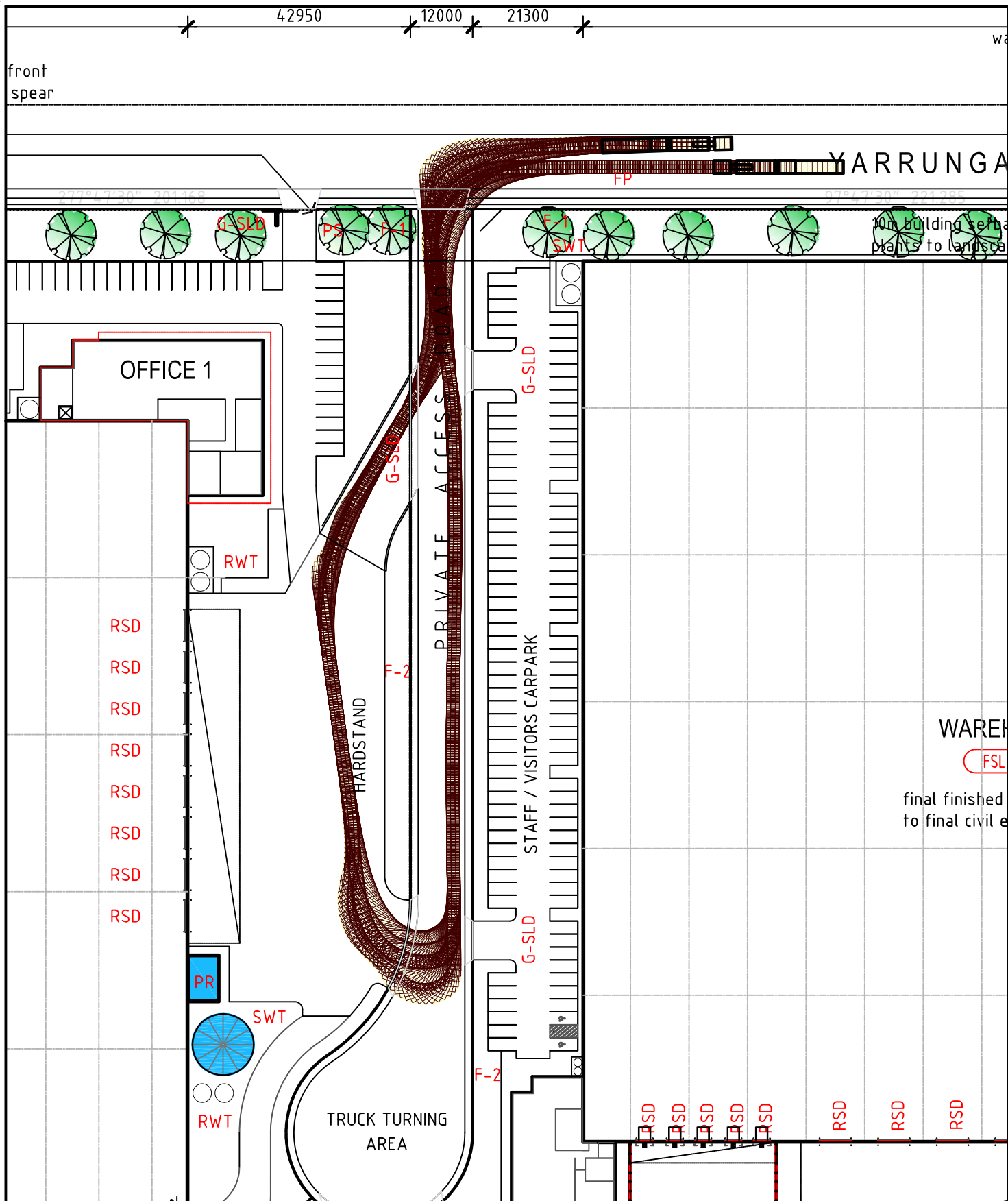
Summary of Parking Surveys		
Site	Size	Peak Parking Demand
1-1A Gibbon Road, Winston Hills	5,665m ²	41
3-5 Gibbon Road, Winston Hills	11,400m ²	146
7-9 Gibbon Road, Winston Hills	7,355m ²	9
16 Prime Avenue, Seven Hills	4,400m ²	28
4 Tucks Road, Seven Hills	24,000m ²	115
2 Distribution Place, Seven Hills	6,890m ²	29
8 Distribution Place, Seven Hills	13,085m ²	71
24-66 Lockwood Road, Erskine Park	47,000m ²	112
Site A, 33-83 Quarry Road, Erskine Park	17,300m ²	111
Total	137,095m²	662

The surveys concluded a peak parking demand of 1 space per 207m² for the nine sites surveyed and it is notable overall that as the floorspace increases the parking demand per 100m² decreases.

