Technical Note 23014

Springwell Road

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Issue 3.0

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Issue: 3.0

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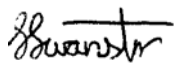
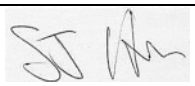
Signature:		

Issue 2.0: Add Evaluations for Option F

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0.0 About this technical note

This technical note is intended for use by personnel experienced in traffic engineering and familiar with the area being analysed / designed. It is designed to help these technical personnel in the decision making process and its contents may be subsumed into a more comprehensive report without permission. This technical note should always be read in conjunction with models, drawing and or supplementary text and documents as outlined throughout the note. This is not intended to be a comprehensive report for the consumption of a wider and potentially none technical audience. A technical note rather than a more descriptive report has been produced at the client's request. JCT are happy to provide supplementary information to others and provide information on the tasks undertaken in alternative format on instruction.

1.0 Brief

1.0.1 JCT were commissioned by Sunderland City Council (SCC) to produce modelling evaluations at the junction with the A183 / Holborn Rd / Springwell Rd, Sunderland.

1.0.2 The existing junction is a four-arm roundabout. SCC have produced two potential proposed layouts, which are:

Historic Option: Signal-controlled crossroads

Option B: Signal-controlled crossroads, designed to better satisfy highway design standards.

Option D: Signal-controlled crossroads, with amendments made to Option B design.

Option E: Existing roundabout, with bus lanes upstream of the A183 entries.

Option F: Signal-controlled crossroads, with amendments made to Option D design.

Issue 1.0 of this technical note included the modelling evaluations for the existing layout, the Historic Option and Option B. Issue 2.0 added Options D and E. Issue 3.0 added Option F.

1.0.3 JCT were asked to produce modelling evaluations of the existing layout and both of the proposals. Modelling runs were required for the AM and PM peak periods using the 2023 traffic survey, along with the 2043 year assuming a 2023-2043 growth factor of +18%.

1.0.4 SCC provided the junction layouts and traffic flows.

2.0 Existing Layout

2.0.1 The aerial image of the existing layout is shown in **Figure 1**.

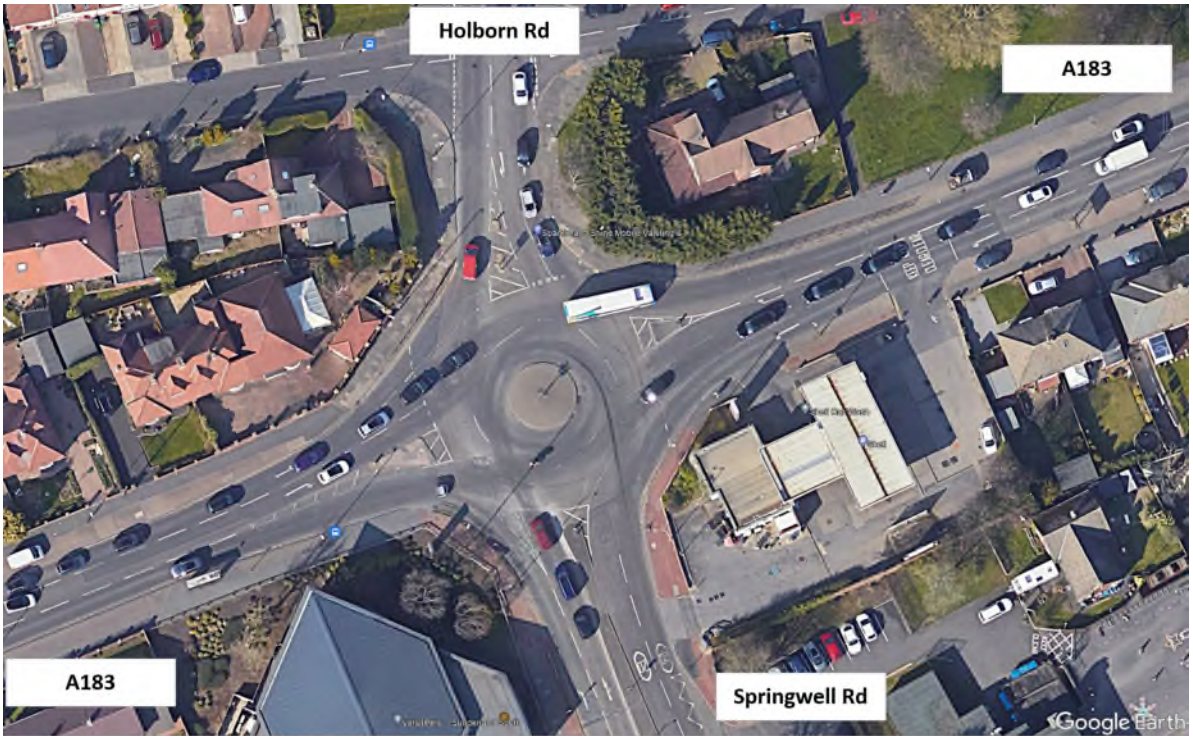


Figure 1: Existing Layout

2.0.2 The existing layout was modelled using ARCADY (within Junctions 10).

2.0.3 Each arm was marked to ensure drivers used the correct lane, depending on the arm they wished to exit. As such, it was likely that traffic flows would not balance evenly across all lanes on the approaches. Therefore, JCT calculated capacity reductions to account for the traffic turning movements in each flow group, for each arm. The calculations used to determine these reductions, and the methodology used are included in **Appendix A**. The A183 arms had 3 lanes at the give-way line, each lane with different lane usages. Therefore, an intermediate calculation was conducted to determine a suitable Intercept between the two busiest lanes, and then this used to get the overall Intercept between these lanes and the final lane on the approach.

2.0.4 The ONE HOUR flow profile was used, which assumes traffic flow arrivals over the hour match a normal distribution curve (the model uses a 90-minute periods to allow for the generation of this profile).

2.0.5 A summary of the modelling results is shown in **Table 1**, with a full copy of the model input/output data in **Appendix B**. The results show the Ratio of Flow to Capacity (RFC) and queue for each arm, along with the average delay per vehicle at the junction. An RFC of 1.00 would indicate that an arm has reached theoretical capacity, with traffic flow equalling capacity. However, due to variable traffic flow arrivals, an arm is generally considered to be over practical capacity once the RFC exceeds 0.85-0.90.

2.0.6 The results reflect the junction capacity, but do not include additional delays that might occur due to exit blocking, or delays that may occur along the links upstream of the junction.

Table 1: Modelling Results – Existing Layout

Springwell Rd Existing Rbt	AM 2023		AM 2043		PM 2023		PM 2043	
	RFC	Queue (pcus)	RFC	Queue (pcus)	RFC	Queue (pcus)	RFC	Queue (pcus)
Holborn Rd	0.86	5.7	1.16	53.6	0.92	8.9	1.26	99.8
A183 (E)	0.68	2.2	0.84	5.0	0.76	3.1	0.93	10.2
Springwell Rd	0.85	5.3	1.05	46.7	0.74	2.8	0.90	8.2
A183 (W)	0.80	3.9	0.98	19.1	0.65	1.8	0.80	3.8
Avg. Delay (s/pcu)	17.32		97.20		16.28		93.04	
File	Springwell Rd Existing.j10							

2.0.7 The results show that in 2023, the AM peak is close to practical capacity on Holborn Rd, Springwell Rd and the A183 (W), with RFC between 0.80-0.90. Holborn Rd is over-capacity in the PM peak, with an RFC of 0.92.

2.0.8 By the year 2043, the junction becomes significantly over-capacity in both peaks. In the AM peak, the RFCs on Holborn Rd, Springwell Rd and the A183 (W) were 1.16, 1.05 and 0.98 respectively. In the PM peak, the RFCs on Holborn Rd, the A183 (E) and Springwell Rd were 1.26, 0.93 and 0.90 respectively.

3.0 Proposal – Historic Option

3.0.1 The layout of the historic option is shown in **Figure 2**.

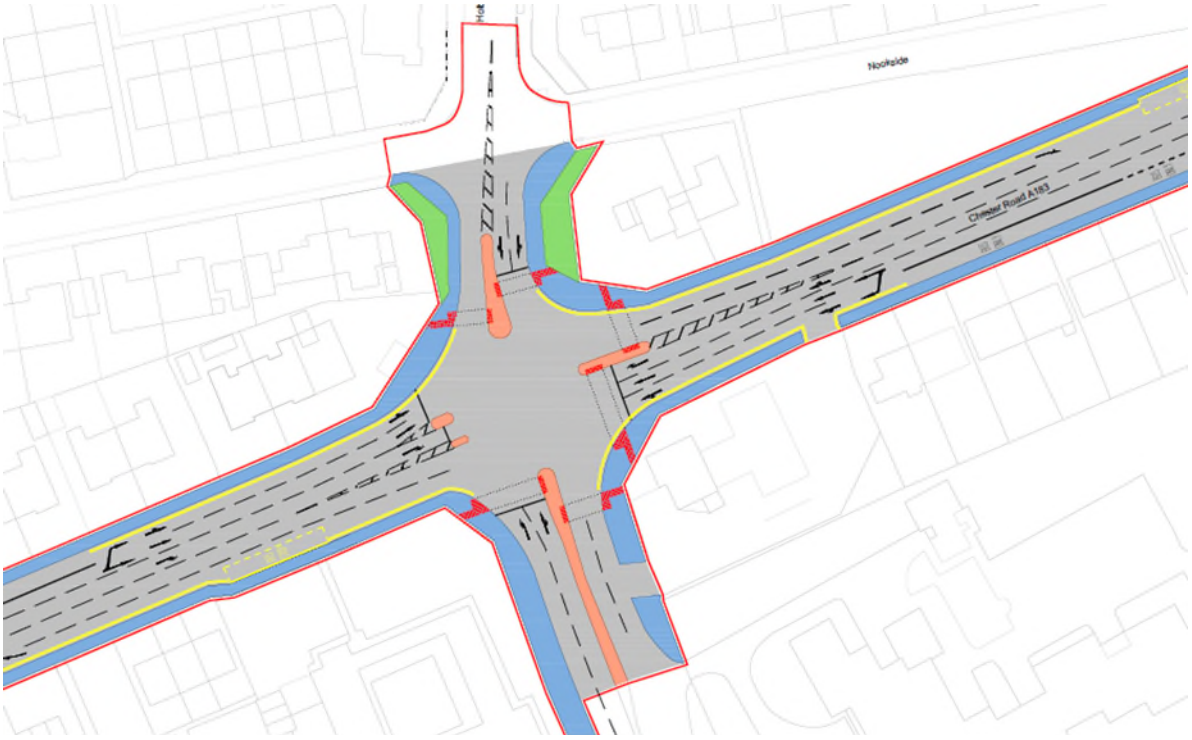


Figure 2: Proposed Layout – Historic Option

3.0.2 The junction was modelled using LinSig3.

3.0.3 Lane saturation flows were predicted using the lane geometry, as per the research in TRRLs RR67.

3.0.4 Intergreens were calculated using guidance in Chapter 6 of the Traffic Signs Manual. The quickGreen report is included in **Appendix C**.

3.0.5 Pedestrian phase minimums were assumed to be 5 seconds, although will depend on the type of crossings installed. The 5 seconds minimums are more likely if nearside displays were used.

3.0.6 The physical length of the nearside flare on Holborn Rd was measured at about 4 pcus. However, as ahead drivers have a choice of lane to use, the occupancy of the flare will depend on driver behaviour. Therefore, the custom occupancy was reduced to 3 pcus, to account for some reduced lane usage.

3.0.7 Phase delays were added to the model, to provide more efficient interstage periods. These primarily reduce the lost time caused by longer intergreens after pedestrian phases. However, if on-crossing detection was used and variable intergreens after pedestrians, then the phase delays may not be required.

3.0.8 The assumed stage sequence is shown in **Figure 3**. The north and south arms were run in separate stages, so that pedestrian phases could run in parallel to non-conflicting traffic movements. Stage 5 is only required during cycles in which Pedestrian Phase I is demanded.

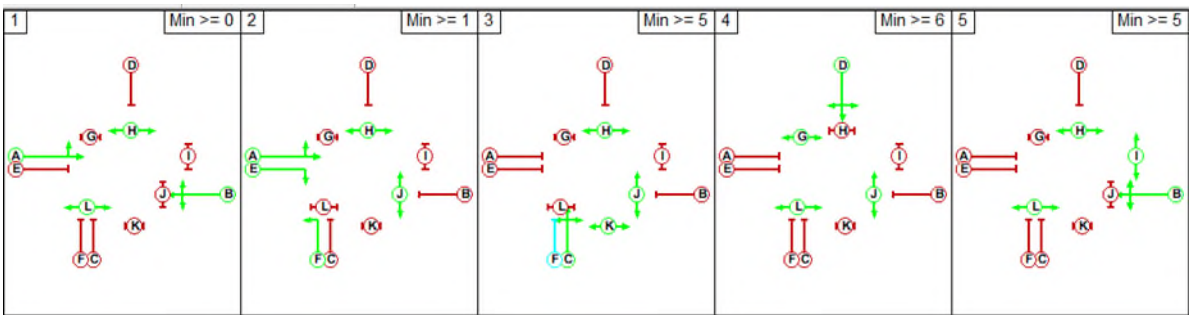


Figure 3: Historic Option - Stages

3.0.9 Each flow group was run twice on the model. The first time to show results assuming the sequence 1-2-3-4-5 (i.e. if Pedestrian Phase I is demanded). The second time to show results assuming the sequence 1-2-3-4 (i.e. Phase I not demanded). The cycle time was set to 120 seconds, JCT assumed that higher cycle times would not be desirable.

3.0.10 A summary of the modelling results is shown in **Table 2**, with a full copy of the model input/output data in **Appendix D**. The results show the highest lane Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each arm, along with the junction Practical Reserve Capacity (PRC) and average delay per vehicle at the junction. The degree of saturation is the ration of flow to capacity, expressed as a percentage. A lane is deemed to be over practical capacity once the DoS exceeds 90%. The PRC is based on the highest DoS, with a value of 0% given if the highest DoS is 90%. The PRC would be negative if the highest DoS exceeds 90%.

Table 2: Modelling Results – Historic Option

Historic Option With Ped I	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	110.7%	48.8	131.7%	107.9	129.2%	112.8	157.6%	198.5
A183 (E)	112.0%	52.9	134.9%	120.5	131.0%	113.5	157.4%	198.3
Springwell Rd	113.4%	53.8	133.9%	105.2	130.8%	77.5	154.2%	125.0
A183 (W)	109.9%	33.7	129.7%	68.3	129.9%	74.6	159.9%	129.0
PRC	-26.0%		-49.8%		-45.6%		-77.6%	
Avg. Delay (s/pcu)	189.6		364.0		371.3		552.3	
Cycle Time	120		120		120		120	
File	Springwell Rd Historic Option.lsg3x							

Historic Option No Ped I	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	110.5%	48.5	131.7%	107.9	129.2%	112.8	157.7%	198.6
A183 (E)	110.7%	49.8	134.9%	119.3	130.7%	111.8	157.1%	193.5
Springwell Rd	109.6%	46.3	133.9%	106.3	130.8%	77.5	154.2%	127.2
A183 (W)	109.9%	33.7	129.7%	68.3	129.9%	74.6	159.9%	129.0
PRC	-23.0%		-49.8%		-45.3%		-77.6%	
Avg. Delay (s/pcu)	177.6		367.1		367.9		549.3	
Cycle Time	120		120		120		120	
File	Springwell Rd Historic Option.lsg3x							

3.0.11 The results show that the proposed historic option would be significantly over-capacity for all scenarios. With Pedestrian Phase I being called, the PRC during the 2023 AM peak was

-26.0% and this fell to -49.8% by 2043. During the PM peak, the PRC was -45.6% in 2023 and this fell to -77.6% in 2043.

3.0.12 When Pedestrian Phase I was not called, the results did not improve significantly. This was primarily because when Stage 5 is called it delays the start of eastbound traffic (Phase A), and this movement was not critical in either peak.

4.0 Proposal – Option B

4.0.1 The layout for Option B is shown in **Figure 4**.

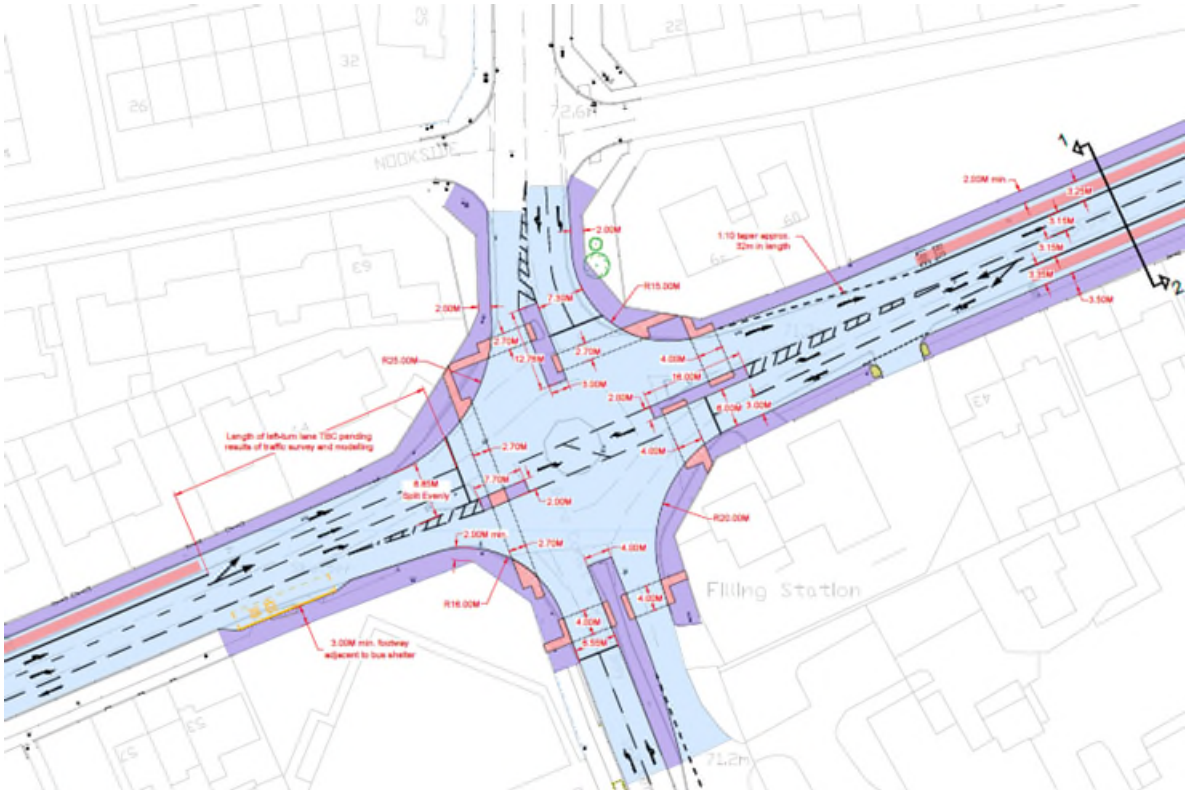


Figure 4: Proposed Layout – Option B

4.0.2 The junction was modelled using LinSig3.

4.0.3 Lane saturation flows were predicted using the lane geometry, as per the research in TRRLs RR67.

4.0.4 Intergreens were calculated using guidance in Chapter 6 of the Traffic Signs Manual. The quickGreen report is included in **Appendix E**.

4.0.5 Pedestrian phase minimums were assumed to be 5 seconds, although will depend on the type of crossings installed. The 5 seconds minimums are more likely if nearside displays were used.

4.0.6 The drawing indicated that eastbound traffic from the west could use the nearside and middle lanes, and then merge on exit. However, JCT set the model up to only allow ahead traffic to use the middle lane. This was considered to be more robust, as JCT felt it unlikely that drivers would move across into the nearside lane after the bus lane, only to have to move back into the offside lane on the exit, due to the bus lane downstream.

4.0.7 Phase delays were added to the model, to provide more efficient interstage periods. These primarily reduce the lost time caused by longer intergreens after pedestrian phases. However, if on-crossing detection was used and variable intergreens after pedestrians, then the phase delays may not be required.

4.0.8 The assumed stage sequence is shown in **Figure 5**. Stage 5 is only required during cycles in which there is a demand for pedestrian Phases I, L or K.

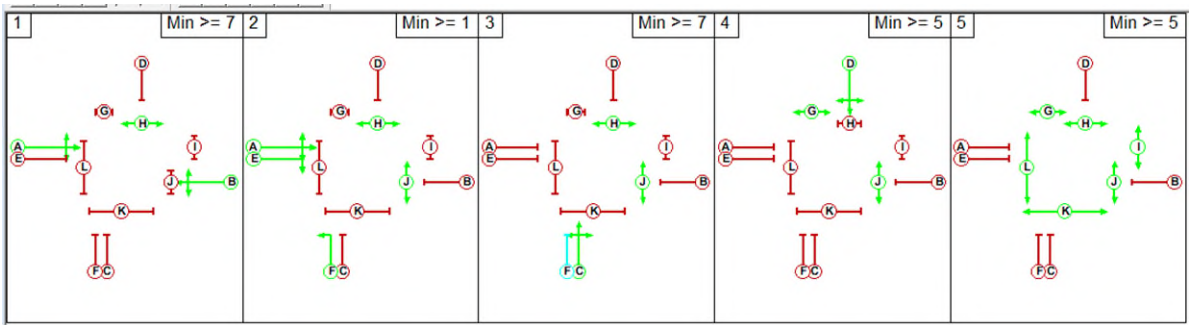


Figure 5: Option B - Stages

4.0.9 Each flow group was run twice on the model. The first time to show results assuming the sequence 1-2-3-4-5 (i.e. if Pedestrian Phases I, L or K are demanded). The second time to show results assuming the sequence 1-2-3-4 (i.e. Phases I, K or L are not demanded). The cycle time was set to 120 seconds, JCT assuming that higher cycle times would not be desirable.

4.0.10 A summary of the modelling results is shown in **Table 3**, with a full copy of the model input/output data in **Appendix F**. The results show the highest lane Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each arm, along with the junction Practical Reserve Capacity (PRC) and average delay per vehicle at the junction. The degree of saturation is the ratio of flow to capacity, expressed as a percentage. A lane is deemed to be over practical capacity once the DoS exceeds 90%. The PRC is based on the highest DoS, with a value of 0% given if the highest DoS is 90%. The PRC would be negative if the highest DoS exceeds 90%.

Table 3: Modelling Results – Option B

Option B With Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	174.6%	150.4	206.1%	209.3	207.4%	229.7	244.9%	306.0
A183 (E)	178.1%	182.9	210.3%	253.7	206.3%	243.7	243.6%	326.3
Springwell Rd	172.8%	137.4	204.0%	192.7	200.2%	146.5	236.0%	196.5
A183 (W)	175.5%	96.0	207.1%	133.4	210.7%	147.2	248.9%	197.5
PRC	-97.8%		-133.6%		-134.1%		-176.5%	
Avg. Delay (s/pcu)	717.9		919.9		817.6		986.7	
Cycle Time	120		120		120		120	
File	Springwell Rd Historic Option.lsg3x							

Option B Without Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	124.1%	79.9	146.4%	138.3	146.1%	150.3	172.5%	226.6
A183 (E)	123.1%	93.6	145.4%	162.5	146.5%	161.2	173.0%	241.1
Springwell Rd	126.2%	77.3	149.1%	131.7	143.0%	94.3	168.6%	144.2
A183 (W)	123.4%	51.0	145.6%	86.9	144.3%	93.1	170.5%	140.3
PRC	-40.3%		-65.6%		-62.8%		-92.2%	
Avg. Delay (s/pcu)	303.2		476.1		485.7		635.9	
Cycle Time	120		120		120		120	
File	Springwell Rd Historic Option.lsg3x							

4.0.11 The results show that the proposed Option B would be significantly over-capacity for all scenarios when the pedestrian Stage 5 was called. The pedestrian stage introduces a

significant period of lost time, with some very long intergreens required after pedestrian phases. The highest intergreen was 24 seconds after Phase L (western crossing on A183) due to the long crossing length. This layout could be made more efficient if crossings could be shortened, and positioned to allow traffic to run in parallel.

4.0.12 However, the results also showed that the junction would still be significantly over-capacity when the pedestrian stage was not called, with the worst PRC of -92.2% during the 2043 PM peak.

5.0 Proposal – Option D

5.0.1 The layout for Option D is shown in **Figure 6**.

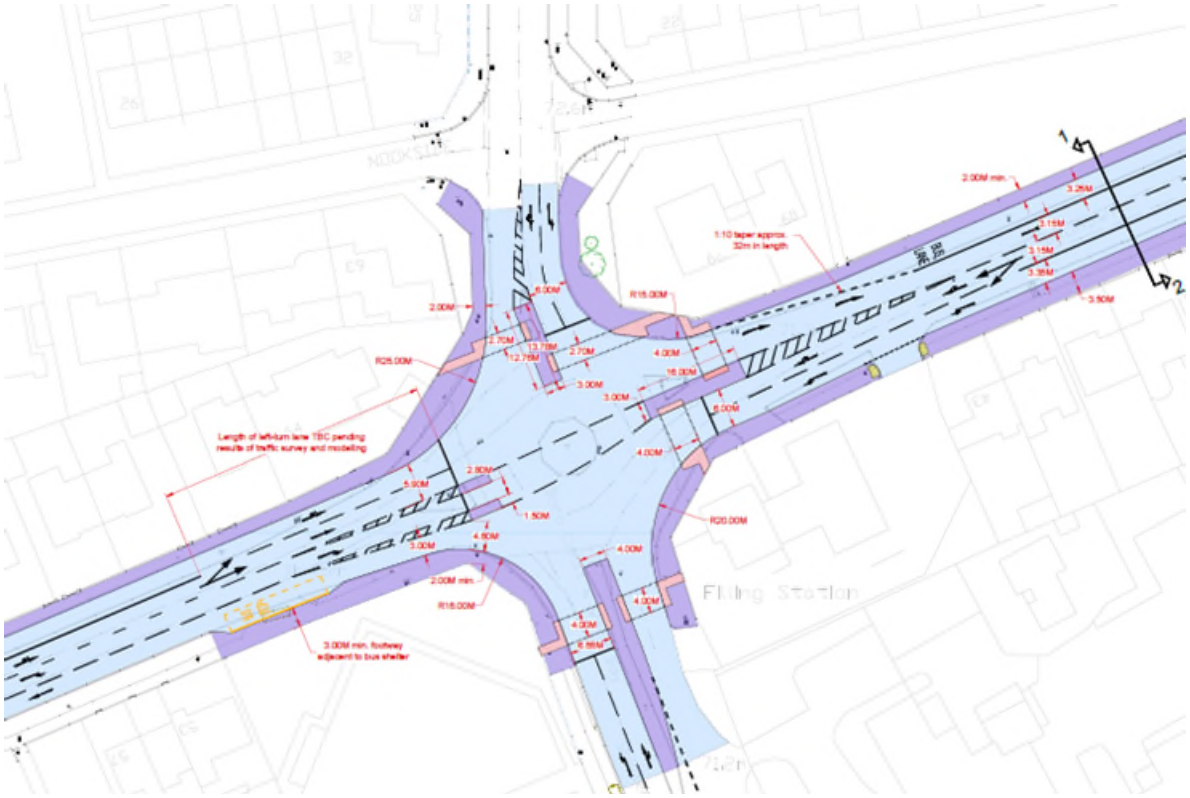


Figure 6: Proposed Layout – Option D

5.0.2 The junction was modelled using LinSig3.

5.0.3 The primary differences between Option D and Option B were the lane marking on the eastern arm (with ahead traffic using the offside lane in Option D rather than the nearside lane), and Option D removing the pedestrian crossing from the western arm. Furthermore, Option D assumes that the right-turn from the A183(W) is fully signal-controlled due to the separator island between the right-turn and ahead lanes.

5.0.4 Lane saturation flows were predicted using the lane geometry, as per the research in TRRLs RR67.

5.0.5 Intergreens were calculated using guidance in Chapter 6 of the Traffic Signs Manual. The quickGreen report is included in **Appendix G**.

5.0.6 Pedestrian phase minimums were assumed to be 5 seconds, although will depend on the type of crossings installed. The 5 seconds minimums are more likely if nearside displays were used.

5.0.7 The drawing indicated that eastbound traffic from the west could use the nearside and middle lanes, and then merge on exit. However, JCT set the model up to only allow ahead traffic to use the middle lane. This was considered to be more robust, as JCT felt it unlikely that drivers would move across into the nearside lane after the bus lane, only to have to move back into the offside lane on the exit, due to the bus lane downstream.

5.0.8 Phase delays were added to the model, to provide more efficient interstage periods. These primarily reduce the lost time caused by longer intergreens after pedestrian phases. However, if on-crossing detection was used and variable intergreens after pedestrians, then the phase delays may not be required.

5.0.9 The assumed stage sequence is shown in **Figure 7**. Stage 5 is only required during cycles in which there is a demand for pedestrian Phase I. JCT assumed that the two crossings on the south arm could be controlled using separate phases. However, these crossings were not staggered on the layout and therefore one phase for both crossings may be more appropriate. It is recommended that these crossings can run separately for a more efficient stage sequence (as modelled), and therefore staggering these should be considered. In the JCT intergreen measurements, JCT assumed they would be staggered, and the approximate crossing locations are shown in the quickGreen data in Appendix G.

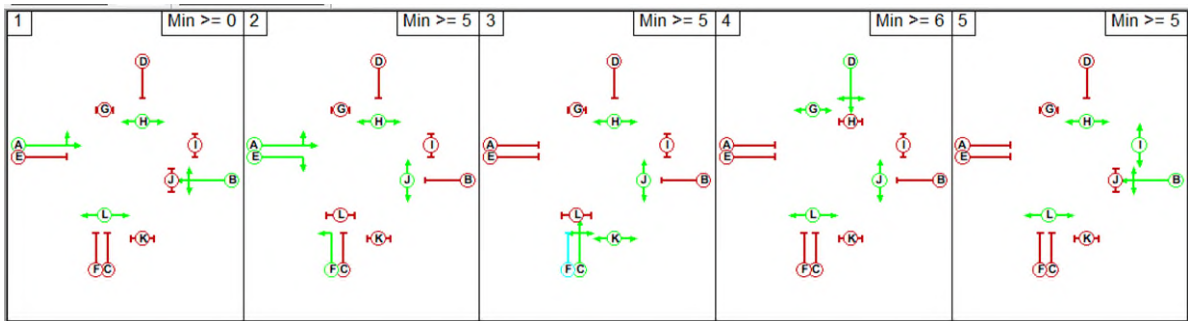


Figure 7: Option D - Stages

5.0.10 Each flow group was run twice on the model. The first time to show results assuming the sequence 1-2-3-4-5 (i.e. if Pedestrian Phase I is demanded). The second time to show results assuming the sequence 1-2-3-4 (i.e. Phase I not demanded). The cycle time was set to 120 seconds, JCT assuming that higher cycle times would not be desirable.

5.0.11 A summary of the modelling results is shown in **Table 3**, with a full copy of the model input/output data in **Appendix H**. The results show the highest lane Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each arm, along with the junction Practical Reserve Capacity (PRC) and average delay per vehicle at the junction. The degree of saturation is the ratio of flow to capacity, expressed as a percentage. A lane is deemed to be over practical capacity once the DoS exceeds 90%. The PRC is based on the highest DoS, with a value of 0% given if the highest DoS is 90%. The PRC would be negative if the highest DoS exceeds 90%.

Table 4: Modelling Results – Option D

Option D With Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	127.0%	84.8	149.8%	143.2	140.5%	138.8	165.9%	214.8
A183 (E)	130.4%	107.5	154.1%	179.4	140.8%	145.6	166.1%	228.9
Springwell Rd	126.2%	77.3	149.1%	129.8	136.5%	85.4	160.9%	133.1
A183 (W)	125.7%	53.7	148.3%	116.9	140.5%	88.5	165.9%	135.9
PRC	-44.9%		-71.2%		-56.4%		-84.6%	
Avg. Delay (s/pcu)	362.9		568.4		457.4		645.0	
Cycle Time	120		120		120		120	
File	Springwell Rd Option D.lsg3x							

Option D Without Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	127.0%	85.4	149.8%	143.2	140.5%	139.5	165.9%	215.7
A183 (E)	130.4%	107.5	154.1%	176.9	140.8%	143.9	166.1%	225.3
Springwell Rd	126.2%	77.3	149.1%	131.6	136.5%	85.4	160.9%	134.8
A183 (W)	125.7%	53.7	148.3%	89.7	140.5%	88.5	165.9%	135.6
PRC	-44.9%		-71.2%		-56.4%		-84.6%	
Avg. Delay (s/pcu)	328.9		486.7		448.6		602.2	
Cycle Time	120		120		120		120	
File	Springwell Rd Option D.lsg3x							

5.0.12 The results show that the proposed Option D would be significantly over-capacity for all scenarios, although when Stage 5 was called Option D produced better results than Option B. For example, the PRC for the year 2043 increased from -133.6% to -71.2% in the AM peak and from -176.5% to -84.6% in the PM peak. This improvement was because Option D did not require an all-red pedestrian stage when Phase I was called.

5.0.13 When Stage 5 was not called (Without Peds results), there was no improvement in the overall junction PRC compared to when Stage 5 was called. However, overall delay was reduced, as the absence of Stage 5 meant that eastbound traffic did not have to be delayed.

5.0.14 JCT ran an additional model, reference Option D1. This was identical to Option D, except that it was assumed the lane marking on the northern arm was changed so that ahead traffic used the nearside lane rather than the offside lane. The results are shown in **Table 5**, and the model input / output data in **Appendix I**.

Table 5: Modelling Results – Option D1

Option D1 With Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	126.3%	83.0	149.0%	141.3	134.0%	123.3	158.3%	199.2
A183 (E)	126.7%	99.5	149.4%	170.5	137.0%	136.7	161.6%	219.9
Springwell Rd	126.2%	77.3	149.1%	129.8	136.5%	85.4	160.9%	133.1
A183 (W)	125.7%	53.7	148.3%	108.7	134.6%	81.0	159.0%	128.1
PRC	-40.7%		-66.3%		-52.2%		-79.6%	
Avg. Delay (s/pcu)	344.4		551.1		422.4		603.7	
Cycle Time	120		120		120		120	
File	Springwell Rd Option D1.lsg3x							

Option D1 Without Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	126.3%	83.6	149.0%	142.0	134.0%	124.1	158.3%	200.2
A183 (E)	126.7%	99.5	149.7%	168.7	137.0%	135.8	161.6%	216.3
Springwell Rd	126.2%	77.3	149.1%	131.7	136.5%	85.4	160.9%	135.1
A183 (W)	125.7%	53.7	148.3%	89.7	134.6%	81.0	159.0%	128.1
PRC	-40.7%		-66.3%		-52.2%		-79.6%	
Avg. Delay (s/pcu)	318.0		476.5		416.8		574.8	
Cycle Time	120		120		120		120	
File	Springwell Rd Option D1.lsg3x							

5.0.15 The results show that Option D1 would provide a small benefit to capacity compared to Option D, with small increases to PRC and reductions to delay.

6.0 Option E

6.0.1 The layout for Option E is shown in **Figure 8**.

Figure 8: Option E Layout

6.0.2 Option E was modelled using ARCADY (within Junctions 10).

6.0.3 Similar to the methodology used for the existing layout modelling, JCT determined capacity corrections on arms, based on unequal lane usage (methodology and calculations included in Appendix A).

6.0.4 The ONE HOUR flow profile was used, which assumes traffic flow arrivals over the hour match a normal distribution curve (the model uses a 90-minute periods to allow for the generation of this profile).

6.0.5 A summary of the modelling results is shown in **Table 6**, with a full copy of the model input/output data in **Appendix J**. The results show the Ratio of Flow to Capacity (RFC) and queue for each arm, along with the average delay per vehicle at the junction. An RFC of 1.00 would indicate that an arm has reached theoretical capacity, with traffic flow equalling capacity. However, due to variable traffic flow arrivals, an arm is generally considered to be over practical capacity once the RFC exceeds 0.85-0.90.

Table 6: Modelling Results – Option E

Springwell Rd Option E	AM 2023		AM 2043		PM 2023		PM 2043	
	RFC	Queue (pcus)	RFC	Queue (pcus)	RFC	Queue (pcus)	RFC	Queue (pcus)
Holborn Rd	0.86	5.7	1.16	53.2	0.92	8.9	1.26	99.6
A183 (E)	0.71	2.4	0.87	6.2	0.80	4.0	0.98	18.6
Springwell Rd	0.85	5.3	1.05	46.4	0.74	2.8	0.90	7.9
A183 (W)	0.80	3.9	0.98	20.2	0.66	2.0	0.82	4.4
Avg. Delay (s/pcu)	17.63		98.66		17.24		99.64	
File	Springwell Rd Option E.j10							

6.0.6 The results show that the junction would be over-capacity by the year 2043, particularly on Holborn Rd with RFCs of 1.16 and 1.26 in the AM and PM peak periods respectively.

6.0.7 However, the RFC results were similar to those predicted for the existing layout (see Table 1). This would indicate that the addition of bus lanes on the A183 approaches would have no significant detriment to the overall capacity across the give-way line. Although capacity may not be significantly reduced once the bus lanes are added, if queues extend as far as the bus lanes, then they can only queue in one lane rather than two. Therefore, the back of the queue is likely to occur further upstream of the give-way line when this happens.

7.0 Proposal – Option F

7.0.1 The layout for Option F is shown in **Figure 9**.

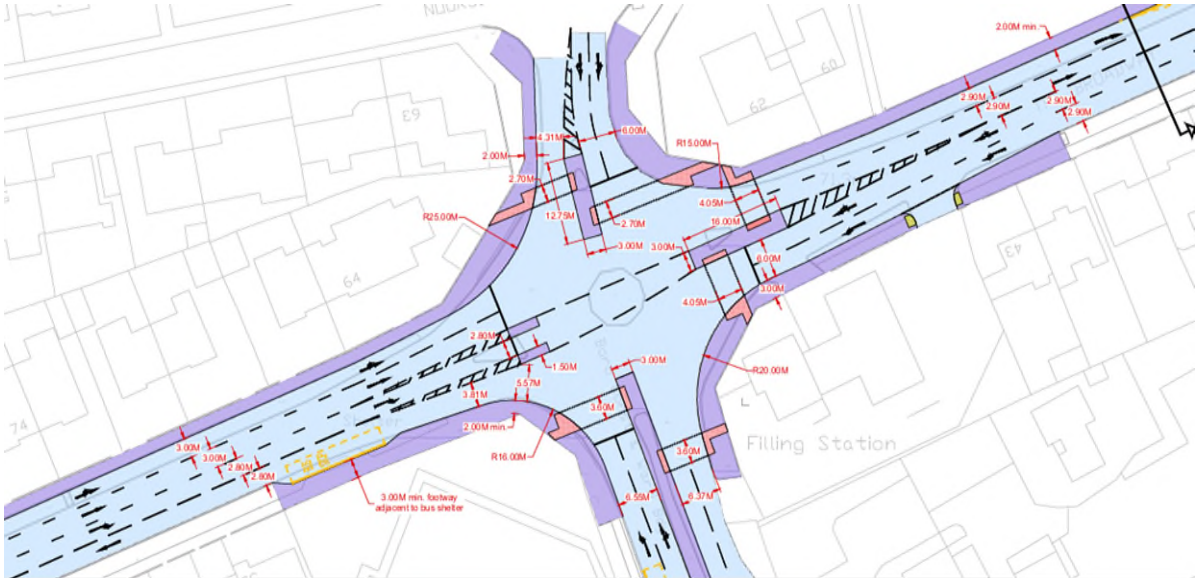


Figure 9: Proposed Layout – Option F

7.0.2 The junction was modelled using LinSig3.

7.0.3 The primary differences between Option F and Option D were the removal of the bus lanes on the east and western approaches and the eastbound exit.. This increased the nearside flare length from 40m to 155m on the western arm and from 52m to 370m on the eastern arm. Both lanes on Holborn Rd can be used to move southbound due to additional exit lane being added.

7.0.4 Lane saturation flows were predicted using the lane geometry, as per the research in TRRLs RR67.

7.0.5 Intergreens were calculated using guidance in Chapter 6 of the Traffic Signs Manual. The quickGreen report is included in **Appendix K**.

7.0.6 Pedestrian phase minimums were assumed to be 5 seconds, although will depend on the type of crossings installed. The 5 seconds minimums are more likely if nearside displays were used.

7.0.7 Phase delays were added to the model, to provide more efficient interstage periods. These primarily reduce the lost time caused by longer intergreens after pedestrian phases. However, if on-crossing detection was used and variable intergreens after pedestrians, then the phase delays may not be required.

7.0.8 The assumed stage sequence is shown in **Figure 10**. Stage 5 is only required during cycles in which there is a demand for pedestrian Phase I.

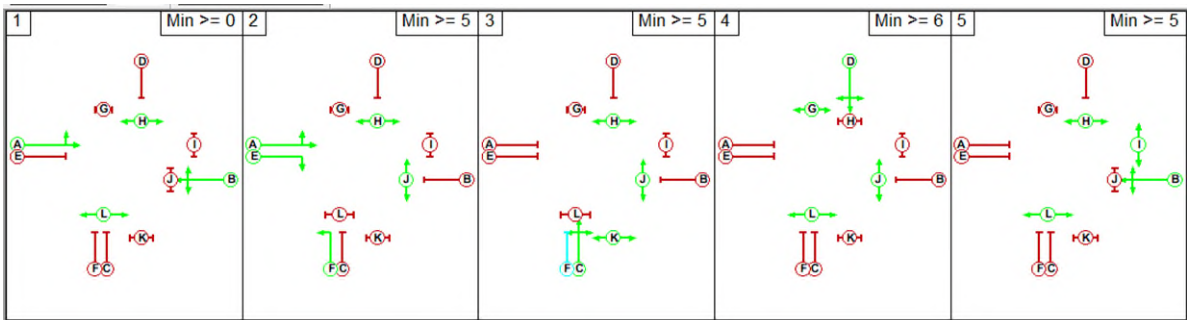


Figure 10: Option F - Stages

7.0.9 Each flow group was run twice on the model. The first time to show results assuming the sequence 1-2-3-4-5 (i.e. if Pedestrian Phase I is demanded). The second time to show results assuming the sequence 1-2-3-4 (i.e. Phase I not demanded). The cycle time was set to 120 seconds, JCT assuming that higher cycle times would not be desirable.

7.0.10 A summary of the modelling results is shown in **Table 7**, with a full copy of the model input/output data in **Appendix L**. The results show the highest lane Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) for each arm, along with the junction Practical Reserve Capacity (PRC) and average delay per vehicle at the junction. The degree of saturation is the ratio of flow to capacity, expressed as a percentage. A lane is deemed to be over practical capacity once the DoS exceeds 90%. The PRC is based on the highest DoS, with a value of 0% given if the highest DoS is 90%. The PRC would be negative if the highest DoS exceeds 90%.

Table 7: Modelling Results – Option F

Option F With Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	116.4%	60.1	137.4%	118.0	129.3%	110.8	152.6%	186.6
A183 (E)	118.5%	58.1	140.0%	115.6	125.8%	67.3	148.4%	131.5
Springwell Rd	117.2%	61.2	138.4%	113.1	130.6%	77.2	153.9%	124.7
A183 (W)	119.7%	46.5	141.3%	82.3	129.3%	73.6	152.7%	120.5
PRC	-33.0%		-57.0%		-45.1%		-71.0%	
Avg. Delay (s/pcu)	227.1		381.4		320.9		477.8	
Cycle Time	120		120		120		120	
File	Springwell Rd Option F.lsg3x							

Option F Without Peds	AM 2023		AM 2043		PM 2023		PM 2043	
	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)	DoS	MMQ (pcus)
Holborn Rd	116.4%	60.7	137.4%	118.7	129.3%	111.6	152.6%	187.5
A183 (E)	118.5%	58.2	140.0%	119.5	125.8%	66.6	148.4%	132.2
Springwell Rd	117.2%	61.2	138.4%	114.4	130.6%	77.2	153.9%	126.4
A183 (W)	119.7%	46.5	141.3%	82.3	129.3%	73.6	152.7%	120.5
PRC	-33.0%		-57.0%		-45.1%		-71.0%	
Avg. Delay (s/pcu)	225.8		385.2		319.7		479.4	
Cycle Time	120		120		120		120	
File	Springwell Rd Option F.lsg3x							

7.0.11 The results show that the proposed Option F would be significantly over-capacity for all scenarios, although when Stage 5 was called Option F produced better results than Option D. For example, the PRC for the year 2043 increased from -71.2% to -57% in the AM peak and from -84.6% to -71% in the PM peak.

7.0.12 When Stage 5 was not called (Without Peds results), there was no significant improvement to the overall results. Eastbound traffic from the A183 (W) received more green time when stage 5 was not called, although this was not a critical movement in either peak, therefore made little difference to the overall results.

8.0 Conclusions

8.0.1 The results for the existing layout showed that Holborn Rd was close to or over-capacity in 2023 for both the AM and PM peak periods, with other arms close to capacity. By 2043 the junction was predicted to be significantly over-capacity.

8.0.2 However, when testing the proposed historic option, the results indicated that the junction would have significantly worse capacity than the existing junction, with severe congestion on all arms. Proposed Option B was worse than the historic option, particularly when the pedestrian stage 5 was called.

8.0.3 Proposed Option B was worse than the historic option, particularly when the pedestrian stage 5 was called.

8.0.4 Option D was an improvement on Option B when it was assumed the pedestrian stage was called, although performed with similar capacity to Option B when the pedestrian stage was not called. A further slight improvement could be made by changing the lane marking on Holborn Rd, although the junction was still predicted to be significantly over-capacity.

8.0.5 Option E, which was the same layout as the existing roundabout but with bus lanes upstream on the A183 arms, was predicted to have a similar amount of capacity as the existing junction. Although the overall capacity may not be significantly impacted, if queues reach the bus lane then the back of the queue will be further upstream from the give-way line, as general traffic could only use the single lane. However, buses would have the advantage of being able to use the bus lane.

8.0.6 Option F was an improvement on Option D due to the removal of bus lanes resulting in longer flares on the east and western approaches. Two lane exits on the east and south allowed traffic to balance more evenly on the approach and the two lane discharge improved the DoS on Holborn Rd and the ahead movement on the A183 (W). However the modelling suggested the junction would still be significantly over capacity.

8.0.7 There may be potential to test a signal roundabout option, in which the entire junction runs on one stage sequence designed to not stop any traffic on the circulating sections (except u-turners at the last internal stopline). There may be difficulties due to restricted carriageway through the circulatory, and providing more capacity than the non-signal option may be difficult (Existing layout and Option E). However, the option may provide more capacity than the historic option, Option B and Option D.

Appendix A

ARCADY Unequal Lane Usage Calculations and Methodology

Geometry and Capacity Corrections for Unequal Lane Usage - Existing Layout

Arm	Name	Full Arm Geometry	1	2	3	4
1	Holborn Rd					
2	A183 (E)	v	4.41	5.78	6.20	5.94
3	Springwell Rd	e	7.16	9.71	7.50	10.19
4	A183 (W)	l'	20.3	15.2	17.0	5.5
		r	12.1	23.4	10.2	39.0
		D	29.3	29.0	29.2	29.3
		ø	27.4	20.2	28.2	23.3
		Int	1874	2502	2106	2273

Busy Lane(s) Geometry	1 (ns)	2 (mid/os)	3 (ns)	4 (mid/ns)	2 (mid)	4 (mid)
v	2.66	2.91	3.21	3.00	2.91	3.00
e	4.33	6.33	3.51	7.00	3.29	4.10
l'	2.5	14.0	2.0	6.5	1.0	1.5
r	12.1	40.0	10.2	39.0	40.0	39.0
D	29.3	29.0	29.2	29.3	29.0	29.3
ø	27.4	20.2	28.2	23.3	20.2	23.3
Int	945	1549	992	1379	988	1056

Capacity Corrections

Arm 1 Holborn Rd

	AM22	AM42	PM22	PM42
Busy Flow	422	498	448	529
Total Flow	550	649	708	836
Adj Int	1232	1232	1493	1493
Cap Corr	**65.72%**	**65.72%**	**79.69%**	**79.69%**

Arm 2 A183(E) — Middle and Offside lane check

	AM22(inter)	AM42(inter)	PM22(inter)	PM42(inter)	AM22	AM42	PM22	PM42
Busy Flow	425	502	409	483	501	592	456	538
Total Flow	501	592	456	538	679	802	782	923
Adj Int	1165	1165	1102	1101	1578	1578	1889	1888
Cap Corr	**75.19%**	**75.22%**	**71.11%**	**71.05%**	**63.09%**	**63.09%**	**75.50%**	**75.46%**

Arm C

	AM22	AM42	PM22	PM42
Busy Flow	580	684	485	572
Total Flow	1100	1298	960	1132
Adj Int	1881	1882	1964	1963
Cap Corr	**89.33%**	**89.39%**	**93.24%**	**93.22%**

Arm D — Middle and Nearside lane check

	AM22(inter)	AM42(inter)	PM22(inter)	PM42(inter)	AM22	AM42	PM22	PM42
Busy Flow	591	697	495	584	661	780	589	695
Total Flow	661	780	589	695	1022	1206	1053	1243
Adj Int	1181	1182	1257	1257	1826	1827	2246	2248
Cap Corr	**85.65%**	**85.70%**	**91.12%**	**91.13%**	**80.34%**	**80.39%**	**98.83%**	**98.88%**

Geometry and Capacity Corrections for Unequal Lane Usage - Option E

Arm	Name	Full Arm Geometry	1	2	3	4
1	Holborn Rd	v	4.41	2.50	6.20	3.00
2	A183 (E)	e	7.16	9.71	7.50	10.19
3	Springwell Rd	l'	20.3	28.3	17.0	27.5
4	A183 (W)	r	12.1	23.4	10.2	39.0
		D	29.3	29.0	29.2	29.3
		ø	27.4	20.2	28.2	23.3
		Int	1874	2042	2106	2194

Busy Lane(s) Geometry	1 (ns)	2 (mid/os)	3 (ns)	4 (mid/ns)	2 (mid)	4 (mid)
v	2.66	2.50	3.21	3.00	2.50	3.00
e	4.33	6.33	3.51	7.00	3.29	4.10
l'	2.5	16.5	2.0	6.5	8.0	1.5
r	12.1	40.0	10.2	39.0	40.0	39.0
D	29.3	29.0	29.2	29.3	29.0	29.3
ø	27.4	20.2	28.2	23.3	20.2	23.3
Int	945	1507	992	1379	994	1056

Capacity Corrections

Arm 1 Holborn Rd

	AM22	AM42	PM22	PM42
Busy Flow	422	498	448	529
Total Flow	550	649	708	836
Adj Int	1232	1232	1493	1493
Cap Corr	**65.72%**	**65.72%**	**79.69%**	**79.69%**

Arm 2 A183(E) — Middle and Offside lane check

	AM22(inter)	AM42(inter)	PM22(inter)	PM42(inter)	AM22	AM42	PM22	PM42
Busy Flow	425	502	409	483	501	592	456	538
Total Flow	501	592	456	538	679	802	782	923
Adj Int	1172	1172	1108	1107	1588	1588	1901	1900
Cap Corr	**77.75%**	**77.78%**	**73.54%**	**73.47%**	**77.77%**	**77.77%**	**93.07%**	**93.02%**

Arm C

	AM22	AM42	PM22	PM42
Busy Flow	580	684	485	572
Total Flow	1100	1298	960	1132
Adj Int	1881	1882	1964	1963
Cap Corr	**89.33%**	**89.39%**	**93.24%**	**93.22%**

Arm D — Middle and Nearside lane check

	AM22(inter)	AM42(inter)	PM22(inter)	PM42(inter)	AM22	AM42	PM22	PM42
Busy Flow	591	697	495	584	661	780	589	695
Total Flow	661	780	589	695	1022	1206	1053	1243
Adj Int	1181	1182	1257	1257	1826	1827	2246	2248
Cap Corr	**85.65%**	**85.70%**	**91.12%**	**91.13%**	**83.23%**	**83.28%**	102.39%	102.44%

Unequal Lane Usage in ARCADY using Junctions 9 – DRAFT 23/08/18

By Simon Swanston BEng, MSc, CEng, FIHE – JCT Consultancy

Date: August 2018

Synopsis

Modelling the performance of roundabouts, without signal-control, has traditionally been conducted using the ARCADY software in the UK, developed by the Transport Research Laboratory (TRL). The ARCADY module is now incorporated within the Junctions 9 software along with the PICADY (priority junctions) and OSCADY (signal-controlled junctions) modules.

Care must always be taken to account for unequal lane usage on entries to the roundabout, as the empirical formulae used to derive capacities / queues do not take any consideration to the number of lanes or turning directions. This was highlighted by Barbara Chard in the "ARCADY Health Warning" paper in 1997, which also provided a method to adjust the intercept to account for unequal lane usage.

Since 1997, although the empirical formulae remain essentially the same, additional features and tools are now available in Junctions 9, such as full capacity adjustments and Lane Simulation.

This paper revisits Barbara Chard's method in accounting for unequal lane usage, and whether any of the new tools in Junction 9 can be incorporated to refine the results. It also compares this method with results from the Lane Simulation tool in Junctions 9 and identifies areas where caution is required using Lane Simulation.

Unequal Lane Usage – Barbara Chard Method

The capacity calculations used in ARCADY assume that traffic can use all of the entry width when there is a queue. However, this fact does not always hold when there is a significant imbalance of traffic across the lanes at the give-way line.

In cases were imbalance exists, an adjustment to the capacity must be considered.

A method of determining Intercept corrections for unequal lane usage was discussed by Barbara Chard in the paper "ARCADY Health Warning: Account for lane usage or risk damaging the Public Purse". This recommended the following steps:

1. Calculate the Intercept for the whole approach.
2. Determine which lane(s) will be the most heavily used.
3. Calculate the Intercept using the geometry of the busiest lane(s) only.
4. Multiply the answer from (3) by the total traffic flow on the entry, then divide this by the traffic flow using the busiest lane(s).
5. If the result from (4) is lower than (1), then (4) is the Intercept you want ARCADY to use.
6. Given that ARCADY will contain the geometry of the full entry, and therefore calculate (1) as the Intercept, a negative adjustment is required so that (4) is used instead.
7. If the result from (4) is higher than (1), then no adjustment is required.

The capacity relationship with circulating flow is shown in Figure 1, and the impact of applying an Intercept correction.

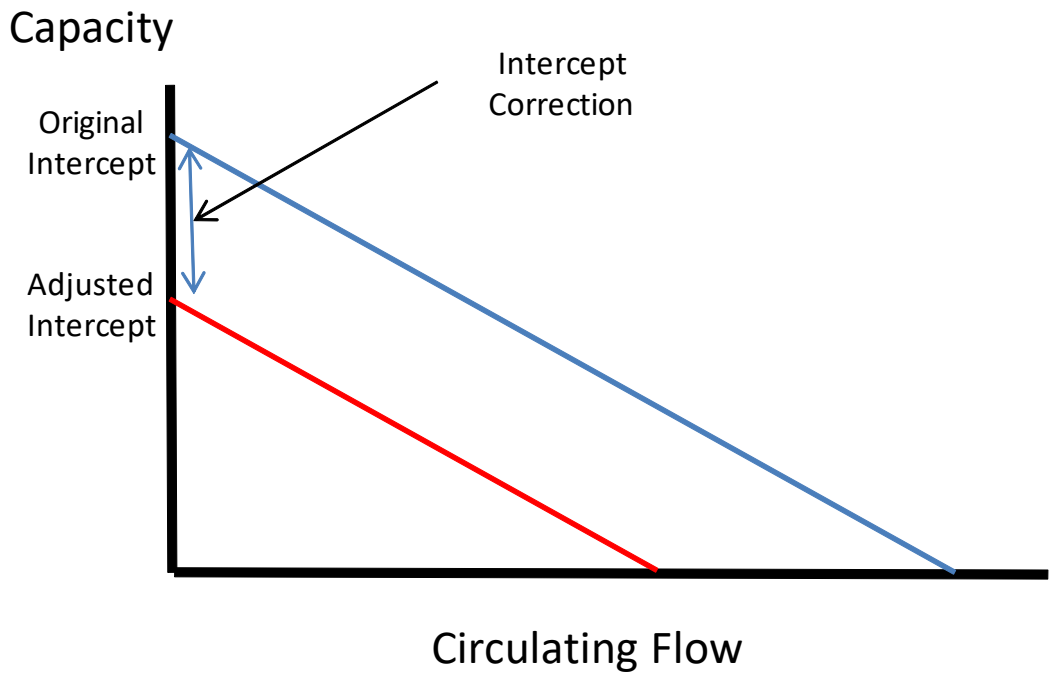


Figure 1: Impact of Intercept correction on Capacity Relationship with Circulating Flow

Limitation of the Intercept Adjustment

The paper by Barbara Chard was written at a time in which adjustments could be made to the Intercept in the software, but not the Slope. Therefore, the absolute reduction to capacity would be equal to the Intercept correction, regardless of circulating flow. However, this results in larger proportional reductions to capacity as circulating flows increase, which may result in overly pessimistic results.

Take a simple hypothetical example:

Imagine an approach consisting of two full lanes to the give-way line (i.e. no flaring). Following the measurement of geometric parameters, the Intercept for the approach is calculated as 2000 pcu/hr and the Slope as 0.6.

However, let us assume that during one peak period 100% of the total traffic flow on the approach uses one lane only. Logic indicates that as the Intercept for both lanes combined is 2000 pcu/hr, then the Intercept of each lane (and therefore the busiest lane) is 1000 pcu/hr. Therefore, an Intercept correction of -1000 pcu/hr would be required to ensure ARCADY used an Intercept of 1000 pcu/hr rather than 2000 pcu/hr during this flow period. The impact of applying this Intercept correction is shown in **Figure 2**.

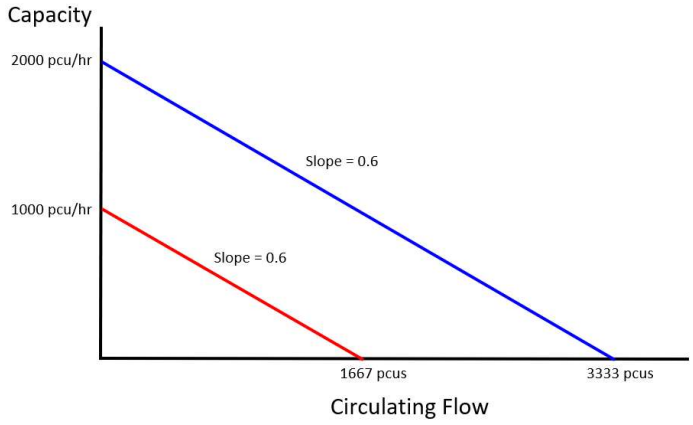


Figure 2: Intercept Correction when Only One Lane of Two Full Lane Approach Utilised

Following the application of the Intercept correction, Figure 2 shows that when circulating flow is zero, the capacity would be 1000 pcu/hr rather than 2000 pcu/hr. This would be expected given that traffic can only proceed into the roundabout from one lane rather than two, resulting in the actual capacity being 50% of the total approach.

However, as the circulating flow increases, the available capacity (red line) continually decreases below 50% of the total approach capacity (blue line). For example, if the circulating flow was 1000 pcu/hr, the capacity for both lanes of the approach would be 2000 – 0.6 x 1000 = 1400 pcu/hr. However, with the Intercept correction, the capacity would be 1000 – 0.6 x 1000 = 400 pcu/hr. Therefore, the capacity of the single lane would be 28.6% of the total capacity of both lanes. The graph also shows that capacity falls to zero when the circulating flow is 1667 pcus following the Intercept correction, whereas if both lanes were well utilised, the combined capacity of both lanes at this point would be 1000 pcu/hr.

The Solution to the Intercept Correction Problem

The latest version of ARCADY (within Junctions 9) now allows direct capacity adjustments rather than Intercept adjustments. Therefore, once a suitable Intercept is calculated using the Barbara Chard method, a calculation should be conducted to determine its percentage against the Intercept for the whole approach. For the case in Figure 2, a percentage of 50% would be calculated (i.e. 1000/2000 x 100%). Junctions 9 then enables this capacity reduction to be applied to the Analysis Set. The impact on the capacity relationship is shown in **Figure 3**.

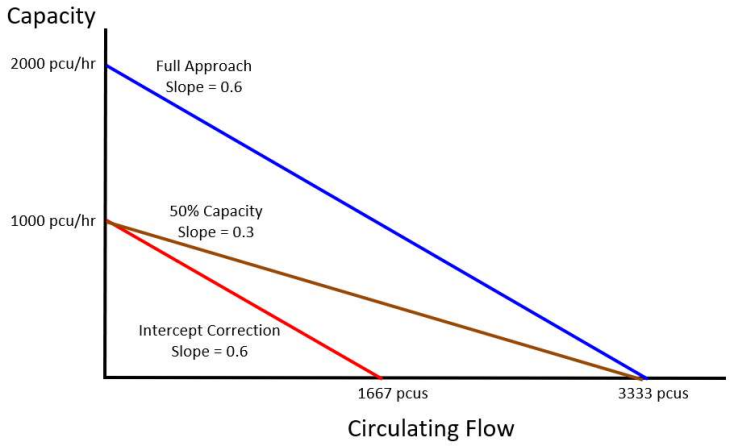


Figure 3: Application of Capacity Adjustment (Brown/Middle Line)

This adjustment to capacity ensures that the capacity reduction will always be proportionally the same (in this case 50%), regardless of circulating flow. This is also equivalent to dividing both the Intercept and Slope by the same proportion.

As described by Barbara Chard, it is still important to bear in mind the following points:

- A capacity adjustment determined using this method should only be applied if the calculated Intercept for the busy lane(s) is lower than the Intercept for the full approach (i.e. the capacity adjustment should not be over 100%).
- The capacity adjustment is dependent on traffic flow proportions and should therefore be calculated independently for each traffic Demand Set. Variable capacity adjustments can be set up in Junctions 9 by creating an Analysis Set for each Demand Set, with the capacity adjustment linked to the Analysis Set.

Demonstration of the Application of a Capacity Adjustment at a Junction

As an example, take the junction in **Figure 4**.

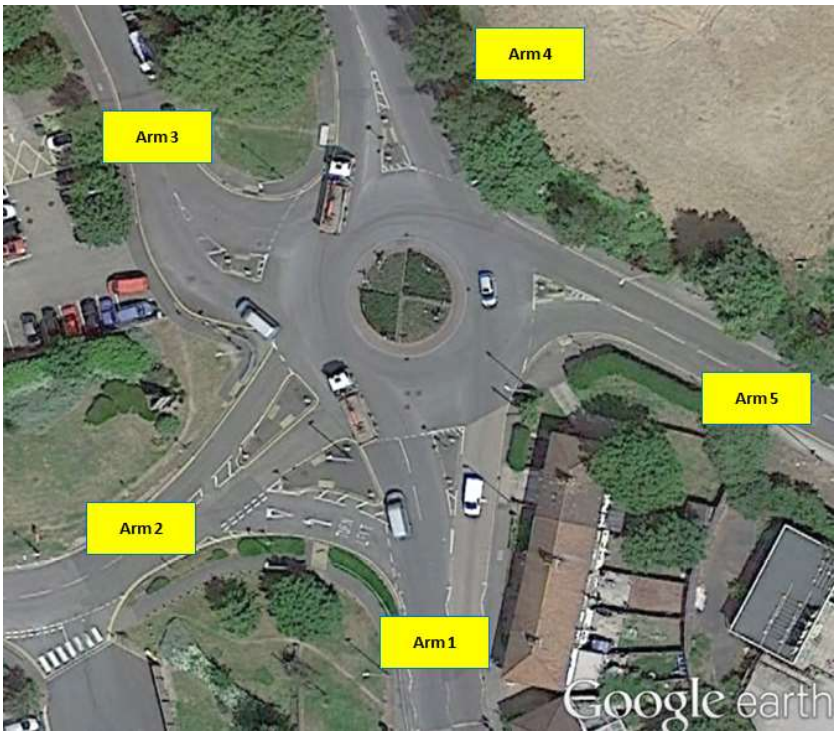


Figure 4: Capacity Adjustment on Arm 4

Arm 4 consists of two lanes. If it was assumed that left turning and ahead traffic used the nearside lane (to Arms 5 and 1) and all other traffic used the offside lane (to Arms 2 and 3), then the usage of each lane would be as follows during the AM Peak:

Nearside	=	166 (to Arm 5) + 727 (to Arm 1)	=	893
Offside	=	15 (to Arm 2) + 25 (to Arm 3)	=	40
Total Arm Flow	=	893 +40	=	933

The geometric measurements and Intercept for Arm 4 are shown below, as well as the corresponding measurements for the nearside lane only (as this was shown to be the busiest lane above).

	Full Approach	**Nearside Lane**
v	3.6	3.6
e	7.8	3.9
l’	15.8	1.0
r	11	11
D	34	34
Φ	18	18
Intercept	**1781**	**1139**

The intercept of 1781 pcu/hr would apply with reasonably balanced flows across both lanes. If the offside lane was never used, then a more appropriate intercept would be 1139 pcu/hr. Given that some traffic does use the offside lane, the Intercept will lie between 1139 pcu/hr and 1781 pcu/hr. This can be estimated as follows:

Adjusted Intercept = Busy Lane Intercept x Total Arm Flow / Busy Lane Flow

= 1139 x 933 / 893

= 1190 pcu/hr

Note, if the calculation above resulted in an answer at or above 1781 pcu/hr, this would indicate no adjustment is required. Increases to Intercepts / Capacity should not be made for unequal lane usage.

The Capacity Adjustment may be calculated as follows:

Capacity Adjustment = 1190 / 1781 x 100 = **66.82%**

Therefore, regardless of circulating flow, ARCADY would always assume a reduction of 66.82% when calculating the output parameters. In comparison, had the Intercept correction been applied only, the calculated capacities are shown for a range of circulating flows in **Table 1**.

Table 1: Capacity Comparison between Capacity Adjustment versus Intercept Adjustment

Circulating	Capacities		
	Full Approach	Capacity Reduction	Intercept Reduction
0	1781	1190	1190
500	1446	966	855
1000	1111	742	520
1500	776	519	185
2000	441	295	0
2500	106	71	0

Once the circulating flow increases beyond zero, the capacity used by ARCADY is always lower if an Intercept correction is applied in comparison to a capacity correction. This may only have a small impact when circulating flows are relatively low of the approach is well within capacity. However, as circulating flows become higher the impact on the results will become more significant, particularly on critical approaches.

Lane Simulation Tool and Comparison to the Capacity Adjustment Method

Junctions 9 includes a Lane Simulation Tool where individual lanes can be set up, the distances at which the number of lanes increases as traffic approaches the give-way line (i.e. flare lengths) and lane turning directions.

The standard ARCADY geometry is still applied to each approach. The Lane Simulation Tool can then share the calculated capacity of the standard model across the specified lanes at the give-way line. There are several stated benefits to Lane Simulation, one of these being that it can model the impact of unequal lane usage.

"Short" Flare

To investigate the results of the Lane Simulation Tool, two models were set up of the same three arm roundabout, each consisting of two lanes at the give-way line and one lane upstream of any flare. Traffic flows were kept constant from Arms B and C. However, a range of flows were tested from Arm A, from 100% (i.e. complete lane starvation of the offside) of the total flow using the nearside to 50% (i.e. balanced usage). Arm A had an approach road half width of 3.5m, entry width of 7.5m and effective flare length of 9m. The first model applied the capacity adjustment calculations, which were an extension to the Barbara Chard method (referred to as Health Warning Update). The second model used the Lane Simulation Tool. Both were modelled using Junctions version 9.5.

Lane Simulation does not provide an RFC for the approach. Therefore, the comparison of calculated delay for Arm A is shown in **Figure 5**.

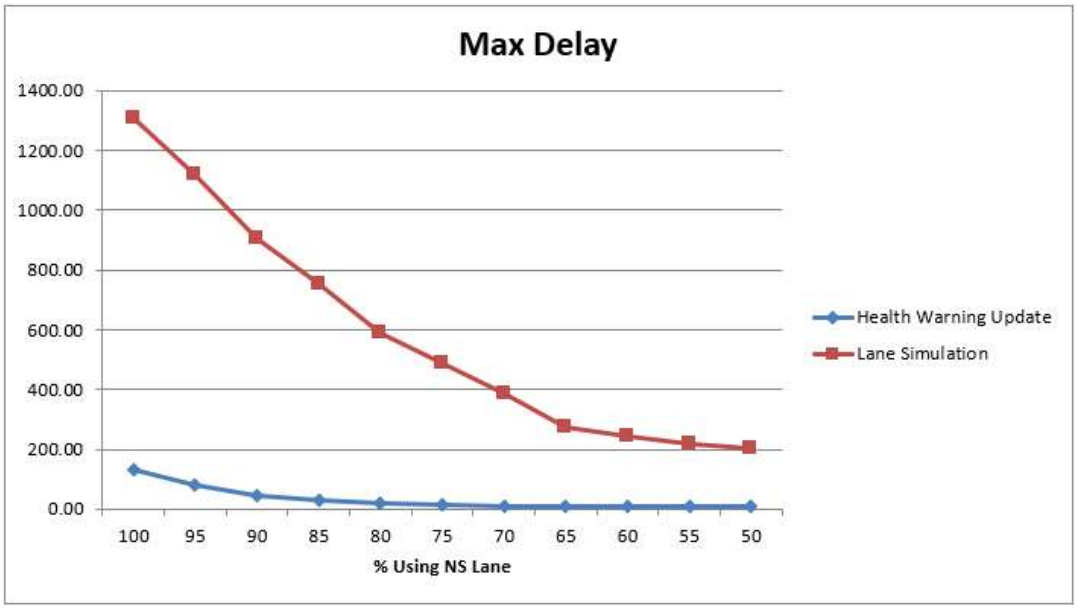


Figure 5: Capacity Adjustment versus Lane Simulation – Arm A Delay

The graph shows that Lane Simulation calculated considerably more delay than the Capacity Adjusted method. However, it is important to note that no capacity adjustment was applied when the traffic flows were balanced. In fact, no capacity adjustment was applied in this example until 75% or more traffic utilised the nearside lane. Therefore, where the nearside flow was less than 75% of the total flow (right side of graph), the Capacity Adjusted is effectively the standard ARCADY model with no corrections.

So, when traffic flows were balanced across both lanes, the standard ARCADY model calculated a delay of 11.79 seconds. However, Lane Simulation calculated a delay of 204.57 seconds, 1635% higher than the standard model. This raised concerns to the results produced by Lane Simulation and indicated that these concerns would also be applicable to where unequal lane usage did exit. For example, where 100% of traffic used the nearside lane, the capacity adjusted model predicted a delay of 130.85 seconds, whereas Lane Simulation calculated a delay of 1307.36 seconds, 899% higher than the capacity adjusted model.

Figure 6 shows the comparison of the predicted queue lengths for the same modelled runs.

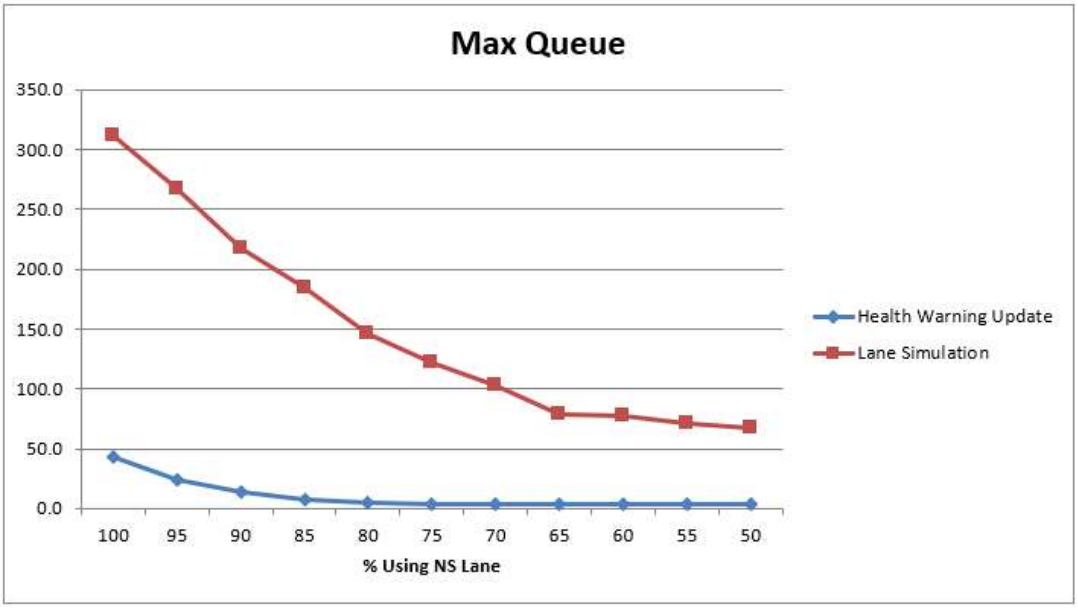


Figure 6: Capacity Adjustment versus Lane Simulation -Arm A Queue

When traffic flows were balanced across both lanes, the standard ARCADY model calculated a queue of 3.5 pcus. However, Lane Simulation calculated a queue of 67.2 pcus, 1820% higher than the standard model. Where 100% of traffic used the nearside lane, the capacity adjusted model predicted a queue of 42.6 pcus, whereas Lane Simulation calculated a queue of 311.5 pcus, 631% higher than the capacity adjusted model.

A likely explanation for the significantly worse results produced using the Lane Simulation tool is that the negative effect of any flaring on the approach is effectively double counted. Firstly, when calculating the combined capacity across all lanes, Lane Simulation will use the values calculated using the standard geometry, which incorporates the effective flare length. Secondly, when setting up the lane levels and lane lengths in Lane Simulation, this will also model the impact of the flare as simulated traffic cannot enter one lane when traffic completely fills the adjacent lane.

"Longer" Flare

Due to the relatively short effective flare length of 9m used in the evaluations above, the models were re-run with an increased flare length of 33m. It was expected that a closer match between the models could be achieved given that the impact of the flare on capacity should be less critical. The comparison of delays on Arm A is shown in **Figure 7**.

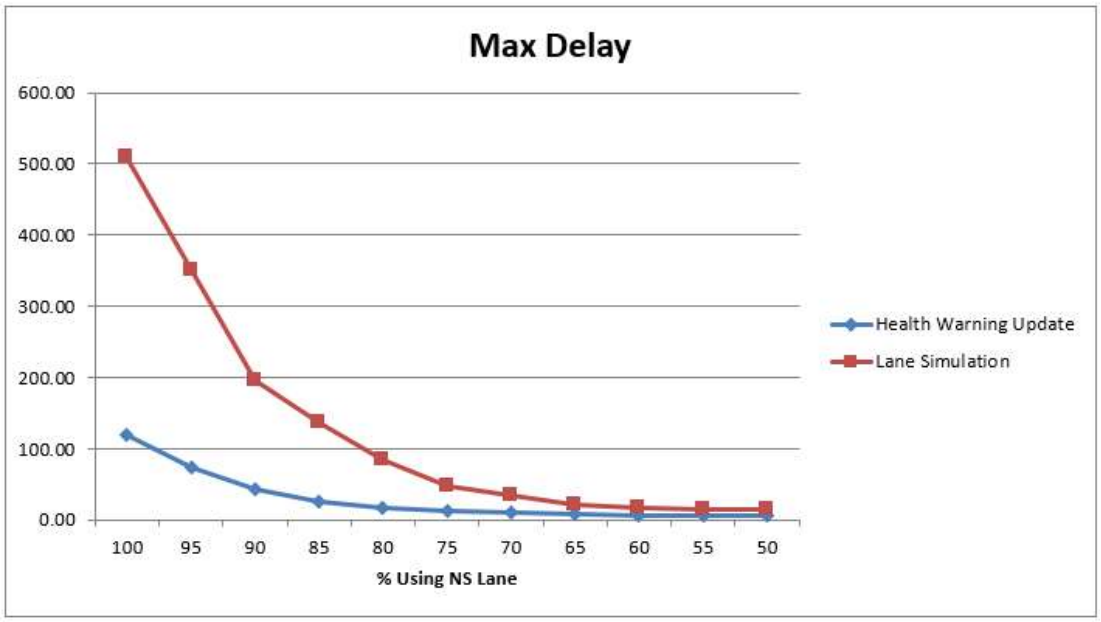


Figure 7: Capacity Adjustment versus Lane Simulation – Arm A Delay, Longer Flare

The graph shows a closer relationship between both sets of results with the increased flare length, although using Lane Simulation continued to provide longer delays, particularly where lane usage was more imbalanced. When traffic flows were balanced across both lanes, the standard ARCADY model calculated a delay of 5.64 seconds. However, Lane Simulation calculated a delay of 13.96 seconds, 148% higher than the standard model. Where 100% of traffic used the nearside lane, the capacity adjusted model predicted a delay of 120.38 seconds, whereas Lane Simulation calculated a delay of 509.06 seconds, 323% higher than the capacity adjusted model.

