

Project: City Centre to Kimmage CBC
Note Traffic Modelling Assessment
Author James Thompson

Date 07 December 2017
Ref TRANSYT/CBC2

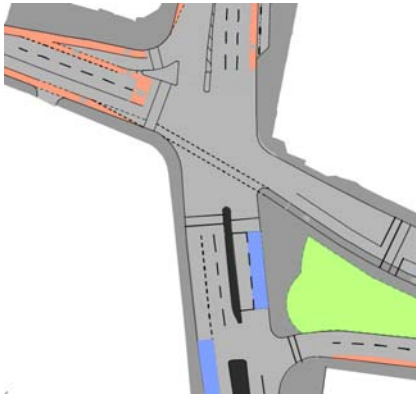
1 Introduction

- 1.1 The purpose of this note is to summarise the results of preliminary junction assessments for the proposed route options. These preliminary assessments have been undertaken using an industry standard TRANSYT 15 software for signal controlled junction assessment.
- 1.2 The standard approach is to run the bus lane on the nearside lane except at junctions where there is a left turn flare for general traffic where the bus lane is in lane 2.
- 1.3 In a number of cases the bus lane replaces a general traffic lane which has visible impact on performance of the junction but a modal shift towards public transport is a driving factor for this scheme going forward.
- 1.4 Assessments have taken the day peak flows to model operation. AM and PM peak flows can be tested when the design progresses and timings are derived from the results.
- 1.5 All junctions will be accessed and any recommendations will be provided in this report.

Model 1	Model 2	Model 3	Model 4	Model 5
<i>Patrick St & New St</i>	<i>Clanbrassil St / S.Circular</i>	<i>Harold Cross</i>	<i>Kimmage Rd/ Sundrive Rd</i>	<i>Kenilworth Park</i>
<i>New St & Maplas Street</i> <i>(Not Modelled – no flow data available)</i>	<i>Emmet Bridge / Parnell Rd</i> <i>(Not Modelled – no flow data available)</i>	<i>Mount Angus Rd</i> <i>(Not Modelled – no flow data available)</i>		

- 1.6 This note will also highlight the sensitivity of junction performance to current traffic levels, thereby identifying any design decisions that should be considered in future design stages
- 1.7 The results will present the Degree of Saturation (DoS) for each lane, which is the measure of how much demand the lane is experiencing compared to its total capacity. The Mean Max Queue (MMQ) is an indication of the typical maximum queue lengths that will be seen for that lane. However, when an approach is heavily oversaturated the MMQ value can increase exponentially and should be treated with caution as it may not give a true representation. Finally, the Practical Reserve Capacity (PRC) for the entire junction, gives an indication on the spare capacity there is through the junction or if a negative number is returned how much over- capacity the junction is.

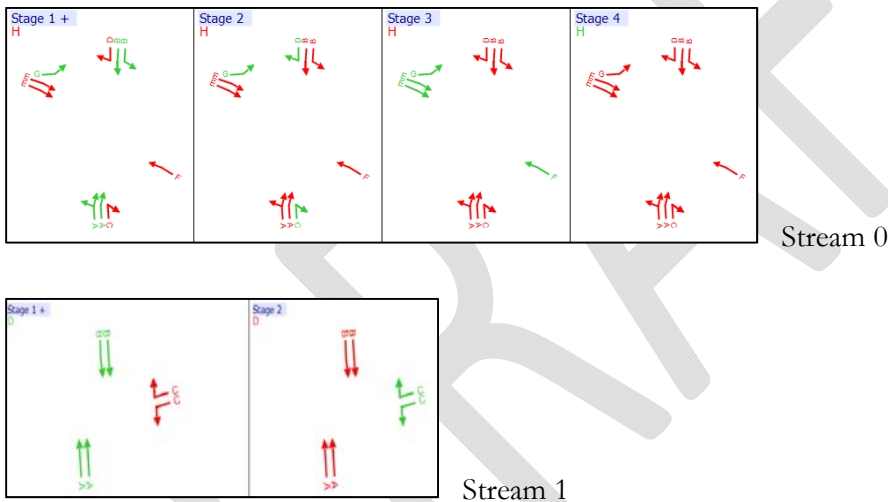
2 Patrick St / New St



- No Changes proposed to current alignment
- Proposed to introduce Bus lanes northbound and southbound

2.1 Proposed Staging:

2.1.1 The proposed staging for the junction that has been taken forward in the modelling process is shown in the Figure below. It is proposed the junction will operate in 2 streams to best optimise the signal timings



2.2 Flows

	1	2	3	4	Total
1	0	219	575	147	941
2	229	0	210	219	658
3	975	123	0	31	1129
4	323	448	0	0	771
Total	1527	790	785	397	-

Zones are allocated clockwise with the northern arm being zone A

2.3 Network Results:

2.3.1 A full analysis has been undertaken however for the purposes of this report only the Degree of Saturation and Mean Maximum Queue on each arm has been shown, to provide

a quick understanding on the capacity of each arm and if there is any excessive queuing in the Peak period.