APPENDIX G

TURNING PATH ASSESSMENT





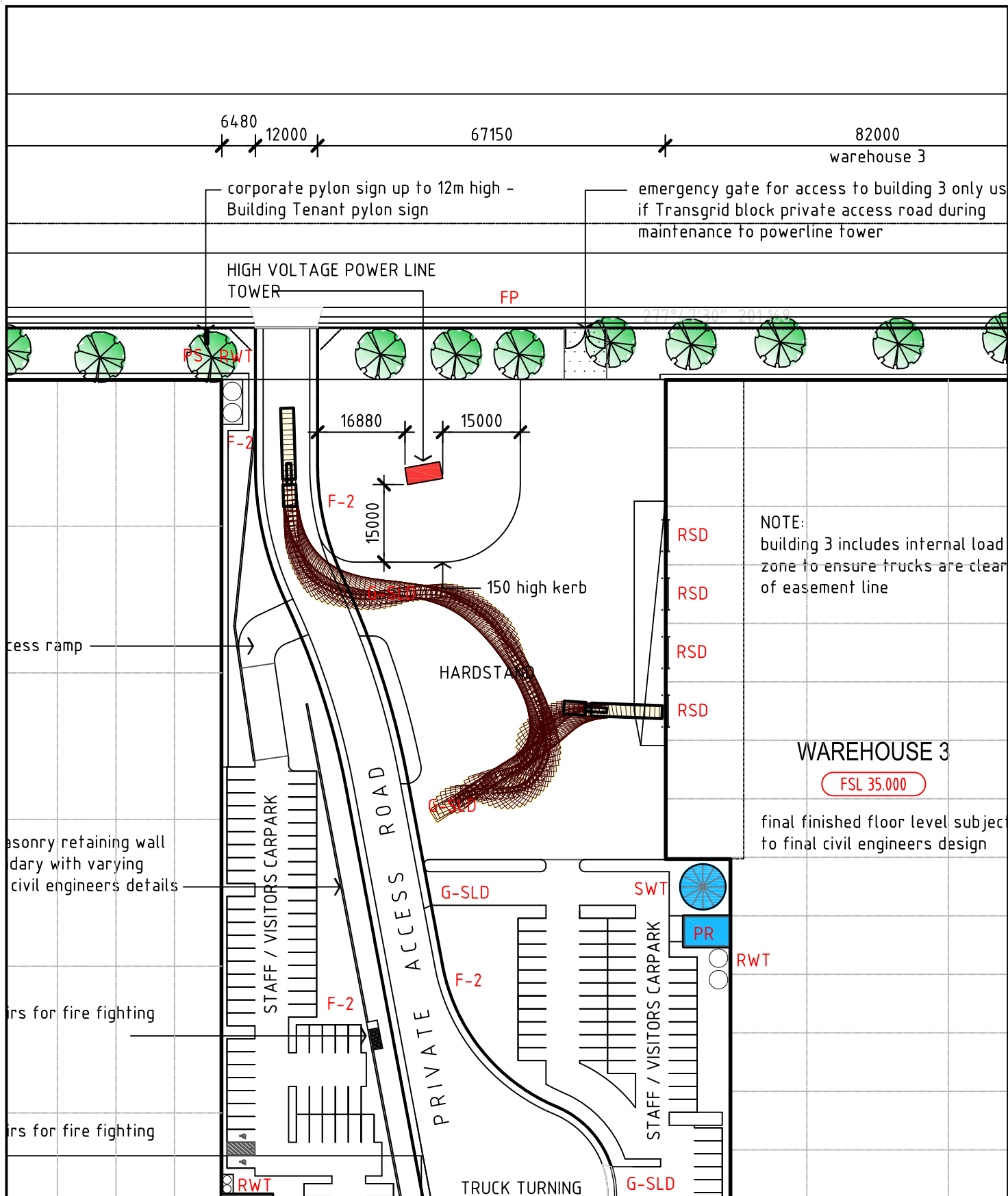
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 25m ARTICULATED
VEHICLE ENTERING AND
EXITING THE SITE**