Figure 8 provided the queue comparison between both models.

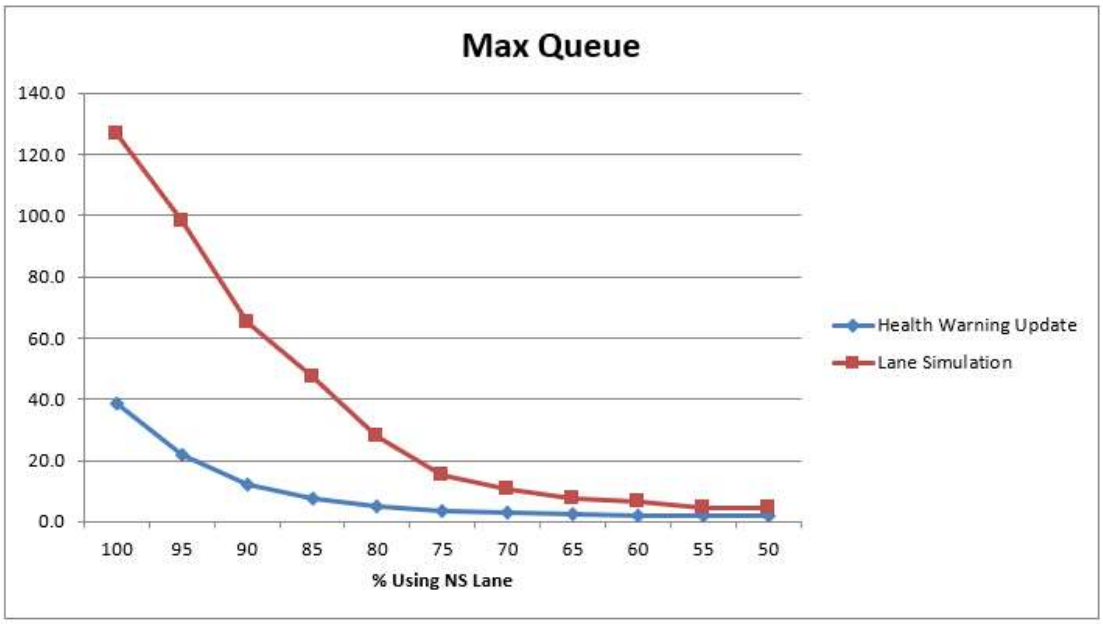


Figure 8: Capacity Adjustment versus Lane Simulation -Arm A Queue, Longer Flare

When traffic flows were balanced across both lanes, the standard ARCADY model calculated a queue of 1.7 pcus. Lane Simulation calculated a queue of 4.7 pcus, 176% higher than the standard model. Where 100% of traffic used the nearside lane, the capacity adjusted model predicted a queue of 38.8 pcus, whereas Lane Simulation calculated a queue of 126.5 pcus, 226% higher than the capacity adjusted model.

Although there was a closer match, there was still a significant difference in results with unbalanced traffic flows. This is because the Intercept of the single lane will be higher than half the Intercept of the full approach, because the full approach Intercept would be reduced due to the impact of any flare. This is taken into account using the Capacity Adjusted method, as the single lane Intercept is first calculated. The single lane Intercept is effectively the lowest Intercept that should be used, and would be used only when 100% of traffic use the busy lane. Otherwise a higher value would be used, lying between the single lane Intercept and the full approach Intercept. However, when using Lane Simulation, if 100% of traffic uses the busy lane only, it simply assumes half of the full approach Intercept. This would be too low, as the impact of any flare would have no impact on the single lane, as it would for the full approach with more balanced traffic flows. When using Lane Simulation, alternatively the capacity for each lane can be entered directly, rather than assuming a simple 50/50 split of capacity across both lanes. Although this could be applied to provide a more realistic result, it would have to be calculated independently for each flow group as variations in lane usage will impact on the capacity of each individual lane.

Modified Lane Simulation Tool and Comparison to the Capacity Adjustment Method

It was shown in the last section that results from the Lane Simulation Tool did not correspond to those from the standard ARCADY model, even when unequal lane usage did not occur. This was because the impact of the flare was effectively double counted in Lane Simulation, with the biggest differences in results occurring for shorter flare lengths. However, the differences in results were still significant for relatively long flares, especially when unequal lane usage was a factor.

Therefore, to remove double counting the impact of the flare, an alternative strategy was tested using Lane Simulation. This was to update the lane geometry to represent a full two-lane approach (i.e. increase the approach road half width to equal the entry width and reduce the effective flare length to zero). The capacity across the two lanes at the give-way line would then initially be calculated from the geometry of a 2 full lane approach, with the impact of the flare length accounted for during simulation using the lane lengths set within the Junction Diagram.

The comparison of delays on Arm A is shown in **Figure 9**, assuming the more critical short flare length. **Figure 10** compares the queue lengths.

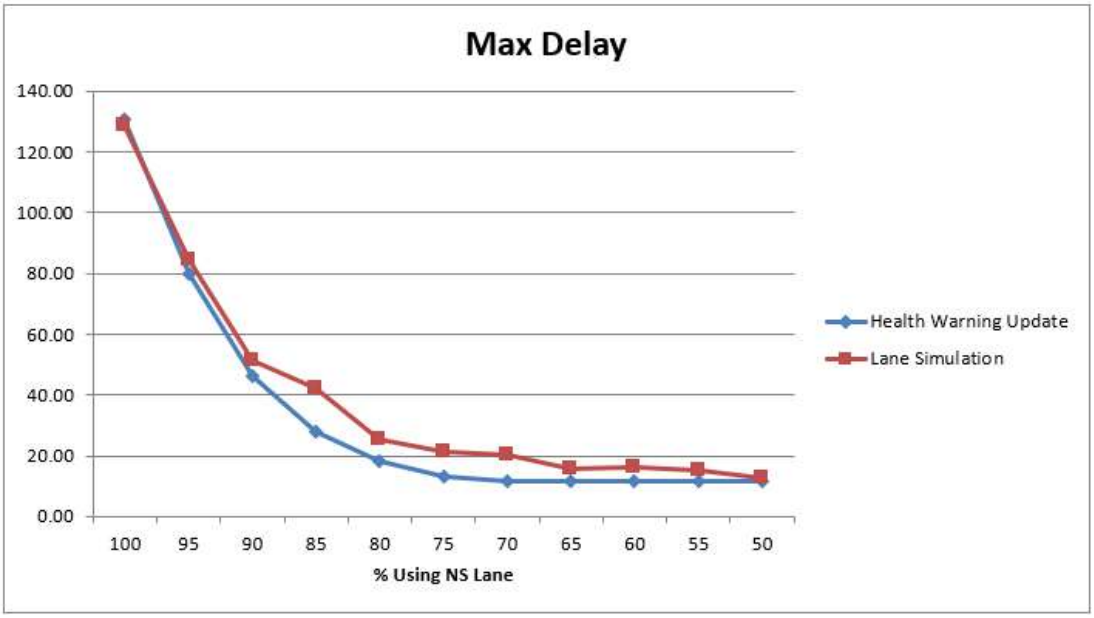


Figure 9: Capacity Adjustment versus Modified Lane Simulation – Arm A Delay, Shorter Flare

When traffic flows were balanced across both lanes, the standard ARCADY model calculated a delay of 11.79 seconds. Lane Simulation calculated a delay of 12.68 seconds, 8% higher than the standard model. Where 100% of traffic used the nearside lane, the capacity adjusted model predicted a delay of 130.85 seconds, whereas Lane Simulation calculated a delay of 128.45 seconds, 2% lower than the capacity adjusted model. Therefore, there was a good correlation between the results from both models.

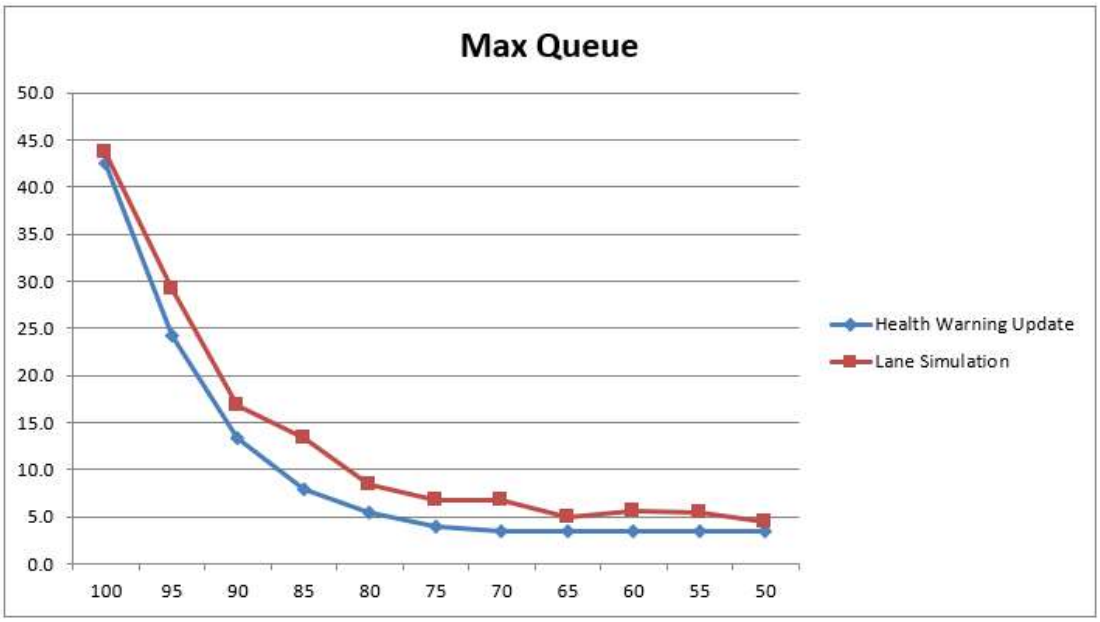


Figure 10: Capacity Adjustment versus Modified Lane Simulation – Arm A Queue, Shorter Flare

When traffic flows were balanced across both lanes, the standard ARCADY model calculated a queue of 3.5 pcus. Lane Simulation calculated a queue of 4.5 pcus, 29% higher than the standard model. Where 100% of traffic used the nearside lane, the capacity adjusted model predicted a queue of 42.6 pcus, whereas Lane Simulation calculated a queue of 43.7 pcus, 3% higher than the capacity adjusted model. Therefore, there was a good correlation between the results from both models. Although the percentage difference was higher with more evenly balanced traffic flows, this was only because the absolute queue predictions were low.

Finally, **Figures 11 and 12** provide the same results as Figures 9 and 10 respectively, but include the standard use of the Lane Simulation Tool (i.e. assuming the standard ARCADY geometry as originally tested, thus double counting the impact of the flare). This was included so that all results could be compared using the same scale in the vertical axis.

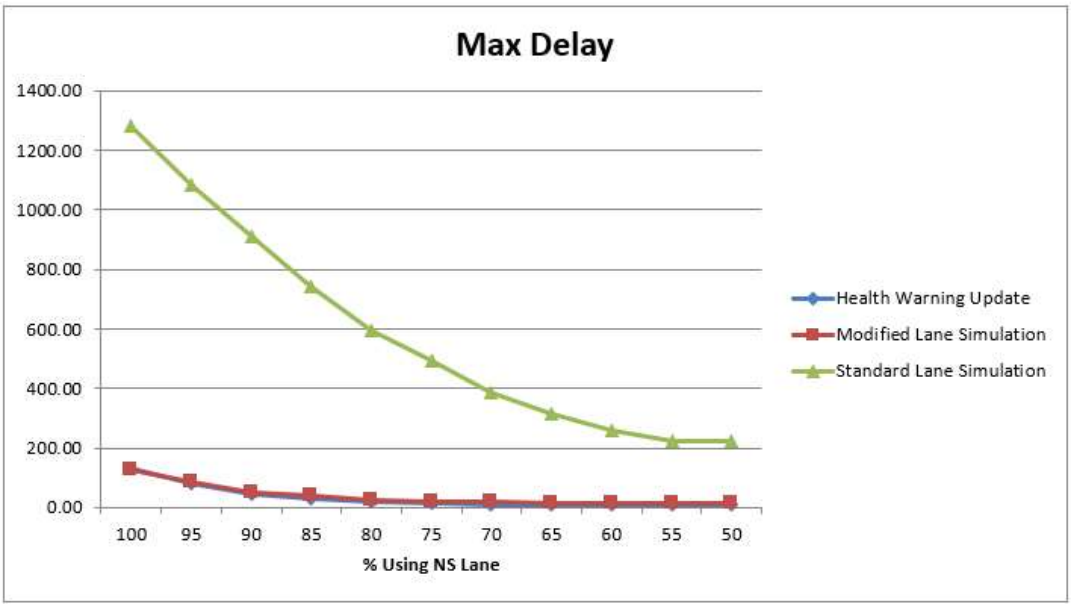


Figure 11: Capacity Adjustment versus Modified Lane Simulation versus Standard Lane Simulation – Arm A Delay, Shorter Flare

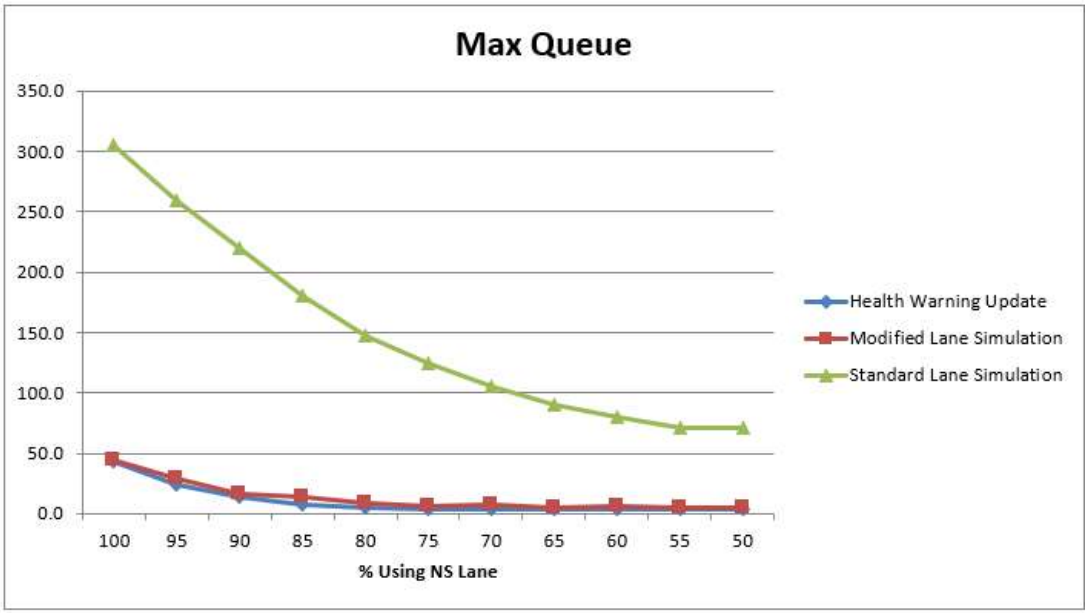


Figure 12: Capacity Adjustment versus Modified Lane Simulation versus Standard Lane Simulation – Arm A Queue, Shorter Flare

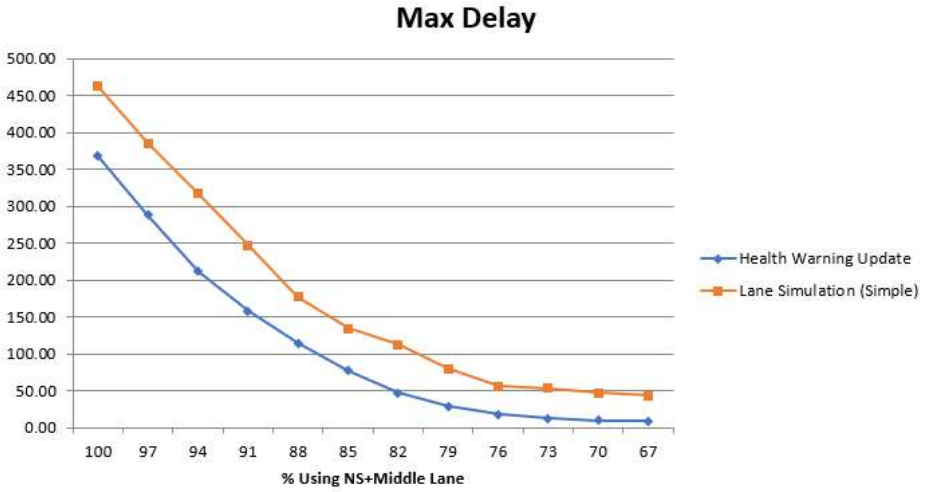
Figures 11 and 12 highlight the close relationship between the standard ARCADY model and the Lane Simulation model once the geometry is modelled to assume two full lanes. Furthermore, once unequal lane usage becomes more significant, the capacity adjustment method (Health Warning Update) also provides similar results to the modified Lane Simulation model.

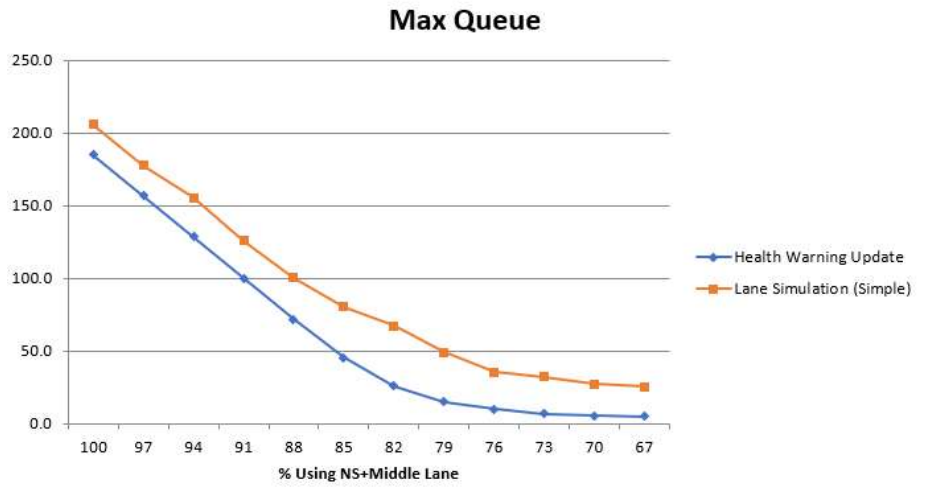
Other Examples comparing Lane Simulation with Capacity Adjustment Method

This section provides more examples, making use of models that were produced as part of Consultancy projects. Each model has been updated to allow for a variation of lane usages on a specified arm and the results compared between the capacity adjusted model and (modified) lane simulation.

Junction 1: A134 Balkerne Hill / A1124 / Southway / B1022 - Colchester

Arm:	Balkerne Hill (North)	Rbt Type:	Standard
Arm Type:	2 into 3 lane flare	Busy Lane(s):	Nearside/Middle
Flow Range:	Nearside + Middle – 100% to 67%	Capacity Adjustments:	>70%



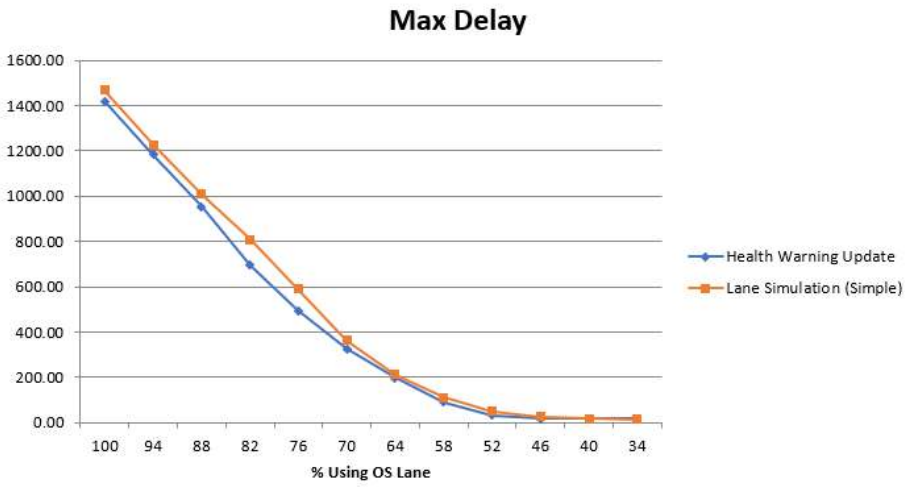


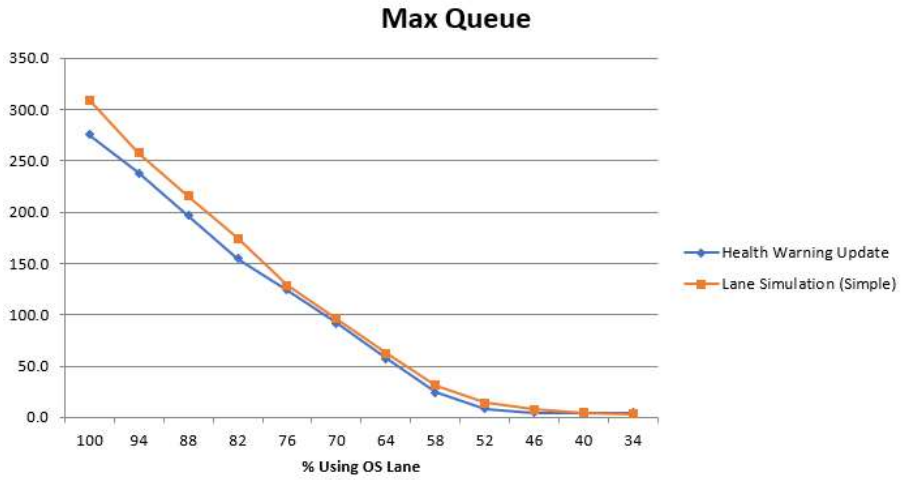
The lane simulation tool predicted higher delays and queues than the standard model with capacity adjustments, even when traffic flows were reasonably balanced across all lanes (i.e. 67% in nearside and middle lanes) and no capacity adjustments were applied to the standard model.

However, the absolute difference between queues and delay between each model were relatively consistent across all the full range of lane usage tests. There was a good correlation in how delays and queues increases as flows became more imbalanced.

Junction 2: Bearsted Rd Rbt - Maidstone

Arm:	Bearsted Rd (East)	Rbt Type:	Standard
Arm Type:	1 into 3 lane flare	Busy Lane(s):	Offside
Flow Range:	Offside – 100% to 34%	Capacity Adjustments:	>46%





There was a good correlation for delays and queues between both methods.

Conclusions

The traditional method for accounting for unequal lane usage at roundabouts was provided by Barbara Chard in the 1997 paper "ARCADY Health Warning". Although this ensured that the impact of unequal lane usage was not under-estimated in the ARCADY results, it was shown that results could be overly robust with higher circulating flows. This was due to the inability to make any adjustments to the Slope.

With the additional features that Junctions 9 (ARCADY 9) contains, the Barbara Chard method can be adapted so that higher circulating flows do not provide overly robust results. Rather than making an adjustment to the Intercept only, a full capacity adjustment can be made that is independent of circulating flows. The full capacity adjustment can be calculated once the flow group dependent Intercept is calculated using Barbara Chard's methodology.

Junctions 9 also provides the Lane Simulation Tool which can be used to test the impact of unequal lane usage. However, caution must be applied when using this. It was shown that, even when traffic flows across all lanes were relatively balanced, lane simulation provided significantly worse results in comparison to the standard ARCADY model. The reason for this was the fact that the impact of the flare was double-counted, in that it was accounted for in both the standard lane geometry and the lane length specified in each lane level used in Lane Simulation. Although the differences between Lane Simulation and the standard model were greatest with shorter flares, the difference continued to be significant for longer flares.

To avoid the double-counting of the flare in Lane Simulation, it was shown that changing the approach road half width (v) to equal the entry width (e) and changing the effective flare length (l') to zero, provided results that were more comparable to the standard ARCADY model.

A range of lane usage values were tested for several roundabouts, ranging from complete lane starvation to even balancing across all lanes. These were tested using both the Capacity Adjustment method (derived from Barbara Chard's methodology but with Capacity rather than Intercept adjustment), and the Lane Simulation Tool (where v changed to match e and l'=zero). The results showed a very good correlation between both methods.

Therefore, when accounting for unequal lane usage, using Capacity Adjustments derived using a similar process to that produced by Barbara Chard continues to provide a logical and robust assessment, without becoming overly robust at higher circulating flows. If Lane Simulation is to be used, lane geometry needs to be changed so that the impact of the flare is not double-counted. It is also recommended that when using Lane Simulation Tool, a Demand Set with balanced traffic flows across all the lanes is set up and the results compared to the standard ARCADY model. This will provide confidence that the Lane Simulation Tool is not providing radically different results to the standard ARCADY model when unequal lane usage cannot be considered the explanation.

Appendix B

Existing Layout

ARCADY Data

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.1.1519

For sales and distribution information, program advice and maintenance, contact TRL Software:
+44 (0)1344 379777 software@trl.co.uk trlsoftware.com

Filename: Springwell Rd Existing.j10
Path: \\JCTSERVER\WorkFiles\Consultancy\Project Files 2023\23014 Springwell Rd\Models
Report generation date: 04/04/2023 10:05:23

Summary of junction performance

	AM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	AM23 - 2023						
1 - Holborn Rd	A1 D1	5.7	35.95	0.86	E	17.32	0 % [1 - Holborn Rd]
2 - A183 (E)		2.2	10.70	0.68	B		
3 - Springwell Rd		5.3	16.35	0.85	C		
4 - A183 (W)		3.9	12.74	0.80	B		

	AM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	AM43 - 2043						
1 - Holborn Rd	A2 D2	53.6	249.67	1.16	F	97.20	-16 % [1 - Holborn Rd]
2 - A183 (E)		5.0	21.19	0.84	C		
3 - Springwell Rd		46.7	108.47	1.05	F		
4 - A183 (W)		19.1	53.57	0.98	F		

	PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	PM23 - 2023						
1 - Holborn Rd	A3 D3	8.9	43.90	0.92	E	16.28	-2 % [1 - Holborn Rd]
2 - A183 (E)		3.1	13.55	0.76	B		
3 - Springwell Rd		2.8	9.75	0.74	A		
4 - A183 (W)		1.8	5.71	0.65	A		

	PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	PM43 - 2043						
1 - Holborn Rd	A4 D4	99.8	368.13	1.26	F	93.04	-17 % [1 - Holborn Rd]
2 - A183 (E)		10.2	38.55	0.93	E		
3 - Springwell Rd		8.2	25.14	0.90	D		
4 - A183 (W)		3.8	10.33	0.80	B		

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

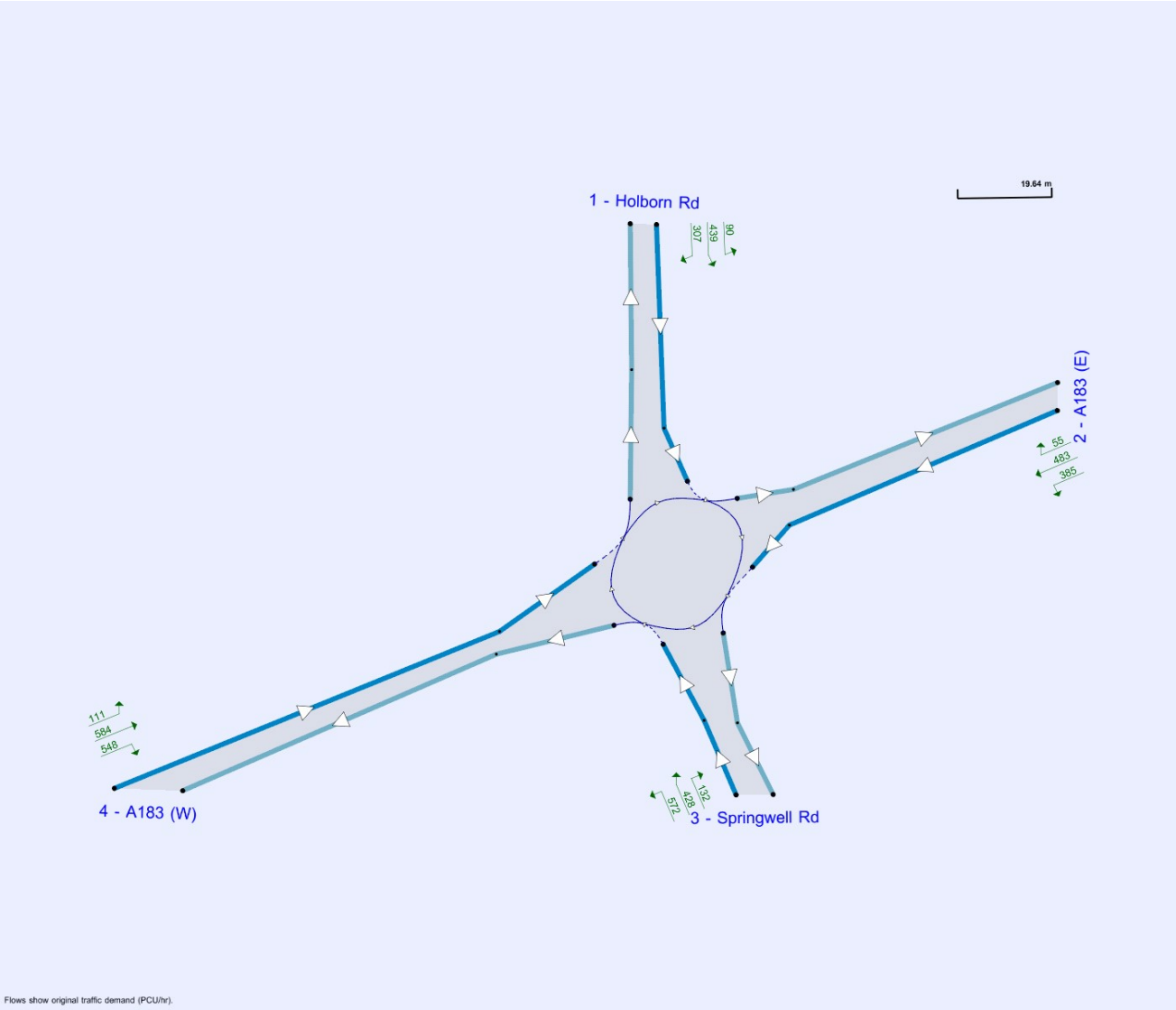
File summary

File Description

Title	Springwell Rd Existing
Location	Sunderland
Site number	
Date	27/03/2023
Version	
Status	(new file)
Identifier	
Client	Sunderland City Council
Jobnumber	23014
Enumerator	jct\simon.swanston
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Show lane queues in feet / metres	Show all PICADY stream intercepts	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)	Use iterations with HCM roundabouts	Max number of iterations for roundabouts
5.75					✓	Delay	0.85	36.00	20.00		500

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2023	AM	ONE HOUR	07:15	08:45	15	✓
D2	2043	AM	ONE HOUR	07:15	08:45	15	✓
D3	2023	PM	ONE HOUR	16:15	17:45	15	✓
D4	2043	PM	ONE HOUR	16:15	17:45	15	✓

AM23 - 2023, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	AM23	✓	✓	D1	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	17.32	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	0	1 - Holborn Rd	17.32	C

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	5.78	9.71	15.2	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	5.94	10.19	5.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.836	2502
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.790	2271

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	65.72
2 - A183 (E)	Percentage	Unequal Lane Usage	63.09
3 - Springwell Rd	Percentage	Unequal Lane Usage	89.33
4 - A183 (W)	Percentage	Unequal Lane Usage	80.34

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2023	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	550	100.000
2 - A183 (E)		ONE HOUR	✓	679	100.000
3 - Springwell Rd		ONE HOUR	✓	1100	100.000
4 - A183 (W)		ONE HOUR	✓	1022	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	74	348	128
	2 - A183 (E)	76	0	178	425
	3 - Springwell Rd	404	116	0	580
	4 - A183 (W)	70	591	361	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	9	2	2
	2 - A183 (E)	6	0	2	3
	3 - Springwell Rd	1	5	0	1
	4 - A183 (W)	1	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	0.86	35.95	5.7	E	505	757
2 - A183 (E)	0.68	10.70	2.2	B	623	935
3 - Springwell Rd	0.85	16.35	5.3	C	1009	1514
4 - A183 (W)	0.80	12.74	3.9	B	938	1407

AM43 - 2043, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	AM43	✓	✓	D2	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	97.20	F

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-16	1 - Holborn Rd	97.20	F

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	5.78	9.71	15.2	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	5.94	10.19	5.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.836	2502
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.790	2271

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	65.72
2 - A183 (E)	Percentage	Unequal Lane Usage	63.09
3 - Springwell Rd	Percentage	Unequal Lane Usage	89.39
4 - A183 (W)	Percentage	Unequal Lane Usage	80.39

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2043	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	649	100.000
2 - A183 (E)		ONE HOUR	✓	802	100.000
3 - Springwell Rd		ONE HOUR	✓	1298	100.000
4 - A183 (W)		ONE HOUR	✓	1206	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	87	411	151
	2 - A183 (E)	90	0	210	502
	3 - Springwell Rd	477	137	0	684
	4 - A183 (W)	83	697	426	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	9	2	2
	2 - A183 (E)	6	0	2	3
	3 - Springwell Rd	1	5	0	1
	4 - A183 (W)	1	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	1.16	249.67	53.6	F	596	893
2 - A183 (E)	0.84	21.19	5.0	C	736	1104
3 - Springwell Rd	1.05	108.47	46.7	F	1191	1787
4 - A183 (W)	0.98	53.57	19.1	F	1107	1660

PM23 - 2023, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A3	PM23	✓	✓	D3	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	16.28	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-2	1 - Holborn Rd	16.28	C

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	5.78	9.71	15.2	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	5.94	10.19	5.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.836	2502
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.790	2271

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	79.69
2 - A183 (E)	Percentage	Unequal Lane Usage	75.50
3 - Springwell Rd	Percentage	Unequal Lane Usage	93.24
4 - A183 (W)	Percentage	Unequal Lane Usage	98.83

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	708	100.000
2 - A183 (E)		ONE HOUR	✓	782	100.000
3 - Springwell Rd		ONE HOUR	✓	960	100.000
4 - A183 (W)		ONE HOUR	✓	1053	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	76	372	260
	2 - A183 (E)	47	0	326	409
	3 - Springwell Rd	363	112	0	485
	4 - A183 (W)	94	495	464	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	6	0	1
	2 - A183 (E)	12	0	2	1
	3 - Springwell Rd	0	5	0	1
	4 - A183 (W)	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	0.92	43.90	8.9	E	650	975
2 - A183 (E)	0.76	13.55	3.1	B	718	1076
3 - Springwell Rd	0.74	9.75	2.8	A	881	1321
4 - A183 (W)	0.65	5.71	1.8	A	966	1449

PM43 - 2043, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A4	PM43	✓	✓	D4	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	93.04	F

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-17	1 - Holborn Rd	93.04	F

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	5.78	9.71	15.2	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	5.94	10.19	5.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.836	2502
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.790	2271

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	79.69
2 - A183 (E)	Percentage	Unequal Lane Usage	75.46
3 - Springwell Rd	Percentage	Unequal Lane Usage	93.22
4 - A183 (W)	Percentage	Unequal Lane Usage	98.88

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2043	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	836	100.000
2 - A183 (E)		ONE HOUR	✓	923	100.000
3 - Springwell Rd		ONE HOUR	✓	1132	100.000
4 - A183 (W)		ONE HOUR	✓	1243	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	90	439	307
	2 - A183 (E)	55	0	385	483
	3 - Springwell Rd	428	132	0	572
	4 - A183 (W)	111	584	548	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	6	0	1
	2 - A183 (E)	12	0	2	1
	3 - Springwell Rd	0	5	0	1
	4 - A183 (W)	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	1.26	368.13	99.8	F	767	1151
2 - A183 (E)	0.93	38.55	10.2	E	847	1270
3 - Springwell Rd	0.90	25.14	8.2	D	1039	1558
4 - A183 (W)	0.80	10.33	3.8	B	1141	1711

Appendix C

Intergreens

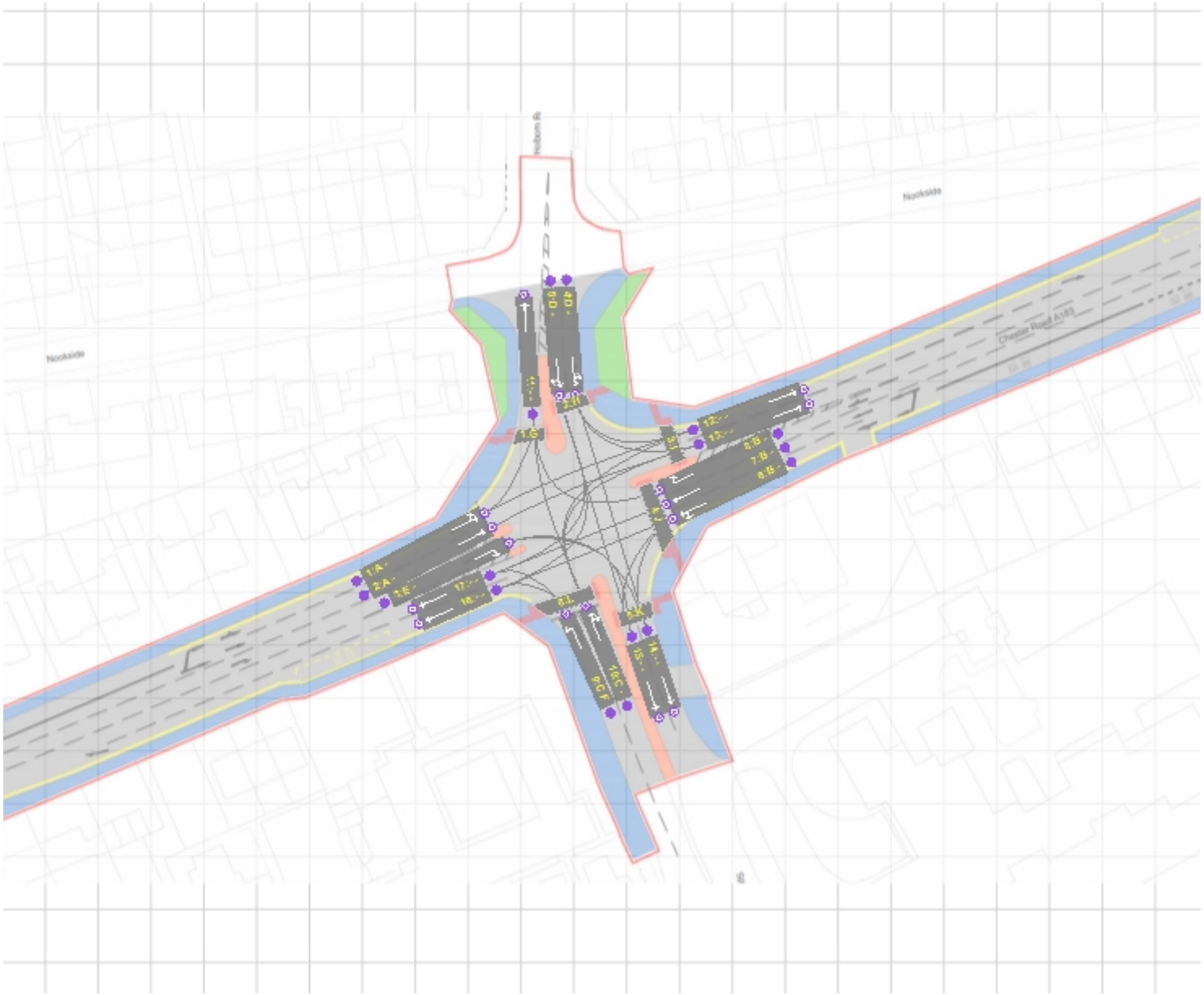
Historic Option

quickGreen Report

Project:	23014 Springwell Rd
Title:	Historic Option

Filename:	Springwell Rd Historic Option IGs.qgn
Location:	Sunderland
Designer:	Simon Swanston
Organisation:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Junction Geometry



Notes

This model does not have notes

Lane Details

Lane	Width (m)	Controlling Phase	Controlling Arrow Phase	Number of Turns	ASL Length (m)	Num Turning Movements
1	3	A		2		0 of 2
2	3	A		1		0 of 1
3	3	E		2		0 of 2
4	3	D		3		0 of 3
5	3	D		3		0 of 3
6	3	B		3		0 of 3
7	3	B		1		0 of 1
8	3	B		1		0 of 1
9	3	C	F	2		0 of 2
10	3	C		3		0 of 3

Pedestrian Crossings

Crossing	Walk Distance (m)	Walk Time (s)	Terminating Intergreen (s)
1	5.75	4.79	6.79
2	6.37	5.31	7.31
3	7.46	6.22	8.22
4	12.25	10.21	12.21
5	6.72	5.60	7.60
6	10.78	8.98	10.98

Traffic Signal Phases

Phase Name	Type	Lanes Controlled
A	3 Aspect Traffic	1 2
B	3 Aspect Traffic	6 7 8
C	3 Aspect Traffic	9 10
D	3 Aspect Traffic	4 5
E	3 Aspect Traffic	3
F	Filter	9
G	Pedestrian	1
H	Pedestrian	2
I	Pedestrian	3
J	Pedestrian	4
K	Pedestrian	5
L	Pedestrian	6

Lane Conflict Distances

Starting Lane

Terminating Lane	Lane Conflict Distances (m)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1				15.26	5.75			-7.93		-5.04
2				13.28	2.29			-3.93		-4.31
3				-11.20	-12.29	11.78	-5.66			-2.52
4	-9.57	-6.12	11.20			22.98	15.43	11.37		-9.18
5	-5.72	-1.88	19.56			21.67	13.33	7.90	30.82	20.87
6			-0.78	-17.99	-10.44				20.38	12.40
7			6.68	-15.43	-8.48				18.02	9.14
8	13.64	3.93		-11.37	-6.09					-2.58
9					-26.50	-19.19	-18.02			
10	16.22	9.95	4.46	20.30	6.61	-12.29	-8.46	6.25		

Traffic\Pedestrian Conflict Distances

Starting Ped Crossing

Terminating Lane	Traffic/Pedestrian Conflict Distances (m)						
	P1	P2	P3	P4	P5	P6
1	19.48		39.75			
2			39.42			
3					33.89	
4		3.28	26.12		45.09	
5		3.97			45.86	
6				4.88	24.19	
7				4.32		
8	33.13			4.05		
9						4.24
10	35.71		44.79			3.84

Phase Intergreen Matrix

Starting Phase

Terminating Phase	Phase Intergreens (s)											
	A	B	C	D	E	F	G	H	I	J	K	L
A			5	6			7		9			
B			7	5	5	7	8			5	7	
C	6	5		7	5		8		9			5
D	5	7	8		7	8		5	7		9	
E		6	5	5							8	
F		5		5								5
G	7	7	7									
H				8								
I	9		9	9								
J		13										
K		8		8	8							
L			11			11						

Additional Phase Intergreen Detail

Phases	Type	Value	Notes
A => B	Phases Oppose	-	
B => A	Phases Oppose	-	

Audit Log Records

This model does not have any audit records

Appendix D

LinSig Data

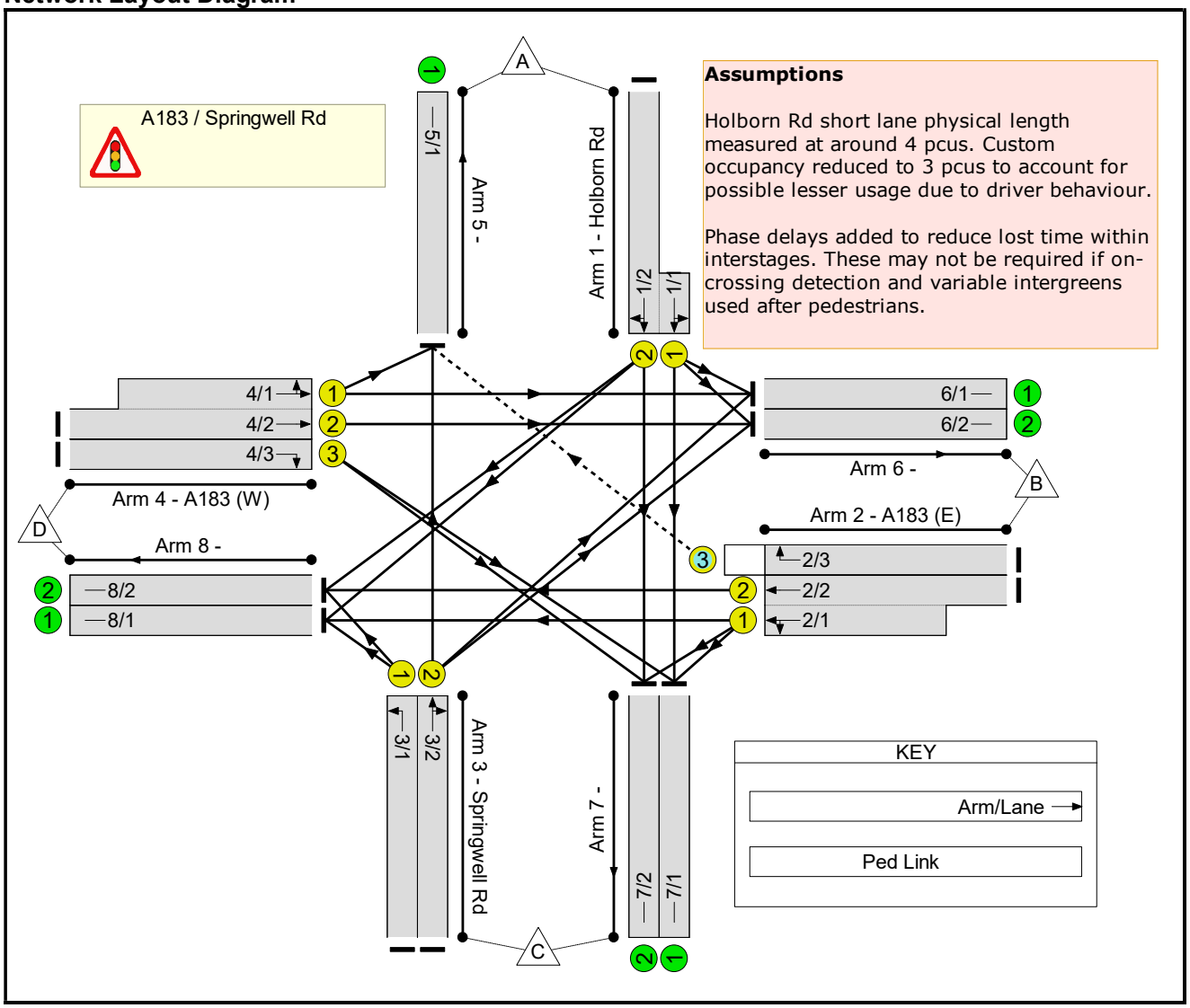
Historic Option

Springwell Rd Historic Option LinSig Data

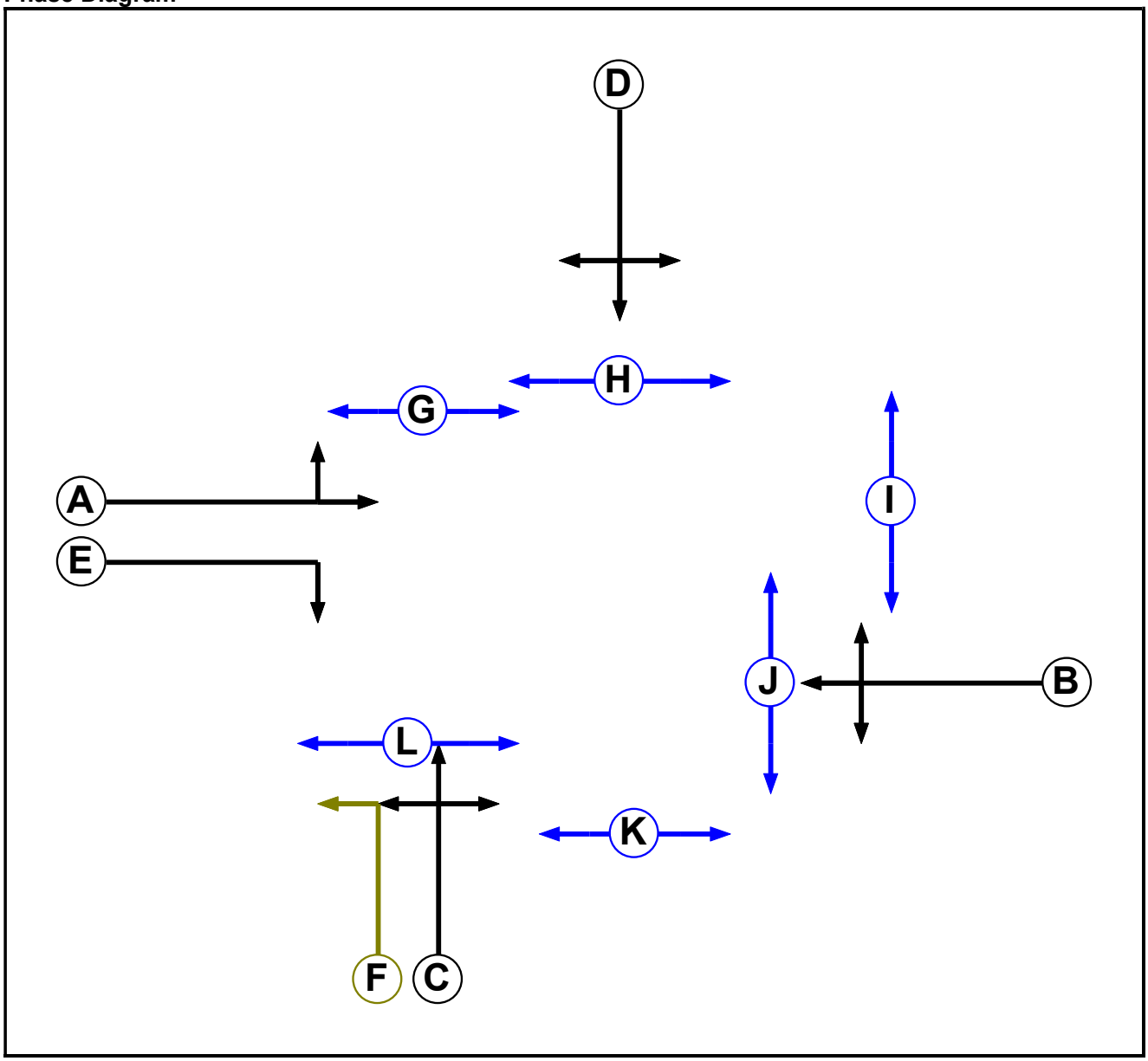
User and Project Details

Project:	**23014 Springwell Rd**
Title:	**Historic Option**
Location:	Sunderland
Client:	Sunderland City Council
Design Layout Ref:	CRSR-SCC-HGN-00-DR-CR-01_000 Rev P01 (SCC)
Date Started:	29/03/23
Model Purpose:	Test performance of proposal
Additional detail:	
File name:	Springwell Rd Historic Option.lsg3x
Author:	Simon Swanston
Company:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Network Layout Diagram



Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Filter	C	4	0
G	Pedestrian		5	5
H	Pedestrian		5	5
I	Pedestrian		5	5
J	Pedestrian		5	5
K	Pedestrian		5	5
L	Pedestrian		5	5

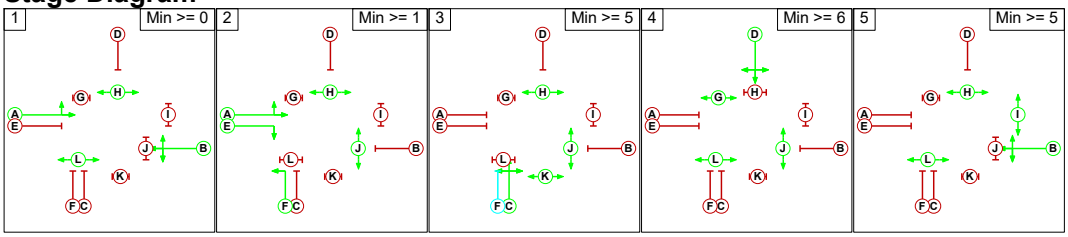
Phase Intergreens Matrix

		Starting Phase											
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		-	5	6	-	-	7	-	9	-	-	-
	B	-		7	5	5	7	8	-	-	5	7	-
	C	6	5		7	5	-	8	-	9	-	-	5
	D	5	7	8		7	8	-	5	7	-	9	-
	E	-	6	5	5		-	-	-	-	-	8	-
	F	-	5	-	5	-		-	-	-	-	-	5
	G	7	7	7	-	-	-		-	-	-	-	-
	H	-	-	-	8	-	-	-		-	-	-	-
	I	9	-	9	9	-	-	-	-		-	-	-
	J	-	13	-	-	-	-	-	-	-		-	-
	K	-	8	-	8	8	-	-	-	-	-		-
	L	-	-	11	-	-	11	-	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B H L
2	A E F H J
3	C H J K
4	D G J L
5	B H I L

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	3	A	Losing	6	6
1	3	B	Losing	4	4
1	4	A	Losing	1	1
3	4	C	Losing	1	1
3	5	C	Losing	4	4
4	1	D	Losing	6	6
4	3	D	Losing	3	3
4	5	D	Losing	6	6
5	3	B	Losing	4	4
5	4	B	Losing	1	1

Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1		11	11	8	9
	2	X		8	X	X
	3	13	8		9	13
	4	13	11	12		13
	5	9	11	11	9	

Give-Way Lane Input Data

Junction: A183 / Springwell Rd											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/3 (A183 (E))	5/1 (Right)	1439	0	4/1	1.09	All	2.00	-	0.50	2	2.00
				4/2	1.09	All					

Lane Input Data

Junction: A183 / Springwell Rd												
Lane	**Lane Type**	**Phases**	**Start Disp.**	**End Disp.**	**Physical Length (PCU)**	**Sat Flow Type**	**Def User Saturation Flow (PCU/Hr)**	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Turns**	**Turning Radius (m)**
1/1 (Holborn Rd)	U	D	2	3	4.0	Geom	-	3.00	0.00	Y	Arm 6 Left	15.00
											Arm 7 Ahead	Inf
1/2 (Holborn Rd)	U	D	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 7 Ahead	Inf
											Arm 8 Right	20.00
2/1 (A183 (E))	U	B	2	3	9.0	Geom	-	3.00	0.00	Y	Arm 7 Left	16.00
											Arm 8 Ahead	Inf
2/2 (A183 (E))	U	B	2	3	60.0	Geom	-	3.00	0.00	N	Arm 8 Ahead	Inf
2/3 (A183 (E))	O	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	12.00
3/1 (Springwell Rd)	U	C F	2	3	60.0	Geom	-	3.25	0.00	Y	Arm 8 Left	12.00
3/2 (Springwell Rd)	U	C	2	3	60.0	Geom	-	3.25	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	15.00
4/1 (A183 (W))	U	A	2	3	10.0	Geom	-	2.80	0.00	Y	Arm 5 Left	23.00
											Arm 6 Ahead	Inf
4/2 (A183 (W))	U	A	2	3	60.0	Geom	-	2.80	0.00	N	Arm 6 Ahead	Inf
4/3 (A183 (W))	U	E	2	3	60.0	Geom	-	2.70	0.00	Y	Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/2	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/2	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/2	U		2	3	60.0	Inf	-	-	-	-	-	-

Junction: A183 / Springwell Rd				
Lane	**Custom Occupancy per Flow Group (PCU)**			
	AM 2023	**AM 2043**	**PM 2023**	**PM 2043**
1/1 (Holborn Rd Lane 1)	3.0	3.0	3.0	3.0

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM 2023'	07:30	08:30	01:00	
2: 'AM 2043'	07:30	08:30	01:00	F1*1.18
3: 'PM 2023'	16:30	17:30	01:00	
4: 'PM 2043'	16:30	17:30	01:00	F3*1.18

Scenario 1: 'AM23 (Ped I)' (FG1: 'AM 2023', Plan 1: 'Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 1: AM23 (Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	262
1/2 (with short)	550(In) 288(Out)
2/1 (short)	332
2/2 (with short)	603(In) 271(Out)
2/3	76
3/1	580
3/2	520
4/1 (short)	316
4/2 (with short)	661(In) 345(Out)
4/3	361
5/1	550
6/1	341
6/2	440
7/1	457
7/2	430
8/1	508
8/2	625

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.2 %	1862	1862
				Arm 7 Ahead	Inf	71.8 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	55.6 %	1853	1853
				Arm 8 Right	20.00	44.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	53.6 %	1823	1823
				Arm 8 Ahead	Inf	46.4 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1898	1898
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	22.2 %	1868	1868
				Arm 6 Ahead	Inf	77.8 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'AM43 (Ped I)' (FG2: 'AM 2043', Plan 1: 'Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 2: AM43 (Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	301
1/2 (with short)	649(In) 348(Out)
2/1 (short)	282
2/2 (with short)	712(In) 430(Out)
2/3	90
3/1	684
3/2	614
4/1 (short)	369
4/2 (with short)	780(In) 411(Out)
4/3	426
5/1	650
6/1	397
6/2	524
7/1	532
7/2	515
8/1	489
8/2	848

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.9 %	1861	1861
				Arm 7 Ahead	Inf	71.1 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	56.6 %	1855	1855
				Arm 8 Right	20.00	43.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	74.5 %	1790	1790
				Arm 8 Ahead	Inf	25.5 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1898	1898
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	22.5 %	1868	1868
				Arm 6 Ahead	Inf	77.5 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'PM23 (Ped I)' (FG3: 'PM 2023', Plan 1: 'Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 3: PM23 (Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	278
1/2 (with short)	708(In) 430(Out)
2/1 (short)	375
2/2 (with short)	735(In) 360(Out)
2/3	47
3/1	485
3/2	475
4/1 (short)	281
4/2 (with short)	589(In) 308(Out)
4/3	464
5/1	504
6/1	281
6/2	402
7/1	597
7/2	565
8/1	421
8/2	733

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	27.3 %	1864	1864
				Arm 7 Ahead	Inf	72.7 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	39.5 %	1832	1832
				Arm 8 Right	20.00	60.5 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	86.9 %	1771	1771
				Arm 8 Ahead	Inf	13.1 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1895	1895
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	33.5 %	1855	1855
				Arm 6 Ahead	Inf	66.5 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'PM43 (Ped I)' (FG4: 'PM 2043', Plan 1: 'Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 4: PM43 (Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	321
1/2 (with short)	836(In) 515(Out)
2/1 (short)	480
2/2 (with short)	868(In) 388(Out)
2/3	55
3/1	572
3/2	560
4/1 (short)	331
4/2 (with short)	695(In) 364(Out)
4/3	548
5/1	594
6/1	331
6/2	475
7/1	697
7/2	675
8/1	534
8/2	828

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.0 %	1863	1863
				Arm 7 Ahead	Inf	72.0 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	40.4 %	1833	1833
				Arm 8 Right	20.00	59.6 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	80.2 %	1781	1781
				Arm 8 Ahead	Inf	19.8 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1895	1895
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	33.5 %	1854	1854
				Arm 6 Ahead	Inf	66.5 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 5: 'AM23 (No Ped I)' (FG1: 'AM 2023', Plan 2: 'No Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 5: AM23 (No Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	263
1/2 (with short)	550(In) 287(Out)
2/1 (short)	264
2/2 (with short)	603(In) 339(Out)
2/3	76
3/1	580
3/2	520
4/1 (short)	316
4/2 (with short)	661(In) 345(Out)
4/3	361
5/1	550
6/1	341
6/2	440
7/1	458
7/2	429
8/1	440
8/2	693

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.1 %	1863	1863
				Arm 7 Ahead	Inf	71.9 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	55.4 %	1853	1853
				Arm 8 Right	20.00	44.6 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	67.4 %	1801	1801
				Arm 8 Ahead	Inf	32.6 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1898	1898
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	22.2 %	1868	1868
				Arm 6 Ahead	Inf	77.8 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 6: 'AM43 (No Ped I)' (FG2: 'AM 2043', Plan 2: 'No Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 6: AM43 (No Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	301
1/2 (with short)	649(In) 348(Out)
2/1 (short)	282
2/2 (with short)	712(In) 430(Out)
2/3	90
3/1	684
3/2	614
4/1 (short)	373
4/2 (with short)	780(In) 407(Out)
4/3	426
5/1	650
6/1	401
6/2	520
7/1	532
7/2	515
8/1	489
8/2	848

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.9 %	1861	1861
				Arm 7 Ahead	Inf	71.1 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	56.6 %	1855	1855
				Arm 8 Right	20.00	43.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	74.5 %	1790	1790
				Arm 8 Ahead	Inf	25.5 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1898	1898
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	22.3 %	1868	1868
				Arm 6 Ahead	Inf	77.7 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 7: 'PM23 (No Ped I)' (FG3: 'PM 2023', Plan 2: 'No Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 7: PM23 (No Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	278
1/2 (with short)	708(In) 430(Out)
2/1 (short)	374
2/2 (with short)	735(In) 361(Out)
2/3	47
3/1	485
3/2	475
4/1 (short)	281
4/2 (with short)	589(In) 308(Out)
4/3	464
5/1	504
6/1	281
6/2	402
7/1	597
7/2	565
8/1	420
8/2	734

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	27.3 %	1864	1864
				Arm 7 Ahead	Inf	72.7 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	39.5 %	1832	1832
				Arm 8 Right	20.00	60.5 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	87.2 %	1770	1770
				Arm 8 Ahead	Inf	12.8 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1895	1895
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	33.5 %	1855	1855
				Arm 6 Ahead	Inf	66.5 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 8: 'PM43 (No Ped I)' (FG4: 'PM 2043', Plan 2: 'No Ped I')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

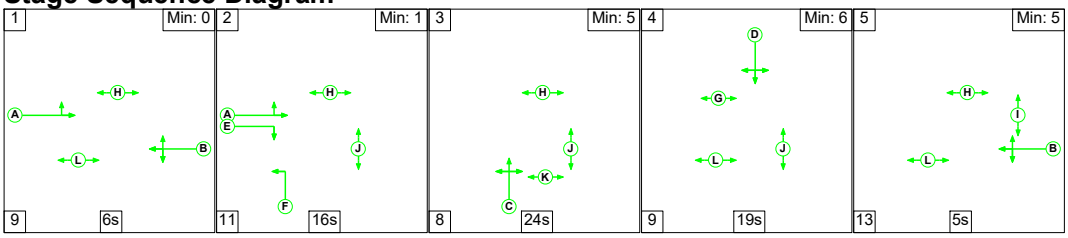
Lane	Scenario 8: PM43 (No Ped I)
Junction: A183 / Springwell Rd	
1/1 (short)	320
1/2 (with short)	836(In) 516(Out)
2/1 (short)	479
2/2 (with short)	868(In) 389(Out)
2/3	55
3/1	572
3/2	560
4/1 (short)	331
4/2 (with short)	695(In) 364(Out)
4/3	548
5/1	594
6/1	331
6/2	475
7/1	696
7/2	676
8/1	533
8/2	829

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	15.00	28.1 %	1863	1863
				Arm 7 Ahead	Inf	71.9 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	40.5 %	1833	1833
				Arm 8 Right	20.00	59.5 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	16.00	80.4 %	1781	1781
				Arm 8 Ahead	Inf	19.6 %		
2/2 (A183 (E))	3.00	0.00	N	Arm 8 Ahead	Inf	100.0 %	2055	2055
2/3 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.25	0.00	Y	Arm 8 Left	12.00	100.0 %	1724	1724
3/2 (Springwell Rd)	3.25	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1895	1895
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.80	0.00	Y	Arm 5 Left	23.00	33.5 %	1854	1854
				Arm 6 Ahead	Inf	66.5 %		
4/2 (A183 (W))	2.80	0.00	N	Arm 6 Ahead	Inf	100.0 %	2035	2035
4/3 (A183 (W))	2.70	0.00	Y	Arm 7 Right	15.00	100.0 %	1714	1714
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
6/2	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
7/2	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf
8/2	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'AM23 (Ped I)' (FG1: 'AM 2023', Plan 1: 'Ped I')

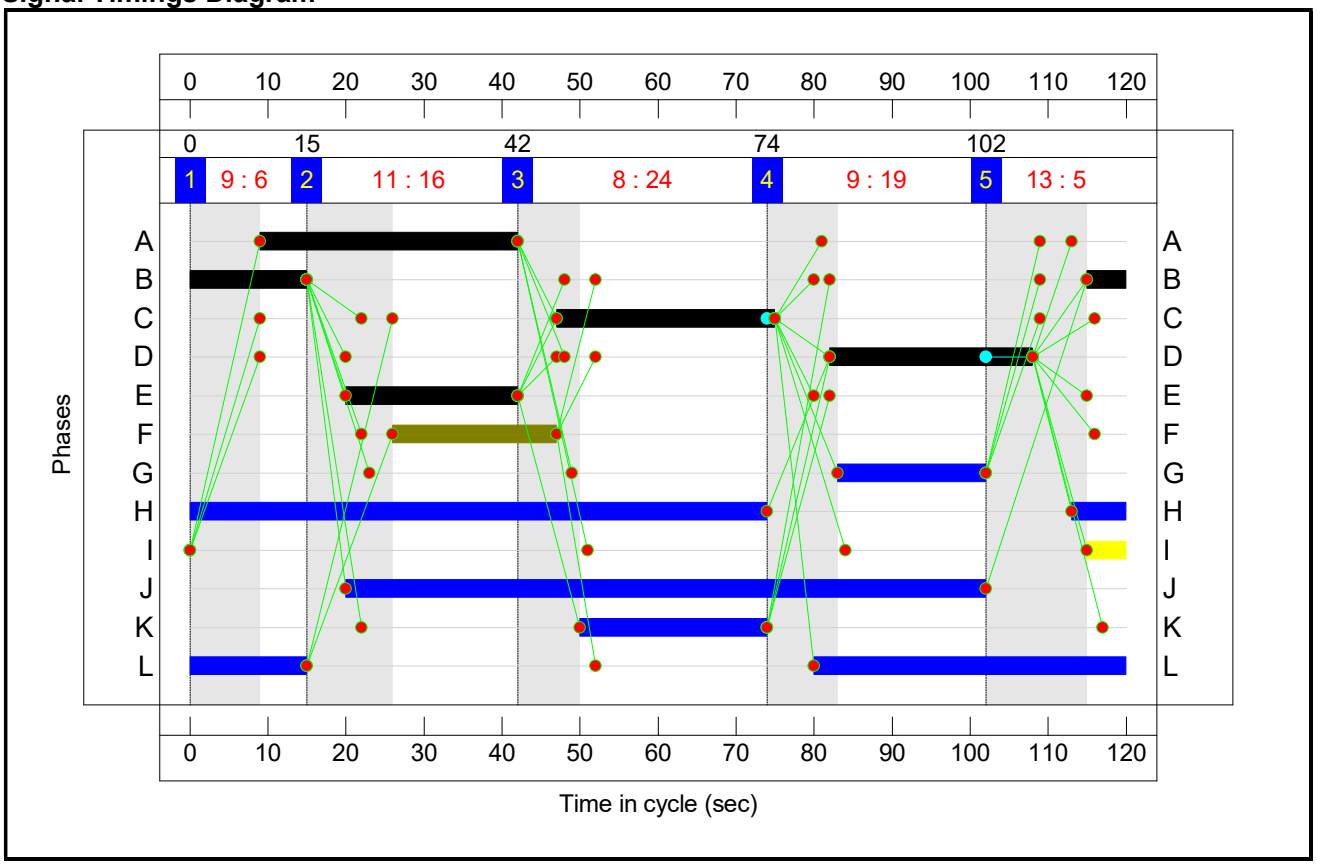
Stage Sequence Diagram



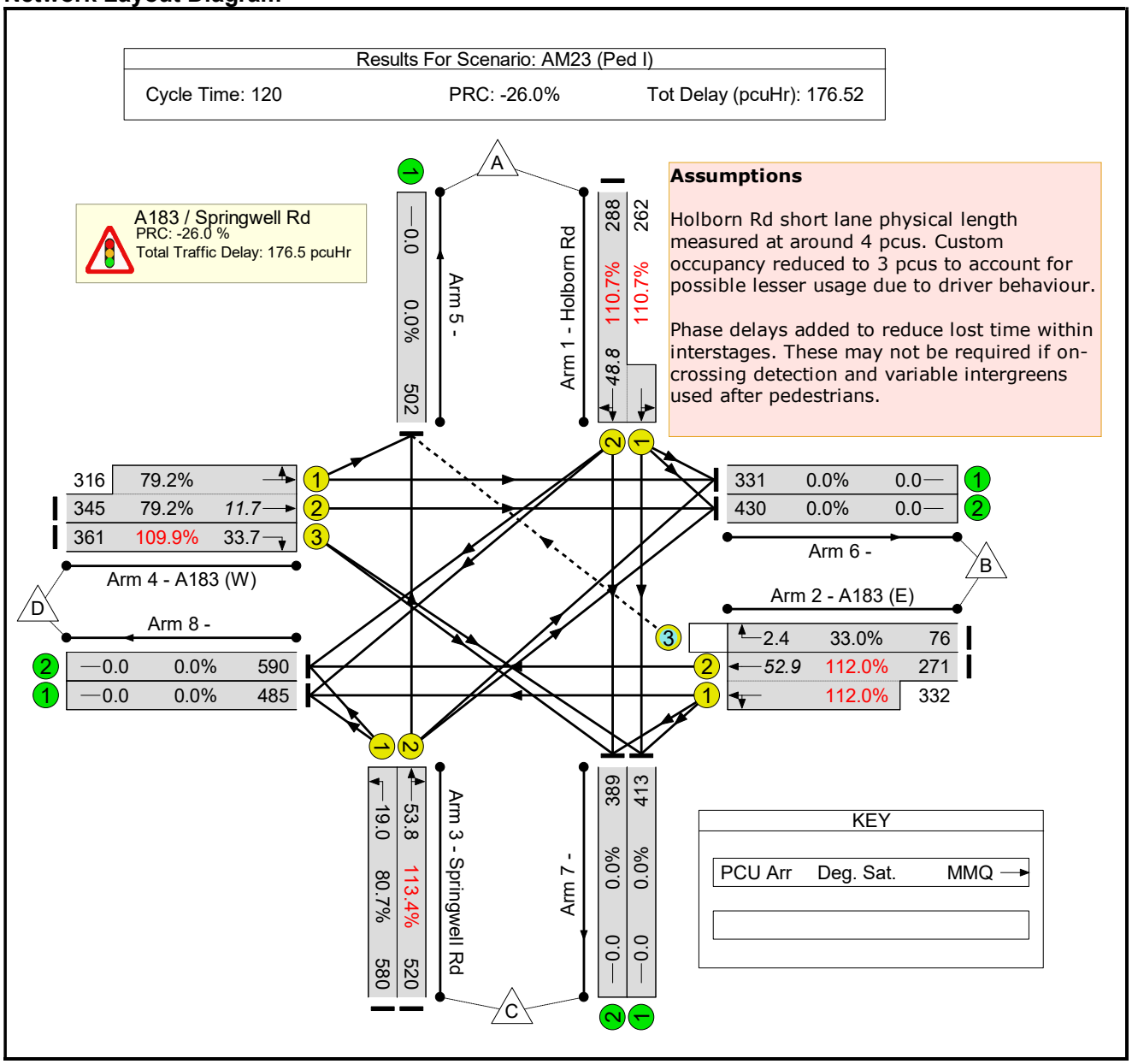
Stage Timings

Stage	1	2	3	4	5
Duration	6	16	24	19	5
Change Point	0	15	42	74	102

Signal Timings Diagram



Network Layout Diagram



Network Results

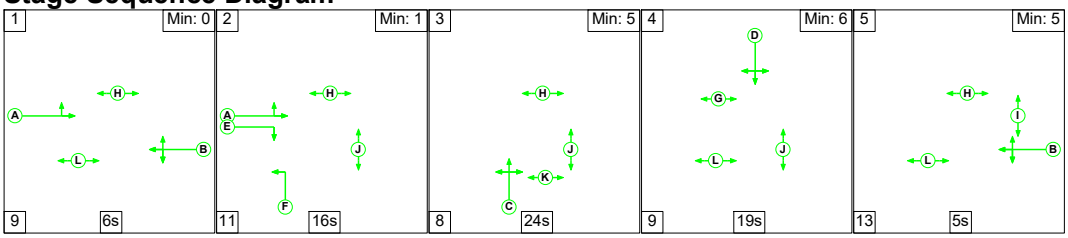
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**113.4%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**113.4%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	550	1853:1862	260+237	110.7 : 110.7%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	20	-	603	2055:1823	242+296	112.0 : 112.0%
2/3	A183 (E) Right	O	N/A	N/A	B		1	20	-	76	1702	230	33.0%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	49	21	580	1724	718	80.7%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	28	-	520	1898	459	113.4%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	33	-	661	2035:1868	436+399	79.2 : 79.2%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	361	1714	329	109.9%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	341	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	440	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	457	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	430	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	508	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	625	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**6**	**70**	**0**	**49.9**	**126.6**	**0.0**	**176.5**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**6**	**70**	**0**	**49.9**	**126.6**	**0.0**	**176.5**	**-**	**-**	**-**	**-**
1/2+1/1	550	497	-	-	-	9.0	31.0	-	40.0	261.6	17.8	31.0	48.8
2/2+2/1	603	538	-	-	-	11.9	36.4	-	48.3	288.6	16.4	36.4	52.9
2/3	76	76	6	70	0	0.9	0.2	0.0	1.2	55.6	2.2	0.2	2.4
3/1	580	580	-	-	-	5.0	2.0	-	7.0	43.4	16.9	2.0	19.0
3/2	520	459	-	-	-	9.6	34.4	-	44.0	304.8	19.4	34.4	53.8
4/2+4/1	661	661	-	-	-	6.8	1.9	-	8.7	47.2	9.9	1.9	11.7
4/3	361	329	-	-	-	6.7	20.6	-	27.4	272.7	13.1	20.6	33.7
5/1	502	502	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	331	331	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	430	430	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	413	413	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	389	389	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	485	485	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	590	590	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -26.0 Total Delay for Signalled Lanes (pcuHr): 176.52 Cycle Time (s): 120
PRC Over All Lanes (%): -26.0 Total Delay Over All Lanes(pcuHr): 176.52