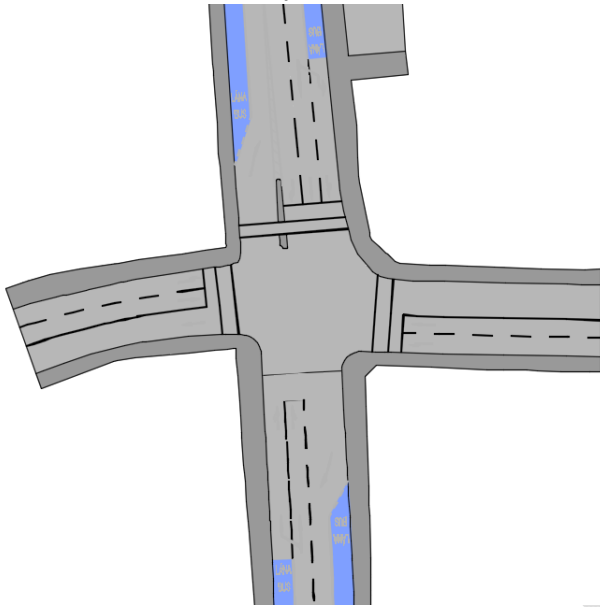
Arm	Lane	Pedestrian Stage Called Every Cycle		No Northbound Bus Lane	
		Deg Sat (%)	Mean Max Queue (m)	Deg Sat (%)	Mean Max Queue (m)
Northbound	Nearside (BUS with small flare for general)	74	75	89	160
	Lane 2	143	725	68	90
	Offside			66	20
Southbound	Nearside	30	20	28	25
	Lane 2 (BUS)	68	70	65	80
	Offside	82	25	82	30
Kevin Street Eastbound	Nearside - Slip	56	20	55	30
	Lane 2	73	35	78	45
	Offside	73	35	78	45
Kevin Street Westbound	Left	25	25	29	25
	Right	45	45	54	25
	Ahead	41	15	47	15
PRC (%)		-37		1	

- 2.3.1 The results show that having a nearside bus lane on the northbound approach breaking only 25 m from the stop line causes significant queuing and bottlenecking on the offside lane. The current scenario has the bus lane ceasing 75 m from the stop line which significantly improves the operation of the junction and reduces queuing in all scenarios.
- 2.3.2 The alternative creates queues of 160 m on the nearside lane but this takes away from the bus priority.
- 2.3.3 The results are with an all-red pedestrian stage operating which when not demanded makes the junction becomes within capacity with the reduced length of bus lane scenario only.

Recommendations:

- 2.3.4 No further recommendations.

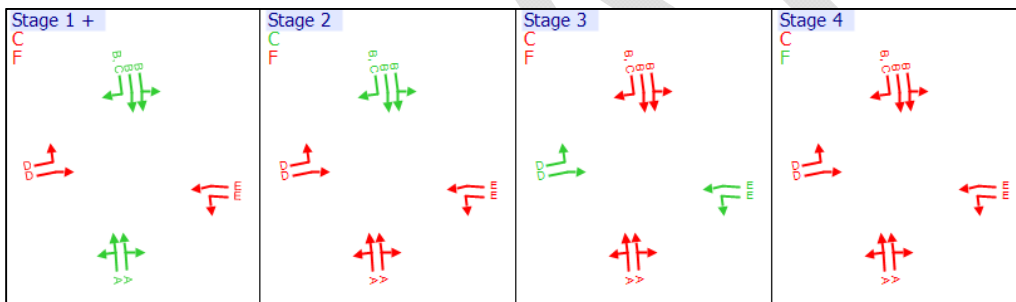
3 Clanbrassil Street / South Circular Rd



No change from current arrangement proposed.

3.1 Proposed Staging:

3.1.1 The proposed staging for the junction that has been taken forward in the modelling process is shown in the Figure below.



3.2 Flows

\	A	B	C	D	Total
A	0	60	166	47	273
B	0	0	190	116	306
C	379	21	0	96	496
D	146	300	0	0	446
Total	525	381	356	259	-

Zones are allocated clockwise with the northern arm being zone A

3.3 Network Results:

3.3.1 A full analysis has been undertaken however for the purposes of this report only the Degree of Saturation and Mean Maximum Queue on each arm has been shown, to provide a quick understanding on the capacity of each arm and if there is any excessive queuing in the Peak period.

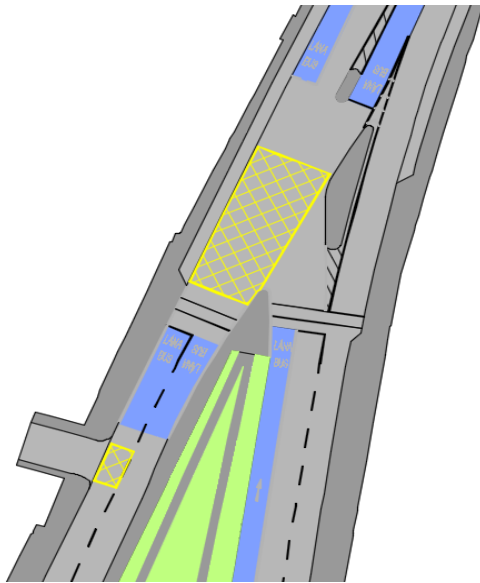
Arm	Lane	Pedestrian Stage Called Every Cycle	
		Deg Sat (%)	Mean Max Queue (m)
Clanbrassil St Northbound	Nearside	42	45
	Offside	16	15
Clanbrassil St Southbound	Nearside	21	20
	Lane 2	6	5
	Offside	6	5
South Circular Eastbound	Nearside	44	25
	Offside	73	60
South Circular Westbound	Nearside	61	35
	Offside	29	20
PRC (%)		19	

3.3.2 The results above indicate that the junction will operate within capacity. The downstream junction of Emmet Bridge / Parnell Road is a distance of 250m away. With the northbound queue suggested to be only 45m then there should be no blocking back from this junction.

