LIVERPOOL HOSPITAL MASTERPLAN FOR REDEVELOPMENT

Supplementary Papers

August 2006

Reference 0635

TRANSPORT AND TRAFFIC PLANNING ASSOCIATES
Transportation, Traffic and Design Consultants
Suite 603, Level 6
282 Victoria Avenue
CHATSWOOD 2067
Telephone (02) 9411 5660
Facsimile (02) 9904 6622
Email: ttpa@ttpa.com.au

CONTENTS

INTERSECTION TRAFFIC SURVEYS

R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client : T.T.P.A

Job No/Name : 1292 Liverpool Hospital 2

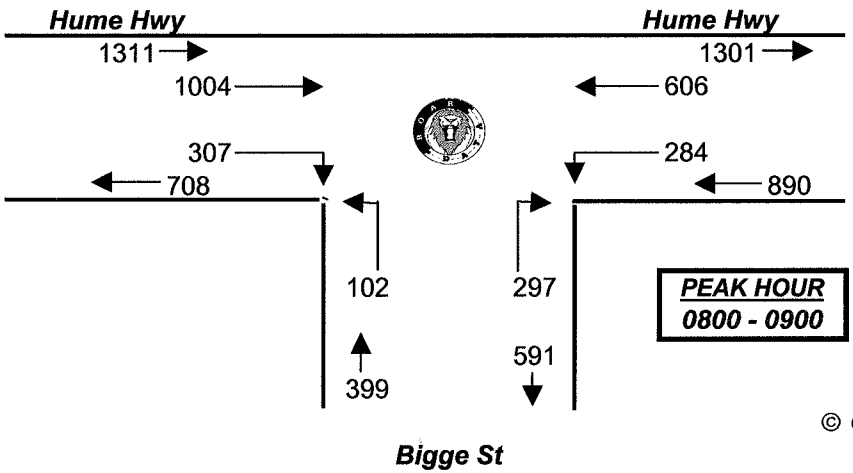
Day/Date : Thursday 9th March 2006

All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Bigge St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0715	548	30	17	89	31		**715**
0715 - 0730		24	14	69	30	204	**341**
0730 - 0745	701	42	13	58	43		**857**
0745 - 0800		36	22	67	50	257	**432**
0800 - 0815	574	80	19	76	58		**807**
0815 - 0830		57	29	80	81	272	**519**
0830 - 0845	430	97	28	72	75		**702**
0845 - 0900		73	26	69	70	334	**572**
Period End	**2253**	**439**	**168**	**580**	**438**	**1067**	**4945**

	WEST		SOUTH		EAST		
	Hume Hwy		*Bigge St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0800	1249	132	66	283	154	461	**2345**
0715 - 0815	1275	182	68	270	181	461	**2437**
0730 - 0830	1275	215	83	281	232	529	**2615**
0745 - 0845	1004	270	98	295	264	529	**2460**
0800 - 0900	1004	307	102	297	284	606	**2600**

PEAK HR	**1004**	**307**	**102**	**297**	**284**	**606**	**2600**

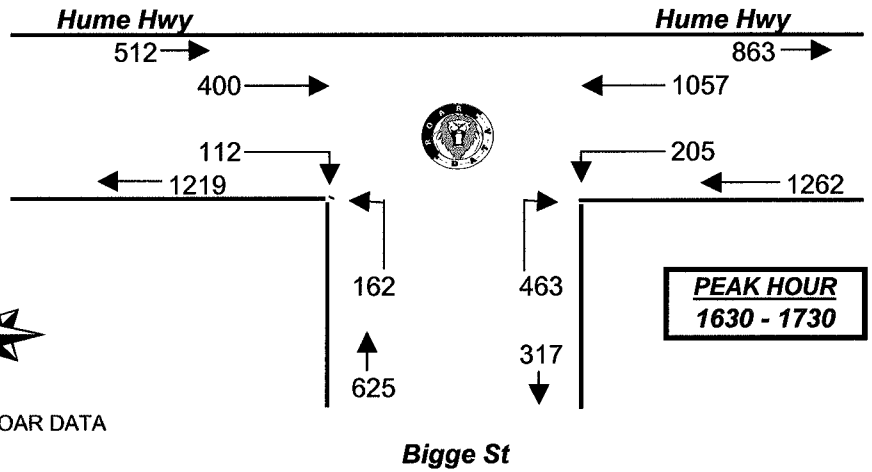


All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Bigge St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1545	249	43	26	113	62		**493**
1545 - 1600		38	27	75	53	495	**688**
1600 - 1615	244	42	27	114	37		**464**
1615 - 1630		39	25	81	69	478	**692**
1630 - 1645	184	34	32	106	53		**409**
1645 - 1700		29	32	116	40	522	**739**
1700 - 1715	216	35	58	126	55		**490**
1715 - 1730		14	40	115	57	535	**761**
Period End	**893**	**274**	**267**	**846**	**426**	**2030**	**4736**

	WEST		SOUTH		EAST		
	Hume Hwy		*Bigge St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1630	493	162	105	383	221	973	**2337**
1545 - 1645	428	153	111	376	212	973	**2253**
1600 - 1700	428	144	116	417	199	1000	**2304**
1615 - 1715	400	137	147	429	217	1000	**2330**
1630 - 1730	400	112	162	463	205	1057	**2399**

PEAK HR	**400**	**112**	**162**	**463**	**205**	**1057**	**2399**



R.O.A.R. DATA

Reliable, Original & Authentic Results

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

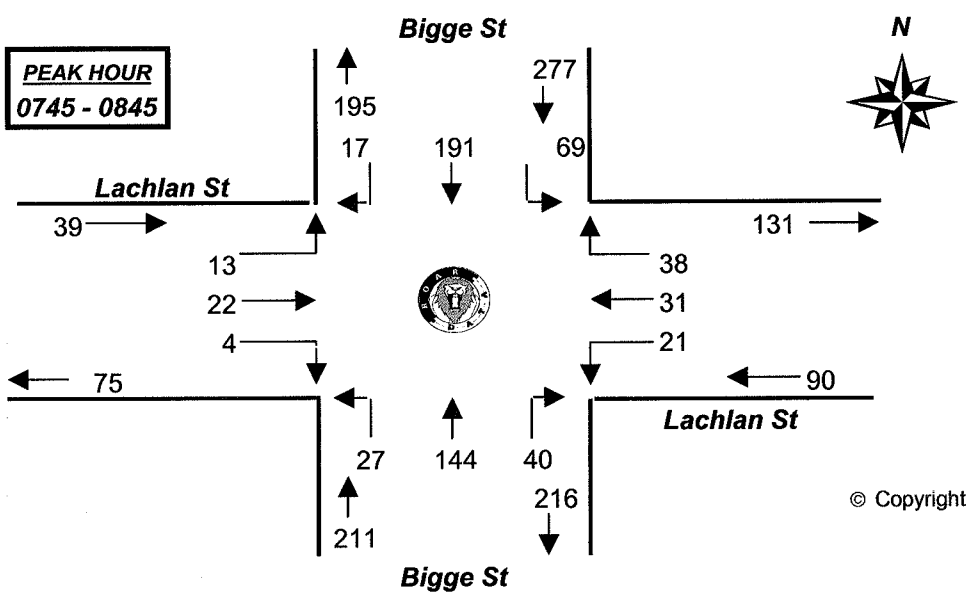
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Thursday 9th March 2006

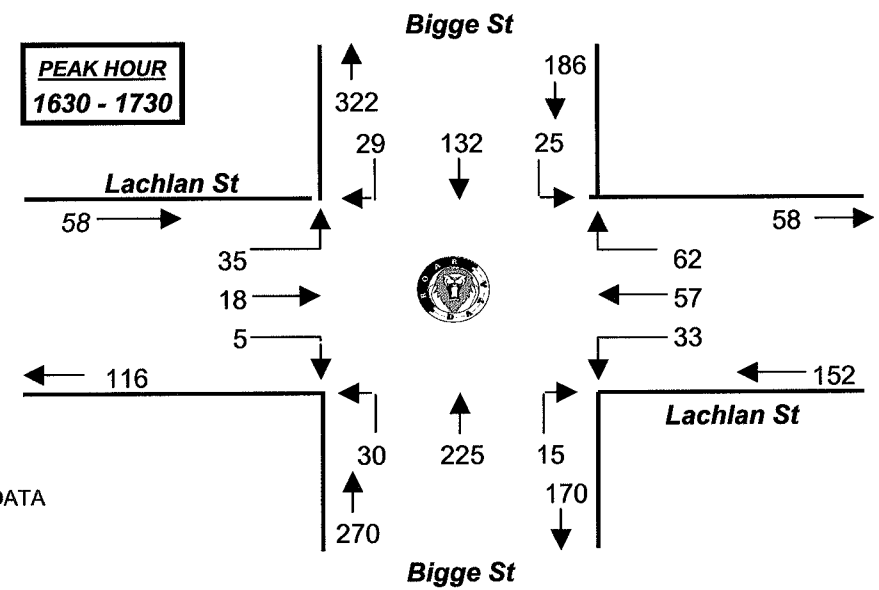
All Vehicles	NORTH Bigge St			WEST Lachlan St			SOUTH Bigge St			EAST Lachlan St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	15	46	8							3	5	8	**85**
0715 - 0730				7	22	1	5	63	15				**113**
0730 - 0745	12	60	4							12	9	6	**103**
0745 - 0800				5	11	4	10	64	22				**116**
0800 - 0815	30	74	7							11	10	12	**144**
0815 - 0830				8	11	0	17	80	18				**134**
0830 - 0845	39	117	10							10	21	26	**223**
0845 - 0900				7	10	2	9	56	19				**103**
Period End	**96**	**297**	**29**	**27**	**54**	**7**	**41**	**263**	**74**	**36**	**45**	**52**	**1021**

All Vehicles	NORTH Bigge St			WEST Lachlan St			SOUTH Bigge St			EAST Lachlan St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545	19	63	16							18	22	29	**167**
1545 - 1600				10	5	1	14	76	10				**116**
1600 - 1615	14	54	12							20	21	31	**152**
1615 - 1630				12	6	2	10	90	9				**129**
1630 - 1645	12	59	13							17	25	25	**151**
1645 - 1700				15	7	3	20	108	7				**160**
1700 - 1715	13	73	16							16	32	37	**187**
1715 - 1730				20	11	2	10	117	8				**168**
Period End	**58**	**249**	**57**	**57**	**29**	**8**	**54**	**391**	**34**	**71**	**100**	**122**	**1230**

	NORTH Bigge St			WEST Lachlan St			SOUTH Bigge St			EAST Lachlan St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	27	106	12	12	33	5	15	127	37	15	14	14	**417**
0715 - 0815	42	134	11	12	33	5	15	127	37	23	19	18	**476**
0730 - 0830	42	134	11	13	22	4	27	144	40	23	19	18	**497**
0745 - 0845	69	191	17	13	22	4	27	144	40	21	31	38	**617**
0800 - 0900	69	191	17	15	21	2	26	136	37	21	31	38	**604**
PEAK HOUR	**69**	**191**	**17**	**13**	**22**	**4**	**27**	**144**	**40**	**21**	**31**	**38**	**617**

	NORTH Bigge St			WEST Lachlan St			SOUTH Bigge St			EAST Lachlan St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	33	117	28	22	11	3	24	166	19	38	43	60	**564**
1545 - 1645	26	113	25	22	11	3	24	166	19	37	46	56	**548**
1600 - 1700	26	113	25	27	13	5	30	198	16	37	46	56	**592**
1615 - 1715	25	132	29	27	13	5	30	198	16	33	57	62	**627**
1630 - 1730	25	132	29	35	18	5	30	225	15	33	57	62	**666**
PEAK HOUR	**25**	**132**	**29**	**35**	**18**	**5**	**30**	**225**	**15**	**33**	**57**	**62**	**666**





R.O.A.R. DATA

Reliable, Original & Authentic Results

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

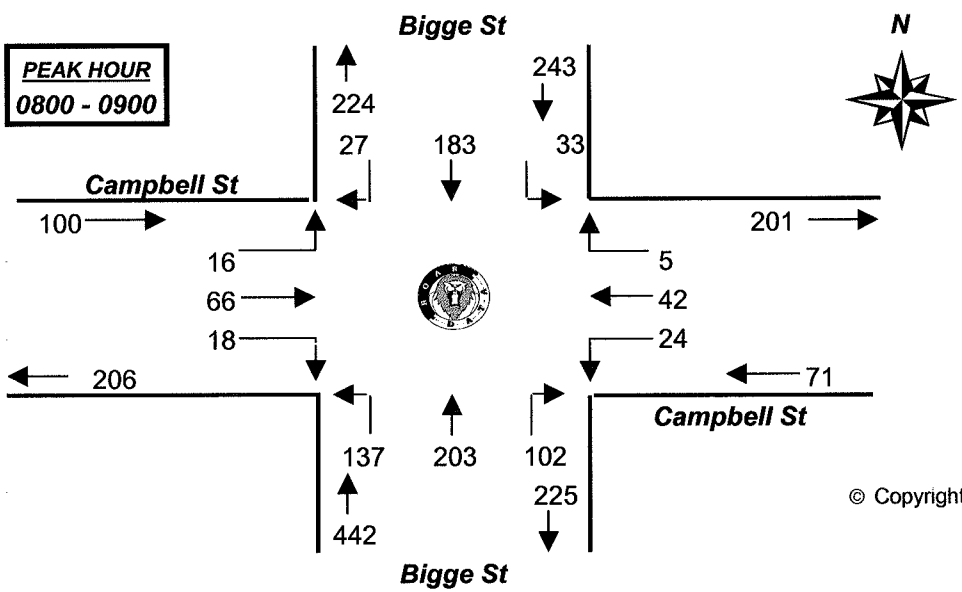
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Tuesday 14th March 2006

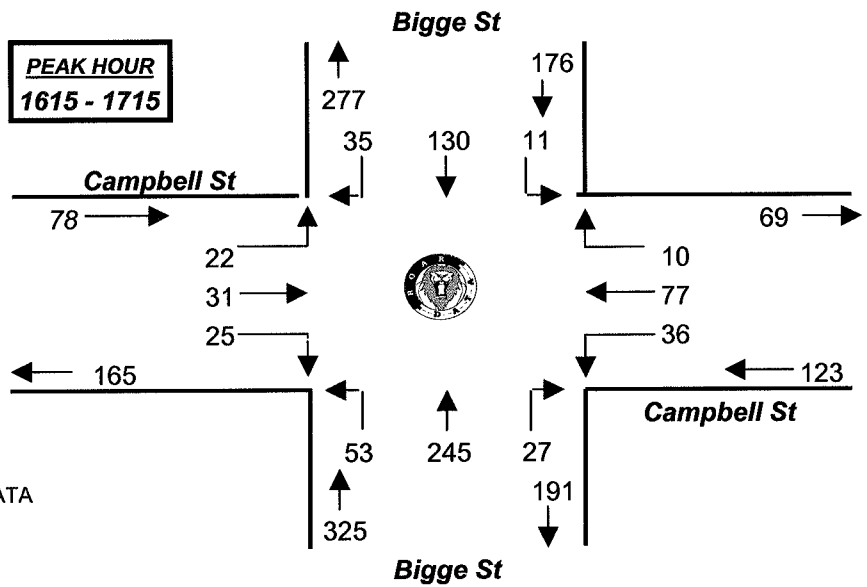
All Vehicles	NORTH Bigge St			WEST Campbell St			SOUTH Bigge St			EAST Campbell St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715							9	76	28	9	5	0	127
0715 - 0730	2	46	4	3	25	8							88
0730 - 0745							23	81	28	16	16	2	166
0745 - 0800	6	52	3	12	41	4							118
0800 - 0815							43	99	46	9	12	1	210
0815 - 0830	13	91	14	9	36	8							171
0830 - 0845							94	104	56	15	30	4	303
0845 - 0900	20	92	13	7	30	10							172
Period End	41	281	34	31	132	30	169	360	158	49	63	7	1355

All Vehicles	NORTH Bigge St			WEST Campbell St			SOUTH Bigge St			EAST Campbell St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545							23	121	17	21	42	6	230
1545 - 1600	9	65	17	10	19	15							135
1600 - 1615							27	116	9	15	26	5	198
1615 - 1630	7	62	18	11	23	14							135
1630 - 1645							25	110	14	22	42	4	217
1645 - 1700	4	68	17	11	8	11							119
1700 - 1715							28	135	13	14	35	6	231
1715 - 1730	5	63	11	8	12	10							109
Period End	25	258	63	40	62	50	103	482	53	72	145	21	1374

	NORTH Bigge St			WEST Campbell St			SOUTH Bigge St			EAST Campbell St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	8	98	7	15	66	12	32	157	56	25	21	2	499
0715 - 0815	8	98	7	15	66	12	66	180	74	25	28	3	582
0730 - 0830	19	143	17	21	77	12	66	180	74	25	28	3	665
0745 - 0845	19	143	17	21	77	12	137	203	102	24	42	5	802
0800 - 0900	33	183	27	16	66	18	137	203	102	24	42	5	856
PEAK HOUR	33	183	27	16	66	18	137	203	102	24	42	5	856

	NORTH Bigge St			WEST Campbell St			SOUTH Bigge St			EAST Campbell St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	16	127	35	21	42	29	50	237	26	36	68	11	698
1545 - 1645	16	127	35	21	42	29	52	226	23	37	68	9	685
1600 - 1700	11	130	35	22	31	25	52	226	23	37	68	9	669
1615 - 1715	11	130	35	22	31	25	53	245	27	36	77	10	702
1630 - 1730	9	131	28	19	20	21	53	245	27	36	77	10	676
PEAK HOUR	11	130	35	22	31	25	53	245	27	36	77	10	702





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Reliable, Original & Authentic Results

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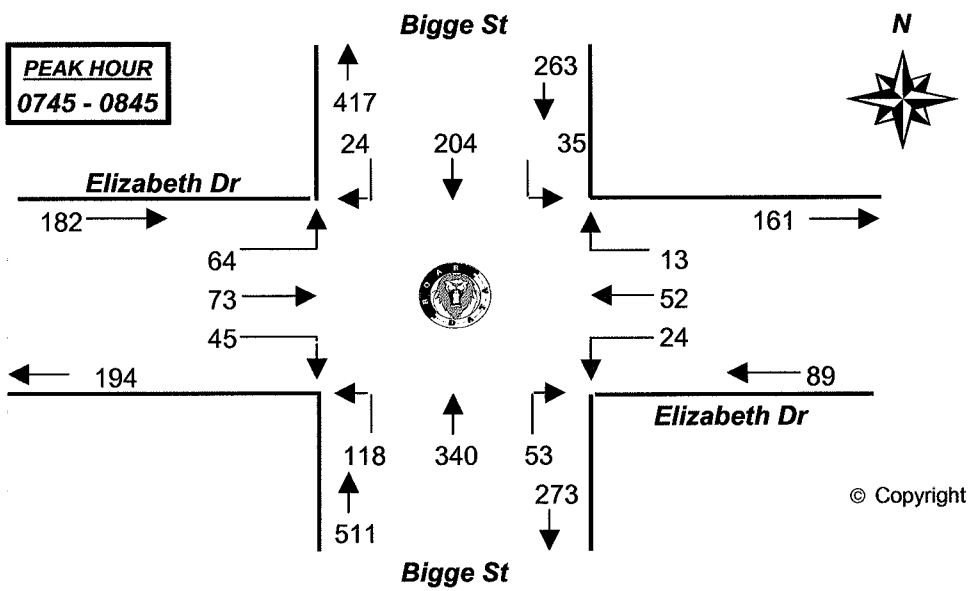
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Tuesday 14th March 2006

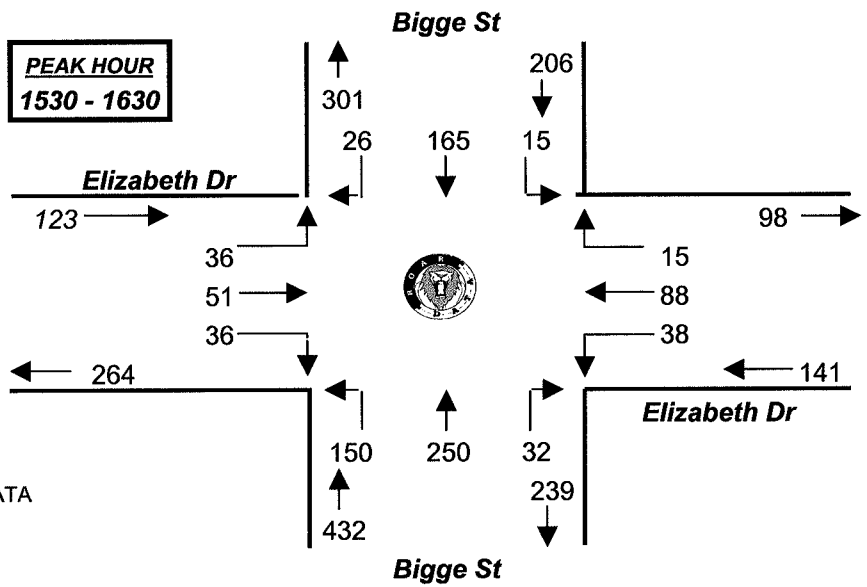
All Vehicles	NORTH Bigge St			WEST Elizabeth Dr			SOUTH Bigge St			EAST Elizabeth Dr			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	1	45	4							9	11	3	**73**
0715 - 0730				5	23	13	48	92	12				**193**
0730 - 0745	4	63	5							11	21	4	**108**
0745 - 0800				12	35	17	62	153	30				**309**
0800 - 0815	21	110	11							11	20	7	**180**
0815 - 0830				52	38	28	56	187	23				**384**
0830 - 0845	14	94	13							13	32	6	**172**
0845 - 0900				25	43	26	64	128	19				**305**
Period End	**40**	**312**	**33**	**94**	**139**	**84**	**230**	**560**	**84**	**44**	**84**	**20**	**1724**

All Vehicles	NORTH Bigge St			WEST Elizabeth Dr			SOUTH Bigge St			EAST Elizabeth Dr			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545	12	96	14							19	49	7	**197**
1545 - 1600				24	24	17	70	125	19				**279**
1600 - 1615	3	69	12							19	39	8	**150**
1615 - 1630				12	27	19	80	125	13				**276**
1630 - 1645	8	87	13							22	39	3	**172**
1645 - 1700				19	19	15	84	116	13				**266**
1700 - 1715	17	61	20							20	46	1	**165**
1715 - 1730				15	38	7	88	120	16				**284**
Period End	**40**	**313**	**59**	**70**	**108**	**58**	**322**	**486**	**61**	**80**	**173**	**19**	**1789**

	NORTH Bigge St			WEST Elizabeth Dr			SOUTH Bigge St			EAST Elizabeth Dr			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	5	108	9	17	58	30	110	245	42	20	32	7	**683**
0715 - 0815	25	173	16	17	58	30	110	245	42	22	41	11	**790**
0730 - 0830	25	173	16	64	73	45	118	340	53	22	41	11	**981**
0745 - 0845	35	204	24	64	73	45	118	340	53	24	52	13	**1045**
0800 - 0900	35	204	24	77	81	54	120	315	42	24	52	13	**1041**
PEAK HOUR	**35**	**204**	**24**	**64**	**73**	**45**	**118**	**340**	**53**	**24**	**52**	**13**	**1045**

	NORTH Bigge St			WEST Elizabeth Dr			SOUTH Bigge St			EAST Elizabeth Dr			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	15	165	26	36	51	36	150	250	32	38	88	15	**902**
1545 - 1645	11	156	25	36	51	36	150	250	32	41	78	11	**877**
1600 - 1700	11	156	25	31	46	34	164	241	26	41	78	11	**864**
1615 - 1715	25	148	33	31	46	34	164	241	26	42	85	4	**879**
1630 - 1730	25	148	33	34	57	22	172	236	29	42	85	4	**887**
PEAK HOUR	**15**	**165**	**26**	**36**	**51**	**36**	**150**	**250**	**32**	**38**	**88**	**15**	**902**





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Client : T.T.P.A

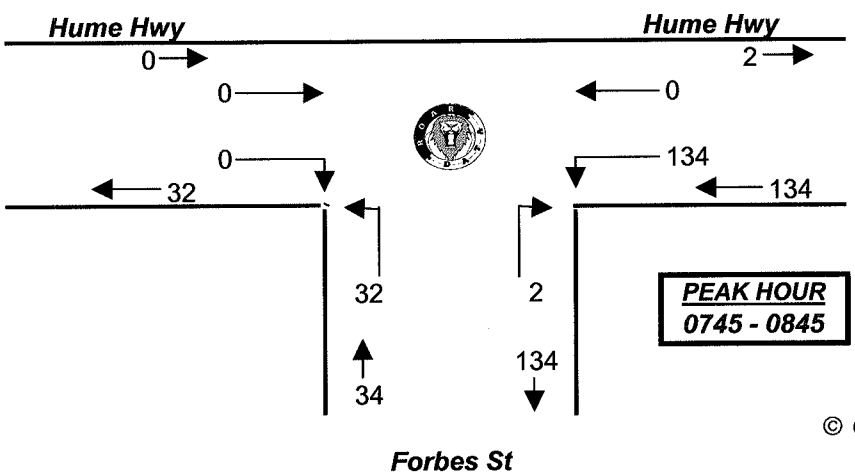
Job No/Name : 1292 Liverpool Hospital 2

Day/Date : Thursday 9th March 2006

All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Forbes St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0715			2	0	12		**14**
0715 - 0730			1	0	11		**12**
0730 - 0745			3	1	22		**26**
0745 - 0800			7	0	28		**35**
0800 - 0815			4	0	35		**39**
0815 - 0830			9	2	33		**44**
0830 - 0845			12	0	38		**50**
0845 - 0900			8	0	21		**29**
Period End	**0**	**0**	**46**	**3**	**200**	**0**	**249**

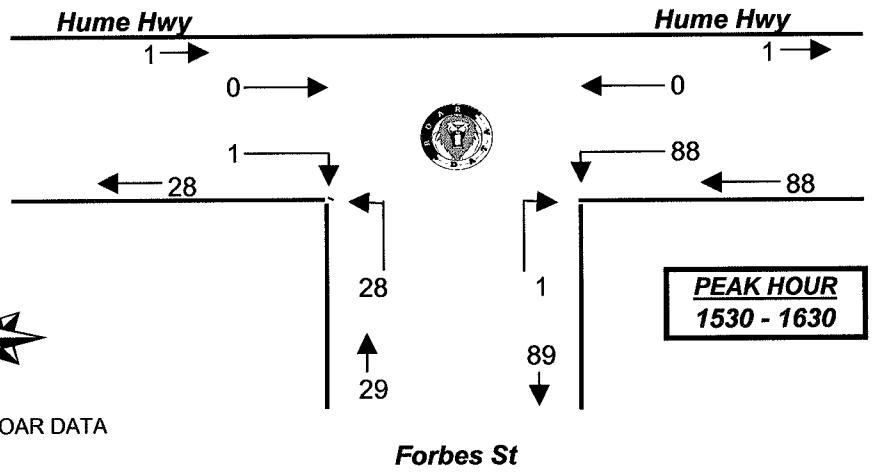
	WEST		SOUTH		EAST		
	Hume Hwy		*Forbes St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0800	0	0	13	1	73	0	**87**
0715 - 0815	0	0	15	1	96	0	**112**
0730 - 0830	0	0	23	3	118	0	**144**
0745 - 0845	0	0	32	2	134	0	**168**
0800 - 0900	0	0	33	2	127	0	**162**
PEAK HR	**0**	**0**	**32**	**2**	**134**	**0**	**168**



All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Forbes St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1545		0	9	1	27		**37**
1545 - 1600		0	9	0	22		**31**
1600 - 1615		1	5	0	19		**25**
1615 - 1630		0	5	0	20		**25**
1630 - 1645		0	7	0	18		**25**
1645 - 1700		0	5	0	12		**17**
1700 - 1715		0	9	0	30		**39**
1715 - 1730		0	5	0	15		**20**
Period End	**0**	**1**	**54**	**1**	**163**	**0**	**219**

	WEST		SOUTH		EAST		
	Hume Hwy		*Forbes St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1630	0	1	28	1	88	0	**118**
1545 - 1645	0	1	26	0	79	0	**106**
1600 - 1700	0	1	22	0	69	0	**92**
1615 - 1715	0	0	26	0	80	0	**106**
1630 - 1730	0	0	26	0	75	0	**101**
PEAK HR	**0**	**1**	**28**	**1**	**88**	**0**	**118**



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Client : T.T.P.A

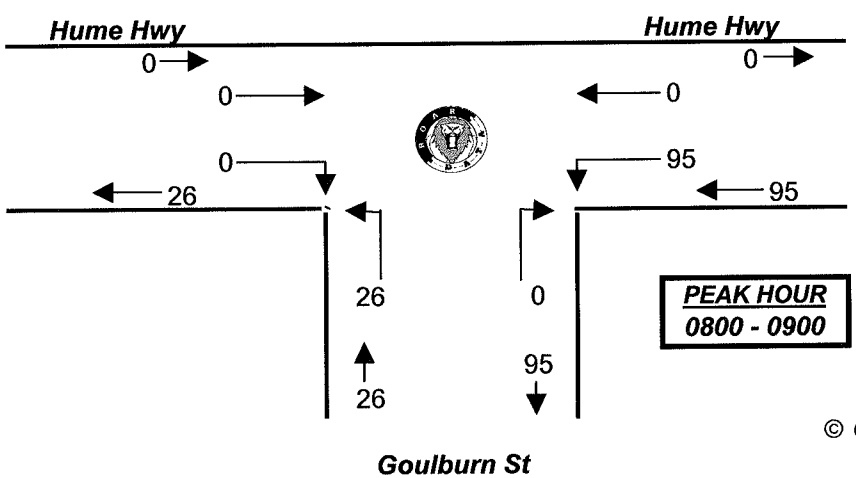
Job No/Name : 1292 Liverpool Hospital 2

Day/Date : Thursday 9th March 2006

All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Goulburn St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0715			6		19		**25**
0715 - 0730			3		15		**18**
0730 - 0745			3		14		**17**
0745 - 0800			3		26		**29**
0800 - 0815			9		21		**30**
0815 - 0830			3		21		**24**
0830 - 0845			5		27		**32**
0845 - 0900			9		26		**35**
Period End	**0**	**0**	**41**	**0**	**169**	**0**	**210**

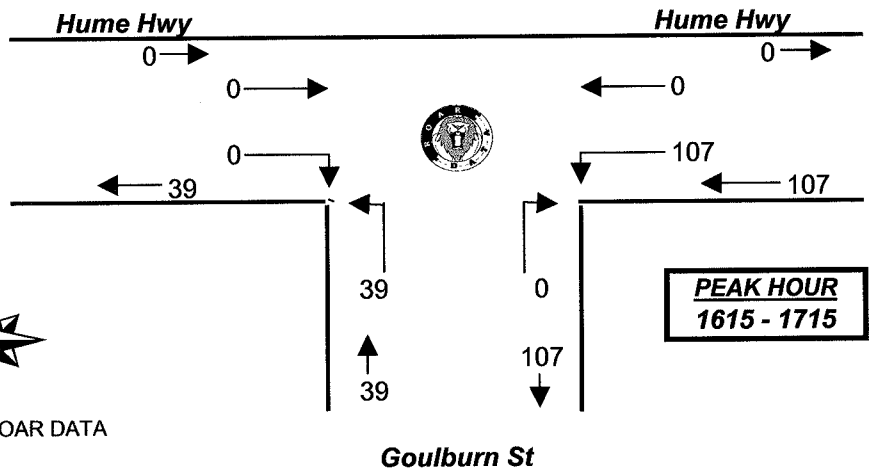
	WEST		SOUTH		EAST		
	Hume Hwy		*Goulburn St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0800	0	0	15	0	74	0	**89**
0715 - 0815	0	0	18	0	76	0	**94**
0730 - 0830	0	0	18	0	82	0	**100**
0745 - 0845	0	0	20	0	95	0	**115**
0800 - 0900	0	0	26	0	95	0	**121**
PEAK HR	**0**	**0**	**26**	**0**	**95**	**0**	**121**



All Vehicles

	WEST		SOUTH		EAST		
	Hume Hwy		*Goulburn St*		*Hume Hwy*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1545			14		27		**41**
1545 - 1600			13		18		**31**
1600 - 1615			10		22		**32**
1615 - 1630			7		22		**29**
1630 - 1645			11		26		**37**
1645 - 1700			9		32		**41**
1700 - 1715			12		27		**39**
1715 - 1730			14		29		**43**
Period End	**0**	**0**	**90**	**0**	**203**	**0**	**293**

	WEST		SOUTH		EAST		
	Hume Hwy		*Goulburn St*		*Hume Hwy*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1630	0	0	44	0	89	0	**133**
1545 - 1645	0	0	41	0	88	0	**129**
1600 - 1700	0	0	37	0	102	0	**139**
1615 - 1715	0	0	39	0	107	0	**146**
1630 - 1730	0	0	46	0	114	0	**160**
PEAK HR	**0**	**0**	**39**	**0**	**107**	**0**	**146**



R.O.A.R. DATA

Reliable, Original & Authentic Results

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

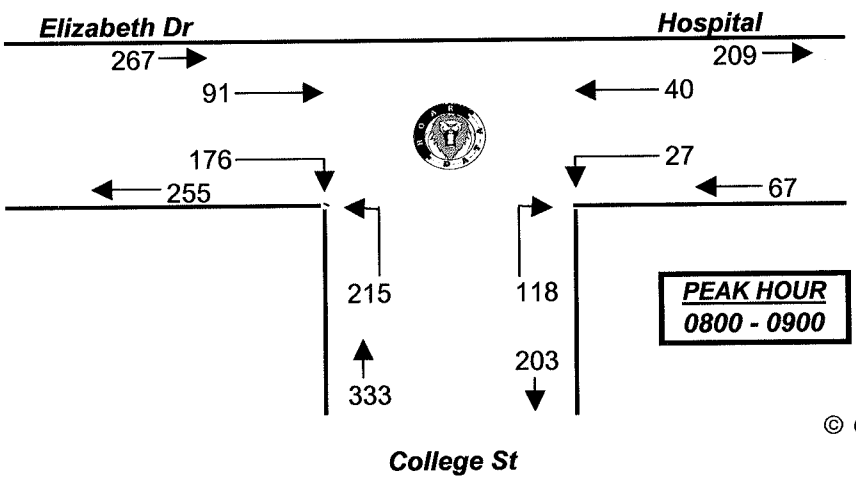
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Thursday 9th March 2006

All Vehicles

	WEST		SOUTH		EAST		
	Elizabeth		*College St*		*Hospital*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0715	12	17	17	19	5	7	**77**
0715 - 0730	16	22	16	14	7	4	**79**
0730 - 0745	25	15	28	35	8	9	**120**
0745 - 0800	27	28	32	35	3	4	**129**
0800 - 0815	22	37	32	25	6	4	**126**
0815 - 0830	27	35	53	36	7	10	**168**
0830 - 0845	16	46	54	26	4	9	**155**
0845 - 0900	26	58	76	31	10	17	**218**
Period End	**171**	**258**	**308**	**221**	**50**	**64**	**1072**

	WEST		SOUTH		EAST		
	Elizabeth		*College St*		*Hospital*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0800	80	82	93	103	23	24	**405**
0715 - 0815	90	102	108	109	24	21	**454**
0730 - 0830	101	115	145	131	24	27	**543**
0745 - 0845	92	146	171	122	20	27	**578**
0800 - 0900	91	176	215	118	27	40	**667**

PEAK HR	**91**	**176**	**215**	**118**	**27**	**40**	**667**

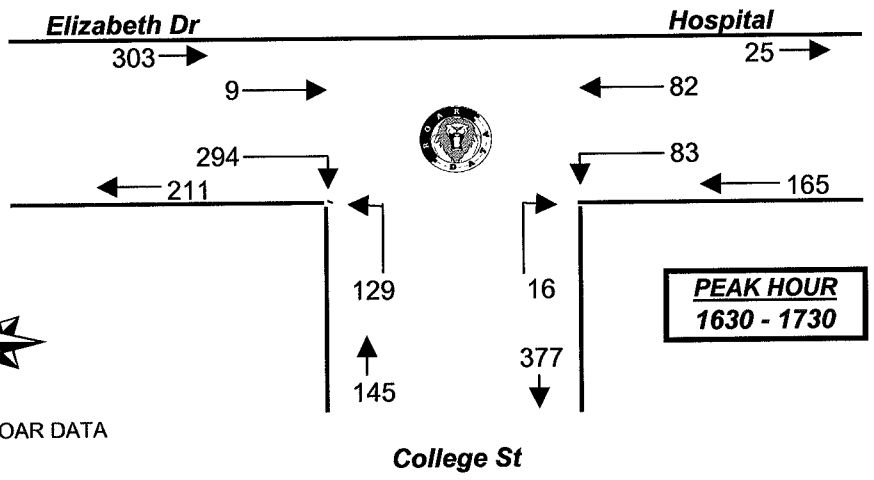


All Vehicles

	WEST		SOUTH		EAST		
	Elizabeth Dr		*College St*		*Hospital*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1545	7	49	23	2	15	13	**109**
1545 - 1600	6	59	33	1	9	9	**117**
1600 - 1615	3	56	31	1	12	25	**128**
1615 - 1630	4	56	32	4	17	18	**131**
1630 - 1645	2	62	17	4	19	15	**119**
1645 - 1700	2	77	37	4	20	17	**157**
1700 - 1715	3	59	34	5	28	27	**156**
1715 - 1730	2	96	41	3	16	23	**181**
Period End	**29**	**514**	**248**	**24**	**136**	**147**	**1098**