Scenario 2: 'AM43 (Ped I)' (FG2: 'AM 2043', Plan 1: 'Ped I')

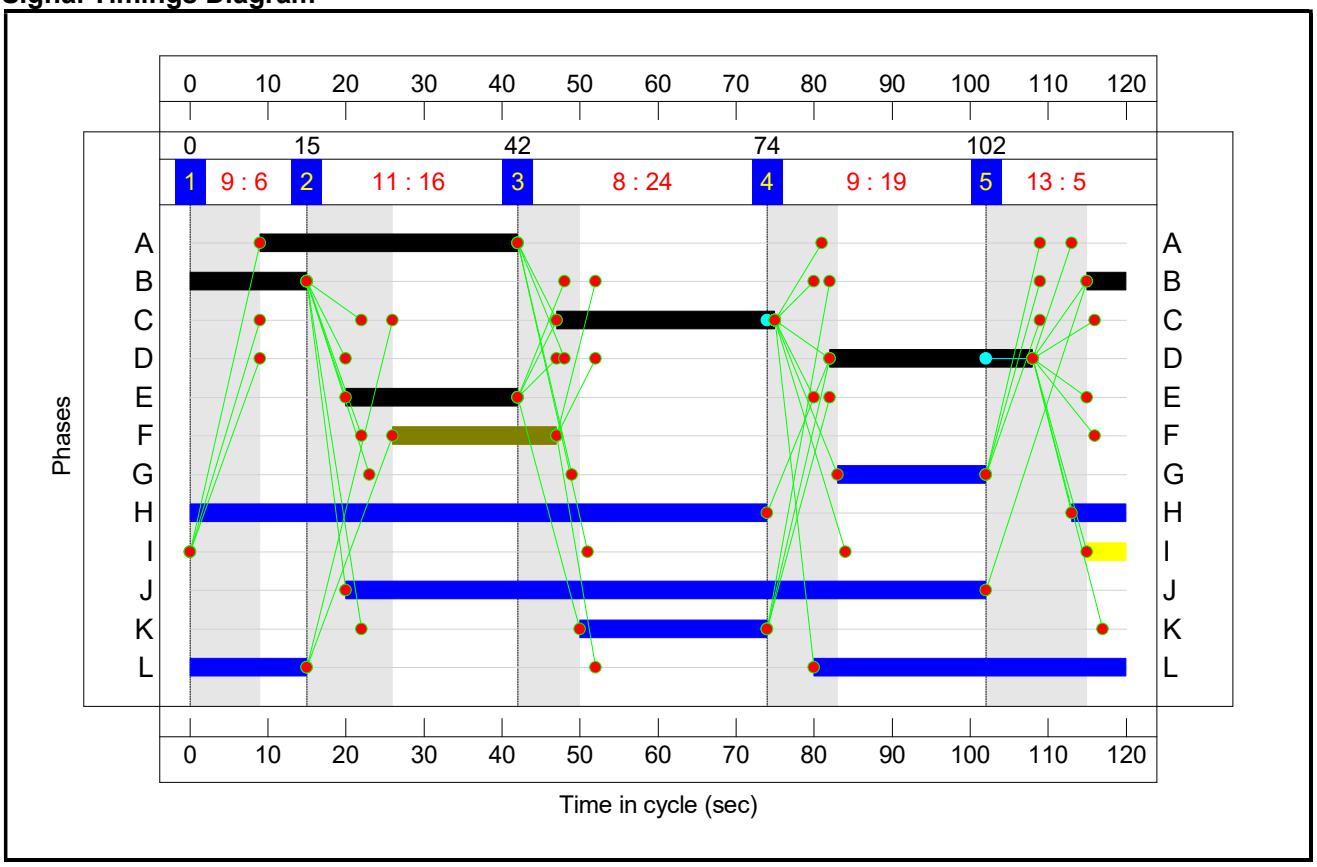
Stage Sequence Diagram



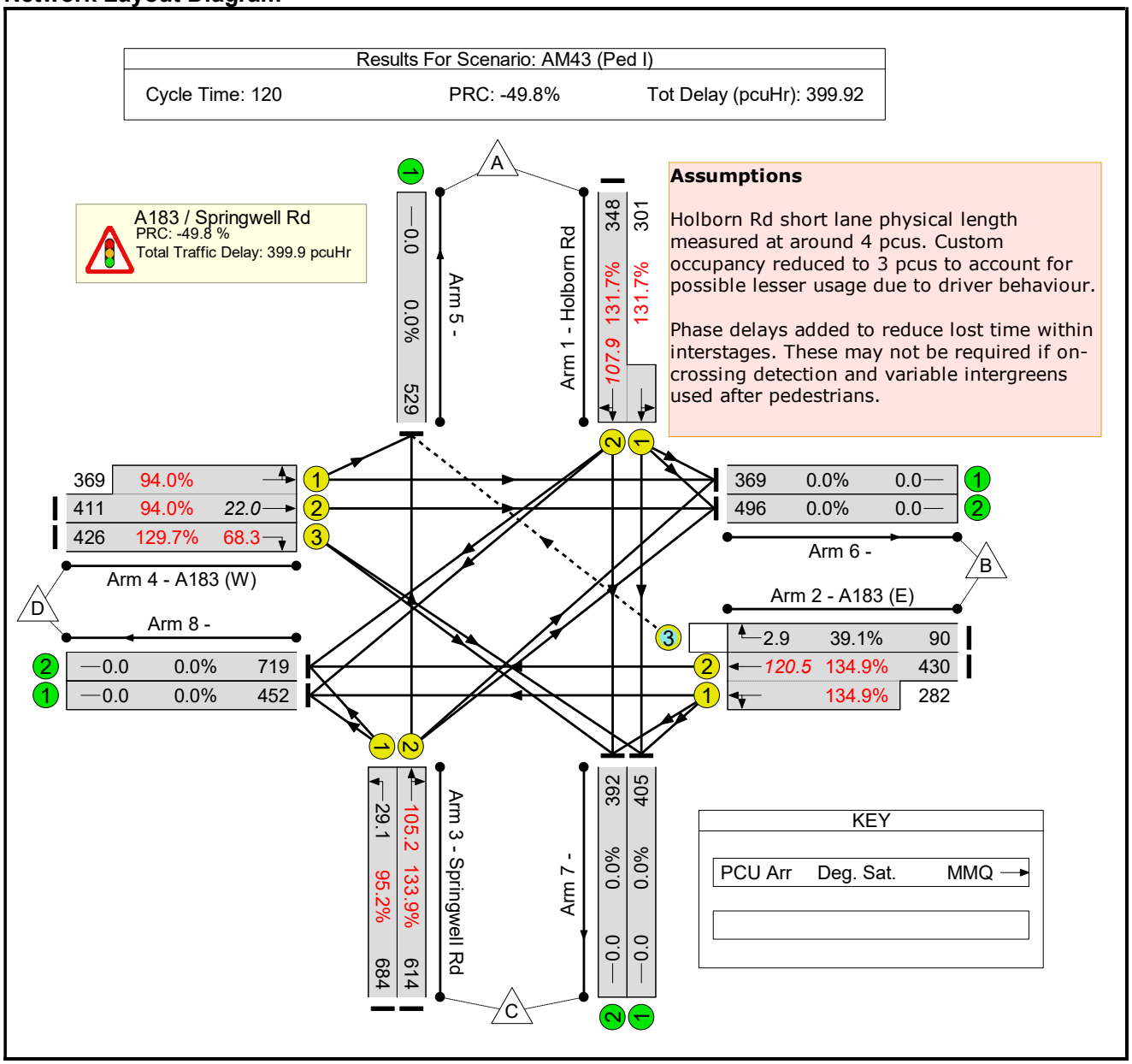
Stage Timings

Stage	1	2	3	4	5
Duration	6	16	24	19	5
Change Point	0	15	42	74	102

Signal Timings Diagram



Network Layout Diagram



Network Results

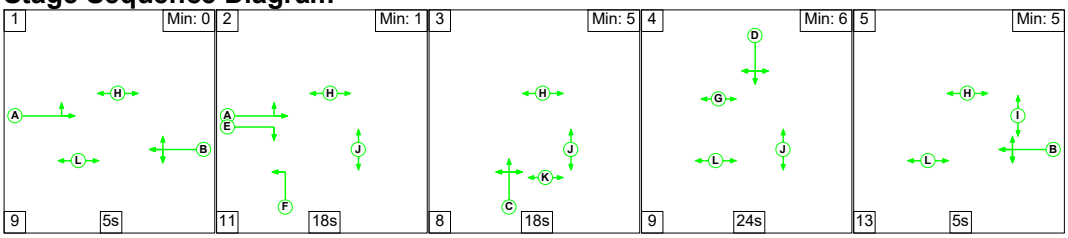
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	649	1855:1861	264+229	131.7 : 131.7%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	20	-	712	2055:1790	319+209	134.9 : 134.9%
2/3	A183 (E) Right	O	N/A	N/A	B		1	20	-	90	1702	230	39.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	49	21	684	1724	718	95.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	28	-	614	1898	459	133.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	33	-	780	2035:1868	437+392	94.0 : 94.0%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	426	1714	329	129.7%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	397	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	524	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	532	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	515	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	489	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	848	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**7**	**83**	**0**	**81.8**	**318.0**	**0.0**	**399.9**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**7**	**83**	**0**	**81.8**	**318.0**	**0.0**	**399.9**	**-**	**-**	**-**	**-**
1/2+1/1	649	493	-	-	-	17.4	80.0	-	97.4	540.5	27.8	80.0	107.9
2/2+2/1	712	528	-	-	-	21.7	93.9	-	115.6	584.7	26.5	93.9	120.5
2/3	90	90	7	83	0	1.1	0.3	0.0	1.4	57.7	2.6	0.3	2.9
3/1	684	684	-	-	-	6.4	7.1	-	13.5	71.0	22.0	7.1	29.1
3/2	614	459	-	-	-	15.4	79.6	-	95.0	556.9	25.6	79.6	105.2
4/2+4/1	780	780	-	-	-	8.5	6.3	-	14.7	68.1	15.7	6.3	22.0
4/3	426	329	-	-	-	11.3	50.8	-	62.2	525.5	17.4	50.8	68.3
5/1	529	529	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	369	369	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	496	496	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	405	405	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	392	392	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	452	452	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	719	719	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -49.8 Total Delay for Signalled Lanes (pcuHr): 399.92 Cycle Time (s): 120
PRC Over All Lanes (%): -49.8 Total Delay Over All Lanes(pcuHr): 399.92

Scenario 3: 'PM23 (Ped I)' (FG3: 'PM 2023', Plan 1: 'Ped I')

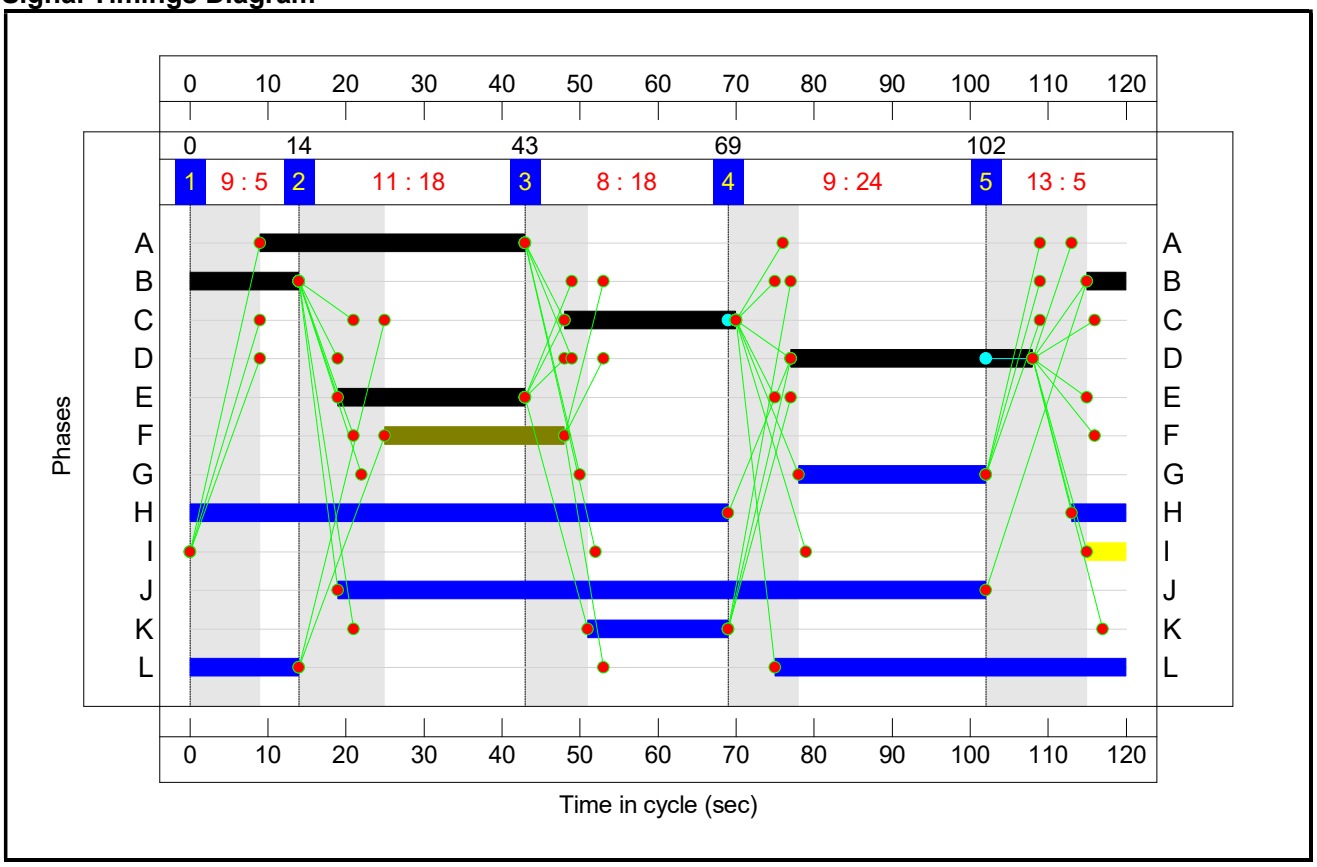
Stage Sequence Diagram



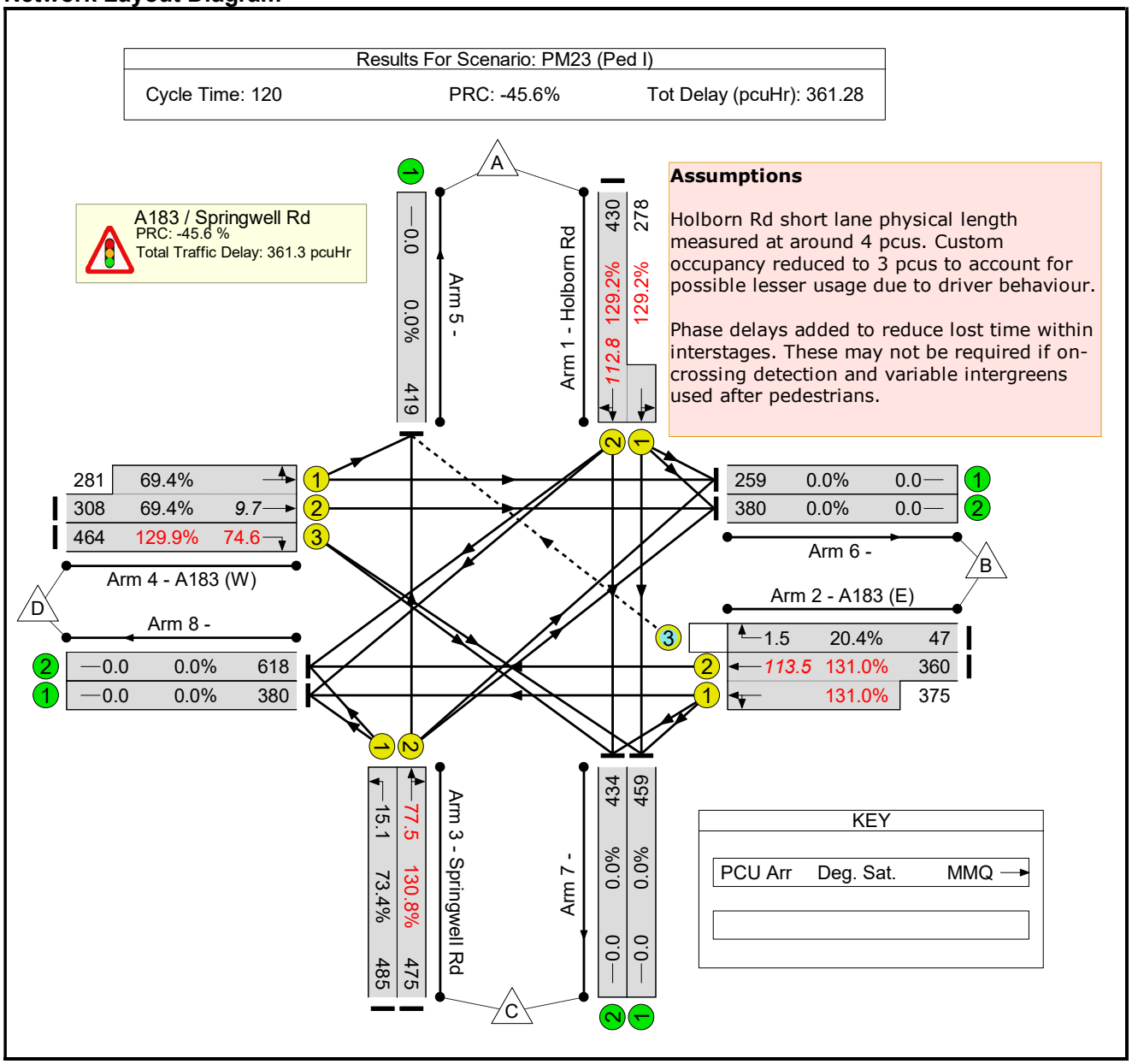
Stage Timings

Stage	1	2	3	4	5
Duration	5	18	18	24	5
Change Point	0	14	43	69	102

Signal Timings Diagram



Network Layout Diagram



Network Results

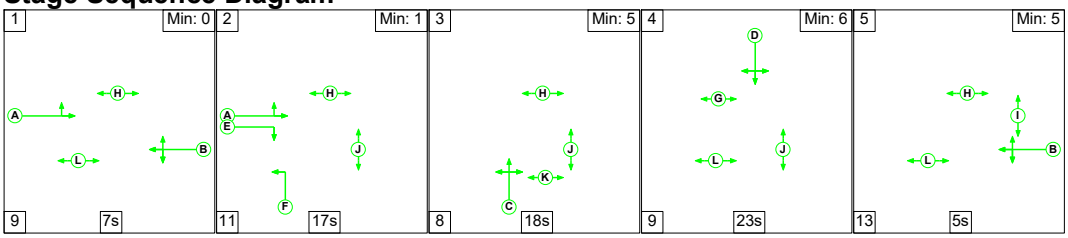
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**131.0%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**131.0%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	708	1832:1864	333+215	129.2 : 129.2%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	19	-	735	2055:1771	275+286	131.0 : 131.0%
2/3	A183 (E) Right	O	N/A	N/A	B		1	19	-	47	1702	230	20.4%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	45	23	485	1724	661	73.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	475	1895	363	130.8%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	34	-	589	2035:1855	444+405	69.4 : 69.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	464	1714	357	129.9%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	281	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	402	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	597	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	565	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	421	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	733	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**3**	**44**	**0**	**73.8**	**287.5**	**0.0**	**361.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**3**	**44**	**0**	**73.8**	**287.5**	**0.0**	**361.3**	**-**	**-**	**-**	**-**
1/2+1/1	708	548	-	-	-	17.9	82.2	-	100.1	509.1	30.6	82.2	112.8
2/2+2/1	735	561	-	-	-	21.0	89.1	-	110.2	539.6	24.4	89.1	113.5
2/3	47	47	3	44	0	0.6	0.1	0.0	0.7	53.6	1.3	0.1	1.5
3/1	485	485	-	-	-	4.3	1.4	-	5.6	41.8	13.7	1.4	15.1
3/2	475	363	-	-	-	12.0	57.9	-	69.9	529.8	19.6	57.9	77.5
4/2+4/1	589	589	-	-	-	5.8	1.1	-	6.9	42.3	8.6	1.1	9.7
4/3	464	357	-	-	-	12.3	55.5	-	67.8	526.2	19.0	55.5	74.6
5/1	419	419	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	380	380	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	459	459	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	434	434	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	380	380	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	618	618	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -45.6 Total Delay for Signalled Lanes (pcuHr): 361.28 Cycle Time (s): 120
PRC Over All Lanes (%): -45.6 Total Delay Over All Lanes(pcuHr): 361.28

Scenario 4: 'PM43 (Ped I)' (FG4: 'PM 2043', Plan 1: 'Ped I')

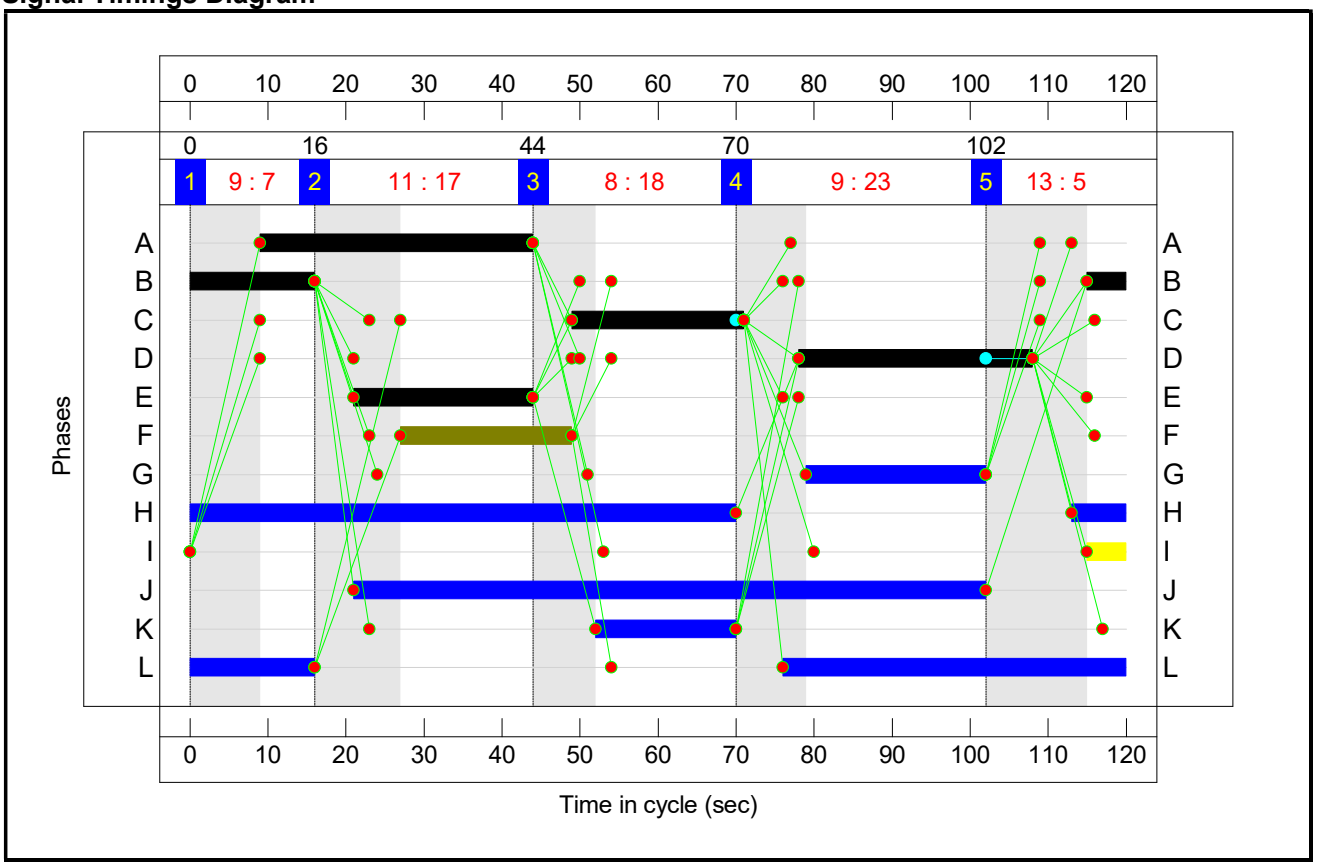
Stage Sequence Diagram



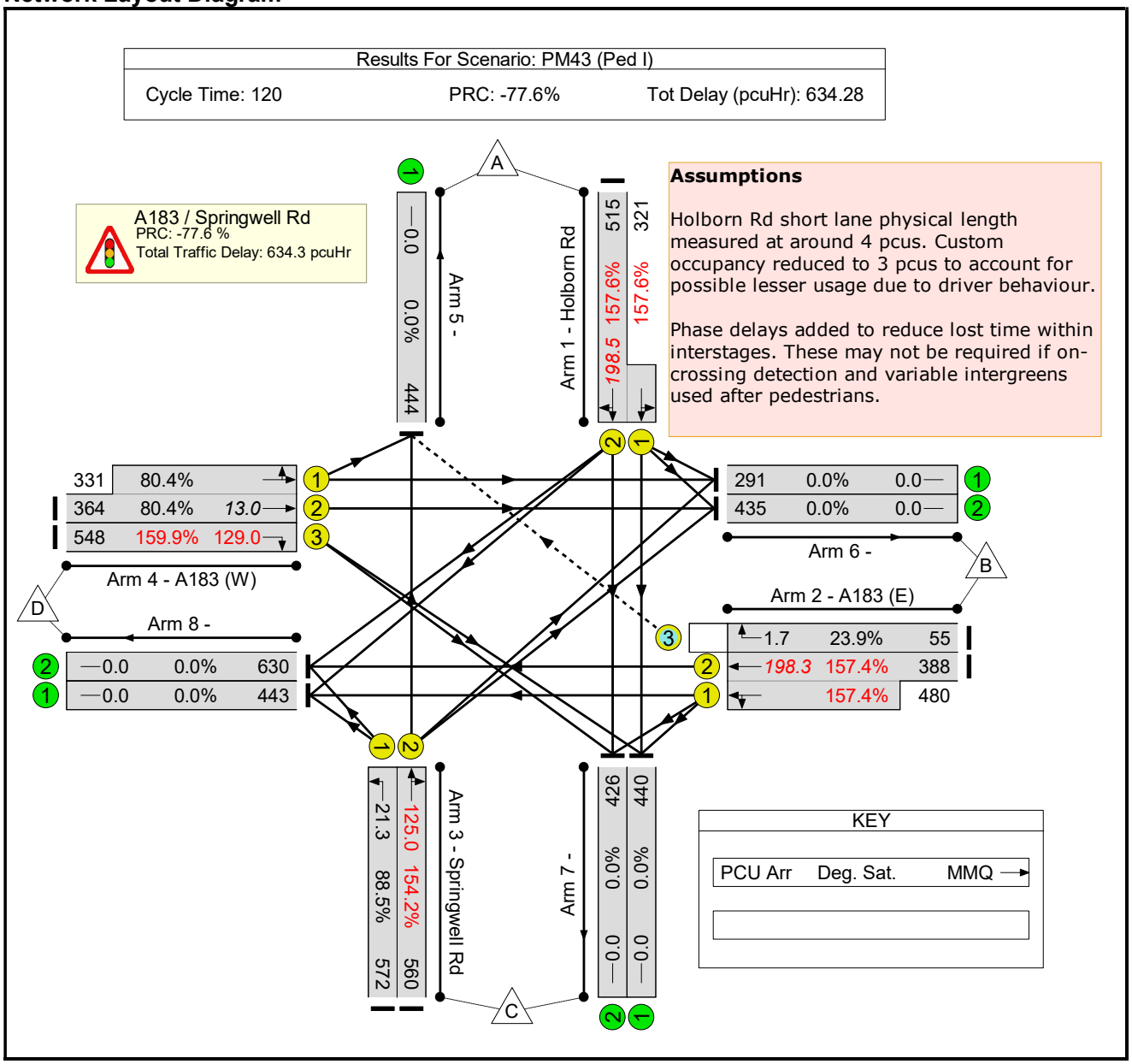
Stage Timings

Stage	1	2	3	4	5
Duration	7	17	18	23	5
Change Point	0	16	44	70	102

Signal Timings Diagram



Network Layout Diagram



Network Results

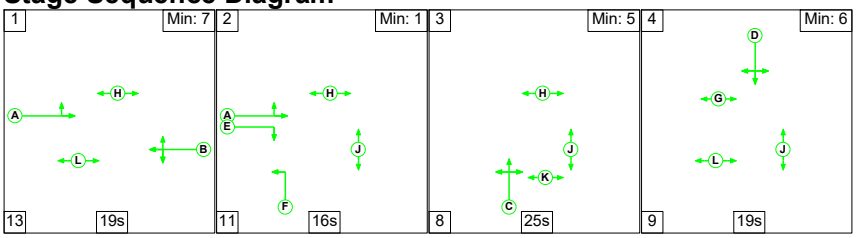
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**159.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**159.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	30	-	836	1833:1863	327+204	157.6 : 157.6%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	21	-	868	2055:1781	246+305	157.4 : 157.4%
2/3	A183 (E) Right	O	N/A	N/A	B		1	21	-	55	1702	230	23.9%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	44	22	572	1724	646	88.5%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	560	1895	363	154.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	35	-	695	2035:1854	453+412	80.4 : 80.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	548	1714	343	159.9%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	331	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	697	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	675	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	534	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	828	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**5**	**50**	**0**	**111.0**	**523.2**	**0.0**	**634.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**5**	**50**	**0**	**111.0**	**523.2**	**0.0**	**634.3**	**-**	**-**	**-**	**-**
1/2+1/1	836	530	-	-	-	29.8	154.2	-	184.0	792.4	44.3	154.2	198.5
2/2+2/1	868	551	-	-	-	31.8	159.7	-	191.4	794.0	38.7	159.7	198.3
2/3	55	55	5	50	0	0.6	0.2	0.0	0.8	53.0	1.5	0.2	1.7
3/1	572	572	-	-	-	5.6	3.5	-	9.1	57.2	17.8	3.5	21.3
3/2	560	363	-	-	-	17.3	99.8	-	117.1	752.6	25.2	99.8	125.0
4/2+4/1	695	695	-	-	-	6.9	2.0	-	8.9	46.2	11.0	2.0	13.0
4/3	548	343	-	-	-	19.0	103.9	-	122.9	807.6	25.1	103.9	129.0
5/1	444	444	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	291	291	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	435	435	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	440	440	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	426	426	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	443	443	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	630	630	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -77.6 Total Delay for Signalled Lanes (pcuHr): 634.28 Cycle Time (s): 120
PRC Over All Lanes (%): -77.6 Total Delay Over All Lanes(pcuHr): 634.28

Scenario 5: 'AM23 (No Ped I)' (FG1: 'AM 2023', Plan 2: 'No Ped I')

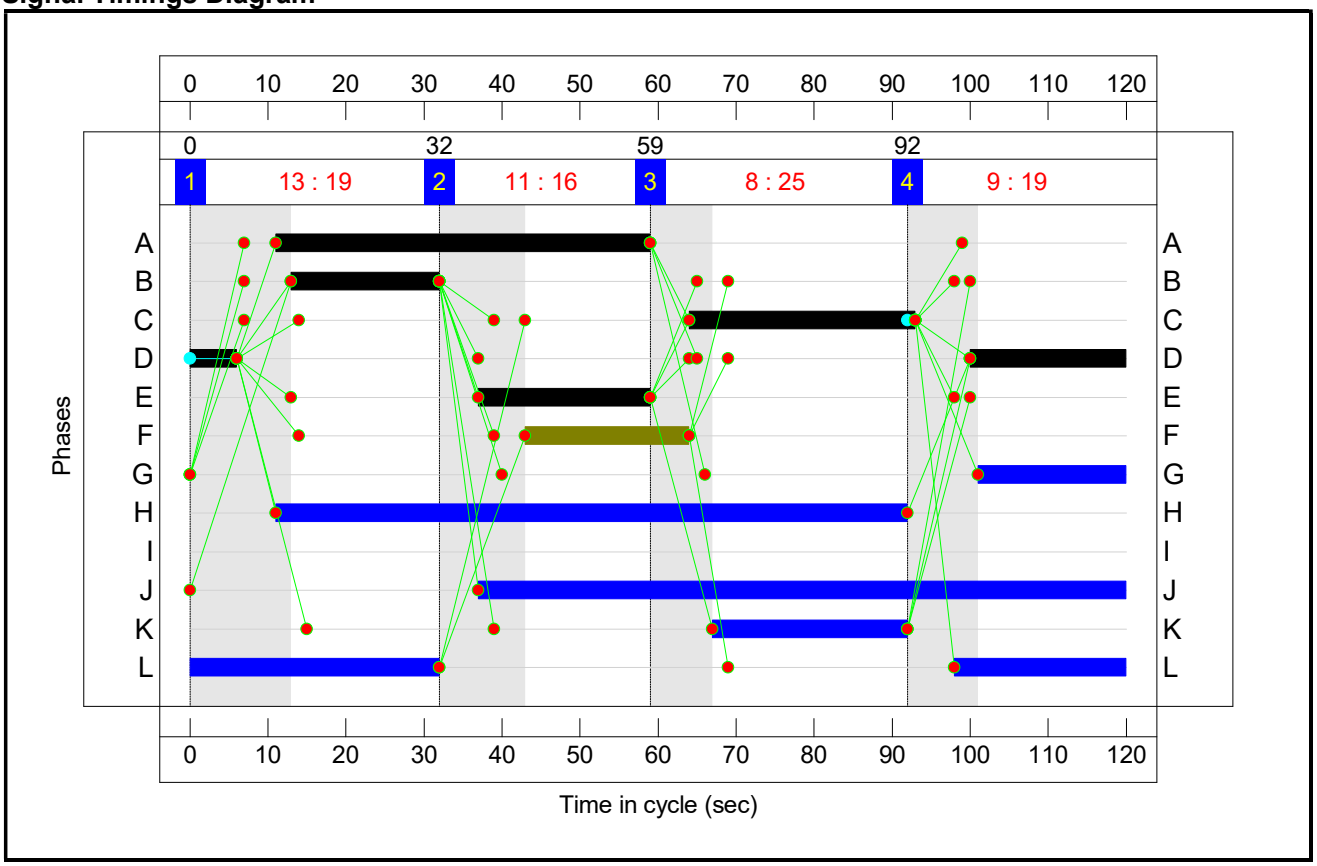
Stage Sequence Diagram



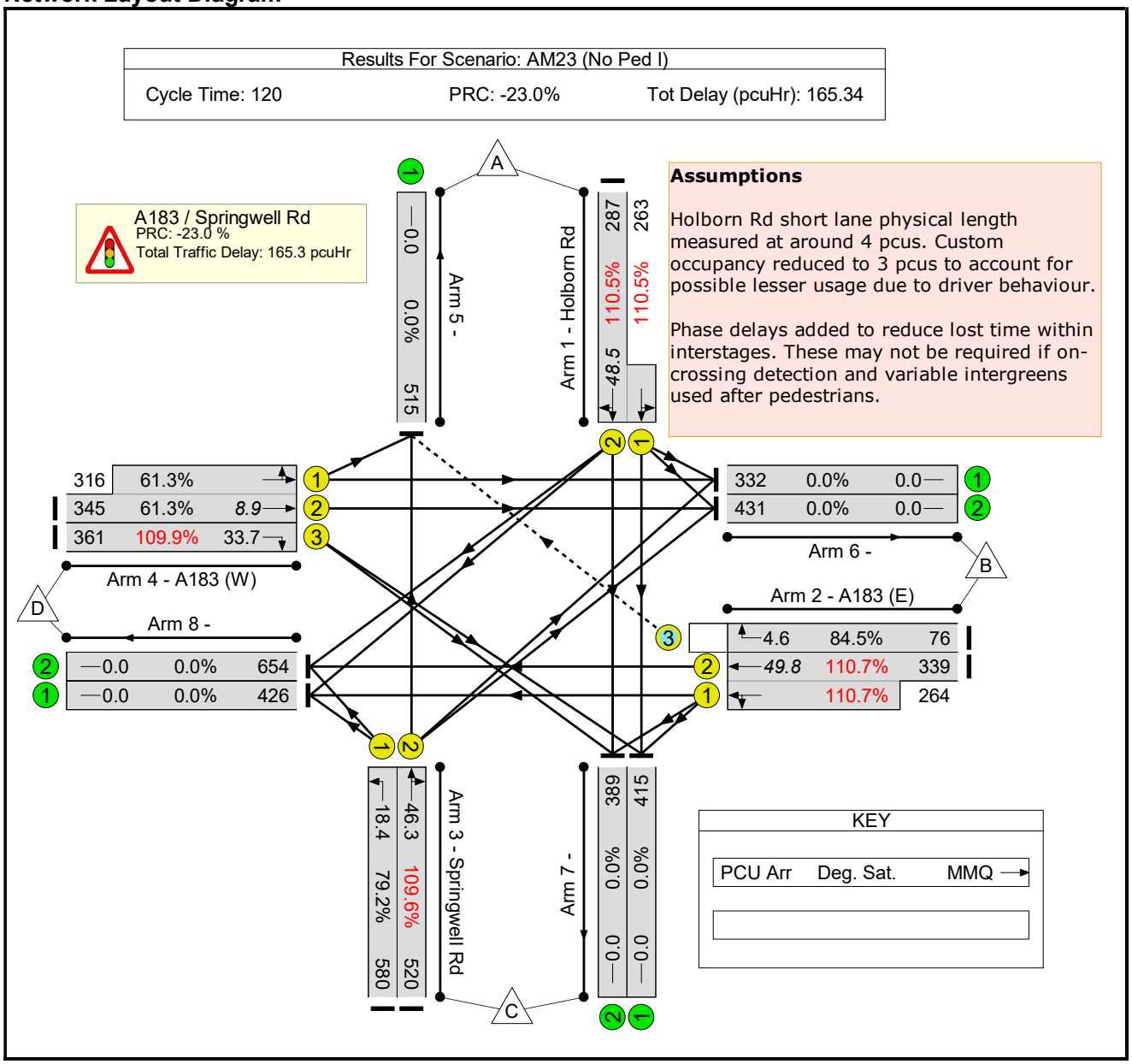
Stage Timings

Stage	1	2	3	4
Duration	19	16	25	19
Change Point	0	32	59	92

Signal Timings Diagram



Network Layout Diagram



Network Results

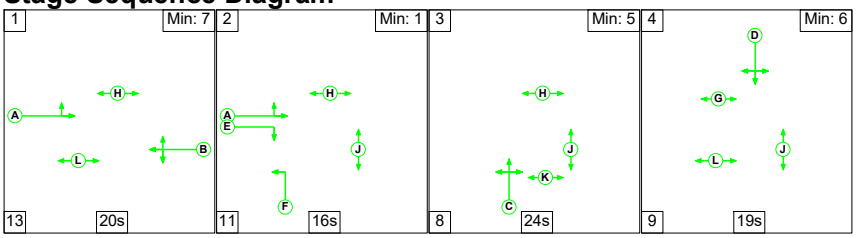
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**110.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**110.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	550	1853:1863	260+238	110.5 : 110.5%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	19	-	603	2055:1801	306+239	110.7 : 110.7%
2/3	A183 (E) Right	O	N/A	N/A	B		1	19	-	76	1702	90	84.5%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	50	21	580	1724	733	79.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	29	-	520	1898	474	109.6%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	48	-	661	2035:1868	563+516	61.3 : 61.3%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	361	1714	329	109.9%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	341	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	440	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	458	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	429	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	440	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	693	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**76**	**0**	**0**	**47.9**	**117.1**	**0.3**	**165.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**76**	**0**	**0**	**47.9**	**117.1**	**0.3**	**165.3**	**-**	**-**	**-**	**-**
1/2+1/1	550	498	-	-	-	10.4	30.7	-	41.1	269.1	17.8	30.7	48.5
2/2+2/1	603	545	-	-	-	12.0	33.6	-	45.6	272.1	16.2	33.6	49.8
2/3	76	76	76	0	0	1.0	2.1	0.3	3.3	158.7	2.5	2.1	4.6
3/1	580	580	-	-	-	4.8	1.9	-	6.7	41.4	16.6	1.9	18.4
3/2	520	474	-	-	-	8.5	27.5	-	36.0	249.2	18.8	27.5	46.3
4/2+4/1	661	661	-	-	-	4.6	0.8	-	5.4	29.6	8.1	0.8	8.9
4/3	361	329	-	-	-	6.6	20.6	-	27.2	271.2	13.1	20.6	33.7
5/1	515	515	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	332	332	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	431	431	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	415	415	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	389	389	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	426	426	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	654	654	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -23.0 Total Delay for Signalled Lanes (pcuHr): 165.34 Cycle Time (s): 120
PRC Over All Lanes (%): -23.0 Total Delay Over All Lanes(pcuHr): 165.34

Scenario 6: 'AM43 (No Ped I)' (FG2: 'AM 2043', Plan 2: 'No Ped I')

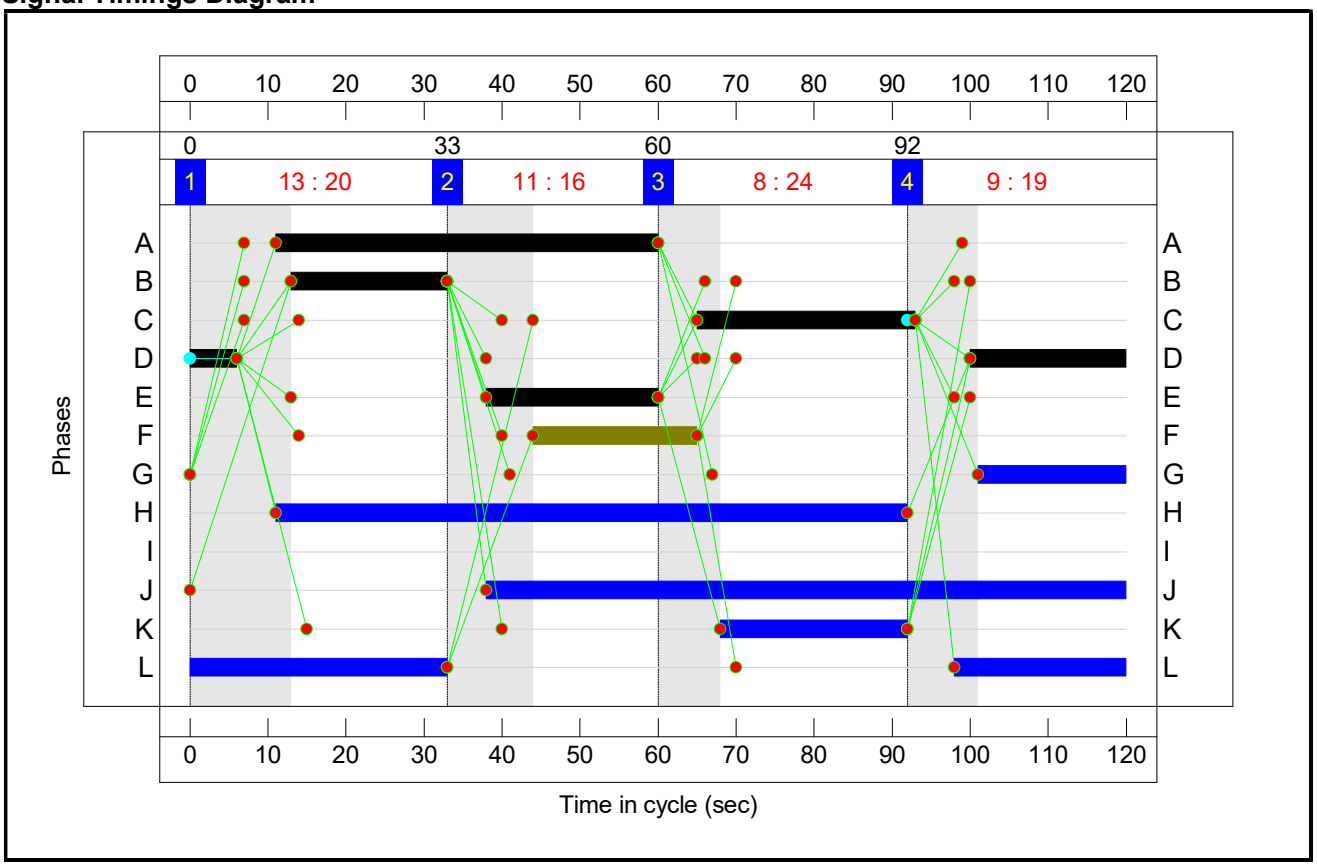
Stage Sequence Diagram



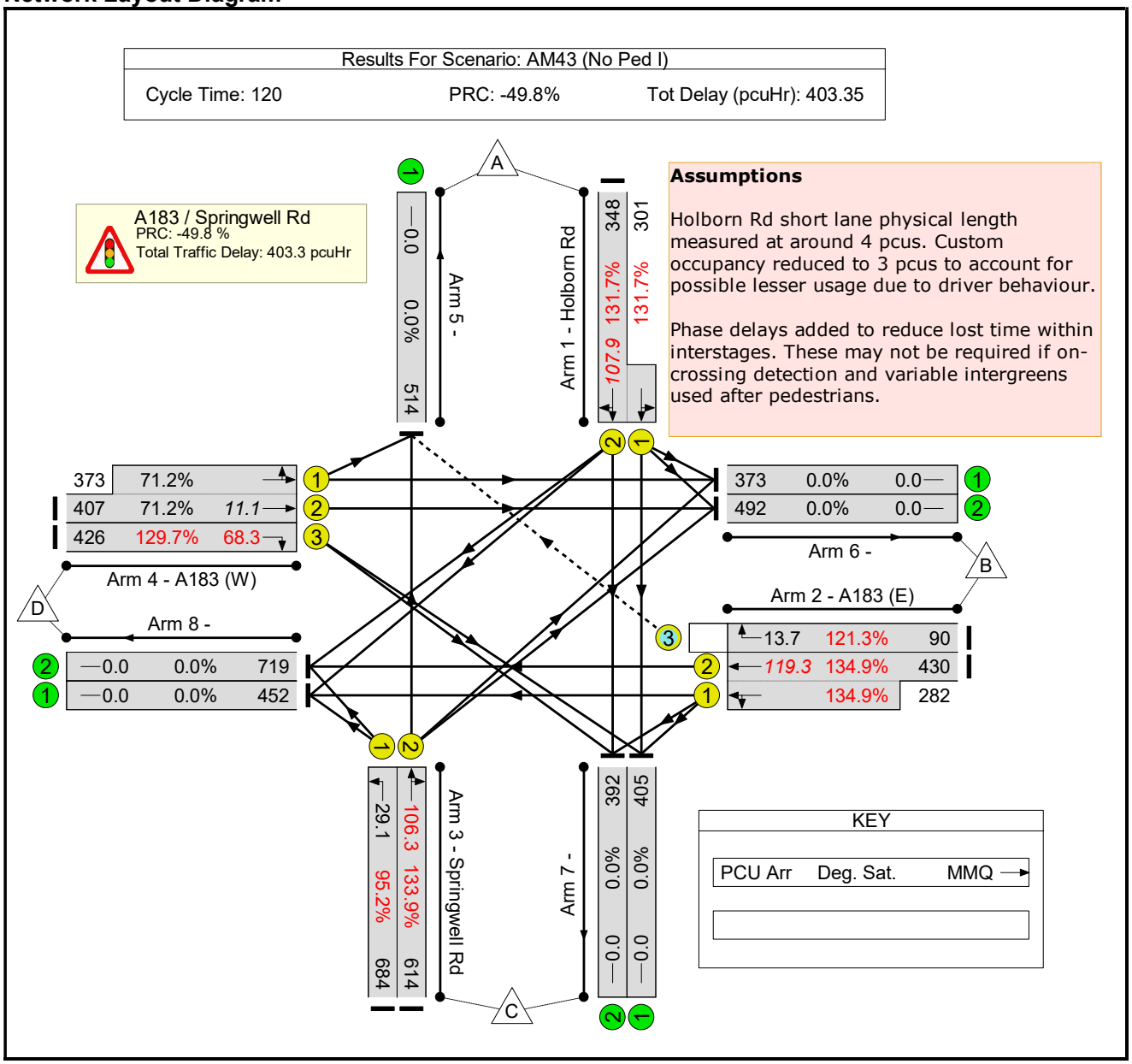
Stage Timings

Stage	1	2	3	4
Duration	20	16	24	19
Change Point	0	33	60	92

Signal Timings Diagram



Network Layout Diagram



Network Results

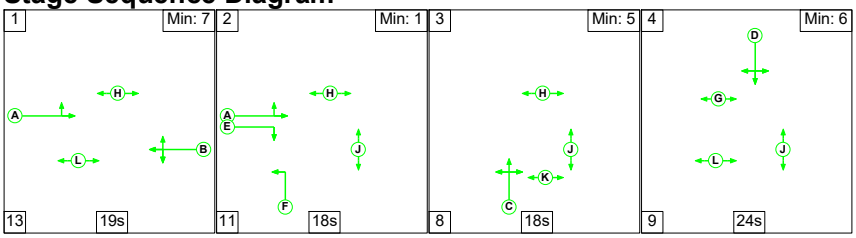
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**134.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	649	1855:1861	264+229	131.7 : 131.7%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	20	-	712	2055:1790	319+209	134.9 : 134.9%
2/3	A183 (E) Right	O	N/A	N/A	B		1	20	-	90	1702	74	121.3%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	49	21	684	1724	718	95.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	28	-	614	1898	459	133.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	49	-	780	2035:1868	572+524	71.2 : 71.2%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	426	1714	329	129.7%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	401	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	520	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	532	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	515	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	489	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	848	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**74**	**0**	**0**	**80.2**	**322.8**	**0.4**	**403.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**74**	**0**	**0**	**80.2**	**322.8**	**0.4**	**403.3**	**-**	**-**	**-**	**-**
1/2+1/1	649	493	-	-	-	18.8	80.0	-	98.8	548.2	27.8	80.0	107.9
2/2+2/1	712	528	-	-	-	20.8	93.9	-	114.7	580.0	25.4	93.9	119.3
2/3	90	74	74	0	0	2.1	10.1	0.4	12.6	503.2	3.5	10.1	13.7
3/1	684	684	-	-	-	6.4	7.1	-	13.5	71.0	22.0	7.1	29.1
3/2	614	459	-	-	-	15.7	79.6	-	95.3	558.7	26.7	79.6	106.3
4/2+4/1	780	780	-	-	-	5.5	1.2	-	6.8	31.2	9.8	1.2	11.1
4/3	426	329	-	-	-	10.9	50.8	-	61.7	521.4	17.4	50.8	68.3
5/1	514	514	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	373	373	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	492	492	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	405	405	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	392	392	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	452	452	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	719	719	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -49.8 Total Delay for Signalled Lanes (pcuHr): 403.35 Cycle Time (s): 120
PRC Over All Lanes (%): -49.8 Total Delay Over All Lanes(pcuHr): 403.35

Scenario 7: 'PM23 (No Ped I)' (FG3: 'PM 2023', Plan 2: 'No Ped I')

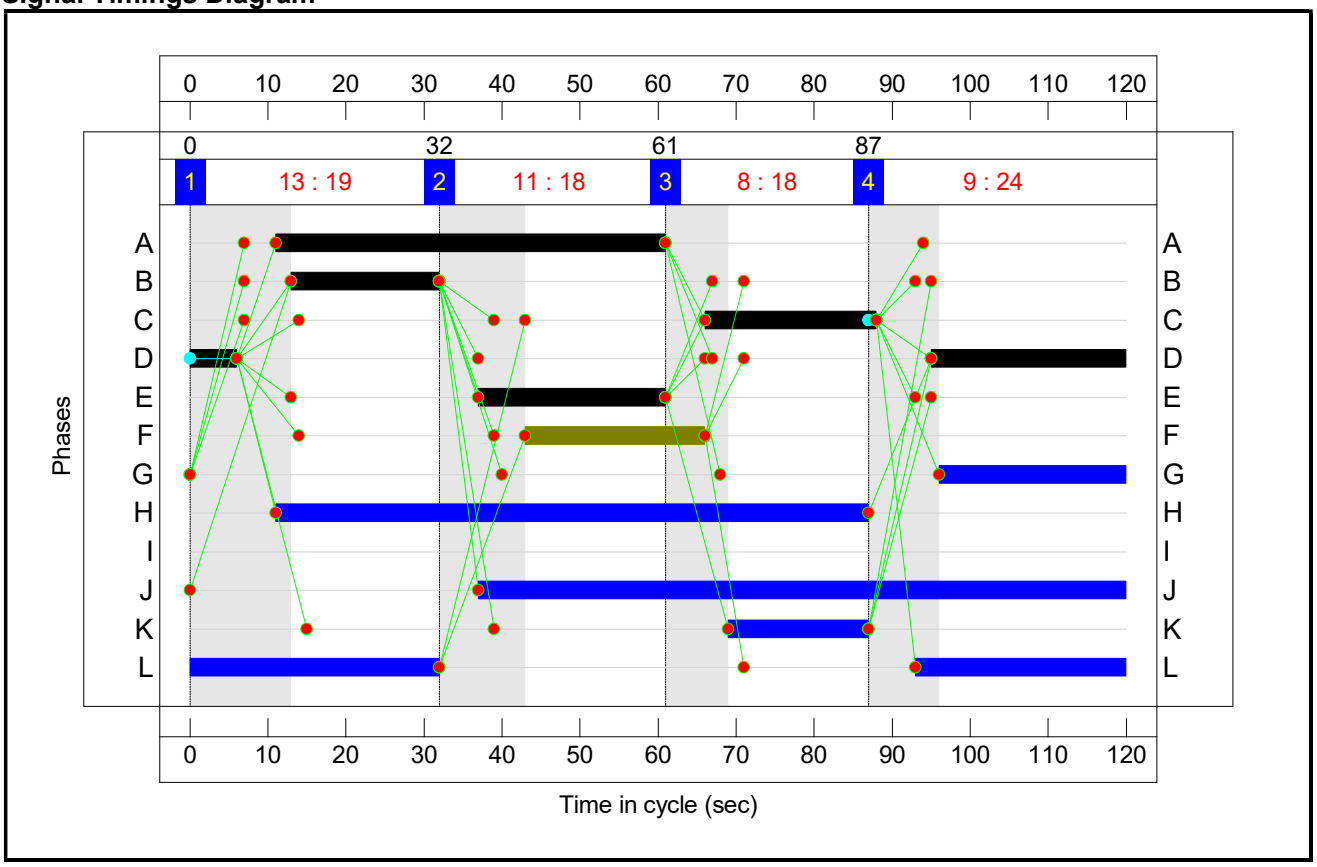
Stage Sequence Diagram



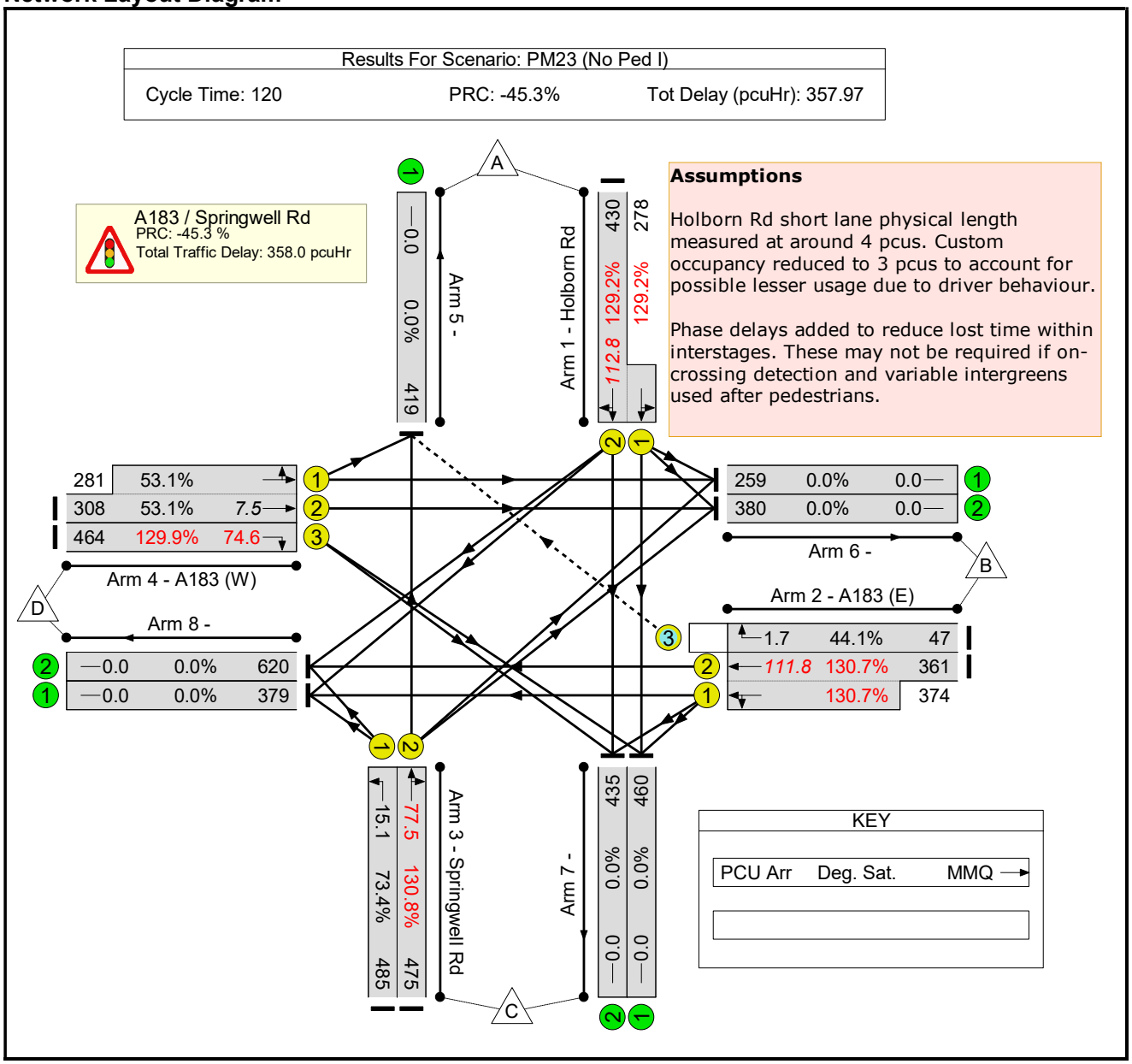
Stage Timings

Stage	1	2	3	4
Duration	19	18	18	24
Change Point	0	32	61	87

Signal Timings Diagram



Network Layout Diagram



Network Results

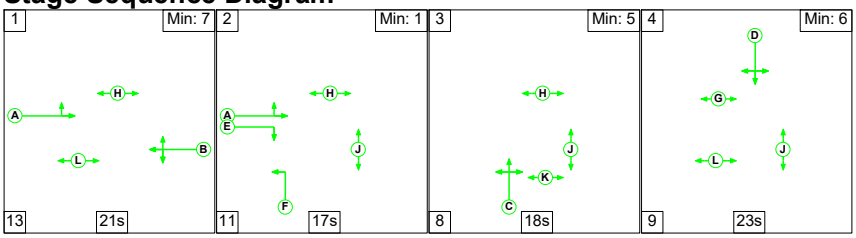
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.8%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.8%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	708	1832:1864	333+215	129.2 : 129.2%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	19	-	735	2055:1770	276+286	130.7 : 130.7%
2/3	A183 (E) Right	O	N/A	N/A	B		1	19	-	47	1702	106	44.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	45	23	485	1724	661	73.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	475	1895	363	130.8%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	50	-	589	2035:1855	580+529	53.1 : 53.1%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	464	1714	357	129.9%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	281	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	402	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	597	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	565	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	420	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	734	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**47**	**0**	**0**	**71.3**	**286.5**	**0.2**	**358.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**47**	**0**	**0**	**71.3**	**286.5**	**0.2**	**358.0**	**-**	**-**	**-**	**-**
1/2+1/1	708	548	-	-	-	19.4	82.2	-	101.7	517.1	30.6	82.2	112.8
2/2+2/1	735	562	-	-	-	20.1	88.4	-	108.5	531.6	23.4	88.4	111.8
2/3	47	47	47	0	0	0.6	0.4	0.2	1.1	84.4	1.3	0.4	1.7
3/1	485	485	-	-	-	4.3	1.4	-	5.6	41.8	13.7	1.4	15.1
3/2	475	363	-	-	-	11.4	57.9	-	69.3	525.6	19.6	57.9	77.5
4/2+4/1	589	589	-	-	-	3.8	0.6	-	4.4	26.8	6.9	0.6	7.5
4/3	464	357	-	-	-	11.7	55.5	-	67.3	522.0	19.0	55.5	74.6
5/1	419	419	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	259	259	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	380	380	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	460	460	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	435	435	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	379	379	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	620	620	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -45.3 Total Delay for Signalled Lanes (pcuHr): 357.97 Cycle Time (s): 120
PRC Over All Lanes (%): -45.3 Total Delay Over All Lanes(pcuHr): 357.97

Scenario 8: 'PM43 (No Ped I)' (FG4: 'PM 2043', Plan 2: 'No Ped I')

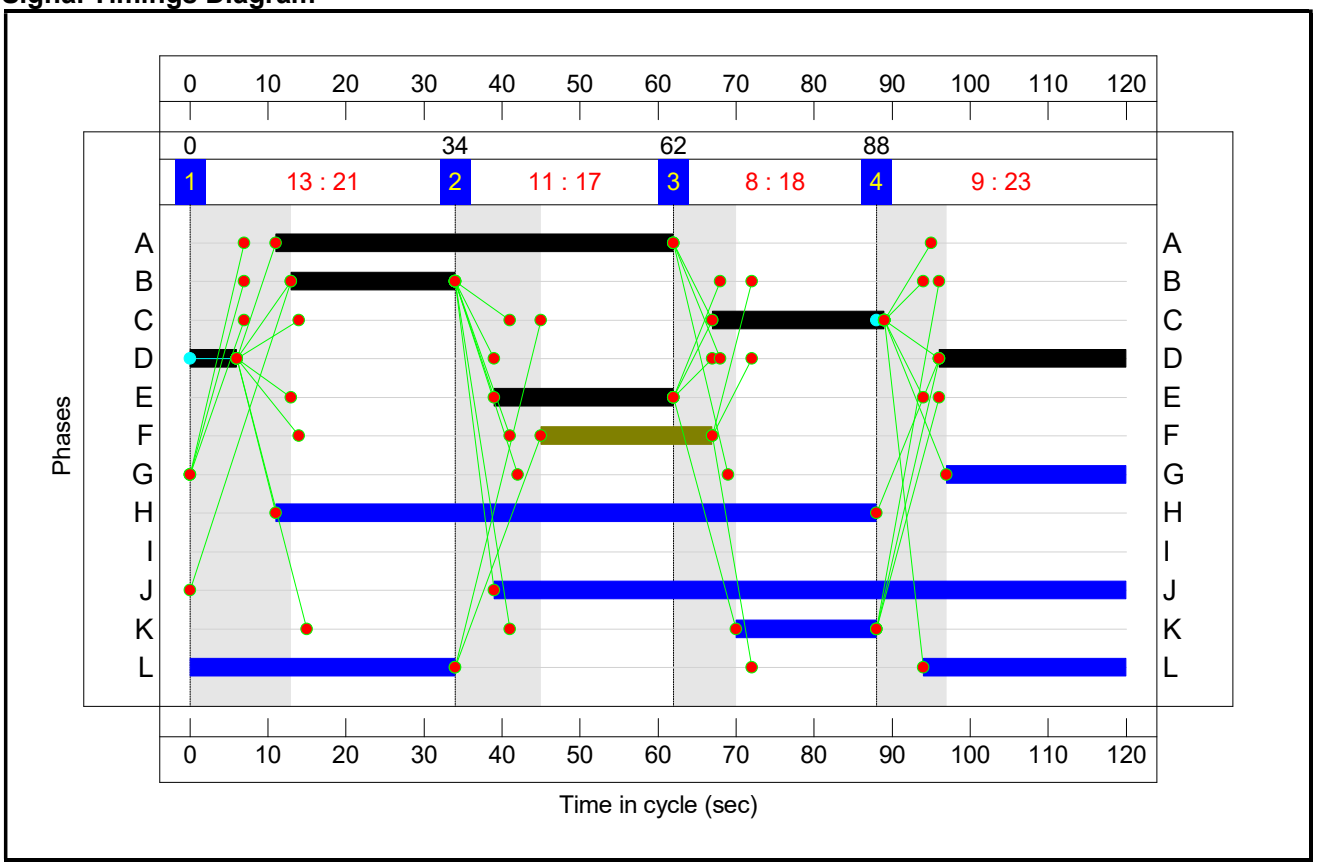
Stage Sequence Diagram



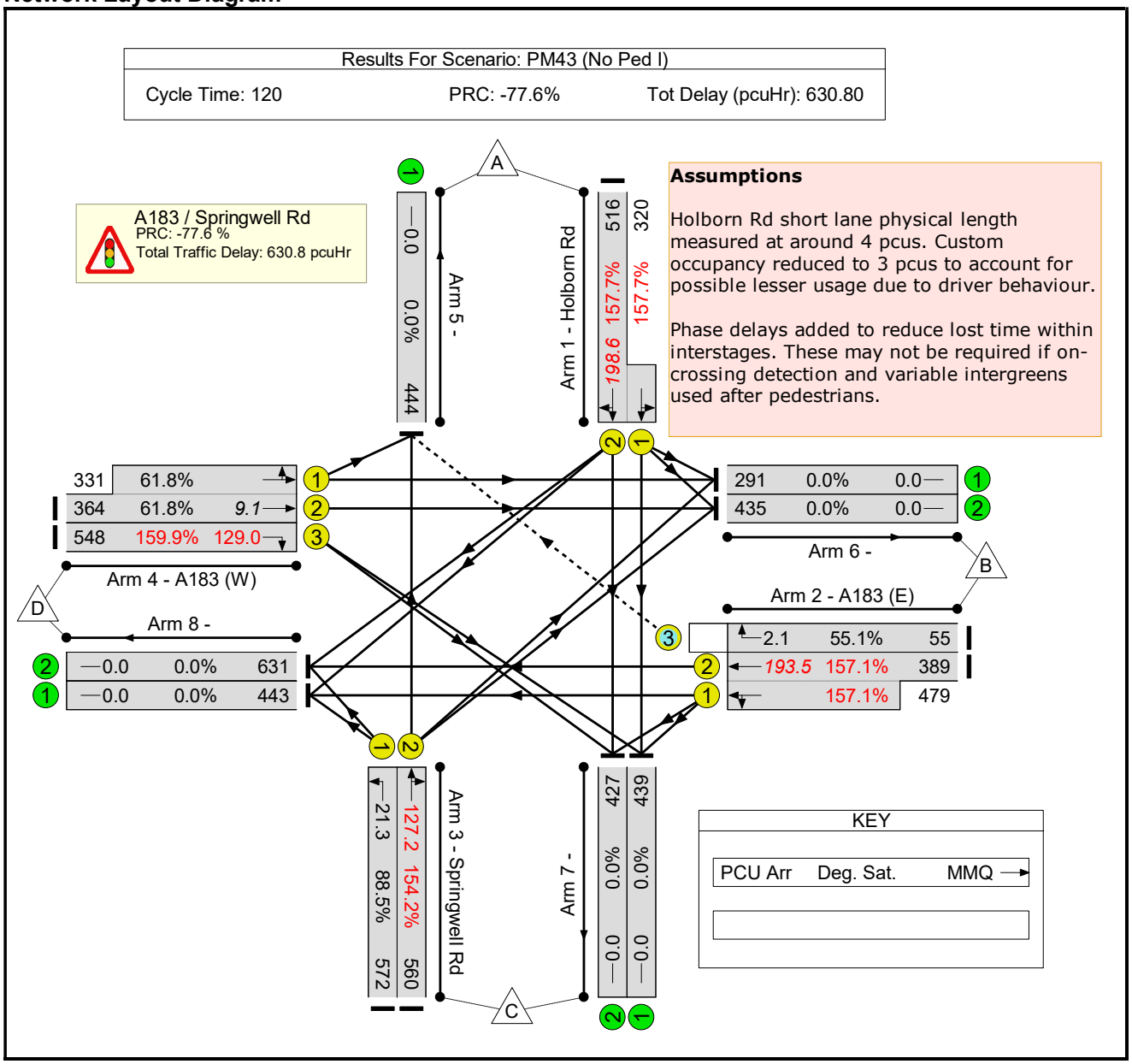
Stage Timings

Stage	1	2	3	4
Duration	21	17	18	23
Change Point	0	34	62	88

Signal Timings Diagram



Network Layout Diagram



Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Historic Option	-	-	**N/A**	-	-		-	-	-	-	-	-	**159.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**159.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	30	-	836	1833:1863	327+203	157.7 : 157.7%
2/2+2/1	A183 (E) Left Ahead	U	N/A	N/A	B		1	21	-	868	2055:1781	248+305	157.1 : 157.1%
2/3	A183 (E) Right	O	N/A	N/A	B		1	21	-	55	1702	100	55.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	44	22	572	1724	646	88.5%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	560	1895	363	154.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	695	2035:1854	589+535	61.8 : 61.8%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	548	1714	343	159.9%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	331	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	475	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	696	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	676	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	533	Inf	Inf	0.0%
8/2		U	N/A	N/A	-		-	-	-	829	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Historic Option	**-**	**-**	**55**	**0**	**0**	**108.5**	**522.1**	**0.2**	**630.8**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**55**	**0**	**0**	**108.5**	**522.1**	**0.2**	**630.8**	**-**	**-**	**-**	**-**
1/2+1/1	836	530	-	-	-	31.1	154.3	-	185.4	798.6	44.3	154.3	198.6
2/2+2/1	868	552	-	-	-	30.1	159.2	-	189.3	785.0	34.3	159.2	193.5
2/3	55	55	55	0	0	0.6	0.6	0.2	1.5	95.0	1.5	0.6	2.1
3/1	572	572	-	-	-	5.6	3.5	-	9.1	57.2	17.8	3.5	21.3
3/2	560	363	-	-	-	18.5	99.8	-	118.3	760.5	27.4	99.8	127.2
4/2+4/1	695	695	-	-	-	4.5	0.8	-	5.3	27.6	8.3	0.8	9.1
4/3	548	343	-	-	-	18.0	103.9	-	121.9	800.9	25.1	103.9	129.0
5/1	444	444	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	291	291	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	435	435	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	439	439	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	427	427	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	443	443	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/2	631	631	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -77.6 Total Delay for Signalled Lanes (pcuHr): 630.80 Cycle Time (s): 120
PRC Over All Lanes (%): -77.6 Total Delay Over All Lanes(pcuHr): 630.80

Appendix E

Intergreens

Option B

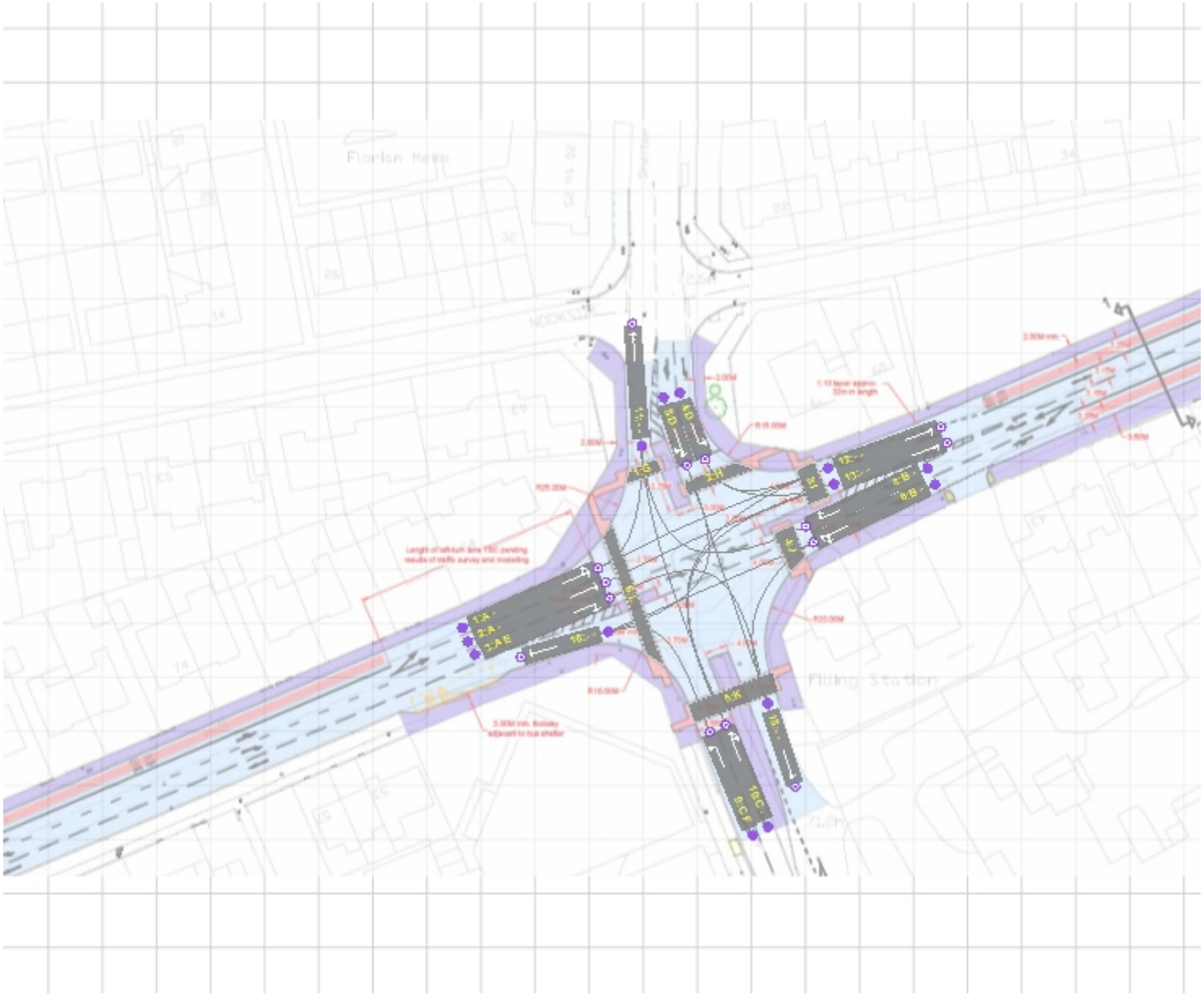
quickGreen Report

Project:	23014 Springwell Rd
Title:	Option B

Filename:	Springwell Rd Option B IGs.qgn
Location:	Sunderland
Designer:	Simon Swanston
Organisation:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Title: Option B

Junction Geometry



Notes

This model does not have notes

Lane Details

Lane	Width (m)	Controlling Phase	Controlling Arrow Phase	Number of Turns	ASL Length (m)	Num Turning Movements
1	3	A		2		0 of 2
2	3	A		1		0 of 1
3	3	A	E	1		0 of 1
4	3	D		2		0 of 2
5	3	D		2		0 of 2
6	3	B		2		0 of 2
8	3	B		1		0 of 1
9	3	C	F	1		0 of 1
10	3	C		3		0 of 3

Pedestrian Crossings

Crossing	Walk Distance (m)	Walk Time (s)	Terminating Intergreen (s)
1	6.46	5.38	7.38
2	11.76	9.80	11.80
3	6.99	5.83	7.83
4	7.11	5.93	7.93
5	16.76	13.97	15.97
6	25.53	21.28	23.28