Recommendations:

Although there is no indication of blocking back from this junction it is recommended that the Emmet Bridge junction downstream is modelled when flow data becomes available.

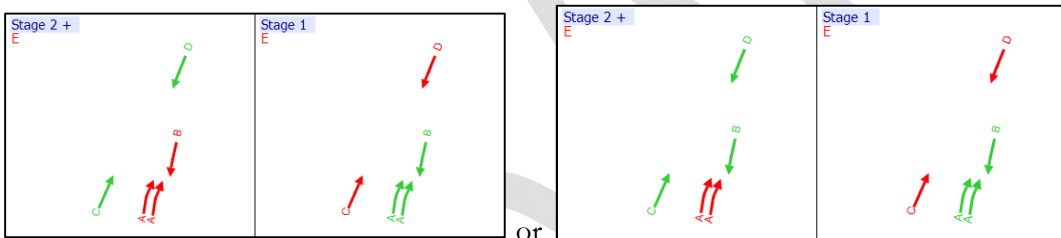
4 Harolds Cross



- Currently general traffic can use both carriageways on either side of the park.
- It is proposed to create a bus gate on the western side of the park.

4.1 Proposed Staging:

4.1.1 The proposed staging for the junction that has been taken forward in the modelling process is shown in the Figure below.



Pedestrian stage Demanded

Pedestrian Stage not called

4.2 Flows

	A	B	C	Total
A	0	508	0	508
B	1093	0	0	1093
C	0	0	0	0
Total	1093	508	0	-

Zones are allocated clockwise with the northern arm being zone A

4.3 Network Results:

4.3.1 A full analysis has been undertaken however for the purposes of this report only the Degree of Saturation and Mean Maximum Queue on each arm has been shown, to provide a quick understanding on the capacity of each arm and if there is any excessive queuing in the Peak period.

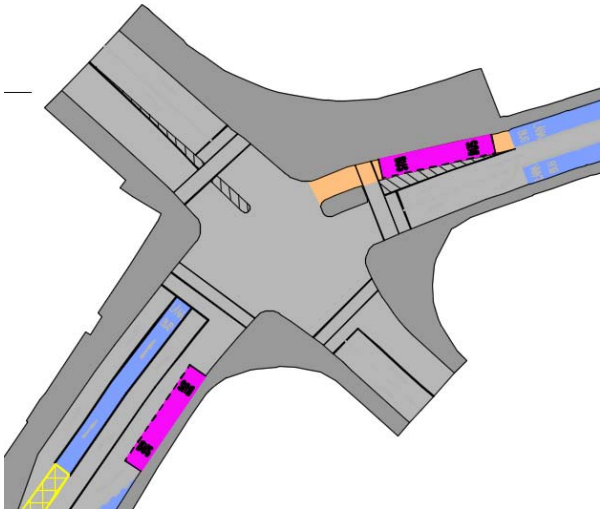
Arm	Lane	Pedestrian Stage Called Every Cycle	
		Deg Sat (%)	Mean Max Queue (m)
Northbound	Nearside (BUS)	3	6
	Offside	87	180
Northbound Bus Gate	Nearside	27	6
Southbound	Nearside (BUS)	28	6
	Offside	41	40
PRC (%)		3	

4.3.2 The junction operates at capacity with the pedestrian cycle being called every cycle. If the pedestrian stage is not called the junction has a PRC of 29% and the northbound offside lane's Mean Maximum Queue reduces to 75m.

Recommendations:

4.3.3 No further recommendations

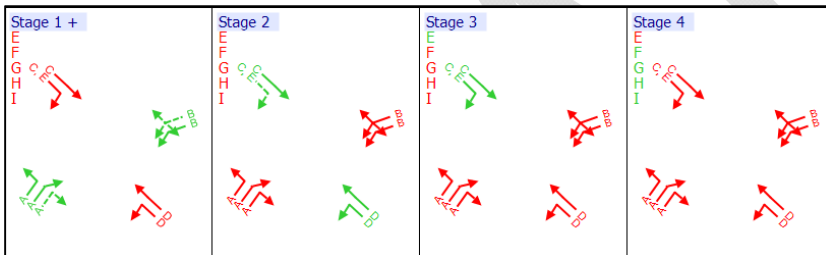
5 Kimmage Rd / Sundrive Rd



The northbound approach has been widened into 3 lanes with the ahead (middle) lane now restricted for bus only to go ahead

5.1 Proposed Staging:

5.1.1 The proposed staging for the junction that has been taken forward in the modelling process is shown in the Figure below.