	WEST		SOUTH		EAST		
	Elizabeth Dr		*College St*		*Hospital*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1630	20	220	119	8	53	65	**485**
1545 - 1645	15	233	113	10	57	67	**495**
1600 - 1700	11	251	117	13	68	75	**535**
1615 - 1715	11	254	120	17	84	77	**563**
1630 - 1730	9	294	129	16	83	82	**613**

PEAK HR	**9**	**294**	**129**	**16**	**83**	**82**	**613**



R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client : T.T.P.A

Job No/Name : 1292 Liverpool Hospital 2

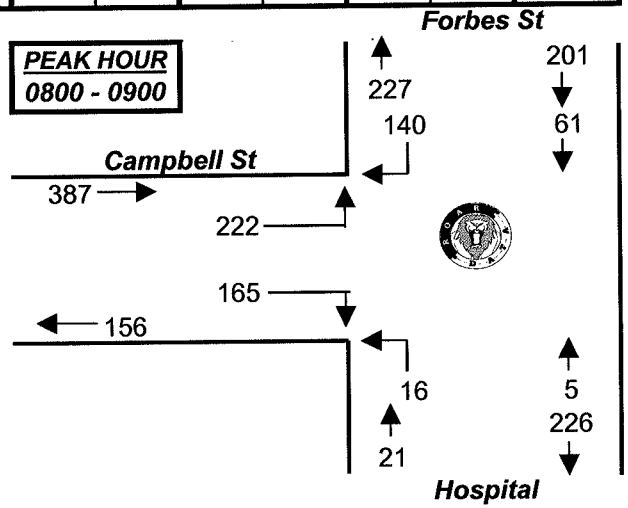
Day/Date : Thursday 9th March 2006

All Vehicles

	NORTH		WEST		SOUTH		
	Forbes St		*Campbell St*		*Hospital*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0715	9	10	23	42	2	1	**87**
0715 - 0730	11	10	19	24	11	2	**77**
0730 - 0745	12	15	30	29	13	2	**101**
0745 - 0800	17	16	33	39	5	1	**111**
0800 - 0815	14	25	40	33	2	0	**114**
0815 - 0830	14	24	58	37	4	0	**137**
0830 - 0845	23	44	66	45	3	3	**184**
0845 - 0900	10	47	58	50	7	2	**174**
Period End	**110**	**191**	**327**	**299**	**47**	**11**	**985**

	NORTH		WEST		SOUTH		
	Forbes St		*Campbell St*		*Hospital*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
0700 - 0800	49	51	105	134	31	6	**376**
0715 - 0815	54	66	122	125	31	5	**403**
0730 - 0830	57	80	161	138	24	3	**463**
0745 - 0845	68	109	197	154	14	4	**546**
0800 - 0900	61	140	222	165	16	5	**609**

PEAK HR	**61**	**140**	**222**	**165**	**16**	**5**	**609**

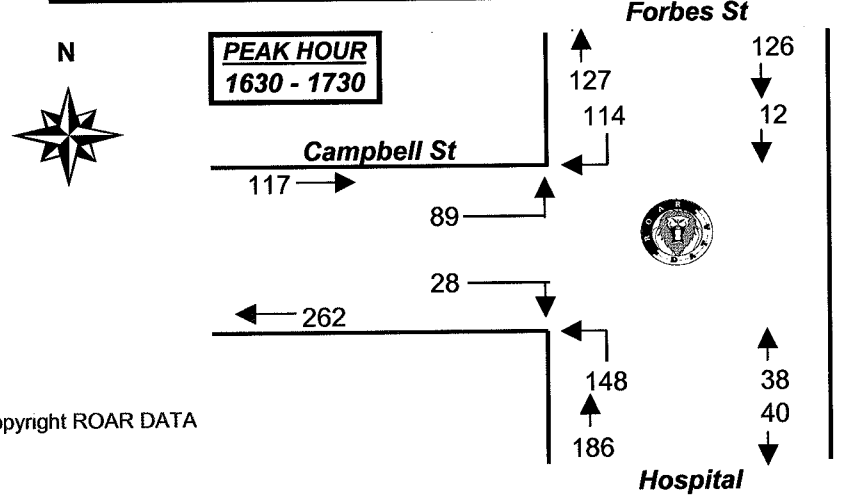


All Vehicles

	NORTH		WEST		SOUTH		
	Forbes St		*Campbell St*		*Hospital*		
Time Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1545	7	43	28	12	37	11	**138**
1545 - 1600	6	35	31	11	26	4	**113**
1600 - 1615	5	26	19	11	19	7	**87**
1615 - 1630	2	26	17	8	24	2	**79**
1630 - 1645	2	30	14	4	44	6	**100**
1645 - 1700	2	20	17	8	33	10	**90**
1700 - 1715	5	32	32	10	46	10	**135**
1715 - 1730	3	32	26	6	25	12	**104**
Period End	**32**	**244**	**184**	**70**	**254**	**62**	**846**

	NORTH		WEST		SOUTH		
	Forbes St		*Campbell St*		*Hospital*		
Peak Per	**T**	**R**	**L**	**R**	**L**	**T**	**TOTAL**
1530 - 1630	20	130	95	42	106	24	**417**
1545 - 1645	15	117	81	34	113	19	**379**
1600 - 1700	11	102	67	31	120	25	**356**
1615 - 1715	11	108	80	30	147	28	**404**
1630 - 1730	12	114	89	28	148	38	**429**

PEAK HR	**12**	**114**	**89**	**28**	**148**	**38**	**429**



R.O.A.R. DATA

Reliable, Original & Authentic Results

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

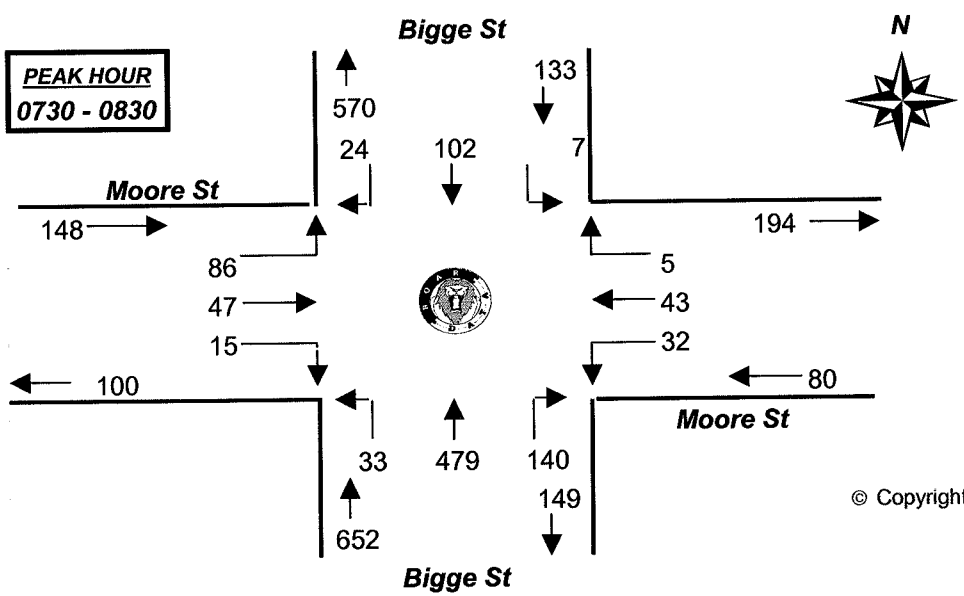
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Tuesday 14th March 2006

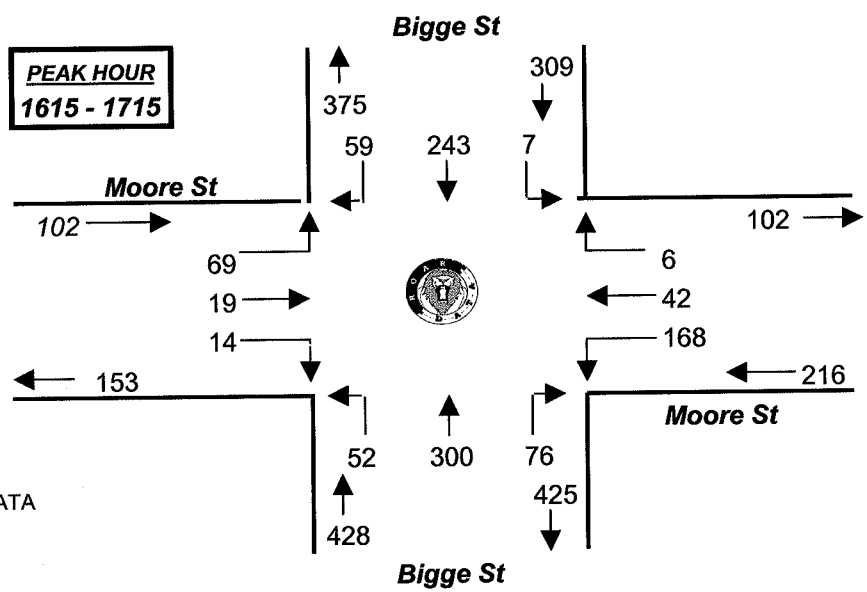
All Vehicles	NORTH Bigge St			WEST Moore St			SOUTH Bigge St			EAST Moore St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715							11	152	44	13	13	1	234
0715 - 0730	3	59	5	21	27	7							122
0730 - 0745							18	225	62	13	19	2	339
0745 - 0800	1	40	5	34	21	8							109
0800 - 0815							15	254	78	19	24	3	393
0815 - 0830	6	62	19	52	26	7							172
0830 - 0845							13	84	99	21	20	8	245
0845 - 0900	10	54	20	61	33	4							182
Period End	20	215	49	168	107	26	57	715	283	66	76	14	1796

All Vehicles	NORTH Bigge St			WEST Moore St			SOUTH Bigge St			EAST Moore St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545							40	161	31	68	22	5	327
1545 - 1600	3	117	17	39	10	7							193
1600 - 1615							44	107	34	82	22	2	291
1615 - 1630	6	121	32	43	7	7							216
1630 - 1645							29	153	29	84	24	1	320
1645 - 1700	1	122	27	26	12	7							195
1700 - 1715							23	147	47	84	18	5	324
1715 - 1730	2	96	32	29	10	9							178
Period End	12	456	108	137	39	30	136	568	141	318	86	13	2044

	NORTH Bigge St			WEST Moore St			SOUTH Bigge St			EAST Moore St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	4	99	10	55	48	15	29	377	106	26	32	3	804
0715 - 0815	4	99	10	55	48	15	33	479	140	32	43	5	963
0730 - 0830	7	102	24	86	47	15	33	479	140	32	43	5	1013
0745 - 0845	7	102	24	86	47	15	28	338	177	40	44	11	919
0800 - 0900	16	116	39	113	59	11	28	338	177	40	44	11	992
PEAK HOUR	7	102	24	86	47	15	33	479	140	32	43	5	1013

	NORTH Bigge St			WEST Moore St			SOUTH Bigge St			EAST Moore St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	9	238	49	82	17	14	84	268	65	150	44	7	1027
1545 - 1645	9	238	49	82	17	14	73	260	63	166	46	3	1020
1600 - 1700	7	243	59	69	19	14	73	260	63	166	46	3	1022
1615 - 1715	7	243	59	69	19	14	52	300	76	168	42	6	1055
1630 - 1730	3	218	59	55	22	16	52	300	76	168	42	6	1017
PEAK HOUR	7	243	59	69	19	14	52	300	76	168	42	6	1055





R.O.A.R. DATA

Reliable, Original & Authentic Results

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

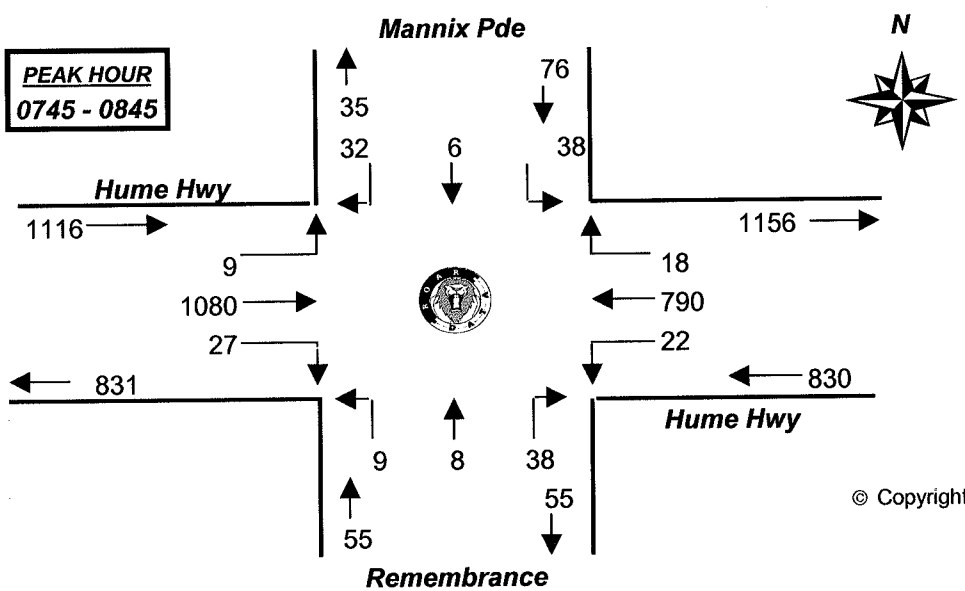
Client : T.T.P.A
Job No/Name : 1292 Liverpool Hospital 2
Day/Date : Thursday 9th March 2006

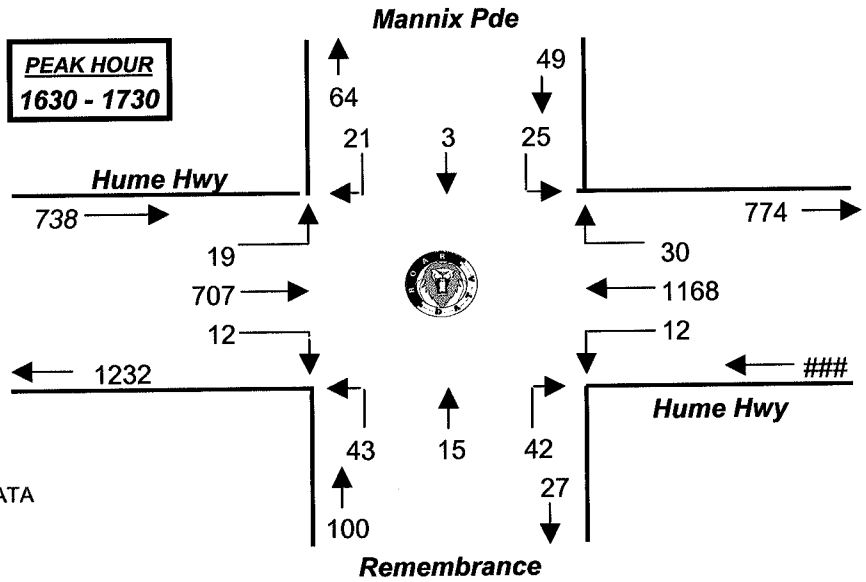
All Vehicles	NORTH Mannix Pde			WEST Hume Hwy			SOUTH Remembrance			EAST Hume Hwy			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715							5	3	16	7	217	2	250
0715 - 0730	9	6	2	2	501	14							534
0730 - 0745							10	1	22	6	283	4	326
0745 - 0800	12	1	9	4	612	15							653
0800 - 0815							5	1	23	10	383	10	432
0815 - 0830	26	5	23	5	468	12							539
0830 - 0845							4	7	15	12	407	8	453
0845 - 0900	18	3	33	7	478	12							551
Period End	65	15	67	18	2059	53	24	12	76	35	1290	24	3738

All Vehicles	NORTH Mannix Pde			WEST Hume Hwy			SOUTH Remembrance			EAST Hume Hwy			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545							11	6	28	6	560	16	627
1545 - 1600	8	2	11	17	288	10							336
1600 - 1615							14	2	16	10	549	19	610
1615 - 1630	11	0	19	8	315	4							357
1630 - 1645							5	10	10	10	600	14	649
1645 - 1700	11	0	9	10	357	6							393
1700 - 1715							38	5	32	2	568	16	661
1715 - 1730	14	3	12	9	350	6							394
Period End	44	5	51	44	1310	26	68	23	86	28	2277	65	4027

	NORTH Mannix Pde			WEST Hume Hwy			SOUTH Remembrance			EAST Hume Hwy			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	21	7	11	6	1113	29	15	4	38	13	500	6	1763
0715 - 0815	21	7	11	6	1113	29	15	2	45	16	666	14	1945
0730 - 0830	38	6	32	9	1080	27	15	2	45	16	666	14	1950
0745 - 0845	38	6	32	9	1080	27	9	8	38	22	790	18	2077
0800 - 0900	44	8	56	12	946	24	9	8	38	22	790	18	1975
PEAK HOUR	38	6	32	9	1080	27	9	8	38	22	790	18	2077

	NORTH Mannix Pde			WEST Hume Hwy			SOUTH Remembrance			EAST Hume Hwy			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	19	2	30	25	603	14	25	8	44	16	1109	35	1930
1545 - 1645	19	2	30	25	603	14	19	12	26	20	1149	33	1952
1600 - 1700	22	0	28	18	672	10	19	12	26	20	1149	33	2009
1615 - 1715	22	0	28	18	672	10	43	15	42	12	1168	30	2060
1630 - 1730	25	3	21	19	707	12	43	15	42	12	1168	30	2097
PEAK HOUR	25	3	21	19	707	12	43	15	42	12	1168	30	2097





R.O.A.R. DATA

Reliable, Original & Authentic Results

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

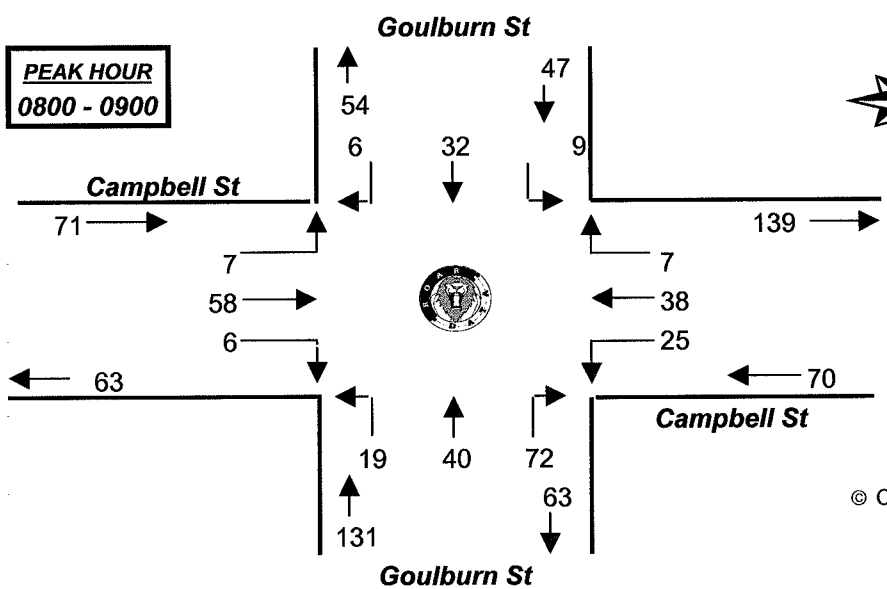
Client :T.T.P.A.
Job No/Name :1308 Liverpool Hospital Hospital 3
Day/Date :Thursday 23rd March 06

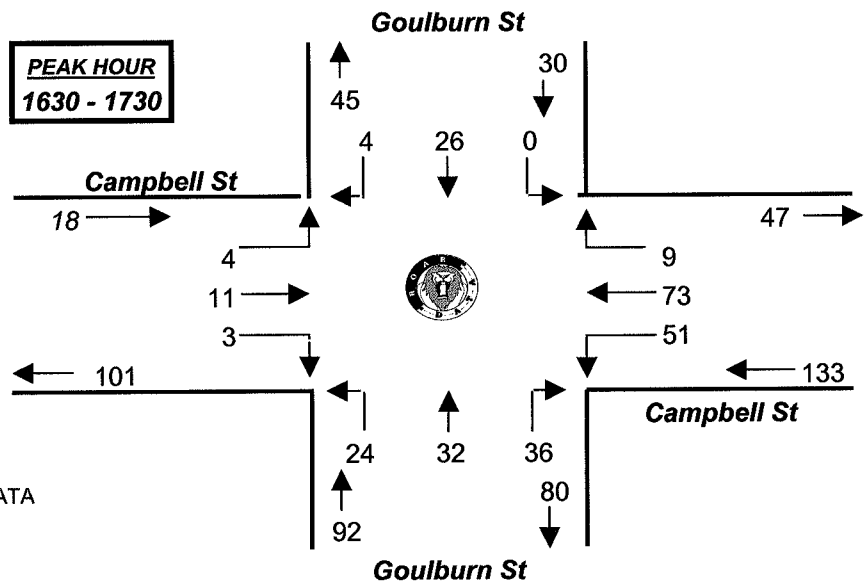
All Vehicles	NORTH Goulburn St			WEST Campbell St			SOUTH Goulburn St			EAST Campbell St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	1	11	0	4	37	3							56
0715 - 0730							6	8	12	6	13	4	49
0730 - 0745	3	15	2	4	51	6							81
0745 - 0800													0
0800 - 0815													0
0815 - 0830							6	22	32	6	20	2	88
0830 - 0845	9	32	6	7	58	6							118
0845 - 0900							13	18	40	19	18	5	113
Period End	13	58	8	15	146	15	25	48	84	31	51	11	505

All Vehicles	NORTH Goulburn St			WEST Campbell St			SOUTH Goulburn St			EAST Campbell St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1545	4	28	5	11	16	11							75
1545 - 1600							15	26	10	22	23	3	99
1600 - 1615	3	20	4	5	11	10							53
1615 - 1630													0
1630 - 1645													0
1645 - 1700							10	10	12	24	41	5	102
1700 - 1715	0	26	4	4	11	3							48
1715 - 1730							14	22	24	27	32	4	123
Period End	7	74	13	20	38	24	39	58	46	73	96	12	500

	NORTH Goulburn St			WEST Campbell St			SOUTH Goulburn St			EAST Campbell St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0800	4	26	2	8	88	9	6	8	12	6	13	4	186
0715 - 0815	3	15	2	4	51	6	6	8	12	6	13	4	130
0730 - 0830	3	15	2	4	51	6	6	22	32	6	20	2	169
0745 - 0845	9	32	6	7	58	6	6	22	32	6	20	2	206
0800 - 0900	9	32	6	7	58	6	19	40	72	25	38	7	319
PEAK HOUR	9	32	6	7	58	6	19	40	72	25	38	7	319

	NORTH Goulburn St			WEST Campbell St			SOUTH Goulburn St			EAST Campbell St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1530 - 1630	7	48	9	16	27	21	15	26	10	22	23	3	227
1545 - 1645	3	20	4	5	11	10	15	26	10	22	23	3	152
1600 - 1700	3	20	4	5	11	10	10	10	12	24	41	5	155
1615 - 1715	0	26	4	4	11	3	10	10	12	24	41	5	150
1630 - 1730	0	26	4	4	11	3	24	32	36	51	73	9	273
PEAK HOUR	0	26	4	4	11	3	24	32	36	51	73	9	273





R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :T.T.P.A.
Job No/Name :~~1306 Warrawee Knox School~~
Day/Date :Tuesday 21st March 06

AM

	Campbell St *Car Park Access*		
Time Per	IN	OUT	TOTAL
0700 - 0715	46	5	**51**
0715 - 0730	30	5	**35**
0730 - 0745	53	12	**65**
0815 - 0830	55	5	**60**
0830 - 0845	48	7	**55**
0845 - 0900	52	8	**60**
Period End	**76**	**10**	**86**

Elizabeth St Goulburn St

	Undergrond *Car Park*		
Time Per	IN	OUT	TOTAL
0745 - 0800	17	3	**20**
0800 - 0815	5	0	**5**
Period End	**22**	**3**	**25**

	Elizabeth St *Port Cochere*		
Time Per	IN	OUT	TOTAL
0745 - 0800	4	5	**9**
0800 - 0815	10	9	**19**
Period End	**14**	**14**	**28**

Time Per			TOTAL
1615 - 1630			**0**
1630 - 1645			**0**
Period End	**0**	**0**	**0**

PM

	Campbell St *Car Park Access*		
Time Per	IN	OUT	TOTAL
1530 - 1545	11	33	**44**
1545 - 1600	11	18	**29**
1600 - 1615	14	34	**48**
1645 - 1700	8	30	**38**
1700 - 1715	18	40	**58**
1715 - 1730	13	43	**56**
Period End	**22**	**51**	**73**

Elizabeth St Goulburn St

	Undergrond *Car Park*		
Time Per	IN	OUT	TOTAL
1615 - 1630	5	9	**14**
1630 - 1645	6	10	**16**
Period End	**11**	**19**	**30**

	Elizabeth St *Port Cochere*		
Time Per	IN	OUT	TOTAL
1615 - 1630	13	7	**20**
1630 - 1645	9	10	**19**
Period End	**22**	**17**	**39**

Vehicles already inside & ambulances

	0 *0*		
Peak Per	0	0	TOTAL
1530 - 1630	0	0	**0**
1545 - 1645	0	0	**0**
1600 - 1700	0	0	**0**
1615 - 1715	0	0	**0**
1630 - 1730	0	0	**0**

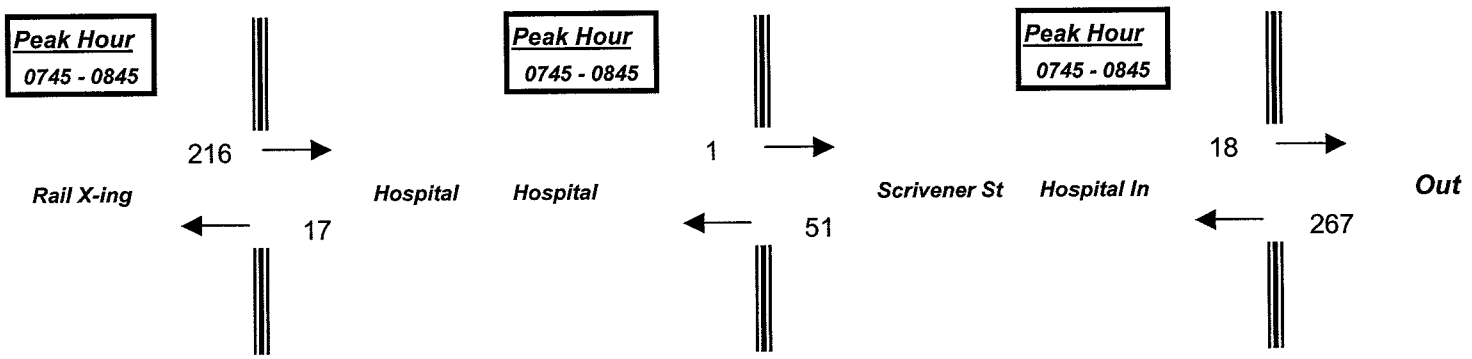
PEAK HR	**694**	**28**	**722**

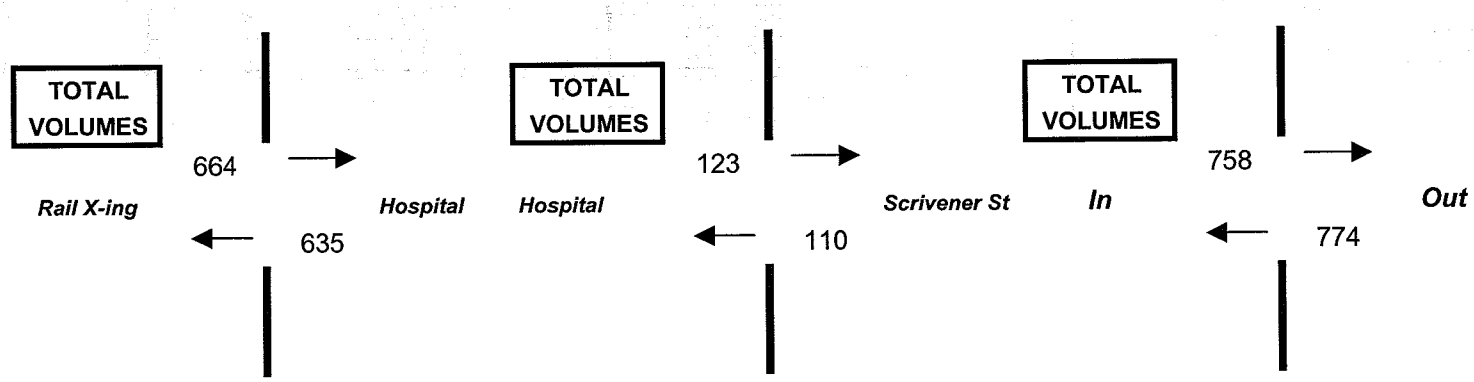
HOSPITAL ACCESS SURVEYS

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :T.T.P.A.
Job No/Name :1285 Liverpool Hospital
Day/Date : Wednesday 1st March 06

Vehicles

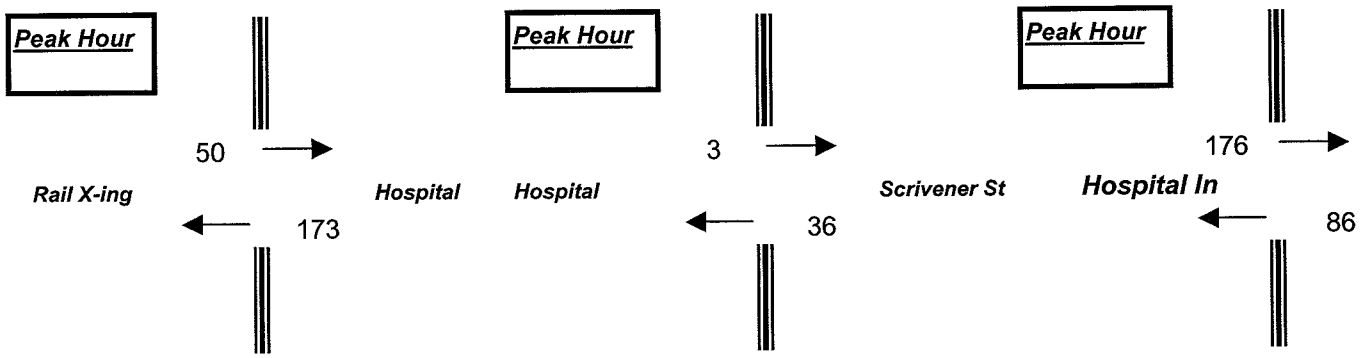


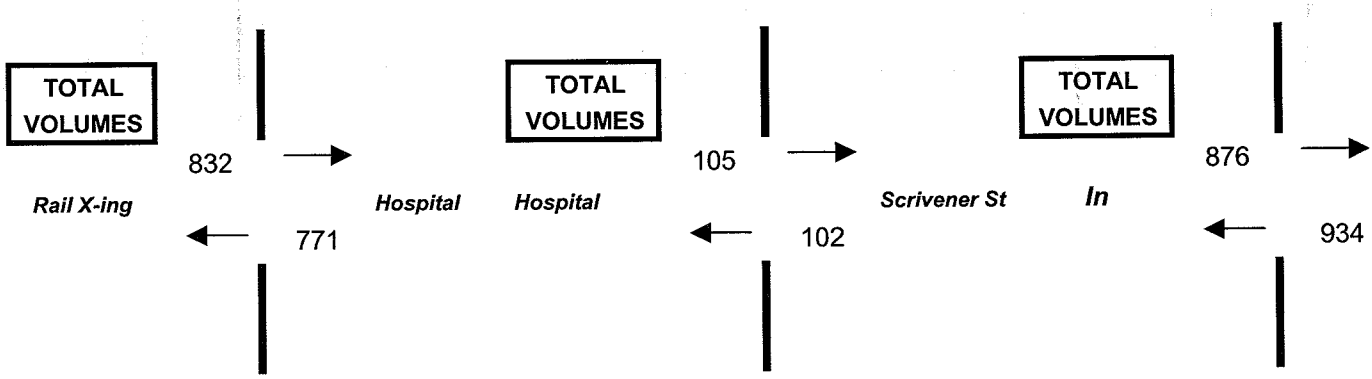


R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :T.T.P.A.
Job No/Name :1285 Liverpool Hospital
Day/Date : Wednesday 1st March 06

Pedestrians





Period End	664	635	1299

Period End	110	123	233

Period End	774	758	1532

R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client :T.T.P.A.