SP 2



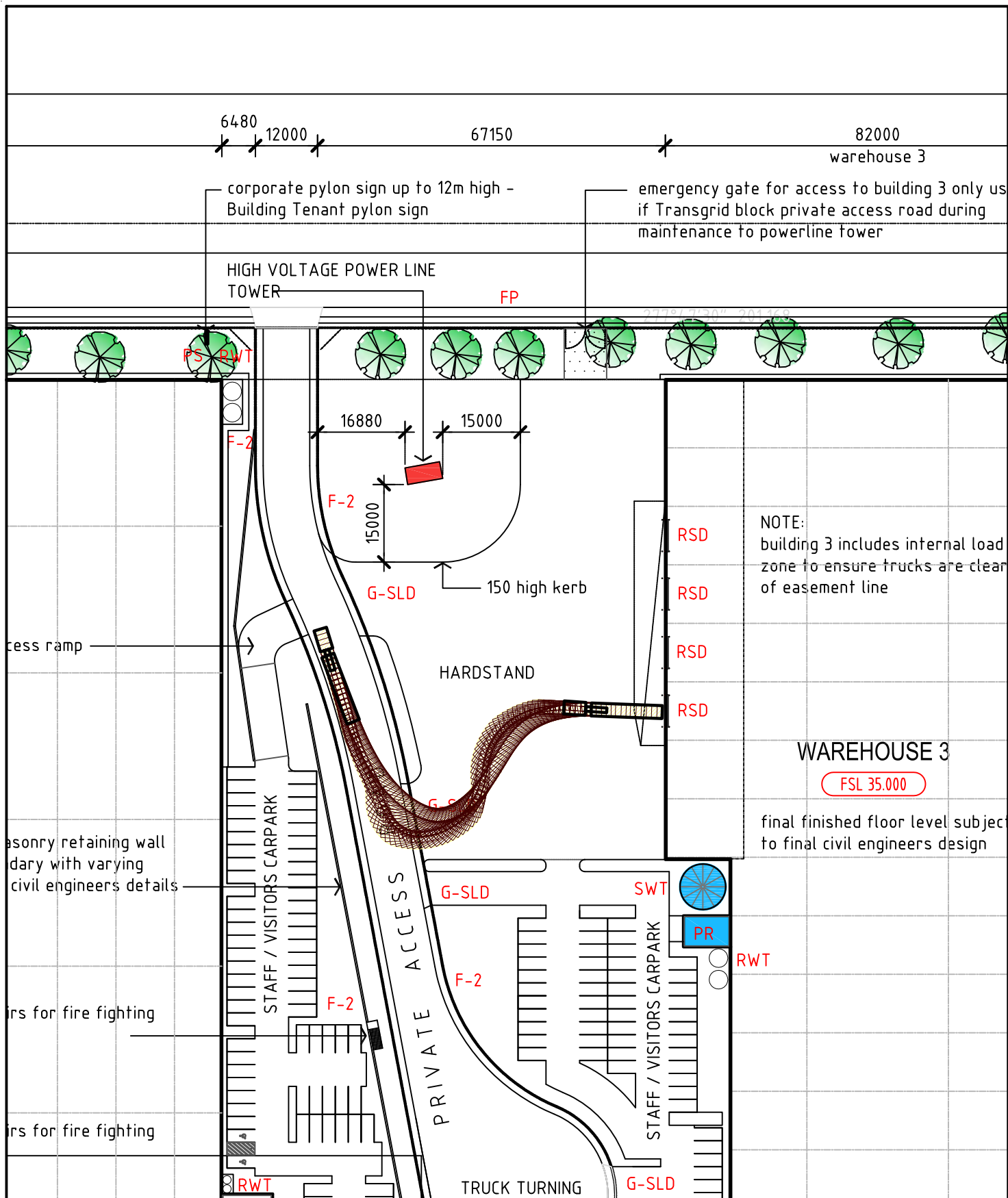
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SWEPT PATH ANALYSIS OF A 19m ARTICULATED VEHICLE ENTERING THE SITE