5.2 Flows

	A	B	C	D	Total
A	0	6	207	102	315
B	0	0	47	302	349
C	0	71	0	86	157
D	0	347	75	0	422
Total	0	424	329	490	-

Zones are allocated clockwise with the northern arm being zone A

5.3 Network Results:

5.3.1 A full analysis has been undertaken however for the purposes of this report only the Degree of Saturation and Mean Maximum Queue on each arm has been shown, to provide a quick understanding on the capacity of each arm and if there is any excessive queuing in the Peak period.

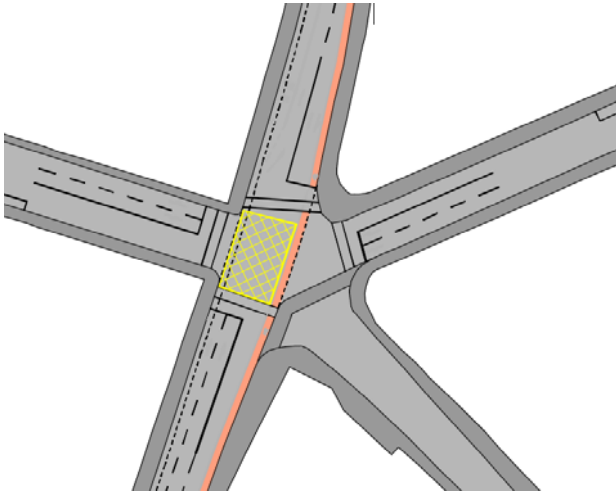
Arm	Lane	Pedestrian Stage Called Every Cycle	
		Deg Sat (%)	Mean Max Queue (m)
Kimmage Rd Northbound	Nearside	14	15
	Lane 2	1	5
	Offside	33	10
Kimmage Rd Southbound	Nearside	1	6
	Offside	65	60
Sundrive Eastbound	Nearside	42	50
	Offside	18	10
Sundrive Westbound	Nearside	8	10
	Offside	52	50
PRC (%)		38	

5.3.2 The results show that the junction operates within capacity with no excessive queuing. However, with the ahead movement now being restricted there has been no high level strategic reassignment of these flows. Sensitivity tests indicate that if 100% of these vehicles are reassigned to turn right then the junction becomes over capacity but if there is a 50:50 split in left and right turns the junction remains in capacity.

Recommendations:

- 5.3.3 It is therefore recommended that a reassignment exercise is carried out and the new flows modelled in TRANSYT.
- 5.3.4 There may be a need to separate the north and southbound movements for a safety element. By banning the ahead movement and replacing with arrow aspects this may indicate a priority right turn when they are conflicted by opposing traffic. If these stages were to be split the junction remains within capacity.

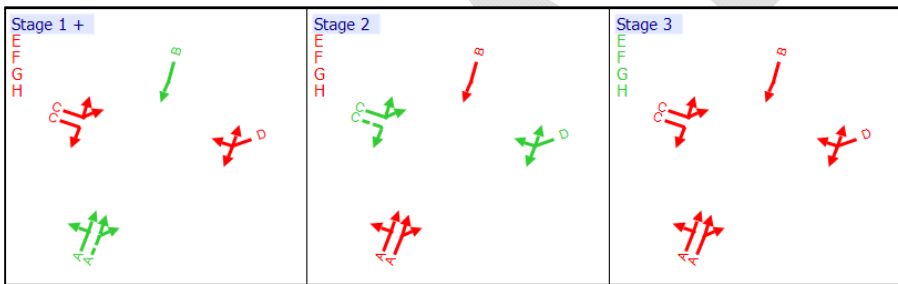
6 Kenilworth Park



The road alignment is to remain the same as the existing except with the closure of the fifth arm – Rathgar Avenue.

6.1 Proposed Staging:

6.1.1 The proposed staging for the junction that has been taken forward in the modelling process is shown in the Figure below.



6.2 Flows

	A	B	D	E	Total
A	0	0	291	0	291
B	63	0	27	108	198
D	504	66	0	74	644
E	26	197	52	0	275
Total	593	263	370	182	-

Zones are allocated clockwise with the northern arm being zone A

6.3 Network Results:

6.3.1 A full analysis has been undertaken however for the purposes of this report only the Degree of Saturation and Mean Maximum Queue on each arm has been shown, to provide a quick understanding on the capacity of each arm and if there is any excessive queuing in the Peak period.