Job No/Name :1285 Liverpool Hospital

Day/Date : Wednesday 1st March 06

Vehicles — Rail Xing — *Vehicles*

Peak Per	IN	OUT	TOTAL
0600 - 0700	64	3	**67**
0615 - 0715	90	7	**97**
0630 - 0730	118	11	**129**
0645 - 0745	145	12	**157**
0700 - 0800	175	13	**188**
0715 - 0815	191	12	**203**
0730 - 0830	211	14	**225**
0745 - 0845	216	17	**233**
0800 - 0900	185	18	**203**
0815 - 0915	162	19	**181**
0830 - 0930	118	14	**132**
0845 - 0945	82	13	**95**
0900 - 1000	60	14	**74**
0915 - 1015	40	13	**53**
0930 - 1030	31	14	**45**
0945 - 1045	21	13	**34**
1000 - 1100	19	19	**38**
1015 - 1115	17	17	**34**
1030 - 1130	17	20	**37**
1045 - 1145	17	18	**35**
1100 - 1200	15	10	**25**
1115 - 1215	18	13	**31**
1130 - 1230	23	14	**37**
1145 - 1245	27	19	**46**
1200 - 1300	30	23	**53**
1215 - 1315	37	28	**65**
1230 - 1330	40	28	**68**
1245 - 1345	41	28	**69**
1300 - 1400	39	27	**66**
1315 - 1415	33	24	**57**
1330 - 1430	26	32	**58**
1345 - 1445	21	44	**65**
1400 - 1500	18	46	**64**
1415 - 1515	18	50	**68**
1430 - 1530	15	46	**61**
1445 - 1545	15	60	**75**
1500 - 1600	21	71	**92**
1515 - 1615	17	91	**108**
1530 - 1630	17	100	**117**
1545 - 1645	16	128	**144**
1600 - 1700	12	154	**166**
1615 - 1715	12	181	**193**
1630 - 1730	14	203	**217**
1645 - 1745	15	168	**183**
1700 - 1800	13	149	**162**
1715 - 1815	10	108	**118**
1730 - 1830	8	84	**92**
1745 - 1845	5	70	**75**
1800 - 1900	4	53	**57**
1815 - 1915	5	46	**51**
1830 - 1930	4	39	**43**
1845 - 1945	5	32	**37**
1900 - 2000	6	27	**33**
1915 - 2015	5	18	**23**
1930 - 2030	5	10	**15**
1945 - 2045	4	10	**14**
2000 - 2100	3	8	**11**

PEAK HOUR	216	17	233

Vehicles — Scrivener St — *Vehicles*

Peak Per	IN	OUT	TOTAL
0600 - 0700	6	0	**6**
0615 - 0715	5	0	**5**
0630 - 0730	7	1	**8**
0645 - 0745	11	4	**15**
0700 - 0800	23	4	**27**
0715 - 0815	35	4	**39**
0730 - 0830	47	3	**50**
0745 - 0845	51	1	**52**
0800 - 0900	42	2	**44**
0815 - 0915	33	2	**35**
0830 - 0930	23	3	**26**
0845 - 0945	16	3	**19**
0900 - 1000	11	2	**13**
0915 - 1015	8	2	**10**
0930 - 1030	5	1	**6**
0945 - 1045	3	2	**5**
1000 - 1100	1	3	**4**
1015 - 1115	1	3	**4**
1030 - 1130	0	5	**5**
1045 - 1145	0	4	**4**
1100 - 1200	1	4	**5**
1115 - 1215	1	4	**5**
1130 - 1230	2	4	**6**
1145 - 1245	4	4	**8**
1200 - 1300	5	6	**11**
1215 - 1315	10	7	**17**
1230 - 1330	10	7	**17**
1245 - 1345	9	6	**15**
1300 - 1400	8	3	**11**
1315 - 1415	5	2	**7**
1330 - 1430	4	2	**6**
1345 - 1445	4	4	**8**
1400 - 1500	3	4	**7**
1415 - 1515	2	6	**8**
1430 - 1530	3	4	**7**
1445 - 1545	3	7	**10**
1500 - 1600	3	8	**11**
1515 - 1615	4	10	**14**
1530 - 1630	3	16	**19**
1545 - 1645	4	17	**21**
1600 - 1700	4	27	**31**
1615 - 1715	3	40	**43**
1630 - 1730	3	40	**43**
1645 - 1745	1	47	**48**
1700 - 1800	1	39	**40**
1715 - 1815	0	29	**29**
1730 - 1830	0	27	**27**
1745 - 1845	0	16	**16**
1800 - 1900	0	15	**15**
1815 - 1915	0	8	**8**
1830 - 1930	0	7	**7**
1845 - 1945	1	6	**7**
1900 - 2000	2	5	**7**
1915 - 2015	2	5	**7**
1930 - 2030	2	3	**5**
1945 - 2045	1	2	**3**
2000 - 2100	0	1	**1**

PEAK HOUR	51	1	52

Vehicles — Combined — *Vehicles*

Peak Per	IN	OUT	TOTAL
0600 - 0700	70	3	**73**
0615 - 0715	95	7	**102**
0630 - 0730	125	12	**137**
0645 - 0745	156	16	**172**
0700 - 0800	198	17	**215**
0715 - 0815	226	16	**242**
0730 - 0830	258	17	**275**
0745 - 0845	267	18	**285**
0800 - 0900	227	20	**247**
0815 - 0915	195	21	**216**
0830 - 0930	141	17	**158**
0845 - 0945	98	16	**114**
0900 - 1000	71	16	**87**
0915 - 1015	48	15	**63**
0930 - 1030	36	15	**51**
0945 - 1045	24	15	**39**
1000 - 1100	20	22	**42**
1015 - 1115	18	20	**38**
1030 - 1130	17	25	**42**
1045 - 1145	17	22	**39**
1100 - 1200	16	14	**30**
1115 - 1215	19	17	**36**
1130 - 1230	25	18	**43**
1145 - 1245	31	23	**54**
1200 - 1300	35	29	**64**
1215 - 1315	47	35	**82**
1230 - 1330	50	35	**85**
1245 - 1345	50	34	**84**
1300 - 1400	47	30	**77**
1315 - 1415	38	26	**64**
1330 - 1430	30	34	**64**
1345 - 1445	25	48	**73**
1400 - 1500	21	50	**71**
1415 - 1515	20	56	**76**
1430 - 1530	18	50	**68**
1445 - 1545	18	67	**85**
1500 - 1600	24	79	**103**
1515 - 1615	21	101	**122**
1530 - 1630	20	116	**136**
1545 - 1645	20	145	**165**
1600 - 1700	16	181	**197**
1615 - 1715	15	221	**236**
1630 - 1730	17	243	**260**
1645 - 1745	16	215	**231**
1700 - 1800	14	188	**202**
1715 - 1815	10	137	**147**
1730 - 1830	8	111	**119**
1745 - 1845	5	86	**91**
1800 - 1900	4	68	**72**
1815 - 1915	5	54	**59**
1830 - 1930	4	46	**50**
1845 - 1945	6	38	**44**
1900 - 2000	8	32	**40**
1915 - 2015	7	23	**30**
1930 - 2030	7	13	**20**
1945 - 2045	5	12	**17**
2000 - 2100	3	9	**12**

PEAK HOUR	267	18	285

R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client :T.T.P.A.
Job No/Name :1285 Liverpool Hospital
Day/Date : Wednesday 1st March 06

Vehicles	Rail Xing Vehicles		
Time Per	IN	OUT	TOTAL
0600 - 0615	6	1	7
0615 - 0630	9	0	9
0630 - 0645	18	1	19
0645 - 0700	31	1	32
0700 - 0715	32	5	37
0715 - 0730	37	4	41
0730 - 0745	45	2	47
0745 - 0800	61	2	63
0800 - 0815	48	4	52
0815 - 0830	57	6	63
0830 - 0845	50	5	55
0845 - 0900	30	3	33
0900 - 0915	25	5	30
0915 - 0930	13	1	14
0930 - 0945	14	4	18
0945 - 1000	8	4	12
1000 - 1015	5	4	9
1015 - 1030	4	2	6
1030 - 1045	4	3	7
1045 - 1100	6	10	16
1100 - 1115	3	2	5
1115 - 1130	4	5	9
1130 - 1145	4	1	5
1145 - 1200	4	2	6
1200 - 1215	6	5	11
1215 - 1230	9	6	15
1230 - 1245	8	6	14
1245 - 1300	7	6	13
1300 - 1315	13	10	23
1315 - 1330	12	6	18
1330 - 1345	9	6	15
1345 - 1400	5	5	10
1400 - 1415	7	7	14
1415 - 1430	5	14	19
1430 - 1445	4	18	22
1445 - 1500	2	7	9
1500 - 1515	7	11	18
1515 - 1530	2	10	12
1530 - 1545	4	32	36
1545 - 1600	8	18	26
1600 - 1615	3	31	34
1615 - 1630	2	19	21
1630 - 1645	3	60	63
1645 - 1700	4	44	48
1700 - 1715	3	58	61
1715 - 1730	4	41	45
1730 - 1745	4	25	29
1745 - 1800	2	25	27
1800 - 1815	0	17	17
1815 - 1830	2	17	19
1830 - 1845	1	11	12
1845 - 1900	1	8	9
1900 - 1915	1	10	11
1915 - 1930	1	10	11
1930 - 1945	2	4	6
1945 - 2000	2	3	5
2000 - 2015	0	1	1
2015 - 2030	1	2	3
2030 - 2045	1	4	5
2045 - 2100	1	1	2

Vehicles	Scrivener St Vehicles		
Time Per	IN	OUT	TOTAL
0600 - 0615	1	0	1
0615 - 0630	0	0	0
0630 - 0645	1	0	1
0645 - 0700	4	0	4
0700 - 0715	0	0	0
0715 - 0730	2	1	3
0730 - 0745	5	3	8
0745 - 0800	16	0	16
0800 - 0815	12	0	12
0815 - 0830	14	0	14
0830 - 0845	9	1	10
0845 - 0900	7	1	8
0900 - 0915	3	0	3
0915 - 0930	4	1	5
0930 - 0945	2	1	3
0945 - 1000	2	0	2
1000 - 1015	0	0	0
1015 - 1030	1	0	1
1030 - 1045	0	2	2
1045 - 1100	0	1	1
1100 - 1115	0	0	0
1115 - 1130	0	2	2
1130 - 1145	0	1	1
1145 - 1200	1	1	2
1200 - 1215	0	0	0
1215 - 1230	1	2	3
1230 - 1245	2	1	3
1245 - 1300	2	3	5
1300 - 1315	5	1	6
1315 - 1330	1	2	3
1330 - 1345	1	0	1
1345 - 1400	1	0	1
1400 - 1415	2	0	2
1415 - 1430	0	2	2
1430 - 1445	1	2	3
1445 - 1500	0	0	0
1500 - 1515	1	2	3
1515 - 1530	1	0	1
1530 - 1545	1	5	6
1545 - 1600	0	1	1
1600 - 1615	2	4	6
1615 - 1630	0	6	6
1630 - 1645	2	6	8
1645 - 1700	0	11	11
1700 - 1715	1	17	18
1715 - 1730	0	6	6
1730 - 1745	0	13	13
1745 - 1800	0	3	3
1800 - 1815	0	7	7
1815 - 1830	0	4	4
1830 - 1845	0	2	2
1845 - 1900	0	2	2
1900 - 1915	0	0	0
1915 - 1930	0	3	3
1930 - 1945	1	1	2
1945 - 2000	1	1	2
2000 - 2015	0	0	0
2015 - 2030	0	1	1
2030 - 2045	0	0	0
2045 - 2100	0	0	0

Vehicles	Combined Vehicles		
Time Per	IN	OUT	TOTAL
0600 - 0615	7	1	8
0615 - 0630	9	0	9
0630 - 0645	19	1	20
0645 - 0700	35	1	36
0700 - 0715	32	5	37
0715 - 0730	39	5	44
0730 - 0745	50	5	55
0745 - 0800	77	2	79
0800 - 0815	60	4	64
0815 - 0830	71	6	77
0830 - 0845	59	6	65
0845 - 0900	37	4	41
0900 - 0915	28	5	33
0915 - 0930	17	2	19
0930 - 0945	16	5	21
0945 - 1000	10	4	14
1000 - 1015	5	4	9
1015 - 1030	5	2	7
1030 - 1045	4	5	9
1045 - 1100	6	11	17
1100 - 1115	3	2	5
1115 - 1130	4	7	11
1130 - 1145	4	2	6
1145 - 1200	5	3	8
1200 - 1215	6	5	11
1215 - 1230	10	8	18
1230 - 1245	10	7	17
1245 - 1300	9	9	18
1300 - 1315	18	11	29
1315 - 1330	13	8	21
1330 - 1345	10	6	16
1345 - 1400	6	5	11
1400 - 1415	9	7	16
1415 - 1430	5	16	21
1430 - 1445	5	20	25
1445 - 1500	2	7	9
1500 - 1515	8	13	21
1515 - 1530	3	10	13
1530 - 1545	5	37	42
1545 - 1600	8	19	27
1600 - 1615	5	35	40
1615 - 1630	2	25	27
1630 - 1645	5	66	71
1645 - 1700	4	55	59
1700 - 1715	4	75	79
1715 - 1730	4	47	51
1730 - 1745	4	38	42
1745 - 1800	2	28	30
1800 - 1815	0	24	24
1815 - 1830	2	21	23
1830 - 1845	1	13	14
1845 - 1900	1	10	11
1900 - 1915	1	10	11
1915 - 1930	1	13	14
1930 - 1945	3	5	8
1945 - 2000	3	4	7
2000 - 2015	0	1	1
2015 - 2030	1	3	4
2030 - 2045	1	4	5
2045 - 2100	1	1	2

Period End	832	771	1603

Period End	102	105	207

Period End	934	876

R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client :T.T.P.A.

Job No/Name :1285 Liverpool Hospital

Day/Date : Wednesday 1st March 06

Peds — Rail Xing — *Vehicles*

Peak Per	IN	OUT	TOTAL
0600 - 0700	6	62	**68**
0615 - 0715	11	78	**89**
0630 - 0730	17	102	**119**
0645 - 0745	26	113	**139**
0700 - 0800	35	136	**171**
0715 - 0815	40	157	**197**
0730 - 0830	47	161	**208**
0745 - 0845	50	173	**223**
0800 - 0900	44	145	**189**
0815 - 0915	41	131	**172**
0830 - 0930	37	115	**152**
0845 - 0945	28	82	**110**
0900 - 1000	29	77	**106**
0915 - 1015	28	57	**85**
0930 - 1030	23	45	**68**
0945 - 1045	28	42	**70**
1000 - 1100	26	38	**64**
1015 - 1115	25	36	**61**
1030 - 1130	24	34	**58**
1045 - 1145	18	37	**55**
1100 - 1200	21	33	**54**
1115 - 1215	23	46	**69**
1130 - 1230	39	67	**106**
1145 - 1245	62	90	**152**
1200 - 1300	77	91	**168**
1215 - 1315	85	90	**175**
1230 - 1330	82	85	**167**
1245 - 1345	68	72	**140**
1300 - 1400	57	73	**130**
1315 - 1415	61	57	**118**
1330 - 1430	74	41	**115**
1345 - 1445	76	31	**107**
1400 - 1500	74	22	**96**
1415 - 1515	64	22	**86**
1430 - 1530	63	19	**82**
1445 - 1545	81	26	**107**
1500 - 1600	95	32	**127**
1515 - 1615	104	37	**141**
1530 - 1630	111	39	**150**
1545 - 1645	123	37	**160**
1600 - 1700	144	34	**178**
1615 - 1715	173	29	**202**
1630 - 1730	177	26	**203**
1645 - 1745	157	18	**175**
1700 - 1800	132	12	**144**
1715 - 1815	106	8	**114**
1730 - 1830	80	6	**86**
1745 - 1845	62	4	**66**
1800 - 1900	51	6	**57**
1815 - 1915	44	9	**53**
1830 - 1930	47	13	**60**
1845 - 1945	42	12	**54**
1900 - 2000	35	10	**45**
1915 - 2015	21	6	**27**
1930 - 2030	8	2	**10**
1945 - 2045	7	2	**9**
2000 - 2100	6	0	**6**

PEAK HOUR	50	173	223

Peds — Scrivener St — *Vehicles*

Peak Per	IN	OUT	TOTAL
0600 - 0700	4	1	**5**
0615 - 0715	8	3	**11**
0630 - 0730	13	5	**18**
0645 - 0745	15	6	**21**
0700 - 0800	19	7	**26**
0715 - 0815	23	5	**28**
0730 - 0830	25	3	**28**
0745 - 0845	36	3	**39**
0800 - 0900	31	2	**33**
0815 - 0915	27	2	**29**
0830 - 0930	24	1	**25**
0845 - 0945	13	0	**13**
0900 - 1000	16	1	**17**
0915 - 1015	14	2	**16**
0930 - 1030	10	2	**12**
0945 - 1045	10	3	**13**
1000 - 1100	5	2	**7**
1015 - 1115	4	2	**6**
1030 - 1130	4	2	**6**
1045 - 1145	2	2	**4**
1100 - 1200	2	2	**4**
1115 - 1215	3	1	**4**
1130 - 1230	4	3	**7**
1145 - 1245	4	4	**8**
1200 - 1300	4	8	**12**
1215 - 1315	3	9	**12**
1230 - 1330	5	10	**15**
1245 - 1345	5	10	**15**
1300 - 1400	7	8	**15**
1315 - 1415	9	12	**21**
1330 - 1430	6	11	**17**
1345 - 1445	6	11	**17**
1400 - 1500	4	10	**14**
1415 - 1515	1	5	**6**
1430 - 1530	0	4	**4**
1445 - 1545	0	6	**6**
1500 - 1600	0	8	**8**
1515 - 1615	2	9	**11**
1530 - 1630	2	13	**15**
1545 - 1645	3	16	**19**
1600 - 1700	3	19	**22**
1615 - 1715	2	31	**33**
1630 - 1730	2	28	**30**
1645 - 1745	2	26	**28**
1700 - 1800	2	25	**27**
1715 - 1815	1	15	**16**
1730 - 1830	1	16	**17**
1745 - 1845	3	11	**14**
1800 - 1900	3	7	**10**
1815 - 1915	4	4	**8**
1830 - 1930	4	1	**5**
1845 - 1945	1	3	**4**
1900 - 2000	1	4	**5**
1915 - 2015	1	4	**5**
1930 - 2030	1	5	**6**
1945 - 2045	1	3	**4**
2000 - 2100	1	1	**2**

PEAK HOUR	36	3	39

Peds — Combined — *Vehicles*

Peak Per	IN	OUT
0600 - 0700	10	63
0615 - 0715	19	81
0630 - 0730	30	107
0645 - 0745	41	119
0700 - 0800	54	143
0715 - 0815	63	162
0730 - 0830	72	164
0745 - 0845	86	176
0800 - 0900	75	147
0815 - 0915	68	133
0830 - 0930	61	116
0845 - 0945	41	82
0900 - 1000	45	78
0915 - 1015	42	59
0930 - 1030	33	47
0945 - 1045	38	45
1000 - 1100	31	40
1015 - 1115	29	38
1030 - 1130	28	36
1045 - 1145	20	39
1100 - 1200	23	35
1115 - 1215	26	47
1130 - 1230	43	70
1145 - 1245	66	94
1200 - 1300	81	99
1215 - 1315	88	99
1230 - 1330	87	95
1245 - 1345	73	82
1300 - 1400	64	81
1315 - 1415	70	69
1330 - 1430	80	52
1345 - 1445	82	42
1400 - 1500	78	32
1415 - 1515	65	27
1430 - 1530	63	23
1445 - 1545	81	32
1500 - 1600	95	40
1515 - 1615	106	46
1530 - 1630	113	52
1545 - 1645	126	53
1600 - 1700	147	53
1615 - 1715	175	60
1630 - 1730	179	54
1645 - 1745	159	44
1700 - 1800	134	37
1715 - 1815	107	23
1730 - 1830	81	22
1745 - 1845	65	15
1800 - 1900	54	13
1815 - 1915	48	13
1830 - 1930	51	14
1845 - 1945	43	15
1900 - 2000	36	14
1915 - 2015	22	10
1930 - 2030	9	7
1945 - 2045	8	5
2000 - 2100	7	1

PEAK HOUR	86	176

R.O.A.R. DATA

Reliable, Original & Authentic Results

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

Client :T.T.P.A.
Job No/Name :1285 Liverpool Hospital
Day/Date : Wednesday 1st March 06

Peds — Rail Xing — Vehicles

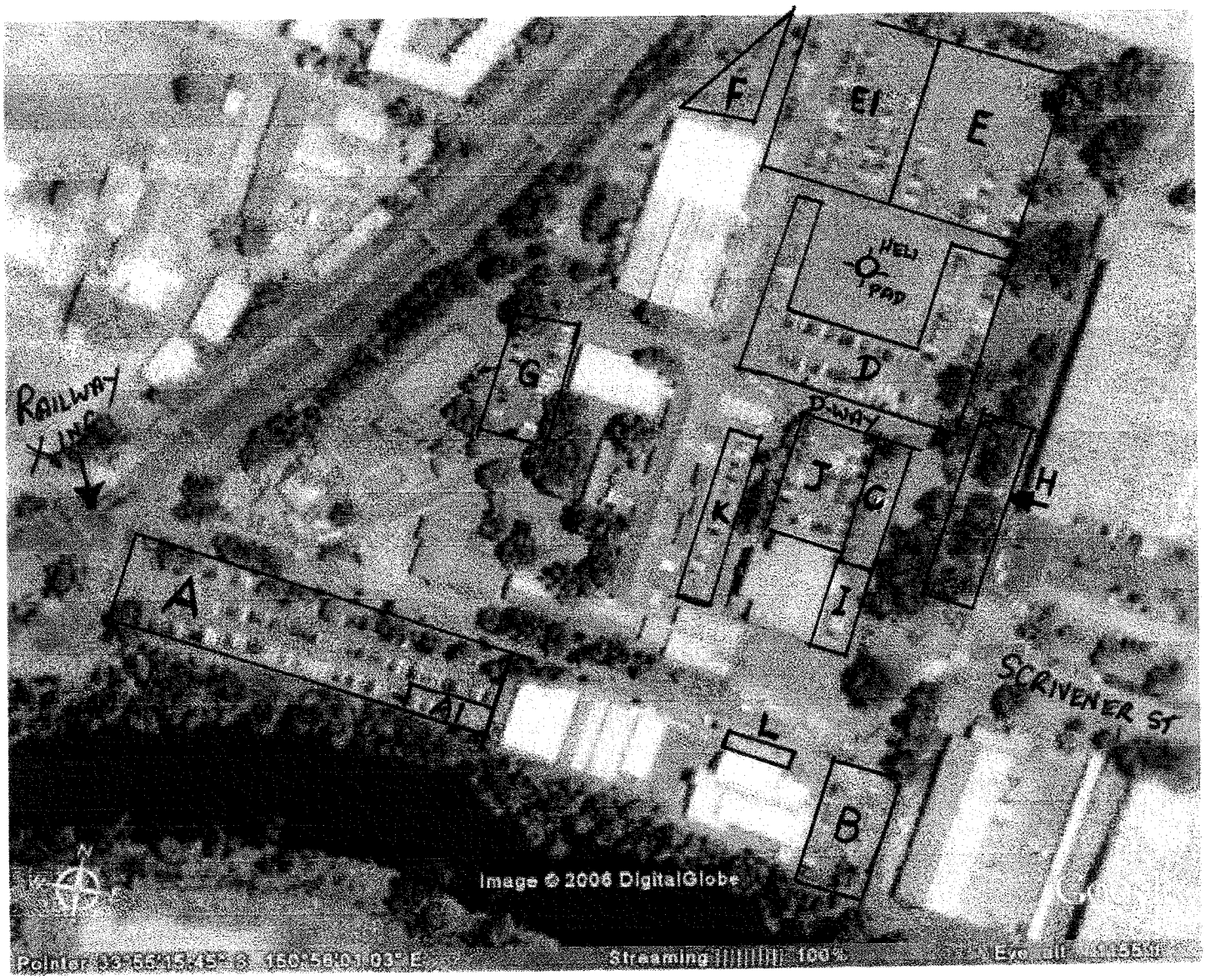
Time Per	IN	OUT	TOTAL
0600 - 0615	1	8	9
0615 - 0630	0	8	8
0630 - 0645	2	16	18
0645 - 0700	3	30	33
0700 - 0715	6	24	30
0715 - 0730	6	32	38
0730 - 0745	11	27	38
0745 - 0800	12	53	65
0800 - 0815	11	45	56
0815 - 0830	13	36	49
0830 - 0845	14	39	53
0845 - 0900	6	25	31
0900 - 0915	8	31	39
0915 - 0930	9	20	29
0930 - 0945	5	6	11
0945 - 1000	7	20	27
1000 - 1015	7	11	18
1015 - 1030	4	8	12
1030 - 1045	10	3	13
1045 - 1100	5	16	21
1100 - 1115	6	9	15
1115 - 1130	3	6	9
1130 - 1145	4	6	10
1145 - 1200	8	12	20
1200 - 1215	8	22	30
1215 - 1230	19	27	46
1230 - 1245	27	29	56
1245 - 1300	23	13	36
1300 - 1315	16	21	37
1315 - 1330	16	22	38
1330 - 1345	13	16	29
1345 - 1400	12	14	26
1400 - 1415	20	5	25
1415 - 1430	29	6	35
1430 - 1445	15	6	21
1445 - 1500	10	5	15
1500 - 1515	10	5	15
1515 - 1530	28	3	31
1530 - 1545	33	13	46
1545 - 1600	24	11	35
1600 - 1615	19	10	29
1615 - 1630	35	5	40
1630 - 1645	45	11	56
1645 - 1700	45	8	53
1700 - 1715	48	5	53
1715 - 1730	39	2	41
1730 - 1745	25	3	28
1745 - 1800	20	2	22
1800 - 1815	22	1	23
1815 - 1830	13	0	13
1830 - 1845	7	1	8
1845 - 1900	9	4	13
1900 - 1915	15	4	19
1915 - 1930	16	4	20
1930 - 1945	2	0	2
1945 - 2000	2	2	4
2000 - 2015	1	0	1
2015 - 2030	3	0	3
2030 - 2045	1	0	1
2045 - 2100	1	0	1

Peds — Scrivener St — Vehicles

Time Per	IN	OUT	TOTAL
0600 - 0615	0	0	0
0615 - 0630	1	1	2
0630 - 0645	0	0	0
0645 - 0700	3	0	3
0700 - 0715	4	2	6
0715 - 0730	6	3	9
0730 - 0745	2	1	3
0745 - 0800	7	1	8
0800 - 0815	8	0	8
0815 - 0830	8	1	9
0830 - 0845	13	1	14
0845 - 0900	2	0	2
0900 - 0915	4	0	4
0915 - 0930	5	0	5
0930 - 0945	2	0	2
0945 - 1000	5	1	6
1000 - 1015	2	1	3
1015 - 1030	1	0	1
1030 - 1045	2	1	3
1045 - 1100	0	0	0
1100 - 1115	1	1	2
1115 - 1130	1	0	1
1130 - 1145	0	1	1
1145 - 1200	0	0	0
1200 - 1215	2	0	2
1215 - 1230	2	2	4
1230 - 1245	0	2	2
1245 - 1300	0	4	4
1300 - 1315	1	1	2
1315 - 1330	4	3	7
1330 - 1345	0	2	2
1345 - 1400	2	2	4
1400 - 1415	3	5	8
1415 - 1430	1	2	3
1430 - 1445	0	2	2
1445 - 1500	0	1	1
1500 - 1515	0	0	0
1515 - 1530	0	1	1
1530 - 1545	0	4	4
1545 - 1600	0	3	3
1600 - 1615	2	1	3
1615 - 1630	0	5	5
1630 - 1645	1	7	8
1645 - 1700	0	6	6
1700 - 1715	1	13	14
1715 - 1730	0	2	2
1730 - 1745	1	5	6
1745 - 1800	0	5	5
1800 - 1815	0	3	3
1815 - 1830	0	3	3
1830 - 1845	3	0	3
1845 - 1900	0	1	1
1900 - 1915	1	0	1
1915 - 1930	0	0	0
1930 - 1945	0	2	2
1945 - 2000	0	2	2
2000 - 2015	1	0	1
2015 - 2030	0	1	1
2030 - 2045	0	0	0
2045 - 2100	0	0	0

Peds — Combined — Vehicles

Time Per	IN	OUT
0600 - 0615	1	8
0615 - 0630	1	9
0630 - 0645	2	16
0645 - 0700	6	30
0700 - 0715	10	26
0715 - 0730	12	35
0730 - 0745	13	28
0745 - 0800	19	54
0800 - 0815	19	45
0815 - 0830	21	37
0830 - 0845	27	40
0845 - 0900	8	25
0900 - 0915	12	31
0915 - 0930	14	20
0930 - 0945	7	6
0945 - 1000	12	21
1000 - 1015	9	12
1015 - 1030	5	8
1030 - 1045	12	4
1045 - 1100	5	16
1100 - 1115	7	10
1115 - 1130	4	6
1130 - 1145	4	7
1145 - 1200	8	12
1200 - 1215	10	22
1215 - 1230	21	29
1230 - 1245	27	31
1245 - 1300	23	17
1300 - 1315	17	22
1315 - 1330	20	25
1330 - 1345	13	18
1345 - 1400	14	16
1400 - 1415	23	10
1415 - 1430	30	8
1430 - 1445	15	8
1445 - 1500	10	6
1500 - 1515	10	5
1515 - 1530	28	4
1530 - 1545	33	17
1545 - 1600	24	14
1600 - 1615	21	11
1615 - 1630	35	10
1630 - 1645	46	18
1645 - 1700	45	14
1700 - 1715	49	18
1715 - 1730	39	4
1730 - 1745	26	8
1745 - 1800	20	7
1800 - 1815	22	4
1815 - 1830	13	3
1830 - 1845	10	1
1845 - 1900	9	5
1900 - 1915	16	4
1915 - 1930	16	4
1930 - 1945	2	2
1945 - 2000	2	4
2000 - 2015	2	0
2015 - 2030	3	1
2030 - 2045	1	0
2045 - 2100	1	0


F
E1
E
HELI
PAD
D
G
RAILWAY
X-ING
P-WAY
J
C
K
H
I
A
A1
SCRIVENER ST
L
B
N
Image © 2006 DigitalGlobe
Pointer 33°53'13.15" S 150°58'01.03" E
Streaming 100%
Eye alt 1135ft

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client :T.T.P.A.
Job No / Name :1285 Liverpool Hospital
Day/Date :Wednesday 1st March 06

Location		Cap	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
A	Bitumen Marked	136	31	71	131	134	125	135	135	135	134	126	96	49	6	30	27	26
A1	Internal Marked	9	8	8	8	8	4	6	7	7	4	5	7	8	8	8	8	8
B	Bitumen Marked	28	4	4	20	26	24	26	26	23	24	24	25	8	5	4	4	4
C	Dirt & Grass Informal	30	1	1	2	25	31	31	32	29	29	27	25	19	5	2	1	1
D	Bitumen nearly all marked	100	4	5	67	94	102	104	103	104	104	98	91	53	20	11	10	9
E	Bitumen Informal	100	1	2	2	5	13	14	15	18	24	21	20	18	12	6	5	5
E1	Bitumen Marked	110	0	0	17	78	87	89	95	104	106	104	94	67	34	27	26	22
F	Bitumen Marked	59	2	2	3	36	47	49	50	51	51	47	45	31	15	8	7	7
G	Bitumen Marked	28	4	22	28	28	28	28	28	28	28	24	11	9	5	4	4	4
H	Bitumen & Gravel Informal	27	1	1	4	22	25	25	25	25	25	26	24	19	5	2	2	2
I	Paved Marked Admin Centre	6	1	1	5	6	6	6	6	6	6	6	5	1	1	1	1	0
I1	Intrnal Reserved Marked	4	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0
J	Paved Marked Admin Centre	35	0	2	24	36	36	36	36	34	36	34	34	14	5	5	4	4
K	SWSAHS Bitumen marked	20	18	18	18	20	20	17	15	20	19	19	21	18	17	17	15	15
L	ISD & Delivery Veh Bitumen	3	2	2	2	3	1	2	2	2	2	2	2	2	2	2	2	2
M	Driveway Bitumen Informal	10	0	0	2	9	10	10	10	10	9	10	10	4	2	2	1	1
Vehicle Totals		**705**	**77**	**139**	**333**	**530**	**559**	**578**	**585**	**597**	**602**	**574**	**511**	**321**	**142**	**129**	**117**	**110**
Number of Vacant Spaces			628	566	372	175	146	127	120	108	103	131	194	384	563	576	588	595
% Capacity Used			**10.9%**	**19.7%**	**47.2%**	**75.2%**	**79.3%**	**82.0%**	**83.0%**	**84.7%**	**85.4%**	**81.4%**	**72.5%**	**45.5%**	**20.1%**	**18.3%**	**16.6%**	**15.6%**

R.O.A.R. DATA
Reliable, Original & Authentic Results
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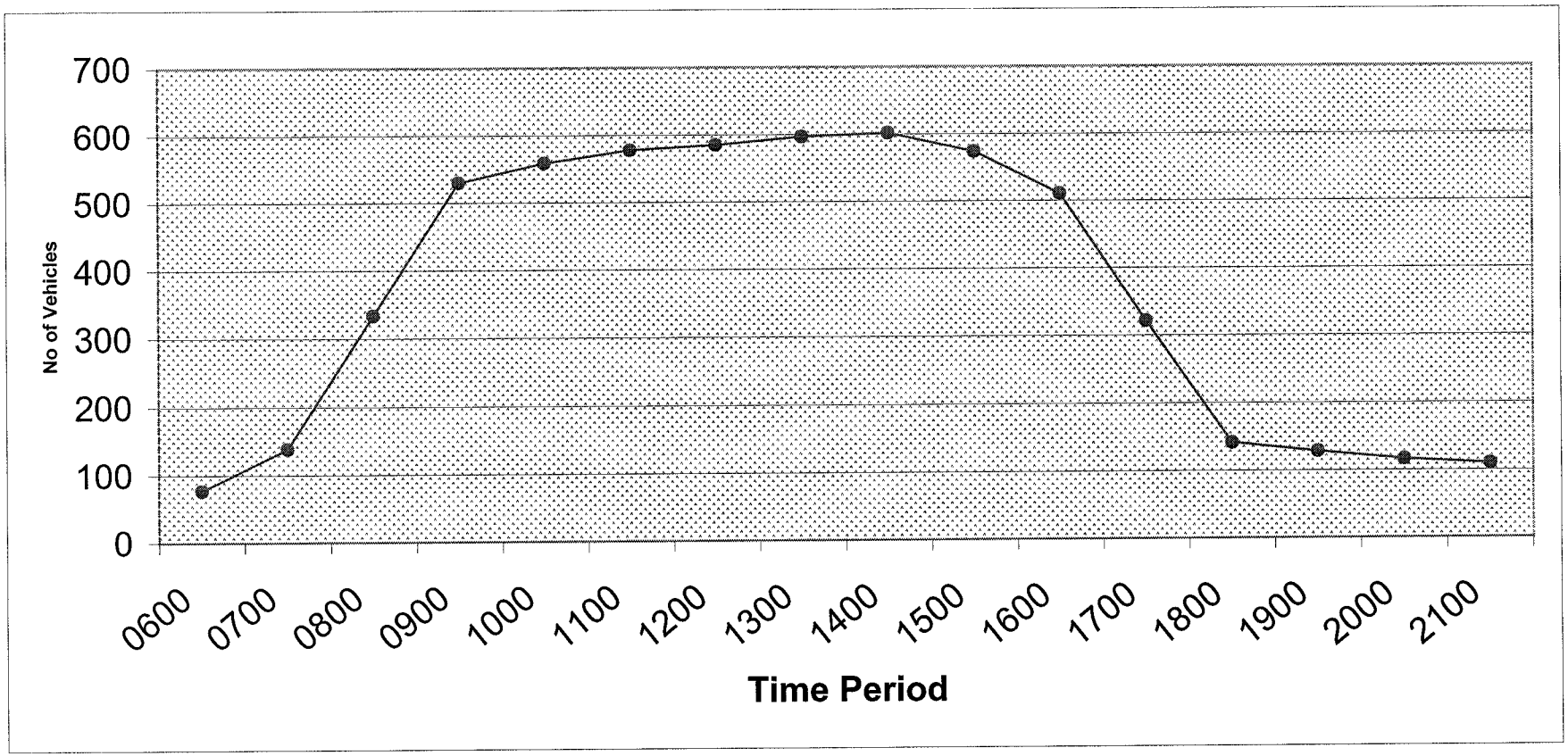
Client	:T.T.P.A.
Job No / Name	:1285 Liverpool Hospital
Day/Date	:Wednesday 1st March 06



PARKING DATA AND SURVEYS

METRO PARKING MANAGEMENT PTY LTD

Parking Data for the Liverpool Hospital Campus

March 27, 2006

Table of Contents

Introduction

There has been a shortage of parking at The Liverpool Hospital Campus for the last 5 years. In the last 2 years demand has accelerated as new buildings (e.g. Mental Health Unit) have opened creating more staff, patient and visitor demand. Furthermore, demand for Area Vehicles to park on campus free of charge has continually grown over time. There has been limited additional parking created during this time.

The waiting time for staff to get parking on the main campus currently stands at 3 years and 8 months. There are in excess of 681 names on this list – although a proportion of these people may no longer work on the campus.

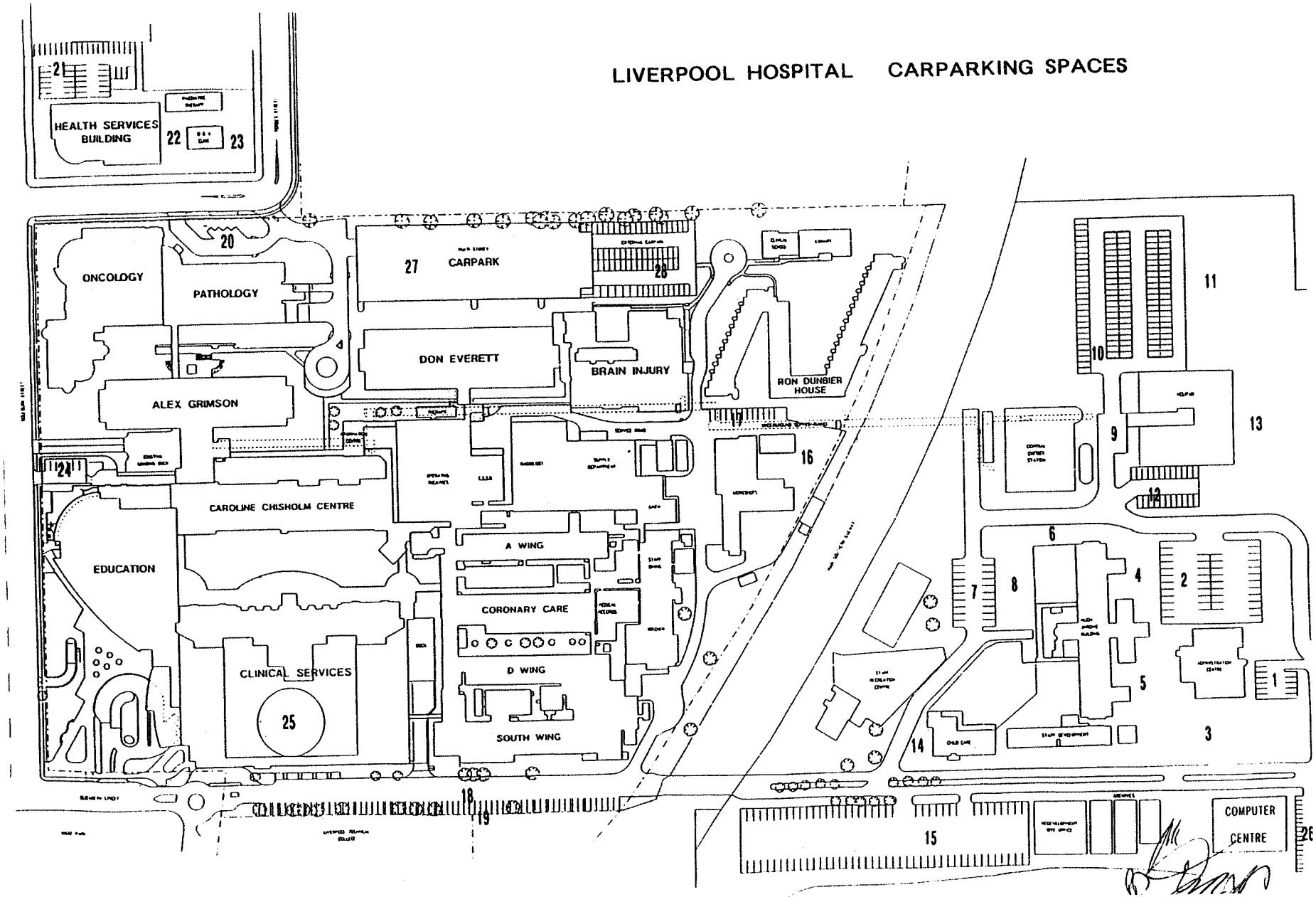
The occupancy data in this report is for Wednesday 15 March, 2006. Data from the access and control system at this site can be directly imported into MS Excel and manipulated using this (or any other) spreadsheet program. Metro is happy to provide additional data and co-operate in any way that they can to ensure that the demand for parking at this campus is met at the earliest opportunity. At this stage Metro has provided an hourly snapshot of usage.

Parking Space Location and Numbers

Please see the campus plan over page. The numbers on the plan relate to the following areas and counts.

LHS Car Park Space Count		
1	Area Secretariat - East	10
2	Area Secretariat - West	34
4	Hugh Jardine North East	10
5	Hugh Jardine South East	7
7	Hugh Jardine West	28
9	Energy Station	4
10	Energy Station - Northern Car Park	115
11	Energy Station - North unformed	56
12	Energy Station - Eastern	23
13	Energy Station Eastern unformed**	200
14	Child Care Centre	4
15	Riverbank	140
16	Maintenance East	18
17	Maintenance North	13
18	Elizabeth Street - North	13
19	Elizabeth Street - South	24
20	Pathology Building - North	4
21	Health Services Building - North	39
24	Caroline Chisholm Building	6
25	Clinical Services Building	140
26	Computer Centre	28
27	Multi Level Car Park	590
	TOTAL	1506
	** Approx	
	Zone 2	847
	Zone 1	659

LIVERPOOL HOSPITAL CARPARKING SPACES



Please note that statistics are only available for areas that are accessed via boom gates. Areas such as 18 and 19 (Elizabeth Street before the boom gates are controlled by signs). The total number of controlled spaces on site is circa 1,428 (659 Zone 1 and 769 in zone 2).