SP 4



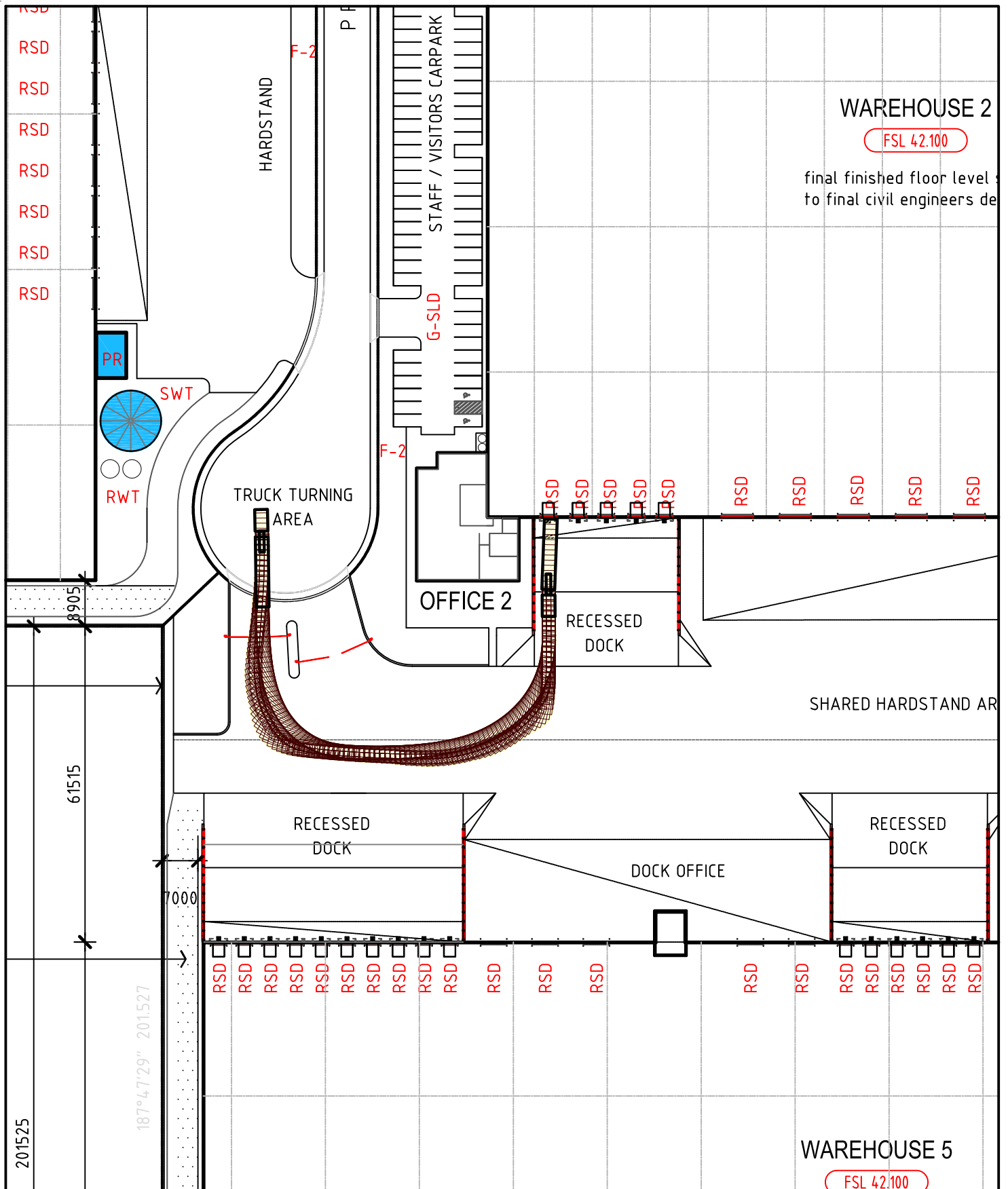
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SWEPT PATH ANALYSIS OF A 19m ARTICULATED VEHICLE EXITING THE SITE