Traffic Signal Phases

Phase Name	Type	Lanes Controlled
A	3 Aspect Traffic	1 2 3
B	3 Aspect Traffic	6 7 8
C	3 Aspect Traffic	9 10
D	3 Aspect Traffic	4 5
E	Ind. Arrow	3
F	Filter	9
G	Pedestrian	1
H	Pedestrian	2
I	Pedestrian	3
J	Pedestrian	4
K	Pedestrian	5
L	Pedestrian	6

Lane Conflict Distances

Starting Lane

Terminating Lane	Lane Conflict Distances (m)								
	1	**2**	**3**	**4**	**5**	**6**	**8**	**9**	**10**
1				20.38	11.60		-12.25		-15.86
2				19.25	8.12		-7.96		-15.17
3					-0.03	12.04			-13.37
4	-20.07	-19.24							-34.42
5	-11.55	-7.72	2.10			12.03	-0.15	11.70	3.61
6			-3.87		-0.56			11.08	3.03
8	18.76	7.96			1.92				-9.86
9					-11.70	-11.07			
10	28.63	22.01	18.28	36.24	22.51	-0.38	14.26		

Traffic\Pedestrian Conflict Distances

Starting Ped Crossing

Terminating Lane	Traffic/Pedestrian Conflict Distances (m)						
		P1	P2	P3	P4	P5	P6
	1	22.49		45.01			6.01
	2			44.84			5.36
	3					45.72	5.63
	4		5.84	25.59			
	5		5.80			45.75	37.40
	6				6.83	33.72	36.77
	8	41.37			6.57		
	9					6.78	25.59
	10	51.20		60.87		6.61	

Phase Intergreen Matrix

Starting Phase

Terminating Phase	Phase Intergreens (s)											
	A	B	C	D	E	F	G	H	I	J	K	L
A			5	7			7		9		9	5
B			6	5	3	6	9			5	8	8
C	8	6		8	7		10		11		5	7
D	5	6	6		5	6		5	7		9	9
E		6	5	5							9	5
F		5		5							5	7
G	8	8	8									
H				12								
I	8		8	8								
J		8										
K	16	16	16	16	16	16						
L	24	24	24	24	24	24						

Additional Phase Intergreen Detail

Phases	Type	Value	Notes
A => B	Phases Oppose	-	
B => A	Phases Oppose	-	
B => E	Override	3	Indicative Arrow

Audit Log Records

This model does not have any audit records

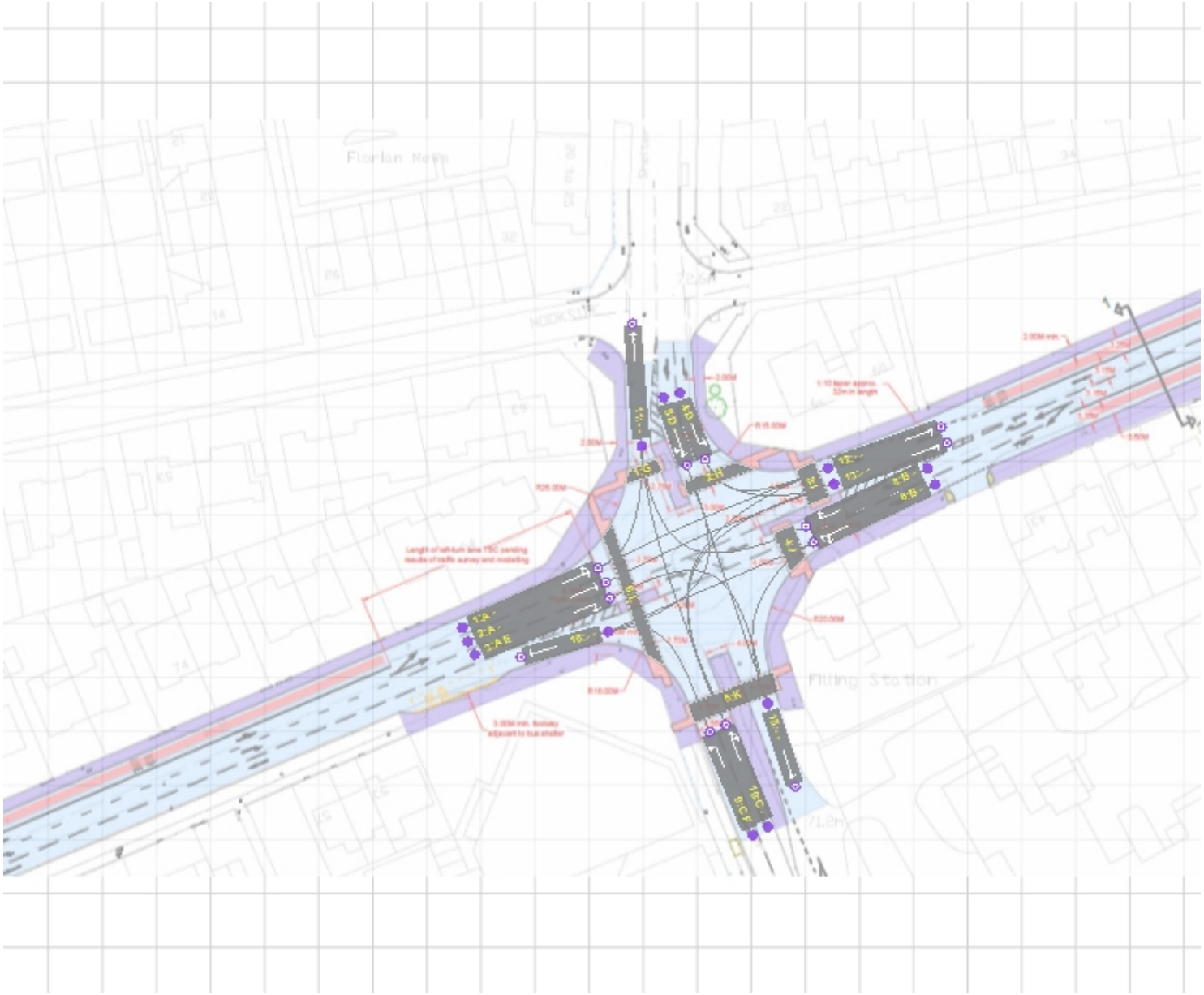
quickGreen Report

Project:	23014 Springwell Rd
Title:	Option B

Filename:	Springwell Rd Option B IGs.qgn
Location:	Sunderland
Designer:	Simon Swanston
Organisation:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Title: Option B

Junction Geometry



Notes

This model does not have notes

Lane Details

Lane	Width (m)	Controlling Phase	Controlling Arrow Phase	Number of Turns	ASL Length (m)	Num Turning Movements
1	3	A		2		0 of 2
2	3	A		1		0 of 1
3	3	A	E	1		0 of 1
4	3	D		2		0 of 2
5	3	D		2		0 of 2
6	3	B		2		0 of 2
8	3	B		1		0 of 1
9	3	C	F	1		0 of 1
10	3	C		3		0 of 3

Pedestrian Crossings

Crossing	Walk Distance (m)	Walk Time (s)	Terminating Intergreen (s)
1	6.46	5.38	7.38
2	11.76	9.80	11.80
3	6.99	5.83	7.83
4	7.11	5.93	7.93
5	16.76	13.97	15.97
6	25.53	21.28	23.28

Traffic Signal Phases

Phase Name	Type	Lanes Controlled
A	3 Aspect Traffic	1 2 3
B	3 Aspect Traffic	6 7 8
C	3 Aspect Traffic	9 10
D	3 Aspect Traffic	4 5
E	Ind. Arrow	3
F	Filter	9
G	Pedestrian	1
H	Pedestrian	2
I	Pedestrian	3
J	Pedestrian	4
K	Pedestrian	5
L	Pedestrian	6

Lane Conflict Distances

Starting Lane

Terminating Lane	Lane Conflict Distances (m)								
	1	**2**	**3**	**4**	**5**	**6**	**8**	**9**	**10**
1				20.38	11.60		-12.25		-15.86
2				19.25	8.12		-7.96		-15.17
3					-0.03	12.04			-13.37
4	-20.07	-19.24							-34.42
5	-11.55	-7.72	2.10			12.03	-0.15	11.70	3.61
6			-3.87		-0.56			11.08	3.03
8	18.76	7.96			1.92				-9.86
9					-11.70	-11.07			
10	28.63	22.01	18.28	36.24	22.51	-0.38	14.26		

Traffic\Pedestrian Conflict Distances

Starting Ped Crossing

Terminating Lane	Traffic/Pedestrian Conflict Distances (m)						
		P1	P2	P3	P4	P5	P6
	1	22.49		45.01			6.01
	2			44.84			5.36
	3					45.72	5.63
	4		5.84	25.59			
	5		5.80			45.75	37.40
	6				6.83	33.72	36.77
	8	41.37			6.57		
	9					6.78	25.59
	10	51.20		60.87		6.61	

Phase Intergreen Matrix

Starting Phase

Terminating Phase	Phase Intergreens (s)											
	A	B	C	D	E	F	G	H	I	J	K	L
A			5	7			7		9		9	5
B			6	5	3	6	9			5	8	8
C	8	6		8	7		10		11		5	7
D	5	6	6		5	6		5	7		9	9
E		6	5	5							9	5
F		5		5							5	7
G	8	8	8									
H				12								
I	8		8	8								
J		8										
K	16	16	16	16	16	16						
L	24	24	24	24	24	24						

Additional Phase Intergreen Detail

Phases	Type	Value	Notes
A => B	Phases Oppose	-	
B => A	Phases Oppose	-	
B => E	Override	3	Indicative Arrow

Audit Log Records

This model does not have any audit records

Appendix F

LinSig Data

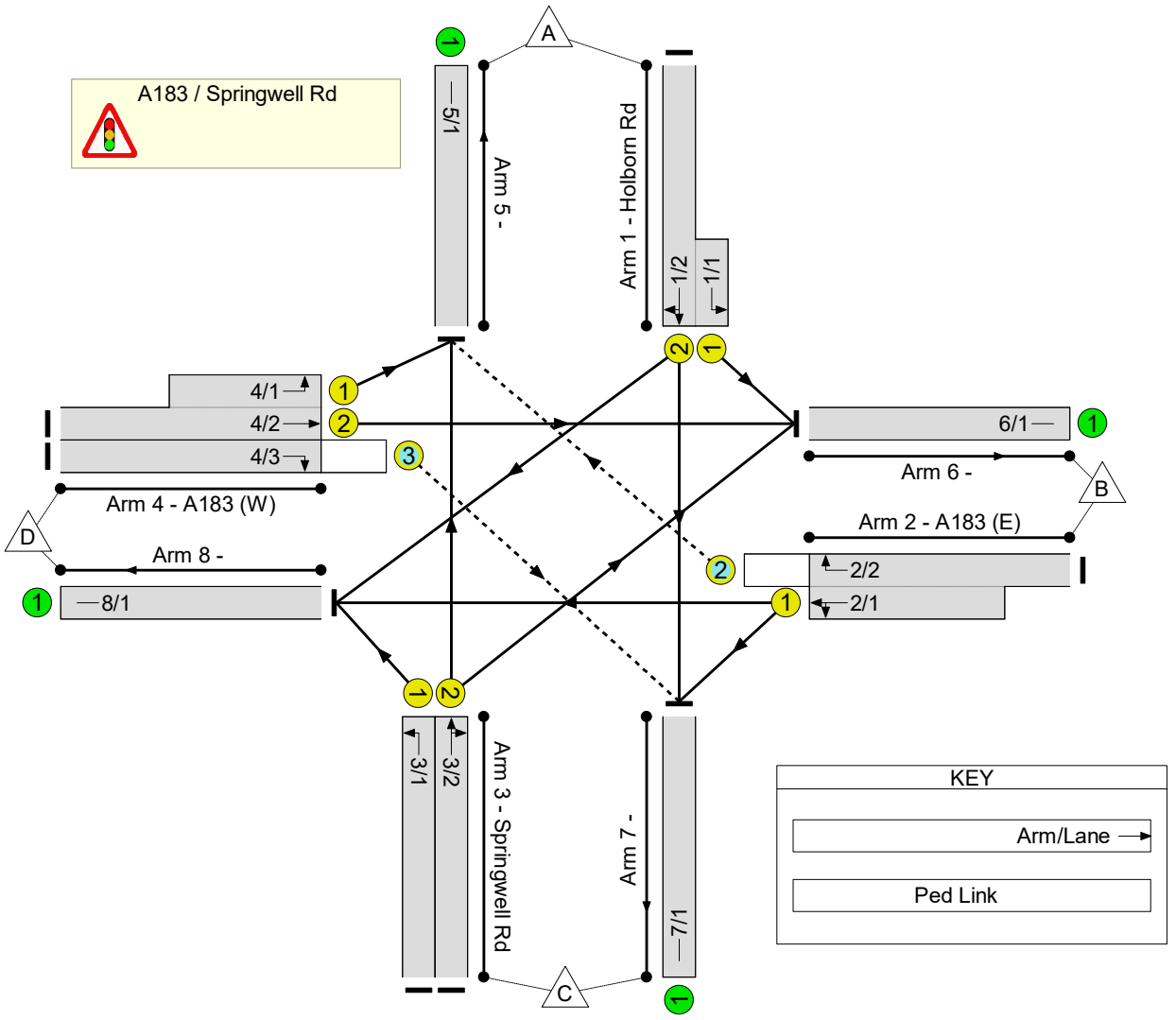
Option B

Springwell Rd Option B LinSig Data

User and Project Details

Project:	**23014 Springwell Rd**
Title:	**Option B**
Location:	Sunderland
Client:	Sunderland City Council
Design Layout Ref:	CRSR-SCC-HGN-00-DR-CR-01_000 Rev P01 (SCC)
Date Started:	03/04/23
Model Purpose:	Test performance of proposal
Additional detail:	
File name:	Springwell Rd Option B.lsg3x
Author:	Simon Swanston
Company:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Network Layout Diagram



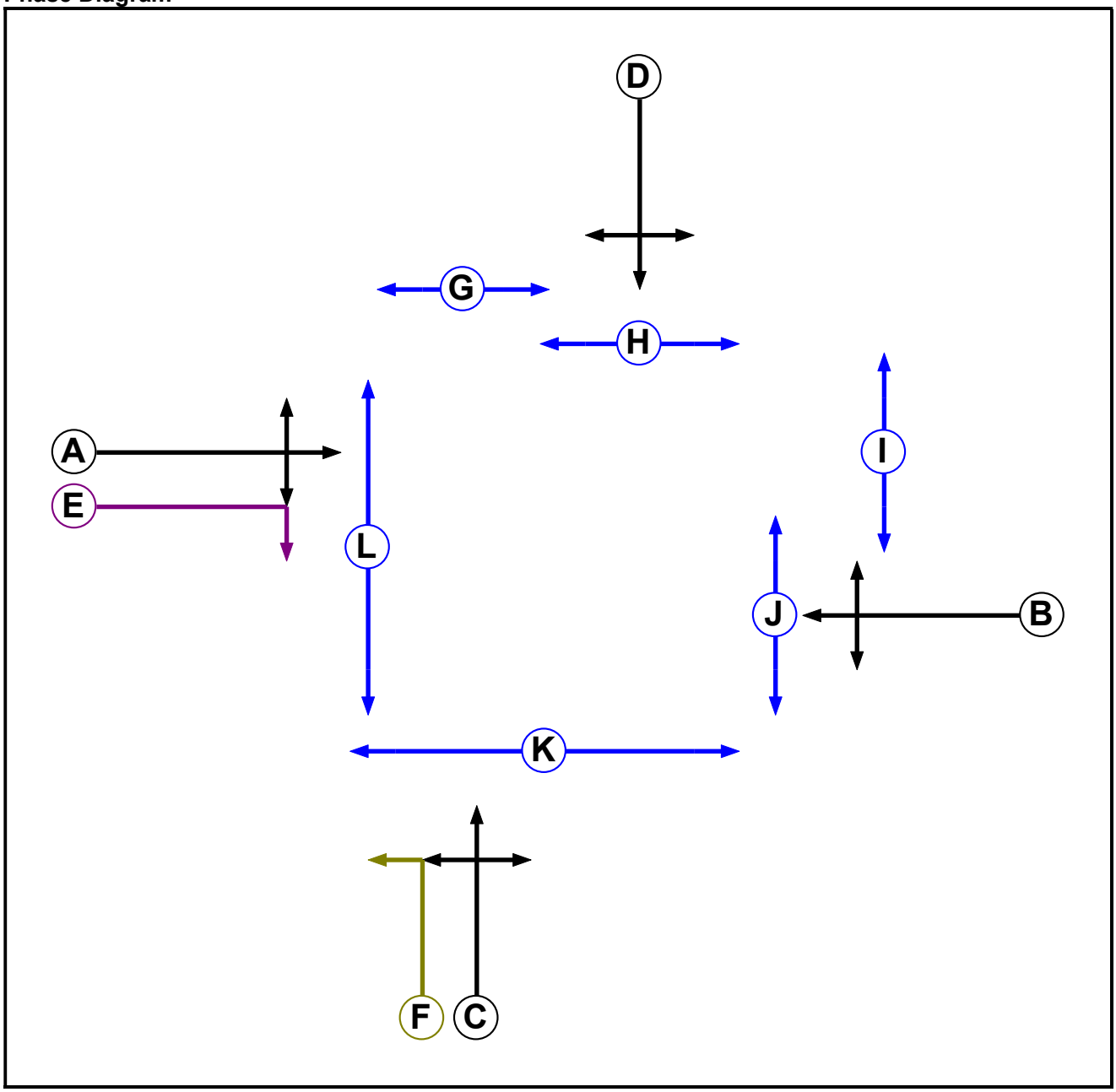
Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Ind. Arrow	A	4	4
F	Filter	C	4	0
G	Pedestrian		5	5
H	Pedestrian		5	5
I	Pedestrian		5	5
J	Pedestrian		5	5
K	Pedestrian		5	5
L	Pedestrian		5	5

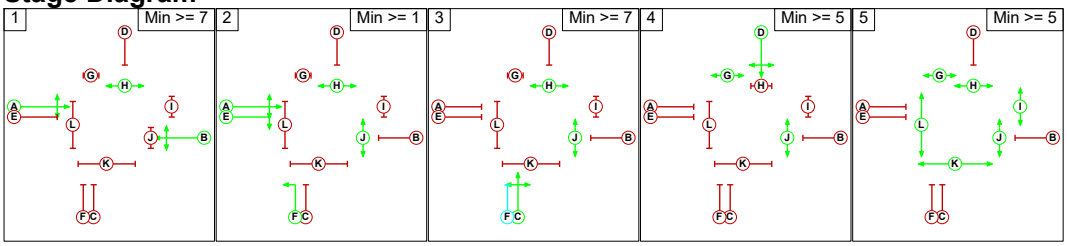
Phase Intergreens Matrix

		Starting Phase											
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		-	5	7	-	-	7	-	9	-	9	5
	B	-		6	5	3	6	9	-	-	5	8	8
	C	8	6		8	7	-	10	-	11	-	5	7
	D	5	6	6		5	6	-	5	7	-	9	9
	E	-	6	5	5		-	-	-	-	-	9	5
	F	-	5	-	5	-		-	-	-	-	5	7
	G	8	8	8	-	-	-		-	-	-	-	-
	H	-	-	-	12	-	-	-		-	-	-	-
	I	8	-	8	8	-	-	-	-		-	-	-
	J	-	8	-	-	-	-	-	-	-		-	-
	K	16	16	16	16	16	16	-	-	-	-		-
	L	24	24	24	24	24	24	-	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B H
2	A E F H J
3	C H J
4	D G J
5	G H I J K L

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	4	A	Losing	5	5
1	4	B	Losing	3	3
3	4	C	Losing	4	4
4	1	D	Losing	2	2
4	3	D	Losing	2	2

Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1		6	6	12	9
	2	X		5	X	X
	3	8	X		14	11
	4	8	X	8		9
	5	24	24	24	24	

Give-Way Lane Input Data

Junction: A183 / Springwell Rd											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/2 (A183 (E))	5/1 (Right)	1439	0	4/1	1.09	All	3.00	-	0.50	3	3.00
				4/2	1.09	All					
4/3 (A183 (W))	7/1 (Right)	1439	0	2/1	1.09	All	3.00	-	0.50	3	3.00

Lane Input Data

Junction: A183 / Springwell Rd

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Holborn Rd)	U	D	2	3	4.0	Geom	-	3.65	0.00	Y	Arm 6 Left	17.00
1/2 (Holborn Rd)	U	D	2	3	60.0	Geom	-	3.65	0.00	Y	Arm 7 Ahead	Inf
											Arm 8 Right	20.00
2/1 (A183 (E))	U	B	2	3	9.0	Geom	-	3.00	0.00	Y	Arm 7 Left	22.00
											Arm 8 Ahead	Inf
2/2 (A183 (E))	O	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	12.00
3/1 (Springwell Rd)	U	C F	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 8 Left	18.00
3/2 (Springwell Rd)	U	C	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	15.00
4/1 (A183 (W))	U	A	2	3	7.0	Geom	-	2.95	0.00	Y	Arm 5 Left	27.00
4/2 (A183 (W))	U	A	2	3	60.0	Geom	-	2.95	0.00	Y	Arm 6 Ahead	Inf
4/3 (A183 (W))	O	A E	2	3	60.0	Geom	-	2.95	0.00	Y	Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM 2023'	07:30	08:30	01:00	
2: 'AM 2043'	07:30	08:30	01:00	F1*1.18
3: 'PM 2023'	16:30	17:30	01:00	
4: 'PM 2043'	16:30	17:30	01:00	F3*1.18

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 1: AM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	74
1/2 (with short)	550(In) 476(Out)
2/1 (short)	603
2/2 (with short)	679(In) 76(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1941	1941
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	29.5 %	1877	1877
				Arm 8 Ahead	Inf	70.5 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 2: AM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	87
1/2 (with short)	649(In) 562(Out)
2/1 (short)	712
2/2 (with short)	802(In) 90(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1941	1941
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	29.5 %	1877	1877
				Arm 8 Ahead	Inf	70.5 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 3: PM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	76
1/2 (with short)	708(In) 632(Out)
2/1 (short)	735
2/2 (with short)	782(In) 47(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	58.9 %	1921	1921
				Arm 8 Right	20.00	41.1 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	44.4 %	1859	1859
				Arm 8 Ahead	Inf	55.6 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 4: PM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	90
1/2 (with short)	836(In) 746(Out)
2/1 (short)	868
2/2 (with short)	923(In) 55(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	58.8 %	1921	1921
				Arm 8 Right	20.00	41.2 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	44.4 %	1859	1859
				Arm 8 Ahead	Inf	55.6 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 5: AM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	74
1/2 (with short)	550(In) 476(Out)
2/1 (short)	603
2/2 (with short)	679(In) 76(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1941	1941
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	29.5 %	1877	1877
				Arm 8 Ahead	Inf	70.5 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 6: AM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	87
1/2 (with short)	649(In) 562(Out)
2/1 (short)	712
2/2 (with short)	802(In) 90(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1941	1941
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	29.5 %	1877	1877
				Arm 8 Ahead	Inf	70.5 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 7: PM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	76
1/2 (with short)	708(In) 632(Out)
2/1 (short)	735
2/2 (with short)	782(In) 47(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	58.9 %	1921	1921
				Arm 8 Right	20.00	41.1 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	44.4 %	1859	1859
				Arm 8 Ahead	Inf	55.6 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

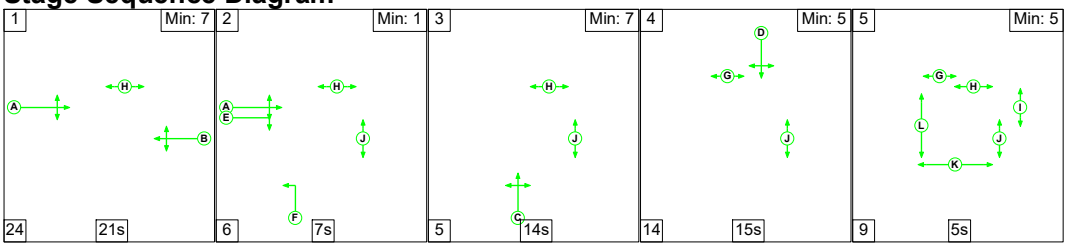
Lane	Scenario 8: PM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	90
1/2 (with short)	836(In) 746(Out)
2/1 (short)	868
2/2 (with short)	923(In) 55(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.65	0.00	Y	Arm 6 Left	17.00	100.0 %	1819	1819
1/2 (Holborn Rd)	3.65	0.00	Y	Arm 7 Ahead	Inf	58.8 %	1921	1921
				Arm 8 Right	20.00	41.2 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	44.4 %	1859	1859
				Arm 8 Ahead	Inf	55.6 %		
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	100.0 %	1702	1702
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.95	0.00	Y	Arm 7 Right	15.00	100.0 %	1736	1736
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

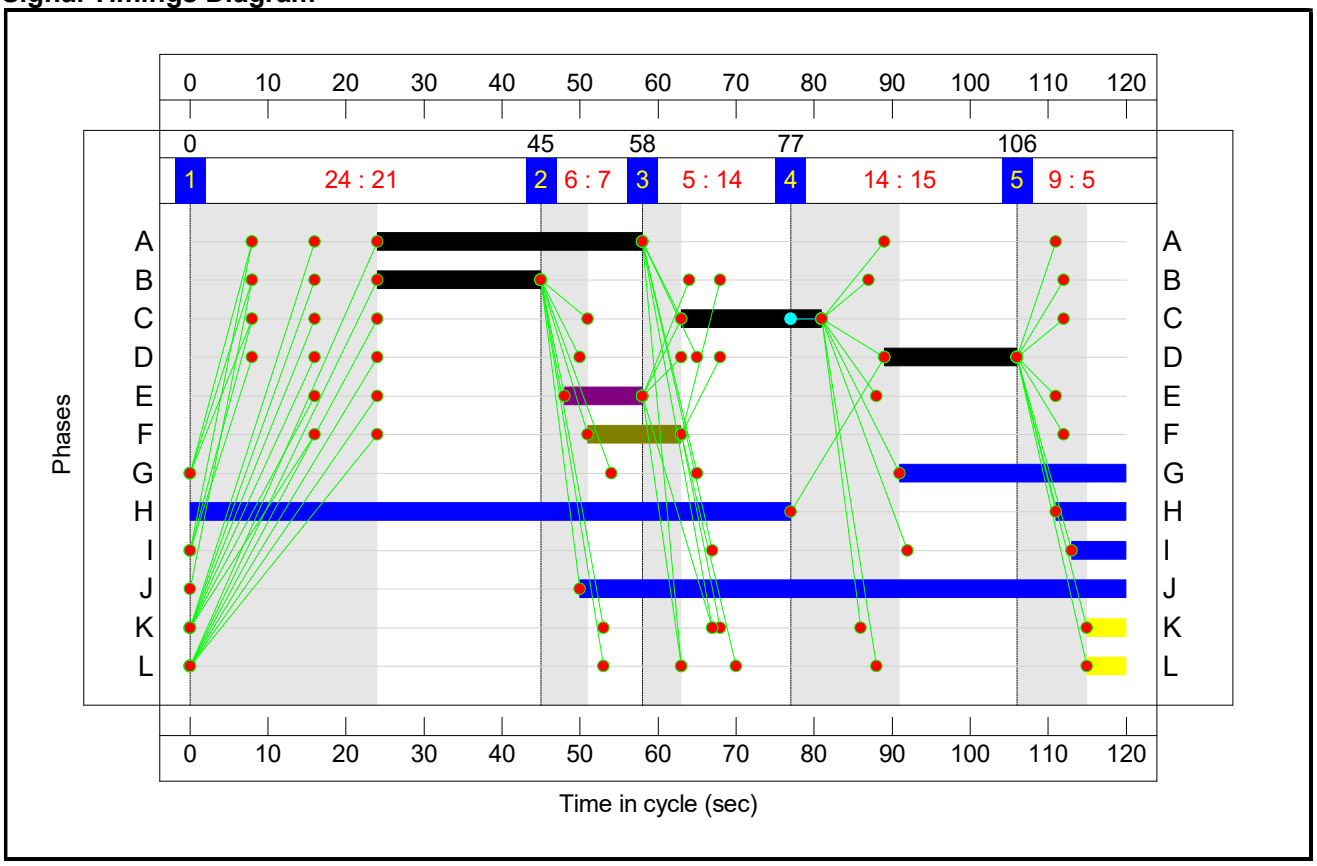
Stage Sequence Diagram



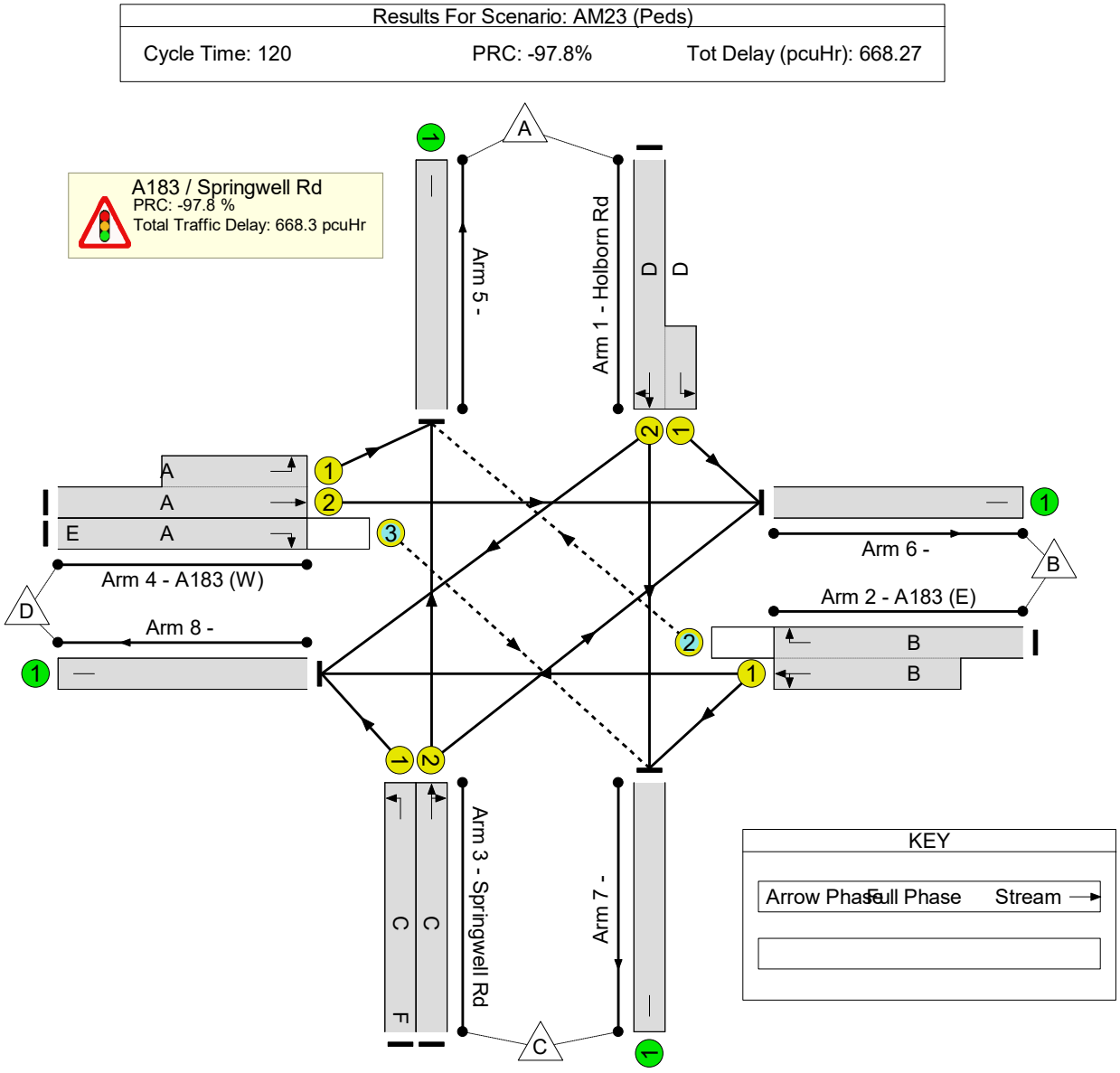
Stage Timings

Stage	1	2	3	4	5
Duration	21	7	14	15	5
Change Point	0	45	58	77	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Network Results

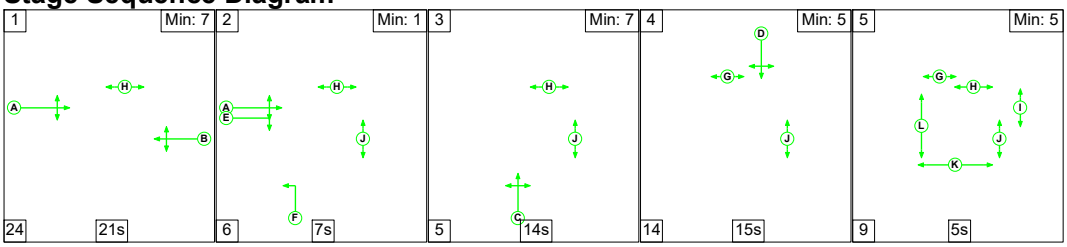
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**178.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**178.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	17	-	550	1941:1819	273+42	174.6 : 174.6%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	21	-	679	1702:1877	43+339	178.1 : 178.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	30	12	580	1794	463	125.1%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	18	-	520	1901	301	172.8%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	34	-	661	1910:1809	521+62	113.4 : 113.4%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	34	10	361	1736	206	175.5%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**0**	**159**	**89**	**105.7**	**561.6**	**0.9**	**668.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**159**	**89**	**105.7**	**561.6**	**0.9**	**668.3**	**-**	**-**	**-**	**-**
1/2+1/1	550	315	-	-	-	22.7	118.7	-	141.3	925.0	31.7	118.7	150.4
2/2+2/1	679	381	0	0	43	26.0	150.0	0.4	176.4	935.1	32.9	150.0	182.9
3/1	580	463	-	-	-	12.7	60.7	-	73.4	455.6	23.2	60.7	83.9
3/2	520	301	-	-	-	19.5	110.7	-	130.2	901.2	26.7	110.7	137.4
4/2+4/1	661	583	-	-	-	12.0	42.9	-	54.8	298.7	24.9	42.9	67.8
4/3	361	206	0	159	47	12.8	78.8	0.5	92.1	918.9	17.2	78.8	96.0
5/1	338	338	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	631	631	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	505	505	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	775	775	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -97.8 Total Delay for Signalled Lanes (pcuHr): 668.27 Cycle Time (s): 120
PRC Over All Lanes (%): -97.8 Total Delay Over All Lanes(pcuHr): 668.27

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

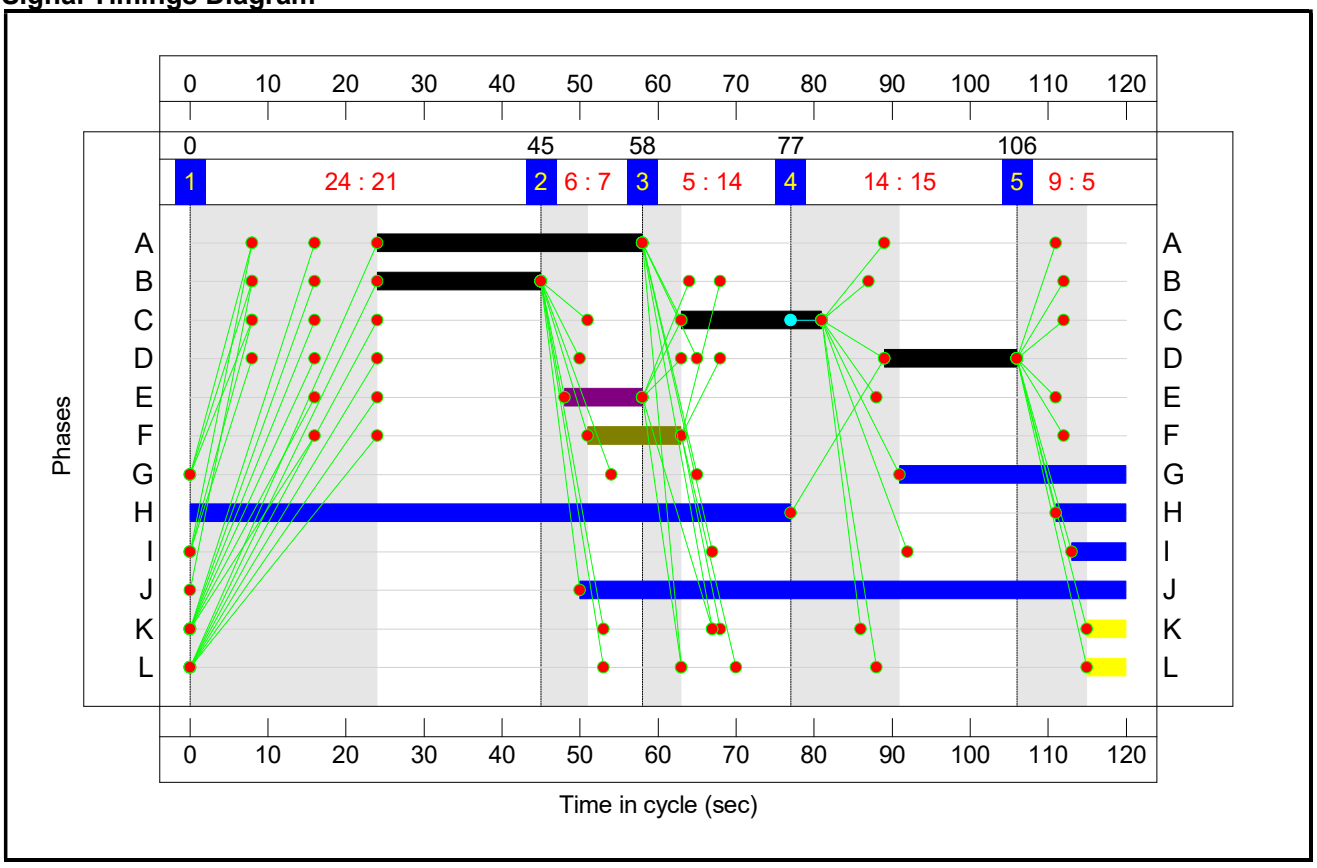
Stage Sequence Diagram



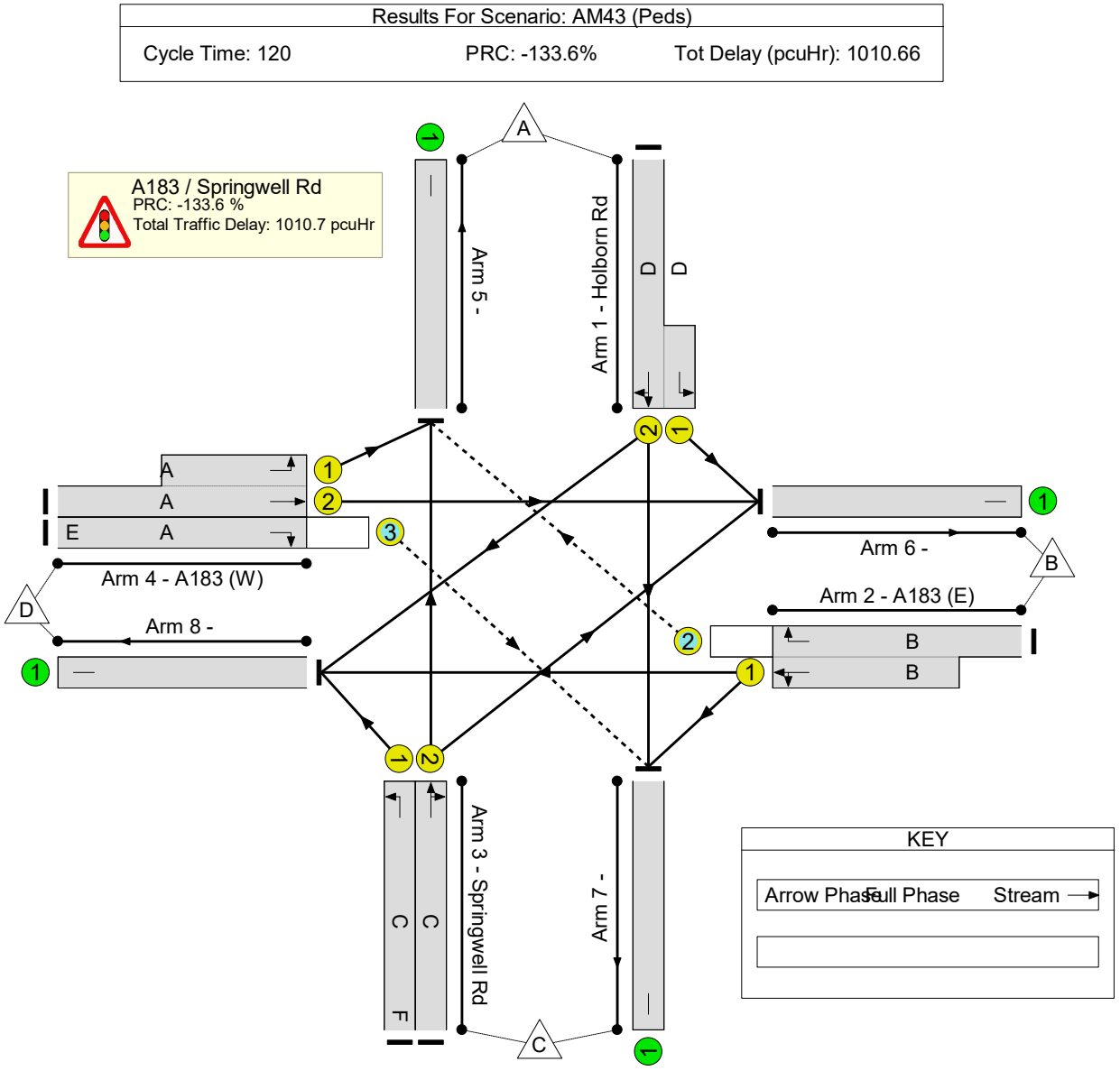
Stage Timings

Stage	1	2	3	4	5
Duration	21	7	14	15	5
Change Point	0	45	58	77	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Network Results

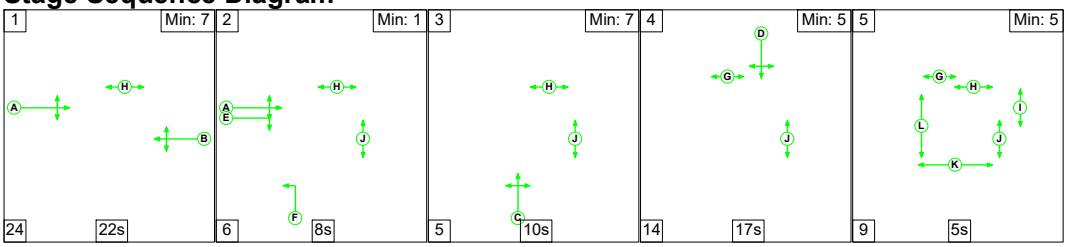
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**210.3%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**210.3%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	17	-	649	1941:1819	273+42	206.1 : 206.1%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	21	-	802	1702:1877	43+339	210.3 : 210.3%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	30	12	684	1794	463	147.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	18	-	614	1901	301	204.0%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	34	-	780	1910:1809	521+62	133.8 : 133.8%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	34	10	426	1736	206	207.1%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**0**	**159**	**89**	**149.7**	**860.0**	**0.9**	**1010.7**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**159**	**89**	**149.7**	**860.0**	**0.9**	**1010.7**	**-**	**-**	**-**	**-**
1/2+1/1	649	315	-	-	-	30.8	168.0	-	198.9	1103.0	41.3	168.0	209.3
2/2+2/1	802	381	0	0	43	34.7	211.2	0.4	246.3	1105.4	42.5	211.2	253.7
3/1	684	463	-	-	-	19.5	111.8	-	131.3	691.1	30.7	111.8	142.5
3/2	614	301	-	-	-	27.3	157.5	-	184.8	1083.6	35.2	157.5	192.7
4/2+4/1	780	583	-	-	-	19.9	100.4	-	120.3	555.1	33.0	100.4	133.4
4/3	426	206	0	159	47	17.5	111.1	0.5	129.1	1091.3	22.0	111.1	133.1
5/1	339	339	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	630	630	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	505	505	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	775	775	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -133.6 PRC Over All Lanes (%): -133.6 Total Delay for Signalled Lanes (pcuHr): 1010.66 Total Delay Over All Lanes(pcuHr): 1010.66 Cycle Time (s): 120

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

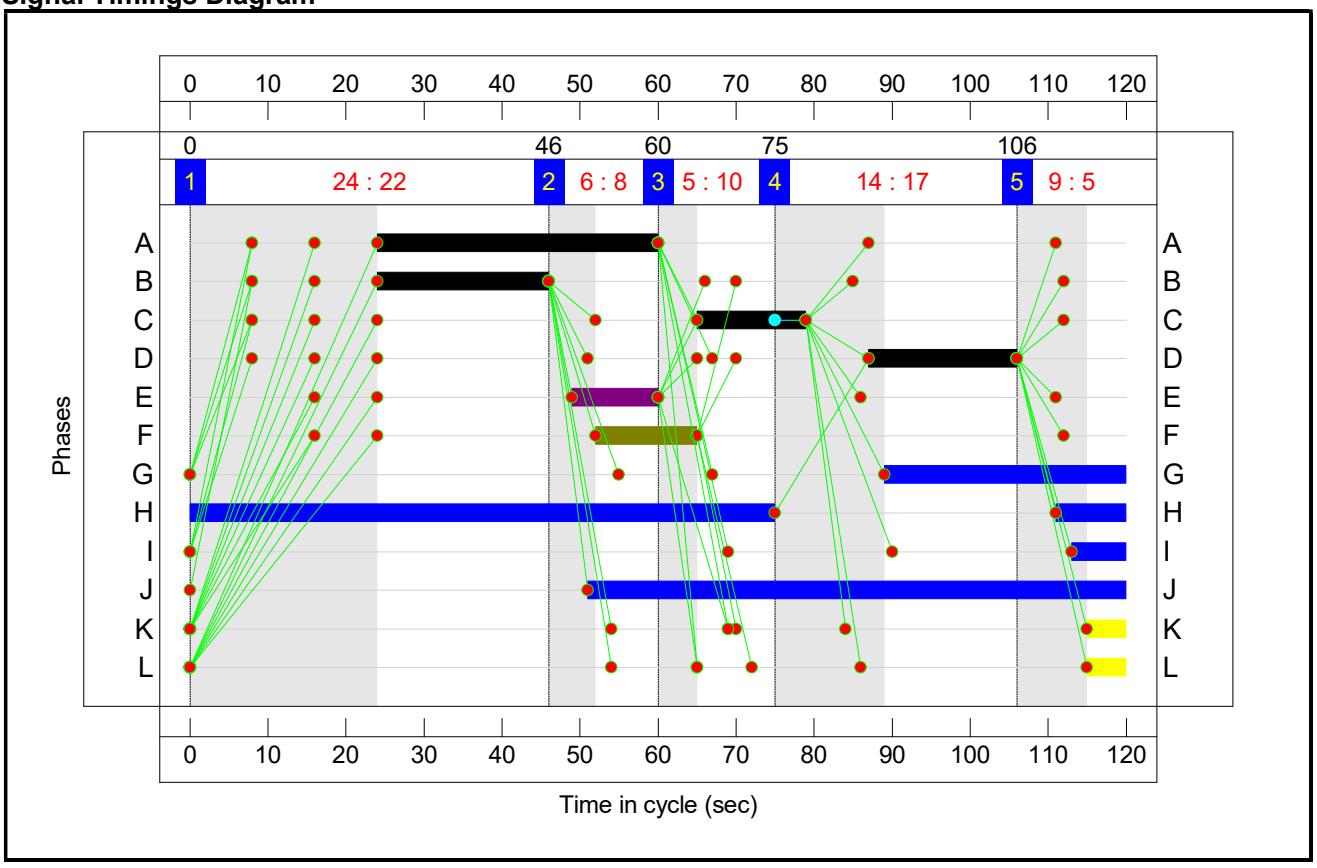
Stage Sequence Diagram



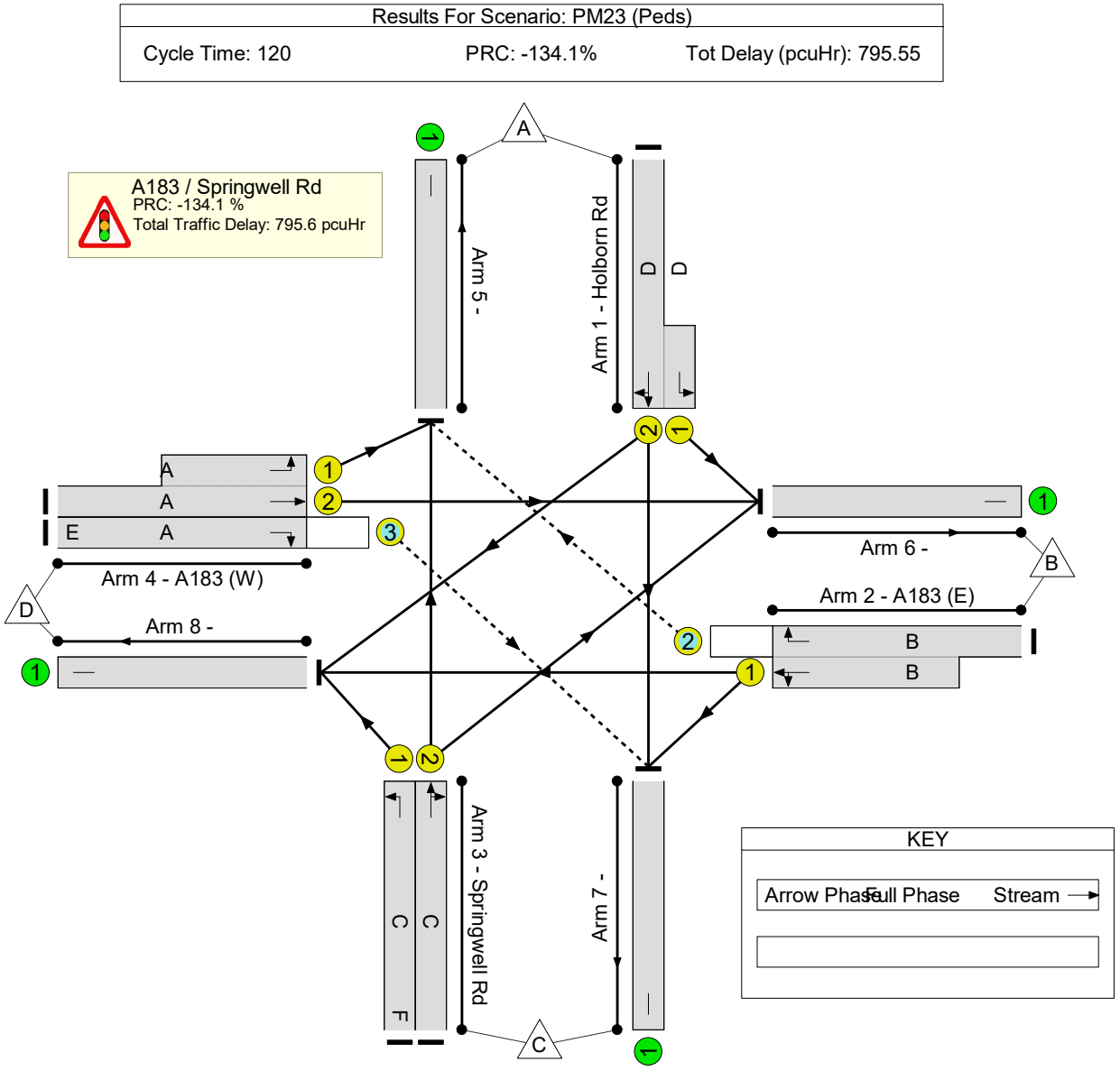
Stage Timings

Stage	1	2	3	4	5
Duration	22	8	10	17	5
Change Point	0	46	60	75	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**210.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**210.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	19	-	708	1921:1819	305+37	207.4 : 207.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	782	1702:1859	23+356	206.3 : 206.3%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	27	13	485	1794	419	115.9%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	14	-	475	1898	237	200.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	36	-	589	1910:1809	528+100	93.7 : 93.7%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	36	11	464	1736	220	210.7%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**20**	**174**	**49**	**123.1**	**671.7**	**0.8**	**795.6**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**20**	**174**	**49**	**123.1**	**671.7**	**0.8**	**795.6**	**-**	**-**	**-**	**-**
1/2+1/1	708	341	-	-	-	33.7	184.3	-	218.0	1108.6	45.4	184.3	229.7
2/2+2/1	782	379	20	0	2	33.2	202.4	0.2	235.9	1085.8	41.3	202.4	243.7
3/1	485	419	-	-	-	9.4	36.5	-	45.9	340.7	18.4	36.5	54.9
3/2	475	237	-	-	-	20.8	119.9	-	140.7	1066.1	26.7	119.9	146.5
4/2+4/1	589	589	-	-	-	6.4	5.8	-	12.2	74.5	17.6	5.8	23.4
4/3	464	220	0	174	47	19.5	122.8	0.6	142.9	1108.9	24.4	122.8	147.2
5/1	298	298	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	588	588	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	742	742	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1

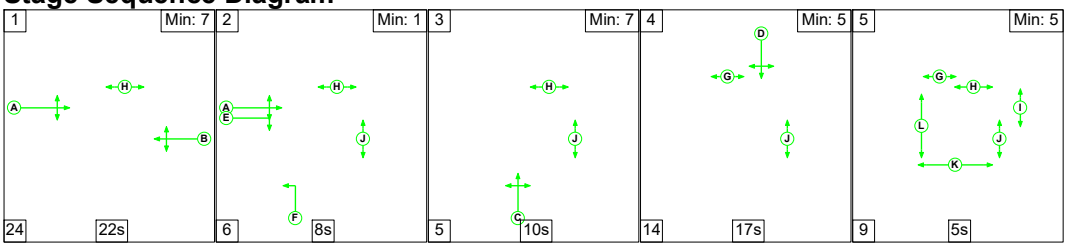
PRC for Signalled Lanes (%): -134.1
PRC Over All Lanes (%): -134.1

Total Delay for Signalled Lanes (pcuHr): 795.55
Total Delay Over All Lanes(pcuHr): 795.55

Cycle Time (s): 120

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

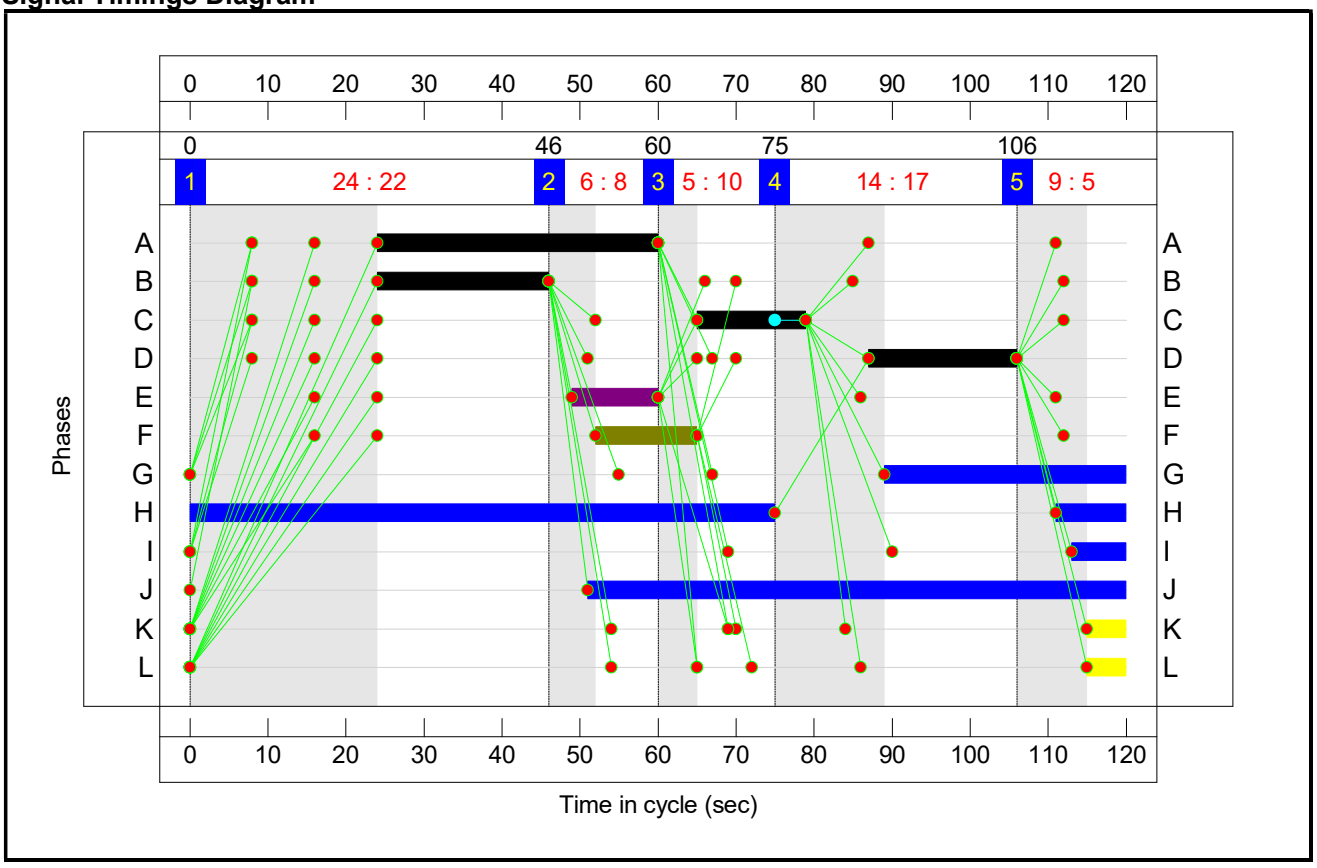
Stage Sequence Diagram



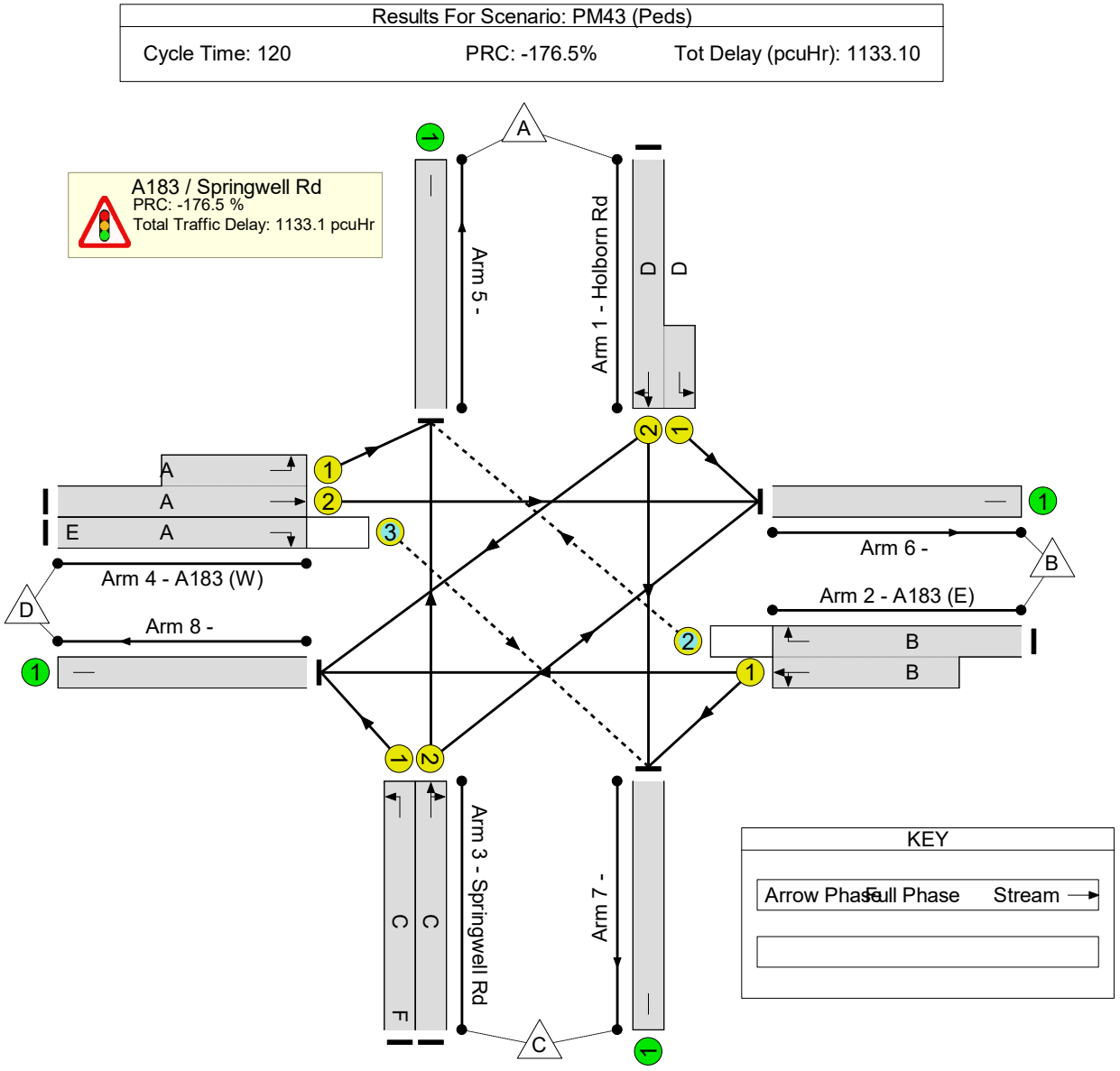
Stage Timings

Stage	1	2	3	4	5
Duration	22	8	10	17	5
Change Point	0	46	60	75	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

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Network Results

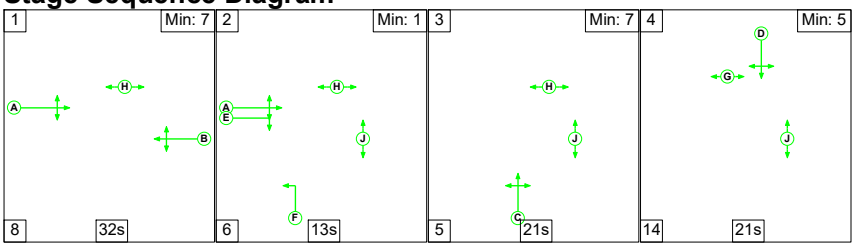
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**248.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**248.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	19	-	836	1921:1819	305+37	244.9 : 244.9%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	923	1702:1859	23+356	243.6 : 243.6%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	27	13	572	1794	419	136.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	14	-	560	1898	237	236.0%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	36	-	695	1910:1809	528+100	110.6 : 110.6%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	36	11	548	1736	220	248.9%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**0**	**174**	**69**	**167.9**	**964.4**	**0.8**	**1133.1**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**174**	**69**	**167.9**	**964.4**	**0.8**	**1133.1**	**-**	**-**	**-**	**-**
1/2+1/1	836	341	-	-	-	44.3	248.2	-	292.5	1259.4	57.8	248.2	306.0
2/2+2/1	923	379	0	0	23	43.1	272.9	0.2	316.2	1233.3	53.4	272.9	326.3
3/1	572	419	-	-	-	14.7	78.5	-	93.2	586.5	24.2	78.5	102.7
3/2	560	237	-	-	-	27.9	162.2	-	190.1	1222.3	34.3	162.2	196.5
4/2+4/1	695	629	-	-	-	11.5	37.8	-	49.3	255.4	25.2	37.8	63.0
4/3	548	220	0	174	47	26.5	164.7	0.6	191.8	1260.2	32.8	164.7	197.5
5/1	304	304	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	621	621	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	557	557	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	742	742	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -176.5 Total Delay for Signalled Lanes (pcuHr): 1133.10 Cycle Time (s): 120
PRC Over All Lanes (%): -176.5 Total Delay Over All Lanes(pcuHr): 1133.10

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

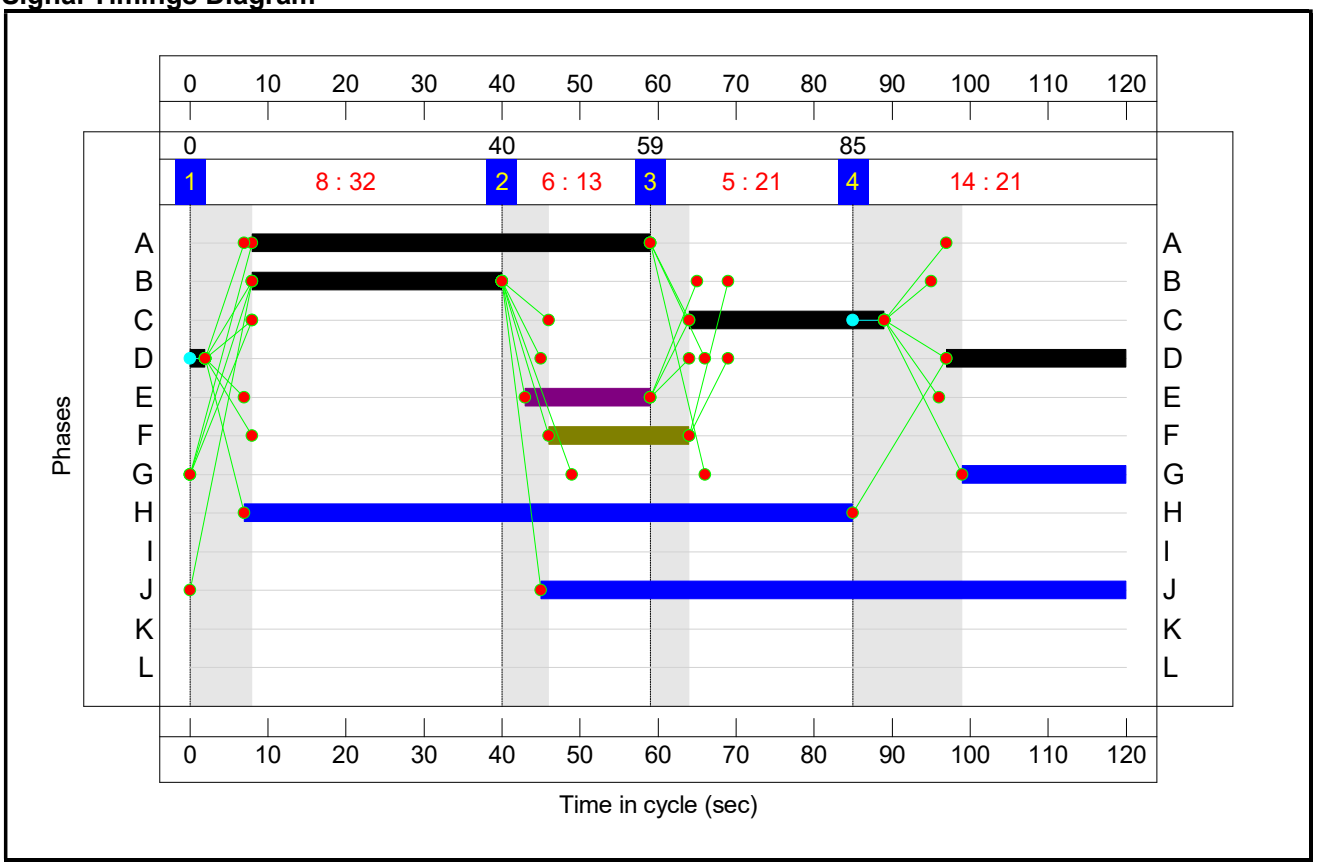
Stage Sequence Diagram



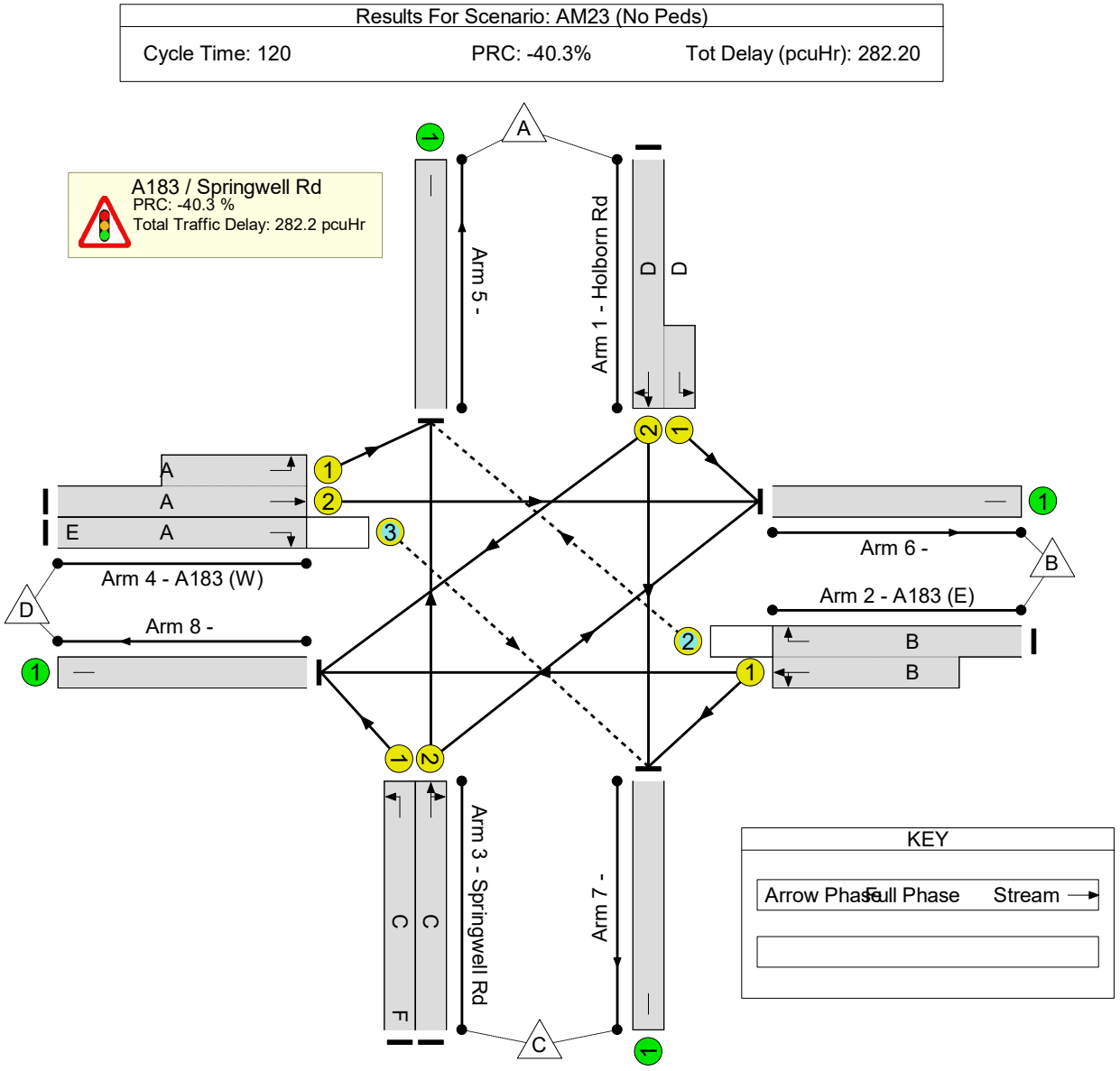
Stage Timings

Stage	1	2	3	4
Duration	32	13	21	21
Change Point	0	40	59	85

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

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Network Results

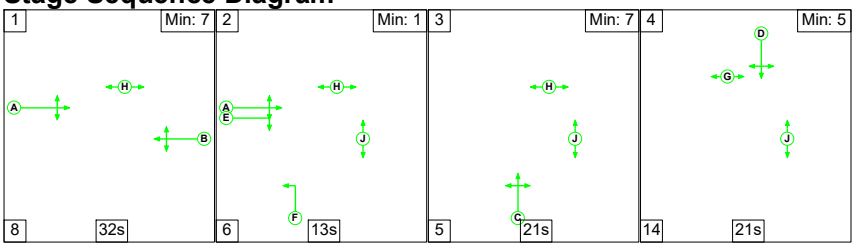
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.2%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.2%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	550	1941:1819	384+60	124.1 : 124.1%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	32	-	679	1702:1877	62+490	123.1 : 123.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	43	18	580	1794	658	88.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	520	1901	412	126.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	661	1910:1809	762+90	77.6 : 77.6%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	51	16	361	1736	293	123.4%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**62**	**246**	**47**	**60.6**	**220.4**	**1.3**	**282.2**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**62**	**246**	**47**	**60.6**	**220.4**	**1.3**	**282.2**	**-**	**-**	**-**	**-**
1/2+1/1	550	443	-	-	-	14.5	55.8	-	70.4	460.6	24.1	55.8	79.9
2/2+2/1	679	551	62	0	0	15.7	66.3	0.5	82.5	437.4	27.3	66.3	93.6
3/1	580	580	-	-	-	5.7	3.4	-	9.2	56.8	18.0	3.4	21.5
3/2	520	412	-	-	-	11.6	56.4	-	68.0	470.8	20.9	56.4	77.3
4/2+4/1	661	661	-	-	-	5.2	1.7	-	6.9	37.4	17.7	1.7	19.4
4/3	361	293	0	246	47	7.8	36.7	0.8	45.3	451.8	14.3	36.7	51.0
5/1	452	452	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	743	743	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	718	718	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1028	1028	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -40.3 Total Delay for Signalled Lanes (pcuHr): 282.20 Cycle Time (s): 120
PRC Over All Lanes (%): -40.3 Total Delay Over All Lanes(pcuHr): 282.20