Allocation of Spaces

Very few spaces are allocated. Space is used in the following numbers by customers.

Customer	Location	Spaces
Visitors	Clinical Building	123
	Campbell Street	150
Staff	Campbell Street	440
	Eastern Campus	570
VMO's	Clinical Building	20
Areas Vehicles	Eastern Campus	90

Note that the bays for staff and area vehicles are estimates as some bays are not marked and not all bays are allocated.

Parking Charges

Customer	Location	Rates
Staff Salary deduction	Eastern Campus	$16.50 /Fortnight
	Campbell Street	$32.90 / Fortnight
Staff 5 day pass	Eastern Campus	$12.50 per 5 days
	Campbell Street (no longer available)	$25.00 per 5 days
VMO Parking	Clinical Services Building	$3,747.70 per year per space
Casual parking	Campbell Street & Clinical Building	$2.40 per half hour up to a maximum of $14.00 per day
Casual 5 Day Pass	Campbell Street	$42.00 for 5 days

Passes on Issue

Customer & Location	Number
Area Health vehicles with key cards	471
Zone 1 staff key cards	805
Zone 2 staff key cards	550
Health Services Building	26
TOTAL	**1,852**

Waiting List Numbers

	N°	From Date	Time
Main Campus (Zone 2)	681	14 July 2002	3 years 8 months
Eastern Campus	231	21 April 2005	11 months

Please note that many staff put themselves on both waiting lists and that some staff may have left the hospital before receiving a pass. So a total of 912 people on the waiting lists is overstating the case – Metro believes there to be about 500 net names on the lists.

Patronage

The figures provided in the table below are for Wednesday 15 March, 2006. The table below shows patronage at each hour for the 24 hours that day.

PARKING ANALYSIS

	Campbell Street					Clinical Building			Eastern Campus			Health Services	GRAND
	Staff Passes	Staff 5 day	Casuals	Cas 5 day	TOTAL	Staff Passes	Casuals	TOTAL	Staff Passes	5 day	TOTAL	Staff Passes	TOTAL
0:00	10	20	5	1	36	13	4	17	20		20	0	73
1:00	7	17	5	1	30	13	4	17	17		17	0	64
2:00	7	17	6	3	33	13	4	17	17	15	32		82
3:00	8	17	6	3	34	13	4	17	17	15	32	0	83
4:00	8	17	6	3	34	13	4	17	17	15	32	0	83
5:00	10	17	6	3	36	13	4	17	18	15	33	0	86
6:00	21	17	7	3	48	13	4	17	24	15	39	0	104
7:00	63	19	10	3	95	13	4	17	90	26	116	11	239
8:00	146	47	20	2	215	4	11	15	254	36	290	18	538
9:00	247	106	49	3	405	12	59	71	411	52	463	24	963
10:00	283	110	114	3	510	13	125	138	449	62	511	22	1181
11:00	287	109	145	5	546	17	122	139	449	63	512	22	1219
12:00	302	109	142	6	559	20	125	145	457	65	522	22	1248
13:00	304	121	138	6	569	22	128	150	489	76	565	23	1307
14:00	308	131	135	5	579	19	122	141	488	75	563	23	1306
15:00	307	126	99	5	537	19	112	131	485	73	558	22	1248
16:00	261	100	83	3	447	18	102	120	439	67	506	14	1087
17:00	180	76	38	4	298	18	83	101	314	42	356	14	769
18:00	91	50	33	3	177	12	81	93	150	29	179	3	452
19:00	69	40	41	3	153	2	86	88	104	22	126	2	369
20:00	57	31	35	3	126	1	94	95	89	16	105	0	326
21:00	44	30	16	2	92	0	13	13	82	15	97	0	202
22:00	37	24	9	1	71	14	1	15	67	12	79	0	165
23:00	11	5	5	1	22	14	1	15	34	7	41	0	78
0:00	11	3	5	1	20	14	1	15	14	6	20	0	55

On March 15th 2006 there would have been around 90 spaces free on campus at peak time. Nearly all of these would have been on the Eastern Campus which is unpopular with Hospital staff and not accessible by patients and visitors. Metro introduced an initiative on Monday 27 March, 2006 to ensure that these spaces will be better utilised.

Other Data Requested

Average length of stay

The average length of stay for casual customers is around 2.5 hours. This is slightly longer than at other Hospital sites operated by Metro due to staff buying casual tickets when staff allocation runs out. As staff stay between 4 – 10 hours this obviously impacts the average length of stay. If adequate staff spaces were provided then this figure would fall.

Reserving Spaces

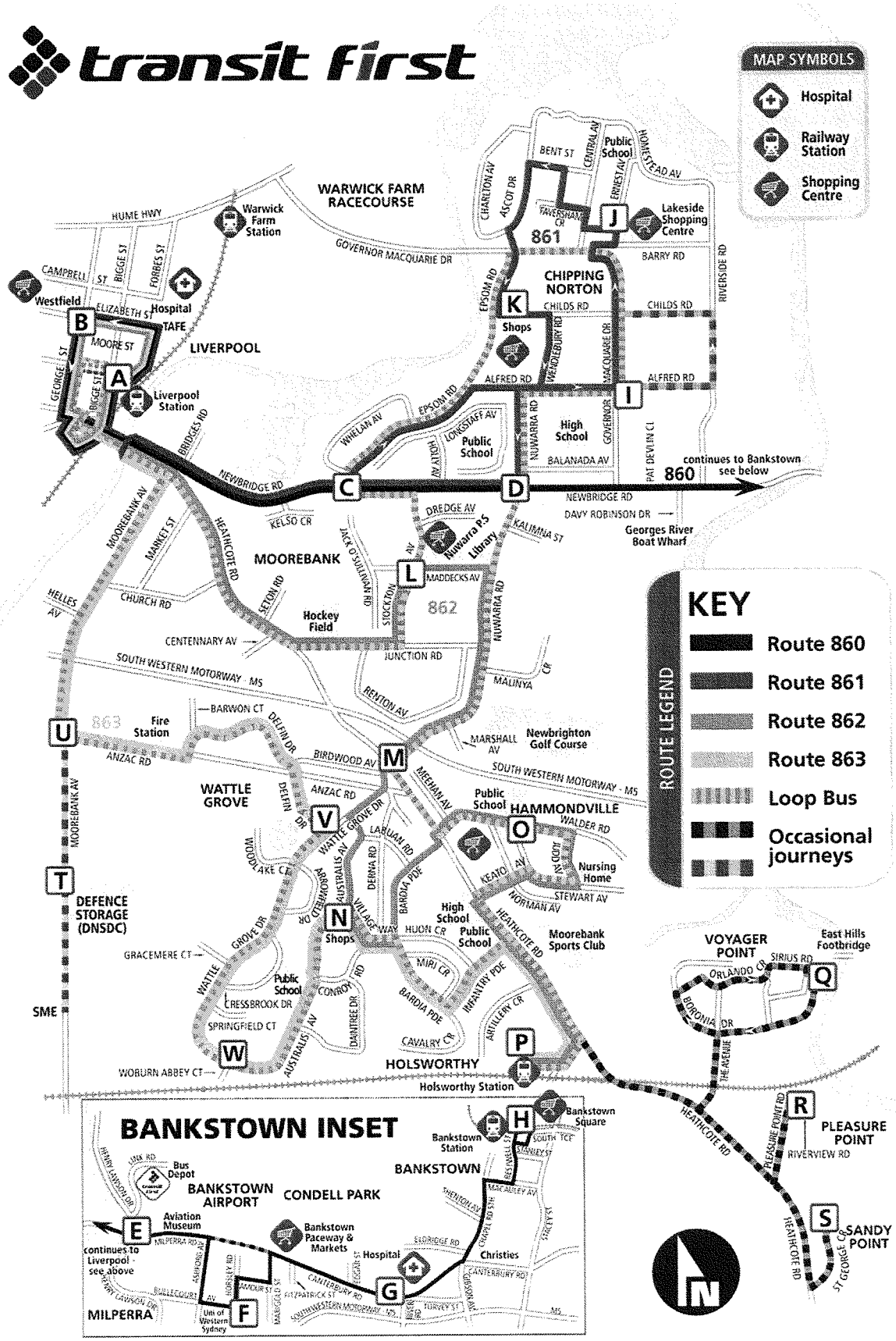
Metro does not reserve space for shift staff. The lower level of Campbell Street Multi Level is roped off until 9:00am (each weekday) to reserve spaces for patients and visitors. The Eastern campus is generally only accessible to hospital staff.

Other items to note

1. Permanent night staff can have an access card immediately as there is ample space at night.
2. Metro stopped selling Campbell Street 5 day passes to hospital staff from Monday 27 March. The 175 weekly passes were sold twice daily (15 morning shift; 10 afternoon shift). The passes were a constant source of conflict as hospital staff did not know from week to week whether they would be able to park. These have been replaced by 100+ proximity passes which will reduce the waiting list by 1-2 years (in progress). Other staff that require parking will have to park on the Eastern Campus. Although very unpopular, this initiative is designed to make parking more transparent and fairer. This initiative will change the occupancy data presented in this paper.

PUBLIC TRANSPORT SERVICES

transit first

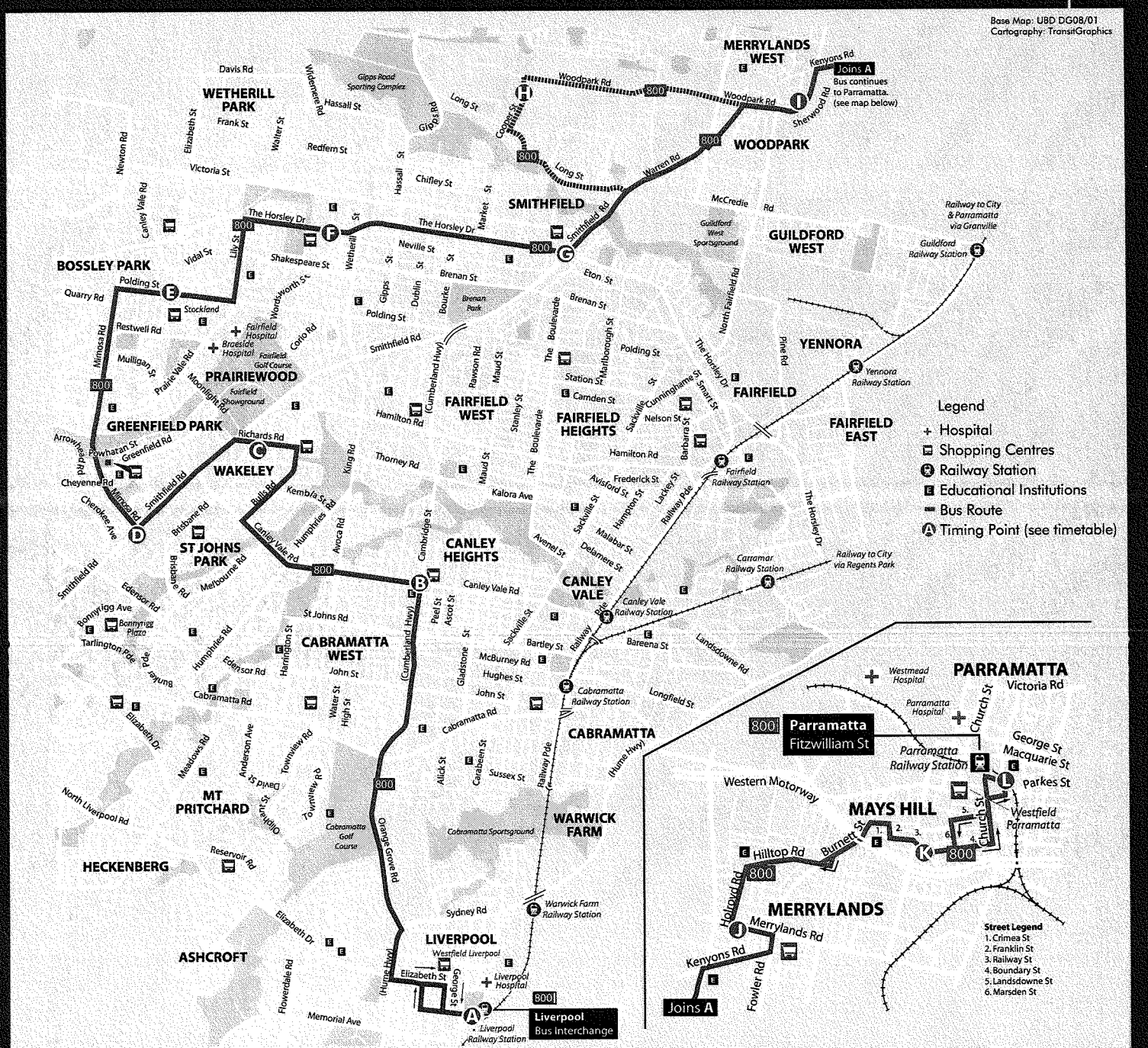


Diagrammatic map not to scale (only main streets shown) - **TransMarketing Pty Ltd**

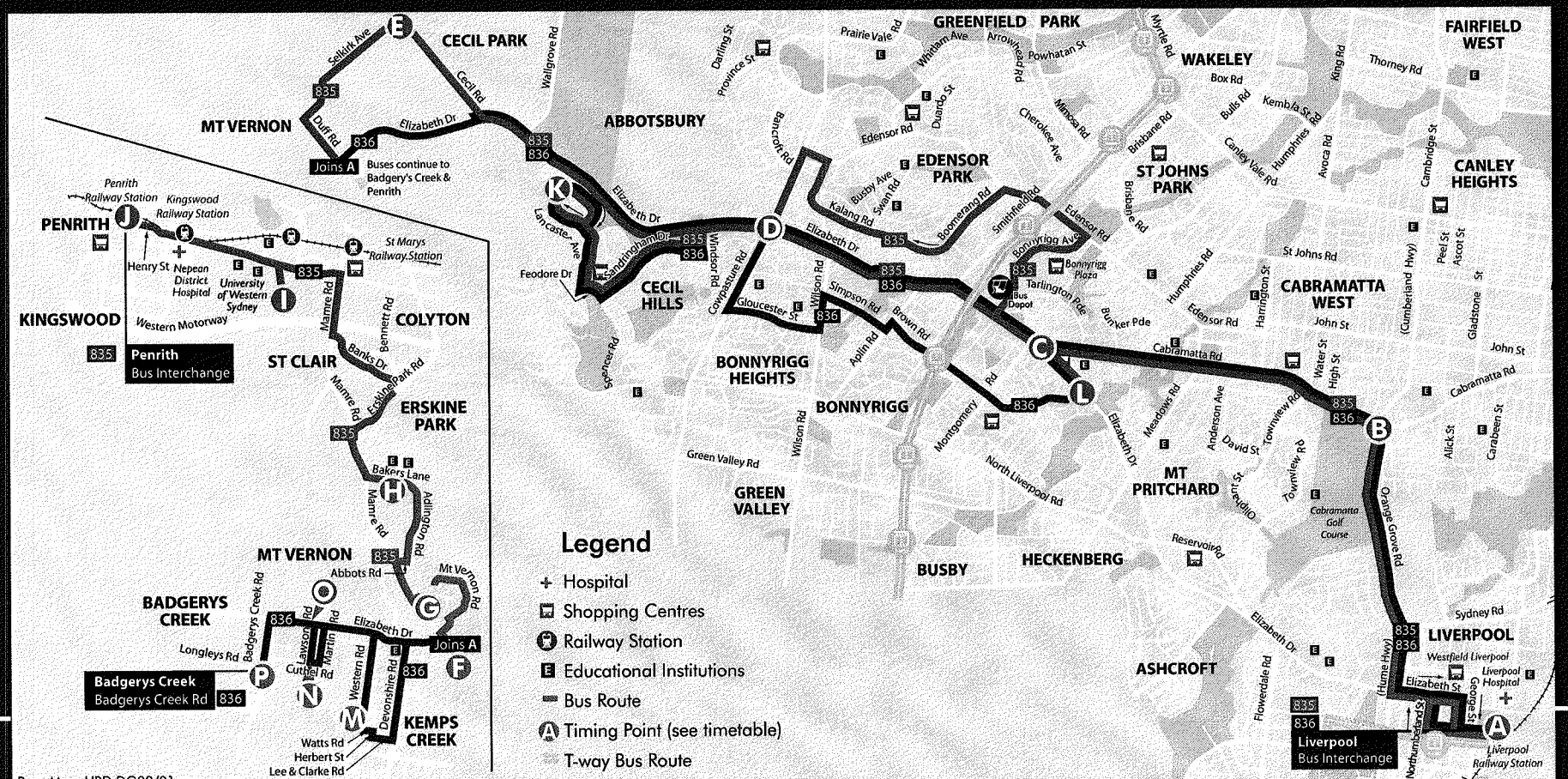
Bus Route Map

800

Liverpool to Parramatta via Canley Heights, St Johns Park, Wakeley, Greenfield Park, Bossley Park, Smithfield, Woodpark, Merrylands West and Mays Hill



Bus Route Map



Base Map: UBD DG08/01
Cartography: TransitGraphics

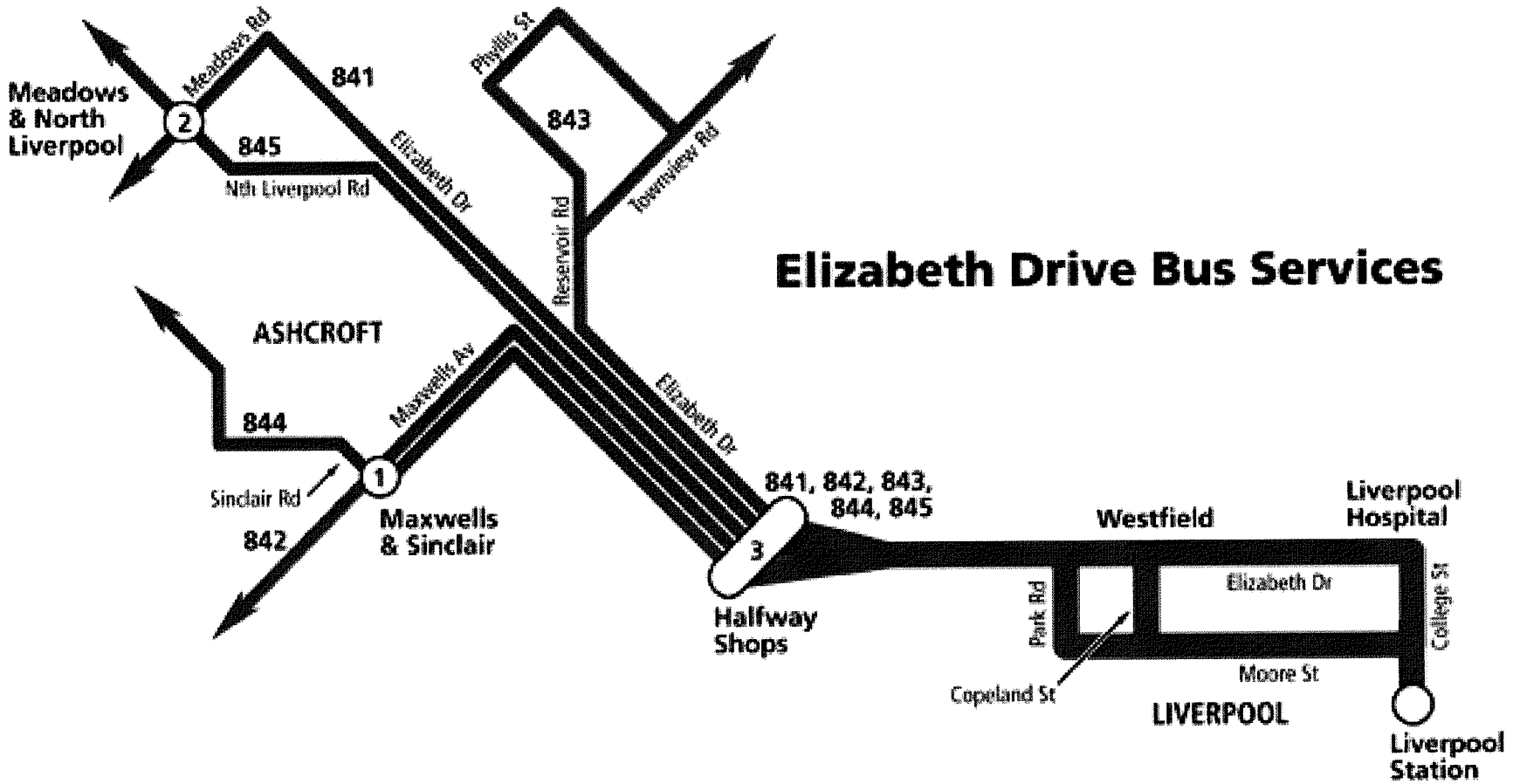
835

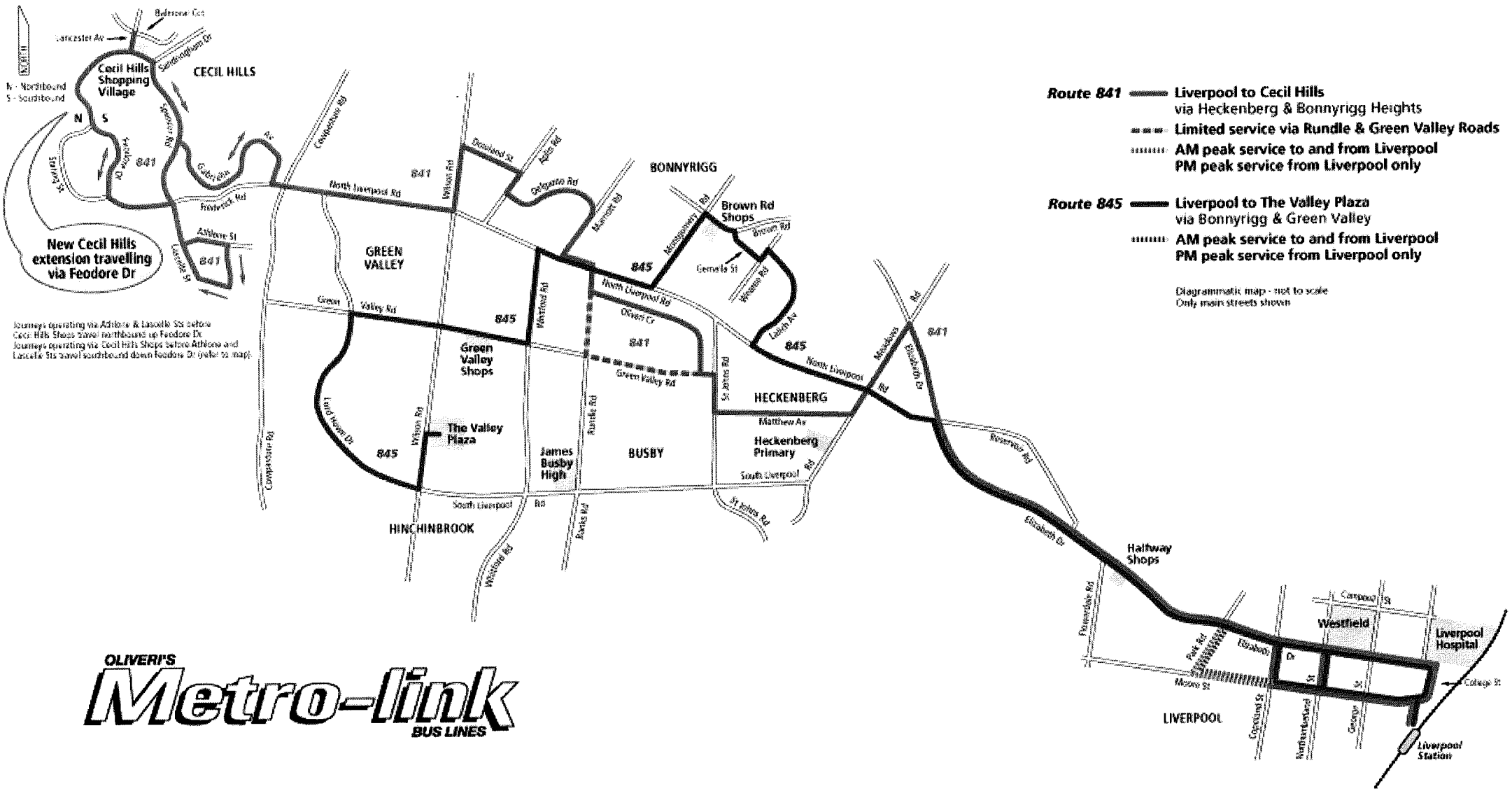
Liverpool to Penrith via Bonnyrigg, Cecil Park and Erskine Park

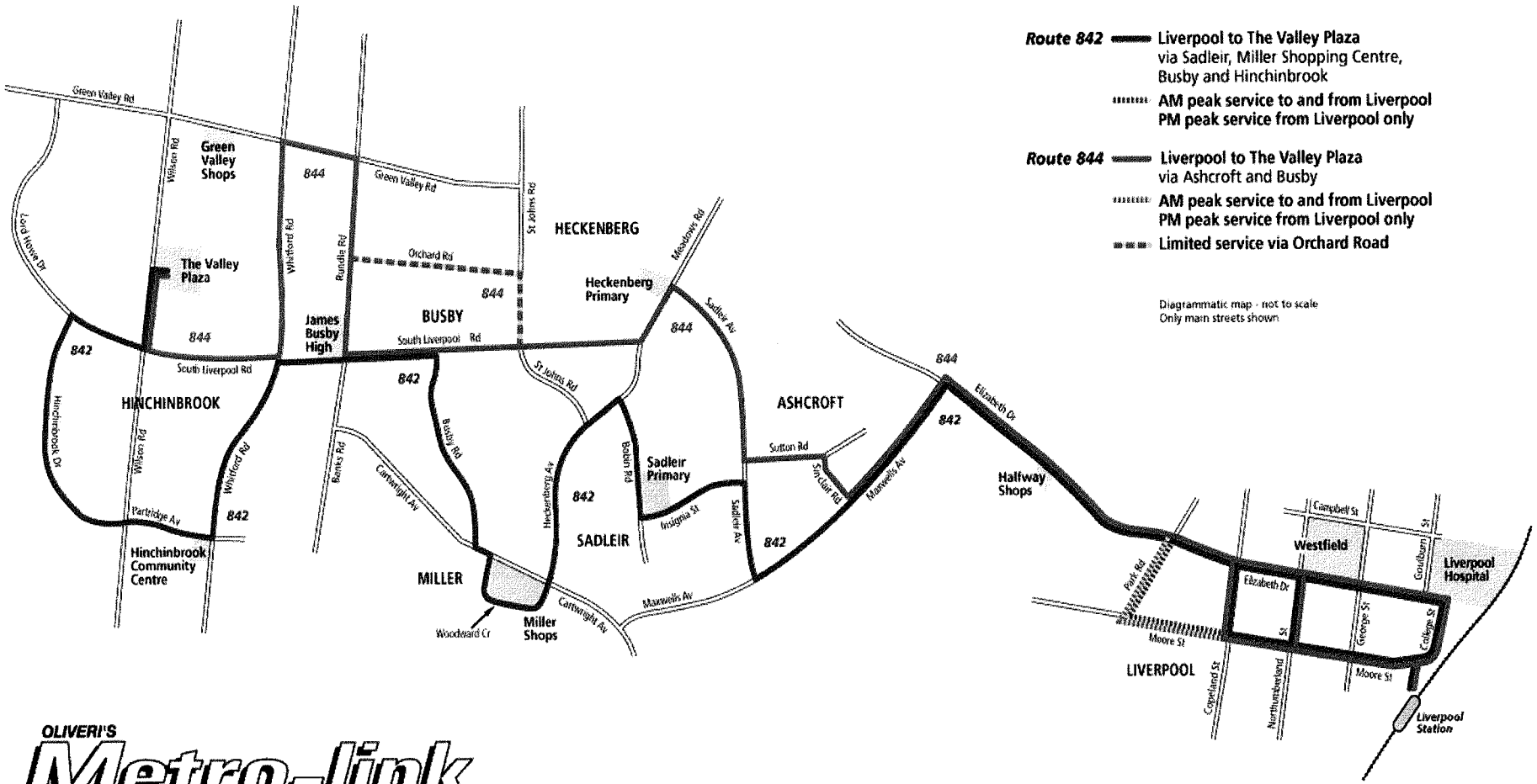
836

Liverpool to Badgerys Creek via Bonnyrigg Cecil Hills and Kemps Creek.

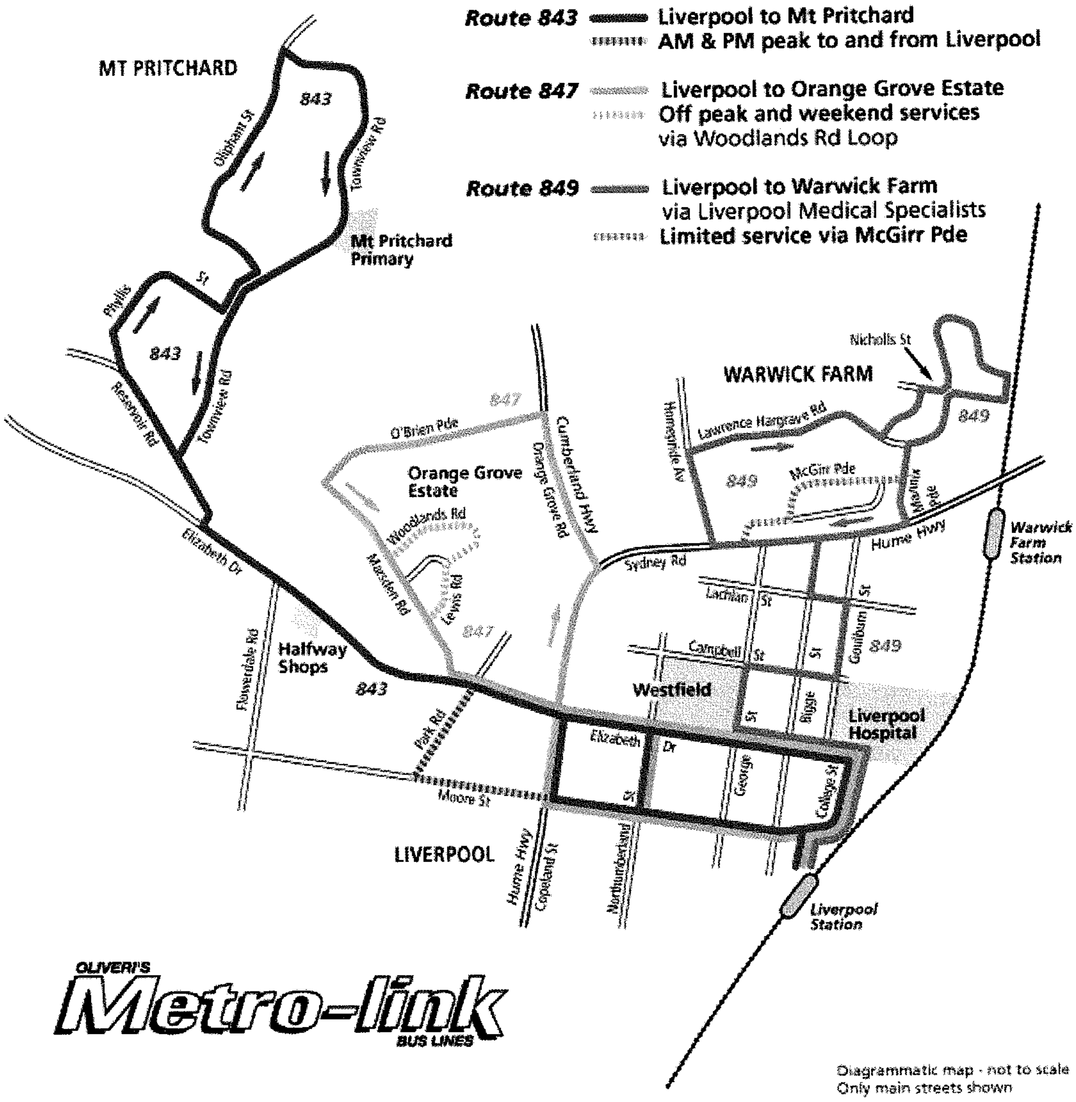
westbus
We're moving you!