SP 5



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



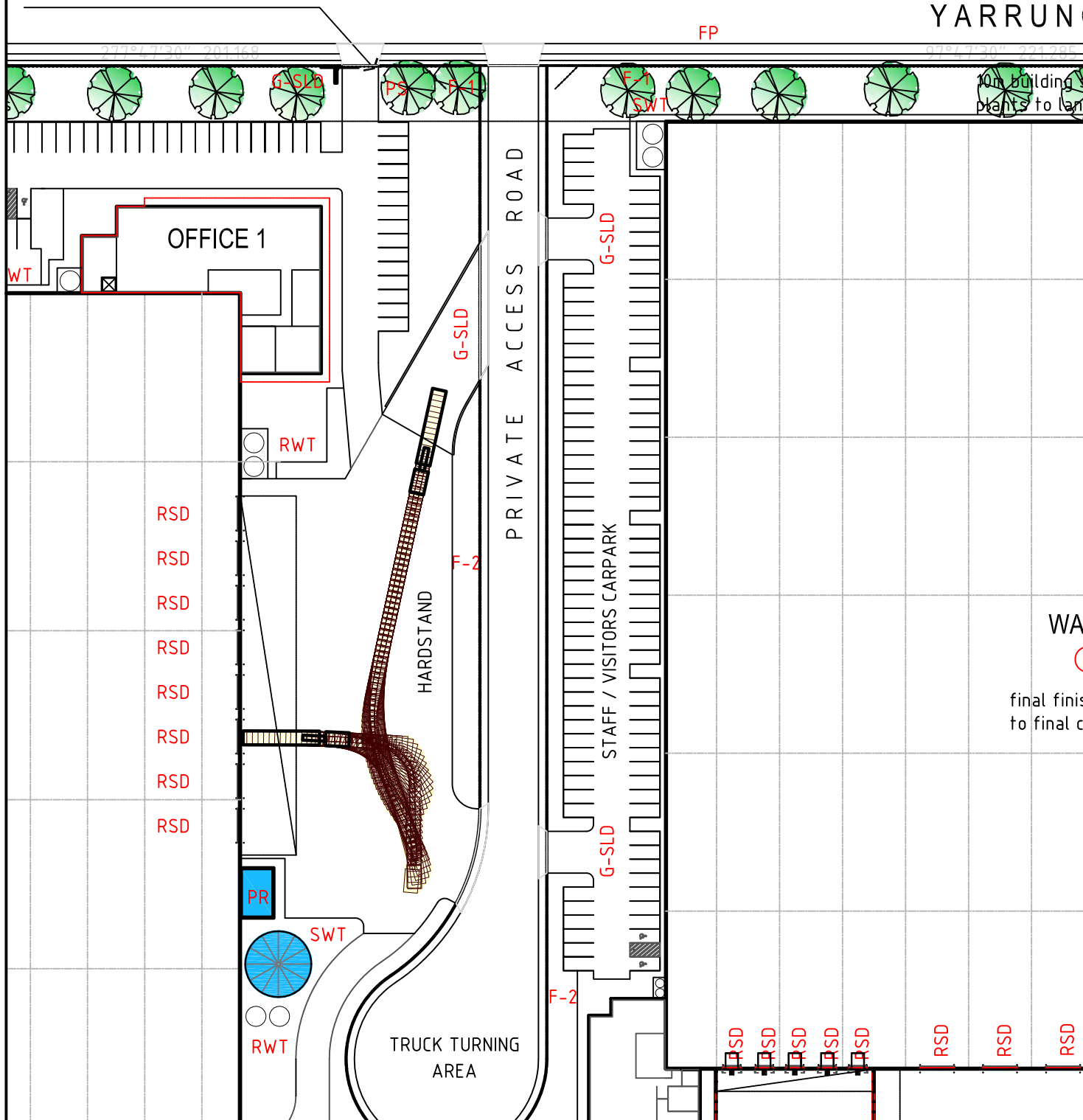
SWEPT PATH ANALYSIS OF A 19m ARTICULATED VEHICLE EXITING THE SITE

SP 7

42950 12000 21300

reet front
nted spear
only

YARRUN



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



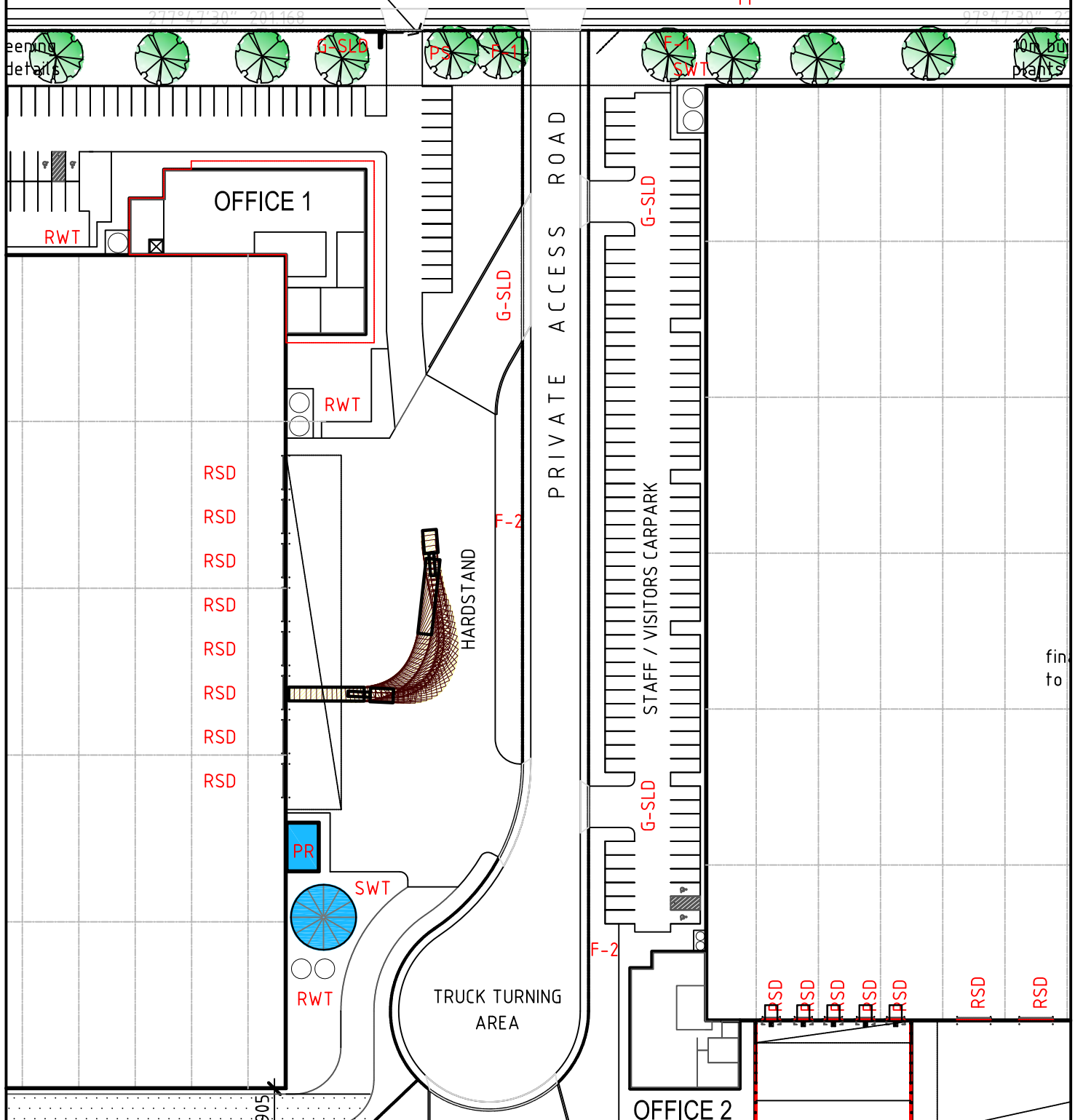
**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE ENTERING THE SITE**