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

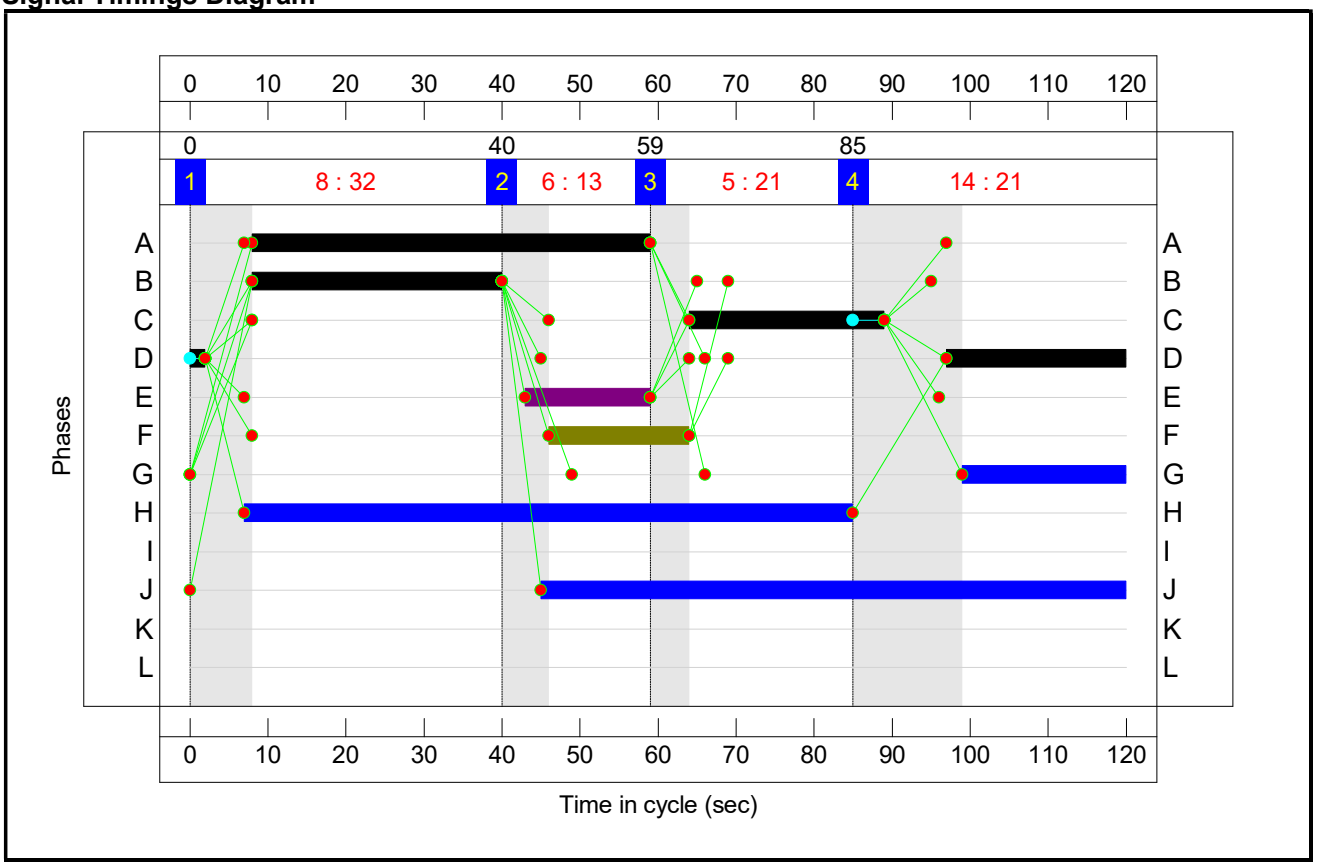
Stage Sequence Diagram



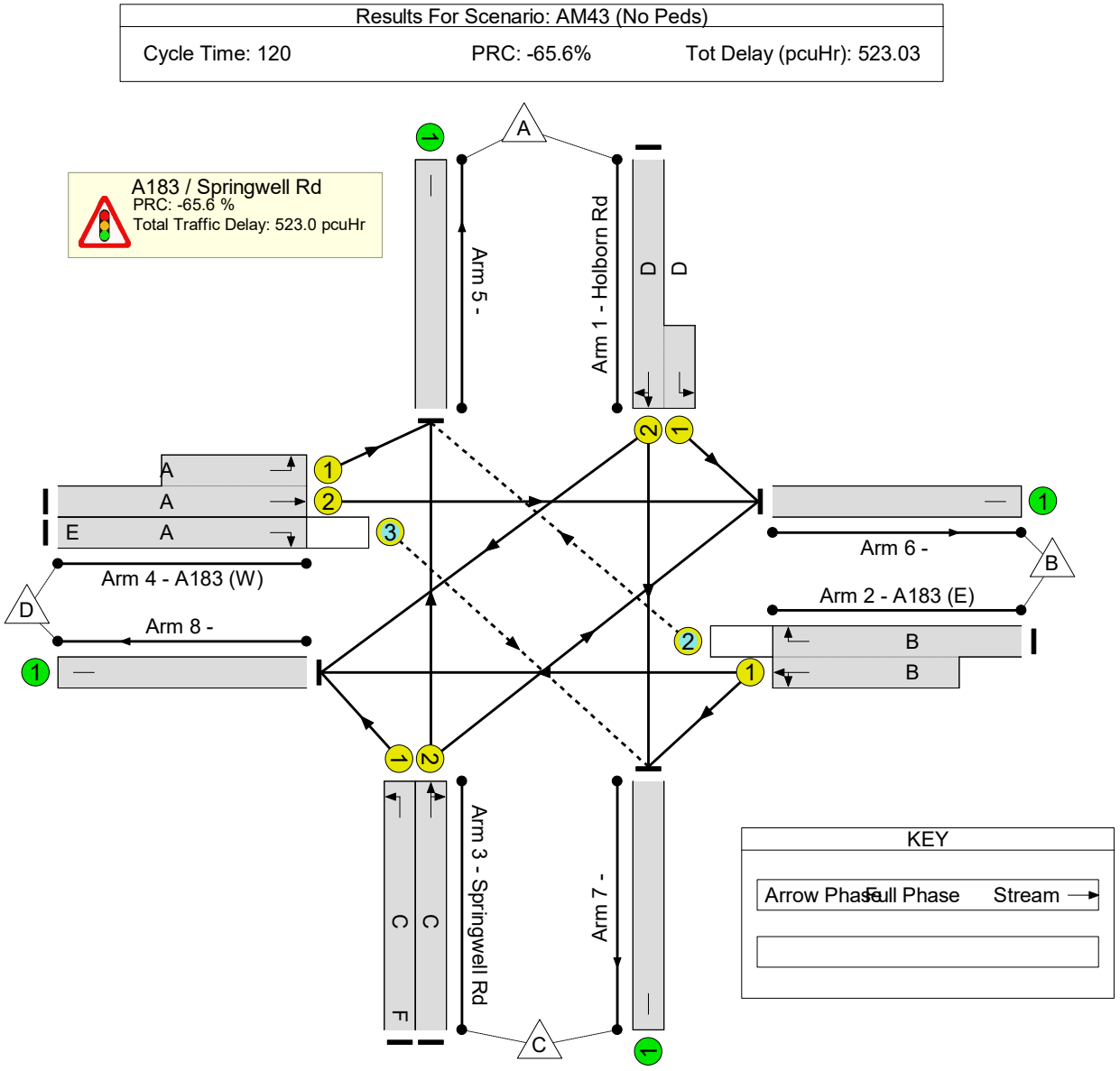
Stage Timings

Stage	1	2	3	4
Duration	32	13	21	21
Change Point	0	40	59	85

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Network Results

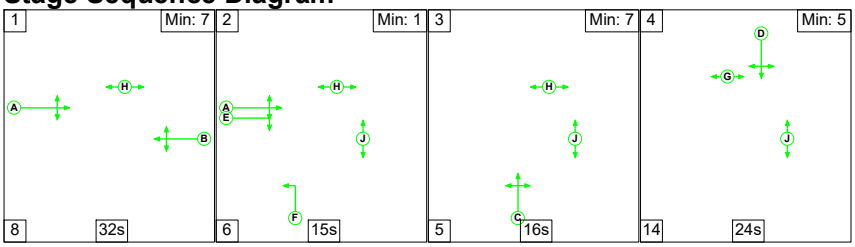
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	649	1941:1819	384+59	146.4 : 146.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	32	-	802	1702:1877	62+490	145.4 : 145.4%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	43	18	684	1794	658	104.0%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	614	1901	412	149.1%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	780	1910:1809	761+91	91.5 : 91.5%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	51	16	426	1736	293	145.6%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**35**	**246**	**73**	**93.5**	**428.1**	**1.5**	**523.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**35**	**246**	**73**	**93.5**	**428.1**	**1.5**	**523.0**	**-**	**-**	**-**	**-**
1/2+1/1	649	443	-	-	-	22.7	104.5	-	127.1	705.1	33.8	104.5	138.3
2/2+2/1	802	552	35	0	26	24.5	126.8	0.7	151.9	682.1	35.7	126.8	162.5
3/1	684	658	-	-	-	8.5	21.2	-	29.6	156.0	23.7	21.2	44.8
3/2	614	412	-	-	-	19.0	102.6	-	121.6	713.0	29.2	102.6	131.7
4/2+4/1	780	780	-	-	-	6.7	4.8	-	11.5	53.1	23.4	4.8	28.2
4/3	426	293	0	246	47	12.1	68.3	0.8	81.2	686.3	18.6	68.3	86.9
5/1	465	465	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	848	848	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	718	718	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1106	1106	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -65.6 Total Delay for Signalled Lanes (pcuHr): 523.03 Cycle Time (s): 120
PRC Over All Lanes (%): -65.6 Total Delay Over All Lanes(pcuHr): 523.03

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

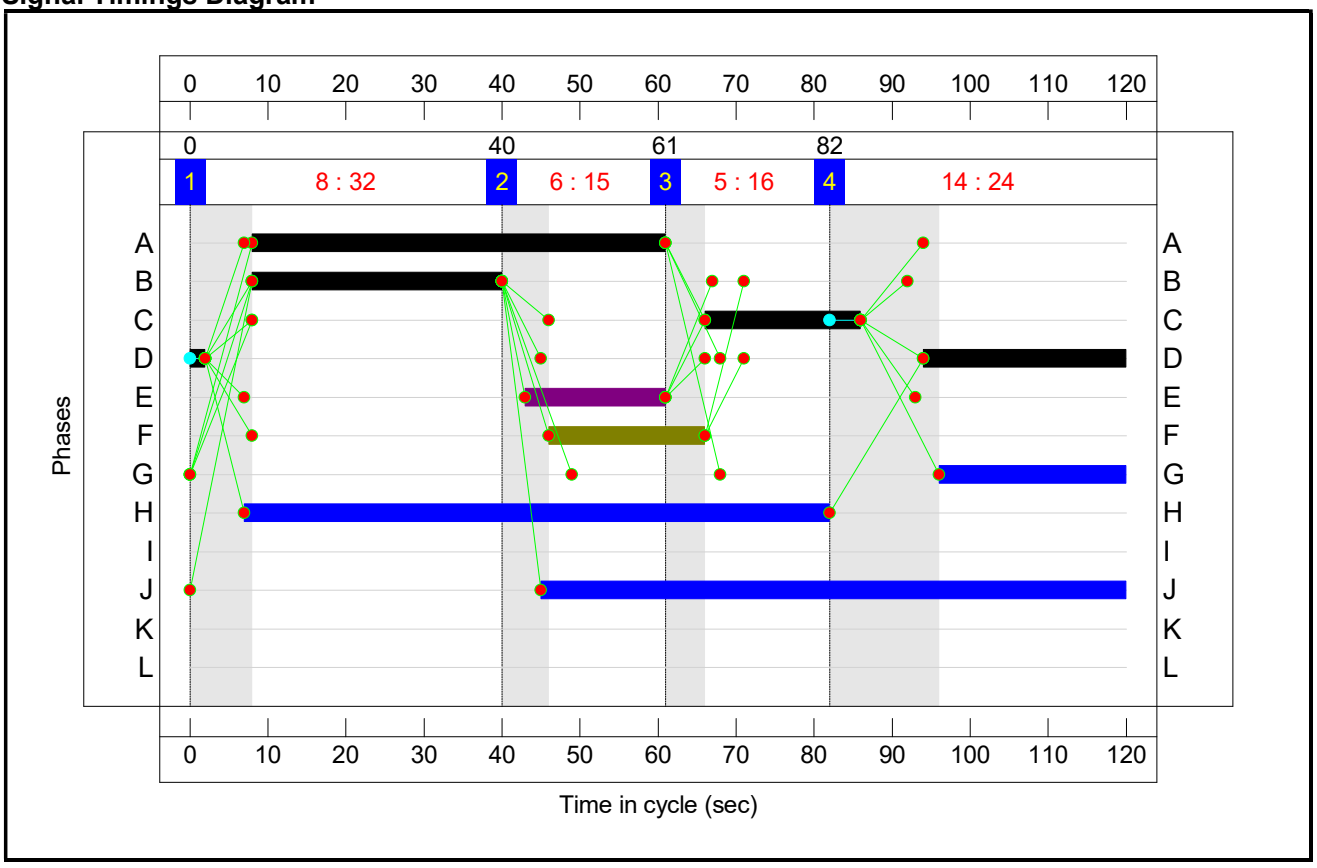
Stage Sequence Diagram



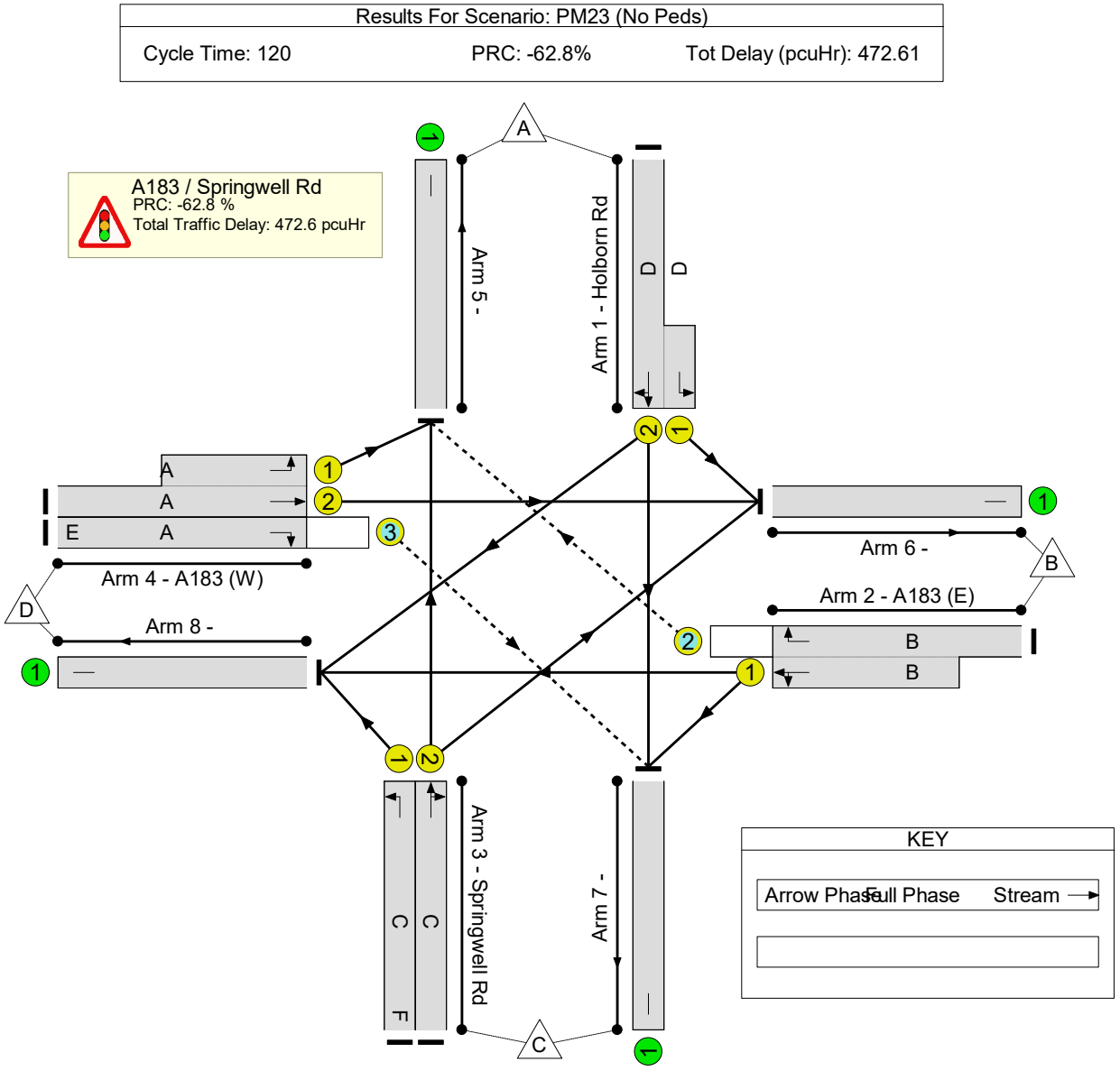
Stage Timings

Stage	1	2	3	4
Duration	32	15	16	24
Change Point	0	40	61	82

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Intergreens after pedestrians set to be equal to the fixed intergreen required to safetly allow peds to cross the road if they start crossing at the end of the green man. This required very long intergreens, especially due to the crossing length on the west. Pedestrian minimums set to 5 seconds, assuming nearside displays. Although longer minimums might be desireable due to length of the crossings?

Network Results

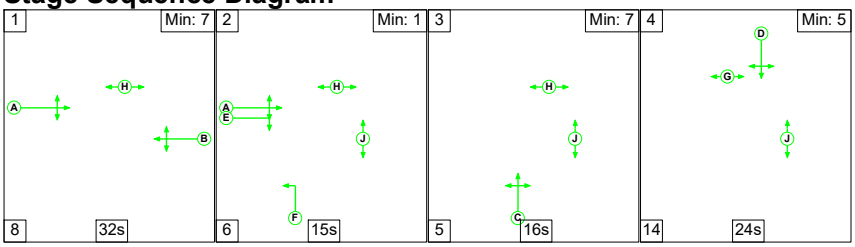
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**146.5%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**146.5%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	28	-	708	1921:1819	432+52	146.1 : 146.1%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	32	-	782	1702:1859	32+502	146.5 : 146.5%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	40	20	485	1794	613	79.1%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	20	-	475	1898	332	143.0%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	53	-	589	1910:1809	754+143	65.7 : 65.7%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	53	18	464	1736	321	144.3%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**32**	**275**	**47**	**84.0**	**387.7**	**1.0**	**472.6**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**32**	**275**	**47**	**84.0**	**387.7**	**1.0**	**472.6**	**-**	**-**	**-**	**-**
1/2+1/1	708	485	-	-	-	24.4	113.3	-	137.7	700.4	37.0	113.3	150.3
2/2+2/1	782	534	32	0	0	24.2	125.7	0.1	150.0	690.5	35.5	125.7	161.2
3/1	485	485	-	-	-	4.8	1.8	-	6.6	49.3	14.5	1.8	16.4
3/2	475	332	-	-	-	13.6	73.1	-	86.7	657.0	21.3	73.1	94.3
4/2+4/1	589	589	-	-	-	4.0	1.0	-	5.0	30.3	13.6	1.0	14.5
4/3	464	321	0	275	47	12.9	72.9	0.8	86.6	672.0	20.2	72.9	93.1
5/1	380	380	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	625	625	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	799	799	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	942	942	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -62.8 Total Delay for Signalled Lanes (pcuHr): 472.61 Cycle Time (s): 120
PRC Over All Lanes (%): -62.8 Total Delay Over All Lanes(pcuHr): 472.61

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

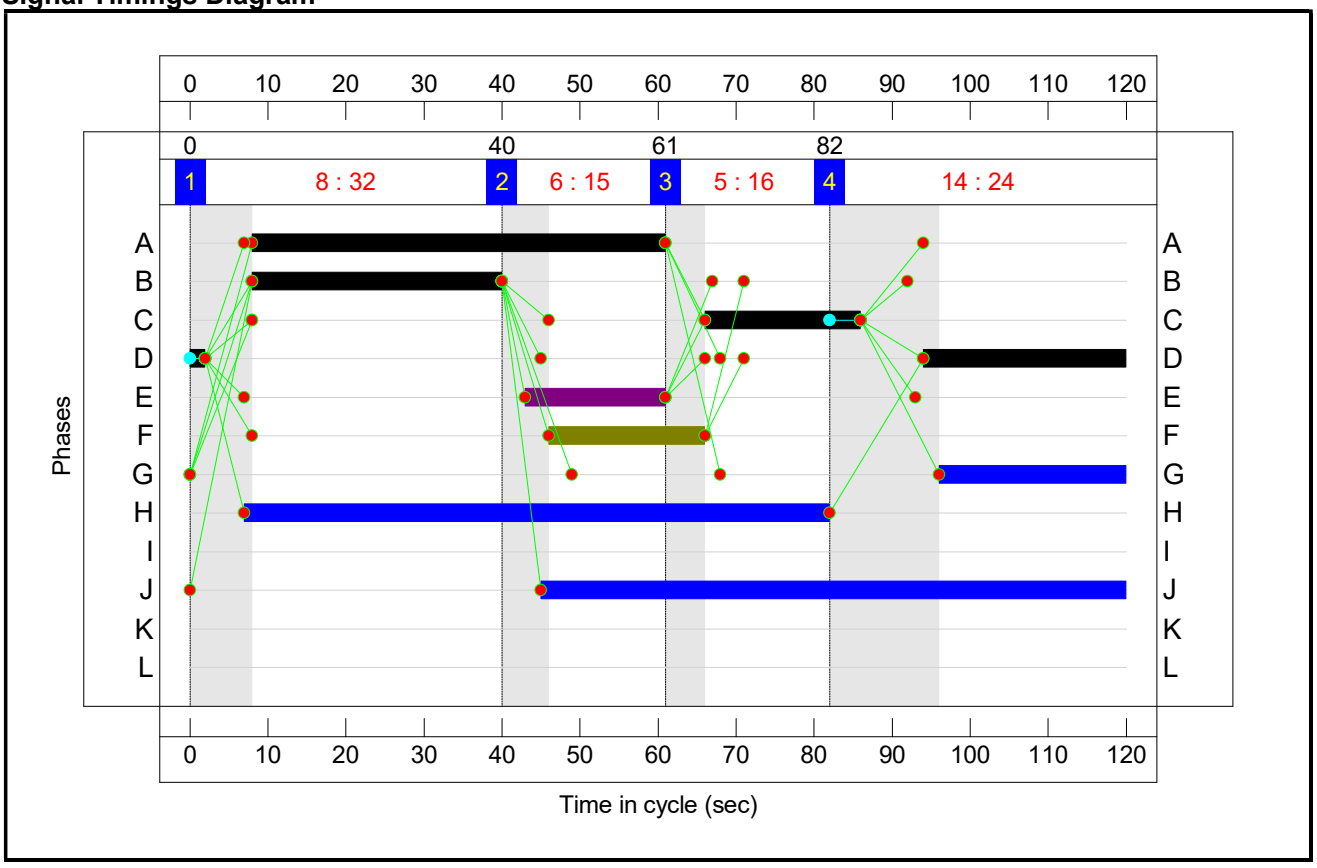
Stage Sequence Diagram



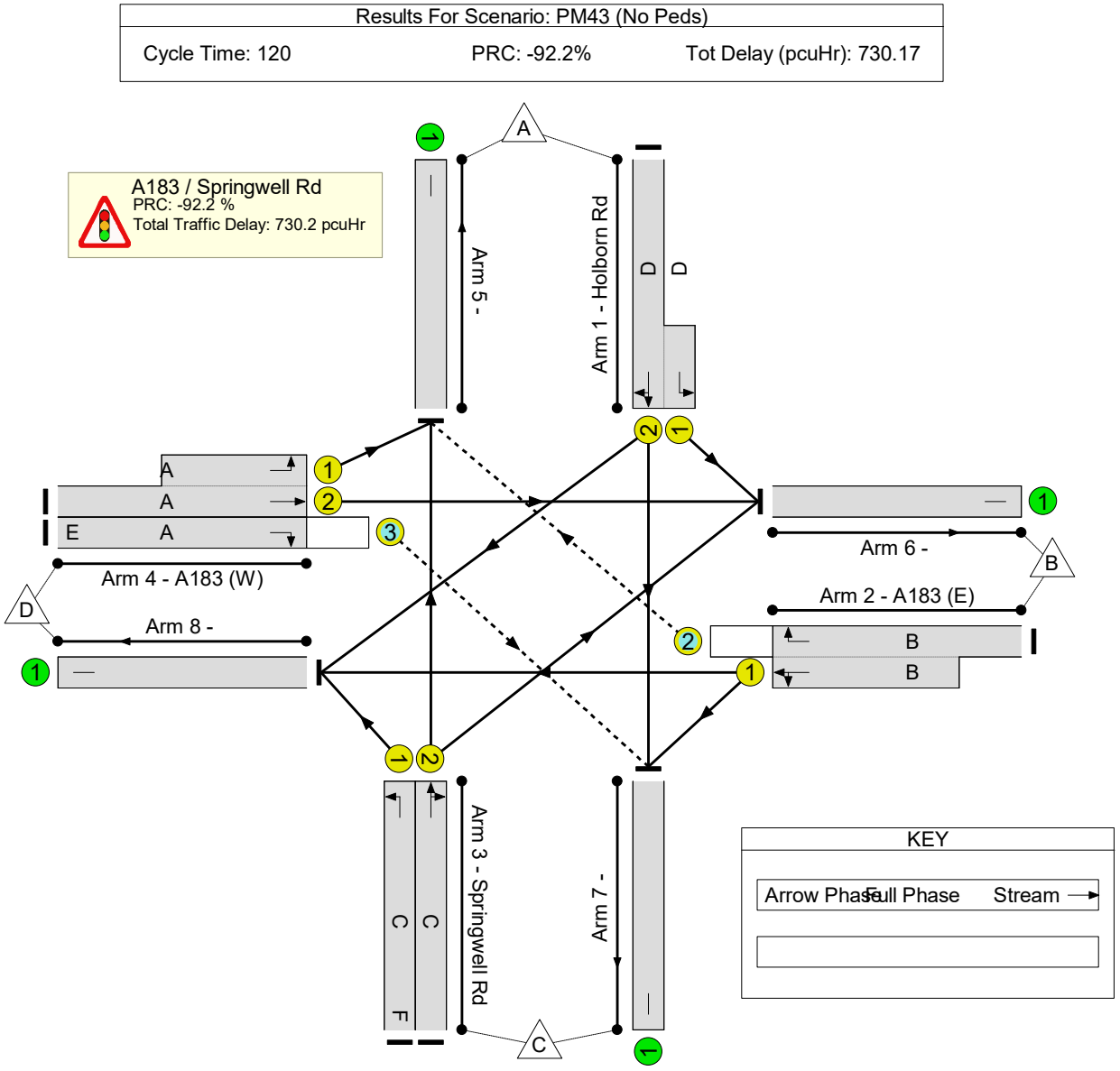
Stage Timings

Stage	1	2	3	4
Duration	32	15	16	24
Change Point	0	40	61	82

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

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Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option B	-	-	**N/A**	-	-		-	-	-	-	-	-	**173.0%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**173.0%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	28	-	836	1921:1819	432+52	172.5 : 172.5%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	32	-	923	1702:1859	32+502	173.0 : 173.0%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	40	20	572	1794	613	93.3%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	20	-	560	1898	332	168.6%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	53	-	695	1910:1809	754+143	77.5 : 77.5%
4/3	A183 (W) Right	O	N/A	N/A	A	E	1	53	18	548	1736	321	170.5%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option B	**-**	**-**	**32**	**275**	**47**	**119.6**	**609.6**	**1.0**	**730.2**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**32**	**275**	**47**	**119.6**	**609.6**	**1.0**	**730.2**	**-**	**-**	**-**	**-**
1/2+1/1	836	485	-	-	-	34.9	176.9	-	211.8	912.2	49.7	176.9	226.6
2/2+2/1	923	534	32	0	0	34.3	195.9	0.2	230.3	898.4	45.2	195.9	241.1
3/1	572	572	-	-	-	6.1	5.5	-	11.6	72.8	18.3	5.5	23.8
3/2	560	332	-	-	-	20.7	115.1	-	135.9	873.4	29.0	115.1	144.2
4/2+4/1	695	695	-	-	-	5.1	1.7	-	6.8	35.3	17.8	1.7	19.5
4/3	548	321	0	275	47	18.5	114.5	0.8	133.7	878.5	25.8	114.5	140.3
5/1	397	397	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	714	714	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	798	798	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1029	1029	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -92.2 Total Delay for Signalled Lanes (pcuHr): 730.17 Cycle Time (s): 120
PRC Over All Lanes (%): -92.2 Total Delay Over All Lanes(pcuHr): 730.17

Appendix G

Intergreens

Option D

quickGreen Report

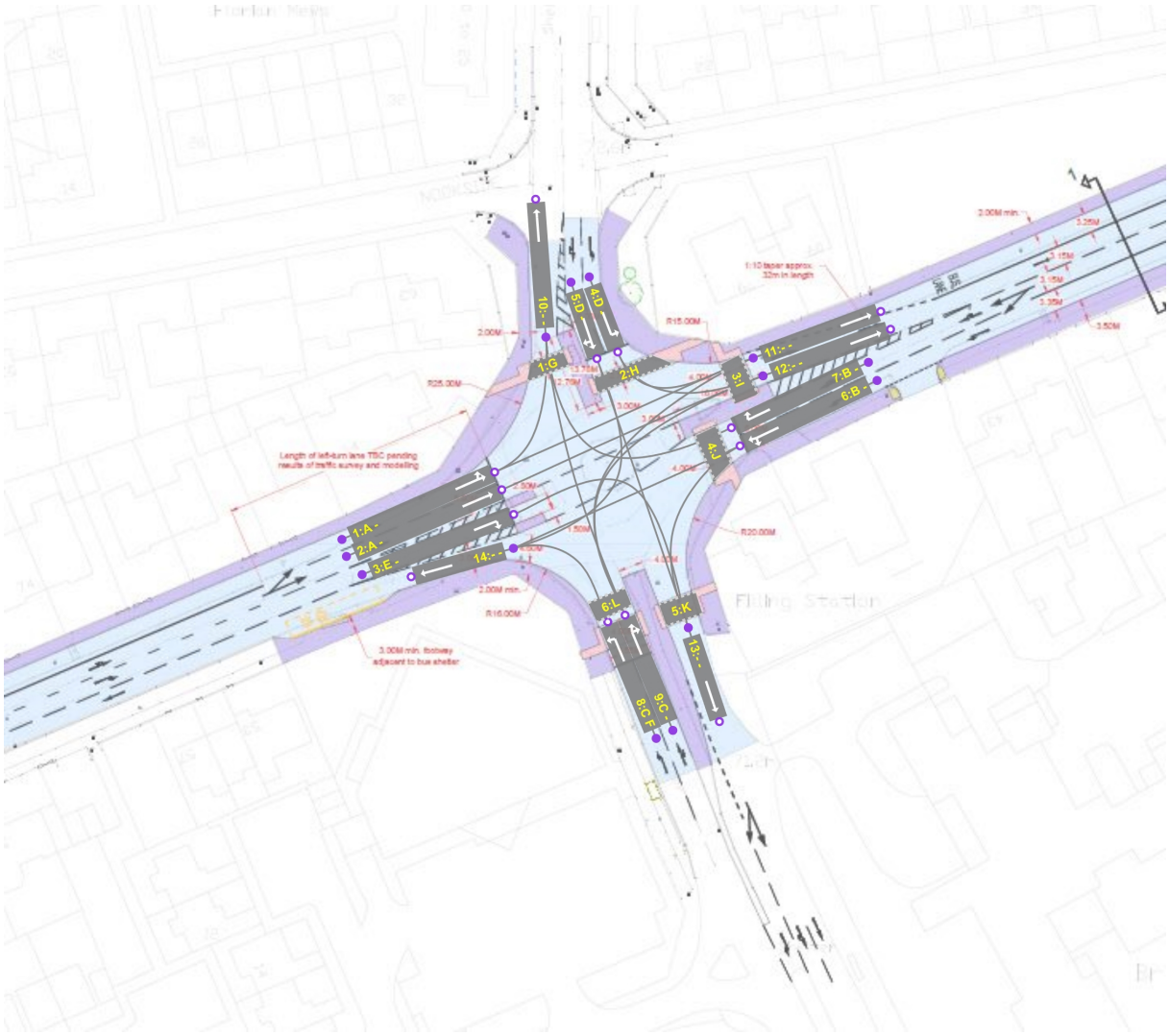
Project: 23014 Springwell Rd
Title: Option D

File Name:	Springwell Rd Option D IGs.qgn
Location:	Sunderland
Designer:	Simon Swanston
Organisation:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

http://www.jctconsultancy.co.uk

Title: Option D

Junction Diagram



Notes

This model does not have notes

Lane Details

Lane	Width (m)	Controlling Phase	Controlling Arrow Phase	ASL Length (m)	Number of Turning Movements	Adjusted Turning Movements
1	3.00	A			2	0 of 2
2	3.00	A			1	0 of 1
3	3.00	E			1	0 of 1
4	3.00	D			2	0 of 2
5	3.00	D			2	0 of 2
6	3.00	B			2	0 of 2
7	3.00	B			1	0 of 1
8	3.00	C	F		1	0 of 1
9	3.00	C			3	0 of 3

Turning Movement Details

Turning Movement	Turning Movement Adjustment (s)	Always Apply Turning Movement Adjustment?	Is this turn controlled by the upstream lane's arrow phase? (If set)
1 => 10	0	Only if conf. dist > 0	N/A
1 => 11	0	Only if conf. dist > 0	N/A
2 => 12	0	Only if conf. dist > 0	N/A
4 => 11	0	Only if conf. dist > 0	N/A
4 => 12	0	Only if conf. dist > 0	N/A
5 => 13	0	Only if conf. dist > 0	N/A
5 => 14	0	Only if conf. dist > 0	N/A
6 => 13	0	Only if conf. dist > 0	N/A
6 => 14	0	Only if conf. dist > 0	N/A
7 => 10	0	Only if conf. dist > 0	N/A
8 => 14	0	Only if conf. dist > 0	Yes
9 => 10	0	Only if conf. dist > 0	N/A
9 => 11	0	Only if conf. dist > 0	N/A
9 => 12	0	Only if conf. dist > 0	N/A
3 => 13	0	Only if conf. dist > 0	N/A

Pedestrian Crossings

Crossing	Controlling Phase	Walk Speed (m/s)	Walk Distance (m)	Walk Time (s)	Additional Clearance Time (s)	Terminating Intergreen (s)	Traffic-Ped Conflict Point
P1	G	1.20	6.42	5.35	2.00	7.35	Worst-case stud line
P2	H	1.20	11.76	9.80	2.00	11.80	Worst-case stud line
P3	I	1.20	6.99	5.83	2.00	7.83	Worst-case stud line
P4	J	1.20	7.11	5.93	2.00	7.93	Worst-case stud line
P5	K	1.20	6.27	5.23	2.00	7.23	Worst-case stud line
P6	L	1.20	6.41	5.34	2.00	7.34	Worst-case stud line

* = Manual override of graphical distance

Traffic Signal Phases

Phase Name	Type	Lanes Controlled
A	3 Aspect Traffic	1, 2
B	3 Aspect Traffic	6, 7
C	3 Aspect Traffic	8, 9
D	3 Aspect Traffic	4, 5
E	3 Aspect Traffic	3
F	Filter	8
G	Pedestrian	1
H	Pedestrian	2
I	Pedestrian	3
J	Pedestrian	4
K	Pedestrian	5
L	Pedestrian	6

Lane Conflict Distances

Lane Conflict Distances (m)										
		Starting Lane								
		1	2	3	4	5	6	7	8	9
Stopping Lane	1	-	-	-	20.53	11.75	-	-12.14	-	-9.39
	2	-	-	-	19.80	8.58	-	-7.54	-	-8.33
	3	-	-	-	-	-0.44	11.62	-	-	-7.43
	4	-20.25	-19.80	-	-	-	-	-	-	-28.13
	5	-11.73	-8.07	2.58	-	-	12.03	-0.15	19.04	10.67
	6	-	-	-3.84	-	-0.64	-	-	18.34	10.09
	7	18.94	7.54	-	-	2.03	-	-	-	-3.28
	8	-	-	-	-	-19.04	-18.34	-	-	-
	9	22.23	15.03	11.37	29.92	15.51	-8.23	8.71	-	-

Traffic/Pedestrian Conflict Distances

Traffic/Pedestrian Conflict Distances (m)							
		Starting Pedestrian Crossing					
		P1	P2	P3	P4	P5	P6
Stopping Lane	1	22.64	-	45.10	-	-	-
	2	-	-	45.24	-	-	-
	3	-	-	-	-	45.25	-
	4	-	5.82	25.44	-	-	-
	5	-	5.80	-	-	45.70	-
	6	-	-	-	6.83	33.67	-
	7	41.64	-	-	6.57	-	-
	8	-	-	-	-	-	4.65
	9	44.92	-	54.49	-	-	4.71

Title: Option D

Phase Intergreen Matrix

Phase Intergreens (s)													
		Starting Phase											
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Terminating Phase	**A**	-	Opp	5	7	-	-	7	-	9	-	-	-
	B	Opp	-	**7**	5	5	**7**	9	-	-	5	8	-
	C	7	**5**	-	8	6	-	9	-	10	-	-	5
	D	5	6	7	-	5	7	-	5	7	-	**9**	-
	E	-	6	5	5	-	-	-	-	-	-	9	-
	F	-	5	-	5	-	-	-	-	-	-	-	5
	G	8	8	8	-	-	-	-	-	-	-	-	-
	H	-	-	-	12	-	-	-	-	-	-	-	-
	I	8	-	8	8	-	-	-	-	-	-	-	-
	J	-	8	-	-	-	-	-	-	-	-	-	-
	K	-	8	-	8	8	-	-	-	-	-	-	-
	L	-	-	8	-	-	8	-	-	-	-	-	-

Opp = Phases Oppose, FNC = Force No Conflict, +/- = Intergreen Adjusted or Custom Set, Bold = Is Close to Intergreen Boundary,
* = Notes Added

Additional Phase Intergreen Detail

Phases	Type	Unadjusted Value	Adjusted Value	Notes
A => B	Phases Oppose	5	-	
B => A	Phases Oppose	7	-	

Audit Log Records

This model does not have any audit records

Appendix H

LinSig Data

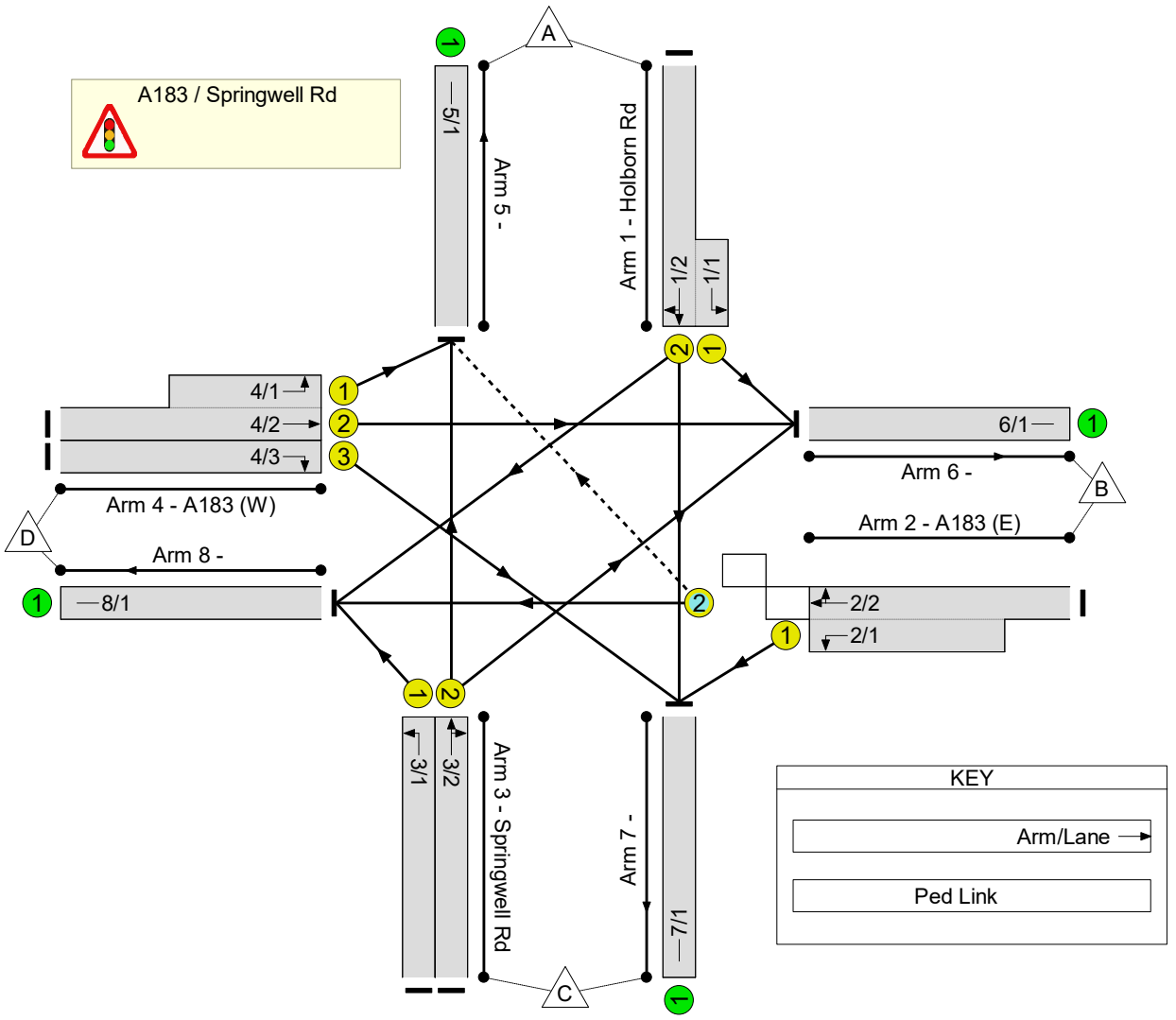
Option D

Springwell Rd Option D LinSig Data

User and Project Details

Project:	**23014 Springwell Rd**
Title:	**Option D**
Location:	Sunderland
Client:	Sunderland City Council
Design Layout Ref:	CRSR-SCC-GEN-Z0-SK-Z-SK_010-S4 Rev P01 (SCC)
Date Started:	6/07/23
Model Purpose:	Test performance of proposal
Additional detail:	
File name:	Springwell Rd Option D.lsg3x
Author:	Simon Swanston
Company:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

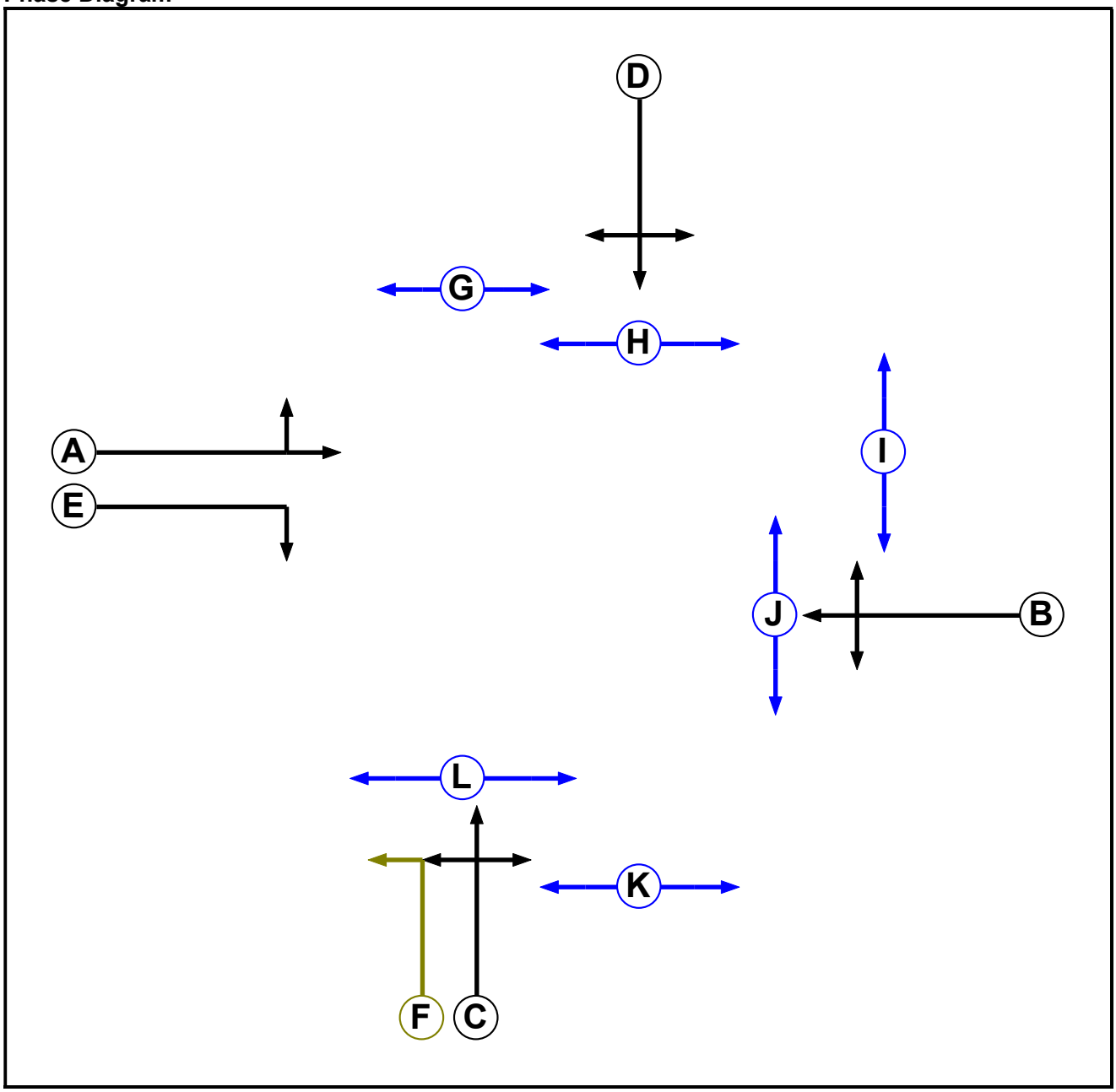
Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Filter	C	4	0
G	Pedestrian		5	5
H	Pedestrian		5	5
I	Pedestrian		5	5
J	Pedestrian		5	5
K	Pedestrian		5	5
L	Pedestrian		5	5

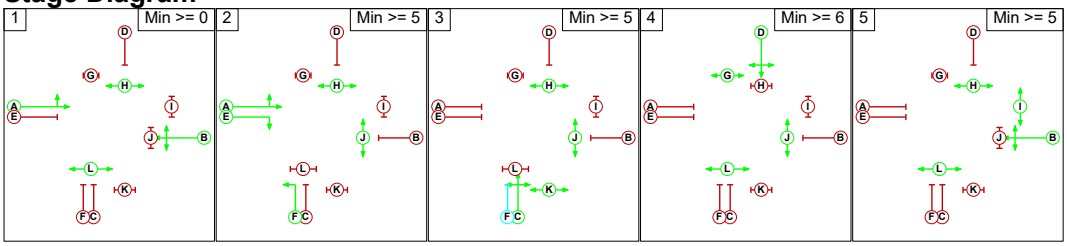
Phase Intergreens Matrix

		Starting Phase											
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		-	5	7	-	-	7	-	9	-	-	-
	B	-		7	5	5	7	9	-	-	5	8	-
	C	7	5		8	6	-	9	-	10	-	-	5
	D	5	6	7		5	7	-	5	7	-	9	-
	E	-	6	5	5		-	-	-	-	-	9	-
	F	-	5	-	5	-		-	-	-	-	-	5
	G	8	8	8	-	-	-		-	-	-	-	-
	H	-	-	-	12	-	-	-		-	-	-	-
	I	8	-	8	8	-	-	-	-		-	-	-
	J	-	8	-	-	-	-	-	-	-		-	-
	K	-	8	-	8	8	-	-	-	-	-		-
	L	-	-	8	-	-	8	-	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B H L
2	A E F H J
3	C H J K
4	D G J L
5	B H I L

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	2	B	Losing	1	1
3	4	C	Losing	4	4
4	1	D	Losing	2	2
4	5	D	Losing	2	2

Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1		8	8	12	9
	2	X		9	X	X
	3	8	8		13	10
	4	8	8	9		9
	5	8	8	8	12	

Give-Way Lane Input Data

Junction: A183 / Springwell Rd											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/2 (A183 (E))	5/1 (Right)	1439	0	4/1	1.09	All	4.00	2.00	0.50	4	4.00
				4/2	1.09	All					

Lane Input Data

Junction: A183 / Springwell Rd												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Holborn Rd)	U	D	2	3	4.0	Geom	-	3.00	0.00	Y	Arm 6 Left	17.00
1/2 (Holborn Rd)	U	D	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 7 Ahead	Inf
											Arm 8 Right	20.00
2/1 (A183 (E))	U	B	2	3	9.0	Geom	-	3.00	0.00	Y	Arm 7 Left	22.00
2/2 (A183 (E))	O	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	12.00
											Arm 8 Ahead	Inf
3/1 (Springwell Rd)	U	C F	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 8 Left	18.00
3/2 (Springwell Rd)	U	C	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	15.00
4/1 (A183 (W))	U	A	2	3	7.0	Geom	-	2.95	0.00	Y	Arm 5 Left	27.00
4/2 (A183 (W))	U	A	2	3	60.0	Geom	-	2.95	0.00	Y	Arm 6 Ahead	Inf
4/3 (A183 (W))	U	E	2	3	60.0	Geom	-	2.80	0.00	Y	Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM 2023'	07:30	08:30	01:00	
2: 'AM 2043'	07:30	08:30	01:00	F1*1.18
3: 'PM 2023'	16:30	17:30	01:00	
4: 'PM 2043'	16:30	17:30	01:00	F3*1.18

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 1: AM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	74
1/2 (with short)	550(In) 476(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1877	1877
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 2: AM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	87
1/2 (with short)	649(In) 562(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1877	1877
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 3: PM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	76
1/2 (with short)	708(In) 632(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	58.9 %	1858	1858
				Arm 8 Right	20.00	41.1 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 4: PM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	90
1/2 (with short)	836(In) 746(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	58.8 %	1858	1858
				Arm 8 Right	20.00	41.2 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 5: AM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	74
1/2 (with short)	550(In) 476(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1877	1877
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 6: AM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	87
1/2 (with short)	649(In) 562(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	73.1 %	1877	1877
				Arm 8 Right	20.00	26.9 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 7: PM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	76
1/2 (with short)	708(In) 632(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	58.9 %	1858	1858
				Arm 8 Right	20.00	41.1 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

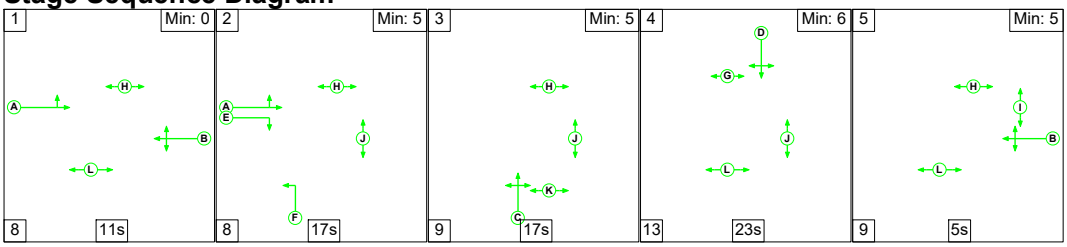
Lane	Scenario 8: PM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	90
1/2 (with short)	836(In) 746(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	100.0 %	1760	1760
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	58.8 %	1858	1858
				Arm 8 Right	20.00	41.2 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

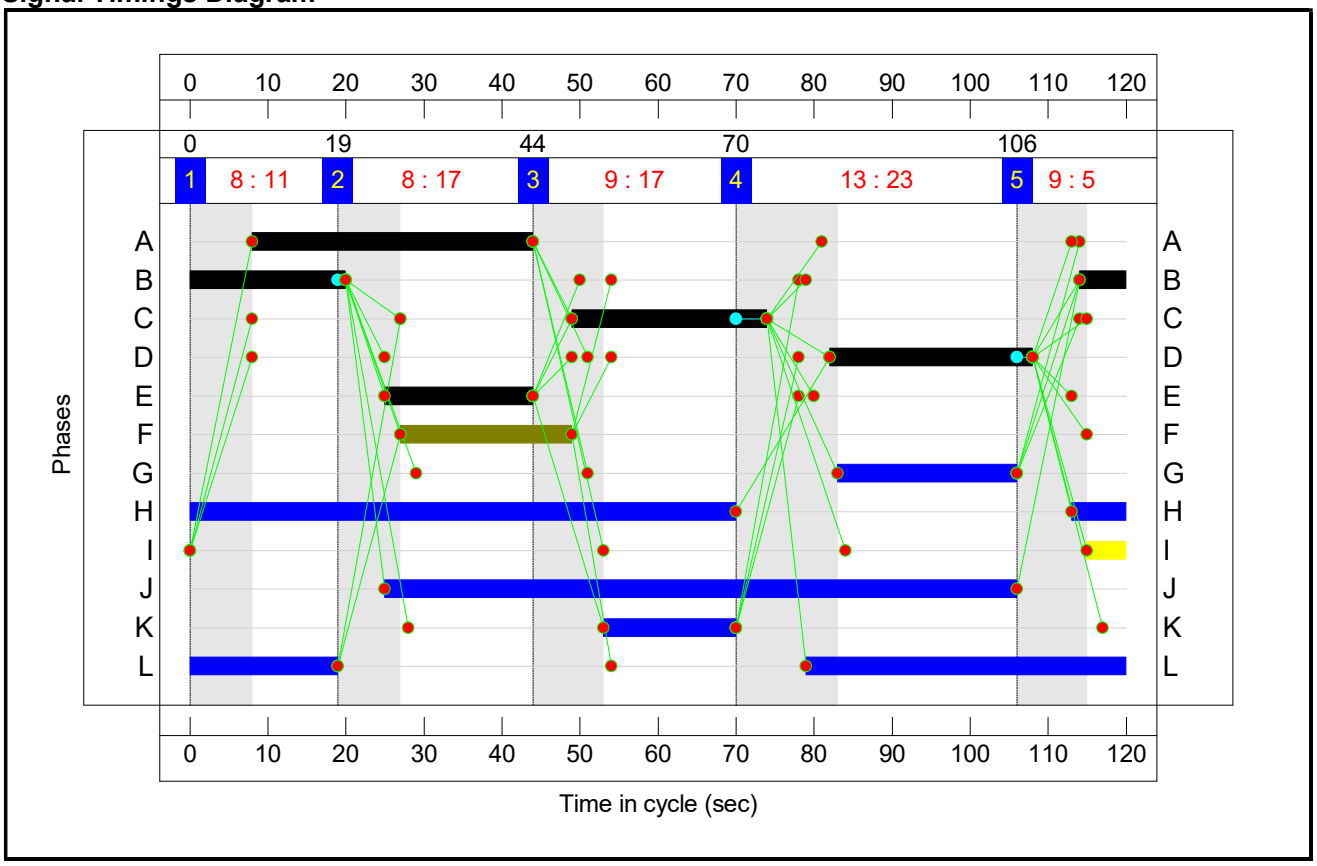
Stage Sequence Diagram



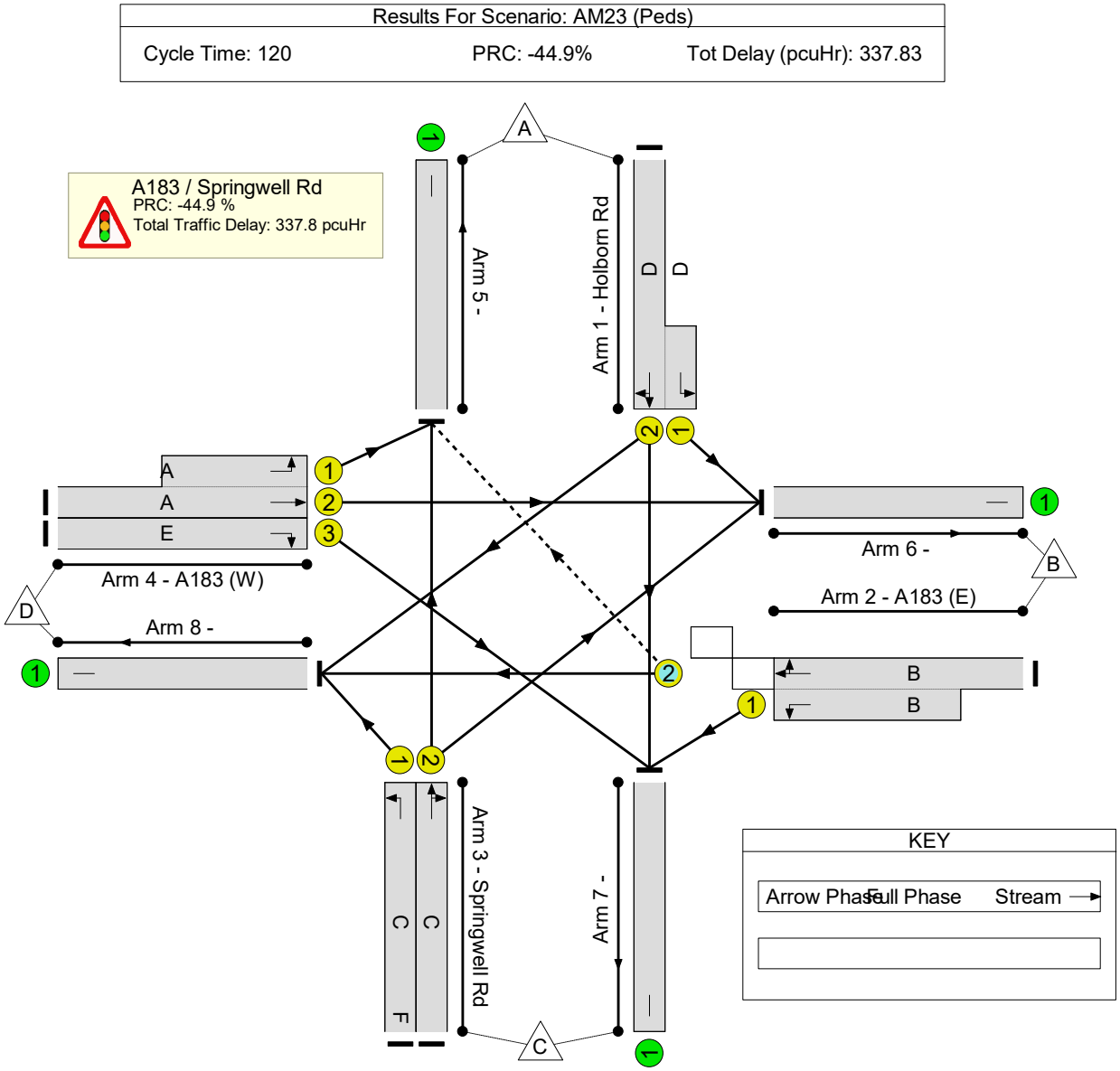
Stage Timings

Stage	1	2	3	4	5
Duration	11	17	17	23	5
Change Point	0	19	44	70	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

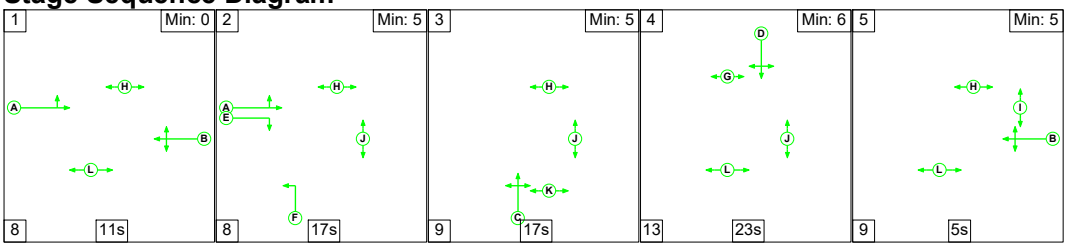
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.4%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.4%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	550	1877:1760	375+58	127.0 : 127.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	679	1879:1793	384+136	130.4 : 130.4%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	580	1794	718	80.8%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	520	1901	412	126.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	36	-	661	1910:1809	550+65	107.5 : 107.5%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	361	1723	287	125.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**0**	**22**	**36**	**69.0**	**268.5**	**0.3**	**337.8**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**22**	**36**	**69.0**	**268.5**	**0.3**	**337.8**	**-**	**-**	**-**	**-**
1/2+1/1	550	433	-	-	-	13.6	60.7	-	74.2	486.0	24.1	60.7	84.8
2/2+2/1	679	521	0	22	36	18.7	81.3	0.3	100.4	532.2	26.2	81.3	107.5
3/1	580	580	-	-	-	5.1	2.0	-	7.2	44.6	17.1	2.0	19.1
3/2	520	412	-	-	-	12.1	56.4	-	68.5	473.9	20.9	56.4	77.3
4/2+4/1	661	615	-	-	-	10.3	28.9	-	39.2	213.3	23.9	28.9	52.8
4/3	361	287	-	-	-	9.2	39.2	-	48.4	482.7	14.5	39.2	53.7
5/1	443	443	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	700	700	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	698	698	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1007	1007	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -44.9 Total Delay for Signalled Lanes (pcuHr): 337.83 Cycle Time (s): 120
PRC Over All Lanes (%): -44.9 Total Delay Over All Lanes(pcuHr): 337.83

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

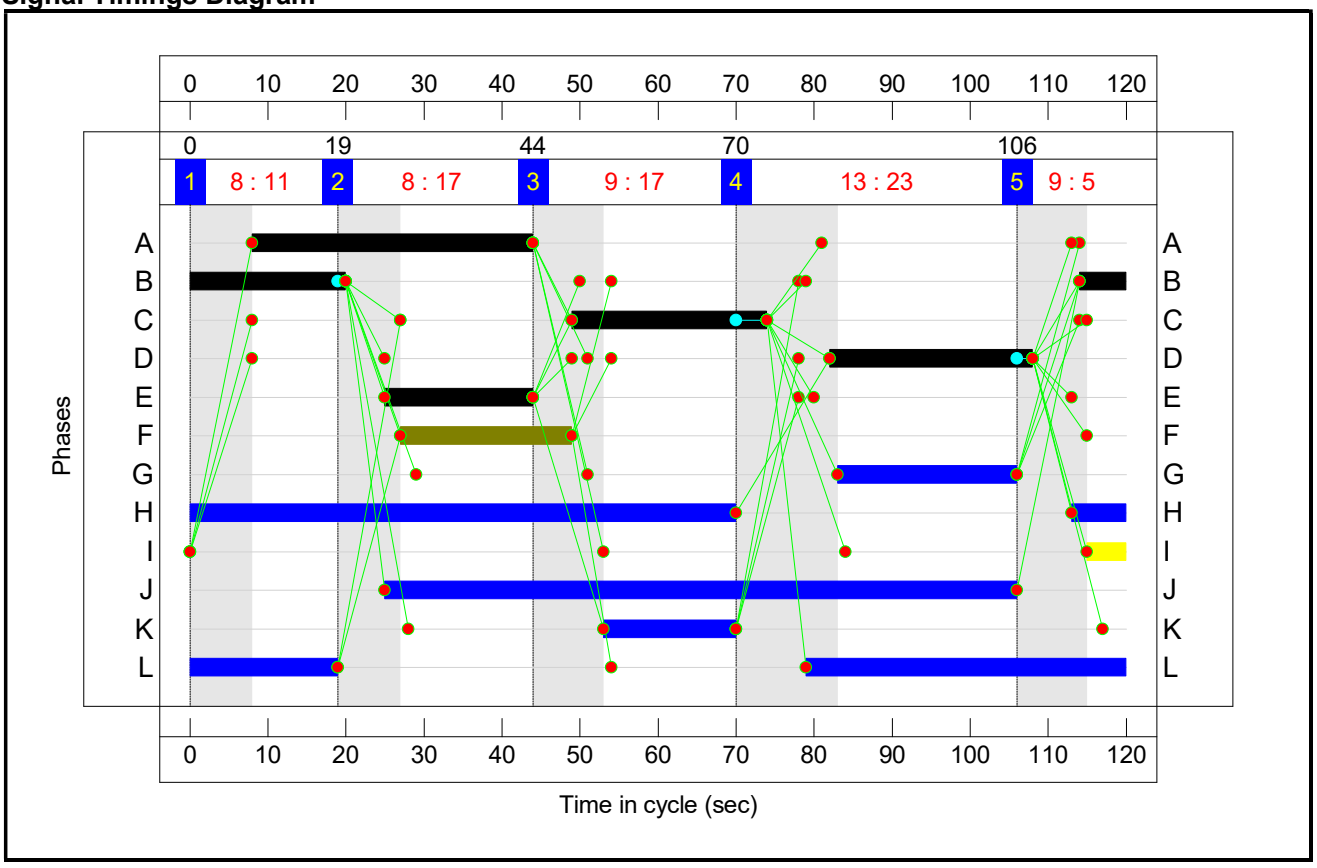
Stage Sequence Diagram



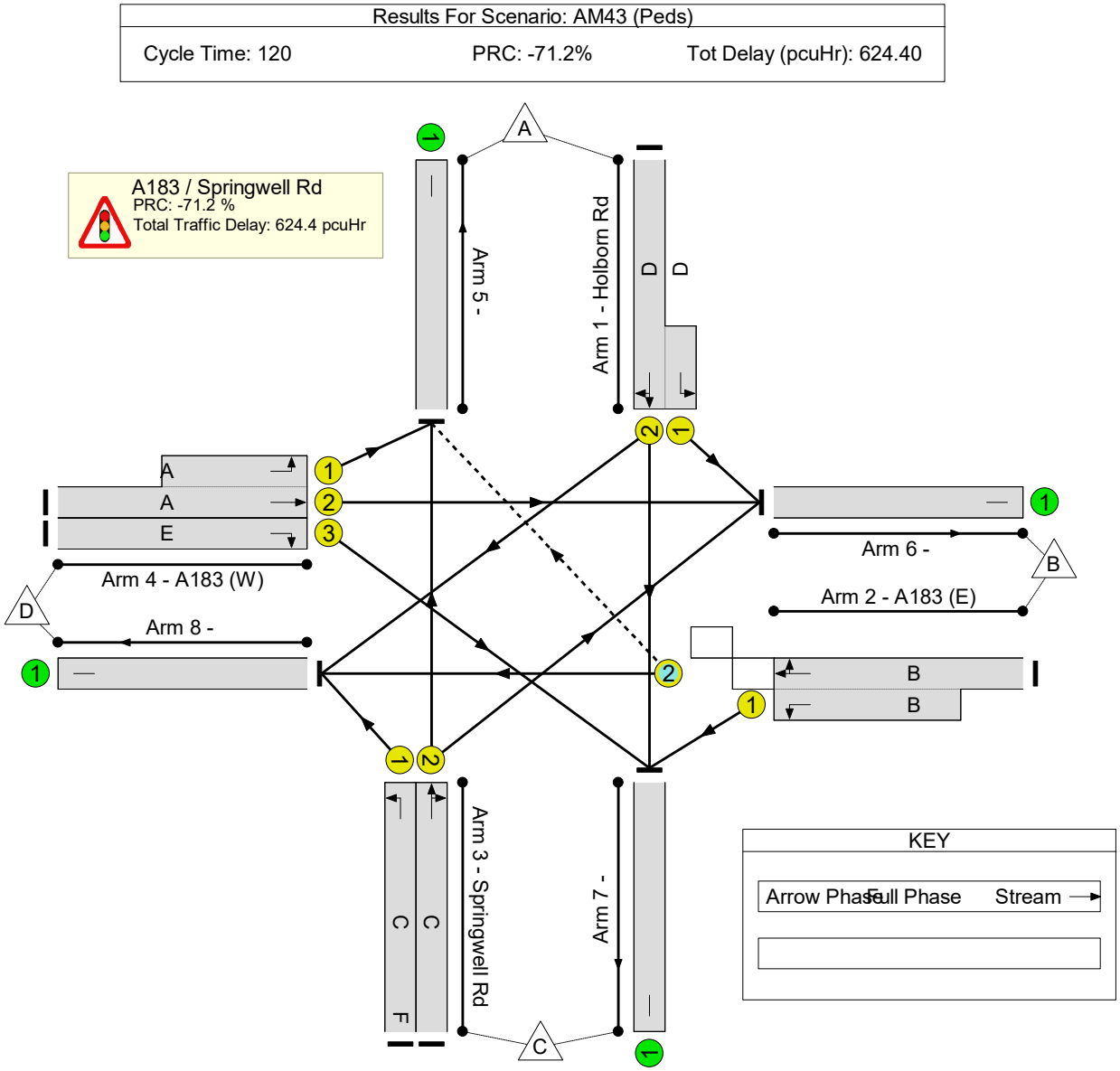
Stage Timings

Stage	1	2	3	4	5
Duration	11	17	17	23	5
Change Point	0	19	44	70	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

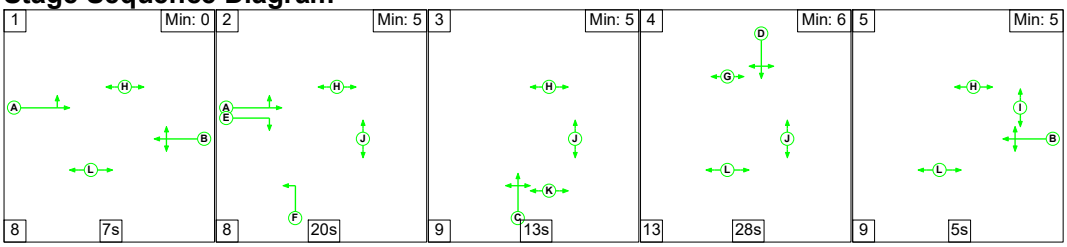
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	649	1877:1760	375+58	149.8 : 149.8%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	802	1879:1793	384+136	154.1 : 154.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	684	1794	718	95.3%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	614	1901	412	149.1%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	36	-	780	1910:1809	549+65	126.9 : 126.9%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	426	1723	287	148.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**0**	**22**	**37**	**106.9**	**517.1**	**0.3**	**624.4**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**22**	**37**	**106.9**	**517.1**	**0.3**	**624.4**	**-**	**-**	**-**	**-**
1/2+1/1	649	433	-	-	-	21.7	109.4	-	131.2	727.5	33.8	109.4	143.2
2/2+2/1	802	520	0	22	37	28.2	142.2	0.3	170.8	766.5	37.2	142.2	179.4
3/1	684	684	-	-	-	6.6	7.1	-	13.8	72.5	22.0	7.1	29.2
3/2	614	412	-	-	-	17.9	102.6	-	120.5	706.4	27.2	102.6	129.8
4/2+4/1	780	615	-	-	-	18.6	84.9	-	103.5	477.9	32.0	84.9	116.9
4/3	426	287	-	-	-	13.8	70.9	-	84.7	715.6	18.8	70.9	89.7
5/1	444	444	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	699	699	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	698	698	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1111	1111	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -71.2 Total Delay for Signalled Lanes (pcuHr): 624.40 Cycle Time (s): 120
PRC Over All Lanes (%): -71.2 Total Delay Over All Lanes(pcuHr): 624.40

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

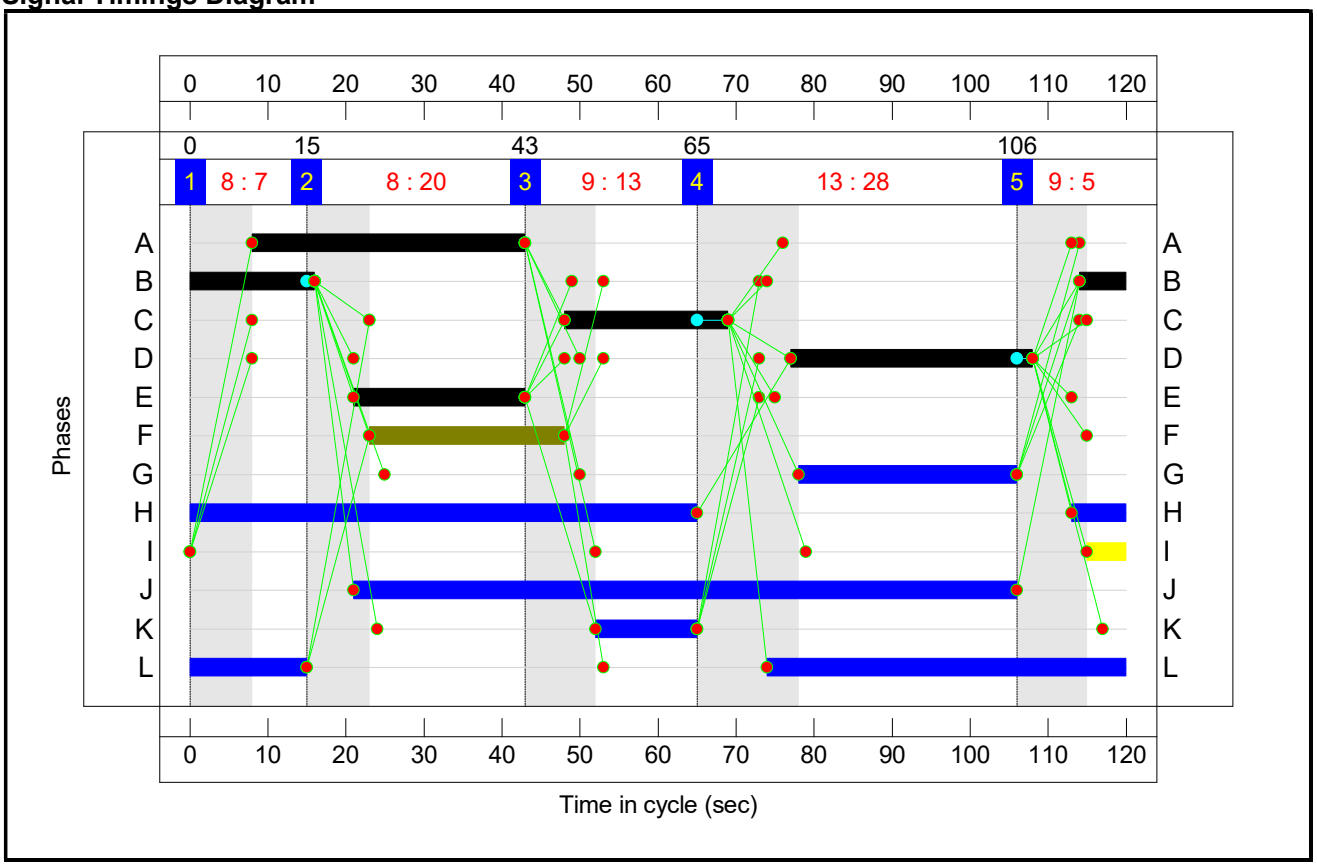
Stage Sequence Diagram



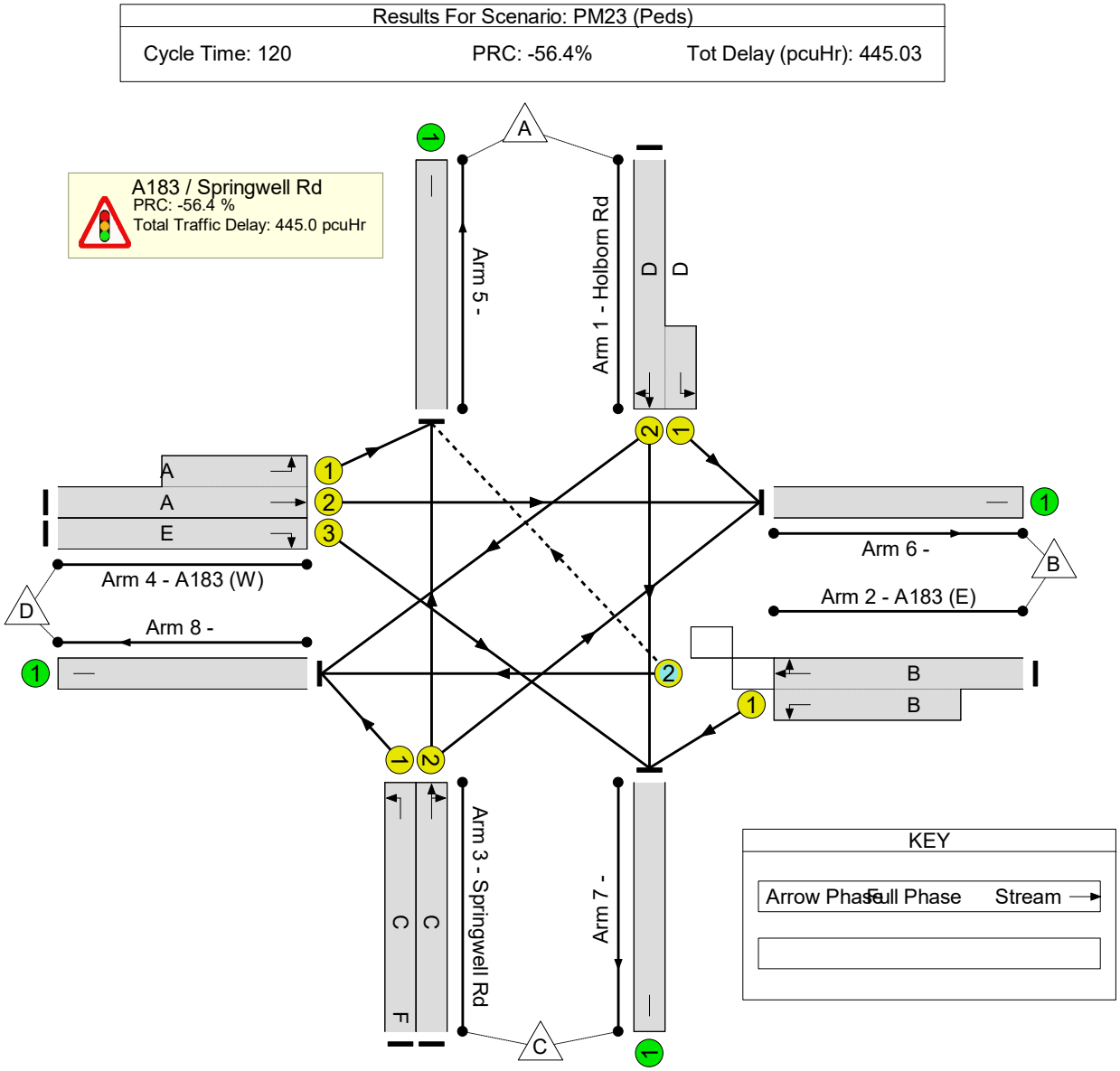
Stage Timings

Stage	1	2	3	4	5
Duration	7	20	13	28	5
Change Point	0	15	43	65	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