Elizabeth Drive Bus Services
Meadows & North Liverpool
Meadows Rd
2
841
845
Nth Liverpool Rd
Elizabeth Dr
Phyllis St
843
Reservoir Rd
Towerview Rd
ASHCROFT
Maxwells Av
844
Sinclair Rd
842
1
Maxwells & Sinclair
Elizabeth Dr
841, 842, 843, 844, 845
3
Halfway Shops
Westfield
Liverpool Hospital
Park Rd
Elizabeth Dr
College St
Moore St
Copeland St
LIVERPOOL
Liverpool Station

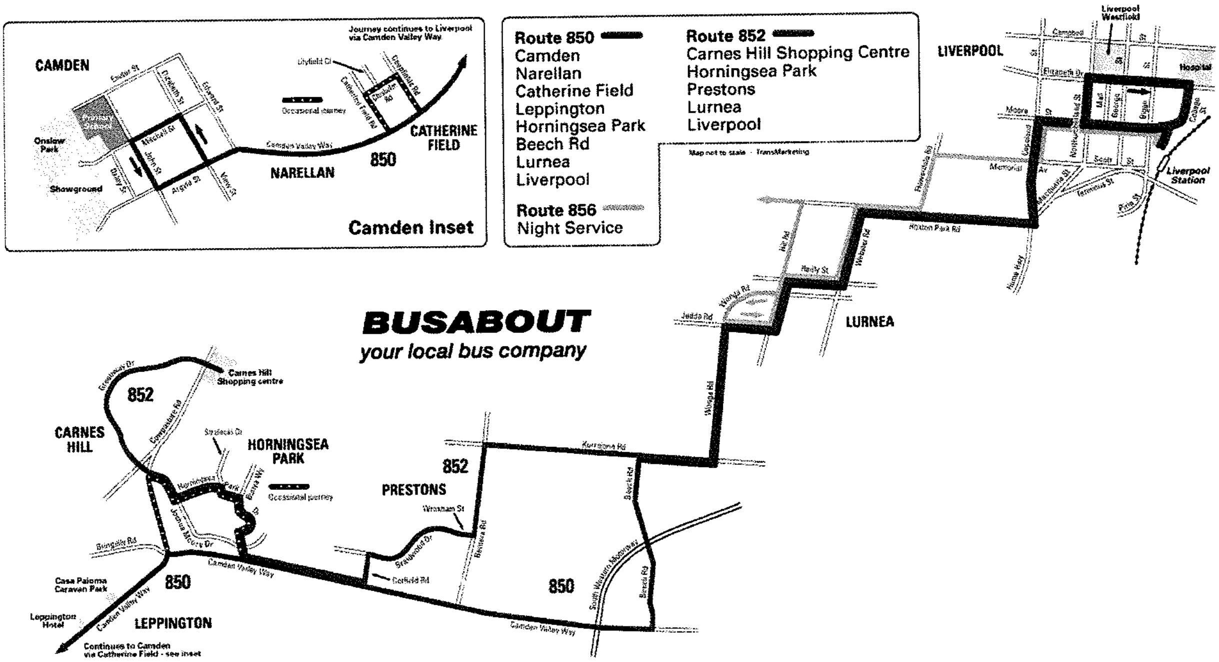

Route 841 Liverpool to Cecil Hills
via Heckenberg & Bonnyrigg Heights
Limited service via Rundle & Green Valley Roads
AM peak service to and from Liverpool
PM peak service from Liverpool only
Route 845 Liverpool to The Valley Plaza
via Bonnyrigg & Green Valley
AM peak service to and from Liverpool
PM peak service from Liverpool only
Diagrammatic map - not to scale
Only main streets shown
N - Northbound
S - Southbound
Cecil Hills Shopping Village
CECIL HILLS
New Cecil Hills extension travelling via Feodore Dr
Journeys operating via Athlone & Lascelle Sts before Cecil Hills Shops travel northbound up Feodore Dr.
Journeys operating via Cecil Hills Shops before Athlone and Lascelle Sts travel southbound down Feodore Dr (refer to map).
GREEN VALLEY
Green Valley Shops
The Valley Plaza
James Busby High
BUSBY
HINCHINBROOK
BONNYRIGG
Brown Rd Shops
HECKENBERG
Heckenberg Primary
Halfway Shops
LIVERPOOL
Westfield
Liverpool Hospital
Liverpool Station
OLIVERI'S
Metro-link
BUS LINES



OLIVERI'S
Metro-link
BUS LINES

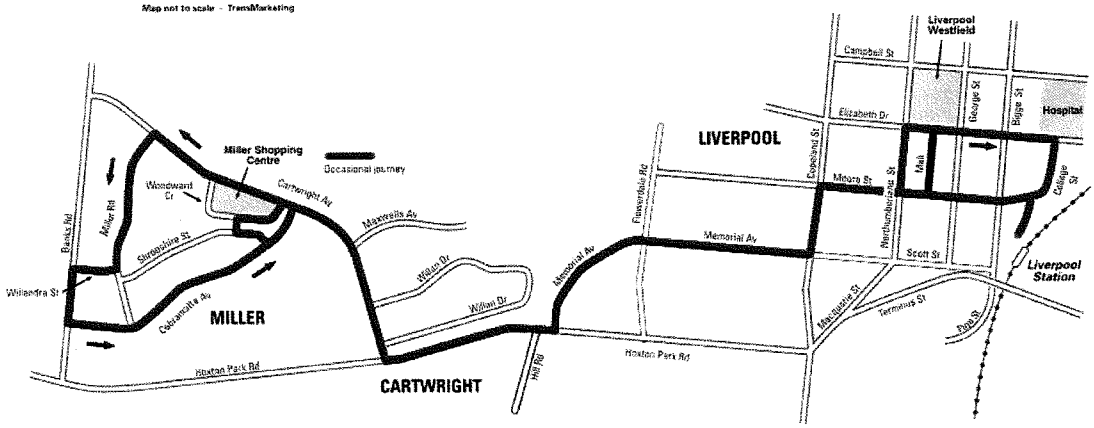


Route 843 Liverpool to Mt Pritchard
AM & PM peak to and from Liverpool
Route 847 Liverpool to Orange Grove Estate
Off peak and weekend services
via Woodlands Rd Loop
Route 849 Liverpool to Warwick Farm
via Liverpool Medical Specialists
Limited service via McGirr Pde
MT PRITCHARD
843
Oliphant St
Townview Rd
Mt Pritchard Primary
Phyllis St
843
Reservoir Rd
Townview Rd
Elizabeth Dr
Flowerdale Rd
Halfway Shops
843
847
O'Brien Pde
Orange Grove Estate
Woodlands Rd
Marsden Rd
Lewis Rd
847
Cumberland Hwy
Orange Grove Rd
Park Rd
Moore St
Elizabeth Dr
St
LIVERPOOL
Hume Hwy
Copeland St
Northumberland
Sydney Rd
Westfield
Nicholls St
WARWICK FARM
Homepride Av
Lawrence Hargrave Rd
849
849
McGirr Pde
Hume Hwy
Lachlan St
Campbell St
St
Goulburn St
849
George St
Bigge
College St
Liverpool Hospital
Warwick Farm Station
Liverpool Station
OLIVERI'S Metro-link BUS LINES
Diagrammatic map - not to scale
Only main streets shown


Camden Inset
CAMDEN
Onslow Park
Showground
Primary School
NARELLAN
CATHERINE FIELD
850
Camden Valley Way
Occasional journey
Journey continues to Liverpool via Camden Valley Way
Route 850
Camden
Narellan
Catherine Field
Leppington
Horningsea Park
Beech Rd
Lurnea
Liverpool
Route 852
Carnes Hill Shopping Centre
Horningsea Park
Prestons
Lurnea
Liverpool
Route 856
Night Service
Map not to scale · TransMarketing
BUSABOUT
your local bus company
LIVERPOOL
Liverpool Westfield
Hospital
Liverpool Station
LURNEA
Hoxton Park Rd
Kurrajong Rd
CARNES HILL
Carnes Hill Shopping centre
852
HORNINGSEA PARK
Occasional journey
PRESTONS
852
850
Casa Paloma Caravan Park
Leppington Hotel
LEPPINGTON
850
Camden Valley Way
Continues to Camden via Catherine Field - see inset

Route 851
Miller
Memorial Ave
Whitlam Centre
Liverpool

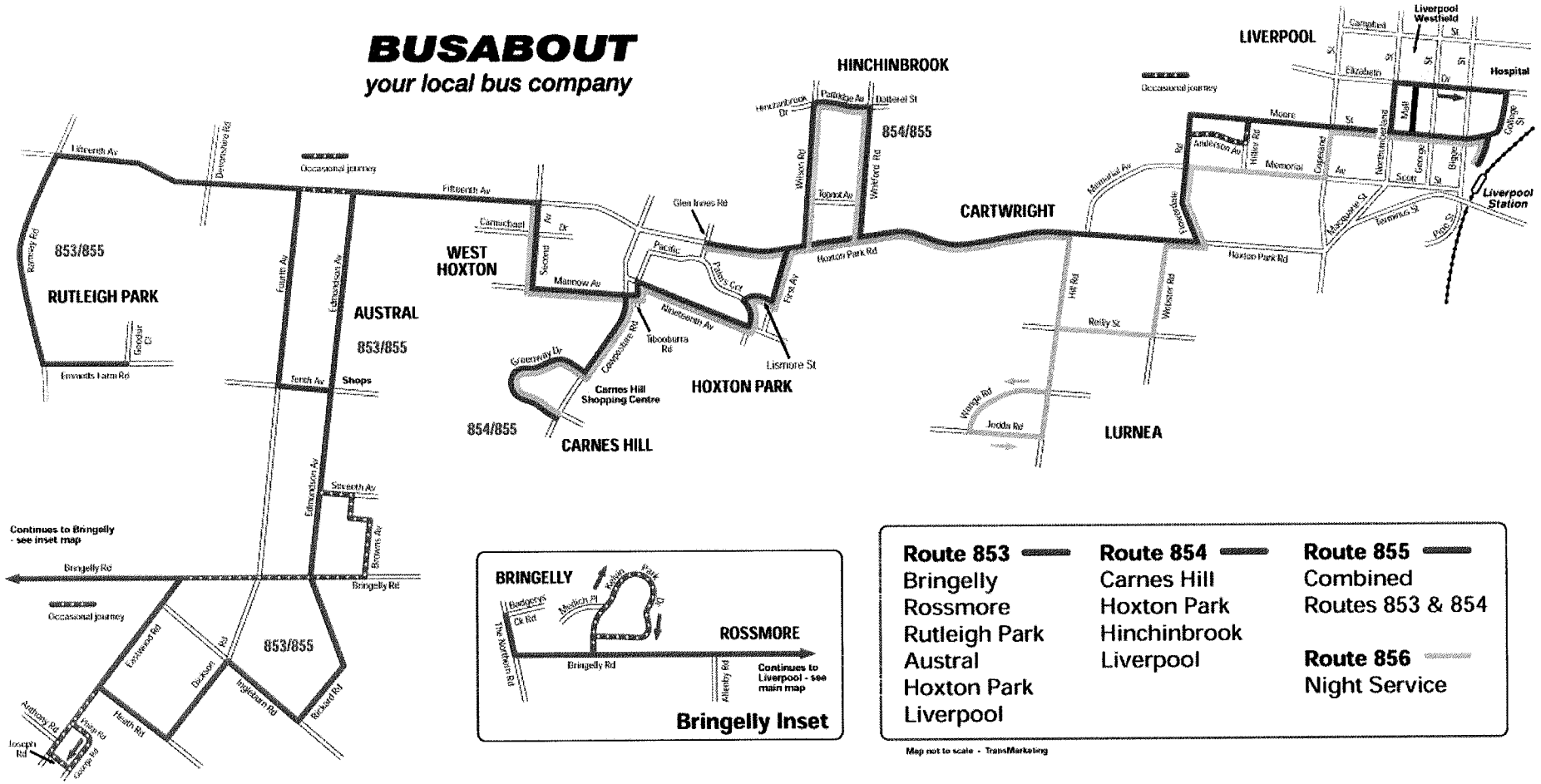
Map not to scale – TransMarketing



BUSABOUT
your local bus company

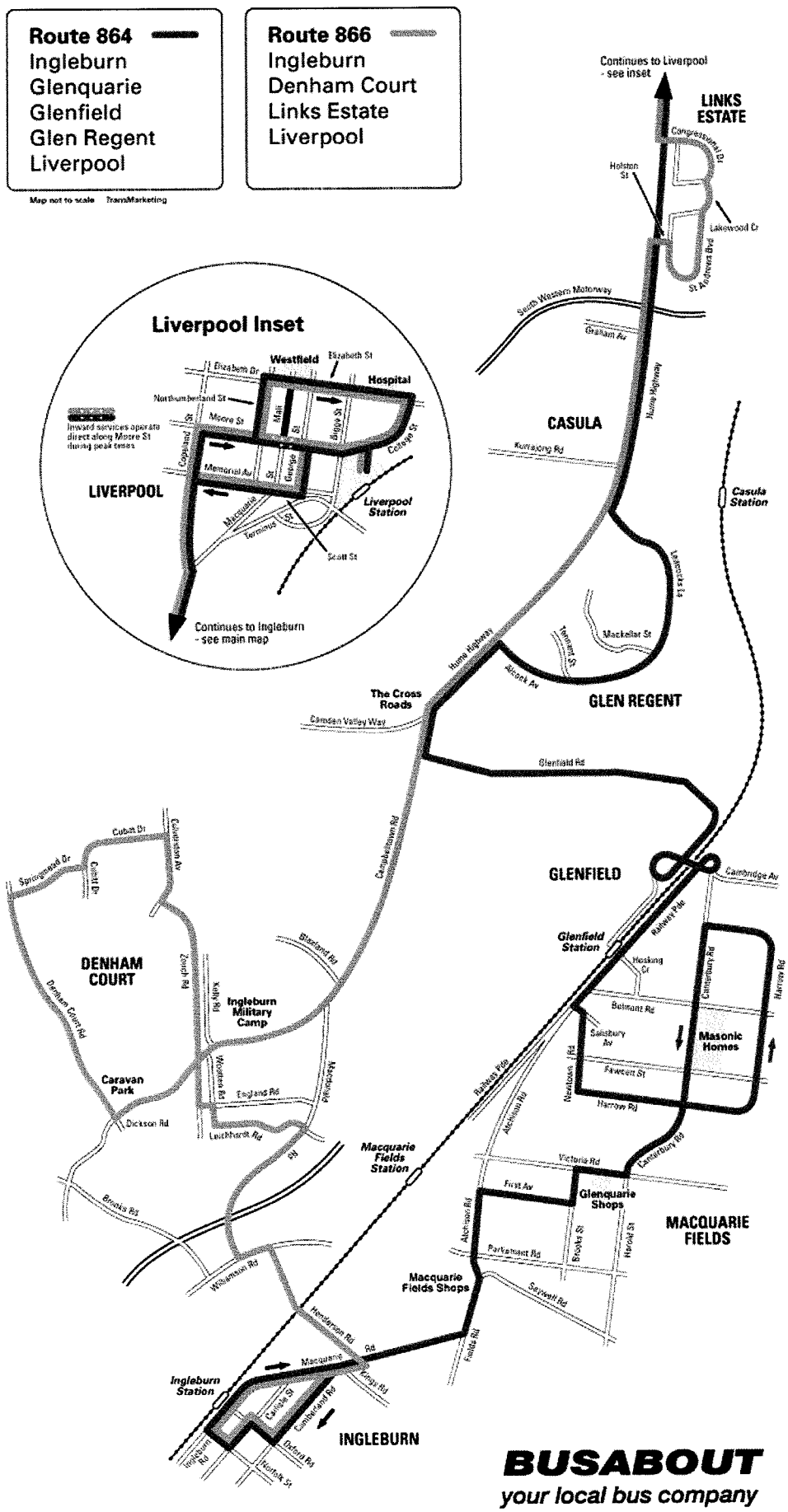
BUSABOUT

your local bus company



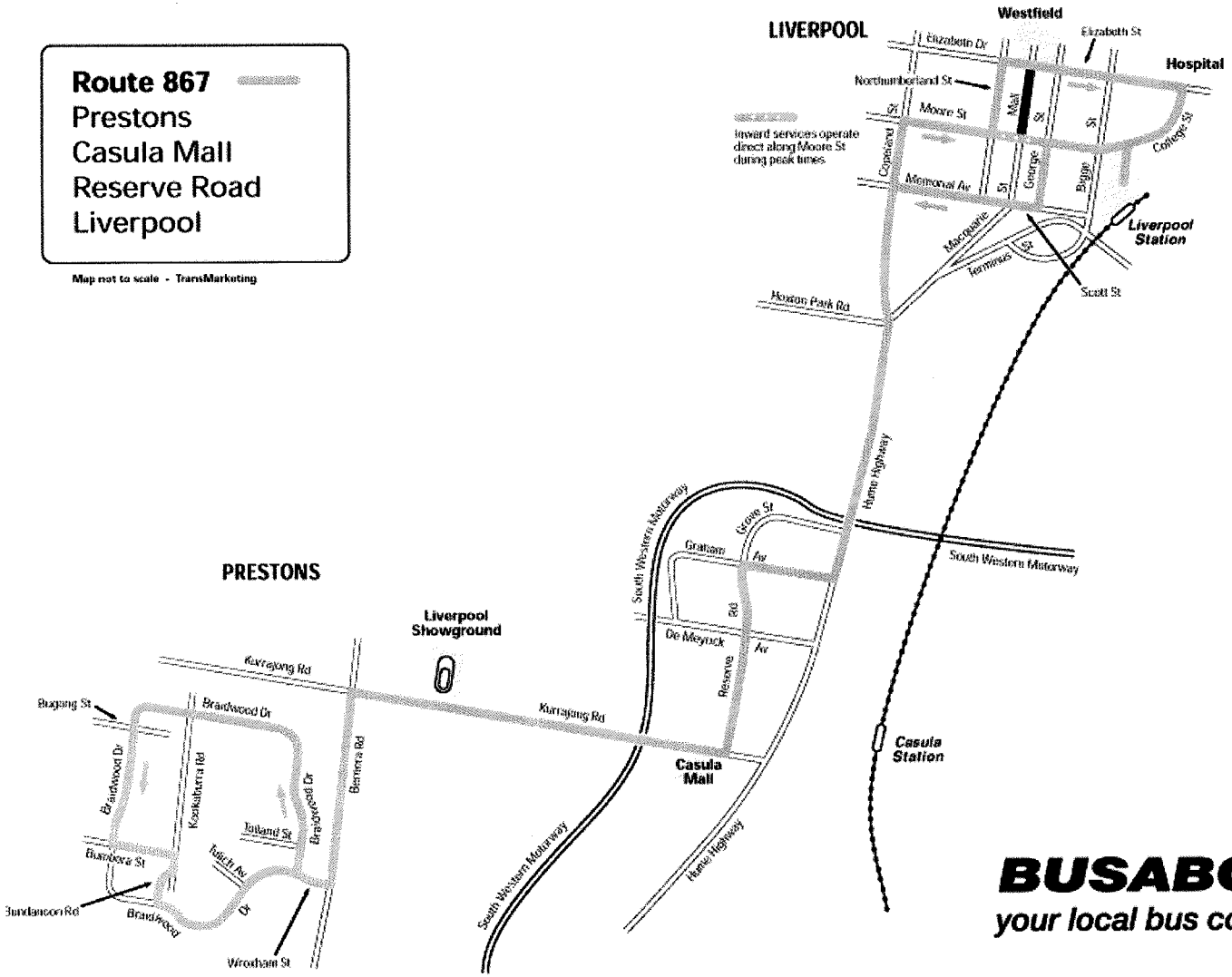
Route 853	Route 854	Route 855
Bringelly	Carnes Hill	Combined
Rossmore	Hoxton Park	Routes 853 & 854
Rutleigh Park	Hinchinbrook	
Austral	Liverpool	**Route 856**
Hoxton Park		Night Service
Liverpool		

Map not to scale - TransMarketing

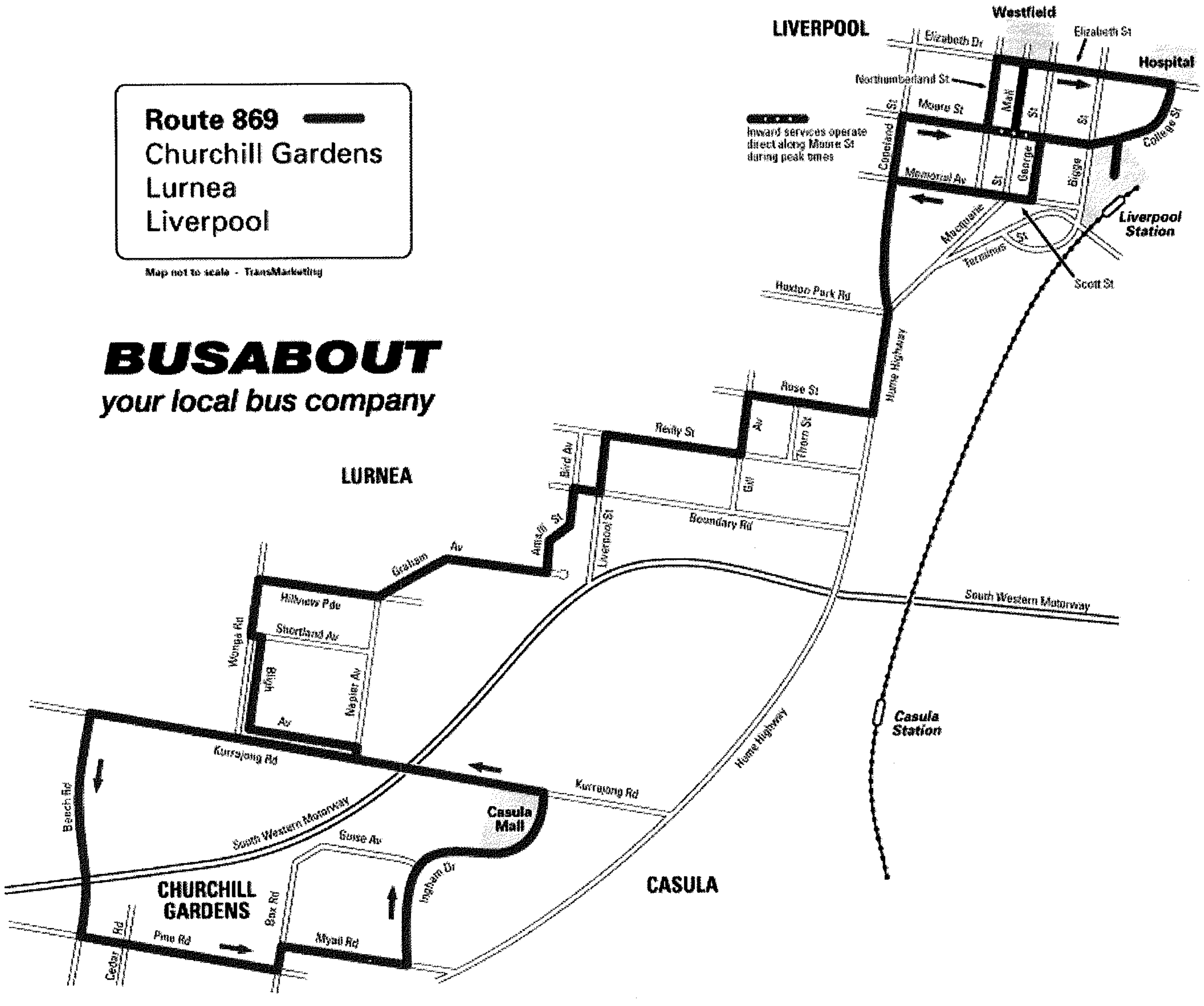

Route 864
Ingleburn
Glenquarie
Glenfield
Glen Regent
Liverpool
Route 866
Ingleburn
Denham Court
Links Estate
Liverpool
Map not to scale TransMarketing
Liverpool Inset
Westfield
Hospital
Elizabeth St
Northumberland St
Moore St
Memorial Av
Macquarie St
Terminus St
Scott St
College St
Liverpool Station
LIVERPOOL
Inward services operate direct along Moore St during peak times
Continues to Ingleburn - see main map
Continues to Liverpool - see inset
LINKS ESTATE
Holston St
Lakewood Dr
St Andrews Blvd
South Western Motorway
Graham Av
Hume Highway
CASULA
Kurrajong Rd
Casula Station
Leacocks La
Mackellar St
Tennant St
Alcock Av
GLEN REGENT
The Cross Roads
Camden Valley Way
Glenfield Rd
Campbelltown Rd
GLENFIELD
Cambridge Av
Glenfield Station
Railway Pde
Hosking Cr
Belmont Rd
Salisbury Av
Masonic Homes
Canterbury Rd
Harrow Rd
Fawcett St
Newtown Rd
Victoria Rd
First Av
Glenquarie Shops
MACQUARIE FIELDS
Macquarie Fields Station
Macquarie Fields Shops
Parliament Rd
Brooks St
Harold St
Alchison Rd
Setwell Rd
Fields Rd
Henderson Rd
Ingleburn Station
Macquarie Rd
Kings Rd
Carlisle St
Cumberland Rd
Oxford Rd
Hurlock St
INGLEBURN
DENHAM COURT
Cubitt Dr
Springwood Dr
Coventon Av
Zouch Rd
Denham Court Rd
Ingleburn Military Camp
Kelly Rd
Blaxland Rd
Caravan Park
Dickson Rd
Wootten Rd
England Rd
Leuchhardt Rd
Macdonald
Brooks Rd
Williamson Rd
BUSABOUT
your local bus company

Route 867
Prestons
Casula Mall
Reserve Road
Liverpool

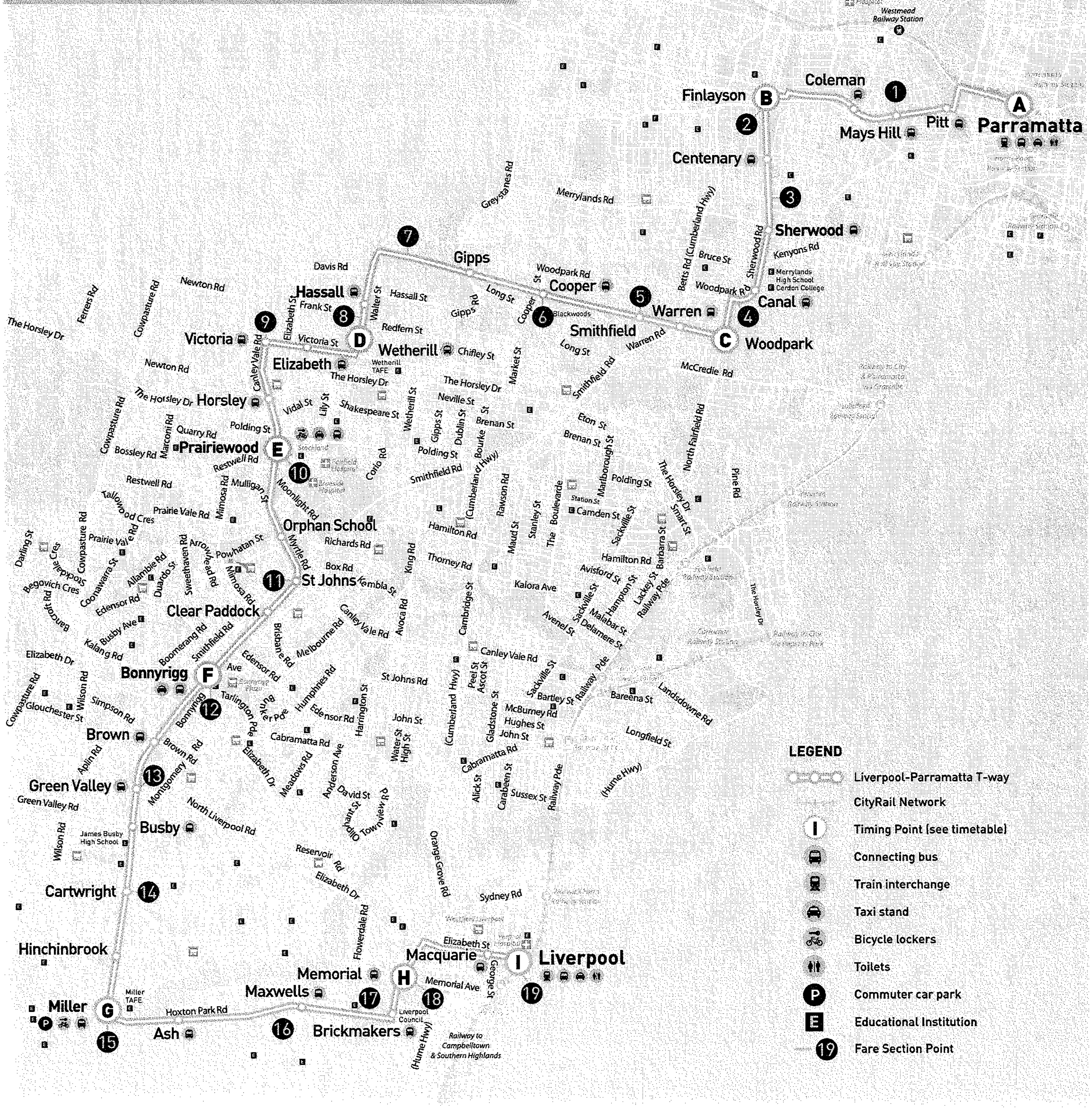
Map not to scale - TransMarketing



BUSABOUT
your local bus company


Route 869
Churchill Gardens
Lurnea
Liverpool
Map not to scale - TransMarketing
BUSABOUT
your local bus company
LIVERPOOL
Westfield
Hospital
Elizabeth Dr
Elizabeth St
Northumberland St
Moore St
Mall
George St
Bigge St
College St
Copeland St
Memorial Av
Macquarie
Terminus St
Scott St
Liverpool Station
Inward services operate direct along Moore St during peak times
Hoxton Park Rd
Hume Highway
Rose St
Reilly St
Thorn St
Gill Av
Boundary Rd
Bird Av
Liverpool St
Amalfi St
Graham Av
LURNEA
Hillview Pde
Shortland Av
Wonga Rd
Bligh Av
Napier Av
Kurrajong Rd
South Western Motorway
Casula Station
Casula Mall
Guise Av
Ingham Dr
CASULA
Beach Rd
CHURCHILL GARDENS
Cedar Rd
Pine Rd
Box Rd
Myall Rd

T-WAY MAP



Parramatta
Pitt
Mays Hill
Coleman
Finlayson
Centenary
Sherwood
Canal
Woodpark
Warren
Smithfield
Cooper
Gipps
Hassall
Wetherill
Victoria
Elizabeth
Horsley
Prairiewood
Orphan School
St Johns
Clear Paddock
Bonnyrigg
Brown
Green Valley
Busby
Cartwright
Hinchinbrook
Miller
Ash
Maxwells
Brickmakers
Memorial
Macquarie
Liverpool
Westmead Railway Station
Merrylands High School
Cerdon College
James Busby High School
Miller TAFE
Wetherill TAFE
Liverpool Council
Railway to Campbelltown & Southern Highlands
LEGEND
Liverpool-Parramatta T-way
CityRail Network
Timing Point (see timetable)
Connecting bus
Train interchange
Taxi stand
Bicycle lockers
Toilets
Commuter car park
Educational Institution
Fare Section Point

TMAP GUIDELINES

Draft Interim Guidelines on

TRANSPORT MANAGEMENT

AND

ACCESSIBILITY

PLANS

Draft Interim Guidelines on:
TRANSPORT MANAGEMENT AND ACCESSIBILITY PLANS

CONTENTS

1.0 WHAT IS A TRANSPORT MANAGEMENT AND ACCESSIBILITY PLAN (TMAP)?

A TMAP is:

- a comprehensive assessment of the transport impacts (addressing both the movement of people and goods) of a *major* site development or re-development proposal; and
- the identification of a package of appropriate transport measures (including infrastructure, services and demand management initiatives) for the proposed development, which will help to manage the demand for travel to and from the development, and in particular, reduce the demand for travel by private car and commercial vehicle.

TMAPS address local, district and sub-regional transport impacts and may include recurrent services as well as capital works. They are not Section 94 Contribution Plans.

A TMAP Agreement is a formal agreement between the proponent and relevant stakeholders on the content, timing and cost of the package of measures and on the funding of the measures.

2.0 PURPOSE OF THE INTERIM GUIDELINES

These Interim Guidelines provide a framework for councils, developers and their consultants to manage the transport impacts of *major* developments in the context of the Government's guiding principles, which are to:

- Promote economic development and create jobs
- Achieve greater social justice including equity of access to jobs and services
- Protect our unique environment and improve our air quality
- Improve the financial performance of Government.

In order to improve the consistency and robustness of TMAPS, it is vital that each TMAP demonstrate how its objectives are to be achieved, in terms of clear assumptions and transparent methodology. These guidelines provide a framework methodology based on reports from PPK Environment and Infrastructure and MWT Transport Modelling and consultation with some key stakeholders[1].

The Interim Guidelines set out the key steps or tasks required in the preparation of a TMAP. As more TMAPs are completed, the Interim Guidelines will be reviewed to improve the framework methodology based on experience with practical application.

The Interim Guidelines aim to provide a sufficiently flexible methodology to allow the proponents of developments to select elements of the overall approach depending on the size and complexity of the proposal, without needing to undertake a full-scale transport modelling process in every case. The basic steps of assessing likely impacts, seeking a higher mode split to public transport, and agreeing on a package of measures can be widely applied to all medium and large-scale developments.

[1] PPK Environment and Infrastructure, "Transport Management and Accessibility Plan Methodology – Final Report", for NSW Department of Transport and Roads and Traffic Authority, 2000.
MWT Transport Modelling, "Transport Management and Accessibility Plans – Modelling Techniques for Predicting Change in Travel Choice", for NSW Department of Transport, 2000.

example, *State Environmental Planning Policy No. 59 – Central Western Sydney Economic and Employment Zone* requires that Precinct Plans address transport issues in the form of a Transport Plan (the contents of which are specified). *Sydney Regional Environmental Plan No.29 – Rhodes Peninsula* requires the consent authority to be satisfied that certain transport infrastructure and services will be provided to the subject area (which has taken the form of a Transport Management Plan).

Generally, they will be undertaken for site-specific major developments in the Greater Metropolitan Region where development agreements or commitments are required to ensure that significant transport infrastructure improvements, particularly public transport infrastructure, is provided as early as possible to meet mode share and vehicle kilometres travelled (VKT) targets. Therefore, a TMAP may need to be prepared in conjunction with a Regional Environmental Plan (REP), Local Environmental Plan (LEP), Development Control Plan (DCP), masterplan or precinct plan, or a Development Application, depending on the circumstances.

TMAPs are generally practical when the following circumstances arise:

- Medium to large scale proposals for development or re-development with significant trip generation and/or transport impacts. These proposals will generally have likely sub-regional, district or corridor impacts;
- A small number of landowners, minimising administrative issues associated with development of the TMAP.

5.0 BENEFITS OF TMAPS

The benefits of preparing TMAPs for major trip generating developments include:

- early consideration of the full transport impacts of proposed major development (not just traffic impacts), including freight and non-car modes of transport, in the planning and design process;
- integrated planning and design of land use, urban form and transport facilities and services;
- negotiated agreement and partnerships between key stakeholders for the provision of required transport infrastructure and services in time with development, to meet the needs of residents and users of the site.

6.0 THE TMAP PROJECT CONTROL GROUP

Key stakeholders in the proposed development of a major site should be involved in the preparation of the TMAP. As most TMAPs will be prepared by consultants, a small and focussed group will need to oversee the preparation of the TMAP. The composition of the TMAP Project Control Group (PCG) will vary according to the nature of and responsibility for the project. It is important to include those organisations that will have responsibility for implementing the TMAP, including funding responsibilities.

The TMAP PCG would include the planning approval authority, which may be the local council(s) and/or the Department of Urban Affairs and Planning and, in most cases, the proponent. Depending on the circumstances, the PCG may also include the Roads and Traffic Authority, the Department of Transport and transport providers, such as State Rail and local bus operators.

Government transport agencies (such as the State Rail Authority) may be involved or may be represented by the Department of Transport, which then liaises with it on key matters. In some

It should be noted that the Transport Data Centre charges for the provision of customised data and maps.

Additional mode specific data (such as patronage, average fleet age) may be available from various transport operators such as private bus operators, CityRail and State Transit, while data on private vehicles and traffic movements may be available from the RTA and/or local councils.

Demographic information at the household level covering a range of parameters that may affect travel behaviour such as car ownership and household structure, is available from TDC and Australian Bureau of Statistics at various geographic levels.

8.0 THE TMAP METHODOLOGY

The full TMAP methodology is shown below.

Component	Tasks
Project Context	• Outline the strategic context • Set objectives and targets/performance criteria
The Project	• Describe the proposed site • Describe the proposed development/land use and potential future land uses • Describe the current transport infrastructure context
Initial Transport Assessment	• Outline the technical assessment assumptions • Assess the existing travel patterns (including freight)
Transport Assessment of Proposal	• Initial estimate of travel demand (person trips, freight trips or both) • Estimate the distribution of generated trips between origins and destinations • Estimate likely modal split (including freight) • Estimate the loads on transport infrastructure/services that serve the project study area • Analyse capacity/amenity/government policy implications and determine if desired transport system performance criteria are met • Identify feasible options (including transport and development design) to modify transport impacts • Testing of options to meet objectives and targets
TMAP and Agreement	• Identify appropriate measures, including infrastructure, services and policies

This can be achieved through the careful design of the proposed development and, in some cases, the provision of appropriate transport infrastructure, services and other initiatives.

For each specific development proposal that is the subject of a TMAP, there needs to be a clear statement of the desired outcomes in transport and travel terms (**the target**) in a way that can be measured and monitored over time (**the indicator(s)**).[2] This target must be agreed by the TMAP Project Control Group. The location of the site and the proposed development will influence the specific targets. It is important that targets are relevant, reasonable and that agreed indicators can be measured and monitored over time.

Clearly, the indicators used will depend on the available data. For this reason, recent Transport Management Plans have generally used mode share targets and/or shifts in mode shares for the journey to work. Despite the limitations of this indicator, it is easily understood, based on readily available data and can be updated every five years. However, the gradual pooling of personal travel behaviour for all trips in the Household Travel Survey by the Department of Transport's Transport Data Centre will allow further indicators to be developed.

In addition, it is important that indicators are able to be understood by the local community. This will assist in building support for the final TMAP package.

Other possible indicators include:

- Freight movement by rail versus road by tonne /kilometre
- Site CO2 generation levels
- Dollars invested in pedestrian and cycling facilities as a proportion of transport infrastructure investment
- Traffic volumes on key road links
- Public transport passenger numbers and trends on key passenger transport links
- Regional VKT estimates
- Number of car parking spaces per square metre of retail and commercial development.

Further indicators may emerge over time.

8.2 The Project

The second step is to describe the proposed site, the proposed development (the project) and its transport context.

8.2.1 The Proposed Site

A brief description of the proposed site is required including:

- Its urban context e.g. greenfield, urban renewal, urban infill
- Its size and characteristics (based on other baseline studies)
- Its development potential

8.2.2 The Proposed Development

[2] Based on UK Department of Environment, Transport and Regions, **Proposals for a Good Practice Guide on Sustainability Appraisals of Regional Planning Guidance**, Baker Associates for DETR, August 1999.

The aim of this task is to establish the level of any existing demand for travel to or from the site, if any. This will depend on the nature of the site. For example, greenfield or disused sites would have little if any existing travel generation.

If the site, however, is to be rezoned or its use intensified, existing travel should be assessed including:

- Trip generation by mode if possible
- Significant freight or commercial vehicle activity
- Trip distribution in terms of both average trip length and geographic spread.

8.2.5 Base Case Transport Assessment

The base case transport assessment identifies the transport impacts generated by the proposed development with conventional trip generation rates. This can then be compared to demand or mode modified scenarios, where the transport impacts have been changed to reflect higher mode shifts to non- car modes or reduced levels of car trips.

The establishment of the base case should involve the Project Control Group (refer Section 6) in:

- Identifying issues to be considered in the transport assessment
- Selecting comparable sites for forecasting trip generation rates, trip distribution and other trip making behaviours
- Establishing technical assumptions such as site trip generation rates and the staging of on and off site development and infrastructure

This will assist the project liaison team to select the appropriate transport assessment technique (see Section 8.3) and negotiate the funding and delivery of critical transport infrastructure and services.

8.2.6 Technical assessment assumptions

Key assumptions are made in any assessment technique, from desktop analysis to four step modelling and can affect the reliability and validity of the TMAP. Such assumptions need to be discussed with the project liaison team and clearly stated in the TMAP report. They include:

- Network provision
- Land use and density
- Staging and timing of development
- Car ownership and income levels
- Trip generation rates and trip distribution
- Comparable sites
- Destinations for journeys to work
- Mode shift

Assumptions that are critical to achieving the TMAP objectives should be challenged by sensitivity and/or scenario testing (see Section 9.7).

Different land use scenarios can be tested iteratively to examine their different effects. Depending on the nature and scale of the subject project, the modelling exercise can be simplified progressively as follows:

a) full multi-modal multi-purpose demand modelling
b) multi-modal single purpose demand modelling (e.g. journey to work, coal haulage)
c) single mode single or multi-purpose trips modelling (e.g. residential or retail traffic generation analysis)
d) comparative single or multi-mode trip generation only (e.g. for cases where it is only necessary to demonstrate that a new development will not produce impacts greater than the use that it is proposed to replace).

The application of these different approaches is discussed below.

8.3.2 Appropriate models for different scales of investigation

In general, the *scale* of the investigation area will have a significant influence on the nature of transport modelling that might be appropriate. The general range of scales is as follows:

Scale	*Example*
1. Regional/sub-regional	Metropolitan area, North West Sector, Macarthur South
2. District, major corridor	ADI site St Marys, Mungerie Park (Kellyville), Parramatta Rail Link
3. Large site	Greystanes Estate, Rhodes Peninsula, North Arncliffe, Sydney Airport
4. Medium site	Fox Studios (Moore Park), major mine, new shopping centre

Some form of transport network modelling would normally be required for 1, 2 and 3, but may also be appropriate for 4, depending on its scale and likely impacts.

For Type 1 assessments, it would normally be necessary to undertake multi-purpose, multi-modal modelling to fully assess all transport requirements.