SP 8

yle street front
th pointed spear
Roads only

high -

YARR



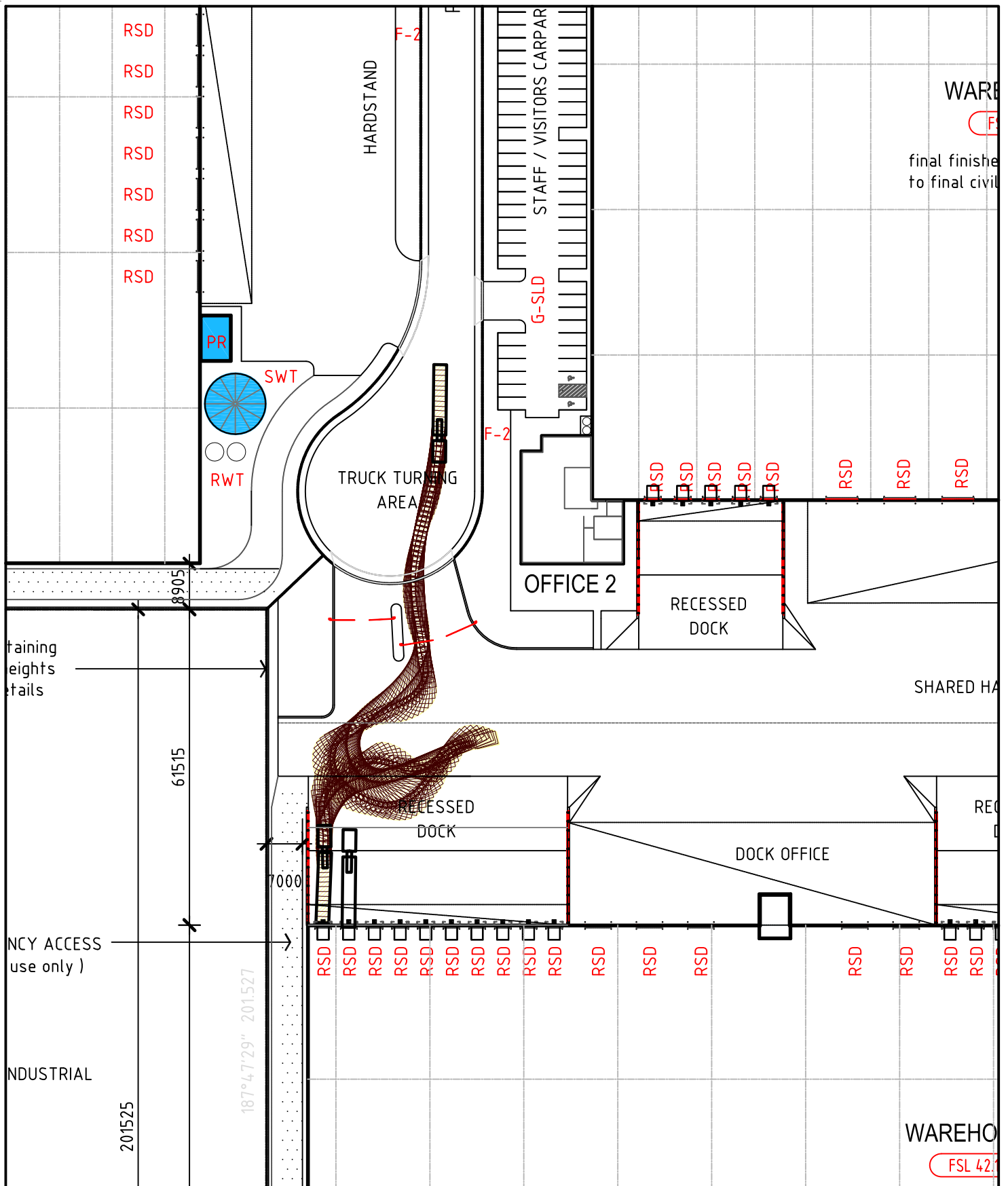
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE EXITING THE SITE**