Arm	Lane	Pedestrian Stage Called Every Cycle	
		Deg Sat (%)	Mean Max Queue (m)
Northbound	Nearside	10	6
	Offside	82	80
Southbound	Nearside	33	30
Eastbound	Nearside	68	30
	Offside	26	6
Westbound	Nearside	75	35
PRC (%)		10	

6.4 The results indicate the junction will operate within capacity with acceptable queuing.

DRAFT

TRANSYT OUTPUTS

TRANSYT 15

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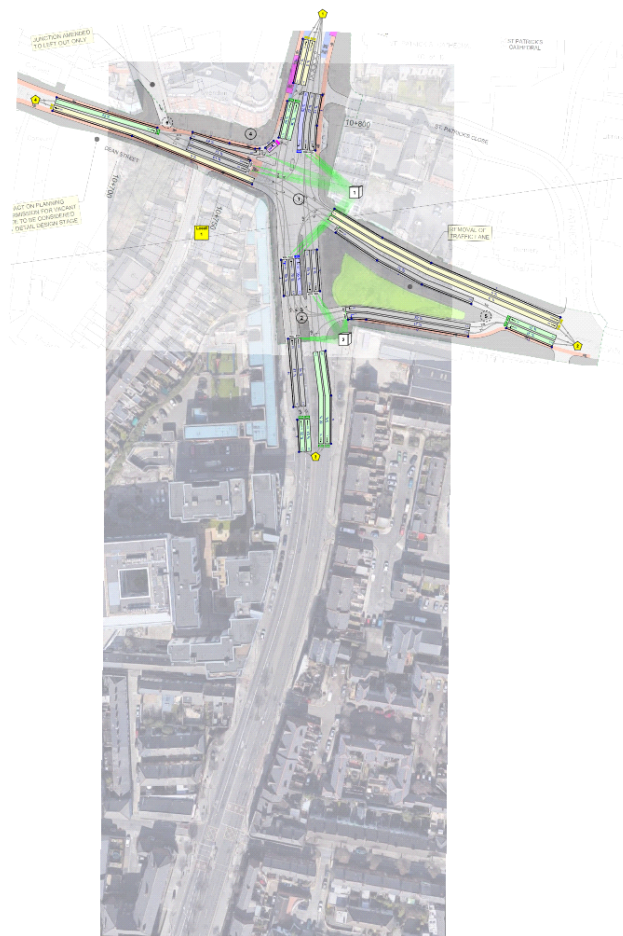
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Report generation date: 15/12/2017 10:00:35

- »Network Diagrams
- «A1 - Patrick St : D1 - (untitled)* :
- »Traffic Stream Results

Network Diagrams



Patrick Street
Cycletime 0s / 100s , Timesteps 99 / 100
Diagram produced using TRANSYT 15.5.1.7048

A1 - Patrick St D1 - (untitled)*

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (€ per hr)	Weighted cost of stops (€ per hr)	Performance Index (€ per hr)
08:00-09:00	1	1	89	1	694	1990	38	42.56	21.75	291.68	116.51	9.39	125.89
		2	70	29	561	2055	38	21.30	6.60	92.04	47.14	2.98	50.12
		3	66	37	122	1854	9	42.65	3.79	54.88	20.52	1.70	22.22
	2	1	72	26	219	1800	16	53.51	6.28	40.34	46.23	2.82	49.05
		3	31	188	219	1800	38	22.35	4.27	94.53	19.31	1.89	21.20
	3	2	72	25	575	2055	38	31.46	14.31	313.13	71.35	6.34	77.69
		3	82	10	147	1800	9	83.00	5.55	119.90	48.13	2.42	50.54
		4	61	49	224	2055	17	45.10	6.18	78.48	39.85	2.73	42.58
	4	2	61	49	224	2055	17	45.10	6.18	78.23	39.85	2.73	42.58
		5	1	0	Unrestricted	0	1800	66	0.00	0.00	0.00	0.00	0.00
	5	2	48	89	575	1800	66	2.20	12.32	108.34	4.99	2.61	7.60
		6	1	0	Unrestricted	0	1800	100	0.00	0.00	0.00	0.00	0.00
	6	2	38	136	785	2055	100	0.54	0.12	0.99	1.68	0.00	1.68
		7	1	0	Unrestricted	504	Unrestricted	100	0.00	0.00	0.00	0.00	0.00
	7	2	0	Unrestricted	285	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
		8	1	49	83	334	1800	74	17.61	4.58	53.89	23.20	2.99
	8	1	43	107	782	1800	100	0.77	0.17	1.98	2.37	0.00	2.37
	9	1	0	Unrestricted	397	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	46	94	835	1800	100	1.37	15.72	224.60	4.52	2.69	7.21
		2	40	124	723	1800	100	0.67	0.13	1.61	1.91	0.00	1.91
	11	1	47	91	210	1935	22	36.97	5.05	38.36	30.62	2.28	32.90
		2	59	52	238	1749	22	40.72	5.91	44.95	38.23	2.58	40.81
	12	1	47	90	570	1800	66	9.31	7.81	119.35	20.92	3.33	24.25
		2	64	40	569	1800	66	17.80	6.37	97.19	39.95	3.06	43.01
14	1	25	262	448	1800	100	0.33	0.04	1.04	0.59	0.00	0.59	
	2	12	640	219	1800	100	0.14	0.01	0.21	0.12	0.00	0.12	
15	1	37	141	334	894	100	10.70	2.11	105.56	14.10	2.79	16.89	
16	1	32	184	570	1800	100	0.46	0.07	2.84	1.04	0.00	1.04	
	2	43	108	569	1800	100	5.58	3.63	121.09	12.53	2.61	15.14	
17	1	0	Unrestricted	30	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00	
	2	0	Unrestricted	1528	Unrestricted	100	0.00	0.00	0.00	0.00	0.00	0.00	