For Type 2 assessments, it may also be appropriate to assess multi-modal transport requirements. However, certain aspects may be investigated using simplified methods, such as manual rather than computer network trip assignment methods.

Type 3 and 4 assessments would usually focus on local traffic, bus, walking and cycling arrangements. The assessment would typically involve manual modelling methods to produce demand forecasts. Simplified trip generation, distribution and mode split relationships would be used, derived from a combination of market studies and comparison with similar developments.

9.0 ASSESSMENT METHODOLOGY

As noted above, transport modelling is likely to be required during the following steps in the TMAP methodology as shown in Section 8.0:

A "gravity model" provides a relationship between trips leaving a particular zone and trips attracted to a particular zone based on the number of trips forecast to leave or enter each zone, those forecast to enter or leave alternative trip production or attraction zones and the relative travel friction between each. These models need to be initially calibrated based on travel surveys. One exists for the whole of Sydney Statistical Division. However it is acceptable to adopt calibration measures from a comparable area subject to normal modelling plausibility checks.

9.3 Modal Split

This analysis would forecast the mode of travel or transport between origin and destination. In the case of person trips, it could be done through either a sophisticated modal choice model or by analogy. Modal choice models are considered in detail in the following chapter. Assessment by analogy would involve adoption of comparative rates (eg RTA guidelines) or a survey of a similar case. In certain cases a modal split outcome may be pre specified (eg through government policy.) In such cases it may be necessary to work backwards iteratively testing management options to identify which would achieve the specified outcome.

For modal assessment of freight transport it is usually appropriate to conduct sensitivity testing of different modes (rail, truck, conveyor, pipeline, ship etc.) This is because the choice of mode is usually determined either by the proponent or the approval authority (i.e. not discretionary). In this case effects rather than choice would be modelled.

9.4 Transport Loads

This task would estimate increased person or vehicle trips on different transport networks (road network, pedestrian paths, bus routes, railways etc).

For complicated networks a computer assignment program would be used (eg SATURN, NETANAL, EMME/2, TRIPS.) For less complicated networks increased loads on different links would be determined manually on the basis of most feasible or most likely travel paths.

9.5 Operational Analysis

To determine implications of increased transport loads it is necessary to examine some or all of capacity, level of service, amenity and environmental outcomes. This would allow effects to be compared with initially specified assessment criteria.

The analysis may be conducted as a network wide exercise to determine regional or district effects. Performance measures such as vehicle kilometres travelled, vehicle hours travelled, vehicle emissions, noise would be output from the analysis. Usually a computer network assignment model is most appropriate to provide these measures as it can more easily add up differences on individual network links. Such a model could also add in intersection delays, distances travelled with hot or cold engines and delay impacts on other vehicle types (eg buses on a road network)

Public transport and pedestrian implications can also be assessed as well as road traffic using a network model.

However for district and site specific studies these would usually be analysed manually through a comparison of forecast loads and line or route capacities based on the specified service levels.

Appendix 1 provides more detailed information on certain aspects of personal travel modelling. It describes the Sydney Travel Model (STM) that is the basis of most macro travel modelling in

9.7 Sensitivity Testing

Sensitivity testing of the transport assessment is important to ensure that technical assumptions do not distort the findings. The Project Control Group may be involved in the identification of factors to be tested, and should agree to areas nominated for no testing. Sensitivity testing should not be confined to development intensity, but should consider the following:

- proposed land uses, densities and staging;
- demographic changes including household size and socio-economic group, car ownership and use levels;
- trip generation rates for various land uses;
- trip purposes and selected modes;
- forecast years, regional development and population changes;
- provision of remote and/or independent transport infrastructure that may influence travel behaviour; and
- variations in travel cost.

A reasonable amount of budget and effort should be allocated for sensitivity testing as the sensitivity testing results would contribute to the assessment of impacts, proposal modification, needs identification, and funding apportionment. Sensitivity testing needs to be designed to enable robust comparisons to be made amongst scenarios.

10.0 DEVELOPING THE TMAP AND AGREEMENT

The assessment process should produce a clear set of impacts and issues to be addressed in the TMAP. Potential packages of infrastructure, service and design measures need to be compared to select an optimum package which meets the TMAP objectives, that is feasible from a technical and funding perspective, and involves action by members of the PCG.

The package is likely to include:

- On and off site transport infrastructure works, e.g. pedestrian links and cycle paths, road and station upgrading, transitway extension
- Public transport service improvements such as new routes, improved frequency
- Parking policies e.g. lower parking requirements for commercial uses near stations
- Development controls and public domain improvements which encourage walking, cycling and public transport use e.g. active frontages along main pedestrian routes, mixed uses near public transport nodes.
- Customised individual travel behaviour programs e.g. information packages for new residents or workers.

The TMAP may be subject to a public consultation period and refined as a result of comments received.

These package components may be funded from a variety of sources, including Section 94 developer contributions, negotiated contributions, Council and Government capital works programs and operating budgets.

APPENDIX 1

MORE DETAILED MODELLING POSSIBILITIES

The Sydney Travel Model and Other Regional Models

The Sydney Travel Model was originally developed for the Sydney Area Transport Study in the 1970's. It is a conventional four step model with sub-models for trip generation, distribution modal split and assignment. It incorporates a car ownership model and parking constraint measures for use in modal split analyses.

The Sydney Travel Model has been progressively updated over the years and the process is continuing. The model is recalibrated at regular intervals using Household Travel Surveys.

The Sydney Travel Model has been used by the Transport Data Centre to produce computer coded road and public transport networks and origin destination trip tables for vehicle and public transport modes.

This would be the best source of forecasting the travel implications of options that have a metropolitan wide or sub-regional scope. Arrangements would need to be made with the Department of Transport's Transport Data Centre to have this work done.

Aside from full scale modelling, the STM is also useful in providing templates for trip distributions by extracting such information for a specimen zone or group of zones. The model can also be used to determine base case traffic or travel demand growth forecasts for use in assessing long term effects of a particular development project.

Travel models (either multi-modal or road based only) also exist for Newcastle, Wollongong and some regional centres. These would also be good starting points for modelling of major developments in these areas.

Mode Choice Modelling

Mode choice modelling involves the application of weightings to the different factors that influence a person's choice regarding which mode to use for a trip between a particular origin and destination. From this probabilities are determined and used to estimate the proportions of trips likely to be made by each mode.

The basis of a mode choice model is that a person seeks to minimise travel times and costs travelling. Not all components of travel are perceived by a traveller to be as pleasant as the other. For instance time spent walking to or waiting for a bus may be perceived by a traveller as being more onerous than time spent actually in the bus (with all uncertainties as to the arrival of the bus removed). To allow for this, a person unconsciously attaches a relative weighting to different travel attributes. For convenience of computation transport planners convert times to equivalent dollar costs in order that travel charges can be given an equivalent to weighted travel times.

This gives rise to a 'generalised time cost' function for each mode of travel available. These functions form the basis of the mode choice sub-models contained within the traditional four step modelling procedure. Because these sub-models relate to an entire transport network, they may be somewhat insensitive to the implications of site-specific transport management proposals that may be contained within a TMAP.

For car trips, the important choice attributes are:

In Vehicle Time (In vehicle)	=	Time spent in car travelling
Cost	=	Out of pocket costs in dollars ($) such as tolls and parking fees. For work trips, assume half the casual rate. Vehicle operating costs are not included as research has found that this has little effect on the choice process.
Egress Time (Egress)	=	The time required walking from parking spot to the final destination.

This gives rise to the following set of generalise time cost functions:

$$GT_B^W = 2\times Access + 2\times Wait + 1\times Invehicle + 4\times Cost + 2\times Egress + 10\times Tranfer + MS_B^W$$
$$GT_B^O = 2\times Access + 2\times Wait + 1\times Invehicle + 8\times Cost + 2\times Egress + 10\times Tranfer + MS_B^O$$

$$GT_R^W = 2\times Access + 2\times Wait + 1\times Invehicle + 4\times Cost + 2\times Egress + 10\times Tranfer + MS_R^W$$
$$GT_R^O = 2\times Access + 2\times Wait + 1\times Invehicle + 8\times Cost + 2\times Egress + 10\times Tranfer + MS_R^O$$

$$GT_C^W = Invehicle + 4\times Cost + 2\times Egress + MS_C^W$$
$$GT_C^O = Invehicle + 8\times Cost + 2\times Egress + MS_C^O$$

Where	GT = Generalised Time Cost
The subscripts/superscripts	B = Bus
	R = Rail
	C = Car Driver/Car Passenger
And	Time is measured in minutes.

MS_B^W, MS_B^O, MS_C^W ..... are the 'mode specific' constants associated with each trip type. These constants fine tune the model to recreate the observed choices in mode of travel but can be interpreted as reflecting other unquantified attributes such as comfort, safety, and reliability.

The determination of these constants is discussed further on.

The next part of the procedure is to convert the generalised time cost functions to 'utilities' through the application of a sensitivity parameter. Previous mode choice studies has found this parameter to range from -0.8 to -0.5. A mean value is simply adopted for this standardised choice model. Accordingly the utilities for each trip purpose (work and other are:

$$U_B^W = -0.065\times GT_B^W$$
$$U_R^W = -0.065\times GT_R^W$$
$$U_C^W = -0.065\times GT_C^W$$

and

$$U_B^O = -0.065\times GT_B^O$$
$$U_R^O = -0.065\times GT_R^O$$
$$U_C^O = -0.065\times GT_C^O$$

Probability of Using Non Motorised Travel

Examination of the ABS Journey to Work (JTW) data reveals a strong relationship exists between the length of a trip and probability of choosing a non-motorised mode of travel.

Chart 5.1 presents the results of an analysis of JTW data which shows the proportion of Non Motorised trips to total trips for the same trip length. These trips are defined as "other" trips being one not made by private car/passenger or public transport. They include trips by walking, cycling and taxis. **The chart is preliminary and is intended primarily as an illustration of the relationship**. Its accuracy would be improved through further analysis.

INSERT CHARTS HERE

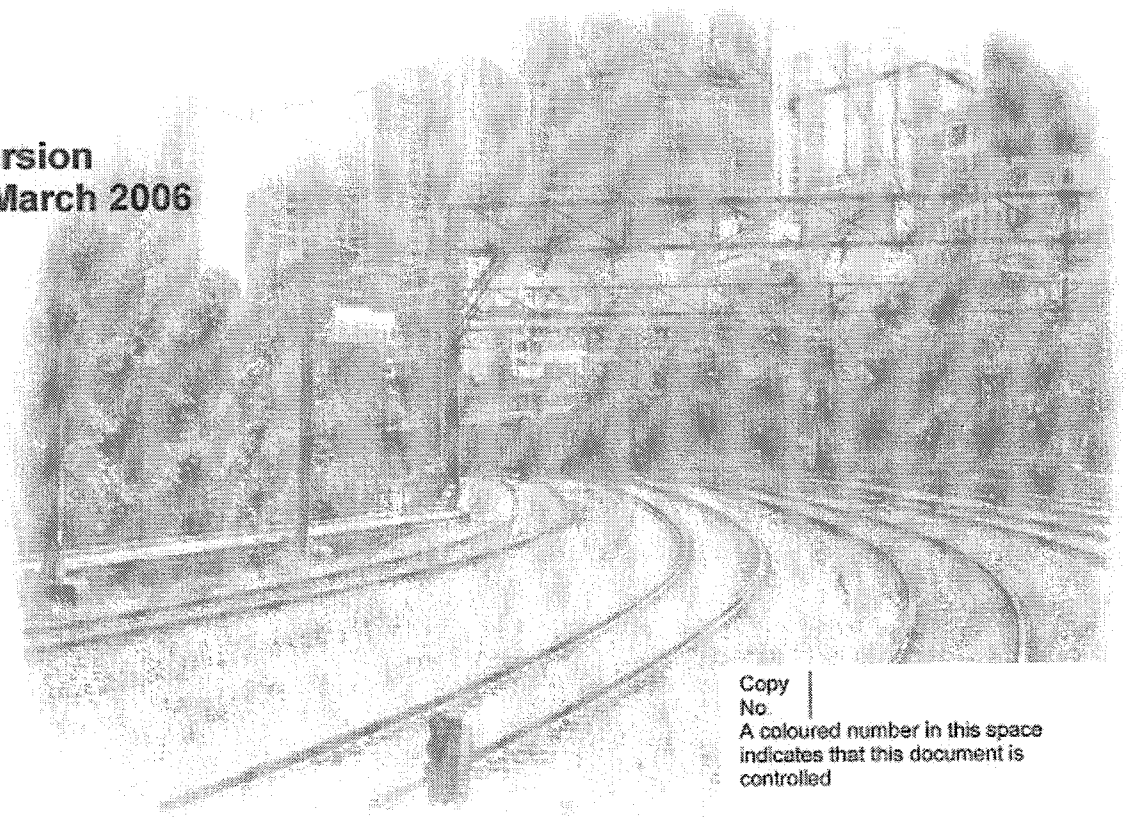
RAILWAY LEVEL CROSSING ASSESSMENT

Rail Corporation New South Wales
Engineering Standards and Services Signalling
Locked Bag 25 Haymarket NSW 1238
Level 12, 477 Pitt Street Sydney NSW 2000

Signal Engineering

Operational Impact of SSFL and Liverpool Clearways Project on Liverpool Hospital Level Crossing

Version
2 March 2006



Copy No

A coloured number in this space indicates that this document is controlled

Signal Engineering

Operational Impact of SSFL and Liverpool Clearways Project on Liverpool Hospital Level Crossing

Version
2 March 2006

PRODUCED BY:

Warwick Allison
Chief Engineer Signals

REVIEWED BY:

Geoff Yarrow
Section Leader Signal Design

CountryLink CityRail RailCorp

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

The introduction of the Southern Sydney Freight Line and the Liverpool Turnback project will result in four tracks over Liverpool Hospital level crossing.

The level crossing is within Liverpool Hospital and services the hospital, including staff and patient movements, and is a critical access path for the functionality of the hospital.

This paper analyses the operational impacts on the crossing with the introduction of the new freight line and additional approach road to Liverpool station.

The conclusion is that the crossing will be closed to road traffic for periods of 30 to 50 mins per hour in peak periods and up to 5 mins for the passage of a single freight train based on current levels of train operation.

The anticipated 2011 timetable will increase the period of crossing operation.

This level of operation will result in the crossing operation being excessive and it will not be able to fulfil its purpose of road access for major time periods during the day.

All timings and speed in this paper are conceptual pending detailed design.

2 BACKGROUND

The level crossing being analysed exists within the grounds of Liverpool Hospital. The crossing is an automatic Type F level crossing interlocked with signalling within Liverpool interlocking. The signaller does not directly control the crossing operation.

Currently 2 operational tracks (Up Main and Down Main lines) and one non-operational siding track traverse the crossing.

The Southern Sydney Freight Line (SSFL) proposes to cross this level crossing on the eastern side in 2008. Additionally, a new track leading to new turnback roads between the Up and Down Main is planned for 2011.

Consequently, the crossing will have 4 tracks and will be approximately 22m wide (on the road alignment) between outer rails.

Because of the potential increased risk, the crossing could become manually controlled by a signaller, who will need to observe a monitor to ensure the crossing is clear of vehicles and pedestrians before clearing signals over the crossing.

This document does not go into detail of these risks, which is subject to a separate analysis.

This paper provides an overview of the level crossing operation that is likely with the following configuration:

- 4 main line running tracks
- Generally 80/100km/h on RailCorp tracks
- 80km/h on ARTC (SSFL) tracks
- Signaller Controlled manually operated fully interlocked operation
- Cameras and monitor provided for the signaller to view the level crossing
- All tracks are controlled by RailCorp signallers, including the SSFL
- Freight trains 1800m long.

An estimate of level crossing operation times is provided.

As the design for the track and signalling is only conceptual, the figures upon which this analysis is based are assumptions formed by typical experience with similar configurations and application of the RailCorp Signalling Design Principles.

3 SIGNALLING CONFIGURATION

A typical configuration of signalling around the level crossing is shown in the attached Appendices A & B.

The level crossing is to be protected by signals on the approach. It is anticipated these signals would be approximately 100m from the level crossing to provide a small overlap to safeguard against the event of a train passing a signal at stop and occupying the level crossing without adequate warning being given.

A risk assessment assessing this aspect is currently in hand by Safety Division.

Other signals would be provided at or greater than braking distance from the signals at the level crossing to provide the driver of an approaching train sufficient warning to stop at the level crossing signals.

4 LEVEL CROSSING OPERATION

4.1 General Operation

When a train is to be signalled over the level crossing, the signaller would initiate level crossing operation. This causes the flashing lights to operate and the audible warning to sound.

4.2 Pedestrian Crossing

The crossing is fitted with pedestrian swing gates. Because of the width of the crossing, additional time needs to be allowed for a pedestrian to complete their crossing before the pedestrian gates close.

The distance over the crossing between safe places inside the gates is estimated to be 30m. (See Appendix 6 for a diagram of the configuration).

The time required for a pedestrian to safely cross is based on a walking speed of 0.8m/s which provides for the elderly and people with disabilities.

This time is 37.5s.

After this time has elapsed, the gates automatically begin to close without further signaller involvement. An additional time is provided for a pedestrian who commences to cross just as the gates commence to close, walking at 1.2m/s.

This time is 25s.

With an allowance of 5s safety margin, a train would not normally pass over the crossing within 67.5s after initial activation. These times are due to the width of the crossing (over twice the distance between safe places as a standard two-track crossing).

However, all gates will be shut about 50s after initiation of the crossing. If the crossing is seen to be cleared, a train may be signalled across after this time.

4.3 Road Crossing Operation

After the signaller has initiated the operation of the warning lights, a delay of 12 seconds applies before the booms can be lowered. The signaller has a lever for gate operation. Depending on the density of traffic, separate levers may be provided for each gate.

The signaller views the monitor and operates the lever to lower the gates. Should a queue of vehicles exist on the crossing, the signaller may delay lowering the gate or raise a gate that is partly lowered, if circumstances dictate.

The gates take approximately 10 seconds to lower.

If four quadrant gates are provided as an additional control, (to prevent the gates being circumvented by vehicles or pedestrians) a delay of 5 seconds (10 or maybe longer in this case, due to crossing width and low road speed) is provided on the exit gate after the entry gate commences to lower.

This permits the entry gate to be lowered and a vehicle to proceed across and exit before the exit gate lowers.

The minimum time for all road gates to lower is:

	Action	
Time Elapsed	***2 Booms***	***4 Booms***
0	Lights flash	Light flash
12s	Booms can lower	Entry Boom can lower
18s		Exit Boom can lower
24s	Booms down	Entry Boom down
30s	Possible train passage	Exit Boom down
35s		Possible train passage

These items assume the booms lower directly on system timers and no delay is included with signaller actions due to normal operation actions or consequential action due to vehicle or pedestrian presence.

As the pedestrian time of 50s is longer than the road time, then the pedestrian time is the limiting time.

4.4 Signal Clearance

Once the crossing is closed, the signaller is to observe the crossing is clear via the monitor before clearing any signals to permit a train movement over the crossing.

5 TRAIN OPERATION OVER THE LEVEL CROSSING

Once all booms are down and gates closed, the signaller can clear the protecting signal over the crossing.

If the approaching train is at least braking distance away, the train will travel (at line speed) to the crossing and then past.

When the train has passed, the crossing will automatically normalise unless another train is closely approaching and the signals are clear.

If a train is within the braking distance, it will be slowing to stop at the signal protecting the crossing. When the driver sees the signal ahead clear, the train can accelerate and pass over the crossing.

However, as the train speed is lower, it is possible that the train will take a similar or longer time to clear the crossing.

The crossing will remain activated for the time it takes the train length to pass over the crossing.

For example, if a train is 400m from the protecting signal, and it then clears, the following timings may apply for a 1500m long freight:

Crossing Operation	50s
Signaller Clear Signal	5s
Train to travel 400 + 100 + 1500 = 2000m @ average 40km/	180s
Total	**3 mins 55s**

This time is the shortest period the crossing will operate for in this scenario.

Signaller manipulation time between operating the crossing promptly on train approach, viewing the monitor and clearing the signal is a variable time, that would usually serve to increase the crossing operation time.

Similarly driver reaction time is also not completely predictable and it is possible to further extend crossing operation times from this case.

6 TRAIN CLEARS CROSSING

Once a train has fully cleared the crossing, the track circuit will energise after 2 seconds. This will cause the booms to rise. Once the booms are fully up, the lights will cease to flash. The booms will take 6-10 seconds to become vertical.

If four quadrant boom gates are provided, the leading gates will not rise until the exit gate has been proven to be rising.

Consequently, road traffic may resume approximately 12 seconds after train passage for half booms, and approximately 17 seconds for full booms.

7 RISK MITIGATION

The extended operating times that will occur with this level crossing configuration and train frequency give rise to additional risks of vehicle drivers and pedestrians attempting to circumvent the protection due to aggravation caused by delay and potential hospital emergency traffic.

These risks will need to be analysed and potentially addressed by one or more of the following:

- Median and road side fencing
- Four quadrant booms
- Grade separation
- Timetabling of services to cross on the level crossing

Irrespective of risk mitigation measures adopted the crossing would appear to be (at least in peak hours) unworkable.

8 ANALYSIS

Appendix 4 provides an analysis of suburban trains operating over the level crossing at 100km/h, 80km/h and 60km/h.

At 80km/h, the time the crossing is operating is 145s.

This time does not include any delay by the signaller in operating the crossing, or time taken for the booms to rise following train passage.

If 10 seconds is allowed for these times, a total crossing operating time of 155 seconds (2'35") results.

Appendix 3 shows the timings for a single freight train of 1800m length passing over the crossing on the SSFL. Timings for undue signaller delay and crossing cancellation following a train are not included. This time is 4 minutes.

Appendix 2 provides maximum and minimum operating times for peak hour operation.

The maximum time occurs if trains on the up and down lines proceed over the level crossing alternately.

The minimum time occurs if up and down train cross simultaneously.

Train occupation time is taken to be 2'35" as per Appendix 4.

For the 2005 timetable and including suburban trains only, the minimum and maximum times are 30 and 50 minutes.

For the projected 2011 timetable, the maximum and minimum times are 37.5 and 75 minutes. Once the time reaches 60 minutes, the crossing is permanently closed.

Appendix 1 shows the minimum and maximum timings per time of day, based on the 2005 timetable.

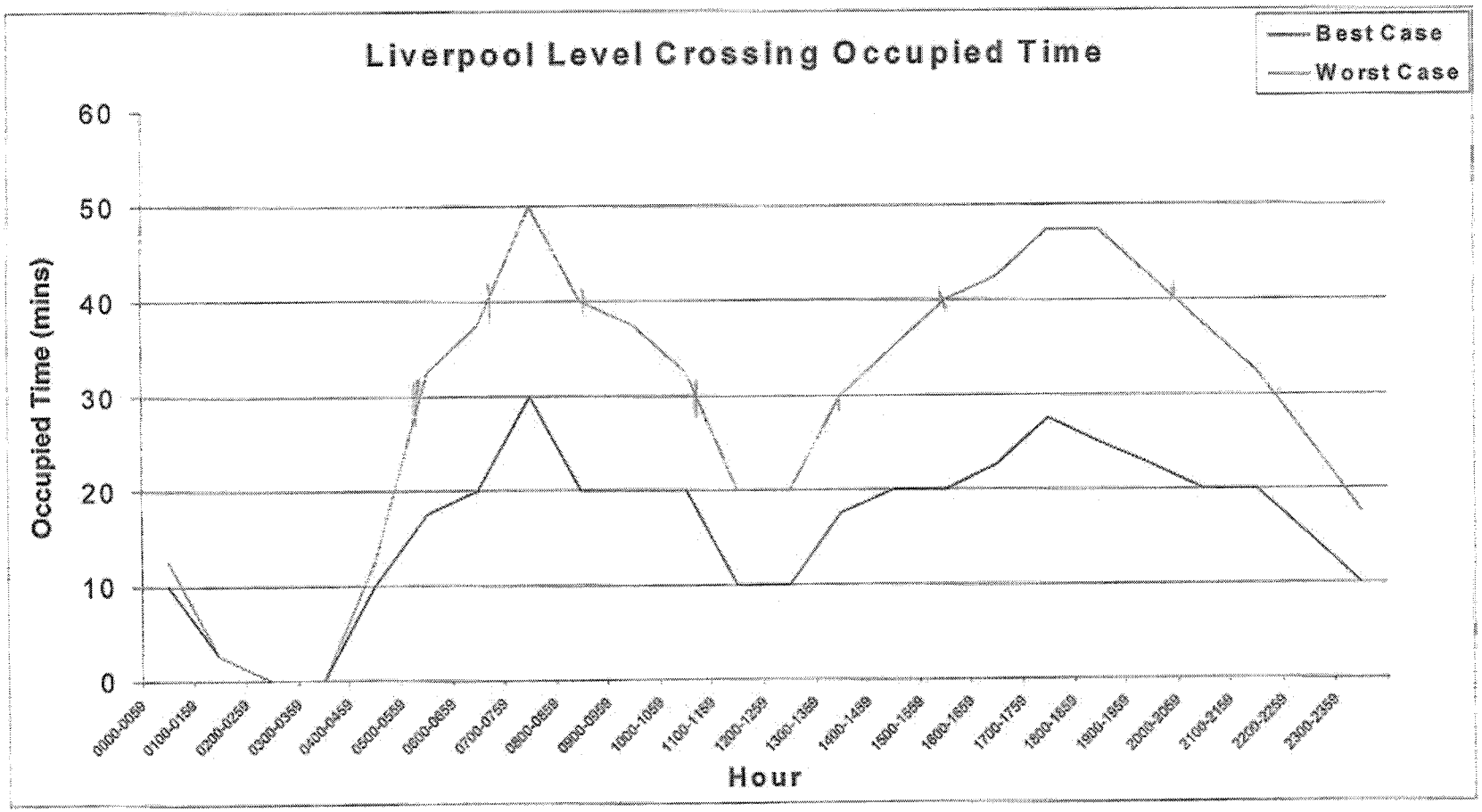
Appendix 1 and 2 analysis do not consider SSFL freight traffic, however as operating time for a freight train exceeds suburban train operating time, level crossing operation times will always increase if included.

9 CONCLUSION

The expected closure times of Liverpool Hospital crossing, under the expected configuration and traffic levels, is excessive. It is unlikely the level crossing will be able to be effectively used (if at all) during peak hours.

10 APPENDIX

10.1 Appendix 1 - Liverpool Level Crossing Occupied Time



10.2 Appendix 2 – Liverpool Level Crossing Operating Time Per Hour Based On Final Crossing Configuration

2005 Peak Hour Train Movements

	Best Case (Note 1)		Worst Case (Note 2)	
	Trains / Hr Up / Down		Trains / Hr Up / Down	
AM	12 / 8 12	30 minutes	20	50 minutes
PM	8 / 11 11	27.5 minutes	19	47.5 minutes

2011 Peak Hours Train Movements (Projected)

AM	15 / 15	37.5 minutes	30	75 minutes. This indicates the crossing is permanently closed in peak hour
PM	15 / 15	37.5 minutes	30	75 minutes. This indicates the crossing is permanently closed in peak hour

All above based on Crossing Operating time of 2'30" per train. Freight on SSFL has not been considered but could potentially increase the above times, however, it is likely that these movements could fit within those above.

Note1: This analysis assumes that up and down movements occur simultaneously. This minimises level crossing operation.

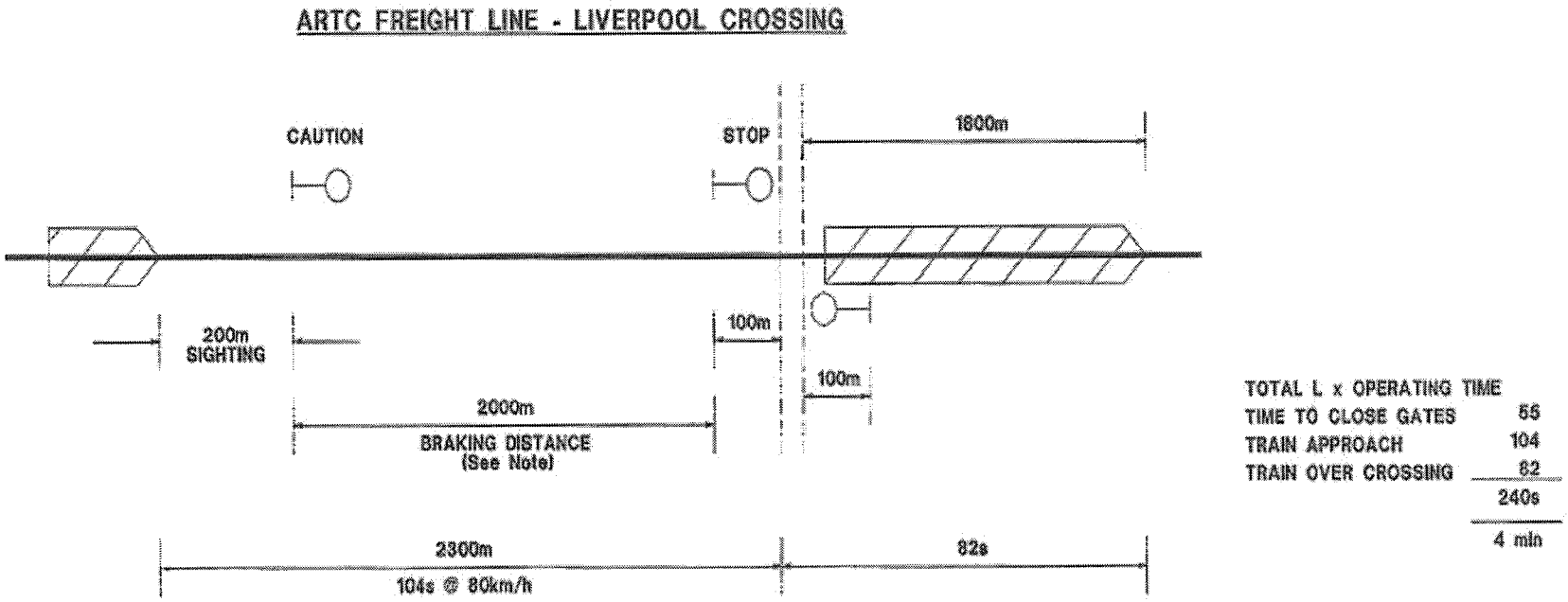
Note2: In this analysis trains run alternately and has the maximum operating time for the level crossing.

2005 Time Table – Trains Through Liverpool

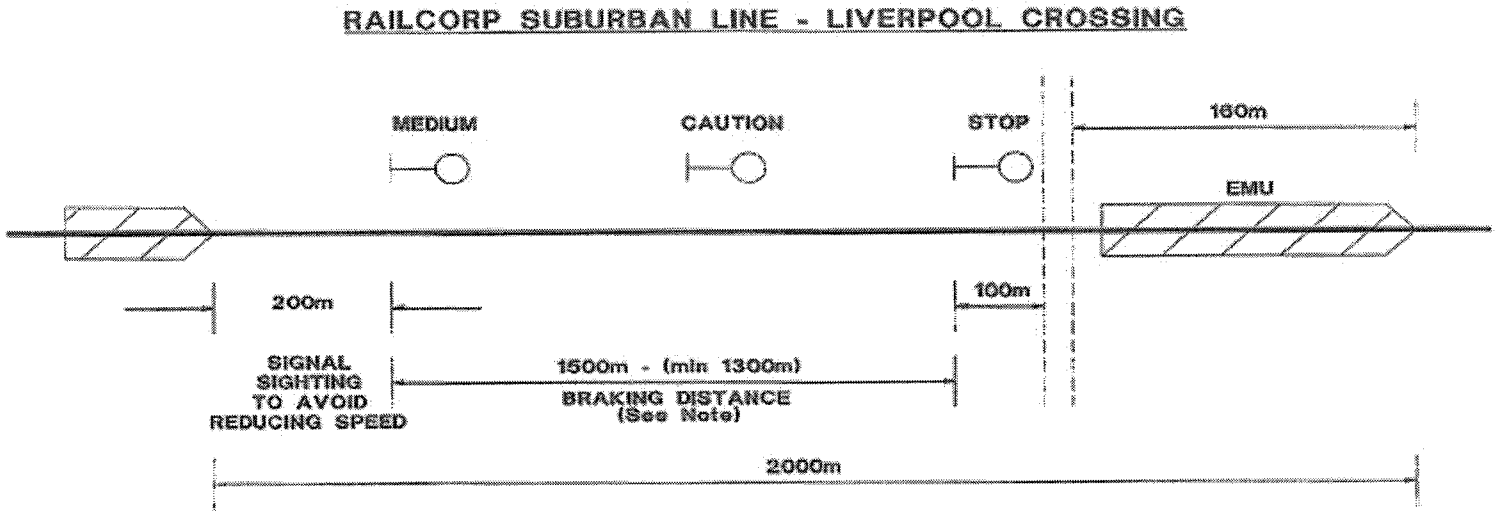
AM	Up Direction	Down Direction
6 – 7 (excl)	8	8
7 – 8 (excl)	12	8
8 – 9 (excl)	8	8

PM	Up Direction	Down Direction
4 – 5 (excl)	8	9
5 – 6 (excl)	8	11

10.3 Appendix 3 – ARTC Freight Line – Liverpool Crossing



10.4 Appendix 4 – RailCorp Suburban Line – Liverpool Crossing



BRAKING DISTANCE SET FOR GW16 BRAKING AT 100km/h (say 1500m)

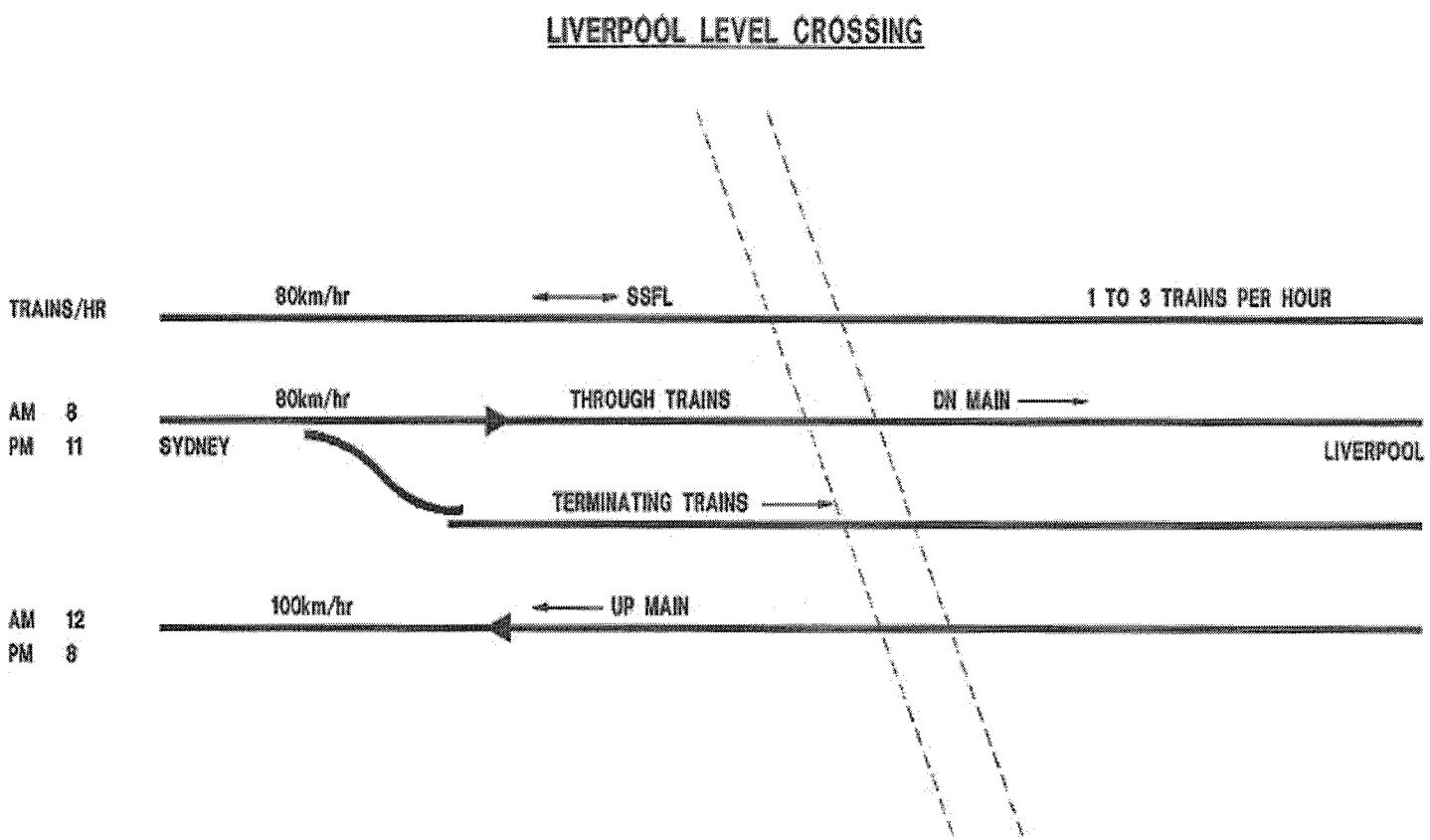
HENCE TIME FOR SUBURBAN TRAIN TO TRAVERSE CROSSING

@ 100km/h	72s + CROSSING OP TIME 55	=	127s
80km/h	90s + 55	=	145s
60km/h	120s + 55	=	175s

∴ 2-3 MINUTES CROSSING OCCUPATION FOR SUBURBAN TRIANS

NOTE:
As freight services may also operate on these lines, braking distance standard for GW16 at line speed applies. Longer trains than 900m are reduced in speed.