SP 9



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V9.21 in conjunction with AutoCAD 2013. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



SWEPT PATH ANALYSIS OF A 19m ARTICULATED VEHICLE ENTERING THE SITE

SP 10

APPENDIX H

EXTRACT FROM RMS GUIDELINES

Section 2 Traffic impact studies.

2.1 Introduction.

This section looks at traffic impact studies and the key issues of their use. It is important to ensure that all relevant traffic impacts are identified and assessed. The findings of a traffic impact study may be used for local development control, ensuring the provision of a safe and efficient road system.

2.2 What is a traffic impact study?

A traffic impact study is a simplified technical appraisal of the traffic and safety implications relating to a specific development. The information provided in the study report should enable the relevant authorities (i.e. council and the RTA) to assess the traffic impact of a development.

Information collected in such studies should reflect the size and type and location of the development as well as its relationship to surrounding developments and the adjacent transport network.

The following outlines issues to be addressed in traffic impact studies:

- existing proposals for improvements to the adjacent road network and hierarchy.
- impact on road safety.
- impact of traffic noise.
- AADT-- annual average daily traffic. It is the estimated yearly total of traffic movements divided by 365.
- examine volumes and historical trends on key adjacent roads.
- peak period traffic volumes and congestion levels at key adjacent intersections.
- existing parking supply and demand in the vicinity of the proposed development.
- existing public transport services in the vicinity of the proposed development.
- parking provisions appropriate to the development (in relation to demand and statutory requirements).
- traffic generation / attraction and trip distribution of the proposed development.
- safety and efficiency of internal road layout, including service and parking areas.
- impact of generated traffic on key adjacent intersections, streets in the neighbourhood of the development, the environment and other major traffic generating development sites in close proximity.
- safety and efficiency of access between the site and the adjacent road network.

All proposed developments listed in Schedules 1 and 2 of SEPP 11 require referral to either a Regional Development Committee or a Council Development Committee.

(See Section 9, Appendix B).

2.2.1 Schedule 1 developments.

In most situations, a traffic impact study is required for developments listed in Schedule 1. In circumstances where the impact on traffic will be minimal, a statement relating to the impact of development on traffic is sufficient. Developments involving transport terminals, bulk stores and liquid fuel depots, or small developments with low traffic movements into and out of the site, are examples of developments that may require a traffic impact statement.

Consider the following factors when planning Schedule 1 Developments.

Location.

The impact of a development varies depending on whether it is located in an urban or rural environment.

Existing infrastructure.

The introduction of heavy vehicles into areas such as the inner city with its narrow road widths would have substantial impact.

Developments in sensitive areas.

Any development with a higher generation rate than the existing adjacent developments, will have an impact on the environment and amenity of the affected area.

2.2.2 Schedule 2 developments.

The scale of the development is the major determinant of whether a traffic impact study is required for developments listed in Schedule 2. As a minimum requirement, driveway location and design and the internal site layout should be investigated.

Schedule 2 developments which require a detailed traffic impact study are:

- clubs and licensed premises.
- drive-in take away food outlets.
- service stations and convenience stores.

2.3 Issues to be addressed.

A traffic impact study should follow the standard format and structure that is listed in Table 2.1. This format covers the key issues to be addressed in determining the impact on traffic of a development. Use of this format and the checklist will ensure those involved in the preparation and / or assessment of Development Applications that the most significant matters are considered.