TRANSYT 15

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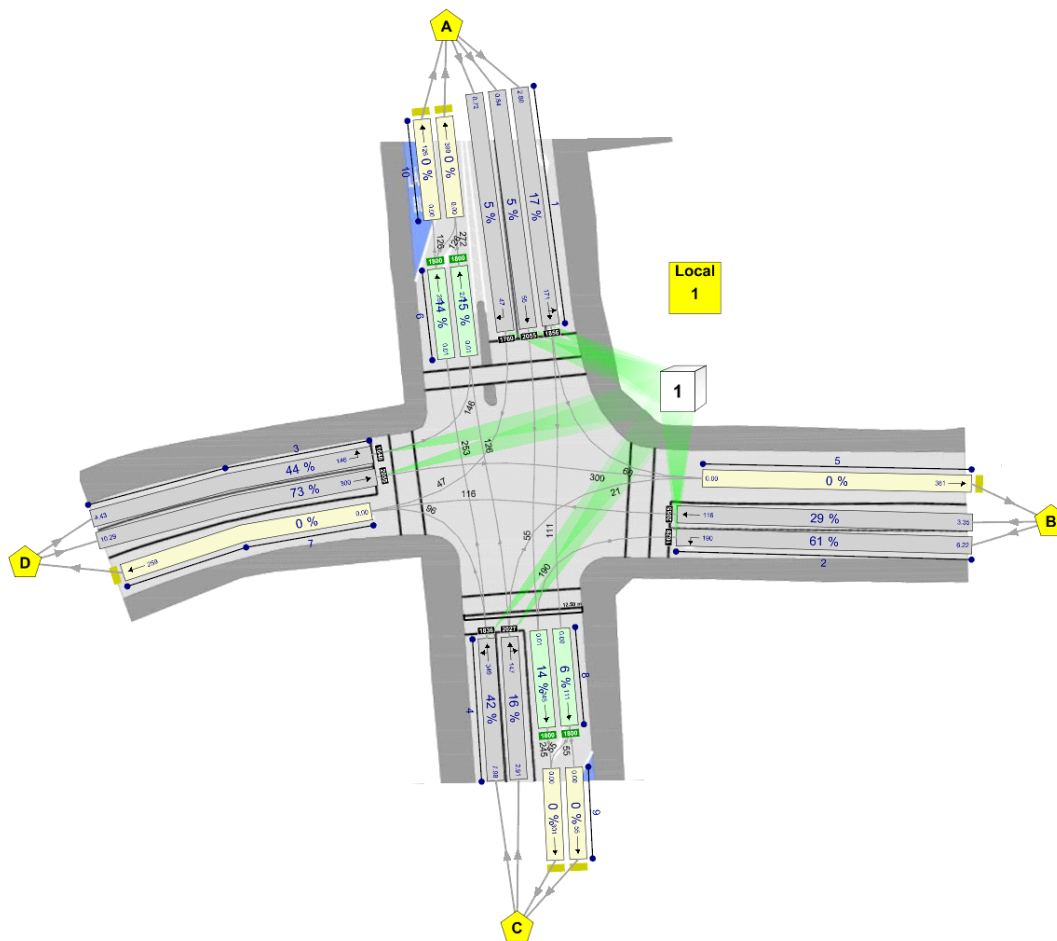
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- » Network Diagrams
- «A1 - Clanbrassil : D1 - (untitled)* :
- » Traffic Stream Results

Network Diagrams



(untitled)
Cycletime 0s / 120s , Timesteps 119 / 120
Diagram produced using TRANSYT 15.5.1.7048

A1 - Clanbrassil D1 - (untitled)*

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	17	440	170	1856	65	13.74	2.80	63.76	9.21	1.03	10.24
		2	5	1750	55	2055	65	12.60	0.84	19.14	2.73	0.31	3.04
		3	5	1754	47	1760	65	12.62	0.72	16.36	2.34	0.26	2.60
	2	1	61	48	190	1629	22	53.19	6.22	114.50	39.87	2.31	42.18
		2	29	206	116	2055	22	43.46	3.35	61.66	19.89	1.24	21.13
	3	1	44	103	146	1646	23	46.48	4.43	83.96	26.76	1.65	28.41
		2	73	23	300	2055	23	56.46	10.29	196.00	66.81	3.82	70.63
	4	1	42	114	348	1836	53	23.98	7.98	304.85	32.92	2.95	35.86
		2	16	458	147	2027	53	19.96	2.91	111.30	11.57	1.07	12.64
	5	1	0	Unrestricted	381	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	6	1	14	543	252	1800	120	0.16	0.01	0.17	0.16	0.00	0.16
		2	15	496	272	1800	120	0.18	0.01	0.23	0.19	0.00	0.19
	7	1	0	Unrestricted	259	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	8	1	6	1373	110	1800	120	0.07	0.00	0.03	0.03	0.00	0.03
		2	14	561	245	1800	120	0.16	0.01	0.17	0.15	0.00	0.15
	9	1	0	Unrestricted	55	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
		2	0	Unrestricted	300	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	126	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
		2	0	Unrestricted	398	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00