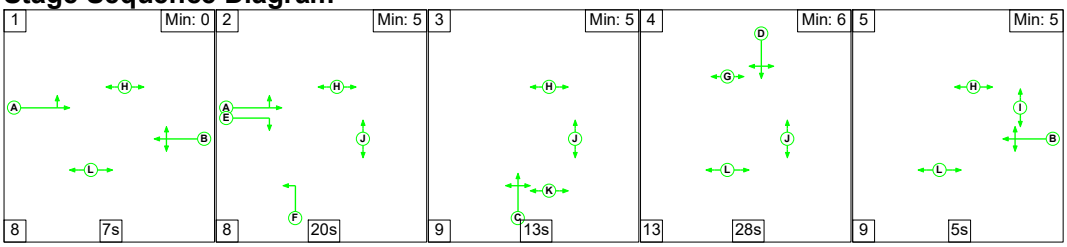
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**140.8%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**140.8%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	708	1858:1760	450+54	140.5 : 140.5%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	782	1891:1793	324+232	140.8 : 140.8%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	46	25	485	1794	703	69.0%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	475	1898	348	136.5%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	35	-	589	1910:1809	515+98	96.1 : 96.1%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	464	1723	330	140.5%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**12**	**15**	**7**	**83.5**	**361.3**	**0.2**	**445.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**12**	**15**	**7**	**83.5**	**361.3**	**0.2**	**445.0**	**-**	**-**	**-**	**-**
1/2+1/1	708	504	-	-	-	21.1	103.8	-	124.9	635.1	35.0	103.8	138.8
2/2+2/1	782	555	12	15	7	25.0	115.0	0.2	140.2	645.3	30.6	115.0	145.6
3/1	485	485	-	-	-	4.1	1.1	-	5.2	38.6	13.5	1.1	14.6
3/2	475	348	-	-	-	12.8	65.3	-	78.1	592.2	20.1	65.3	85.4
4/2+4/1	589	589	-	-	-	6.6	7.6	-	14.1	86.5	17.8	7.6	25.4
4/3	464	330	-	-	-	13.9	68.6	-	82.5	639.9	19.9	68.6	88.5
5/1	393	393	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	631	631	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	827	827	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	961	961	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -56.4 Total Delay for Signalled Lanes (pcuHr): 445.03 Cycle Time (s): 120
PRC Over All Lanes (%): -56.4 Total Delay Over All Lanes(pcuHr): 445.03

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

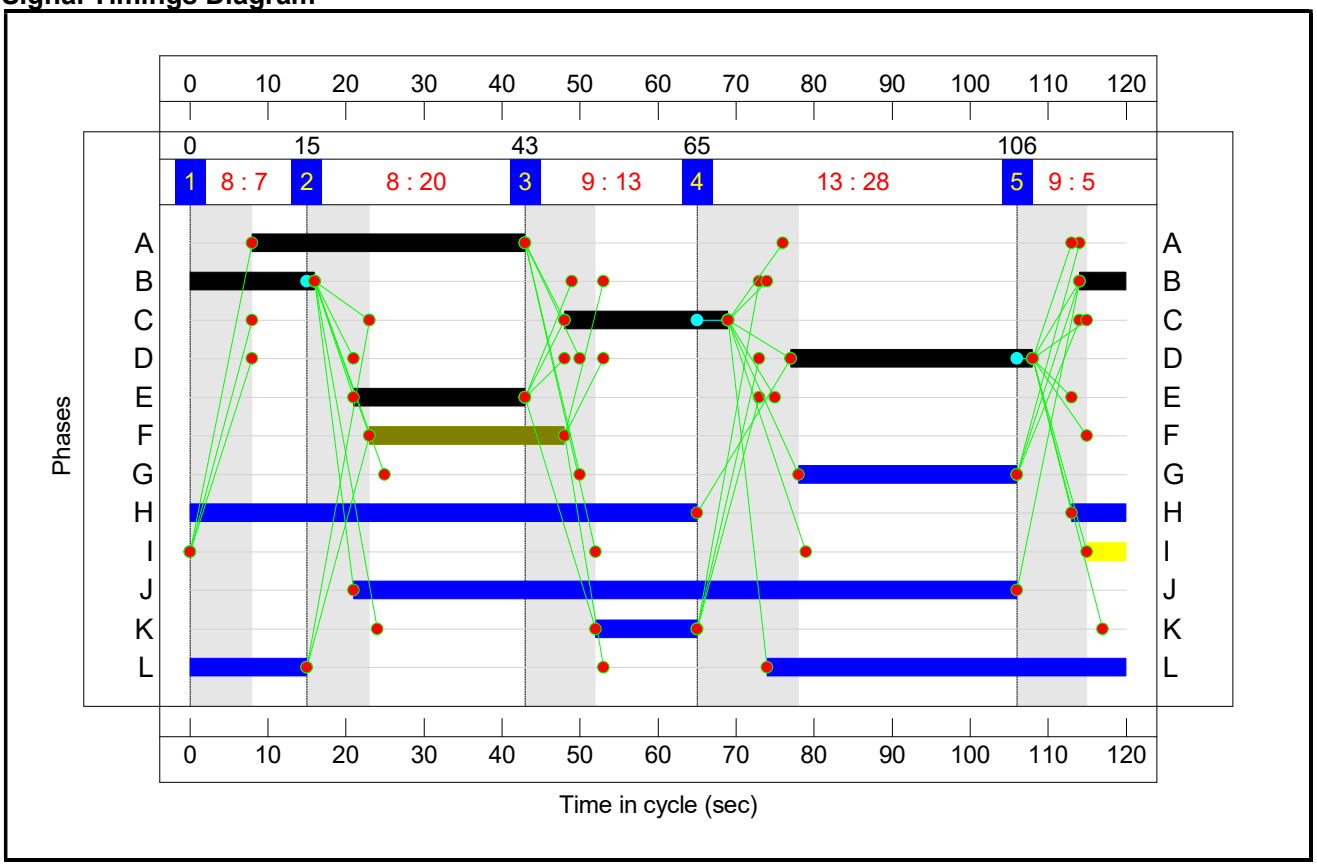
Stage Sequence Diagram



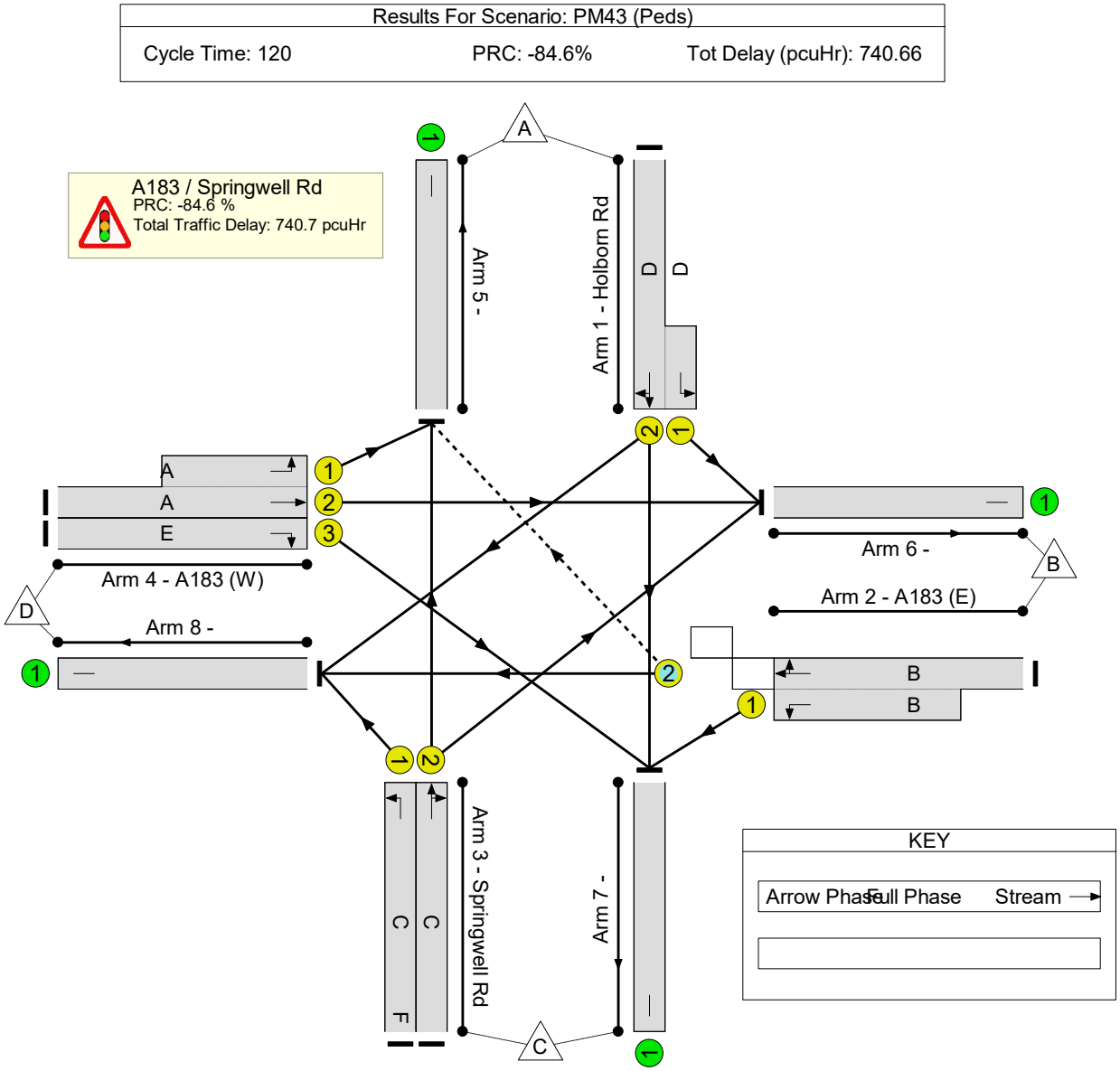
Stage Timings

Stage	1	2	3	4	5
Duration	7	20	13	28	5
Change Point	0	15	43	65	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

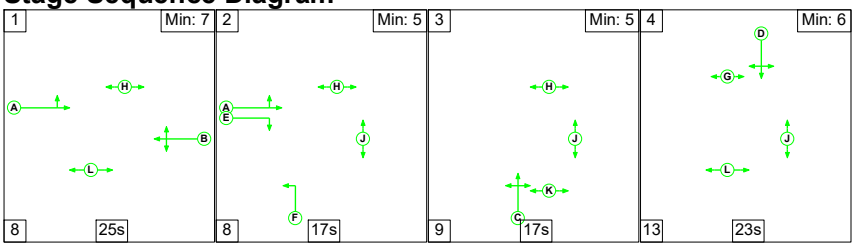
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**166.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**166.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	836	1858:1760	450+54	165.9 : 165.9%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	923	1891:1793	324+232	166.1 : 166.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	46	25	572	1794	703	81.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	560	1898	348	160.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	35	-	695	1910:1809	515+98	113.4 : 113.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	548	1723	330	165.9%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**0**	**15**	**18**	**123.7**	**616.8**	**0.2**	**740.7**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**15**	**18**	**123.7**	**616.8**	**0.2**	**740.7**	**-**	**-**	**-**	**-**
1/2+1/1	836	504	-	-	-	31.6	167.3	-	199.0	856.7	47.4	167.3	214.8
2/2+2/1	923	556	0	15	18	36.0	184.9	0.2	221.1	862.5	43.9	184.9	228.9
3/1	572	572	-	-	-	5.2	2.1	-	7.3	45.9	17.0	2.1	19.1
3/2	560	348	-	-	-	18.2	107.3	-	125.5	806.9	25.7	107.3	133.1
4/2+4/1	695	613	-	-	-	12.8	45.0	-	57.8	299.4	25.7	45.0	70.7
4/3	548	330	-	-	-	19.8	110.1	-	130.0	853.8	25.8	110.1	135.9
5/1	397	397	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	651	651	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	827	827	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1048	1048	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -84.6 Total Delay for Signalled Lanes (pcuHr): 740.66 Cycle Time (s): 120
PRC Over All Lanes (%): -84.6 Total Delay Over All Lanes(pcuHr): 740.66

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

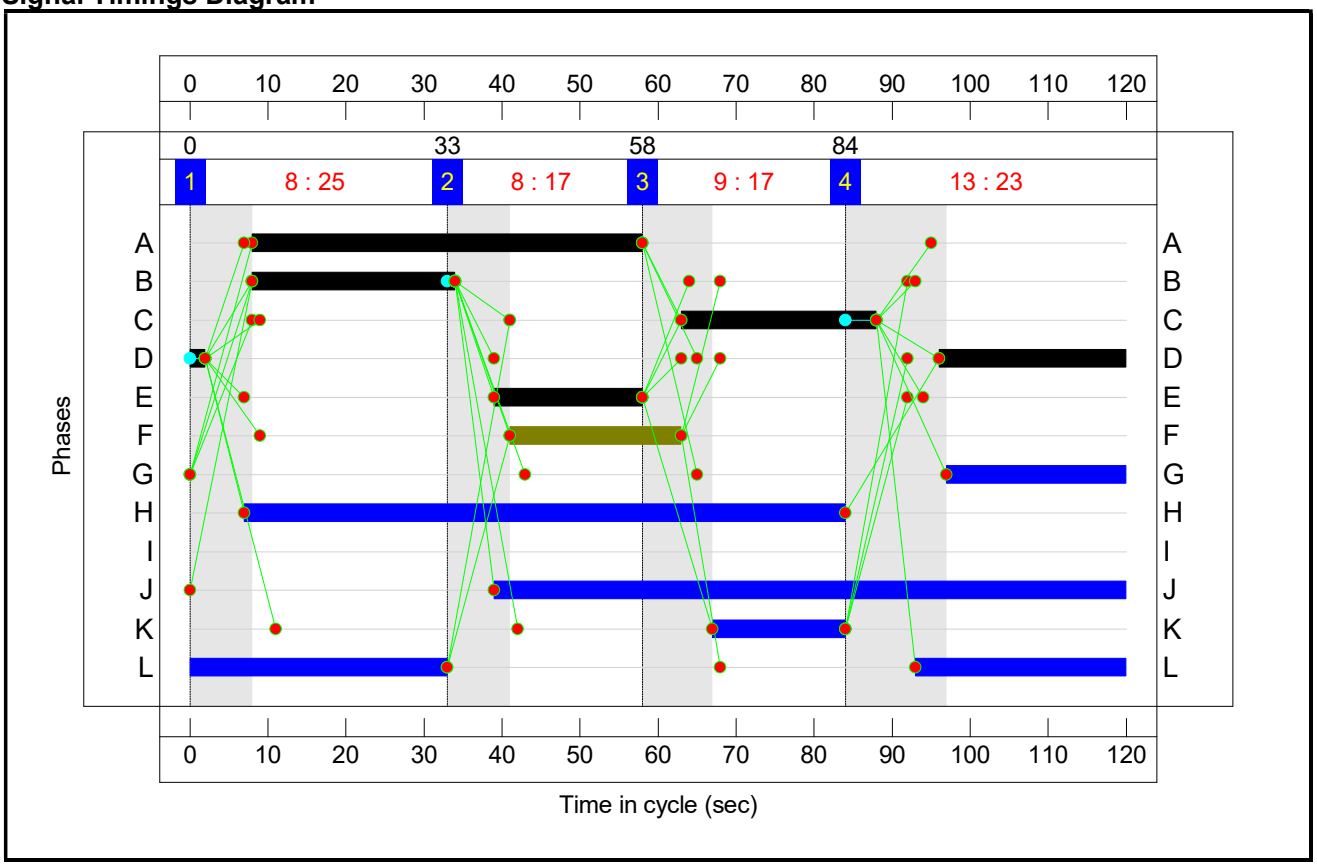
Stage Sequence Diagram



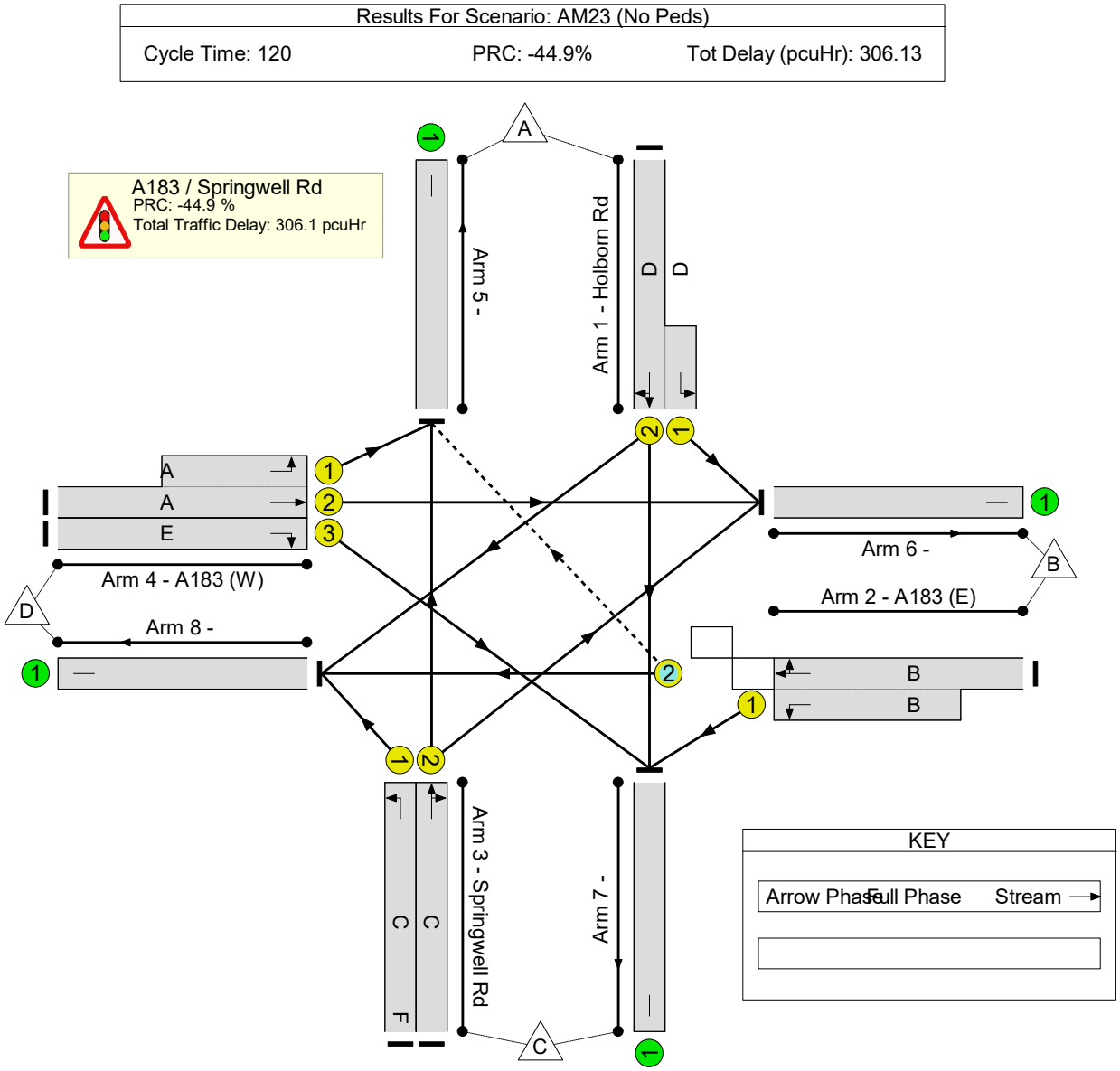
Stage Timings

Stage	1	2	3	4
Duration	25	17	17	23
Change Point	0	33	58	84

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

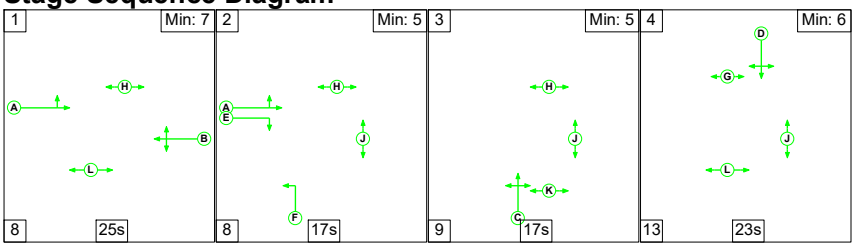
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.4%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.4%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	550	1877:1760	375+58	127.0 : 127.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	679	1879:1793	384+136	130.4 : 130.4%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	580	1794	718	80.8%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	520	1901	412	126.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	50	-	661	1910:1809	748+89	79.1 : 79.1%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	361	1723	287	125.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**55**	**0**	**3**	**64.3**	**241.4**	**0.4**	**306.1**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**55**	**0**	**3**	**64.3**	**241.4**	**0.4**	**306.1**	**-**	**-**	**-**	**-**
1/2+1/1	550	433	-	-	-	15.1	60.7	-	75.8	496.0	24.7	60.7	85.4
2/2+2/1	679	521	55	0	3	18.1	81.3	0.4	99.8	529.3	26.2	81.3	107.5
3/1	580	580	-	-	-	5.1	2.0	-	7.2	44.6	17.1	2.0	19.1
3/2	520	412	-	-	-	11.7	56.4	-	68.0	471.0	20.9	56.4	77.3
4/2+4/1	661	661	-	-	-	5.3	1.8	-	7.2	39.1	18.1	1.8	19.9
4/3	361	287	-	-	-	8.9	39.2	-	48.1	479.9	14.5	39.2	53.7
5/1	448	448	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	741	741	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	698	698	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1007	1007	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -44.9 Total Delay for Signalled Lanes (pcuHr): 306.13 Cycle Time (s): 120
PRC Over All Lanes (%): -44.9 Total Delay Over All Lanes(pcuHr): 306.13

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

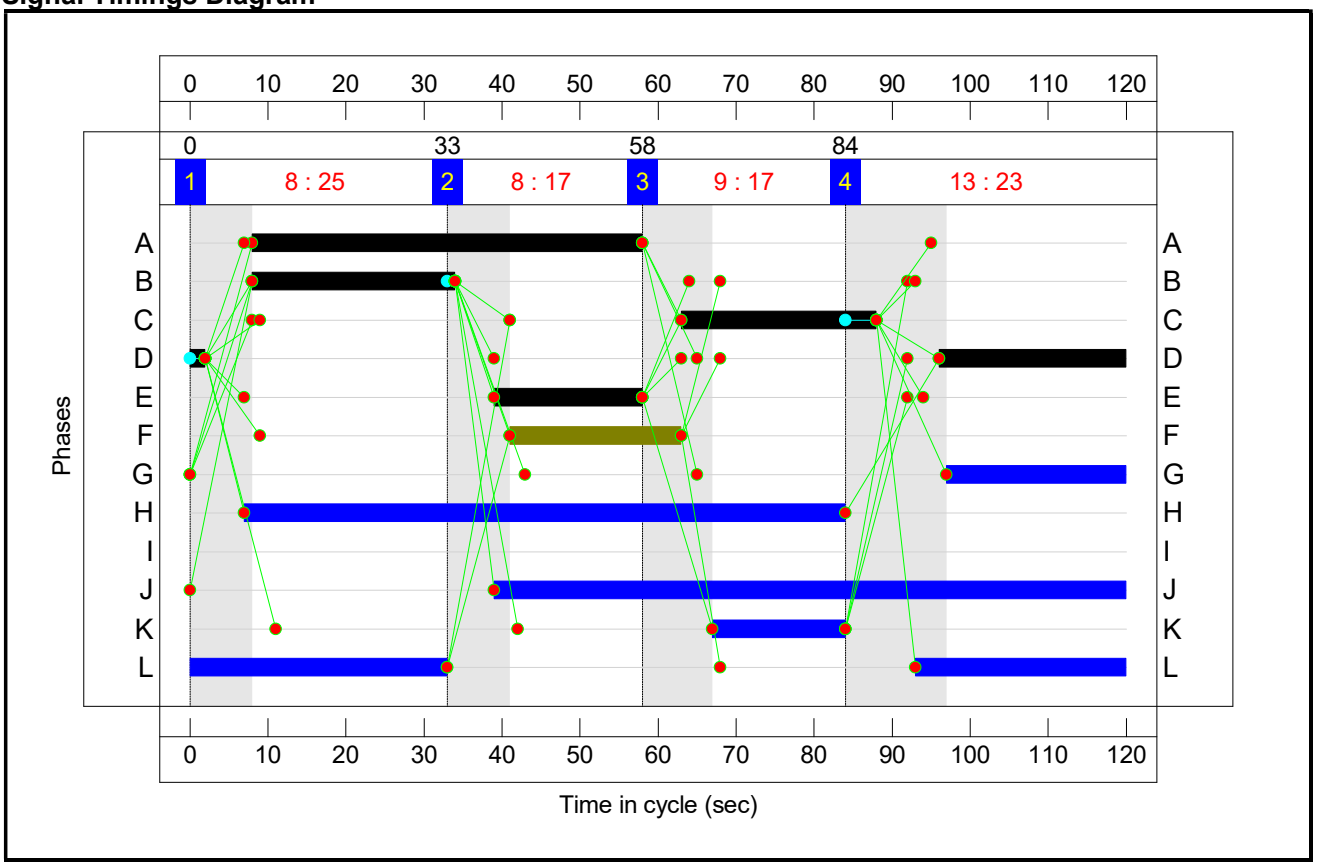
Stage Sequence Diagram



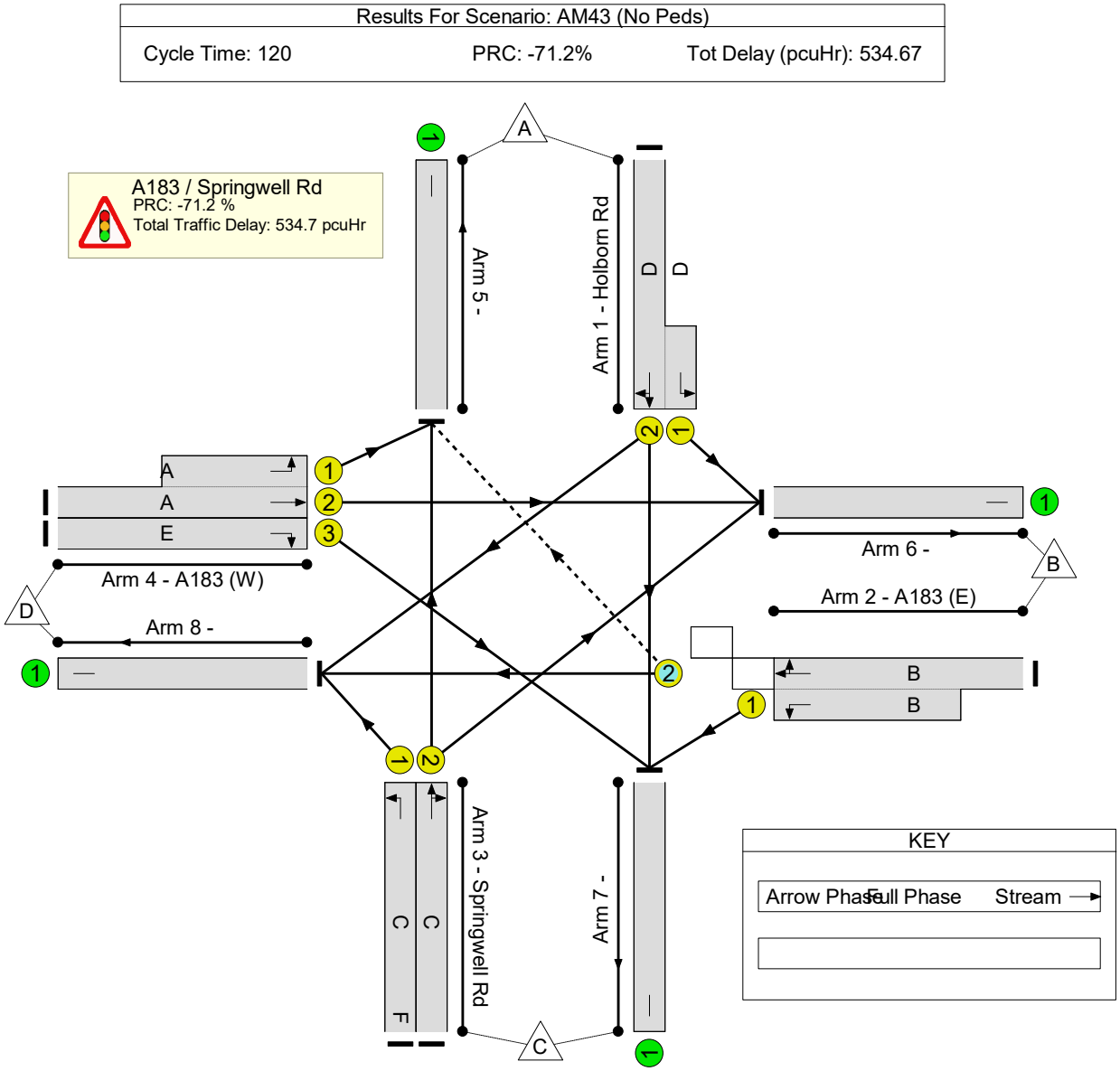
Stage Timings

Stage	1	2	3	4
Duration	25	17	17	23
Change Point	0	33	58	84

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**154.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	26	-	649	1877:1760	375+58	149.8 : 149.8%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	802	1879:1793	384+136	154.1 : 154.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	684	1794	718	95.3%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	614	1901	412	149.1%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	50	-	780	1910:1809	747+89	93.3 : 93.3%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	426	1723	287	148.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**28**	**0**	**30**	**96.1**	**438.0**	**0.6**	**534.7**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**28**	**0**	**30**	**96.1**	**438.0**	**0.6**	**534.7**	**-**	**-**	**-**	**-**
1/2+1/1	649	433	-	-	-	23.3	109.4	-	132.7	735.9	34.5	109.4	143.9
2/2+2/1	802	520	28	0	30	27.1	142.2	0.6	169.9	762.6	34.7	142.2	176.9
3/1	684	684	-	-	-	6.6	7.1	-	13.8	72.5	22.0	7.1	29.2
3/2	614	412	-	-	-	18.9	102.6	-	121.5	712.3	29.0	102.6	131.6
4/2+4/1	780	780	-	-	-	6.9	5.8	-	12.7	58.6	23.6	5.8	29.4
4/3	426	287	-	-	-	13.2	70.9	-	84.1	711.1	18.8	70.9	89.7
5/1	461	461	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	847	847	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	698	698	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1111	1111	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1

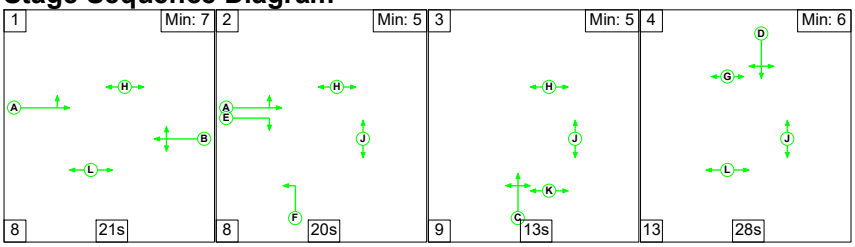
PRC for Signalled Lanes (%): -71.2
PRC Over All Lanes (%): -71.2

Total Delay for Signalled Lanes (pcuHr): 534.67
Total Delay Over All Lanes(pcuHr): 534.67

Cycle Time (s): 120

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

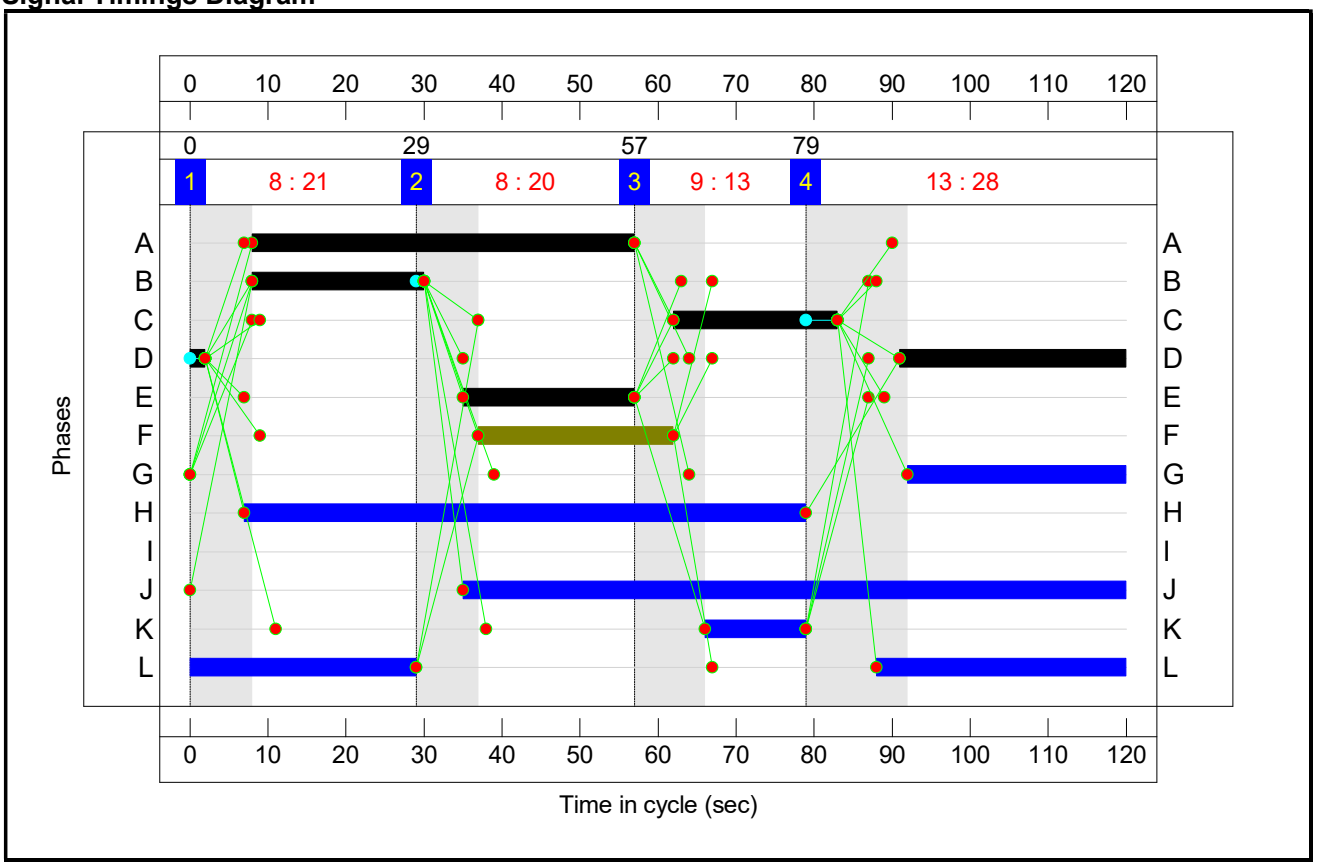
Stage Sequence Diagram



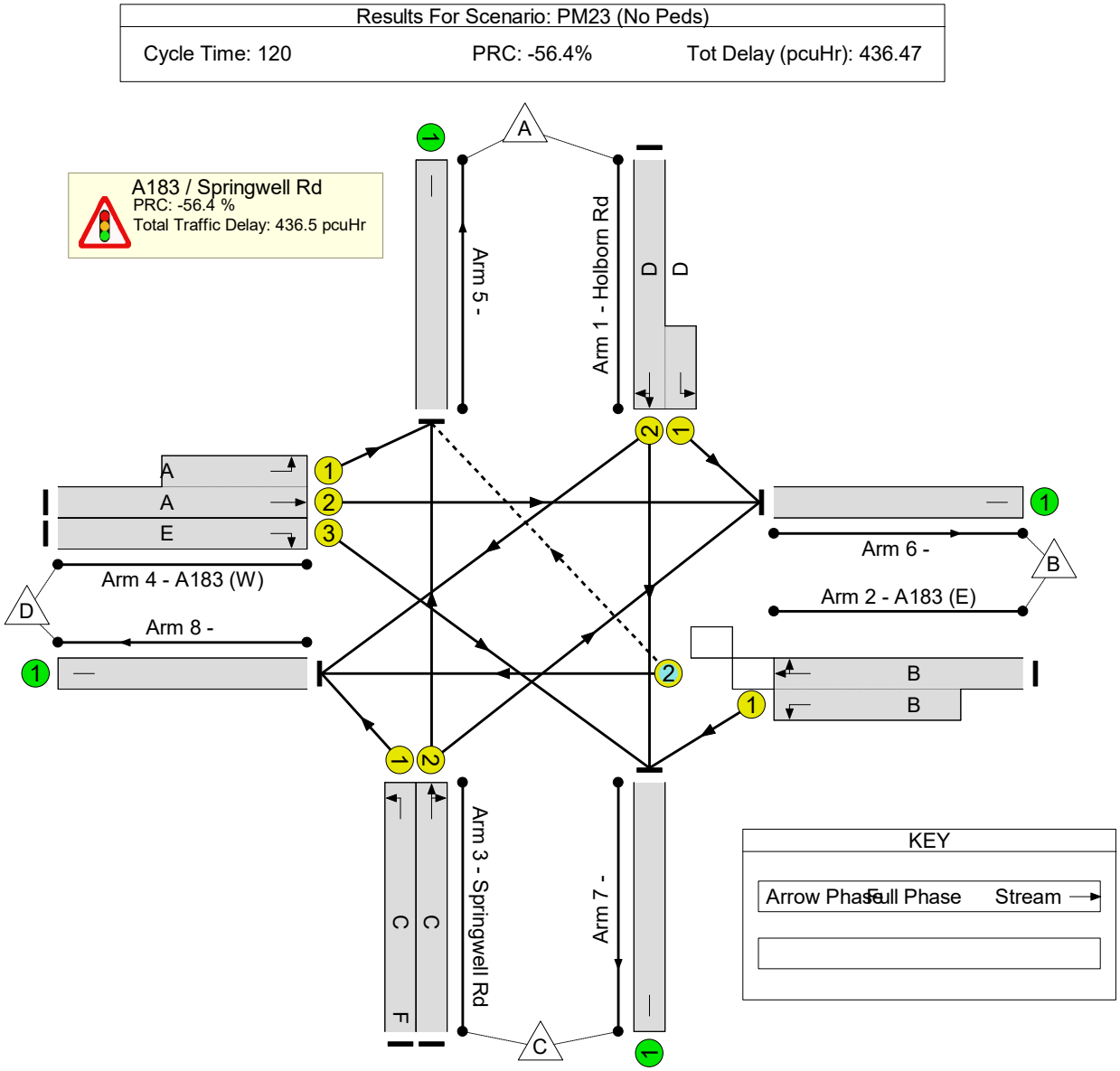
Stage Timings

Stage	1	2	3	4
Duration	21	20	13	28
Change Point	0	29	57	79

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

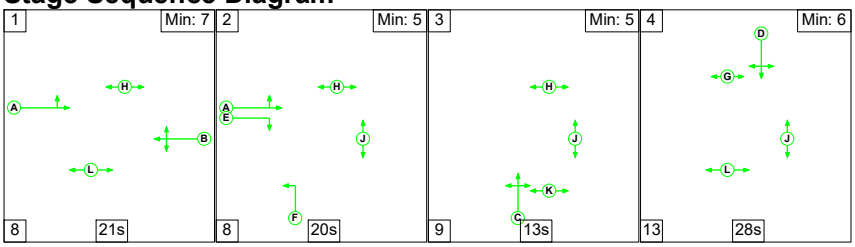
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**140.8%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**140.8%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	708	1858:1760	450+54	140.5 : 140.5%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	782	1891:1793	324+232	140.8 : 140.8%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	46	25	485	1794	703	69.0%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	475	1898	348	136.5%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	49	-	589	1910:1809	701+133	70.7 : 70.7%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	464	1723	330	140.5%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**32**	**0**	**2**	**81.3**	**355.0**	**0.2**	**436.5**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**32**	**0**	**2**	**81.3**	**355.0**	**0.2**	**436.5**	**-**	**-**	**-**	**-**
1/2+1/1	708	504	-	-	-	22.9	103.8	-	126.7	644.0	35.7	103.8	139.5
2/2+2/1	782	555	32	0	2	24.2	115.0	0.2	139.3	641.3	28.9	115.0	143.9
3/1	485	485	-	-	-	4.1	1.1	-	5.2	38.6	13.5	1.1	14.6
3/2	475	348	-	-	-	12.3	65.3	-	77.6	588.4	20.1	65.3	85.4
4/2+4/1	589	589	-	-	-	4.5	1.2	-	5.7	34.9	14.5	1.2	15.7
4/3	464	330	-	-	-	13.4	68.6	-	82.0	635.9	19.9	68.6	88.5
5/1	393	393	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	631	631	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	827	827	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	961	961	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -56.4 Total Delay for Signalled Lanes (pcuHr): 436.47 Cycle Time (s): 120
PRC Over All Lanes (%): -56.4 Total Delay Over All Lanes(pcuHr): 436.47

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

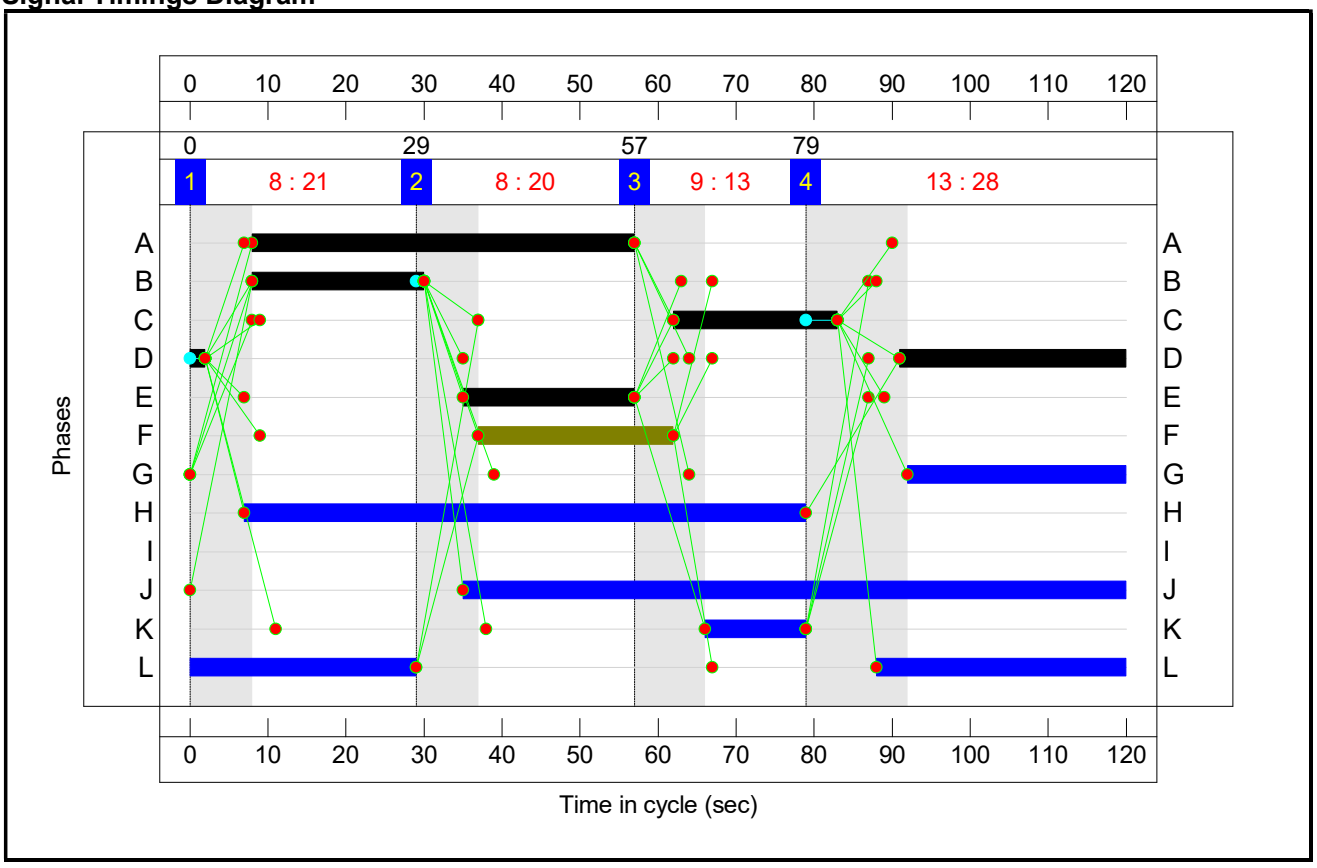
Stage Sequence Diagram



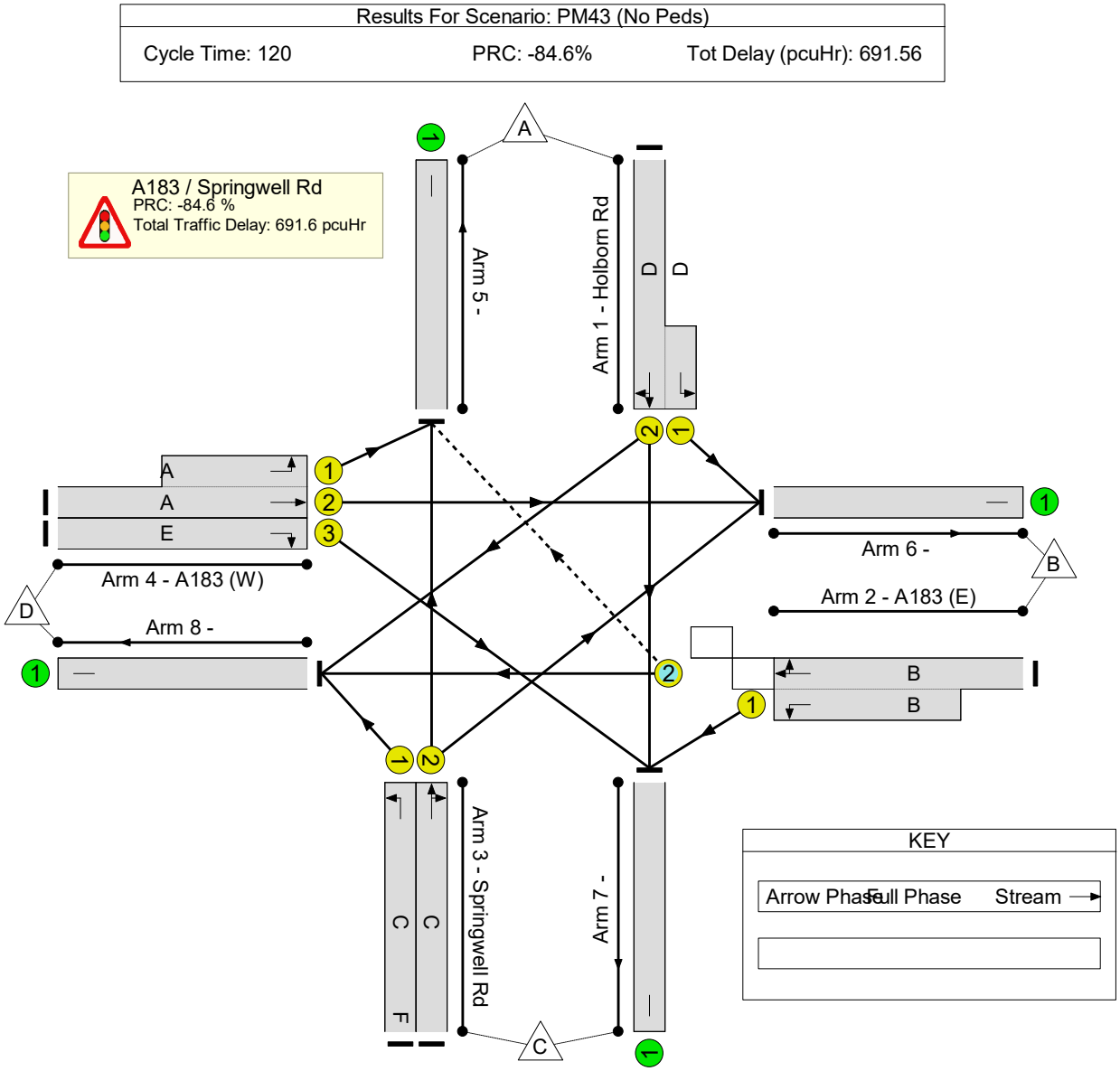
Stage Timings

Stage	1	2	3	4
Duration	21	20	13	28
Change Point	0	29	57	79

Signal Timings Diagram



Network Layout Diagram



Assumptions

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D	-	-	**N/A**	-	-		-	-	-	-	-	-	**166.1%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**166.1%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	31	-	836	1858:1760	450+54	165.9 : 165.9%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	923	1891:1793	324+232	166.1 : 166.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	46	25	572	1794	703	81.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	560	1898	348	160.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	49	-	695	1910:1809	700+133	83.4 : 83.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	22	-	548	1723	330	165.9%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D	**-**	**-**	**31**	**0**	**2**	**117.1**	**574.2**	**0.3**	**691.6**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**31**	**0**	**2**	**117.1**	**574.2**	**0.3**	**691.6**	**-**	**-**	**-**	**-**
1/2+1/1	836	504	-	-	-	33.4	167.3	-	200.7	864.2	48.4	167.3	215.7
2/2+2/1	923	556	31	0	2	34.6	184.9	0.3	219.8	857.2	40.4	184.9	225.3
3/1	572	572	-	-	-	5.2	2.1	-	7.3	45.9	17.0	2.1	19.1
3/2	560	348	-	-	-	19.1	107.3	-	126.5	813.0	27.5	107.3	134.8
4/2+4/1	695	695	-	-	-	5.8	2.4	-	8.2	42.5	19.1	2.4	21.6
4/3	548	330	-	-	-	19.0	110.1	-	129.1	848.2	25.5	110.1	135.6
5/1	410	410	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	720	720	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	827	827	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1048	1048	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -84.6 Total Delay for Signalled Lanes (pcuHr): 691.56 Cycle Time (s): 120
PRC Over All Lanes (%): -84.6 Total Delay Over All Lanes(pcuHr): 691.56

Appendix I

LinSig Data

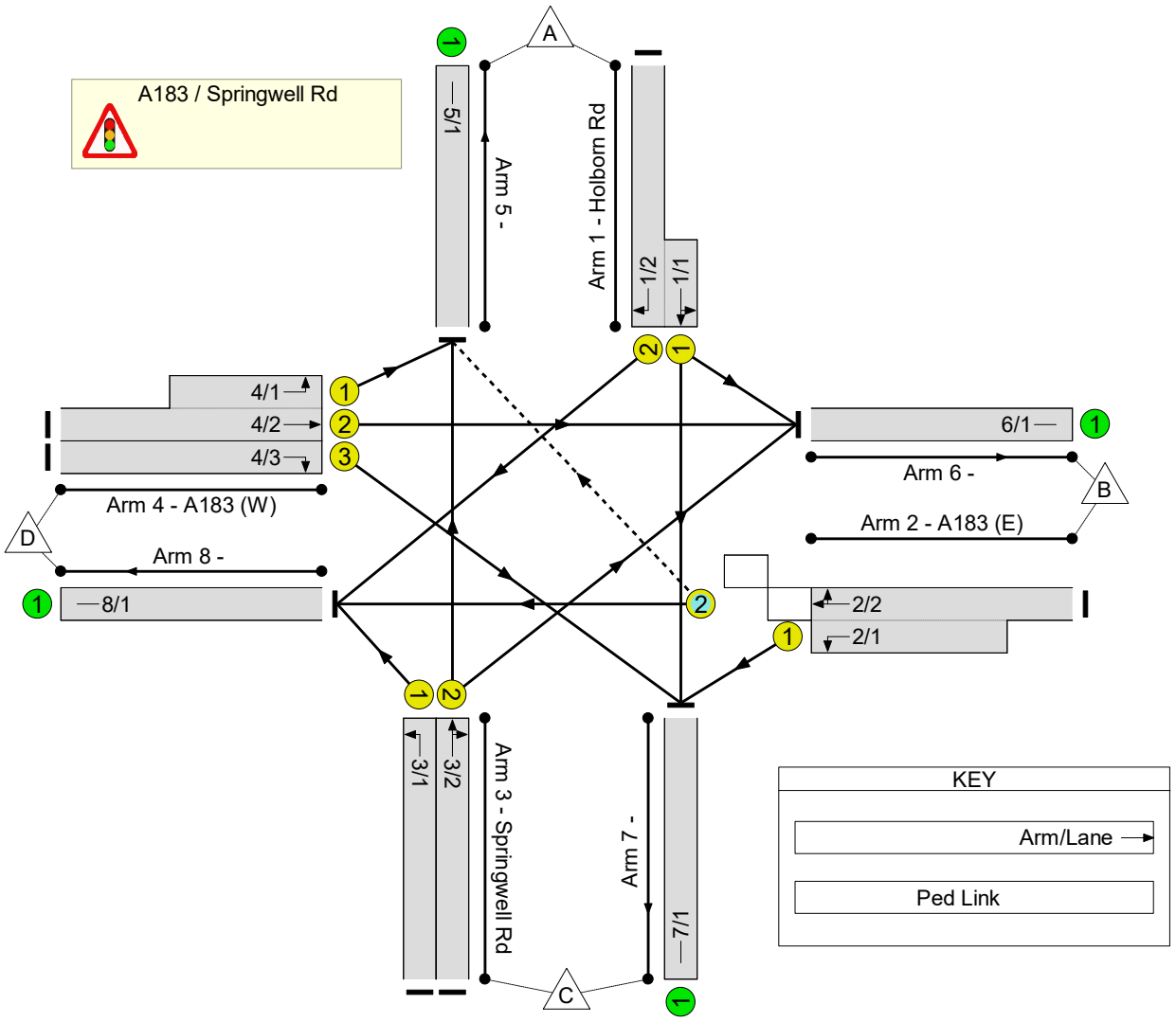
Option D1

Springwell Rd Option D1 LinSig Data

User and Project Details

Project:	**23014 Springwell Rd**
Title:	**Option D1**
Location:	Sunderland
Client:	Sunderland City Council
Design Layout Ref:	CRSR-SCC-GEN-Z0-SK-Z-SK_010-S4 Rev P01 (SCC)
Date Started:	6/07/23
Model Purpose:	Test performance of proposal
Additional detail:	
File name:	Springwell Rd Option D1.lsg3x
Author:	Simon Swanston
Company:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Network Layout Diagram



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

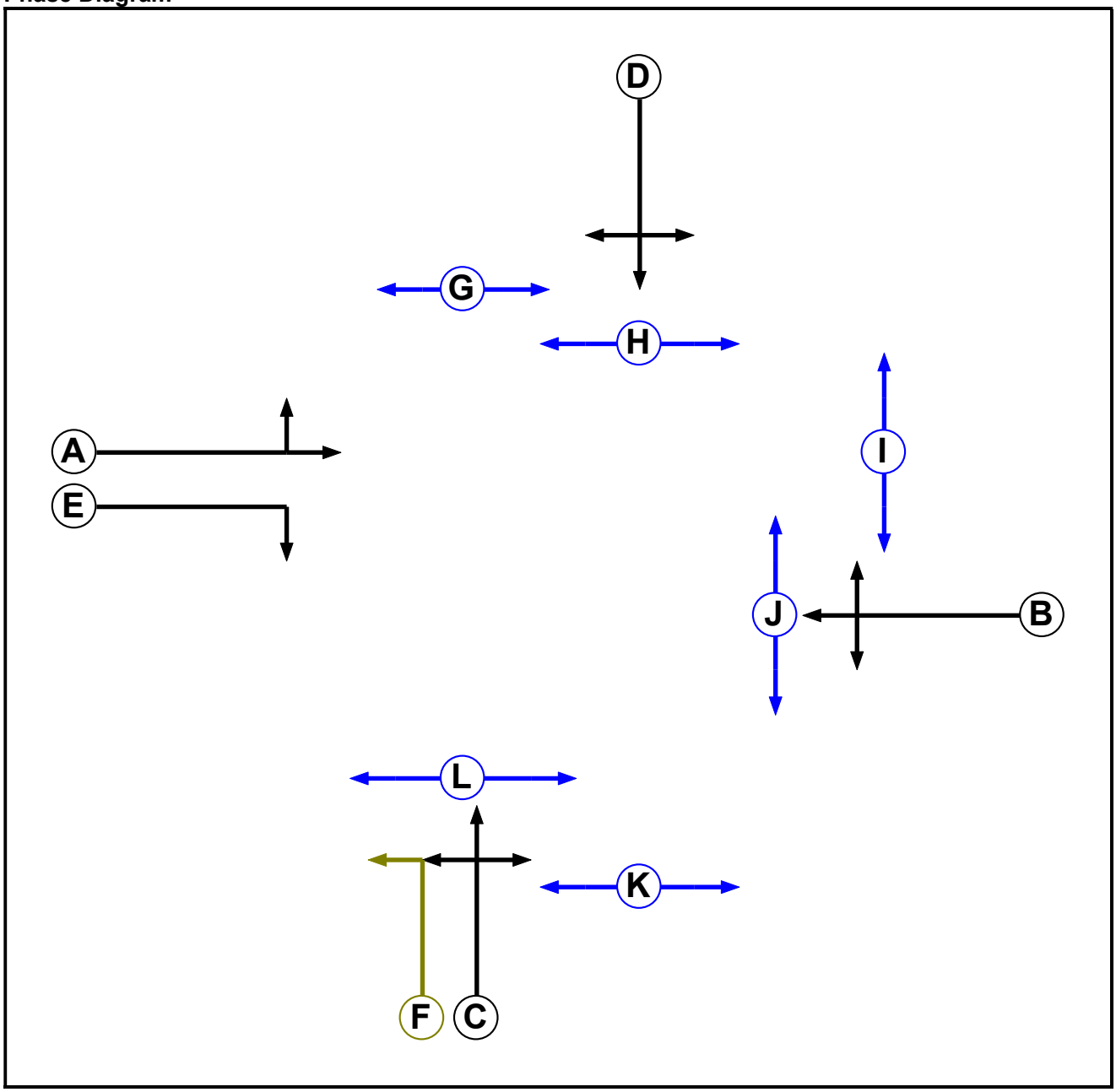
Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Filter	C	4	0
G	Pedestrian		5	5
H	Pedestrian		5	5
I	Pedestrian		5	5
J	Pedestrian		5	5
K	Pedestrian		5	5
L	Pedestrian		5	5

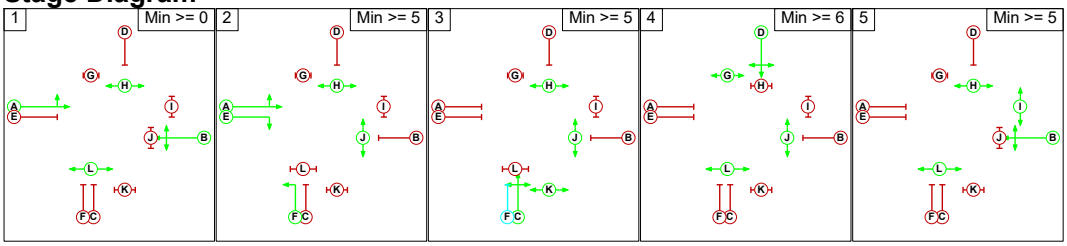
Phase Intergreens Matrix

		Starting Phase											
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		-	5	7	-	-	7	-	9	-	-	-
	B	-		7	5	5	7	9	-	-	5	8	-
	C	7	5		8	6	-	9	-	10	-	-	5
	D	5	6	7		5	7	-	5	7	-	9	-
	E	-	6	5	5		-	-	-	-	-	9	-
	F	-	5	-	5	-		-	-	-	-	-	5
	G	8	8	8	-	-	-		-	-	-	-	-
	H	-	-	-	12	-	-	-		-	-	-	-
	I	8	-	8	8	-	-	-	-		-	-	-
	J	-	8	-	-	-	-	-	-	-		-	-
	K	-	8	-	8	8	-	-	-	-	-		-
	L	-	-	8	-	-	8	-	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B H L
2	A E F H J
3	C H J K
4	D G J L
5	B H I L

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	2	B	Losing	1	1
3	4	C	Losing	4	4
4	1	D	Losing	2	2
4	5	D	Losing	2	2

Prohibited Stage Change

From Stage \ To Stage	1	2	3	4	5
1		8	8	12	9
2	X		9	X	X
3	8	8		13	10
4	8	8	9		9
5	8	8	8	12	

Give-Way Lane Input Data

Junction: A183 / Springwell Rd											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/2 (A183 (E))	5/1 (Right)	1439	0	4/1	1.09	All	4.00	2.00	0.50	4	4.00
				4/2	1.09	All					

Lane Input Data

Junction: A183 / Springwell Rd

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Holborn Rd)	U	D	2	3	4.0	Geom	-	3.00	0.00	Y	Arm 6 Left	17.00
											Arm 7 Ahead	Inf
1/2 (Holborn Rd)	U	D	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 8 Right	20.00
2/1 (A183 (E))	U	B	2	3	9.0	Geom	-	3.00	0.00	Y	Arm 7 Left	22.00
2/2 (A183 (E))	O	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	12.00
											Arm 8 Ahead	Inf
3/1 (Springwell Rd)	U	C F	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 8 Left	18.00
3/2 (Springwell Rd)	U	C	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	15.00
4/1 (A183 (W))	U	A	2	3	7.0	Geom	-	2.95	0.00	Y	Arm 5 Left	27.00
4/2 (A183 (W))	U	A	2	3	60.0	Geom	-	2.95	0.00	Y	Arm 6 Ahead	Inf
4/3 (A183 (W))	U	E	2	3	60.0	Geom	-	2.80	0.00	Y	Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM 2023'	07:30	08:30	01:00	
2: 'AM 2043'	07:30	08:30	01:00	F1*1.18
3: 'PM 2023'	16:30	17:30	01:00	
4: 'PM 2043'	16:30	17:30	01:00	F3*1.18

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 1: AM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	422
1/2 (with short)	550(In) 128(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.5 %	1886	1886
				Arm 7 Ahead	Inf	82.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 2: AM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	498
1/2 (with short)	649(In) 151(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.5 %	1886	1886
				Arm 7 Ahead	Inf	82.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 3: PM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	448
1/2 (with short)	708(In) 260(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.0 %	1887	1887
				Arm 7 Ahead	Inf	83.0 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 4: PM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	529
1/2 (with short)	836(In) 307(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.0 %	1887	1887
				Arm 7 Ahead	Inf	83.0 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 5: AM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	422
1/2 (with short)	550(In) 128(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	70
4/2 (with short)	661(In) 591(Out)
4/3	361
5/1	550
6/1	781
7/1	887
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.5 %	1886	1886
				Arm 7 Ahead	Inf	82.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 6: AM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	498
1/2 (with short)	649(In) 151(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	83
4/2 (with short)	780(In) 697(Out)
4/3	426
5/1	650
6/1	921
7/1	1047
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.5 %	1886	1886
				Arm 7 Ahead	Inf	82.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 7: PM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	448
1/2 (with short)	708(In) 260(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	94
4/2 (with short)	589(In) 495(Out)
4/3	464
5/1	504
6/1	683
7/1	1162
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.0 %	1887	1887
				Arm 7 Ahead	Inf	83.0 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

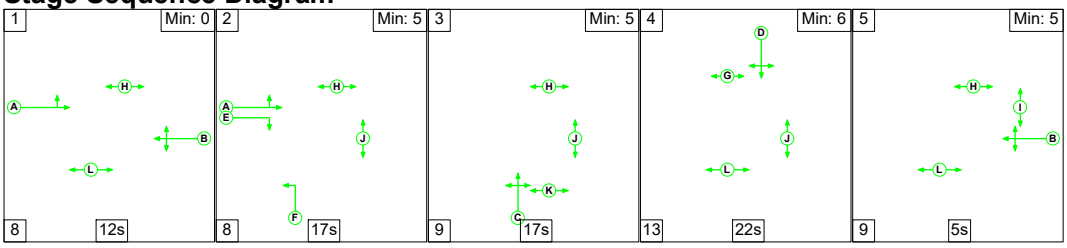
Lane	Scenario 8: PM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	529
1/2 (with short)	836(In) 307(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	111
4/2 (with short)	695(In) 584(Out)
4/3	548
5/1	594
6/1	806
7/1	1372
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	17.0 %	1887	1887
				Arm 7 Ahead	Inf	83.0 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 8 Right	20.00	100.0 %	1781	1781
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	2.95	0.00	Y	Arm 5 Left	27.00	100.0 %	1809	1809
4/2 (A183 (W))	2.95	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1910	1910
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723
5/1	Infinite Saturation Flow						Inf	Inf
6/1	Infinite Saturation Flow						Inf	Inf
7/1	Infinite Saturation Flow						Inf	Inf
8/1	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

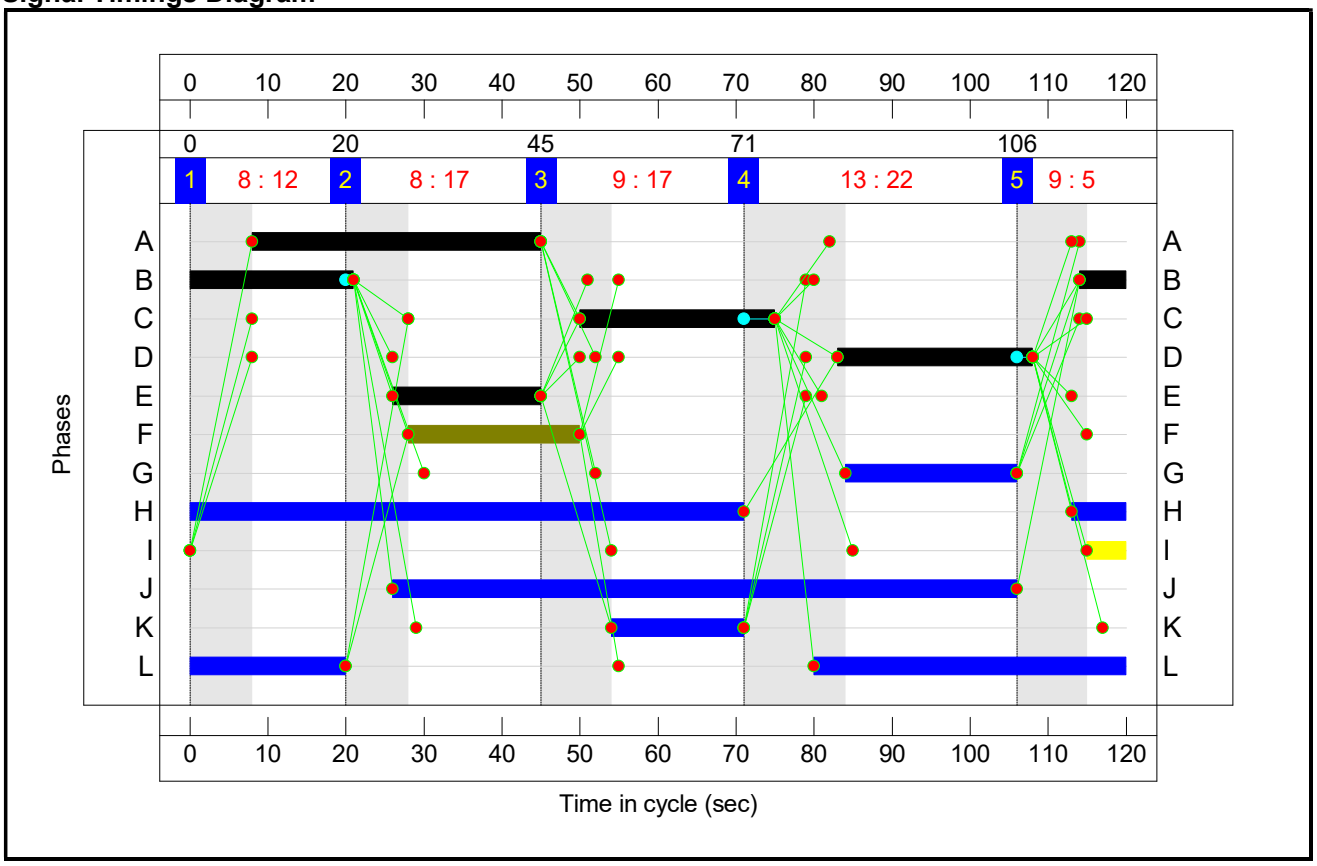
Stage Sequence Diagram



Stage Timings

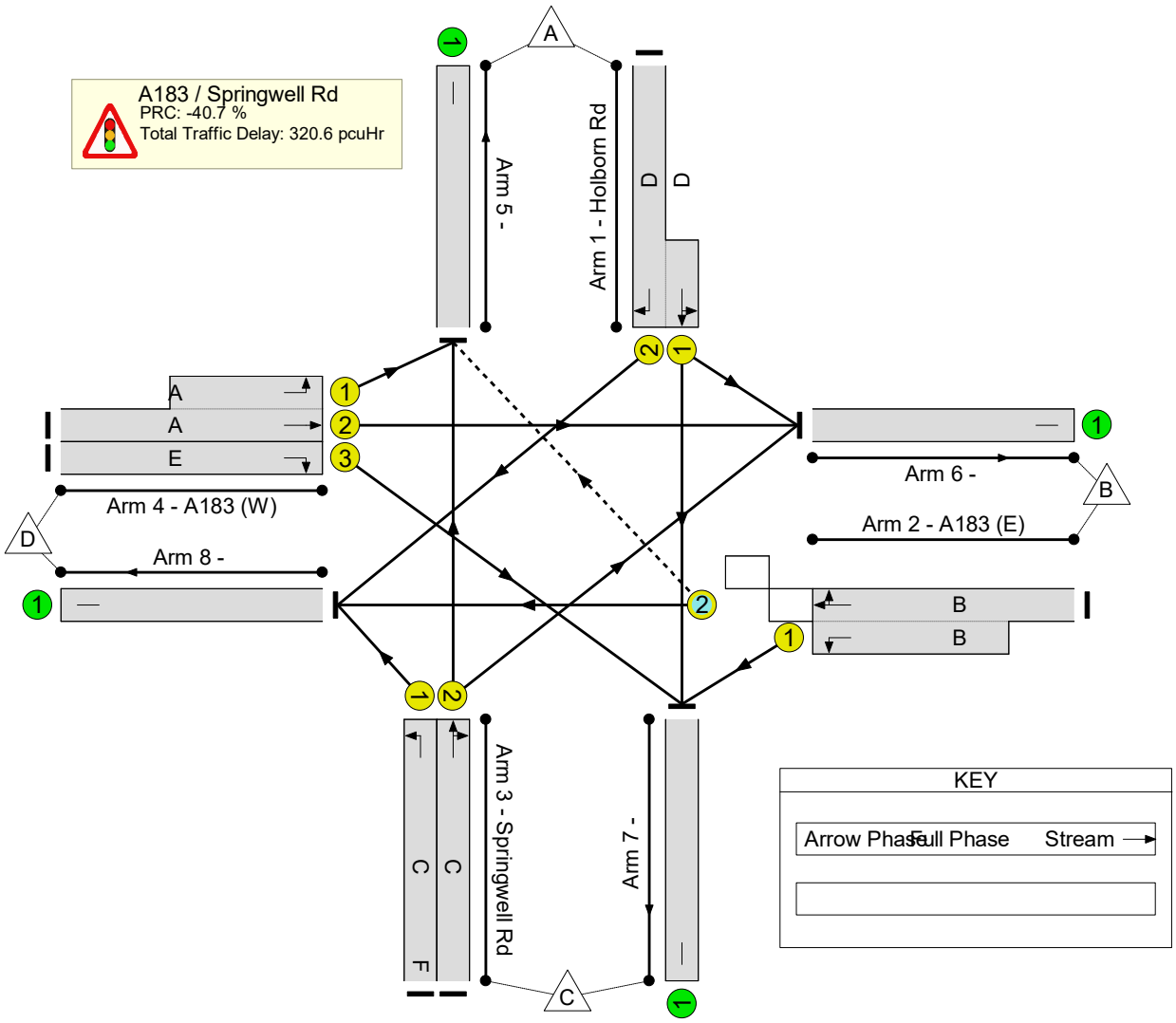
Stage	1	2	3	4	5
Duration	12	17	17	22	5
Change Point	0	20	45	71	106

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: AM23 (Peds)		
Cycle Time: 120	PRC: -40.7%	Tot Delay (pcuHr): 320.58



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

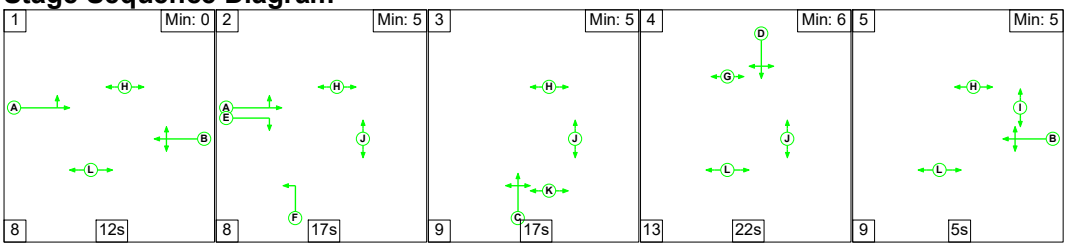
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	550	1781:1886	101+334	126.3 : 126.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	27	-	679	1879:1793	396+141	126.7 : 126.7%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	580	1794	718	80.8%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	520	1901	412	126.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	661	1910:1809	564+67	104.8 : 104.8%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	361	1723	287	125.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**0**	**22**	**38**	**66.6**	**253.6**	**0.4**	**320.6**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**22**	**38**	**66.6**	**253.6**	**0.4**	**320.6**	**-**	**-**	**-**	**-**
1/2+1/1	550	435	-	-	-	13.4	59.6	-	73.0	477.9	23.4	59.6	83.0
2/2+2/1	679	536	0	22	38	17.6	73.8	0.4	91.8	486.5	25.7	73.8	99.5
3/1	580	580	-	-	-	5.1	2.0	-	7.2	44.6	17.1	2.0	19.1
3/2	520	412	-	-	-	12.1	56.4	-	68.4	473.7	20.9	56.4	77.3
4/2+4/1	661	630	-	-	-	9.2	22.6	-	31.8	173.2	23.1	22.6	45.7
4/3	361	287	-	-	-	9.2	39.2	-	48.4	482.5	14.5	39.2	53.7
5/1	447	447	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	714	714	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	703	703	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1017	1017	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -40.7 Total Delay for Signalled Lanes (pcuHr): 320.58 Cycle Time (s): 120
PRC Over All Lanes (%): -40.7 Total Delay Over All Lanes(pcuHr): 320.58