Table 2.1
Key issues in preparing traffic impact studies

Procedures & Key Parameters	Source	Check✓
Brief description of the development		
Application and study process		
Introduction		
Background		
Scope of report		
The key issues and objectives of a traffic impact study		
General Data Collection / Existing Conditions		
Description of the Site and Proposed Activity		
Site location		
Current land use characteristics (zoning) of the proposed site and land use in the vicinity	Development Consent Authority	
Site access		
The Existing Traffic Conditions		
Road hierarchy; including the identification of the classified road network (major and minor roads) which may be affected by the development proposal	Council / RTA	
Inventory of road widths, road conditions, traffic management and parking control	Council / RTA and Survey	
Current and proposed roadworks, traffic management works and bikeways	Council / RTA	
Traffic Flows		

Procedures & Key Parameters	Source	Check✓
Selection of key streets - possibly divided into the major and the minor road network; selection of key assessment periods, chosen to cover the times at which the development would be expected to have its major impacts	Section 3	
AADT on key streets	Council / RTA and Survey	
Daily traffic flow hourly distribution, particularly in or near residential areas	Survey	
Estimate of the speed of traffic on the road to which vehicular access is proposed	Survey	
Current traffic generation of site	Survey	
Daily and peak period heavy vehicle flows and percentages	Survey	
The adaptation of appropriate computer models or techniques for assessing levels of traffic congestion and queuing conditions		
<i>Traffic Safety</i>		
Accident history of road network in the area	Council / RTA	
<i>Parking Supply and Demand</i>		
On-street parking provision	Council	
Off-street parking provision	Council / Survey	
Current parking demand, including utilisation by time of day and turnover rates	Survey	
Short term pick up and set down areas	Council / Survey	
<i>Modal Split</i>		
<i>Public Transport</i>		
Rail station locations	State Rail / Cityrail	
Bus routes and bus stop locations; Pedestrian access to bus stops; Constraints and conflicts	STA / Private Operators / Council / Survey	
Rail and bus service frequencies, ideally separated into Monday to Friday, Saturday and Sunday, for both peak and off-peak times	State Rail / Cityrail / Survey	



Procedures & Key Parameters	Source	Check✓
Commuter parking provision	State Rail / Cityrail / Survey	
<i>Pedestrian Network</i>		
Identify major pedestrian routes	Survey	
Pedestrian flows and potential conflicts with vehicles, particularly where such conflicts cause capacity constraint on either vehicular or pedestrian movement	Survey	
Pedestrian infrastructure	Survey	
<i>Proposed developments in the vicinity</i>		
Proposed Development		
<i>The Development</i>		
Plan reference, if plans not contained in study report		
Nature of development		
Gross floor areas of each component of development		
Projected number of employees/users/residents		
Hours and days of operations		
Staging and timing of development		
Selection of appropriate design vehicles for determining access and circulation requirements	Section 6	
<i>Access</i>		
Driveway location, including review of alternative locations	Sections 5, 6	
Sight distance of driveways and comparisons with stopping and desirable minimum sight distances	Section 6	
Service vehicle access	Section 6	
Analysis of projected queuing at entrances	Section 6	
Current access to site and comparison with proposed access		
Provision for access to, and by, public transport	Section 6	



Procedures & Key Parameters		Source	Check✓
<i>Circulation</i>			
Proposed pattern of circulation		Section 6	
Internal road widths		Section 6	
Provision for bus movements		Section 6	
Service area layout			
<i>Parking</i>			
Proposed supply			
Parking provision recommended by State Government policy		RTA / DUAP	
Council code and local parking policies and plans		Council	
Parking layout			
Projected peak demand, based where appropriate on similar research reports and on surveys of similar developments;		Section 5	
Parking for Service / courier vehicles and bicycles		Section 5	
Impact of Proposed Development			
<i>Traffic generation during design periods</i>			
Daily and seasonal factors			
Pedestrian generation and movements			
<i>Traffic Distribution and Assignments</i>			
Hourly distribution of trips			
Assignments of these trips to the road system based where possible on development feasibility studies or on origin/ destination surveys undertaken at similar developments in the areas			
<i>Impact on Traffic Safety</i>			
Assessment of Road Safety Impact			
<i>Impact of Generated Traffic</i>			
Daily traffic flows and composition on key streets and their expected effect on the environment particularly in residential areas			



Procedures & Key Parameters	Source	Check✓
Peak period volumes at key intersections and effect of generated traffic on congestion levels	Survey	
Impact of construction traffic during construction stages		
Other proposed developments in the vicinity their timing and likely impact, if known		
Assessment of traffic noise		
<i>Public Transport</i>		
Options for extensions and changes to bus routes and bus stops following discussions with the STA and or private bus operators	STA / Private Operators	
Provision for pedestrian access to bus stops		
<i>Recommended Works</i>		
Improvements to site access and circulation		
Improvements to roads, signals, roundabouts and other traffic management measures		
Improvements to pedestrian facilities		
Effect of recommended works on the operation of adjacent developments		
Effect of recommended works on public transport services including access to bus routes and bus stops		
Provision of LATM measures		
Funding of proposed improvement projects		
Noise attenuation measures		