TRANSYT 15

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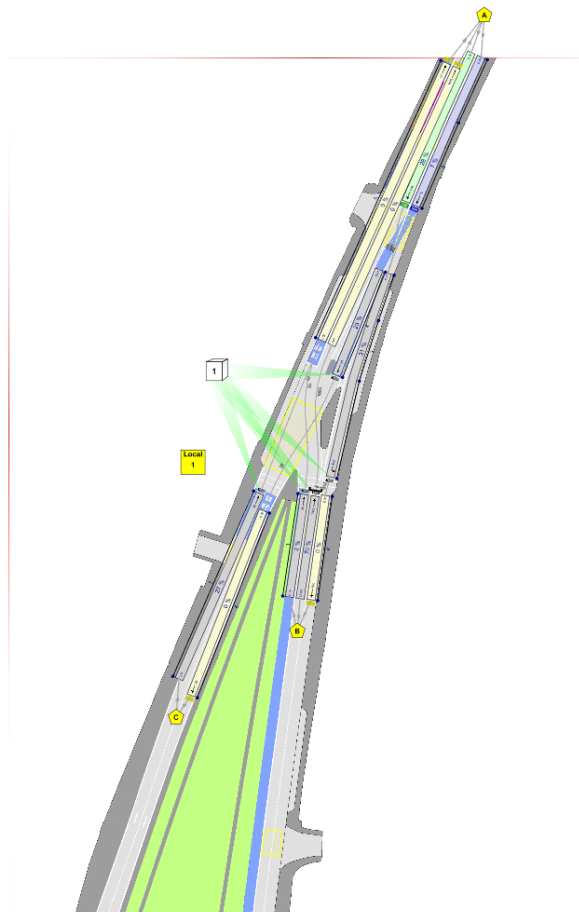
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- »Network Diagrams
- »Traffic Stream Results

Network Diagrams



Harold's Cross Park
Cycletime 0s / 120s , Timesteps 119 / 120
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Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (€ per hr)	Weighted cost of stops (€ per hr)	Performance Index (€ per hr)	
08:00-09:00	1	1	2	3911	35	1800	103	1.16	0.16	2.70	0.16	0.01	0.17	
		2	70	28	1093	1800	103	5.40	12.96	224.83	23.28	4.47	27.75	
	2	1	7	1186	70	1000	120	0.14	0.00	0.03	0.04	0.00	0.04	
		2	28	219	508	1800	120	0.39	0.06	0.61	0.79	0.00	0.79	
	3	1	31	195	550	1800	120	0.44	0.07	0.42	0.95	0.00	0.95	
	4	1	23	286	28	1800	7	57.68	0.91	8.75	6.37	0.09	6.46	
	5	1	0	Unrestricted	67	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	0	Unrestricted	1093	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	1	0	Unrestricted	28	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	1	27	238	32	1800	7	58.63	1.06	9.42	7.40	0.10	7.50	
8	1	0	Unrestricted	550	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

TRANSYT 15

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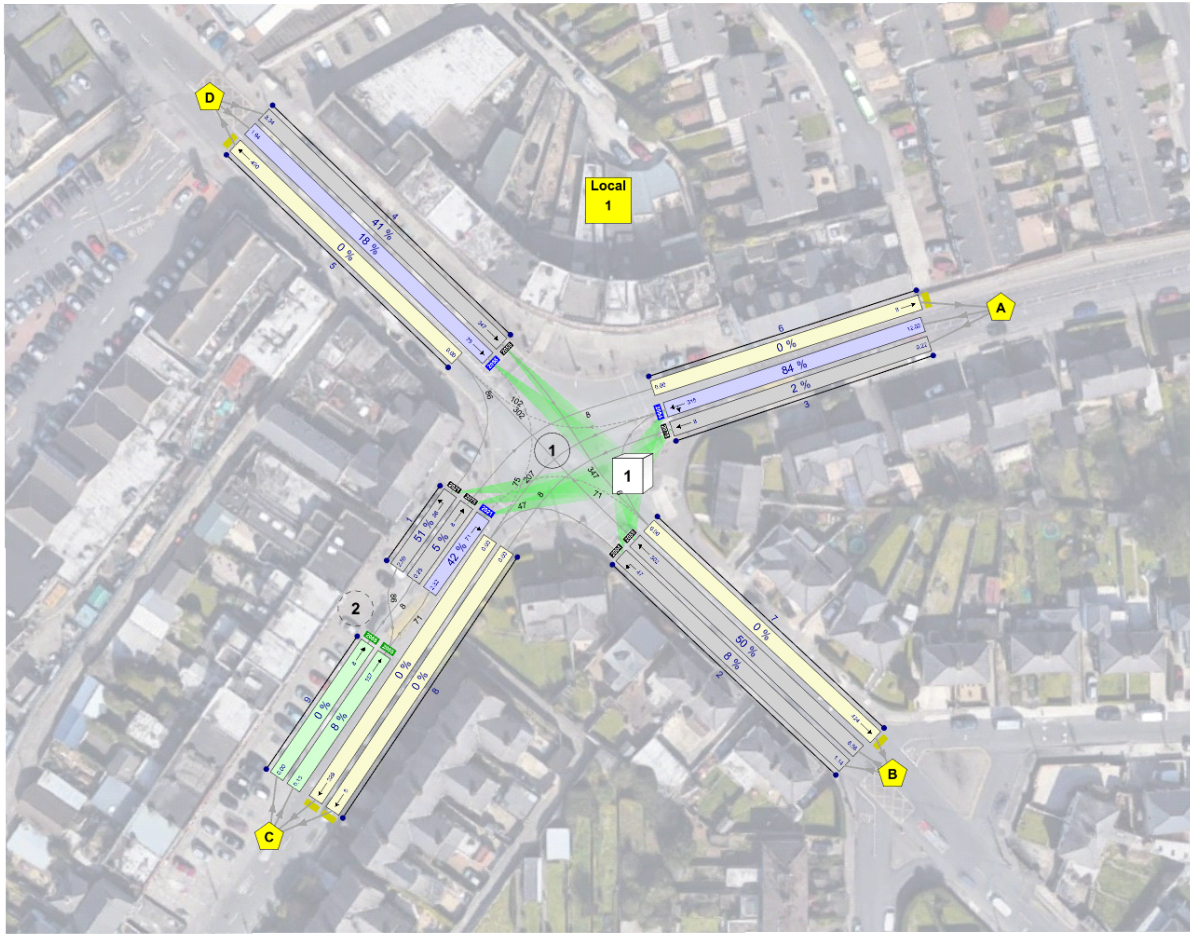
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»Network Diagrams