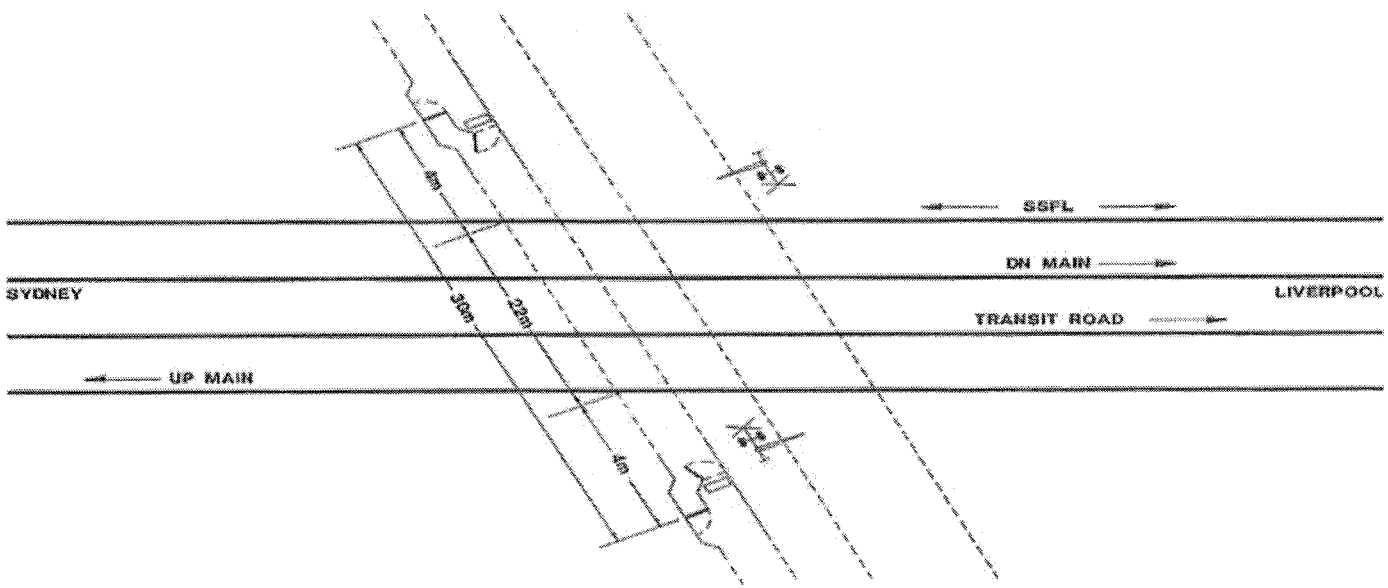
10.5 Appendix 5 – Liverpool Level Crossing



10.6 Appendix 6 – Liverpool Pedestrian Level Crossing

NOTE:
DIMENSIONS ESTIMATED FOR THE PURPOSE OF THIS ANALYSIS

LIVERPOOL PEDESTRIAN CROSSING TIMES



PEDESTRIAN CROSSING
1. LIGHTS OPERATING TIME 12s FLASHING
2. GATES COMMENCE TO CLOSE @ 30m x 0.8m/s = 37.5s
3. GATES CLOSED TIME 12s (max)
4. SECOND PEDESTRIAN TIME 30m x 1.2m/s = 25s
5. TOTAL TIME TO SIGNAL CLEARANCE = 37.5 + 12 + 5 (safety margin) = 55s
6. TOTAL TIME TO GUARANTEE PEDESTRIAN CLEAR = 37.5 + 25 + 5 (safety margin) = 67.5s

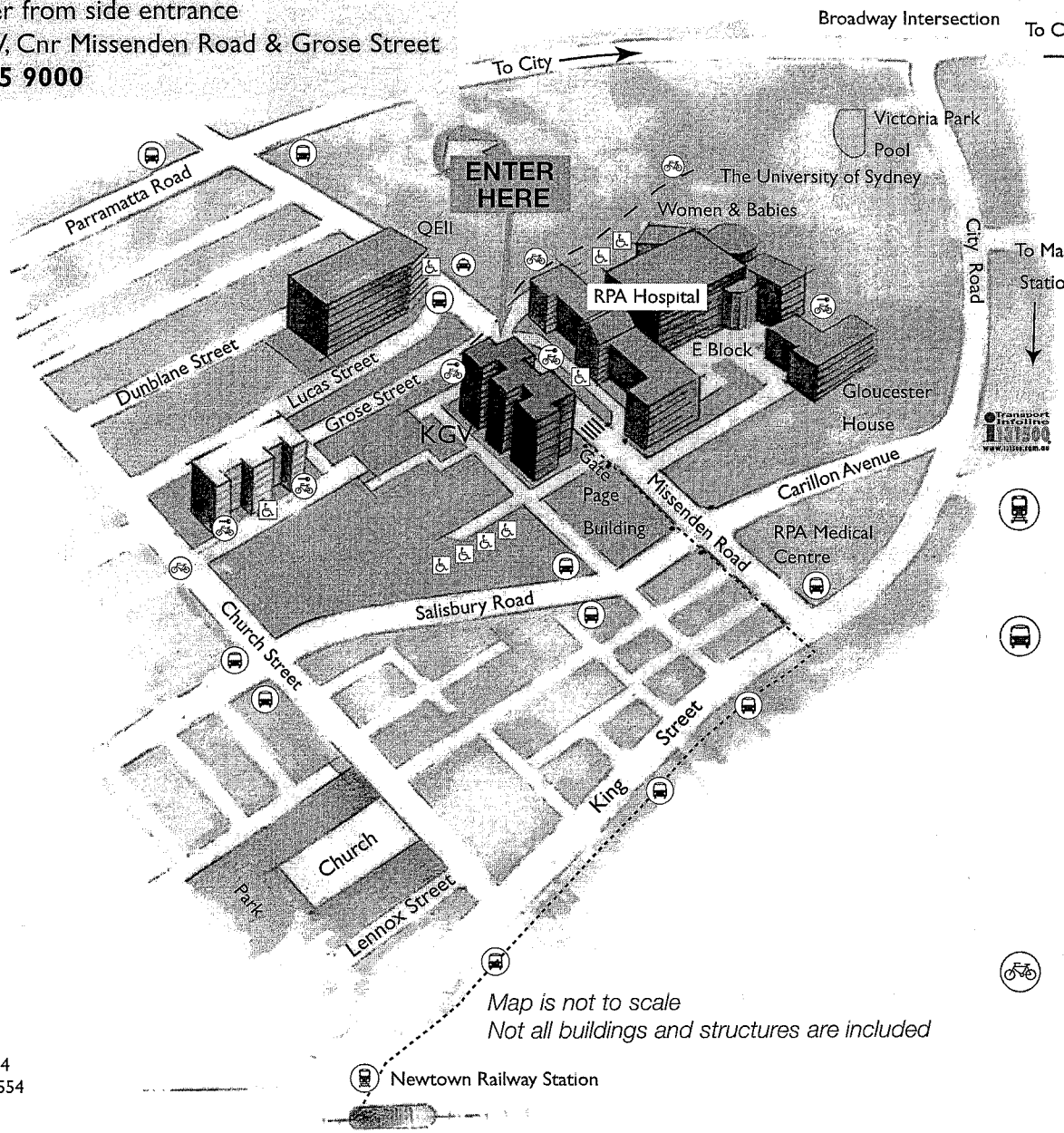
EXAMPLE TRANSPORT PLANS

KING GEORGE V BUILDING (KGV)

CSAHS
Central Sydney Area Health Service

CAMPERDOWN HEALTH CENTRE
Level 5 (ground floor) & Level 6
Enter from side entrance
KGV, Cnr Missenden Road & Grose Street
9515 9000

30 minutes of moderate physical activity (walking) on most days of the week can maintain good health



KEY
- Disabled Parking
- Suggested walk route
- Bike route
- Bike parking
- Bus stop
- Taxi rank

Paid parking available

NO SMOKING CAMPUS

HOW TO REACH US:

Plan your public transport. Contact: 131 500 or access www.131500.com

TRAINS Newtown Station is a 20 minute walk along King St and Missenden Rd.
Redfern Station is a 30 minute walk through Chippendale and Sydney University.

BUSES between the city and inner west (413, 436, 437, 438, 440, 461, 480, 483) stop on Parramatta Rd, near Missenden Rd. It takes 10 minutes to walk to RPA/KGV.
Buses (422, 423, 426, 428) between the city and Newtown, and route 370 between Coogee and Leichhardt all stop on King St near Missenden Rd. It takes 10 minutes to walk to RPA/KGV.
The 412 bus (between the city and Campsie Station) stops on Missenden Rd outside RPA.
The 352 from Bondi Junction via Oxford, Crown and Cleveland Sts stops on King St.
Bus timetables and travel passes are available at post office/newsagent on Missenden Rd.

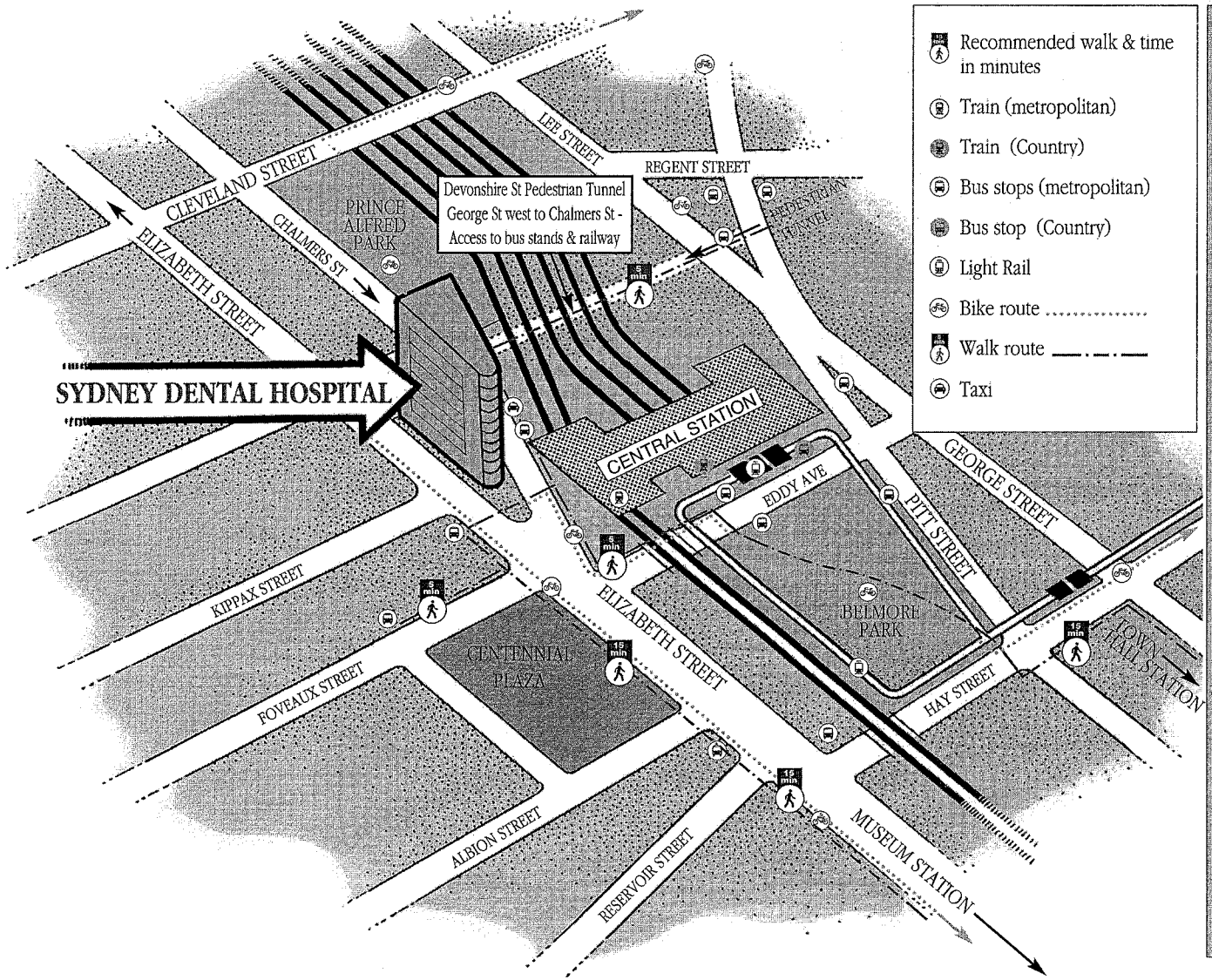
BICYCLE parking is available outside KGV and RPA on Missenden Rd.
For quiet back street routes through the inner west to KGV and/or to contact your local bicycle user group go to www.massbug.org.au

Car parking for staff can be arranged for a fee through the hospital Transport Department.

July 2004
AVS 47554

Sydney Dental Hospital is easy to get to by public transport, walking or cycling.

30 minutes of moderate physical activity (eg walking and cycling) on most days of the week can maintain good health



Sydney Dental Hospital entrance is approximately 5 minutes walk from the Devonshire Street exit of Central Railway Station. From Railway Square bus interchange, walk down steps to the Devonshire Street subway and walk approximately15 minutes to the Devonshire Street exit.

Plan your public transport travel. For timetables and details on low floor buses, contact the Transport Infoline 131500
www.131500.com.au
For regular public transport users, TravelPasses, Rail Weeklies and TravelTen tickets are cheaper and more convenient than single tickets. Stations or newsagencies sell these tickets.

All metropolitan and country trains go to Central Station.

Light Rail from Lilyfield goes to Central Station.

Many bus services stop near the Hospital at Railway Square, Eddy Ave, Elizabeth Street or Chalmers Street.

For the RPA and University of Sydney Bike Map
CSAHS Tel – 9515 9055
Cycling Information: Bicycle NSW Tel: 9281 4099
www.bicyclensw.org.au
Cycling maps RTA Tel: 1800 060 607
www.rta.nsw.gov.au/bicycles.htm
The cycling routes from Bike it ! Sydney by Bruce Ashley Chain Gang Press

Legion 131451 Combined 8332 8888

Sydney Dental Hospital 9293 3200
2 Chalmers St
Surry Hills 2010

This building and map is not to scale and does not include all streets and surrounding buildings

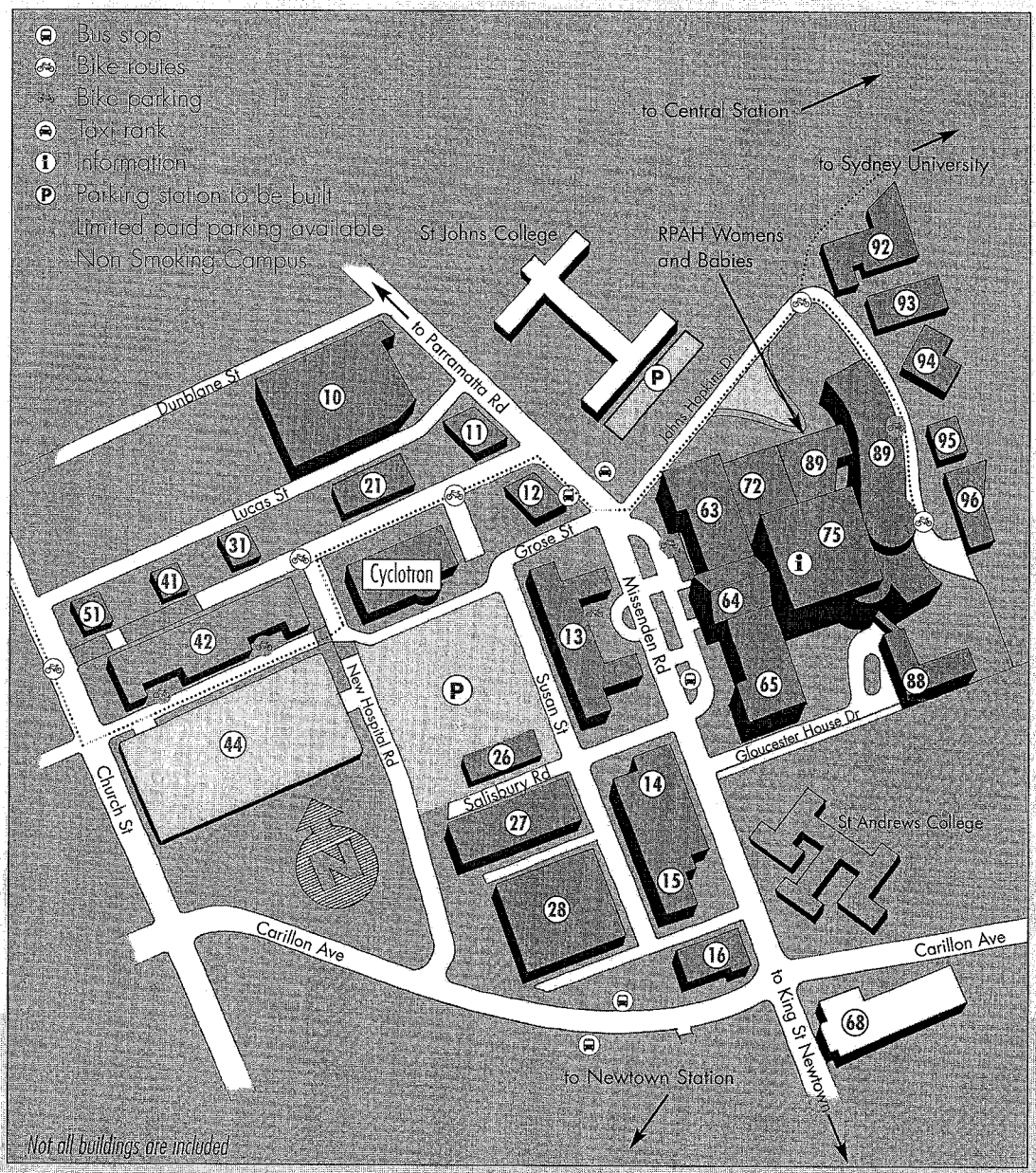
October 2004

AVS 47493

Royal Prince Alfred Hospital

30 minutes of moderate physical activity (walking, cycling) on most days of the week can maintain good health.

Phone: 9515 6111



Buildings:

10. QE11 (IRO Building)
11. Buiding 11
12. Building 12
13. KGV Administration Building
14. Page Building
15. General Outpatients Building
16. Heart Research Institute
26. Audio Visual Department
27. Radiation Oncology
28. Engineering Services
31. Endocrine Research facility
41. Child Care Centre
42. Queen Mary Building
44. Staff Car Park
51. School of Nursing
63. Albert Pavilion
64. Administration
65. Victoria Pavilion
68. Medical Centre
72. Kerry Packer Education Centre
75. "E" Block
88. Gloucester House
89. Clinical Services Block
92. Missenden Psychiatry Unit
93. Centenary Institute
94. Immunology Department
95. RPAH Chapel
96. Blackburn Pavilion - Sydney University

The hospital is a 10 minute walk from most bus stops and 20 – 30 minute walk from major train stations

Plan your public transport travel. Timetable, fare, wheelchair access details contact the Transport Infoline 131500 www.131500.com.au

Newtown Station is a 20 minute walk along King St and Missenden Rd. Redfern Station is a 30 minute walk through Chippendale and Sydney University

Buses run between the city and inner west from Central Station.

Routes:

413, 436, 437, 438, 440,461, 480, 483 stop on Parramatta Rd near Missenden Rd
412 travels up Missenden Rd and stops out front of the hospital
422, 423,426, 428 runs between the city and King St near Missenden Rd Newtown
370 between Coogee and Leichhardt stops on King St near Missenden Rd.
352 from Bondi Junction via, Oxford, Crown and Cleveland Sts, stops on King St near Missenden Rd.

For cycling information: Bicycle NSW ph: 9281 4099 www.bicyclensw.org.au
Cycling maps RTA ph: 1800 060 607 www.rta.nsw.gov.au/bicycles.htm

LEGION 131451 Combined 8332 8888

This document can be downloaded from www.cs.nsw.gov.au/rpa

Buildings:

10. Queen Elizabeth 11 Building (Institute of Rheumatology and Orthopaedics)
- Orthopaedic Wards
- Physiotherapy Clinics
- Bone,Joint,Connective Tissue Clinics
- Rehabilitation Clinics

11 Building 11

12 Building 12

13. KGV Administration Building
- Level 4 Food Services
- Level 5 Community Health Services
- Level 6 Community Health Services, Dietetics
- Level 7 Human Resource Department
  - Community Aged Care Services
  - Discharge Liaison
  - Nursing Support Services (Quality Improvement/Occupational Health & Safety/ Staff Health)
- Level 8 Finance Department
  - Telephone Services
  - RPAH Museum of Nursing
- Level 9 Division of Population Health
  - Health Promotion Unit
  - Public Health Unit
  - Community Health Services
  - Community Health Administration
  - Central Sydney Community Nursing
  - Multicultural Health
  - Aboriginal Health
  - Women's Health
- Level 10
  - The George Institute for International Health
- Level 11 RPAH Executive Offices
  - CSAHS/SWSAHS Executive Offices

14. Page Building
- RPAH Drug Health Services
- Brown St Out-Patients Department

15. General Outpatients Building

16. Heart Research Institute

21 Building 21

26. Audio Visual Department

27. Radiation Oncology Department
- All outpatient clinics for Radiation Oncology

28. Engineering Services Department

31. Endocrine Research Facility

41. Lucas Street Child Centre

42. Queen Mary Building

44. Staff Car Park

51. Sydney University School of Nursing

63. Albert Pavilion
- Emergency Department
- Paediatric Emergency Department
- Paediatric Unit
- Nuclear Medicine Unit

64. Administration Building
- RPAH Security and Parking Services

65. Victoria Pavilion
- Pharmacy
- Central Sydney Laboratory Services

68. Medical Centre
- Specialist Outpatient Rooms

72. RMO's Education Centre
- Kerry Packer Education Centre
- Susman Library
- Learning and Development Unit

75. "E" Block
- Enquiries Counter
- Radiology Department
- Discharge Lounge
- Volunteers Centre
- Nursing Administration Office
- Inpatient Ward Areas
- Operating Theatres

88. Gloucester House
- Sydney Cancer Centre
- Ambulatory Care Cancer Services

89. Clinical Services Block
- Jacaranda Hospital Cafeteria
- Intensive Care Services
- Ambulatory Care Clinics
- RPAH Women and Babies Hospital
- Delivery Ward/Birth Centre

92. Missenden Unit Psychiatry Services

93. Centenary Institute

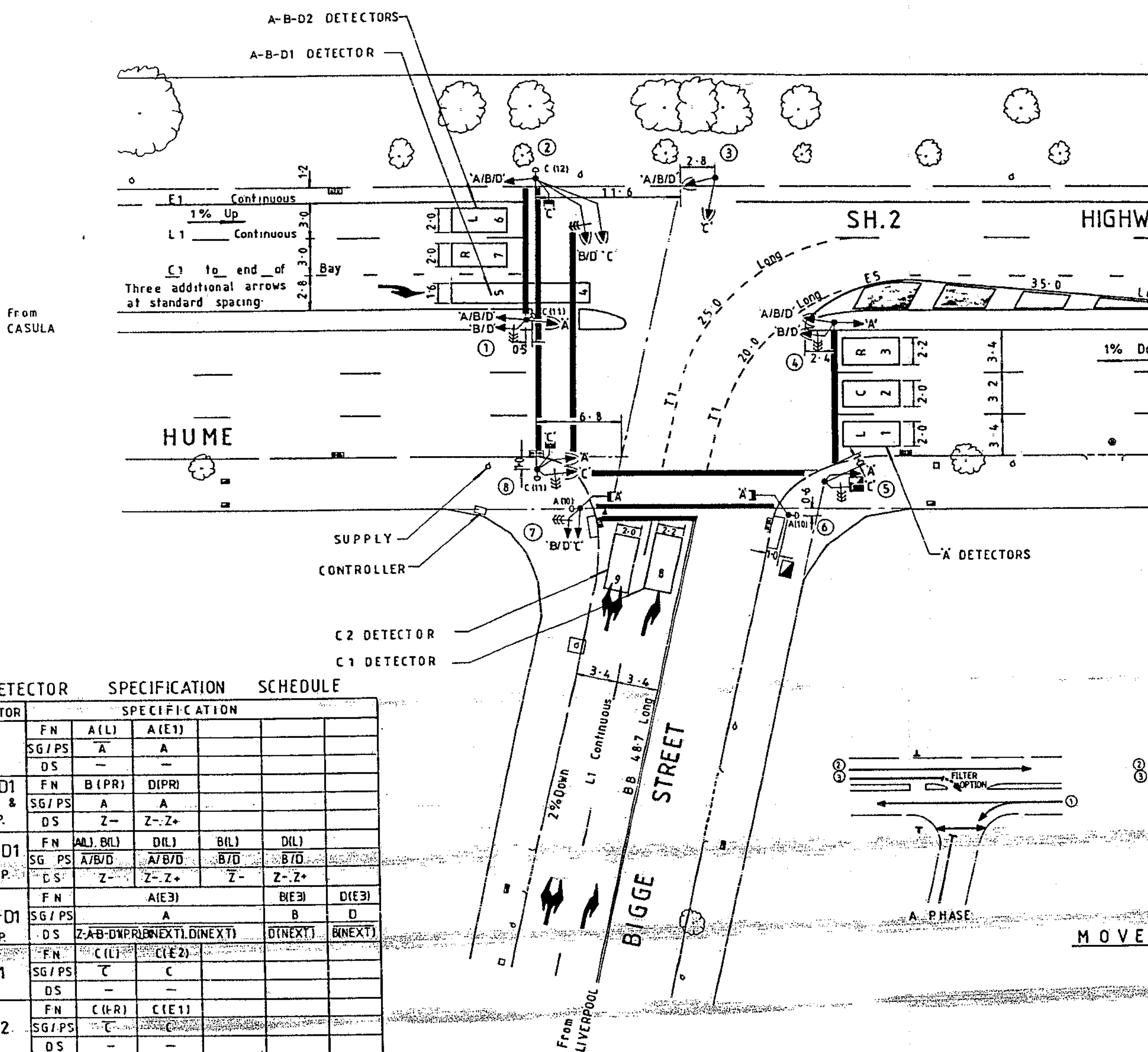
94. Haematology Dept and Blood Bank

95. RPAH Chapel

96. Blackburn Pavilion- Sydney University

EXISTING INTERSECTION PLANS

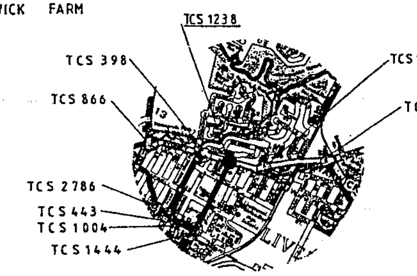
DATE IN SERVICE 20-6-77



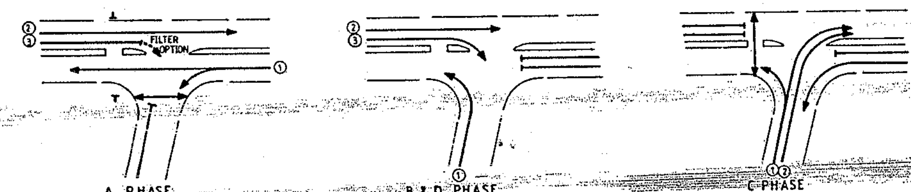
SPECIAL SIGNAL GROUP DISPLAY CHART VD018-8

SIGNAL GROUP	TABLE TYPE	REMARKS
A / B/D	3	
B/D(RT)	39	TIMED RA PROTECTION FOR 'A' PEDS, Z-FILTER OPTION.
B/D(LT)	12	Timed R.A. protection for 'C' peds.*
C (LT)	21	Timed R.A. protection for 'A' peds.

* PB ON POST 2 EXTENDS THE RED ARROW, SUBJECT TO TIMER.



LOCALITY SKETCH
ISG. CO-ORDINATES
E293290—N1245900



MOVEMENT

DETECTOR SPECIFICATION SCHEDULE

DETECTOR		SPECIFICATION				
A	FN	A(L)	A(E1)			
	SG/PS	A	A			
	DS	–	–			
A-B-D1 APP. & DEP.	FN	B(PR)	D(PR)			
	SG/PS	A	A			
	DS	Z–	Z–.Z+			
A-B-D1 APP.	FN	A(L).B(L)	D(L)	B(L)	D(L)	
	SG PS	A/B/D	A/B/D	B/D	B/D	
	DS	Z–	Z–.Z+	Z–	Z–.Z+	
cont. A-B-D1 APP.	FN	A(E3)			B(E3)	D(E3)
	SG/PS	A			B	D
	DS	Z-A-B-D(PR)B(NEXT).D(NEXT)			D(NEXT)	B(NEXT)
C1	FN	C(L)	C(E2)			
	SG/PS	C	C			
	DS	–	–			
C2	FN	C(I-R)	C(E1)			
	SG/PS	C	C			
	DS	–	–			
C PB	FN	C(PB)	A(L)			
	SG/PS	C(WALK)	C.C(WALK)			
	DS	–	A.B.D			
A PB	FN	A(PB)	C(L)			
	SG/PS	A(WALK)	A A(WALK)			
	DS	—	B.C.D			
A-B-D2	FN	A(L)	A(E2)		B(E2)	
	SG/PS	A/B/D	A		B	
	DS	-	B(NEXT).D(NEXT)		A(NEXT).D(NEXT)	

cont.					
A-B-D2	FN	D(E2)			
	SG/PS	D			
	DS	A(NEXT).B(NEXT)			

POST	TYPE	LENGTH	OFFSET	REMARKS
1	2	4·1	0·8	EXISTING
2	2	4·1	0·6	EXISTING
3	2	3·2	0·6	EXISTING
4	2	4·1	0·6	EXISTING
5	2	4·1	1·0	EXISTING
6	2	3·2	1·0	EXISTING
7	2	4·1	1·0	EXISTING
8	2	4·1	1·0	EXISTING

NOTES
1 Special regulatory stop signs to be placed on posts 6 and 7.
2 This site is S.C.A.T.S. linked.

DESIGN LAYOUT

A ORIGINAL ISSUE
B ISSUE JI. SWR.2124 12-10-89 B'(LT) LANTERN ADDED TO POST 3. A-B-D2 DETS. REDRAWN. DET. SPEC. SCH. AMENDED. DRAWN S.R. CHECKED G.R.
C Issue JISW659 29/3/95 Add-2 lants. on post 2 for B/D'&C' aspects. Remove B(LT) lant. from post 2. Provide D phase. Separate C pb on post 2. KK 19-4-95

REFERENCE PLANS	
Symbols & Abb.	BD003.5
Standard Posit.	BD001.3
Pres. Detectors	2C005.9
Type 2 Posts	PM202.1
Det. Schedule Expl.	VD018.10

SURVEYOR ....
DATE ....
FLD. BK. ....
U.B.D. REF 88 E3
DESIGNED G E
CHECKED R M
PASSED [signature] 20-4-95

THIS PLAN HAS BEEN TAKEN TO THE SITE AND IS APPROVED
[signature]
DIVISIONAL ENGINEER OPERATIONS
DATE 28 September 1989

ROADS & TRAFFIC AUTHORITY NSW
CITY OF LIVERPOOL
HUME HIGHWAY & BIGGE STREET
LIVERPOOL
T.C.S. No. 1238

REGION: SYDNEY
FILE No. 259TS158
No. OF SHEETS
SHEET No. 7
SUPERSEDES 1
ISSUE A B C
SCALE 1:200
Reg. No: 0002.259VV1238

REDUCTION RATIO

DATE IN SERVICE 30-6-77

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE (Refer VD018-8)

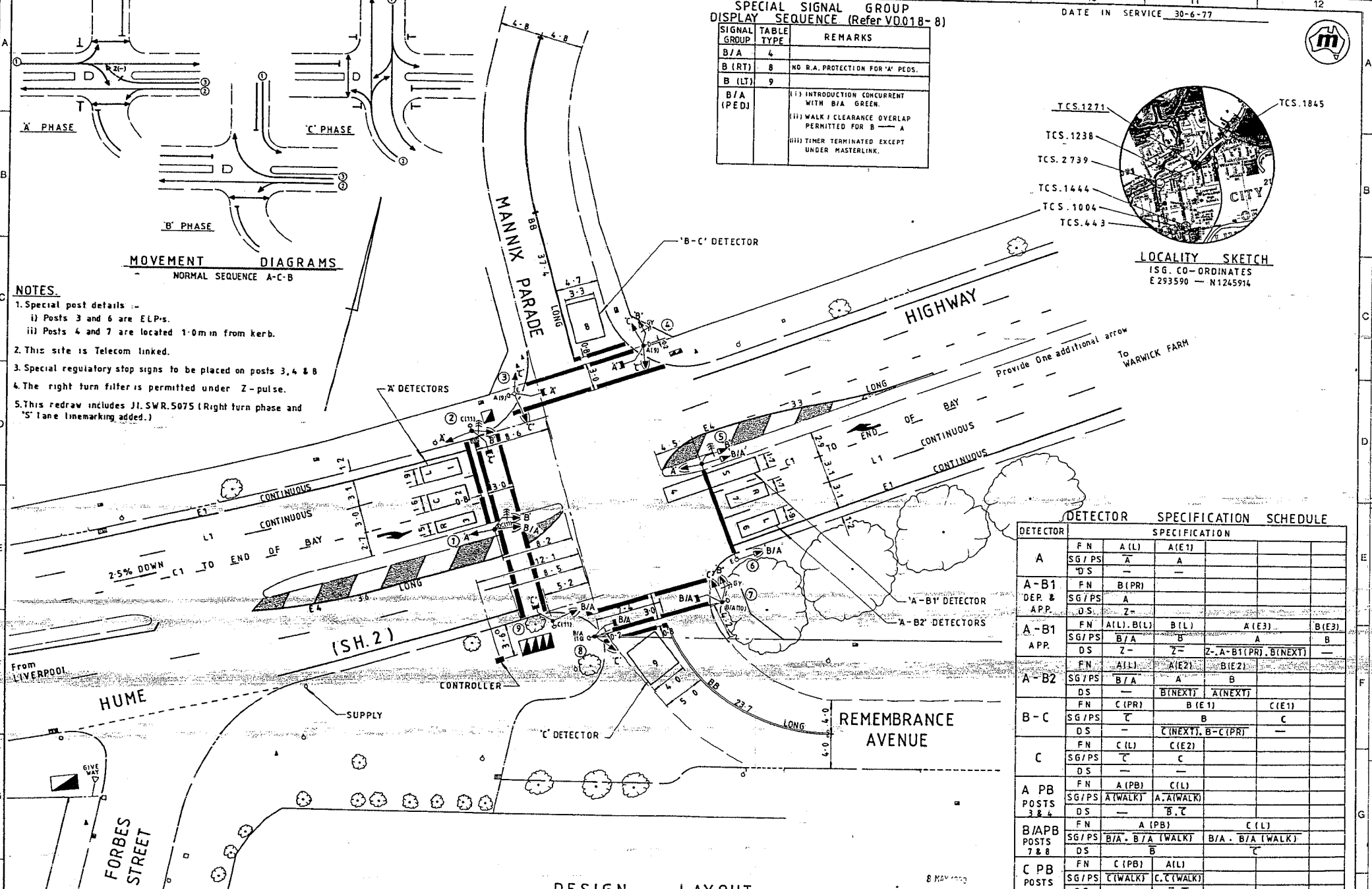
SIGNAL GROUP	TABLE TYPE	REMARKS
B/A	4	
B (RT)	8	NO R.A. PROTECTION FOR 'A' PEDS.
B (LT)	9	
B/A (PED)		(i) INTRODUCTION CONCURRENT WITH B/A GREEN. (ii) WALK / CLEARANCE OVERLAP PERMITTED FOR B — A (iii) TIMER TERMINATED EXCEPT UNDER MASTERLINK.

MOVEMENT DIAGRAMS
NORMAL SEQUENCE A-C-B

LOCALITY SKETCH
ISG. CO-ORDINATES
E 293590 — N 1245914

NOTES.

1. Special post details :-
   i) Posts 3 and 6 are ELPs.
   ii) Posts 4 and 7 are located 1·0m in from kerb.
2. This site is Telecom linked.
3. Special regulatory stop signs to be placed on posts 3, 4 & 8
4. The right turn filter is permitted under Z-pulse.
5. This redraw includes JI.SWR.5075 (Right turn phase and 'S' lane linemarking added.)