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

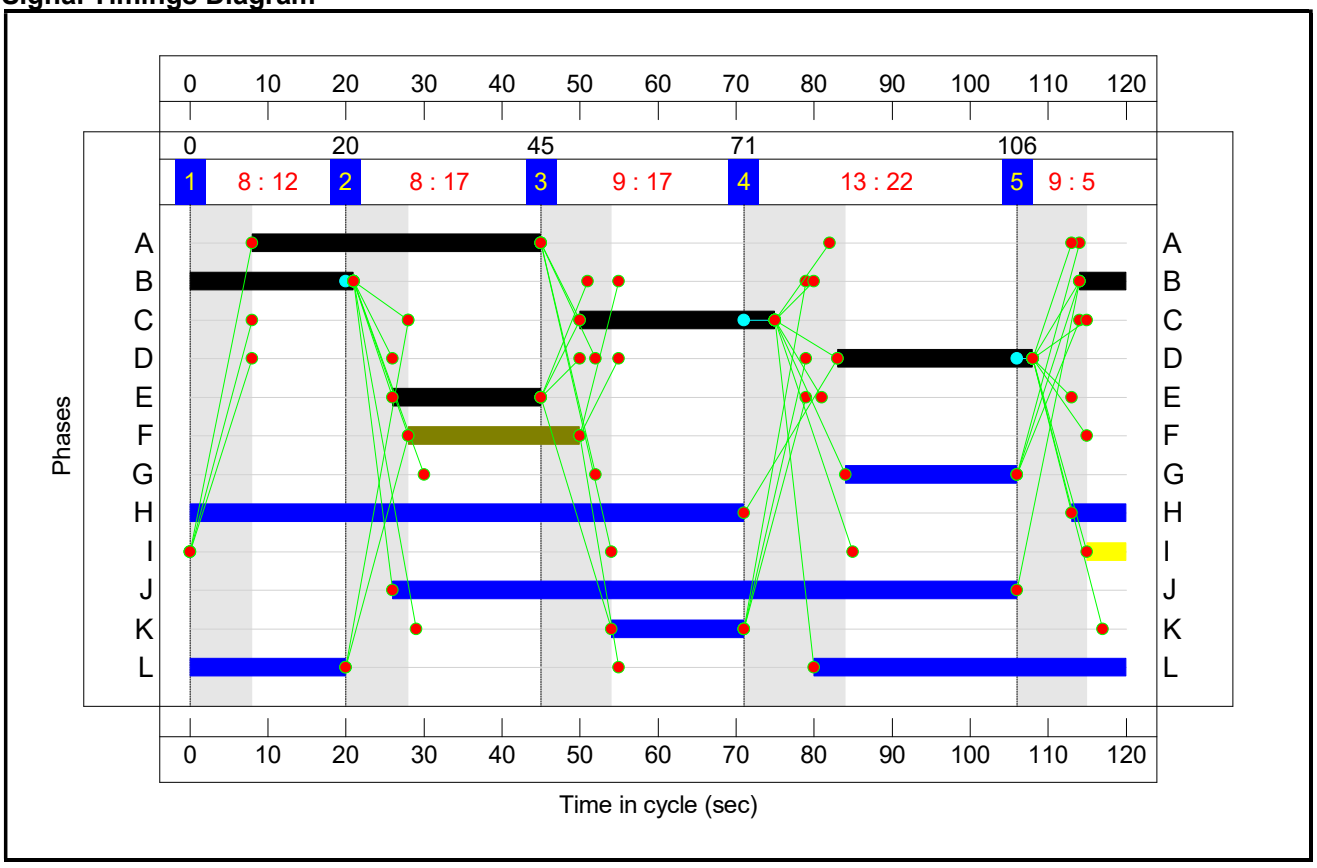
Stage Sequence Diagram



Stage Timings

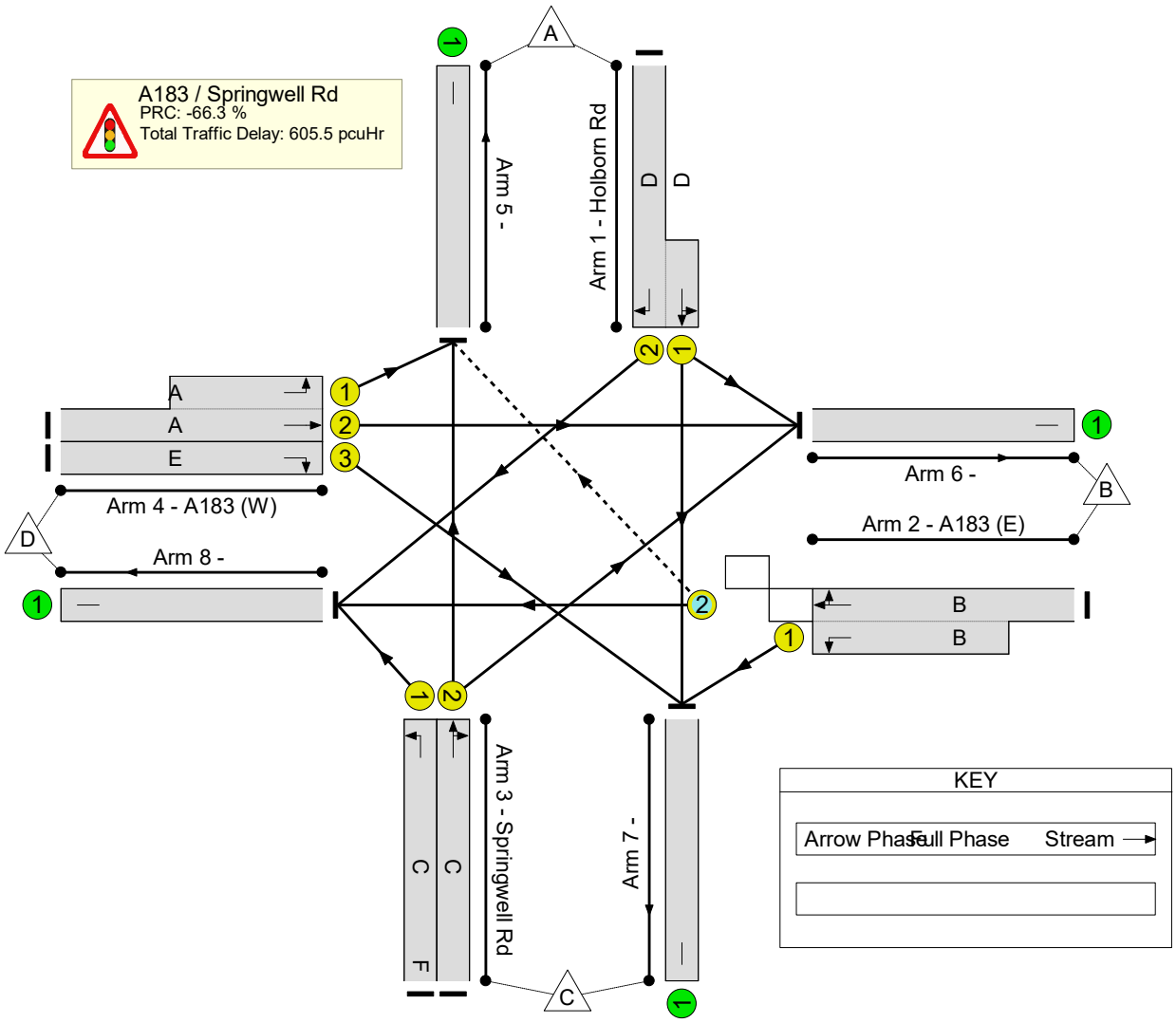
Stage	1	2	3	4	5
Duration	12	17	17	22	5
Change Point	0	20	45	71	106

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: AM43 (Peds)		
Cycle Time: 120	PRC: -66.3%	Tot Delay (pcuHr): 605.47



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

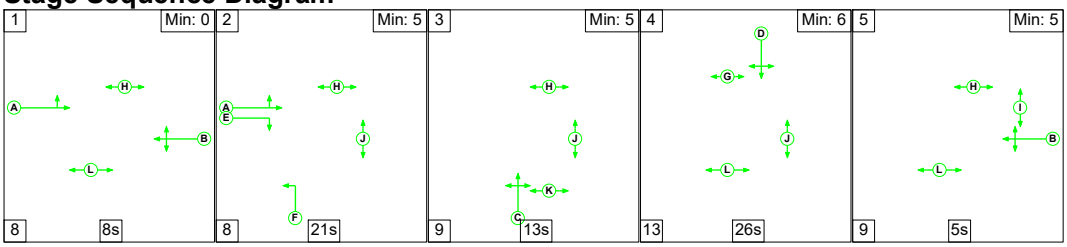
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	649	1781:1886	101+334	149.0 : 149.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	27	-	802	1879:1793	396+140	149.7 : 149.7%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	684	1794	718	95.3%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	614	1901	412	149.1%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	780	1910:1809	563+67	123.7 : 123.7%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	426	1723	287	148.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**0**	**21**	**39**	**104.4**	**500.7**	**0.4**	**605.5**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**21**	**39**	**104.4**	**500.7**	**0.4**	**605.5**	**-**	**-**	**-**	**-**
1/2+1/1	649	435	-	-	-	21.6	108.3	-	129.9	720.3	33.0	108.3	141.3
2/2+2/1	802	536	0	21	39	27.1	134.5	0.4	162.0	727.1	35.9	134.5	170.5
3/1	684	684	-	-	-	6.6	7.1	-	13.8	72.5	22.0	7.1	29.2
3/2	614	412	-	-	-	17.9	102.6	-	120.4	706.1	27.2	102.6	129.8
4/2+4/1	780	631	-	-	-	17.6	77.2	-	94.8	437.5	31.4	77.2	108.7
4/3	426	287	-	-	-	13.7	70.9	-	84.6	715.3	18.8	70.9	89.7
5/1	447	447	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	714	714	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	703	703	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1121	1121	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -66.3 Total Delay for Signalled Lanes (pcuHr): 605.47 Cycle Time (s): 120
PRC Over All Lanes (%): -66.3 Total Delay Over All Lanes(pcuHr): 605.47

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

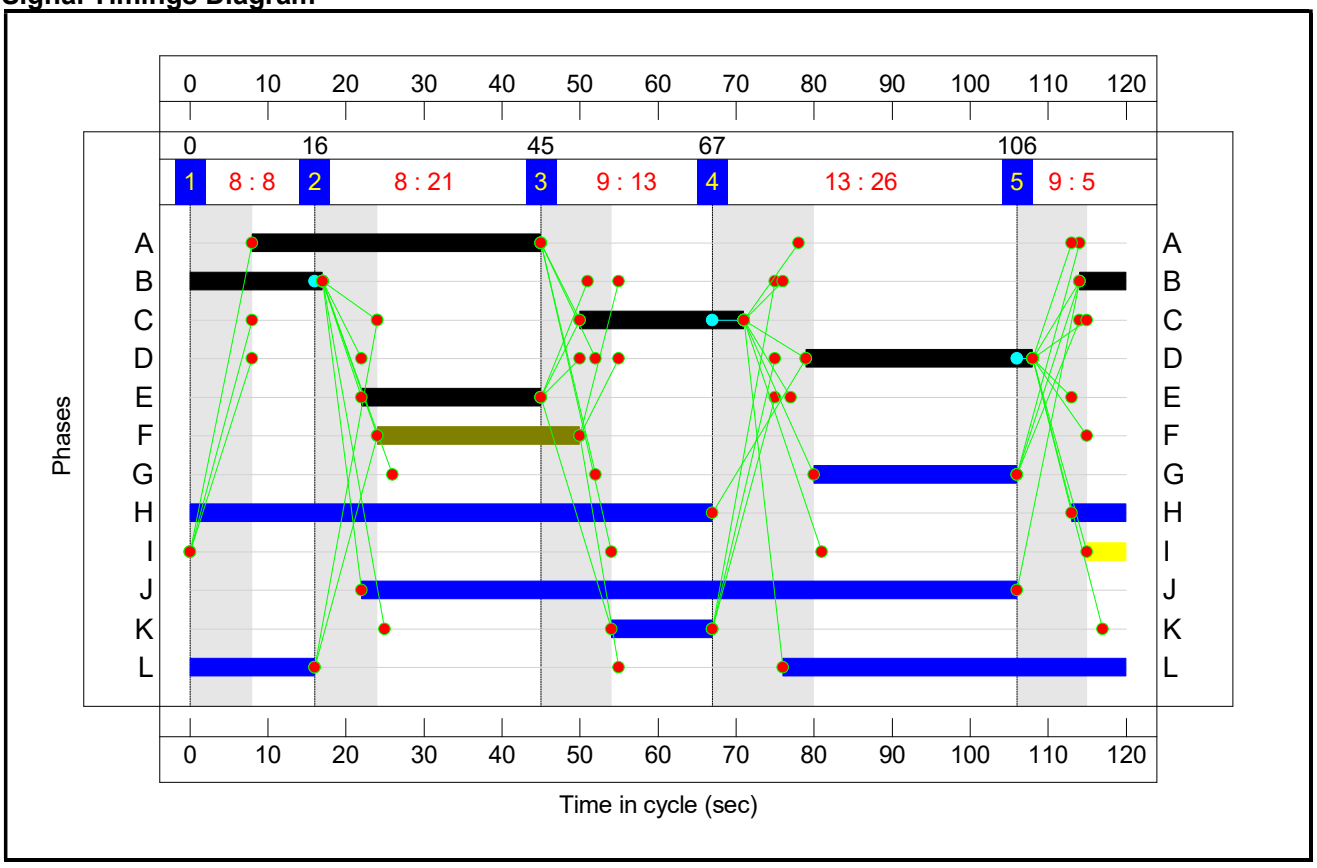
Stage Sequence Diagram



Stage Timings

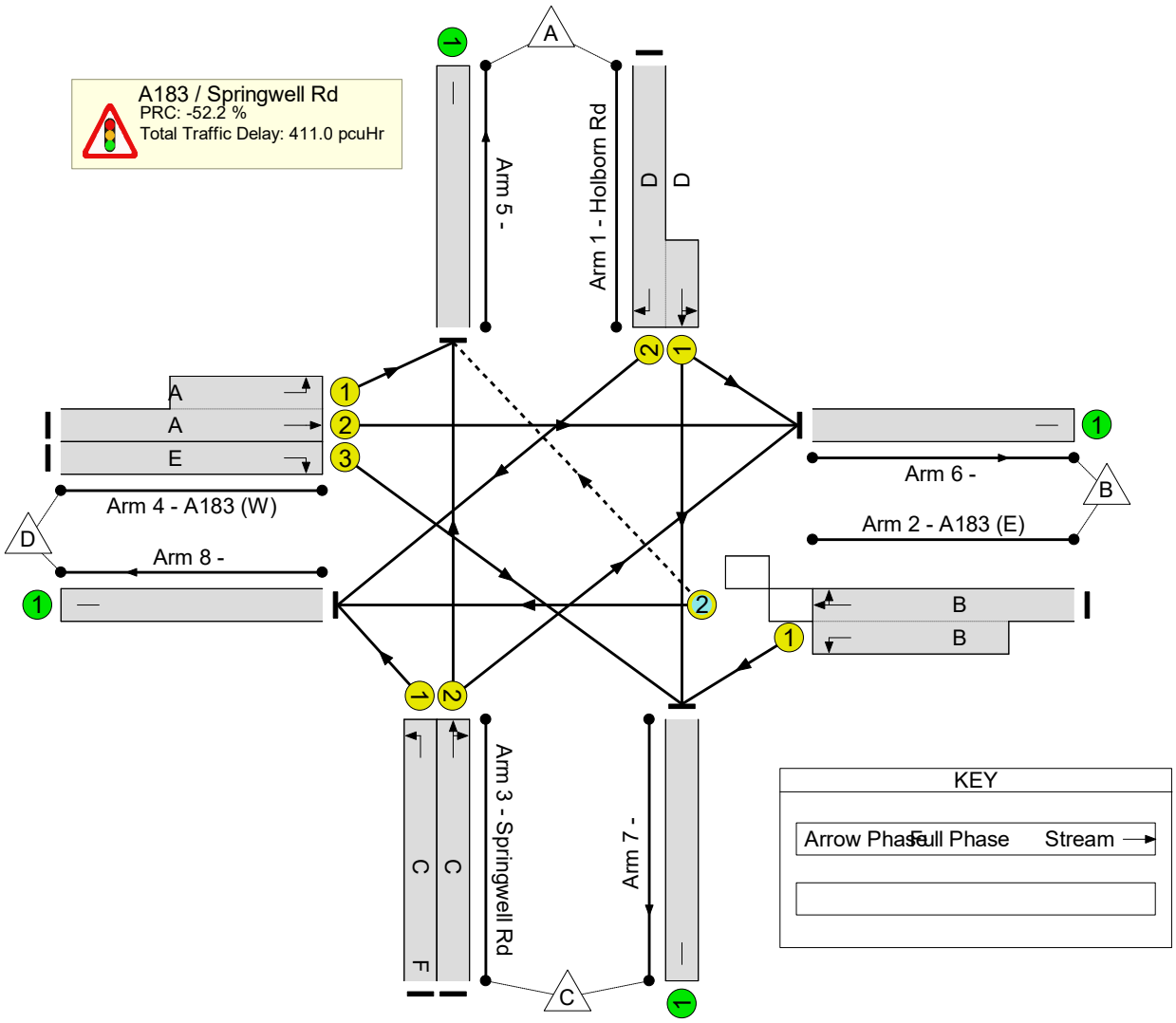
Stage	1	2	3	4	5
Duration	8	21	13	26	5
Change Point	0	16	45	67	106

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: PM23 (Peds)		
Cycle Time: 120	PRC: -52.2%	Tot Delay (pcuHr): 410.99



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

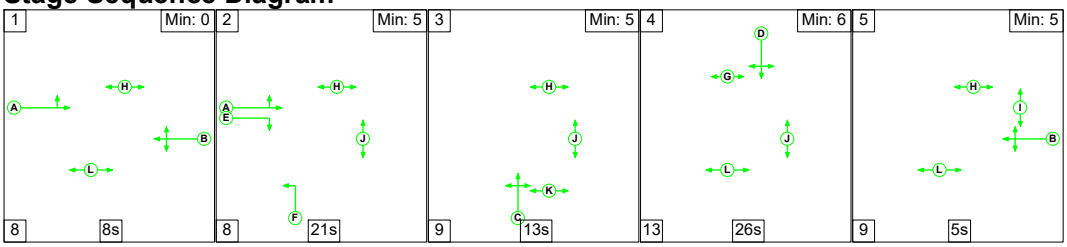
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**137.0%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**137.0%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	29	-	708	1781:1887	194+334	134.0 : 134.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	23	-	782	1891:1793	333+238	137.0 : 137.0%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	26	485	1794	718	67.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	475	1898	348	136.5%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	589	1910:1809	541+103	91.4 : 91.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	464	1723	345	134.6%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**17**	**15**	**2**	**79.1**	**331.7**	**0.2**	**411.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**17**	**15**	**2**	**79.1**	**331.7**	**0.2**	**411.0**	**-**	**-**	**-**	**-**
1/2+1/1	708	528	-	-	-	19.3	91.8	-	111.1	564.9	31.5	91.8	123.3
2/2+2/1	782	571	17	15	2	23.9	107.4	0.2	131.4	605.0	29.4	107.4	136.7
3/1	485	485	-	-	-	4.0	1.0	-	5.0	37.3	13.2	1.0	14.2
3/2	475	348	-	-	-	12.7	65.3	-	78.1	591.6	20.1	65.3	85.4
4/2+4/1	589	589	-	-	-	6.3	4.6	-	10.8	66.2	17.3	4.6	21.9
4/3	464	345	-	-	-	13.0	61.6	-	74.6	578.4	19.4	61.6	81.0
5/1	394	394	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	634	634	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	860	860	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	978	978	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -52.2 Total Delay for Signalled Lanes (pcuHr): 410.99 Cycle Time (s): 120
PRC Over All Lanes (%): -52.2 Total Delay Over All Lanes(pcuHr): 410.99

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

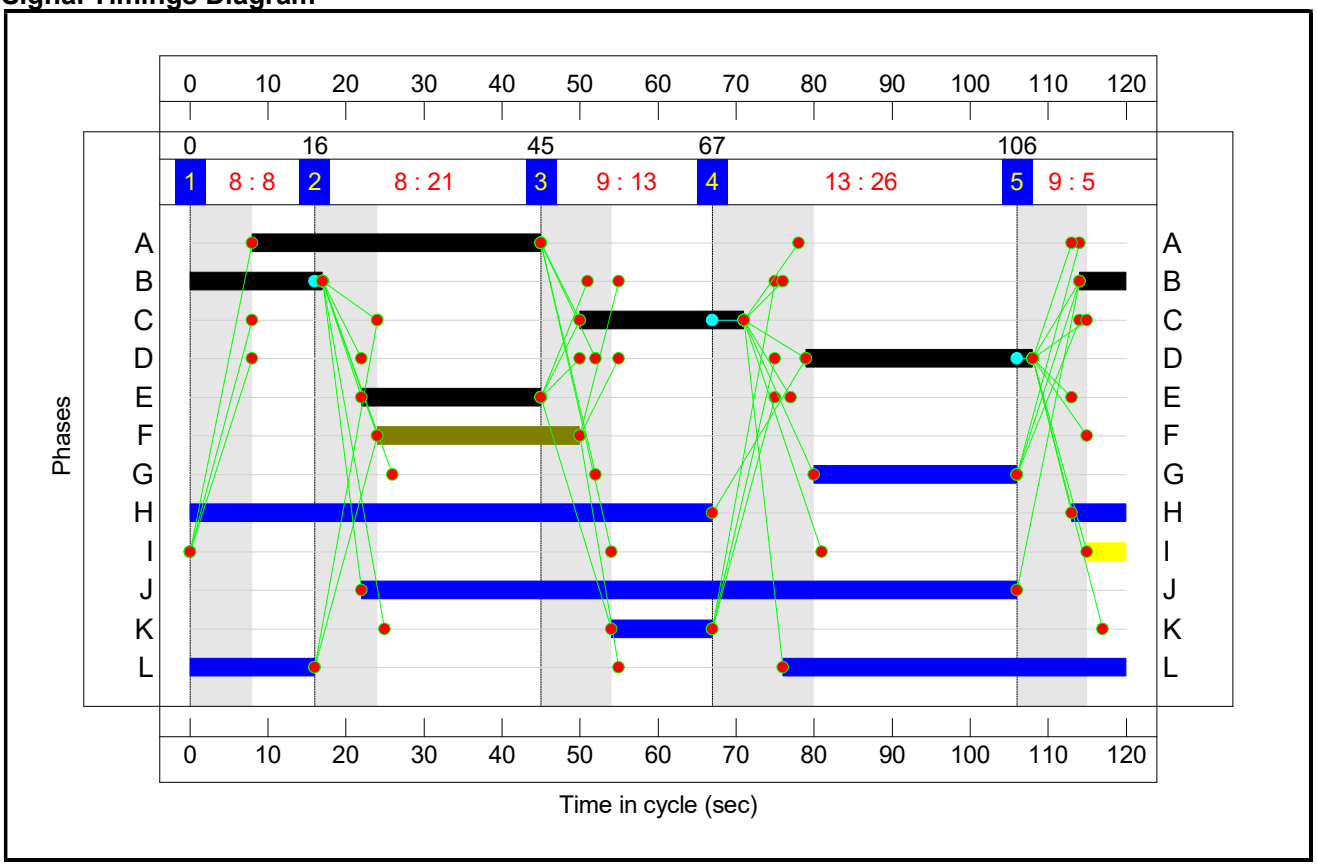
Stage Sequence Diagram



Stage Timings

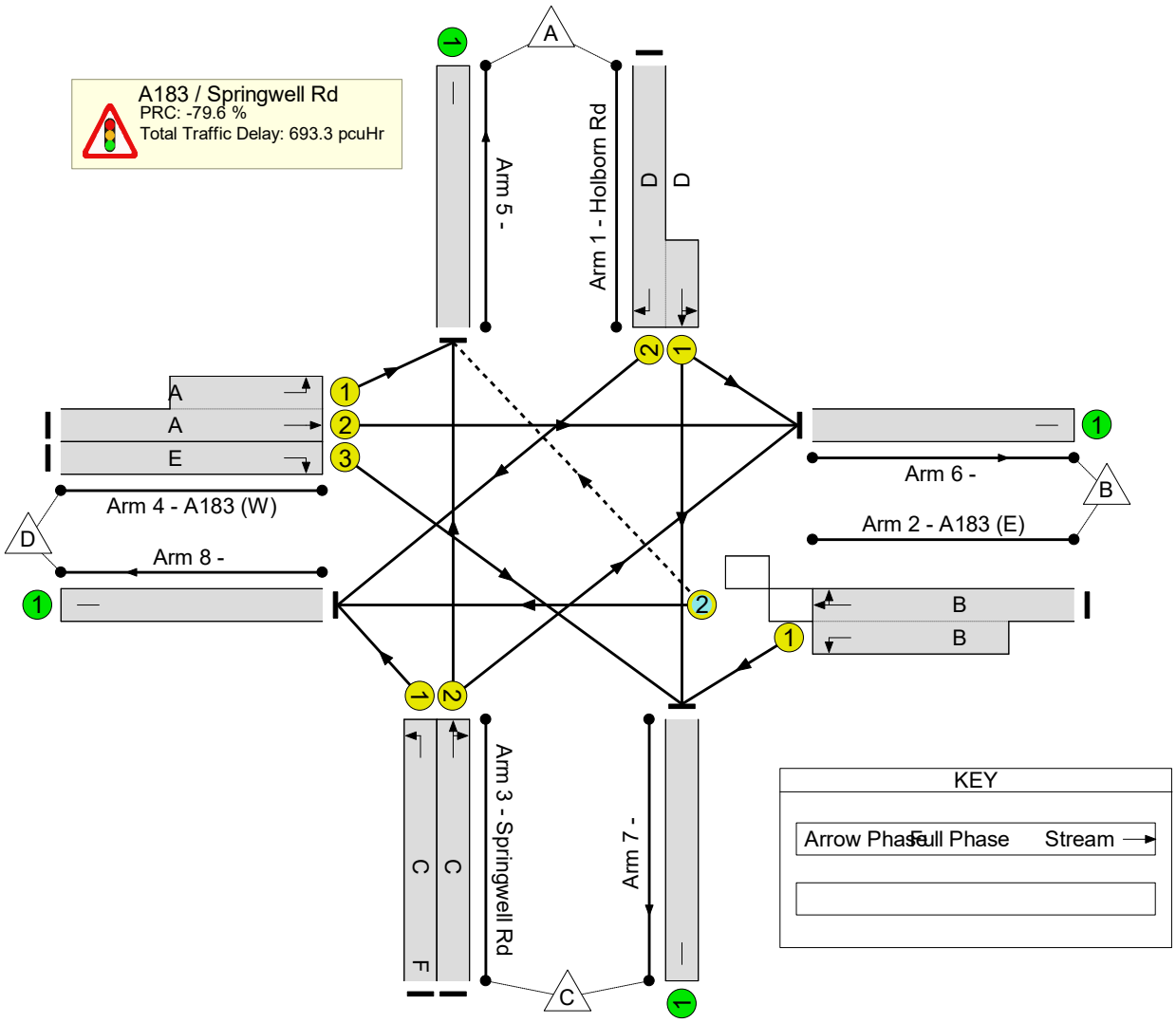
Stage	1	2	3	4	5
Duration	8	21	13	26	5
Change Point	0	16	45	67	106

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: PM43 (Peds)		
Cycle Time: 120	PRC: -79.6%	Tot Delay (pcuHr): 693.27



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

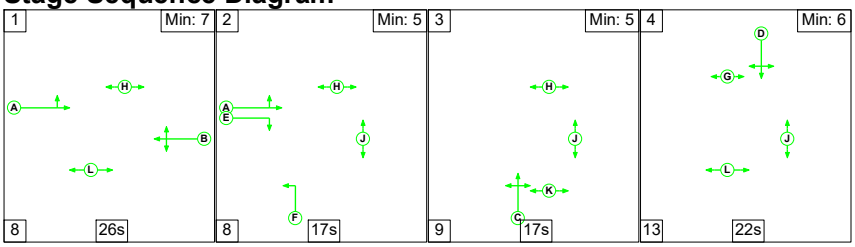
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**161.6%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**161.6%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	29	-	836	1781:1887	194+334	158.3 : 158.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	23	-	923	1891:1793	333+238	161.6 : 161.6%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	26	572	1794	718	79.7%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	560	1898	348	160.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	695	1910:1809	541+103	107.9 : 107.9%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	548	1723	345	159.0%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**0**	**15**	**19**	**117.4**	**575.7**	**0.2**	**693.3**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**0**	**15**	**19**	**117.4**	**575.7**	**0.2**	**693.3**	**-**	**-**	**-**	**-**
1/2+1/1	836	528	-	-	-	29.8	155.3	-	185.1	796.9	44.0	155.3	199.2
2/2+2/1	923	571	0	15	19	34.8	177.3	0.2	212.3	828.0	42.7	177.3	219.9
3/1	572	572	-	-	-	5.0	1.9	-	7.0	43.8	16.7	1.9	18.6
3/2	560	348	-	-	-	18.1	107.3	-	125.4	806.1	25.7	107.3	133.1
4/2+4/1	695	644	-	-	-	10.7	31.0	-	41.7	215.9	24.7	31.0	55.6
4/3	548	345	-	-	-	18.9	103.0	-	121.9	800.7	25.0	103.0	128.1
5/1	403	403	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	680	680	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	860	860	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1065	1065	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -79.6 Total Delay for Signalled Lanes (pcuHr): 693.27 Cycle Time (s): 120
PRC Over All Lanes (%): -79.6 Total Delay Over All Lanes(pcuHr): 693.27

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

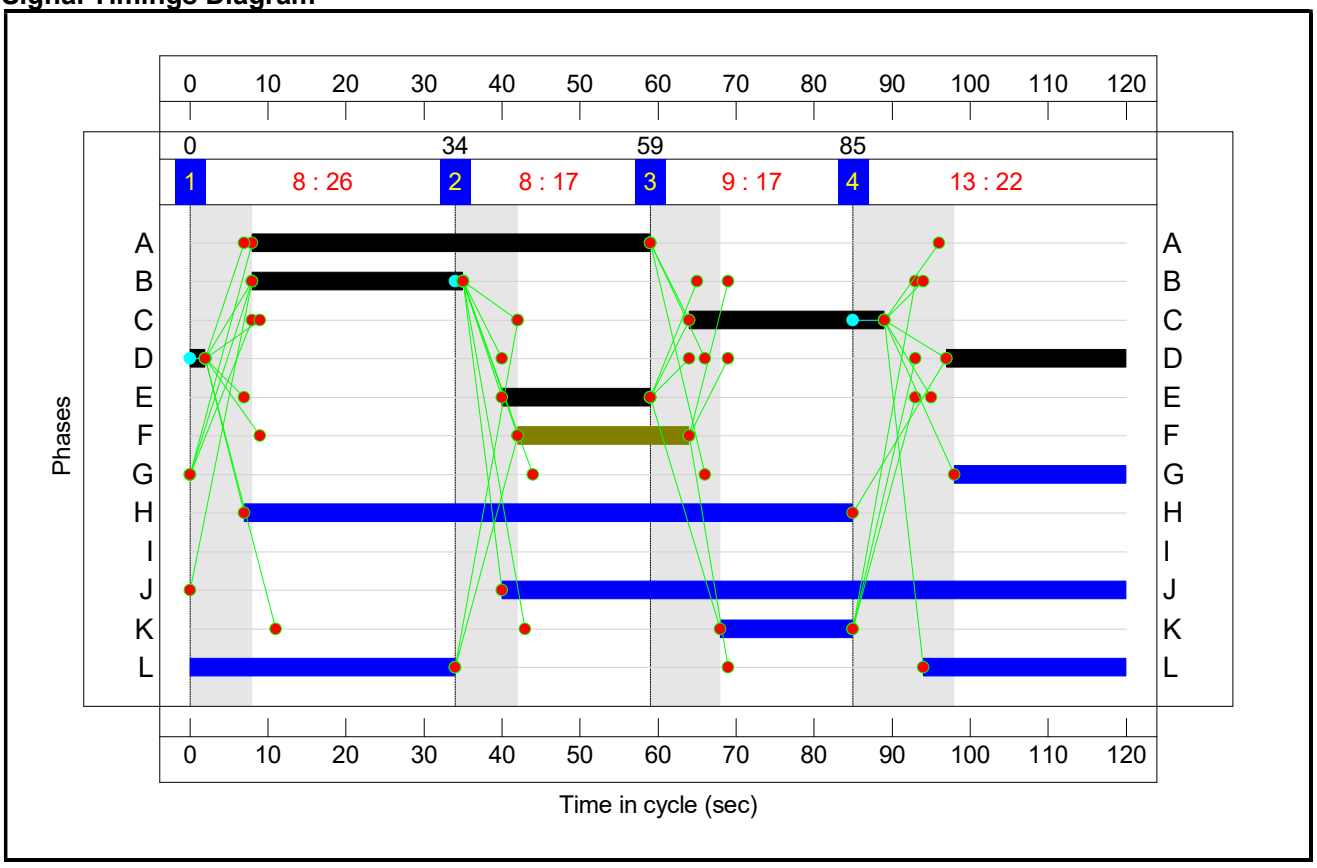
Stage Sequence Diagram



Stage Timings

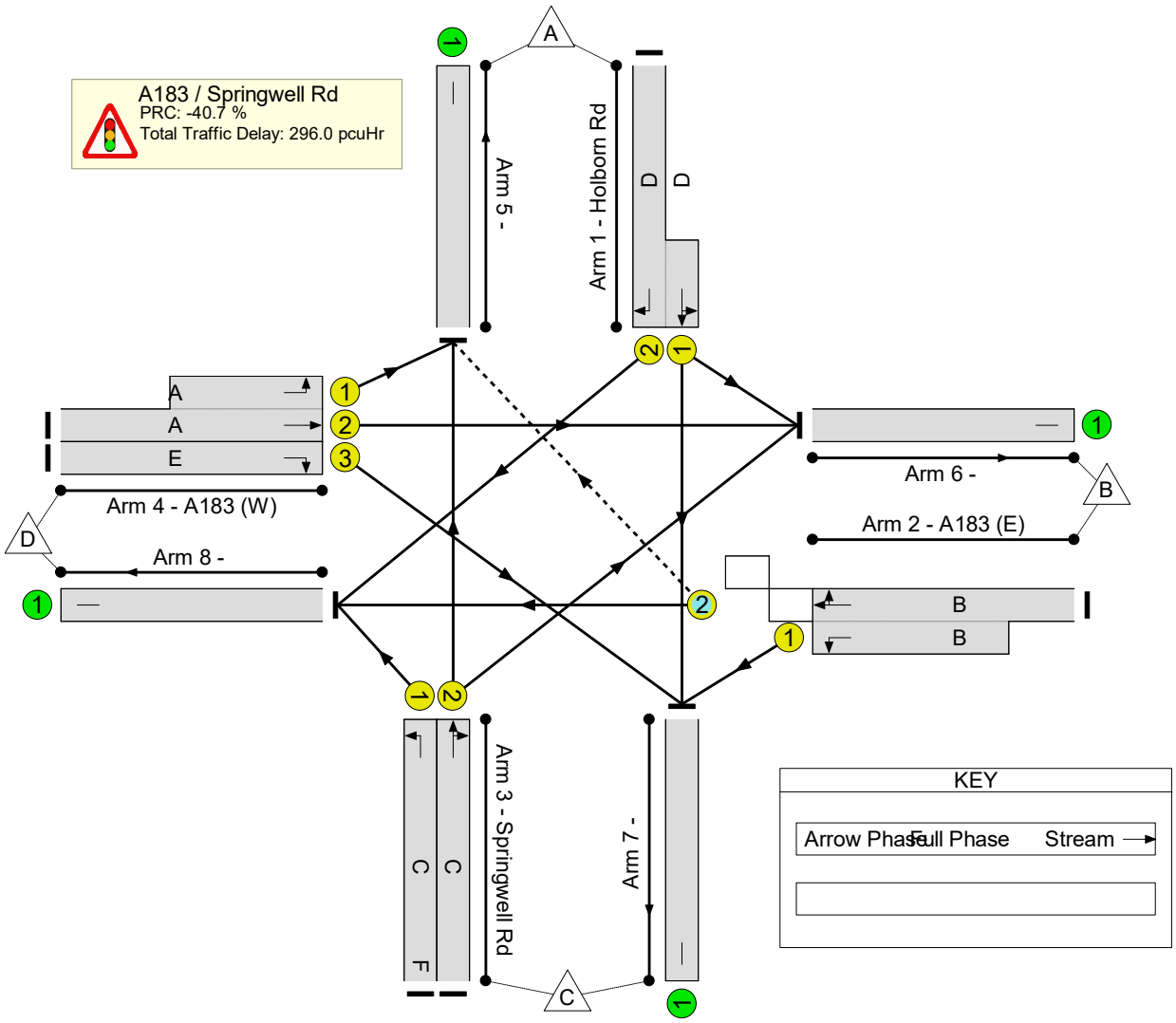
Stage	1	2	3	4
Duration	26	17	17	22
Change Point	0	34	59	85

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: AM23 (No Peds)		
Cycle Time: 120	PRC: -40.7%	Tot Delay (pcuHr): 295.96



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

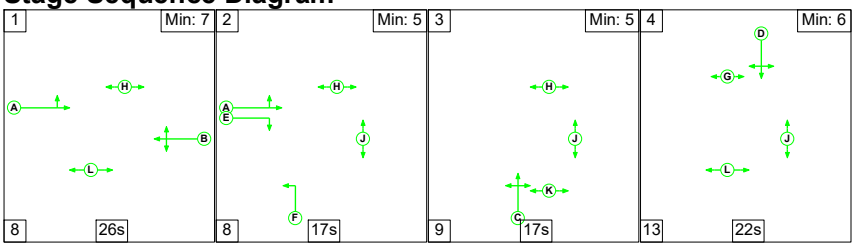
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**126.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	550	1781:1886	101+334	126.3 : 126.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	27	-	679	1879:1793	396+141	126.7 : 126.7%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	580	1794	718	80.8%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	520	1901	412	126.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	661	1910:1809	762+90	77.6 : 77.6%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	361	1723	287	125.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	887	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**57**	**0**	**3**	**62.9**	**232.7**	**0.4**	**296.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**57**	**0**	**3**	**62.9**	**232.7**	**0.4**	**296.0**	**-**	**-**	**-**	**-**
1/2+1/1	550	435	-	-	-	15.0	59.6	-	74.5	487.9	24.0	59.6	83.6
2/2+2/1	679	536	57	0	3	17.1	73.8	0.4	91.3	483.8	25.7	73.8	99.5
3/1	580	580	-	-	-	5.1	2.0	-	7.2	44.6	17.1	2.0	19.1
3/2	520	412	-	-	-	11.6	56.4	-	68.0	470.8	20.9	56.4	77.3
4/2+4/1	661	661	-	-	-	5.2	1.7	-	6.9	37.4	17.7	1.7	19.4
4/3	361	287	-	-	-	8.9	39.2	-	48.1	479.6	14.5	39.2	53.7
5/1	450	450	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	741	741	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	703	703	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1017	1017	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -40.7 Total Delay for Signalled Lanes (pcuHr): 295.96 Cycle Time (s): 120
PRC Over All Lanes (%): -40.7 Total Delay Over All Lanes(pcuHr): 295.96

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

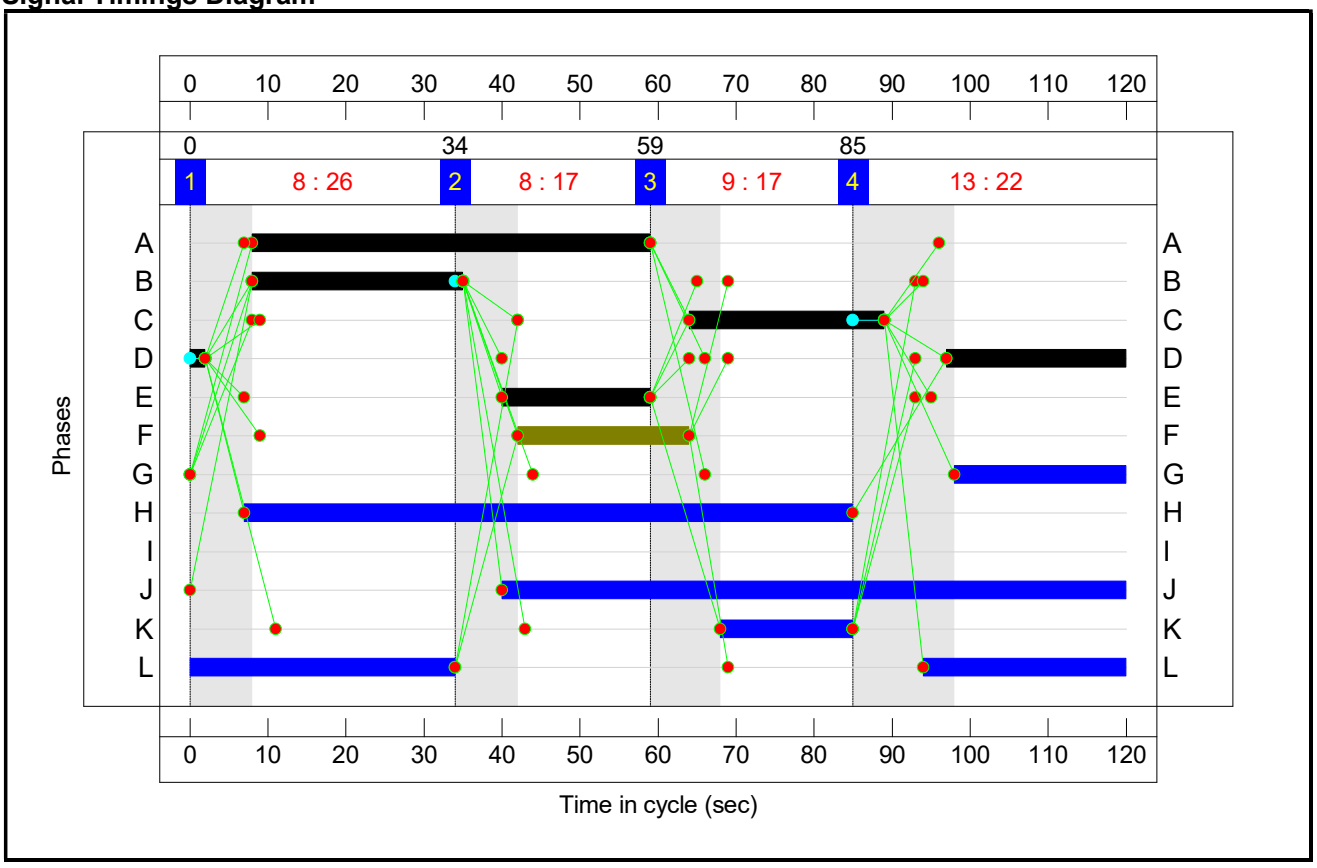
Stage Sequence Diagram



Stage Timings

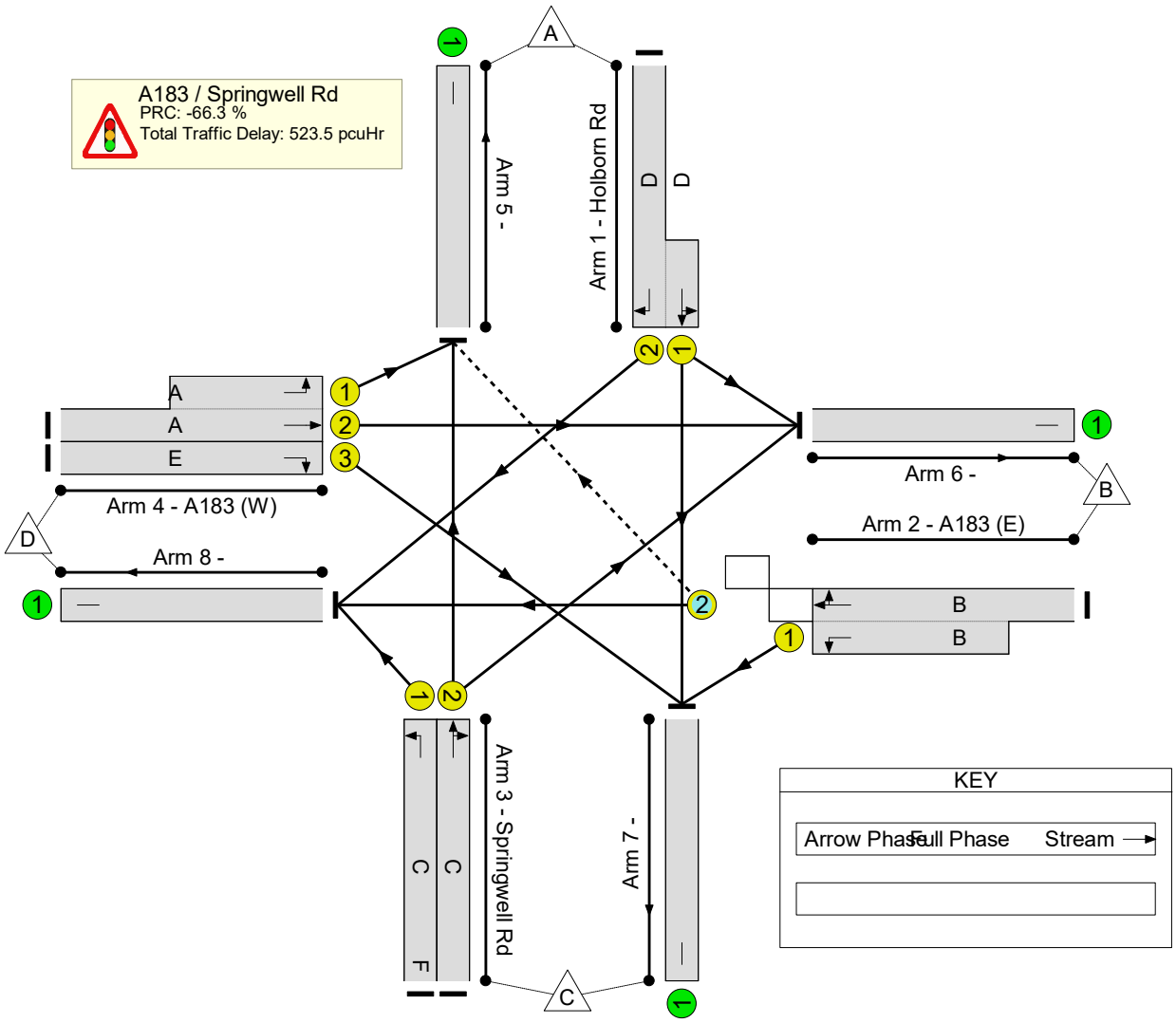
Stage	1	2	3	4
Duration	26	17	17	22
Change Point	0	34	59	85

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: AM43 (No Peds)		
Cycle Time: 120	PRC: -66.3%	Tot Delay (pcuHr): 523.53



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

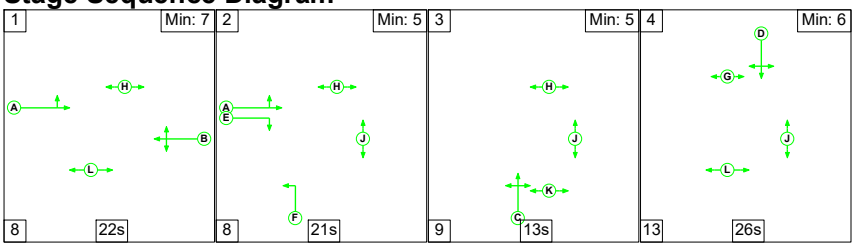
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**149.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	25	-	649	1781:1886	101+334	149.0 : 149.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	27	-	802	1879:1793	396+140	149.7 : 149.7%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	22	684	1794	718	95.3%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	25	-	614	1901	412	149.1%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	780	1910:1809	761+91	91.5 : 91.5%
4/3	A183 (W) Right	U	N/A	N/A	E		1	19	-	426	1723	287	148.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1047	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**35**	**0**	**25**	**94.7**	**428.2**	**0.6**	**523.5**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**35**	**0**	**25**	**94.7**	**428.2**	**0.6**	**523.5**	**-**	**-**	**-**	**-**
1/2+1/1	649	435	-	-	-	23.1	108.3	-	131.4	728.7	33.8	108.3	142.0
2/2+2/1	802	536	35	0	25	26.0	134.5	0.6	161.2	723.4	34.2	134.5	168.7
3/1	684	684	-	-	-	6.6	7.1	-	13.8	72.5	22.0	7.1	29.2
3/2	614	412	-	-	-	19.0	102.6	-	121.6	713.0	29.2	102.6	131.7
4/2+4/1	780	780	-	-	-	6.7	4.8	-	11.5	53.1	23.4	4.8	28.2
4/3	426	287	-	-	-	13.2	70.9	-	84.1	710.7	18.8	70.9	89.7
5/1	463	463	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	847	847	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	703	703	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1121	1121	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -66.3 Total Delay for Signalled Lanes (pcuHr): 523.53 Cycle Time (s): 120
PRC Over All Lanes (%): -66.3 Total Delay Over All Lanes(pcuHr): 523.53

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

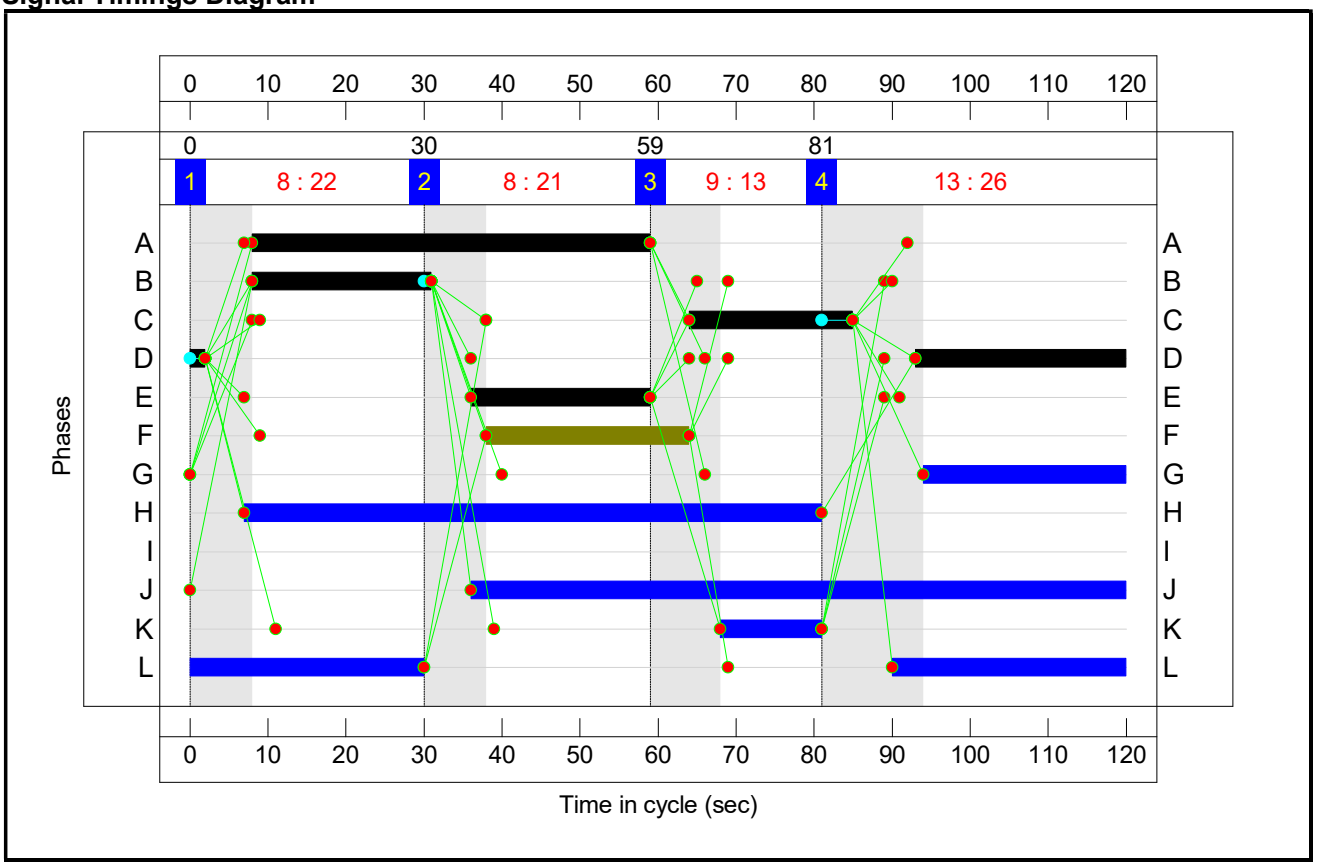
Stage Sequence Diagram



Stage Timings

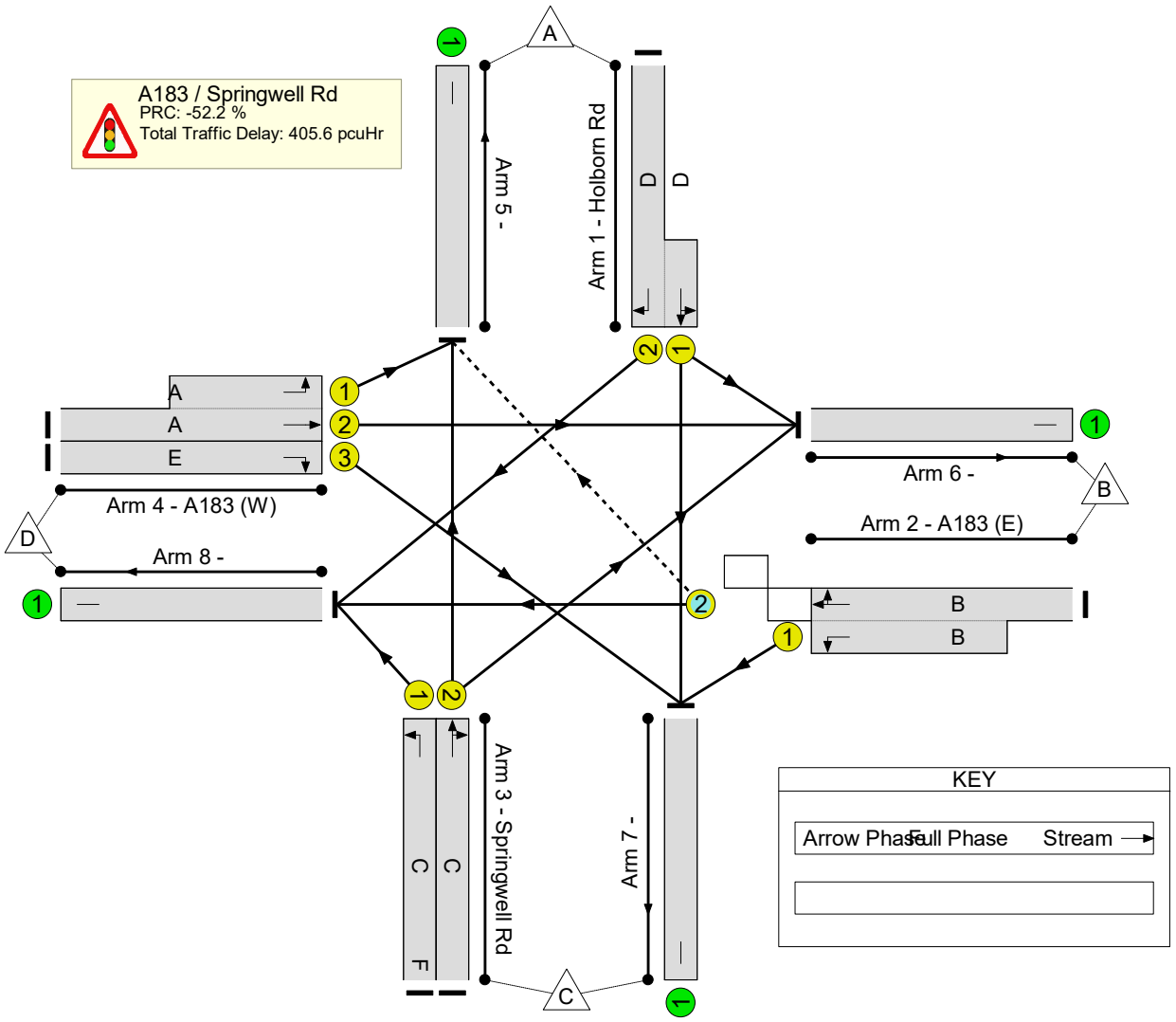
Stage	1	2	3	4
Duration	22	21	13	26
Change Point	0	30	59	81

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: PM23 (No Peds)		
Cycle Time: 120	PRC: -52.2%	Tot Delay (pcuHr): 405.57



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

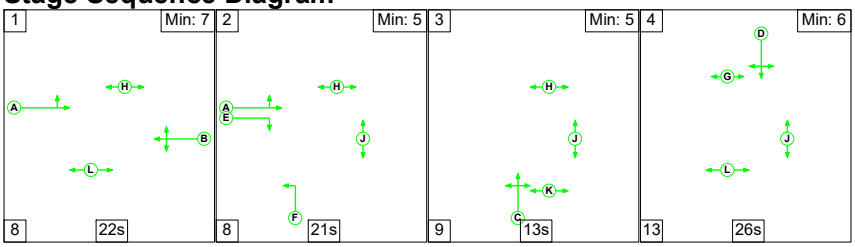
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**137.0%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**137.0%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	29	-	708	1781:1887	194+334	134.0 : 134.0%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	23	-	782	1891:1793	333+238	137.0 : 137.0%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	26	485	1794	718	67.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	475	1898	348	136.5%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	589	1910:1809	727+138	68.1 : 68.1%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	464	1723	345	134.6%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	683	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1162	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**32**	**0**	**2**	**77.2**	**328.2**	**0.2**	**405.6**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**32**	**0**	**2**	**77.2**	**328.2**	**0.2**	**405.6**	**-**	**-**	**-**	**-**
1/2+1/1	708	528	-	-	-	21.1	91.8	-	113.0	574.3	32.3	91.8	124.1
2/2+2/1	782	571	32	0	2	23.1	107.4	0.2	130.6	601.3	28.4	107.4	135.8
3/1	485	485	-	-	-	4.0	1.0	-	5.0	37.3	13.2	1.0	14.2
3/2	475	348	-	-	-	12.2	65.3	-	77.6	588.0	20.1	65.3	85.4
4/2+4/1	589	589	-	-	-	4.3	1.1	-	5.3	32.5	14.1	1.1	15.1
4/3	464	345	-	-	-	12.5	61.6	-	74.1	574.8	19.4	61.6	81.0
5/1	394	394	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	634	634	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	860	860	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	978	978	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -52.2 Total Delay for Signalled Lanes (pcuHr): 405.57 Cycle Time (s): 120
PRC Over All Lanes (%): -52.2 Total Delay Over All Lanes(pcuHr): 405.57

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

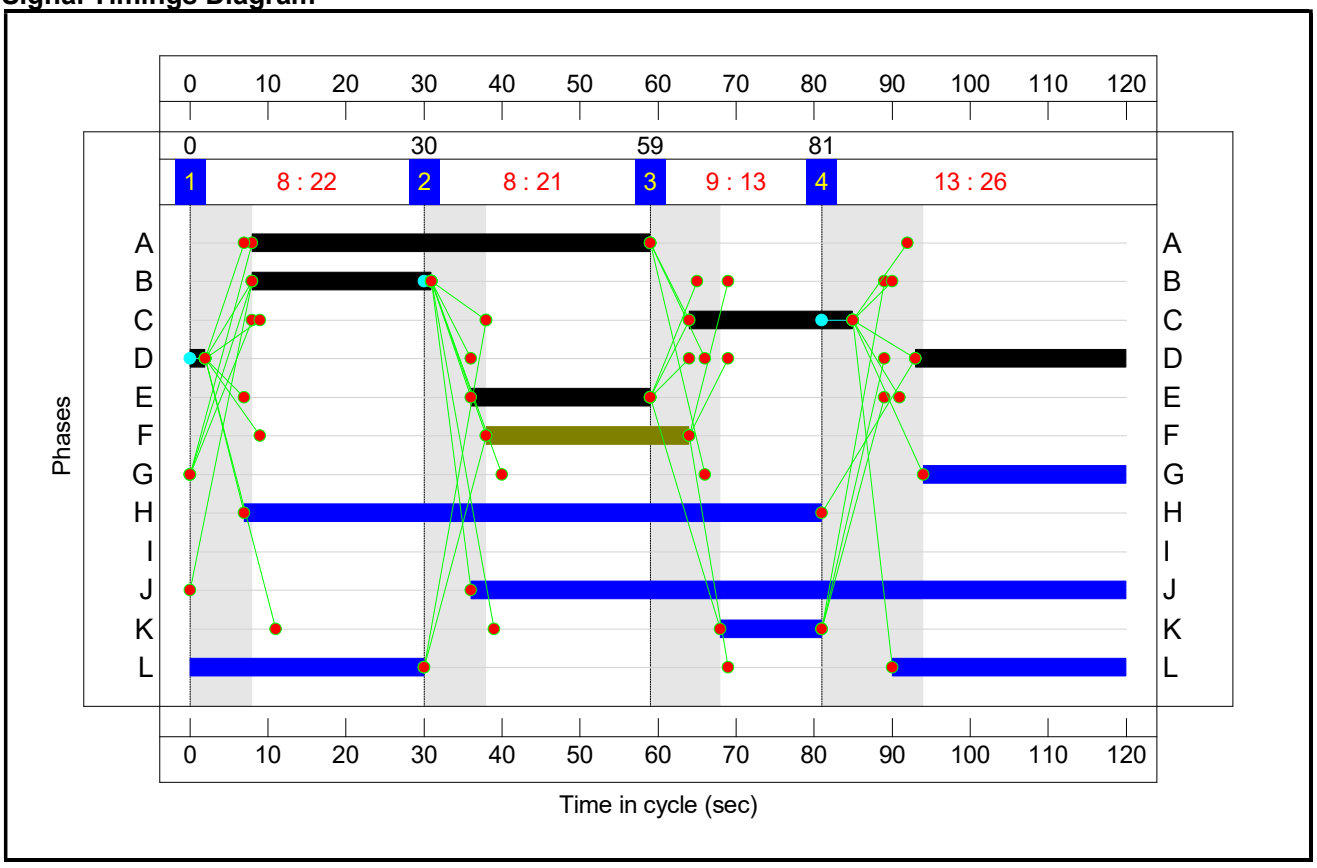
Stage Sequence Diagram



Stage Timings

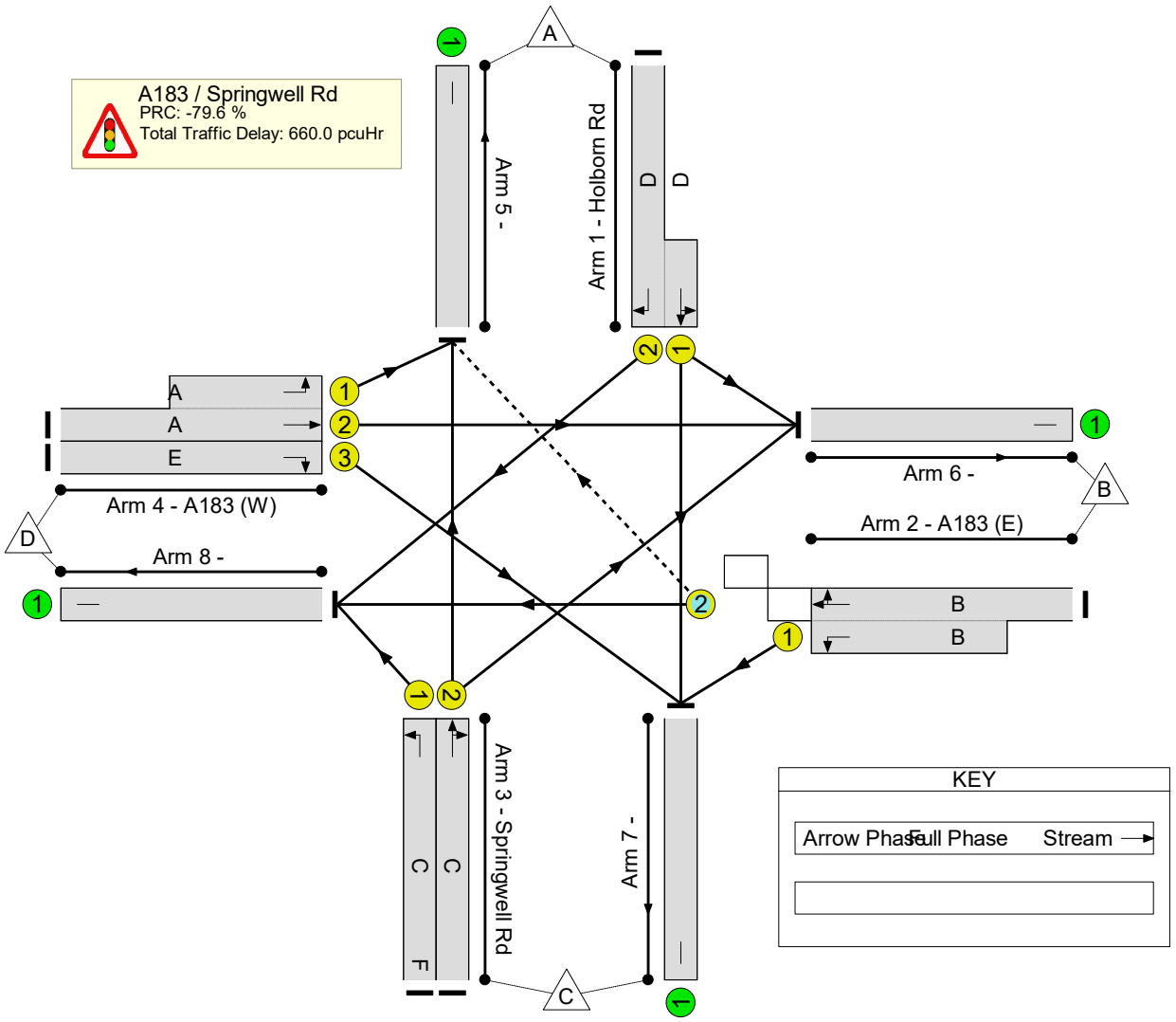
Stage	1	2	3	4
Duration	22	21	13	26
Change Point	0	30	59	81

Signal Timings Diagram



Network Layout Diagram

Results For Scenario: PM43 (No Peds)		
Cycle Time: 120	PRC: -79.6%	Tot Delay (pcuHr): 660.02



Assumptions

Option D1 changes the lane marking on north, with aheads using nearside instead of offside lane.

The drawing shows that ahead traffic from the west can use both lanes on the approach. However, JCT assumed this traffic only used the middle lane, as it was felt it was unlikely drivers would move across to the nearside lane after the bus lane, only to have to merge back into the offside lane after exiting the junction due to the bus lane downstream.

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The drawing showed two crossings on Springwell Rd, although they were not staggered. The modelling assumed that these crossings could run independently of each other, and therefore consideration to staggering these crossings is recommended, so that pedestrians do not think a green man indicates they are permitted to cross both crossings in one go. The intergreen measurements assumed they were staggered, with approximate locations indicated in the quickGreen file.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option D1	-	-	**N/A**	-	-		-	-	-	-	-	-	**161.6%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**161.6%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	29	-	836	1781:1887	194+334	158.3 : 158.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	23	-	923	1891:1793	333+238	161.6 : 161.6%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	26	572	1794	718	79.7%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	21	-	560	1898	348	160.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	695	1910:1809	727+138	80.3 : 80.3%
4/3	A183 (W) Right	U	N/A	N/A	E		1	23	-	548	1723	345	159.0%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	806	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	1372	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option D1	**-**	**-**	**32**	**0**	**2**	**113.0**	**546.8**	**0.2**	**660.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**32**	**0**	**2**	**113.0**	**546.8**	**0.2**	**660.0**	**-**	**-**	**-**	**-**
1/2+1/1	836	528	-	-	-	31.6	155.3	-	186.9	804.7	44.9	155.3	200.2
2/2+2/1	923	571	32	0	2	33.5	177.3	0.2	211.0	822.9	39.1	177.3	216.3
3/1	572	572	-	-	-	5.0	1.9	-	7.0	43.8	16.7	1.9	18.6
3/2	560	348	-	-	-	19.3	107.3	-	126.7	814.3	27.8	107.3	135.1
4/2+4/1	695	695	-	-	-	5.5	2.0	-	7.4	38.6	18.4	2.0	20.4
4/3	548	345	-	-	-	18.1	103.0	-	121.1	795.5	25.0	103.0	128.1
5/1	411	411	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	723	723	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	860	860	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1065	1065	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -79.6 Total Delay for Signalled Lanes (pcuHr): 660.02 Cycle Time (s): 120
PRC Over All Lanes (%): -79.6 Total Delay Over All Lanes(pcuHr): 660.02

Appendix J

Existing Layout

ARCADY Data

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.1.1519

For sales and distribution information, program advice and maintenance, contact TRL Software:
+44 (0)1344 379777 software@trl.co.uk trlsoftware.com

Filename: Springwell Rd Option E.j10
Path: \\JCTSERVER\WorkFiles\Consultancy\Project Files 2023\23014 Springwell Rd\Models
Report generation date: 07/07/2023 11:23:54

Summary of junction performance

	AM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	AM23 - 2023						
1 - Holborn Rd	A1 D1	5.7	35.94	0.86	E	17.63	0 % [1 - Holborn Rd]
2 - A183 (E)		2.4	11.92	0.71	B		
3 - Springwell Rd		5.3	16.34	0.85	C		
4 - A183 (W)		3.9	12.97	0.80	B		

	AM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	AM43 - 2043						
1 - Holborn Rd	A2 D2	53.2	247.92	1.16	F	98.66	-16 % [1 - Holborn Rd]
2 - A183 (E)		6.2	26.82	0.87	D		
3 - Springwell Rd		46.4	107.73	1.05	F		
4 - A183 (W)		20.2	56.34	0.98	F		

	PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	PM23 - 2023						
1 - Holborn Rd	A3 D3	8.9	43.88	0.92	E	17.24	-2 % [1 - Holborn Rd]
2 - A183 (E)		4.0	17.24	0.80	C		
3 - Springwell Rd		2.8	9.74	0.74	A		
4 - A183 (W)		2.0	6.16	0.66	A		

	PM						
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Junction Delay (s)	Network Residual Capacity
	PM43 - 2043						
1 - Holborn Rd	A4 D4	99.6	367.35	1.26	F	99.64	-17 % [1 - Holborn Rd]
2 - A183 (E)		18.6	67.74	0.98	F		
3 - Springwell Rd		7.9	24.30	0.90	C		
4 - A183 (W)		4.4	11.89	0.82	B		

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

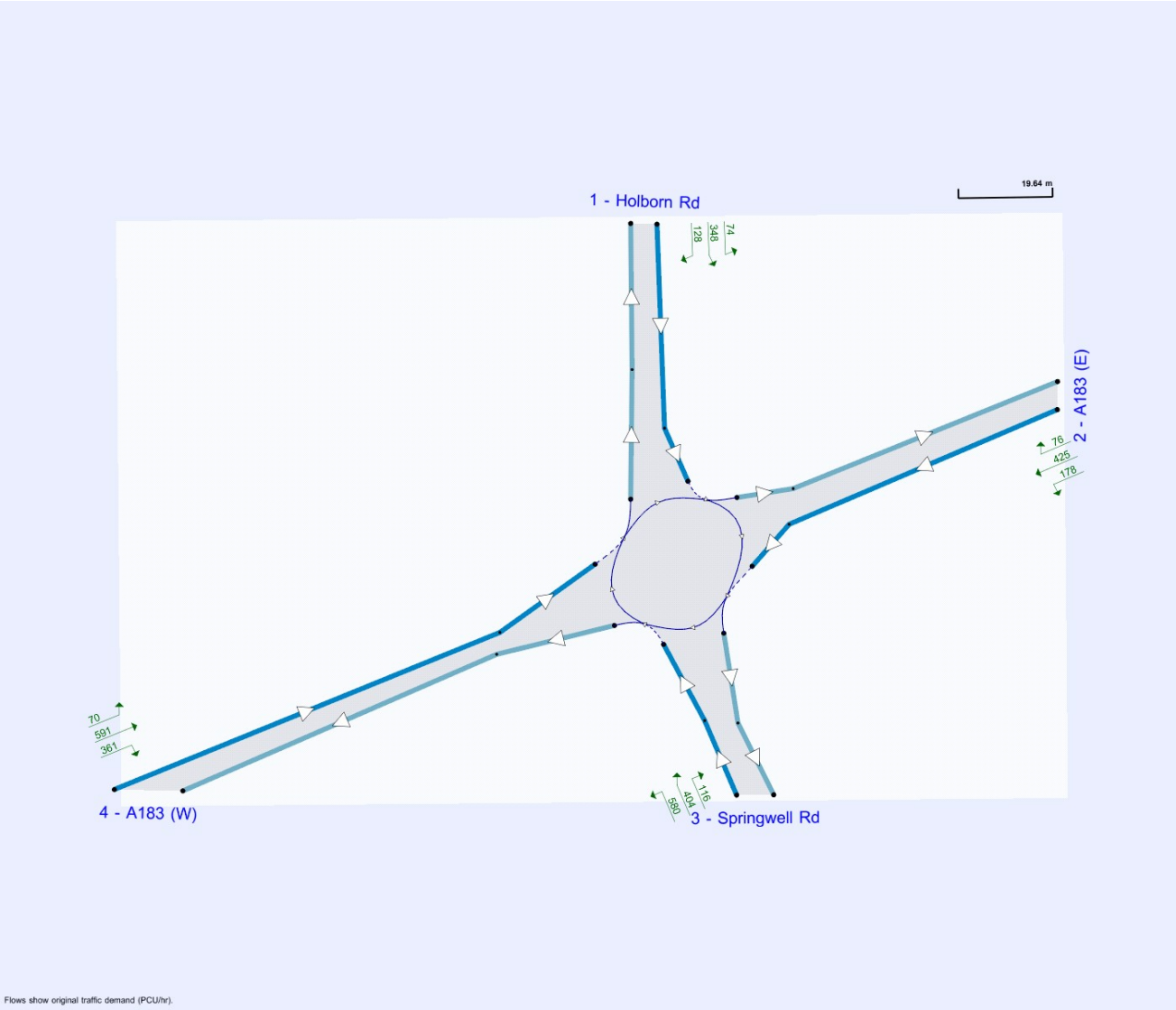
File summary

File Description

Title	Springwell Rd Option E
Location	Sunderland
Site number	
Date	07/07/2023
Version	
Status	(new file)
Identifier	
Client	Sunderland City Council
Jobnumber	23014
Enumerator	jct\simon.swanston
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Show lane queues in feet / metres	Show all PICADY stream intercepts	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)	Use iterations with HCM roundabouts	Max number of iterations for roundabouts
5.75					✓	Delay	0.85	36.00	20.00		500

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2023	AM	ONE HOUR	07:15	08:45	15	✓
D2	2043	AM	ONE HOUR	07:15	08:45	15	✓
D3	2023	PM	ONE HOUR	16:15	17:45	15	✓
D4	2043	PM	ONE HOUR	16:15	17:45	15	✓

AM23 - 2023, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	AM23	✓	✓	D1	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	17.63	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	0	1 - Holborn Rd	17.63	C

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	2.50	9.71	28.3	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	3.00	10.19	27.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.742	2042
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.774	2194

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	65.72
2 - A183 (E)	Percentage	Unequal Lane Usage	77.77
3 - Springwell Rd	Percentage	Unequal Lane Usage	89.33
4 - A183 (W)	Percentage	Unequal Lane Usage	83.23

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2023	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	550	100.000
2 - A183 (E)		ONE HOUR	✓	679	100.000
3 - Springwell Rd		ONE HOUR	✓	1100	100.000
4 - A183 (W)		ONE HOUR	✓	1022	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	74	348	128
	2 - A183 (E)	76	0	178	425
	3 - Springwell Rd	404	116	0	580
	4 - A183 (W)	70	591	361	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	9	2	2
	2 - A183 (E)	6	0	2	3
	3 - Springwell Rd	1	5	0	1
	4 - A183 (W)	1	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	0.86	35.94	5.7	E	505	757
2 - A183 (E)	0.71	11.92	2.4	B	623	935
3 - Springwell Rd	0.85	16.34	5.3	C	1009	1514
4 - A183 (W)	0.80	12.97	3.9	B	938	1407

AM43 - 2043, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A2	AM43	✓	✓	D2	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	98.66	F

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-16	1 - Holborn Rd	98.66	F

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	2.50	9.71	28.3	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	3.00	10.19	27.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.742	2042
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.774	2194

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	65.72
2 - A183 (E)	Percentage	Unequal Lane Usage	77.77
3 - Springwell Rd	Percentage	Unequal Lane Usage	89.39
4 - A183 (W)	Percentage	Unequal Lane Usage	83.28

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2043	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	649	100.000
2 - A183 (E)		ONE HOUR	✓	802	100.000
3 - Springwell Rd		ONE HOUR	✓	1298	100.000
4 - A183 (W)		ONE HOUR	✓	1206	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	87	411	151
	2 - A183 (E)	90	0	210	502
	3 - Springwell Rd	477	137	0	684
	4 - A183 (W)	83	697	426	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	9	2	2
	2 - A183 (E)	6	0	2	3
	3 - Springwell Rd	1	5	0	1
	4 - A183 (W)	1	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	1.16	247.92	53.2	F	596	893
2 - A183 (E)	0.87	26.82	6.2	D	736	1104
3 - Springwell Rd	1.05	107.73	46.4	F	1191	1787
4 - A183 (W)	0.98	56.34	20.2	F	1107	1660

PM23 - 2023, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A3	PM23	✓	✓	D3	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	17.24	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-2	1 - Holborn Rd	17.24	C

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	2.50	9.71	28.3	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	3.00	10.19	27.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.742	2042
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.774	2194

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	79.69
2 - A183 (E)	Percentage	Unequal Lane Usage	93.07
3 - Springwell Rd	Percentage	Unequal Lane Usage	93.24

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2023	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	708	100.000
2 - A183 (E)		ONE HOUR	✓	782	100.000
3 - Springwell Rd		ONE HOUR	✓	960	100.000
4 - A183 (W)		ONE HOUR	✓	1053	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	76	372	260
	2 - A183 (E)	47	0	326	409
	3 - Springwell Rd	363	112	0	485
	4 - A183 (W)	94	495	464	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	6	0	1
	2 - A183 (E)	12	0	2	1
	3 - Springwell Rd	0	5	0	1
	4 - A183 (W)	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	0.92	43.88	8.9	E	650	975
2 - A183 (E)	0.80	17.24	4.0	C	718	1076
3 - Springwell Rd	0.74	9.74	2.8	A	881	1321
4 - A183 (W)	0.66	6.16	2.0	A	966	1449

PM43 - 2043, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Name	Include in report	Use specific Demand Set(s)	Specific Demand Set(s)	Network flow scaling factor (%)	Network capacity scaling factor (%)
A4	PM43	✓	✓	D4	100.000	100.000

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	A183 / Springwell Rd / Holborn Rd	Standard Roundabout		1, 2, 3, 4	99.64	F

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	-17	1 - Holborn Rd	99.64	F

Arms

Arms

Arm	Name	Description	No give-way line
1	Holborn Rd		
2	A183 (E)		
3	Springwell Rd		
4	A183 (W)		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Holborn Rd	4.41	7.16	20.3	12.1	29.3	27.4		
2 - A183 (E)	2.50	9.71	28.3	23.4	29.0	20.2		
3 - Springwell Rd	6.20	7.50	17.0	10.2	29.2	28.2		
4 - A183 (W)	3.00	10.19	27.5	39.0	29.3	23.3		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Holborn Rd	0.687	1875
2 - A183 (E)	0.742	2042
3 - Springwell Rd	0.729	2106
4 - A183 (W)	0.774	2194

The slope and intercept shown above include any corrections and adjustments.