«A1 - Sundrive Rd : D1 - (untitled)* :

»Traffic Stream Results

Network Diagrams



(untitled)
 Cycletime 0s / 120s , Timesteps 119 / 120
 Diagram produced using TRANSYT 15.5.1.7048

A1 - Sundrive Rd D1 - (untitled)*

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (€ per hr)	Weighted cost of stops (€ per hr)	Performance Index (€ per hr)
08:00-09:00	1	1	51	76	86	2021	9	63.62	2.89	96.33	21.58	1.10	22.68
		2	5	1845	8	2075	9	51.38	0.25	8.19	1.62	0.02	1.64
		3	42	113	71	2021	9	59.97	2.32	77.39	16.79	0.88	17.68
	2	1	8	1019	47	2004	34	31.10	1.14	2.15	5.77	0.42	6.19
		2	50	79	302	2055	34	38.33	8.56	16.18	45.66	3.18	48.84
	3	1	2	4180	8	2075	21	40.53	0.22	0.47	1.28	0.02	1.30
		2	84	8	315	2054	21	69.69	12.02	25.72	86.59	4.45	91.04
	4	1	41	118	347	2055	48	26.79	8.34	14.64	36.66	3.08	39.74
		2	18	399	75	1019	48	34.13	1.94	3.40	10.10	0.72	10.82
	5	1	0	Unrestricted	490	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	6	1	0	Unrestricted	8	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	7	1	0	Unrestricted	424	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	8	1	0	Unrestricted	8	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
		2	0	Unrestricted	329	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	23019	8	2055	120	0.00	0.00	0.00	0.00	0.00	0.00
		2	8	1049	157	2055	120	0.13	0.13	0.48	0.08	0.05	0.13

<h1>TRANSYT 15</h1>
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- »Network Diagrams
- «A1 - Kennilworth : D1 - (untitled)* :
- »Traffic Stream Results

Network Diagrams



(untitled)
 Cycletime 0s / 90s . Timesteps 89 / 90
 Diagram produced using TRANSYT 15.5.1.7048

A1 - Kennilworth D1 - (untitled)*

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (€ per hr)	Weighted cost of stops (€ per hr)	Performance Index (€ per hr)
08:00-09:00	1	1	68	33	223	1644	17	44.57	5.84	109.96	39.21	2.87	42.08
		2	26	246	52	1000	17	33.53	1.13	21.26	6.88	0.56	7.44
	2	1	33	171	291	2075	37	18.50	4.93	70.37	21.24	2.42	23.65
	3	1	75	20	198	1319	17	53.48	5.75	87.92	41.77	2.81	44.58
	4	1	10	767	74	1689	37	16.03	1.12	2.75	4.68	0.55	5.23
		2	82	10	570	1647	37	34.25	14.29	229.46	77.01	6.99	84.00
	5	1	0	Unrestricted	182	Unrestricted	90	0.00	0.00	0.00	0.00	0.00	0.00
	6	2	16	478	593	3810	90	0.09	0.01	0.29	0.20	0.00	0.20
	7	1	0	Unrestricted	263	Unrestricted	90	0.00	0.00	0.00	0.00	0.00	0.00
	8	1	0	Unrestricted	370	Unrestricted	90	0.00	0.00	0.00	0.00	0.00	0.00
9	1	0	Unrestricted	593	Unrestricted	90	0.00	0.00	0.00	0.00	0.00	0.00	
10	1	0	Unrestricted	0	Unrestricted	90	0.00	0.00	0.00	0.00	0.00	0.00	