DESIGN LAYOUT

DETECTOR SPECIFICATION SCHEDULE

DETECTOR	SPECIFICATION					
A	F N	A (L)	A(E1)			
	SG / PS	A	A			
	D S	—	—			
A-B1 DEP. & APP.	F N	B(PR)				
	SG/PS	A				
	D S	Z-				
A-B1 APP.	F N	A(L). B(L)	B (L)	A(E3)		B(E3)
	SG/PS	B/A	B	A		B
	DS	Z-	Z-	Z-.A-B1(PR). B(NEXT)		—
A-B2	F N	A(L)	A(E2)	B(E2)		
	SG/PS	B/A	A	B		
	DS	—	B(NEXT)	A(NEXT)		
B-C	F N	C(PR)	B (E1)		C(E1)	
	SG/PS	C	B		C	
	DS	—	C(NEXT). B-C(PR)		—	
C	F N	C (L)	C(E2)			
	SG/PS	C	C			
	DS	—	—			
A PB POSTS 3 & 4	F N	A (PB)	C(L)			
	SG/PS	A(WALK)	A.A(WALK)			
	DS	—	B.C			
B/APB POSTS 7 & 8	F N	A (PB)		C (L)		
	SG/PS	B/A. B/A (WALK)		B/A. B/A (WALK)		
	DS	B		C		
C PB POSTS 1,2 & 9	F N	C (PB)	A(L)			
	SG/PS	C(WALK)	C.C(WALK)			
	DS	—	A.B			

A ORIGINAL ISSUE
'B' Issue: JI.SWR.2120 Detectors relocated. Movement diagram altered. SSDD.5 chart altered
Drawn: J.B Checked: G.R

REFERENCE PLANS		SURVEYOR	
Symbols & Abb.	BD003.5	DATE	
Standard Posit.	BD001.3	FLD. BK	
Pres. Detectors	2C005.9	U.B.D. REF	88 03
Type 2 Posts	PM202.1	DESIGNED	G. EYRE.
Det. Schedule Expl.	VD018.10	CHECKED	G RUTTER
		PASSED	10-9-89

THIS PLAN HAS BEEN TAKEN TO THE SITE AND IS APPROVED
DIVISIONAL ENGINEER OPERATIONS
DATE 12 September 1989

ROADS & TRAFFIC AUTHORITY N.S.W.
CITY OF LIVERPOOL
HUME HIGHWAY (SH.2), MANNIX PDE. AND REMEMBRANCE AV. LIVERPOOL
T.C.S. No. 1271

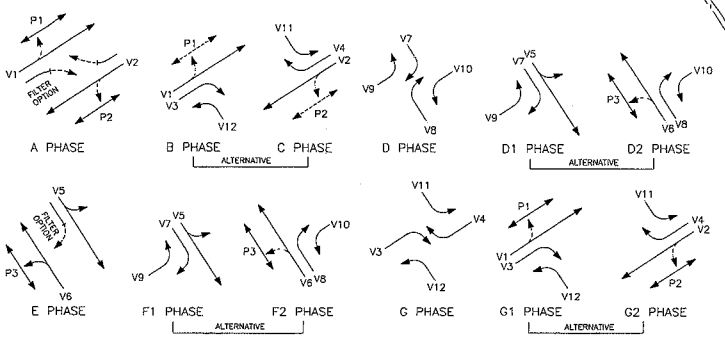
DIVISION: PARRAMATTA
FILE No. 259TS160
No. OF SHEETS 6
SHEET No.
SUPERSEDES SHEET 1
ISSUE B
SCALE 1:200
Reg. No. 0002 259.VV.1271

DRAWN BY CADD
DO NOT AMEND MANUALLY

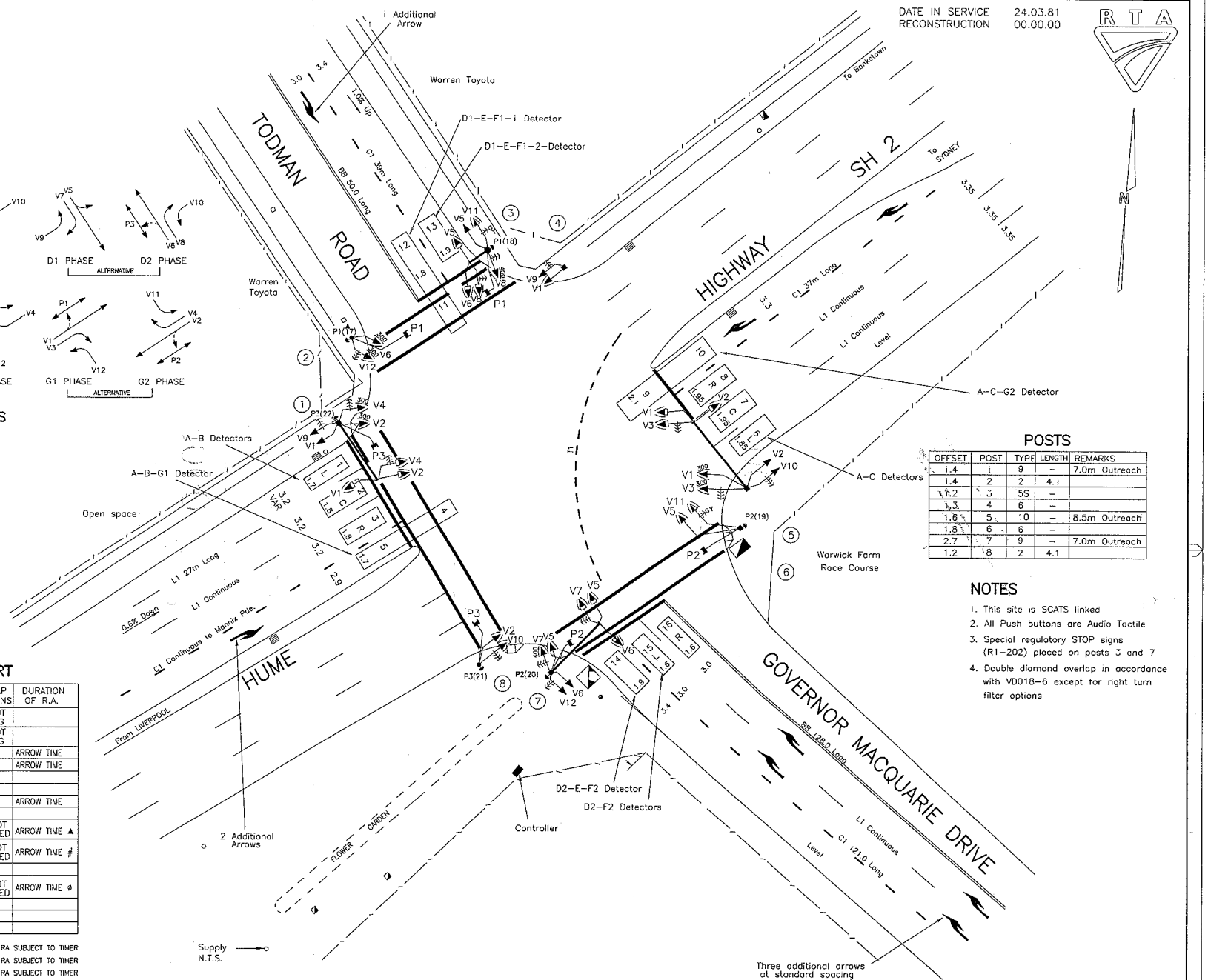
0002.259.W.1845 SHT-5E

DATE IN SERVICE 24.03.81
RECONSTRUCTION 00.00.00

RTA



MOVEMENTS



POSTS

OFFSET	POST	TYPE	LENGTH	REMARKS
1.4	1	9	–	7.0m Outreach
1.4	2	2	4.1	
1.2	3	5S	–	
3	4	6	–	
1.6	5	10	–	8.5m Outreach
1.8	6	6	–	
2.7	7	9	–	7.0m Outreach
1.2	8	2	4.1	

NOTES

1. This site is SCATS linked
2. All Push buttons are Audio Tactile
3. Special regulatory STOP signs (R1–202) placed on posts 3 and 7
4. Double diamond overlap in accordance with VD018–6 except for right turn filter options

SIGNAL GROUP / PHASE CHART

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					D2/E/F2		
V7				X	X			X						D/D1		ARROW TIME
V8				X		X			X					D/D2		
V9				X	X			X						D/D1,F1/G1×, F1/A×	×P1 NOT DEMANDED	ARROW TIME ▲
V10				X		X			X					D/D2,F2/G2×, F2/A×	×P2 NOT DEMANDED	ARROW TIME #
V11			X							X		X		C/G2,C/G		
V12		X								X	X			G/G1,B/D2×, B/E×	×P3 NOT DEMANDED	ARROW TIME ø
P1	X	X									X			G1/A/B		
P2	X		X									X		G2/A/C		
P3						X	X		X					D2/E/F2		

▲ PUSH BUTTON ON POST 3 EXTENDS RA SUBJECT TO TIMER
PUSH BUTTON ON POST 7 EXTENDS RA SUBJECT TO TIMER
ø PUSH BUTTON ON POST 1 EXTENDS RA SUBJECT TO TIMER

A	ORIGINAL ISSUE	
B	ISSUE JI SW 5601 26 2 93 SDO PHASING ALTERED: PHASING MOV DIAGRAMS SIP CHART M.A.C. TSDS6 CHECKED: G.E.	
C	ISSUE J/1 YEN 95/23 W.A.E. POST No 3,5 & 6 WERE TYPE 2 LAWSON/MEYER 5/95	
D	ISSUE GOVERNOR MACQUARIE DRIVE WIDENED AND D00 PHASING ADDED TTPA 24.03.02	
E	ISSUE PLAN ALTERED TO WAE ROADSTONE ENG. P/L 21/08/03	

PUBLIC UTILITY LEGEND		REFERENCE PLANS	
HYDRANT	□	SYMBOLS/ABBS.	VD003–8
STOP VALVE	△	STD. POSIT.	VD001–5
GAS VALVE	#	DET. SCHED. EXP	VD018–10
SEWER MANHOLE	Ⓢ	PRES. DETECT	VC005–17
TELECOM PIT	☑	SSG DIS. SEQ.	VD018–8
ELECT. LIGHT POLE	○		
POWER POLE	○		
STAY POLE	⊘		
TELEPHONE BOX	☎	SURVEYOR: Cardno MBK	
TELECOM PILLAR	◎	DATE : 2001	

U.B.D. Ref. MAP 88, D5
I.S.G. E: 294 175
CO-ORDS N: 1 246 220
DESIGNED
CHECKED
R.N.
SITE CHECKED
R.N.
RECOMMENDED

DESIGN APPROVAL
APPROVED
ROSS NETTLE
POSITION DIRECTOR
DATE 12.06.02
DESIGN PREPARED BY
TRANSPORT AND TRAFFIC PLANNING ASSOCIATES

RTA ACCEPTANCE
RECOMMENDED
POSITION .....
DATE .....
ACCEPTED
POSITION .....
DATE .....

Roads & Traffic Authority, N.S.W

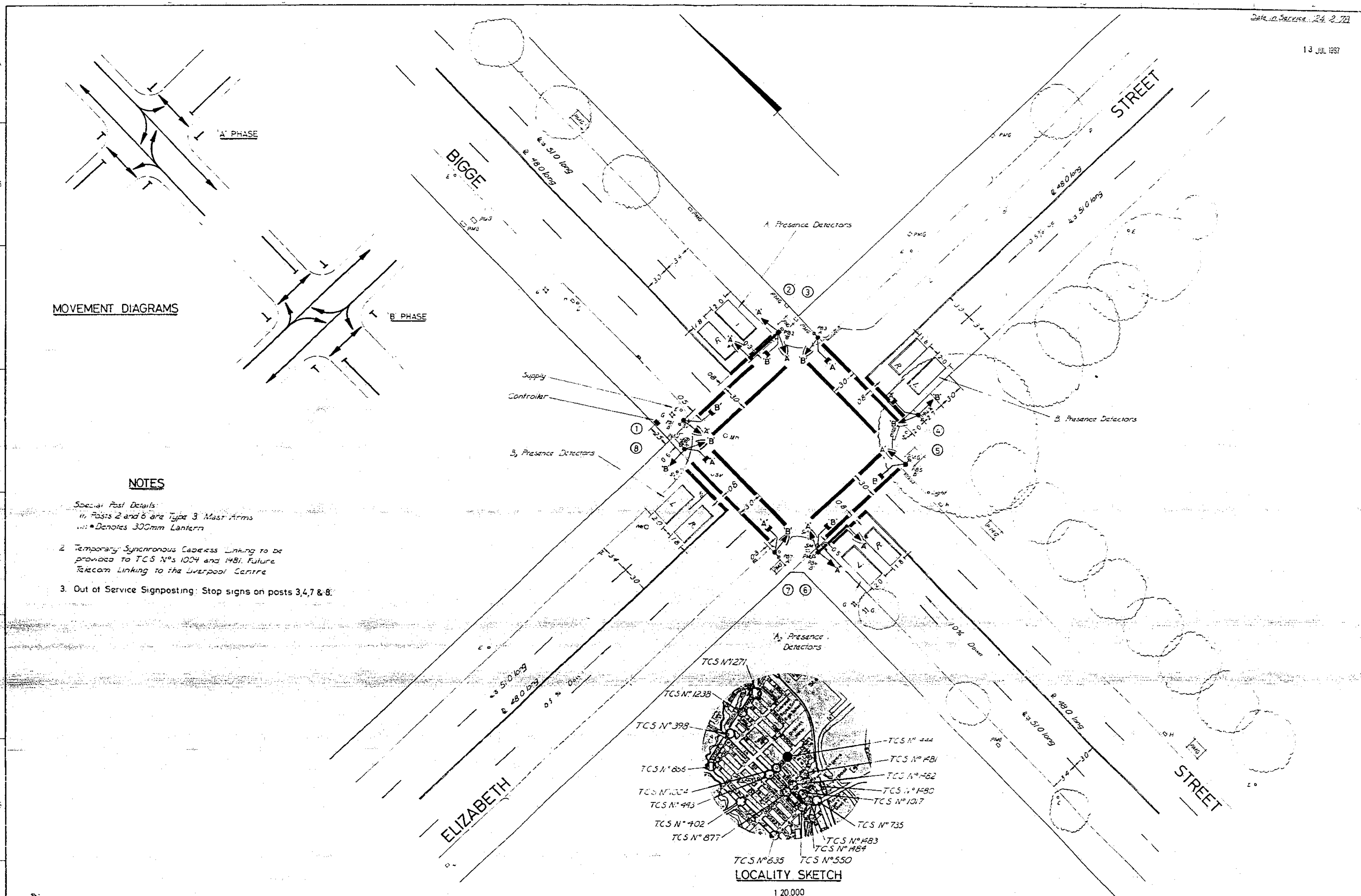
LIVERPOOL CITY COUNCIL AREA
S.H. NO.2–HUME HIGHWAY, TODMAN ROAD AND GOVERNOR MACQUARIE DRIVE
WARWICK FARM

DESIGN LAYOUT TCS No. 1845

EXISTING ☑ PROPOSED ☐
CADD FILE: W1845_5E.dgn
SCALE 5 0 (1:200) 5 10
ISSUE E
FILE 259 TS 273
SUPERSEDES SHEET/ISSUE 5D
REGN. 0002.259.W.1845
SHEET 5

Date in Service 24.2.78

13 JUL 1997



NOTES

1. Special Post Details:
   i) Posts 2 and 6 are Type 3 Mast Arms
   ii) • Denotes 300mm Lantern
2. Temporary Synchronous Cableless Linking to be provided to TCS N°s 1004 and 1481. Future Telecom Linking to the Liverpool Centre
3. Out of Service Signposting: Stop signs on posts 3,4,7 & 8.

REFERENCE PLANS	
Symbolic Abb	BD003-5
Standard Post	BD001-3
Standard Notes	PD018-3
Type 2 Posts	PM2021
Pres Detectors	2C005-9
Type M.A	1M203-11

SURVEYOR	
DATE	30.11.76
FIELD BK	3544L 3949
N.B.O REF	MAP 5153
DESIGNED	PLA 12.1.77
DRAWN	PLA 12.7.77
CHECKED	KH 8.6.77
CHECKED	DT 1.7.77
TRACED	
PASSED	

THESE DRAWINGS HAVE BEEN TAKEN TO THE SITE OF THE WORK AND ARE RECOMMENDED

APPROVED

B. H. Butcher

DATE 26-9-77

DEPT. OF MAIN ROADS, N.S.W.

ELIZABETH ST. & BIGGE ST.

– LIVERPOOL –

FILE N° 259 TS 110

T.C.S N° 1444

SCALE 1:200

FILE N° 259TS110

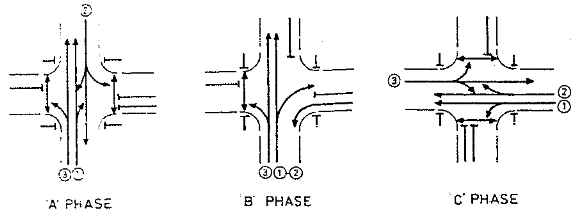
SHEET 1

DIVISION PARRAMATTA

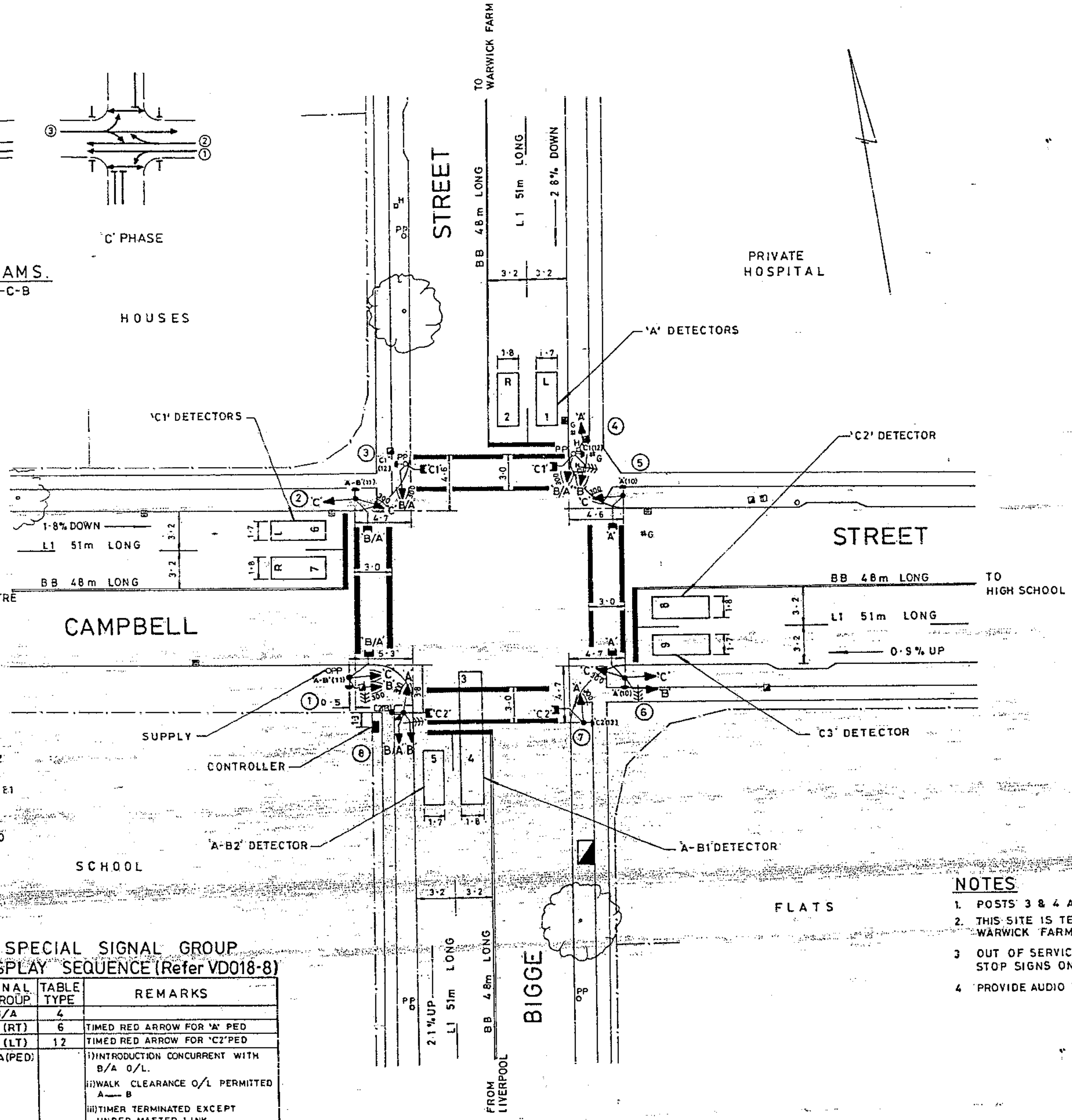
Reg. N° 7000.259.VV.1444

A ORIGINAL ISSUE
B Issue 16 ET 216 29 6 78 WAE
C Issue: J13179 12-6-87 Out of service signposting note added
Drawn CJ Checked LN

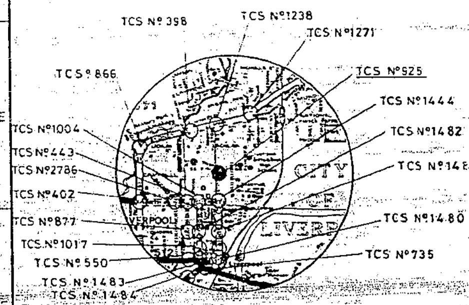
DATE IN SERVICE 24-8-88



MOVEMENT DIAGRAMS.
NORMAL SEQUENCE A-C-B



DESIGN LAYOUT



LOCALITY SKETCH
ISG MAP CO-ORDINATES
(293215E), (1245435N)

DETECTOR SPECIFICATION SCHEDULE

DETECTOR		SPECIFICATION		
A	F N	A(L)	A(E2)	
	SG/PS	Ā	A	
	D S	–	–	
A-B1 APPROACH & DEPARTURE	F N	B(PR1)	B(E2)	
	SG/PS	A	B	
	D S	–	A(NEXT)	
A-B1 APPROACH	F N	A(L).B(L)	A(E1)	B(E1)
	SG/PS	B/A	A	B
	D S	–	A-B(PR).B(NEXT)	Ā(NEXT)
A-B2	F N	A(L)	A(E3)	B(E3)
	SG/PS	B/Ā	A	B
	D S	–	B(NEXT)	Ā(NEXT)
C1	F N	C(L)	C(E3)	
	SG/PS	C̄	C	
	D S	–	–	
C2	F N	C(L)	C(E2)	
	SG/PS	C̄	C	
	D S	–	–	
C3	F N	C(PR2)	C(E1)	
	SG/PS	C̄	C	
	D S	–	–	
A PB POSTS 5 & 6	F N	A(PB)	C(L)	
	SG/PS	A(WALK)	A.Ā(WALK)	
	D S	–	B̄.C̄	
A-B PB POSTS 1 & 2	F N	A(PB).B(PB)	C(L)	
	SG/PS	B/A(WALK)	B/A.B/Ā(WK)	
	D S	–	C̄	
C1PB POSTS 3 & 4	F N	C(PB)	A(L)	
	SG/PS	C̄(WALK)	C.C̄(WALK)	
	D S	–	Ā.B̄	
C2 PB POSTS 7 & 8	F N	C(PB)	A(L)	
	SG PS	C̄(WALK)	C.C̄(WALK)	
	D S	–	Ā.B̄	

1

NOTES

1. POSTS 3 & 4 ARE POWER POLES.
2. THIS SITE IS TELECOM LINKED TO WARWICK FARM CABIN.
3. OUT OF SERVICE :- STOP SIGNS ON POSTS 1, 2, 5 & 6.
4. PROVIDE AUDIO TACTILE PUSH BUTTONS TO ALL POSTS.

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE (Refer VD018-8)

SIGNAL GROUP	TABLE TYPE	REMARKS
B/A	4	
B (RT)	6	TIMED RED ARROW FOR 'A' PED
B (LT)	12	TIMED RED ARROW FOR 'C2' PED
B/A(PED)		i) INTRODUCTION CONCURRENT WITH B/A O/L. ii) WALK CLEARANCE O/L PERMITTED A—B iii) TIMER TERMINATED EXCEPT UNDER MASTER LINK
C (PEDS)		TO CALL AND OPERATE INDEPENDENTLY

ISSUE	
A	ORIGINAL ISSUE
B	ISSUE [illegible] 28-4-88 C PHASE PEDS TO CALL AND OPERATE INDEPENDENTLY CHARTS AMENDED TO SUIT
C	ISSUE [illegible] PHASE SEQUENCE WAS A-B-C [illegible] PERMITTED SOUTH TO WEST
D	Issue [illegible] Post 8 repositioned Controller repositioned

REFERENCE PLANS	
Symbols & Abb	VD003-6
Standard Posit	VD001-5
Det. Schedule Exp	VD016-7

SURVEYOR	A. DEGIORGIO
DATE	30-6-87
FLD. BK.	
U.B.D. REF	MAP88 F3
DESIGNED	R. WASSELL
CHECKED	G. EYRE
PASSED	1-2-88

THIS PLAN HAS BEEN TAKEN TO THE SITE AND IS APPROVED

A/DIVISIONAL ENGINEER

DATE 5-2-88

DEPT. OF MAIN ROADS, N.S.W.

CITY OF LIVERPOOL
BIGGE ST. & CAMPBELL ST.
AT LIVERPOOL

T.C.S. Nº 925

DIVISION: PARRAMATTA

FILE Nº	Nº OF SHEETS	SHEET Nº
259TS301		1

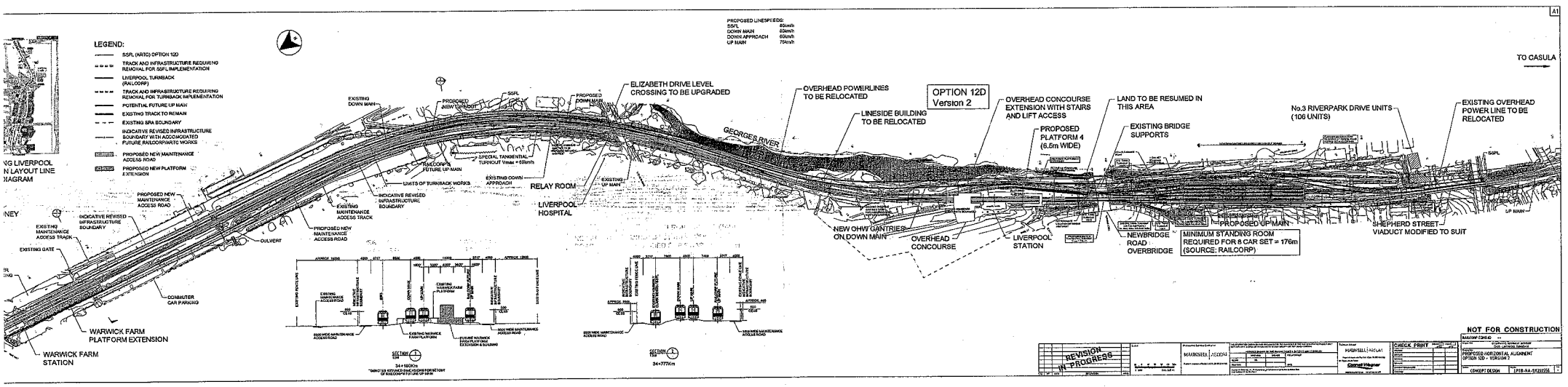
SCALE 1:200

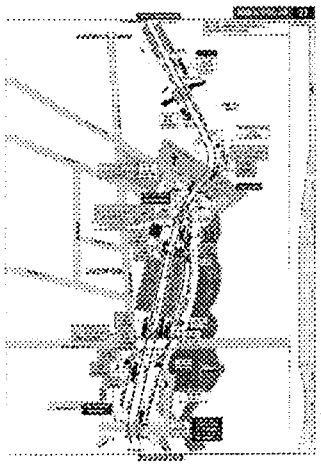
Reg. Nº 7000.259.VV.0925

SUPERSEDE

ISSUE A B C D

PROPOSED DEVELOPMENT OF RAILWAY CORRIDOR


LEGEND:
SSFL (ARTC) OPTION 12D
TRACK AND INFRASTRUCTURE REQUIRING REMOVAL FOR SSFL IMPLEMENTATION
LIVERPOOL TURNBACK (RAILCORP)
TRACK AND INFRASTRUCTURE REQUIRING REMOVAL FOR TURNBACK IMPLEMENTATION
POTENTIAL FUTURE UP MAIN
EXISTING TRACK TO REMAIN
EXISTING SRA BOUNDARY
INDICATIVE REVISED INFRASTRUCTURE BOUNDARY WITH ACCOMODATED FUTURE RAILCORP/ARTC WORKS
PROPOSED NEW MAINTENANCE ACCESS ROAD
PROPOSED NEW PLATFORM EXTENSION
PROPOSED LINESPEEDS:
SSFL 80km/h
DOWN MAIN 80km/h
DOWN APPROACH 60km/h
UP MAIN 70km/h
TO CASULA
OPTION 12D Version 2
ELIZABETH DRIVE LEVEL CROSSING TO BE UPGRADED
OVERHEAD POWERLINES TO BE RELOCATED
LINESIDE BUILDING TO BE RELOCATED
OVERHEAD CONCOURSE EXTENSION WITH STAIRS AND LIFT ACCESS
LAND TO BE RESUMED IN THIS AREA
EXISTING BRIDGE SUPPORTS
PROPOSED PLATFORM 4 (6.5m WIDE)
No.3 RIVERPARK DRIVE UNITS (106 UNITS)
EXISTING OVERHEAD POWER LINE TO BE RELOCATED
GEORGES RIVER
RELAY ROOM
LIVERPOOL HOSPITAL
NEW OHW GANTRIES ON DOWN MAIN
OVERHEAD CONCOURSE
LIVERPOOL STATION
NEWBRIDGE ROAD - OVERBRIDGE
PROPOSED UP MAIN
MINIMUM STANDING ROOM REQUIRED FOR 8 CAR SET = 176m (SOURCE: RAILCORP)
SHEPHERD STREET VIADUCT MODIFIED TO SUIT
WARWICK FARM PLATFORM EXTENSION
WARWICK FARM STATION
COMMUTER CAR PARKING
CULVERT
EXISTING GATE
EXISTING MAINTENANCE ACCESS TRACK
INDICATIVE REVISED INFRASTRUCTURE BOUNDARY
PROPOSED NEW MAINTENANCE ACCESS ROAD
EXISTING MAINTENANCE ACCESS TRACK
LIMITS OF TURNBACK WORKS
SPECIAL TANGENTIAL TURNOUT Vmax = 60km/h
EXISTING DOWN APPROACH
EXISTING UP MAIN
SECTION 34+660Km
SECTION 34+777Km
NOT FOR CONSTRUCTION
REVISION IN PROGRESS
MAUNSELL AECOM
CHECK PRINT
PROPOSED HORIZONTAL ALIGNMENT OPTION 12D - VERSION 2
CONCEPT DESIGN
EPIB-NA-SK20556



EXISTING LIVERPOOL STATION LAYOUT LINE DIAGRAM

LEGEND:

- SSFL (ARTC) OPTION 12D
- TRACK AND INFRASTRUCTURE REQUIRING REMOVAL FOR SSFL IMPLEMENTATION
- LIVERPOOL TURNBACK (RAILCORP)
- TRACK AND INFRASTRUCTURE REQUIRING REMOVAL FOR TURNBACK IMPLEMENTATION
- POTENTIAL FUTURE UP MAIN
- EXISTING TRACK TO REMAIN
- EXISTING SRA BOUNDARY
- INDICATIVE REVISED INFRASTRUCTURE BOUNDARY WITH ACCOMODATED FUTURE RAILCORP/ARTC WORKS
- PROPOSED NEW MAINTENANCE ACCESS ROAD
- PROPOSED NEW PLATFORM EXTENSION

FROM SYDNEY

EXISTING MAINTENANCE ACCESS TRACK

INDICATIVE REVISED INFRASTRUCTURE BOUNDARY

PROPOSED NEW MAINTENANCE ACCESS ROAD

EXISTING GATE

COMMUTER CAR PARKING

CULVERT

PROPOSED NEW MAINTENANCE ACCESS ROAD

EXISTING MAINTENANCE ACCESS TRACK

INDICATIVE REVISED INFRASTRUCTURE BOUNDARY

LIMITS OF TURNBACK WORKS

RAILCORP'S FUTURE UP MAIN

SPECIAL TANGENTIAL TURNOUT Vmax = 60km/h

PROPOSED NEW TURNOUT*

SSFL

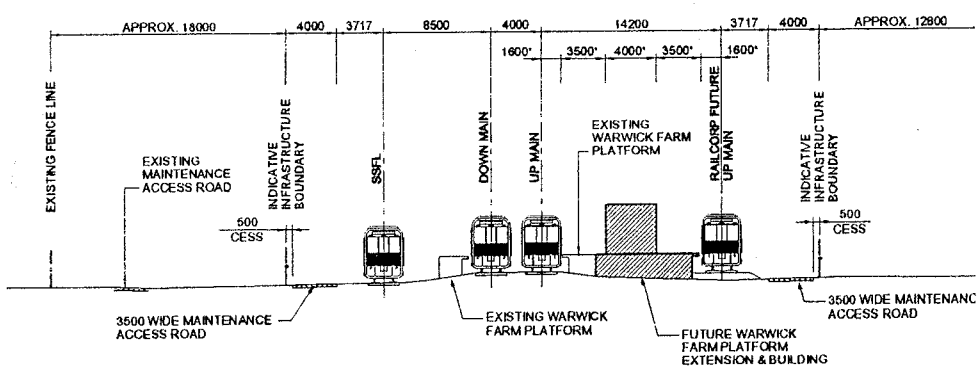
EXISTING DOWN MAIN

EXISTING DOWN APPROACH

COMMUTER CAR PARKING

WARWICK FARM PLATFORM EXTENSION

WARWICK FARM STATION



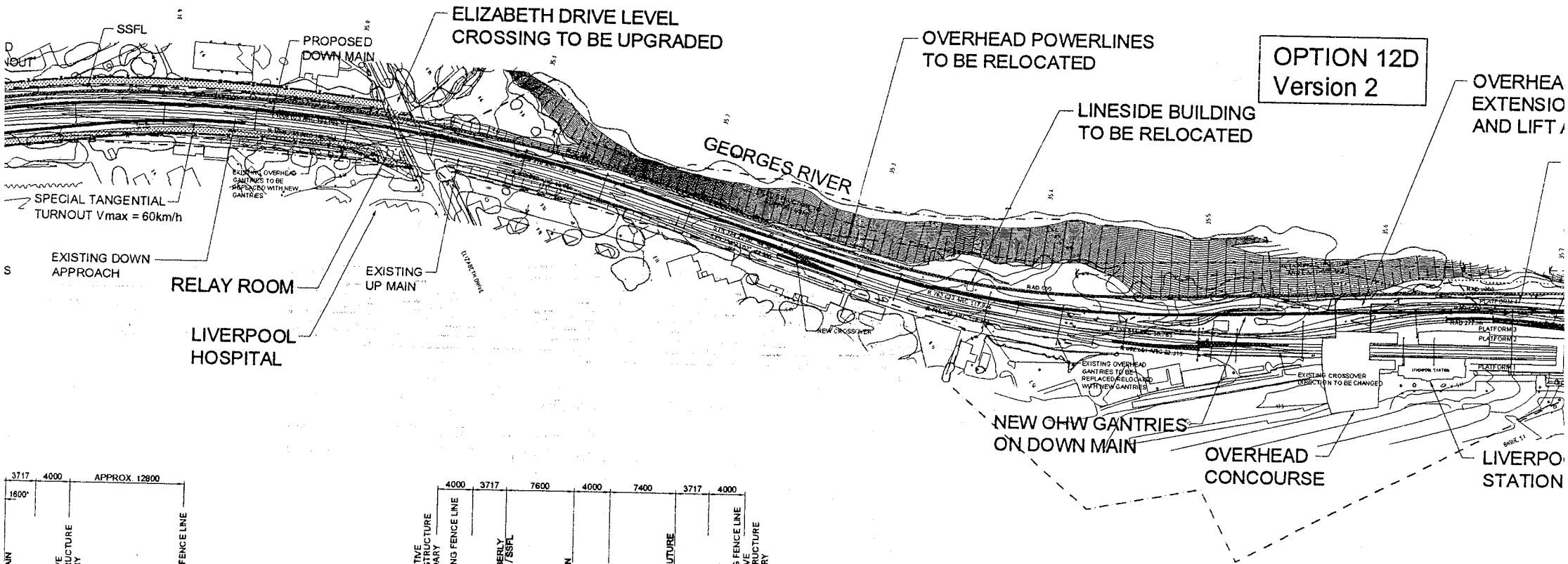
SECTION 1 1:200

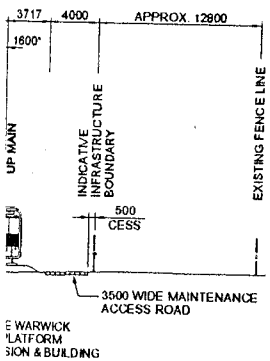
34+180Km

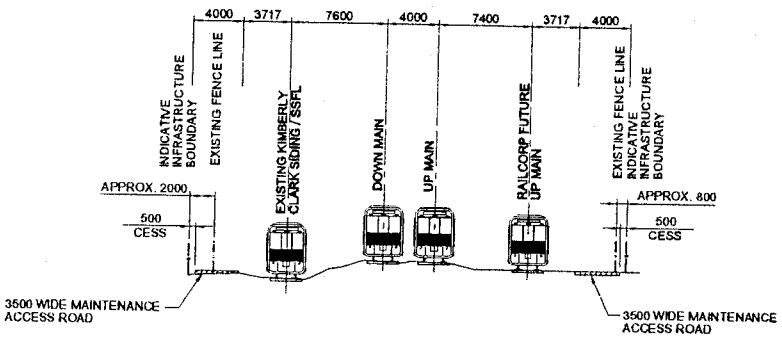
*DENOTES ASSUMED DIMENSIONS FOR SETOUT OF RAILCORP'S FUTURE UP MAIN

PROPOSED LINESPEEDS:

SSFL	80km/h
DOWN MAIN	80km/h
DOWN APPROACH	60km/h
UP MAIN	75km/h







SECTION 2
1:200

34+777Km