Arm Capacity Adjustments

Arm	Type	Reason	Percentage capacity adjustment (%)
1 - Holborn Rd	Percentage	Unequal Lane Usage	79.69
2 - A183 (E)	Percentage	Unequal Lane Usage	93.02
3 - Springwell Rd	Percentage	Unequal Lane Usage	93.22

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2043	PM	ONE HOUR	16:15	17:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Holborn Rd		ONE HOUR	✓	836	100.000
2 - A183 (E)		ONE HOUR	✓	923	100.000
3 - Springwell Rd		ONE HOUR	✓	1132	100.000
4 - A183 (W)		ONE HOUR	✓	1243	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	90	439	307
	2 - A183 (E)	55	0	385	483
	3 - Springwell Rd	428	132	0	572
	4 - A183 (W)	111	584	548	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Holborn Rd	2 - A183 (E)	3 - Springwell Rd	4 - A183 (W)
From	1 - Holborn Rd	0	6	0	1
	2 - A183 (E)	12	0	2	1
	3 - Springwell Rd	0	5	0	1
	4 - A183 (W)	1	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Holborn Rd	1.26	367.35	99.6	F	767	1151
2 - A183 (E)	0.98	67.74	18.6	F	847	1270
3 - Springwell Rd	0.90	24.30	7.9	C	1039	1558
4 - A183 (W)	0.82	11.89	4.4	B	1141	1711

Appendix K

Intergreens

Option F

quickGreen Report

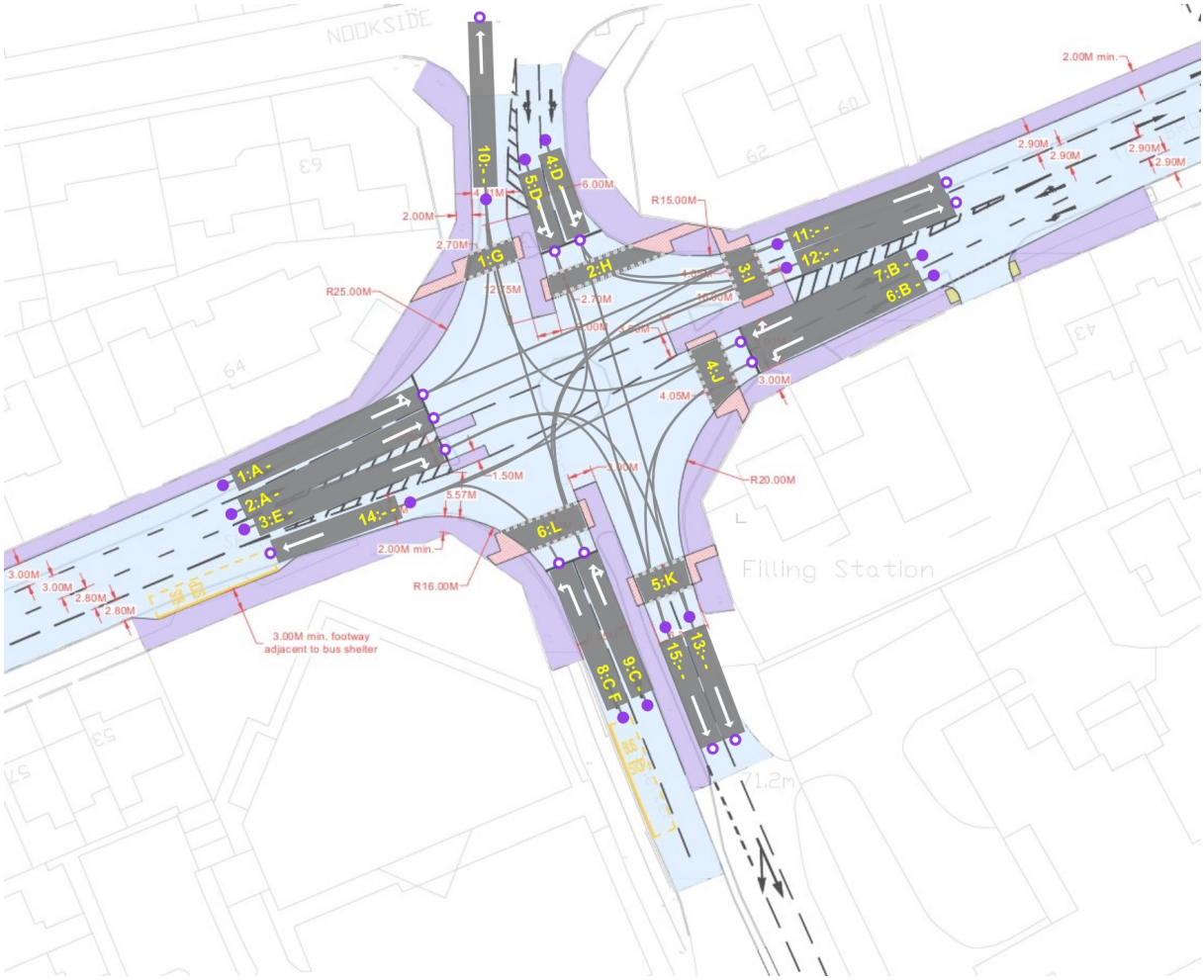
Project: 23014 Springwell Rd
Title: Option F

File Name:	Springwell Rd Option F IGs.qgn
Location:	Sunderland
Designer:	Stuart Hanson
Organisation:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

http://www.jctconsultancy.co.uk

Title: Option F

Junction Diagram



Notes

This model does not have notes

Title: Option F

Lane Details

Lane	Width (m)	Controlling Phase	Controlling Arrow Phase	ASL Length (m)	Number of Turning Movements	Adjusted Turning Movements
1	3.00	A			2	0 of 2
2	3.00	A			1	0 of 1
3	3.00	E			2	0 of 2
4	3.00	D			3	0 of 3
5	3.00	D			2	0 of 2
6	3.00	B			2	0 of 2
7	3.00	B			2	0 of 2
8	3.00	C	F		1	0 of 1
9	3.00	C			3	0 of 3

Turning Movement Details

Turning Movement	Turning Movement Adjustment (s)	Always Apply Turning Movement Adjustment?	Is this turn controlled by the upstream lane's arrow phase? (If set)
1 => 10	0	Only if conf. dist > 0	N/A
1 => 11	0	Only if conf. dist > 0	N/A
2 => 12	0	Only if conf. dist > 0	N/A
4 => 11	0	Only if conf. dist > 0	N/A
4 => 12	0	Only if conf. dist > 0	N/A
5 => 15	0	Only if conf. dist > 0	N/A
5 => 14	0	Only if conf. dist > 0	N/A
6 => 13	0	Only if conf. dist > 0	N/A
7 => 14	0	Only if conf. dist > 0	N/A
7 => 10	0	Only if conf. dist > 0	N/A
8 => 14	0	Only if conf. dist > 0	Yes
9 => 10	0	Only if conf. dist > 0	N/A
9 => 11	0	Only if conf. dist > 0	N/A
9 => 12	0	Only if conf. dist > 0	N/A
3 => 13	0	Only if conf. dist > 0	N/A
4 => 13	0	Only if conf. dist > 0	N/A
3 => 15	0	Only if conf. dist > 0	N/A
6 => 15	0	Only if conf. dist > 0	N/A

Pedestrian Crossings

Crossing	Controlling Phase	Walk Speed (m/s)	Walk Distance (m)	Walk Time (s)	Additional Clearance Time (s)	Terminating Intergreen (s)	Traffic-Ped Conflict Point
P1	G	1.20	6.54	5.45	2.00	7.45	Worst-case stud line
P2	H	1.20	13.00	10.83	2.00	12.83	Worst-case stud line
P3	I	1.20	6.11	5.09	2.00	7.09	Worst-case stud line
P4	J	1.20	7.11	5.93	2.00	7.93	Worst-case stud line
P5	K	1.20	6.28	5.23	2.00	7.23	Worst-case stud line
P6	L	1.20	8.92	7.43	2.00	9.43	Worst-case stud line

* = Manual override of graphical distance

Traffic Signal Phases

Phase Name	Type	Lanes Controlled
A	3 Aspect Traffic	1, 2
B	3 Aspect Traffic	6, 7
C	3 Aspect Traffic	8, 9
D	3 Aspect Traffic	4, 5
E	3 Aspect Traffic	3
F	Filter	8
G	Pedestrian	1
H	Pedestrian	2
I	Pedestrian	3
J	Pedestrian	4
K	Pedestrian	5
L	Pedestrian	6

Lane Conflict Distances

Lane Conflict Distances (m)										
		Starting Lane								
		1	2	3	4	5	6	7	8	9
Stopping Lane	1	-	-	-	20.78	11.49	-	-16.24	-	-6.06
	2	-	-	-	19.53	7.75	-	-12.49	-	-5.43
	3	-	-	-	-2.23	-2.14	8.53	-2.53	-	-2.93
	4	-14.21	-10.79	2.23	-	-	10.82	5.08	-	-16.07
	5	-10.87	-7.49	5.91	-	-	9.66	1.89	21.42	10.63
	6	-	-	-6.37	-10.57	-9.65	-	-	-	-
	7	22.03	12.49	4.45	-3.31	2.75	-	-	22.73	12.61
	8	-	-	-	-	-21.42	-	-22.73	-	-
	9	18.13	10.34	5.66	26.84	12.51	-	-1.44	-	-

Traffic/Pedestrian Conflict Distances

Traffic/Pedestrian Conflict Distances (m)							
		Starting Pedestrian Crossing					
		P1	P2	P3	P4	P5	P6
Stopping Lane	1	21.90	-	45.22	-	-	-
	2	-	-	45.19	-	-	-
	3	-	-	-	-	43.39	-
	4	-	6.76	25.64	-	45.62	-
	5	-	5.68	-	-	45.42	-
	6	-	-	-	7.17	35.77	-
	7	44.01	-	-	6.86	-	-
	8	-	-	-	-	-	6.93
	9	40.16	-	51.28	-	-	6.61

Title: Option F

Phase Intergreen Matrix

Phase Intergreens (s)													
		Starting Phase											
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Terminating Phase	**A**	-	Opp	5	7	-	-	7	-	9	-	-	-
	B	Opp	-	7	5	5	7	9	-	-	5	8	-
	C	**7**	5	-	**7**	5	-	9	-	10	-	-	5
	D	5	6	7	-	5	7	-	5	7	-	**9**	-
	E	-	**5**	5	5	-	-	-	-	-	-	9	-
	F	-	5	-	5	-	-	-	-	-	-	-	5
	G	8	8	8	-	-	-	-	-	-	-	-	-
	H	-	-	-	13	-	-	-	-	-	-	-	-
	I	8	-	8	8	-	-	-	-	-	-	-	-
	J	-	8	-	-	-	-	-	-	-	-	-	-
	K	-	8	-	8	8	-	-	-	-	-	-	-
	L	-	-	10	-	-	10	-	-	-	-	-	-

Opp = Phases Oppose, FNC = Force No Conflict, +/- = Intergreen Adjusted or Custom Set, Bold = Is Close to Intergreen Boundary, * = Notes Added

Additional Phase Intergreen Detail

Phases	Type	Unadjusted Value	Adjusted Value	Notes
A => B	Phases Oppose	5	-	
B => A	Phases Oppose	7	-	

Audit Log Records

This model does not have any audit records

Appendix L

LinSig Data

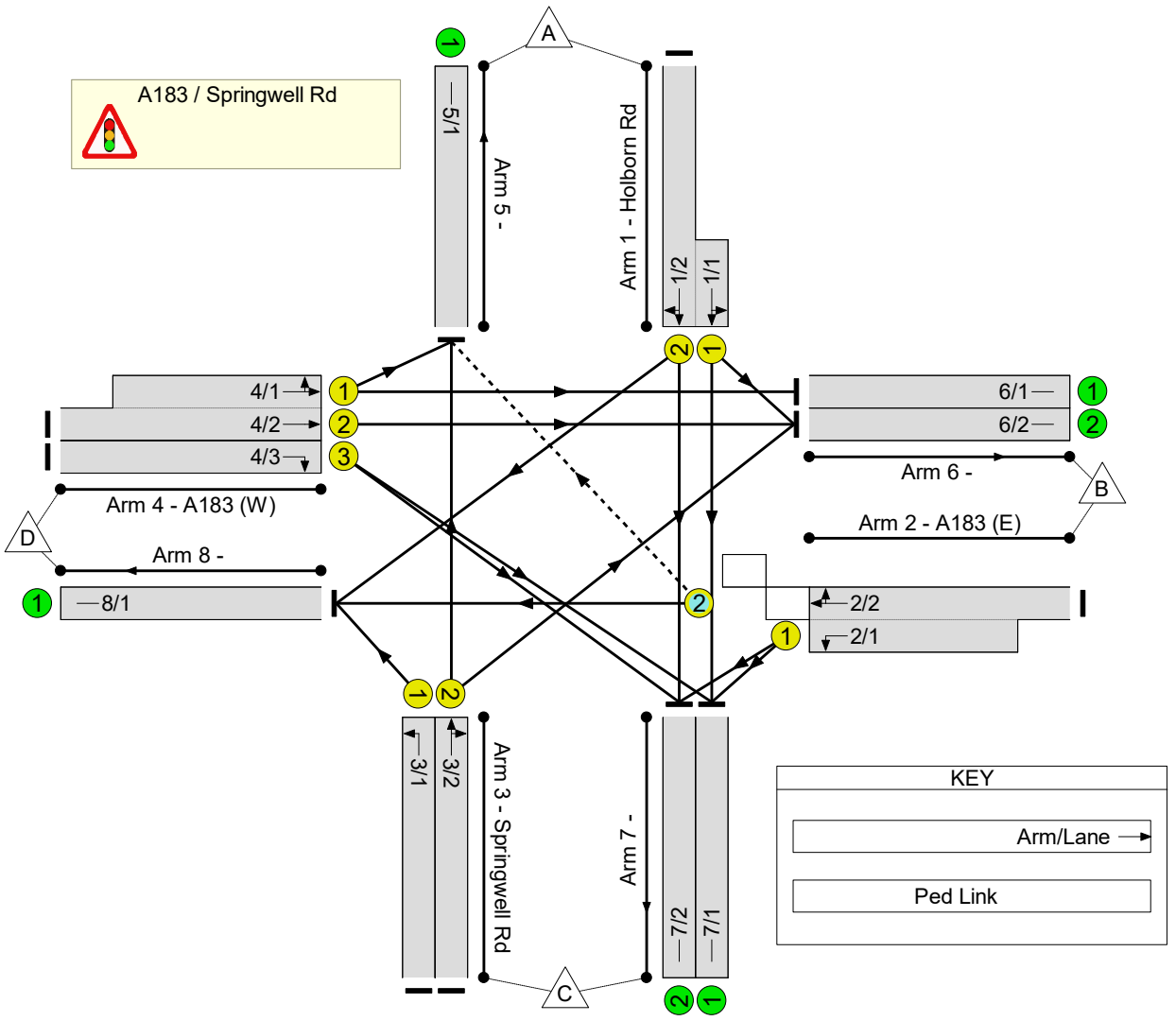
Option F

Springwell Rd Option F LinSig Data

User and Project Details

Project:	**23014 Springwell Rd**
Title:	**Option F**
Location:	Sunderland
Client:	Sunderland City Council
Design Layout Ref:	CRSR-SCC-GEN-Z0-SK-Z-ZK_018-S4
Date Started:	22/08/23
Date Completed:	24/08/23
Model Purpose:	Test performance of proposal
Additional detail:	
File name:	Springwell Rd Option F.lsg3x
Author:	Simon Swanston
Company:	JCT Consultancy
Address:	LinSig House, Deepdale Lane, Nettleham, Lincoln, LN2 2LL

Network Layout Diagram



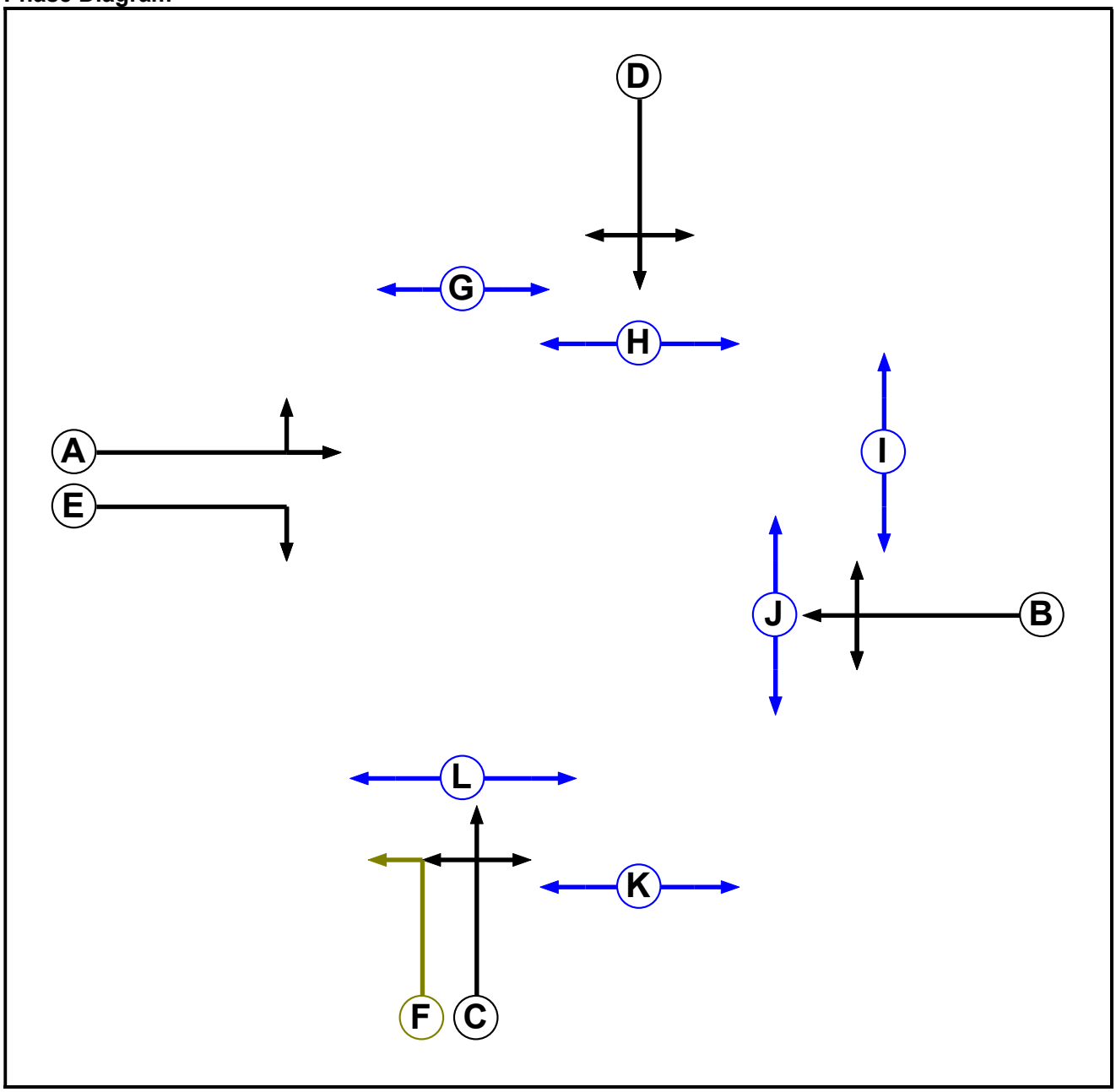
Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Filter	C	4	0
G	Pedestrian		5	5
H	Pedestrian		5	5
I	Pedestrian		5	5
J	Pedestrian		5	5
K	Pedestrian		5	5
L	Pedestrian		5	5

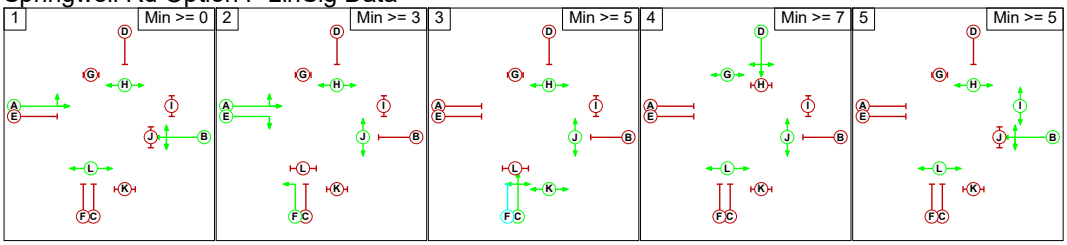
Phase Intergreens Matrix

		Starting Phase											
		A	B	C	D	E	F	G	H	I	J	K	L
Terminating Phase	A		-	5	7	-	-	7	-	9	-	-	-
	B	-		7	5	5	7	9	-	-	5	8	-
	C	7	5		7	5	-	9	-	10	-	-	5
	D	5	6	7		5	7	-	5	7	-	9	-
	E	-	5	5	5		-	-	-	-	-	9	-
	F	-	5	-	5	-		-	-	-	-	-	5
	G	8	8	8	-	-	-		-	-	-	-	-
	H	-	-	-	13	-	-	-		-	-	-	-
	I	8	-	8	8	-	-	-	-		-	-	-
	J	-	8	-	-	-	-	-	-	-		-	-
	K	-	8	-	8	8	-	-	-	-	-		-
	L	-	-	10	-	-	10	-	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B H L
2	A E F H J
3	C H J K
4	D G J L
5	B H I L

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	2	B	Losing	1	1
3	4	C	Losing	4	4
4	1	D	Losing	2	2
4	5	D	Losing	2	2

Prohibited Stage Change

		To Stage				
		1	2	3	4	5
From Stage	1		10	10	13	9
	2	X		9	X	X
	3	8	8		13	10
	4	8	10	10		9
	5	8	10	10	13	

Give-Way Lane Input Data

Junction: A183 / Springwell Rd											
Lane	**Movement**	**Max Flow when Giving Way (PCU/Hr)**	**Min Flow when Giving Way (PCU/Hr)**	**Opposing Lane**	**Opp. Lane Coeff.**	**Opp. Mvmnts.**	**Right Turn Storage (PCU)**	**Non-Blocking Storage (PCU)**	**RTF**	**Right Turn Move up (s)**	**Max Turns in Intergreen (PCU)**
2/2 (A183 (E))	5/1 (Right)	1439	0	4/1	1.09	All	4.00	2.00	0.50	4	4.00
				4/2	1.09	All					

Lane Input Data

Junction: A183 / Springwell Rd

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Holborn Rd)	U	D	2	3	4.0	Geom	-	3.00	0.00	Y	Arm 6 Left	17.00
											Arm 7 Ahead	Inf
1/2 (Holborn Rd)	U	D	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 7 Ahead	Inf
											Arm 8 Right	20.00
2/1 (A183 (E))	U	B	2	3	64.3	Geom	-	3.00	0.00	Y	Arm 7 Left	22.00
2/2 (A183 (E))	O	B	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 5 Right	12.00
											Arm 8 Ahead	Inf
3/1 (Springwell Rd)	U	C F	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 8 Left	18.00
3/2 (Springwell Rd)	U	C	2	3	60.0	Geom	-	3.28	0.00	Y	Arm 5 Ahead	Inf
											Arm 6 Right	15.00
4/1 (A183 (W))	U	A	2	3	27.0	Geom	-	3.00	0.00	Y	Arm 5 Left	27.00
											Arm 6 Ahead	Inf
4/2 (A183 (W))	U	A	2	3	60.0	Geom	-	3.00	0.00	N	Arm 6 Ahead	Inf
4/3 (A183 (W))	U	E	2	3	60.0	Geom	-	2.80	0.00	Y	Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/2	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/2	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM 2023'	07:30	08:30	01:00	
2: 'AM 2043'	07:30	08:30	01:00	F1*1.18
3: 'PM 2023'	16:30	17:30	01:00	
4: 'PM 2043'	16:30	17:30	01:00	F3*1.18

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 1: AM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	275
1/2 (with short)	550(In) 275(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	331
4/2 (with short)	661(In) 330(Out)
4/3	361
5/1	550
6/1	261
6/2	520
7/1	470
7/2	417
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	26.9 %	1871	1871
				Arm 7 Ahead	Inf	73.1 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	53.5 %	1850	1850
				Arm 8 Right	20.00	46.5 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	21.1 %	1893	1893
				Arm 6 Ahead	Inf	78.9 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 2: AM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	325
1/2 (with short)	649(In) 324(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	390
4/2 (with short)	780(In) 390(Out)
4/3	426
5/1	650
6/1	307
6/2	614
7/1	556
7/2	491
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd

Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	26.8 %	1871	1871
				Arm 7 Ahead	Inf	73.2 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	53.4 %	1850	1850
				Arm 8 Right	20.00	46.6 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	21.3 %	1893	1893
				Arm 6 Ahead	Inf	78.7 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 3: PM23 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	354
1/2 (with short)	708(In) 354(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	294
4/2 (with short)	589(In) 295(Out)
4/3	464
5/1	504
6/1	200
6/2	483
7/1	673
7/2	489
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	21.5 %	1879	1879
				Arm 7 Ahead	Inf	78.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	26.6 %	1815	1815
				Arm 8 Right	20.00	73.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	32.0 %	1882	1882
				Arm 6 Ahead	Inf	68.0 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 4: PM43 (Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	418
1/2 (with short)	836(In) 418(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	348
4/2 (with short)	695(In) 347(Out)
4/3	548
5/1	594
6/1	237
6/2	569
7/1	794
7/2	578
8/1	1362

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	21.5 %	1879	1879
				Arm 7 Ahead	Inf	78.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	26.6 %	1815	1815
				Arm 8 Right	20.00	73.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	31.9 %	1882	1882
				Arm 6 Ahead	Inf	68.1 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	74	348	128	550
	B	76	0	178	425	679
	C	404	116	0	580	1100
	D	70	591	361	0	1022
	Tot.	550	781	887	1133	3351

Traffic Lane Flows

Lane	Scenario 5: AM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	275
1/2 (with short)	550(In) 275(Out)
2/1 (short)	178
2/2 (with short)	679(In) 501(Out)
3/1	580
3/2	520
4/1 (short)	331
4/2 (with short)	661(In) 330(Out)
4/3	361
5/1	550
6/1	261
6/2	520
7/1	470
7/2	417
8/1	1133

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	26.9 %	1871	1871
				Arm 7 Ahead	Inf	73.1 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	53.5 %	1850	1850
				Arm 8 Right	20.00	46.5 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	21.1 %	1893	1893
				Arm 6 Ahead	Inf	78.9 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	87	411	151	649
	B	90	0	210	502	802
	C	477	137	0	684	1298
	D	83	697	426	0	1206
	Tot.	650	921	1047	1337	3955

Traffic Lane Flows

Lane	Scenario 6: AM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	325
1/2 (with short)	649(In) 324(Out)
2/1 (short)	210
2/2 (with short)	802(In) 592(Out)
3/1	684
3/2	614
4/1 (short)	390
4/2 (with short)	780(In) 390(Out)
4/3	426
5/1	650
6/1	307
6/2	614
7/1	556
7/2	491
8/1	1337

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	26.8 %	1871	1871
				Arm 7 Ahead	Inf	73.2 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	53.4 %	1850	1850
				Arm 8 Right	20.00	46.6 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	15.2 %	1879	1879
				Arm 8 Ahead	Inf	84.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	77.7 %	1901	1901
				Arm 6 Right	15.00	22.3 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	21.3 %	1893	1893
				Arm 6 Ahead	Inf	78.7 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	76	372	260	708
	B	47	0	326	409	782
	C	363	112	0	485	960
	D	94	495	464	0	1053
	Tot.	504	683	1162	1154	3503

Traffic Lane Flows

Lane	Scenario 7: PM23 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	354
1/2 (with short)	708(In) 354(Out)
2/1 (short)	326
2/2 (with short)	782(In) 456(Out)
3/1	485
3/2	475
4/1 (short)	294
4/2 (with short)	589(In) 295(Out)
4/3	464
5/1	504
6/1	200
6/2	483
7/1	673
7/2	489
8/1	1154

Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	21.5 %	1879	1879
				Arm 7 Ahead	Inf	78.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	26.6 %	1815	1815
				Arm 8 Right	20.00	73.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.3 %	1891	1891
				Arm 8 Ahead	Inf	89.7 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	32.0 %	1882	1882
				Arm 6 Ahead	Inf	68.0 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

Traffic Flows, Desired

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	90	439	307	836
	B	55	0	385	483	923
	C	428	132	0	572	1132
	D	111	584	548	0	1243
	Tot.	594	806	1372	1362	4134

Traffic Lane Flows

Lane	Scenario 8: PM43 (No Peds)
Junction: A183 / Springwell Rd	
1/1 (short)	418
1/2 (with short)	836(In) 418(Out)
2/1 (short)	385
2/2 (with short)	923(In) 538(Out)
3/1	572
3/2	560
4/1 (short)	348
4/2 (with short)	695(In) 347(Out)
4/3	548
5/1	594
6/1	237
6/2	569
7/1	794
7/2	578
8/1	1362

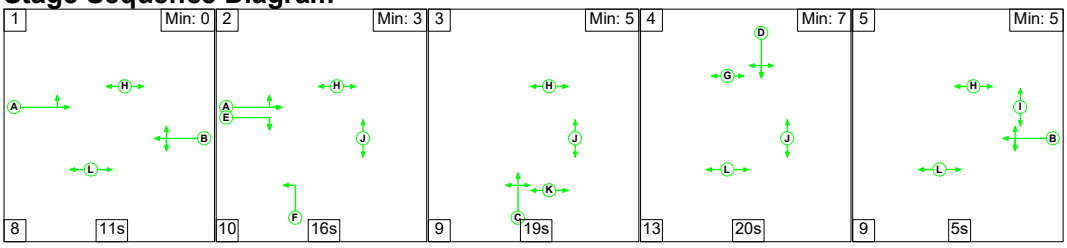
Lane Saturation Flows

Junction: A183 / Springwell Rd								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
1/1 (Holborn Rd)	3.00	0.00	Y	Arm 6 Left	17.00	21.5 %	1879	1879
				Arm 7 Ahead	Inf	78.5 %		
1/2 (Holborn Rd)	3.00	0.00	Y	Arm 7 Ahead	Inf	26.6 %	1815	1815
				Arm 8 Right	20.00	73.4 %		
2/1 (A183 (E))	3.00	0.00	Y	Arm 7 Left	22.00	100.0 %	1793	1793
2/2 (A183 (E))	3.00	0.00	Y	Arm 5 Right	12.00	10.2 %	1891	1891
				Arm 8 Ahead	Inf	89.8 %		
3/1 (Springwell Rd)	3.28	0.00	Y	Arm 8 Left	18.00	100.0 %	1794	1794
3/2 (Springwell Rd)	3.28	0.00	Y	Arm 5 Ahead	Inf	76.4 %	1898	1898
				Arm 6 Right	15.00	23.6 %		
4/1 (A183 (W))	3.00	0.00	Y	Arm 5 Left	27.00	31.9 %	1882	1882
				Arm 6 Ahead	Inf	68.1 %		
4/2 (A183 (W))	3.00	0.00	N	Arm 6 Ahead	Inf	100.0 %	2055	2055
4/3 (A183 (W))	2.80	0.00	Y	Arm 7 Right	15.00	100.0 %	1723	1723

5/1	Infinite Saturation Flow	Inf	Inf
6/1	Infinite Saturation Flow	Inf	Inf
6/2	Infinite Saturation Flow	Inf	Inf
7/1	Infinite Saturation Flow	Inf	Inf
7/2	Infinite Saturation Flow	Inf	Inf
8/1	Infinite Saturation Flow	Inf	Inf

Scenario 1: 'AM23 (Peds)' (FG1: 'AM 2023', Plan 1: 'Peds')

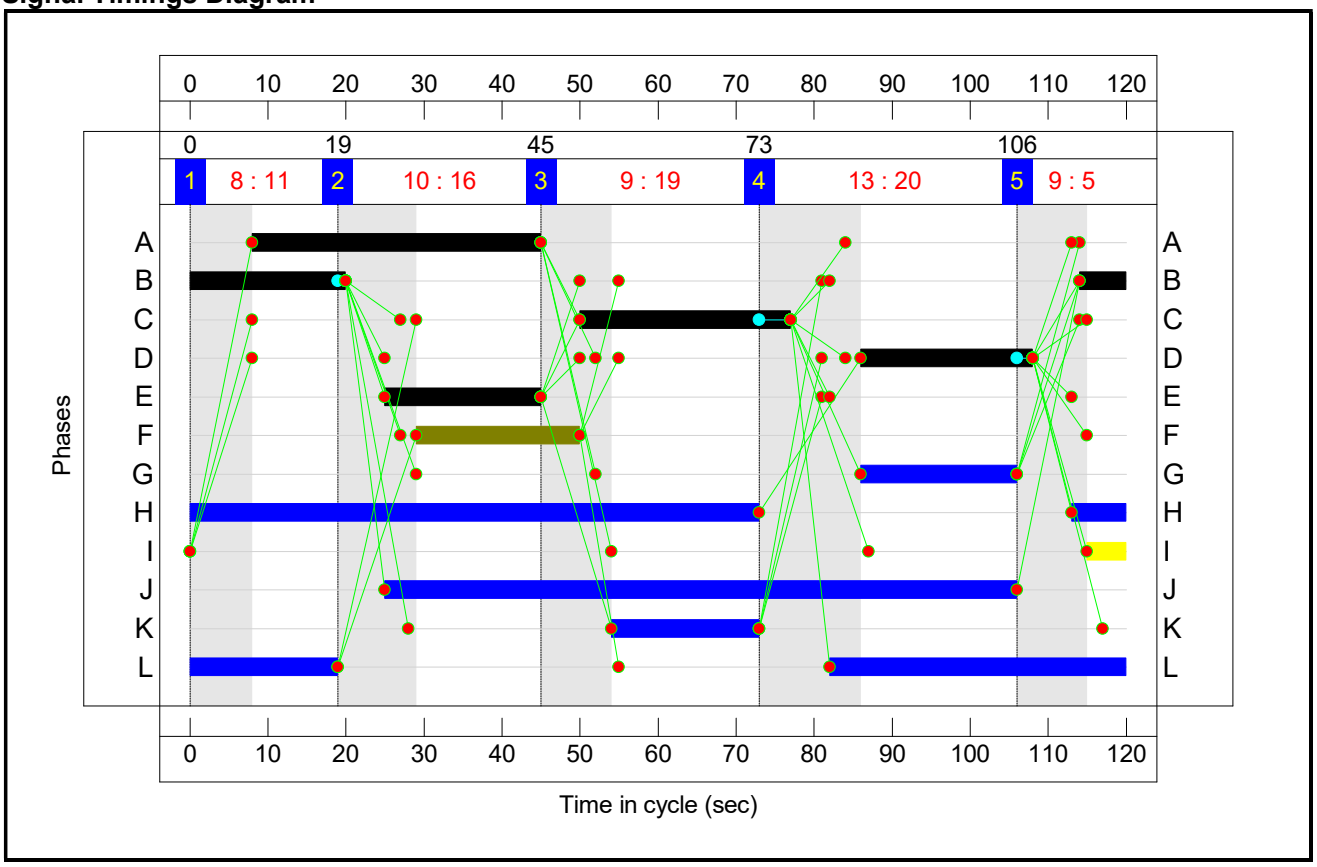
Stage Sequence Diagram



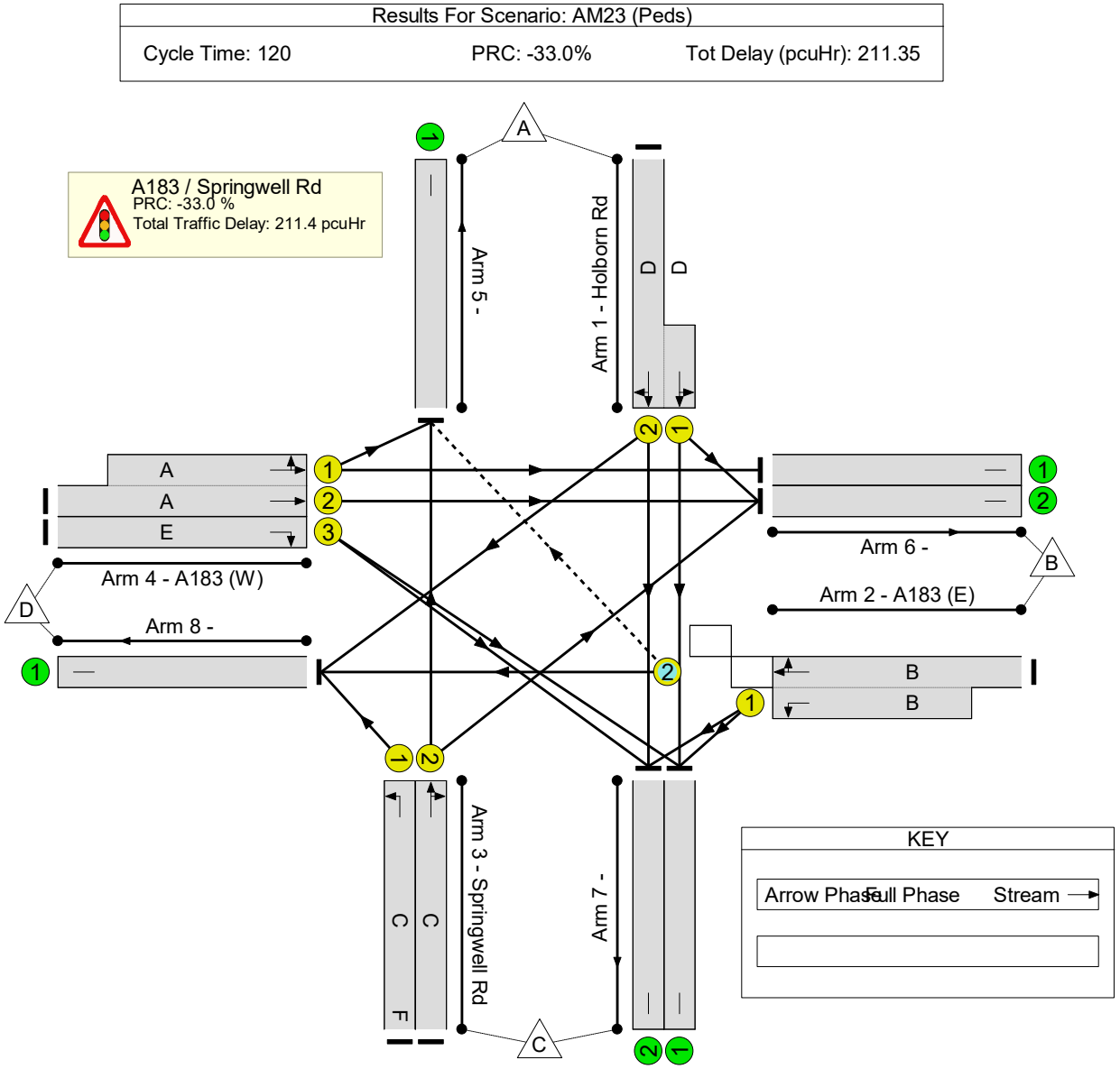
Stage Timings

Stage	1	2	3	4	5
Duration	11	16	19	20	5
Change Point	0	19	45	73	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

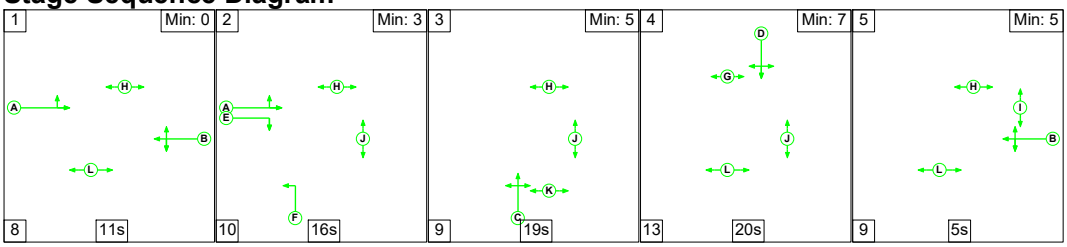
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**119.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**119.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	22	-	550	1850:1871	236+236	116.4 : 116.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	679	1879:1793	423+403	118.5 : 44.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	48	21	580	1794	733	79.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	27	-	520	1901	444	117.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	661	2055:1893	651+599	50.7 : 55.2%
4/3	A183 (W) Right	U	N/A	N/A	E		1	20	-	361	1723	302	119.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	261	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	520	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	470	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	417	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**36**	**22**	**7**	**51.5**	**159.6**	**0.2**	**211.4**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**36**	**22**	**7**	**51.5**	**159.6**	**0.2**	**211.4**	**-**	**-**	**-**	**-**
1/2+1/1	550	473	-	-	-	10.8	42.0	-	52.8	345.5	18.1	42.0	60.1
2/2+2/1	679	601	36	22	7	10.9	41.4	0.2	52.4	278.0	16.7	41.4	58.1
3/1	580	580	-	-	-	5.0	1.9	-	6.9	42.6	16.8	1.9	18.6
3/2	520	444	-	-	-	10.3	41.4	-	51.7	358.0	19.9	41.4	61.2
4/2+4/1	661	661	-	-	-	6.2	0.6	-	6.7	36.7	9.1	0.6	9.7
4/3	361	302	-	-	-	8.3	32.5	-	40.8	407.2	14.0	32.5	46.5
5/1	479	479	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	261	261	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	493	493	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	412	412	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	366	366	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1049	1049	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -33.0 Total Delay for Signalled Lanes (pcuHr): 211.35 Cycle Time (s): 120
PRC Over All Lanes (%): -33.0 Total Delay Over All Lanes(pcuHr): 211.35

Scenario 2: 'AM43 (Peds)' (FG2: 'AM 2043', Plan 1: 'Peds')

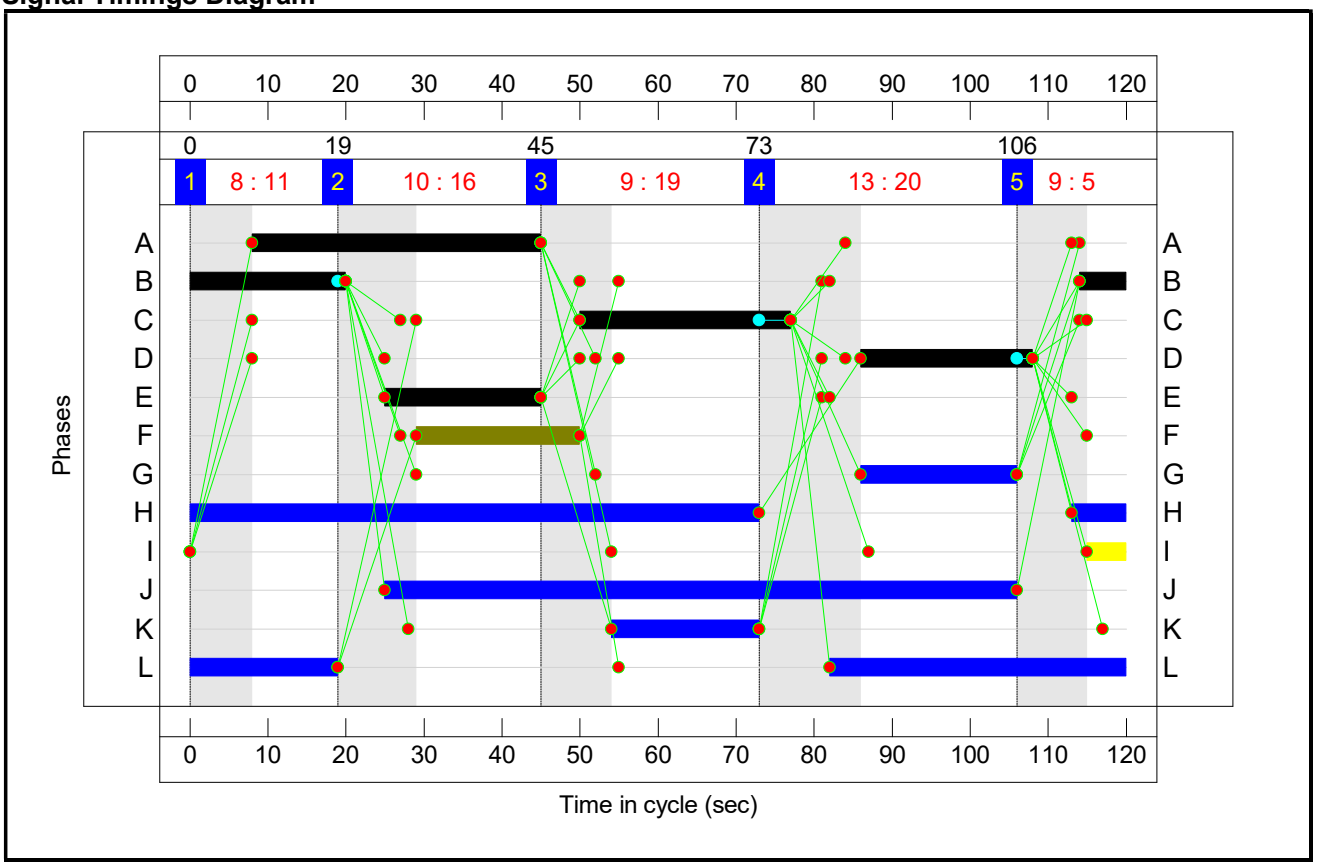
Stage Sequence Diagram



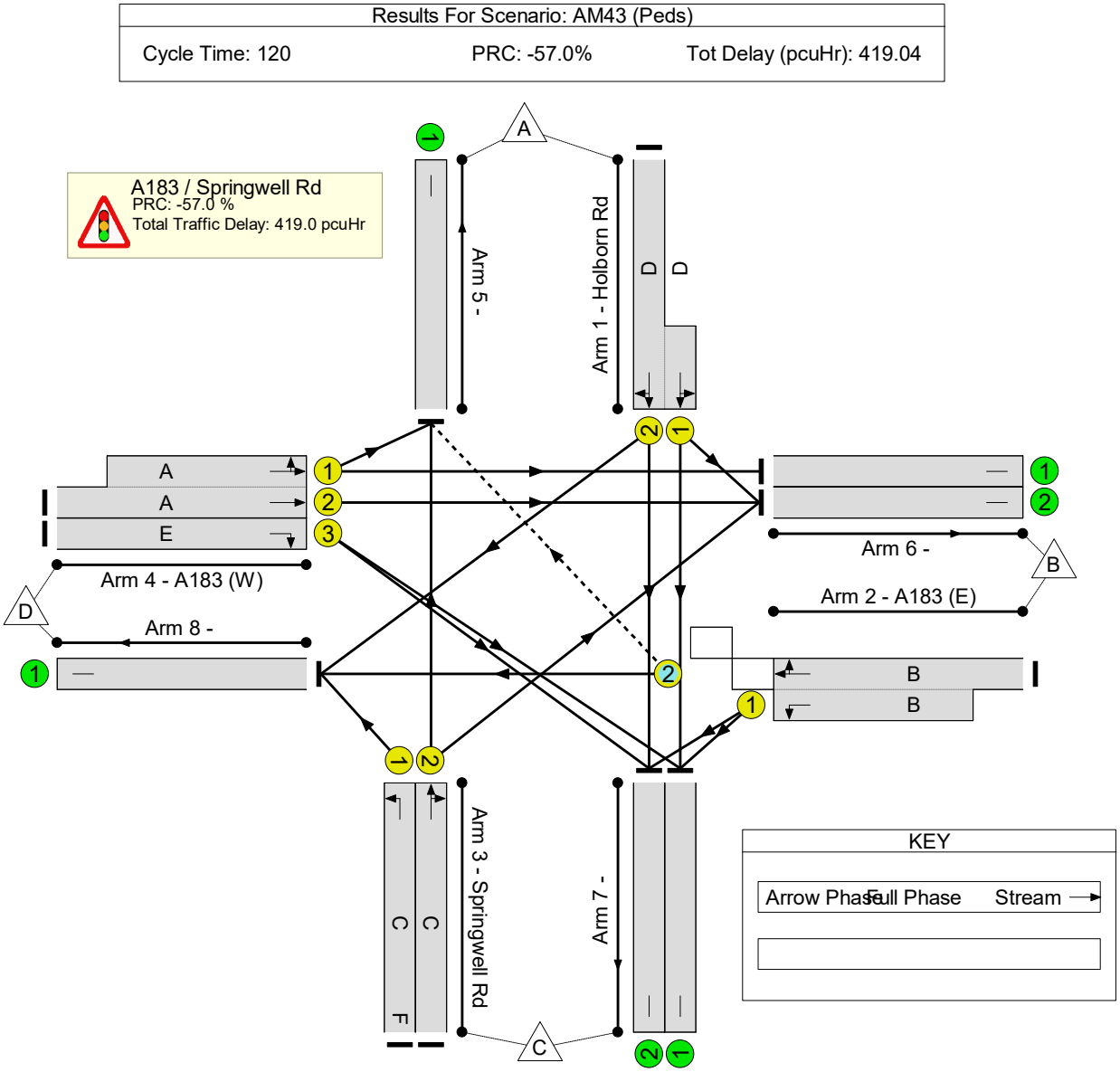
Stage Timings

Stage	1	2	3	4	5
Duration	11	16	19	20	5
Change Point	0	19	45	73	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

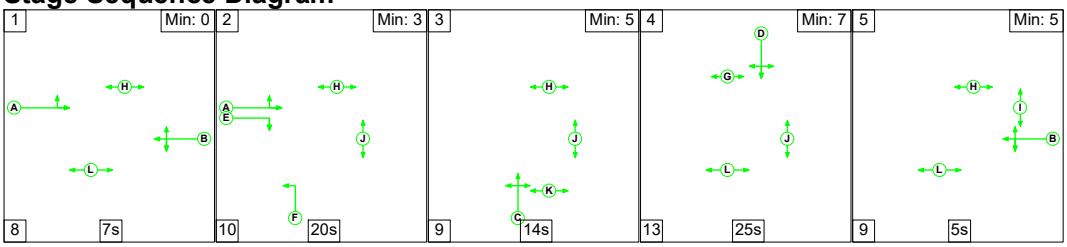
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.3%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.3%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	22	-	649	1850:1871	236+236	137.4 : 137.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	802	1879:1793	423+403	140.0 : 52.1%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	48	21	684	1794	733	93.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	27	-	614	1901	444	138.4%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	780	2055:1893	651+599	59.9 : 65.1%
4/3	A183 (W) Right	U	N/A	N/A	E		1	20	-	426	1723	302	141.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	307	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	614	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	556	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	491	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**36**	**24**	**5**	**77.2**	**341.6**	**0.2**	**419.0**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**36**	**24**	**5**	**77.2**	**341.6**	**0.2**	**419.0**	**-**	**-**	**-**	**-**
1/2+1/1	649	472	-	-	-	19.0	90.2	-	109.2	605.6	27.8	90.2	118.0
2/2+2/1	802	633	36	24	5	15.2	94.0	0.2	109.4	491.3	21.6	94.0	115.6
3/1	684	684	-	-	-	6.5	5.7	-	12.2	64.0	21.7	5.7	27.4
3/2	614	444	-	-	-	16.1	87.0	-	103.1	604.4	26.1	87.0	113.1
4/2+4/1	780	780	-	-	-	7.6	0.8	-	8.4	38.8	11.2	0.8	12.0
4/3	426	302	-	-	-	12.9	63.9	-	76.8	648.8	18.3	63.9	82.3
5/1	492	492	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	307	307	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	552	552	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	429	429	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	382	382	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1152	1152	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -57.0 Total Delay for Signalled Lanes (pcuHr): 419.04 Cycle Time (s): 120
PRC Over All Lanes (%): -57.0 Total Delay Over All Lanes(pcuHr): 419.04

Scenario 3: 'PM23 (Peds)' (FG3: 'PM 2023', Plan 1: 'Peds')

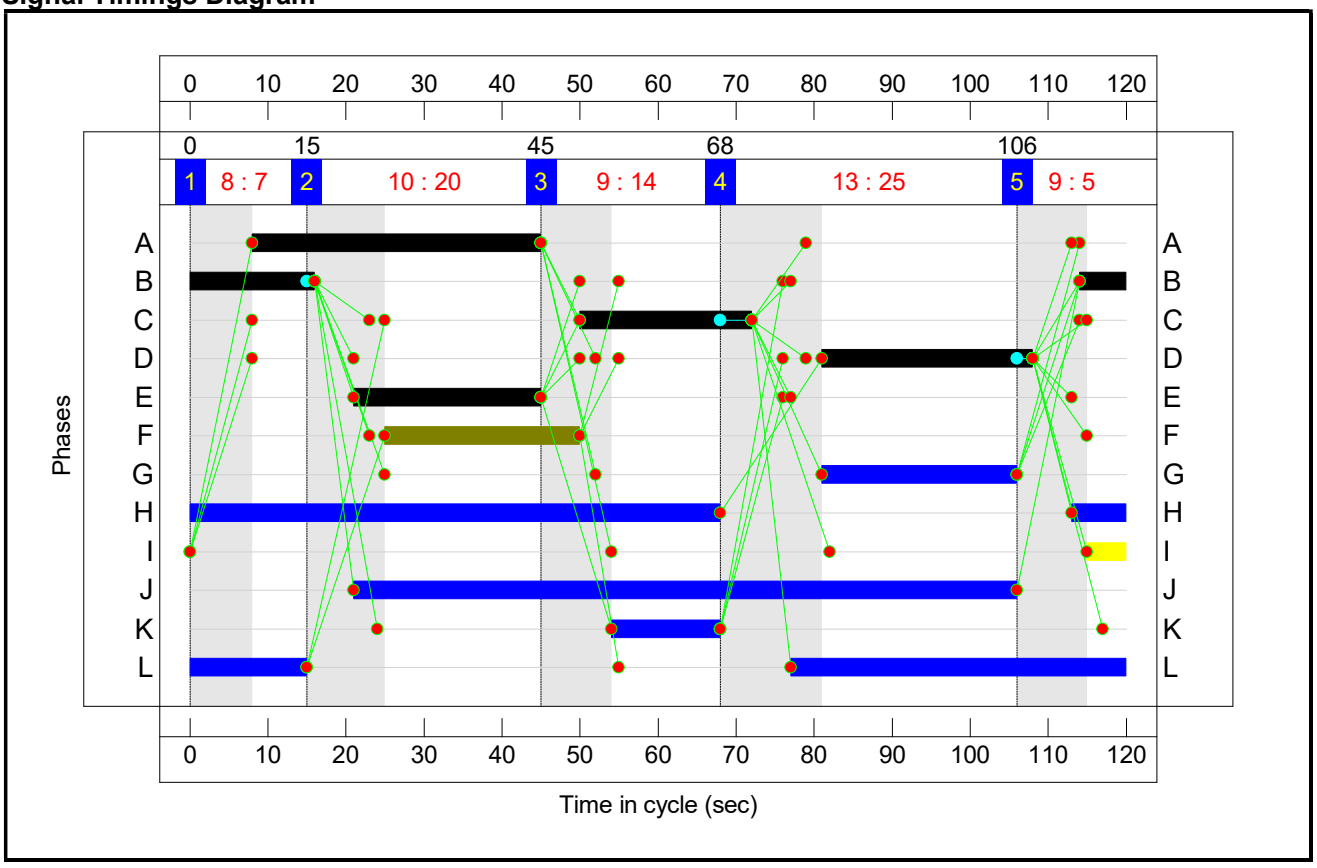
Stage Sequence Diagram



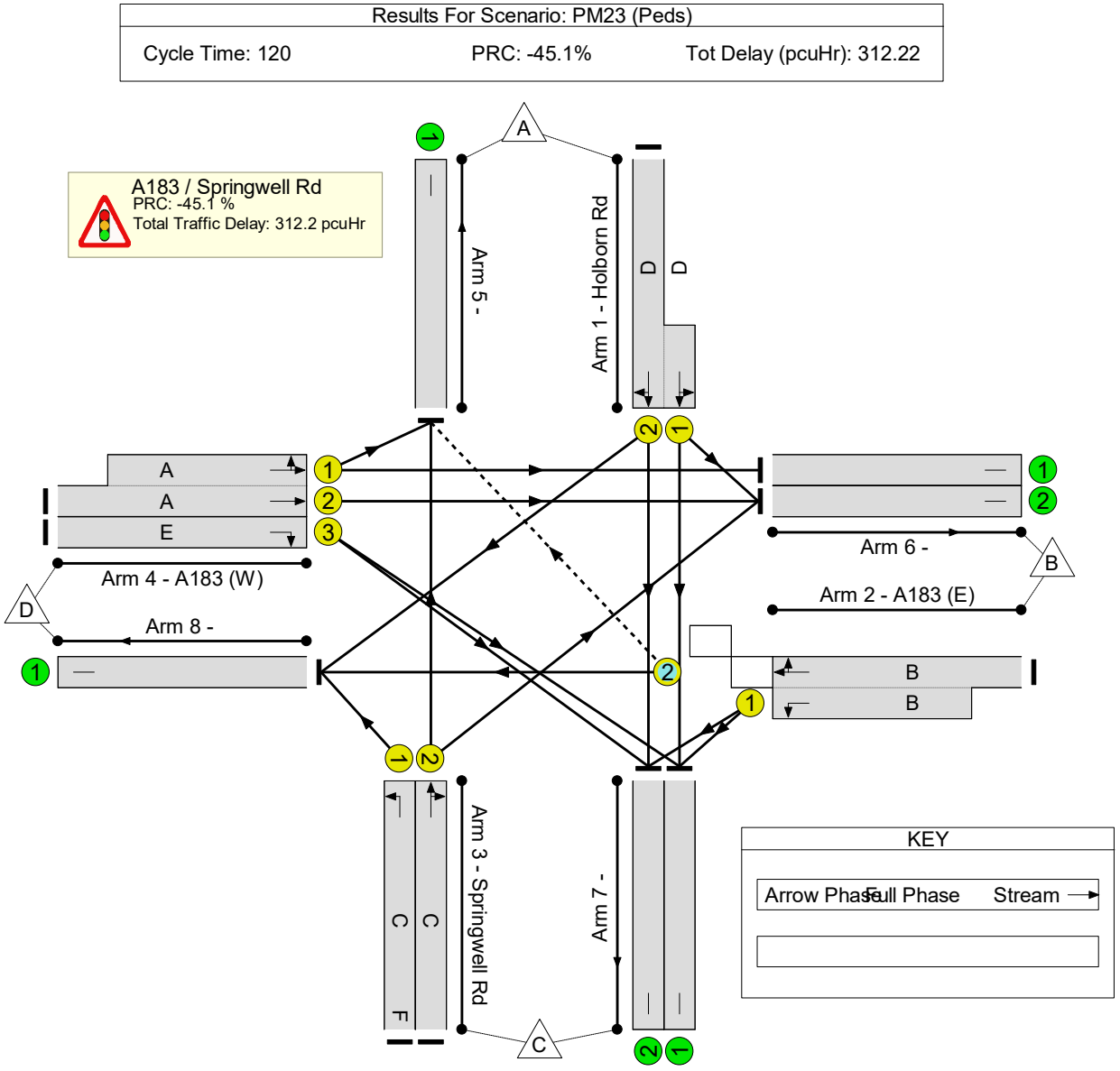
Stage Timings

Stage	1	2	3	4	5
Duration	7	20	14	25	5
Change Point	0	15	45	68	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

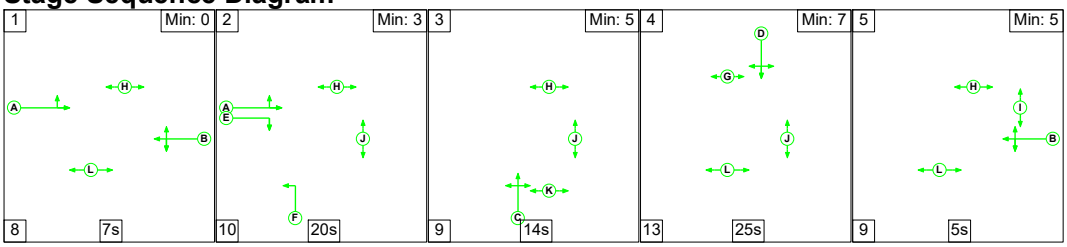
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.6%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.6%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	27	-	708	1815:1879	274+274	129.3 : 129.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	782	1891:1793	362+344	125.8 : 94.9%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	25	485	1794	718	67.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	475	1898	364	130.6%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	589	2055:1882	651+596	45.3 : 49.3%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	464	1723	359	129.3%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	200	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	483	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	673	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	489	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**18**	**15**	**5**	**64.7**	**247.4**	**0.1**	**312.2**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**18**	**15**	**5**	**64.7**	**247.4**	**0.1**	**312.2**	**-**	**-**	**-**	**-**
1/2+1/1	708	548	-	-	-	17.9	82.3	-	100.2	509.3	28.5	82.3	110.8
2/2+2/1	782	688	18	15	5	13.4	51.4	0.1	64.9	298.8	15.9	51.4	67.3
3/1	485	485	-	-	-	4.0	1.0	-	5.0	37.3	13.2	1.0	14.2
3/2	475	364	-	-	-	11.9	57.7	-	69.5	527.0	19.5	57.7	77.2
4/2+4/1	589	589	-	-	-	5.4	0.4	-	5.8	35.7	7.9	0.4	8.4
4/3	464	359	-	-	-	12.1	54.6	-	66.7	517.9	19.0	54.6	73.6
5/1	409	409	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	200	200	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	440	440	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	415	415	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1011	1011	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -45.1 Total Delay for Signalled Lanes (pcuHr): 312.22 Cycle Time (s): 120
PRC Over All Lanes (%): -45.1 Total Delay Over All Lanes(pcuHr): 312.22

Scenario 4: 'PM43 (Peds)' (FG4: 'PM 2043', Plan 1: 'Peds')

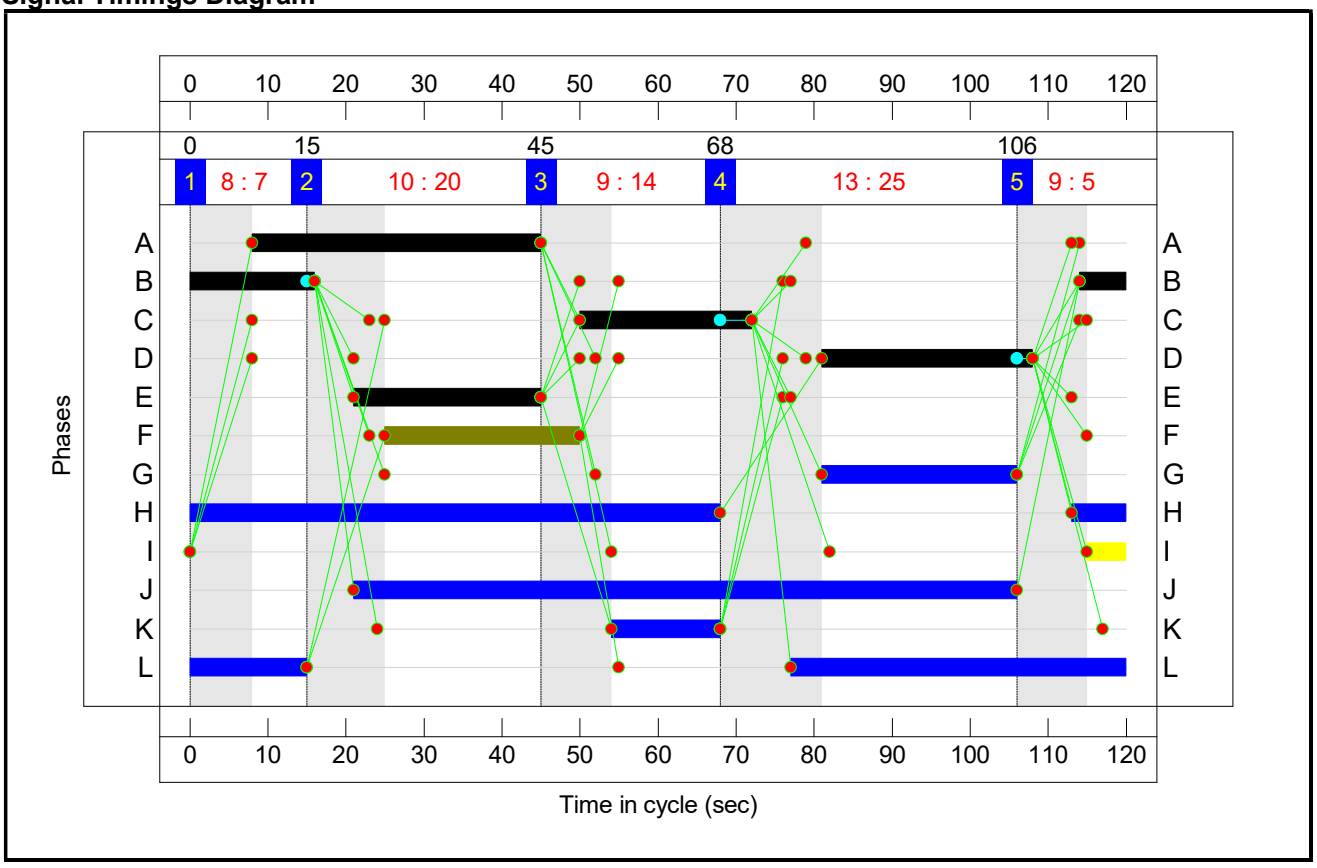
Stage Sequence Diagram



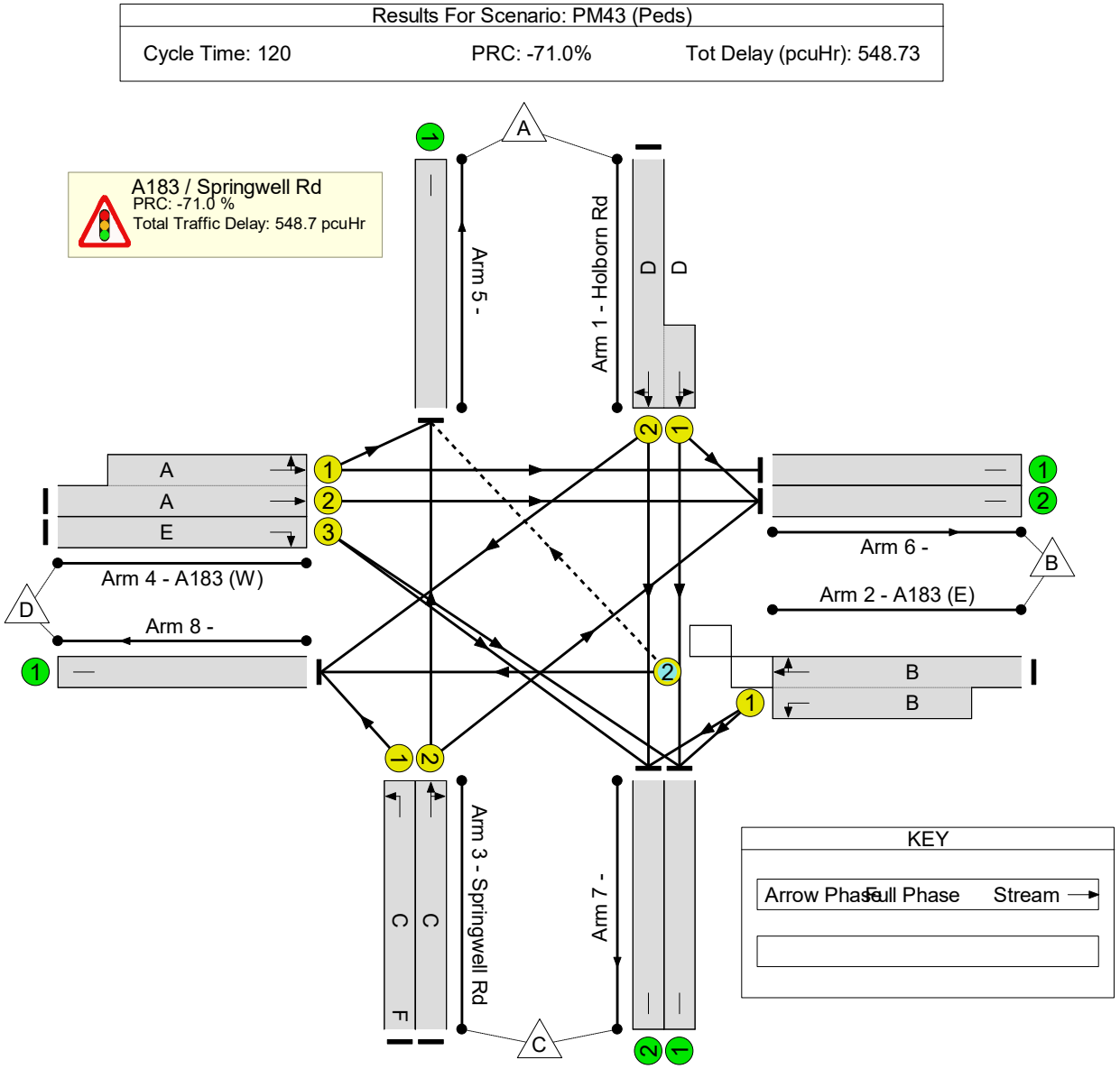
Stage Timings

Stage	1	2	3	4	5
Duration	7	20	14	25	5
Change Point	0	15	45	68	106

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

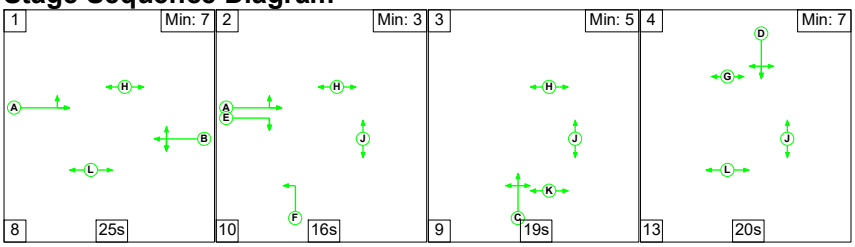
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	27	-	836	1815:1879	274+274	152.6 : 152.6%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	923	1891:1793	362+344	148.4 : 112.0%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	25	572	1794	718	79.7%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	560	1898	364	153.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	37	-	695	2055:1882	651+596	53.3 : 58.4%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	548	1723	359	152.7%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	237	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	569	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	794	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	578	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**18**	**15**	**4**	**94.5**	**454.1**	**0.1**	**548.7**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**18**	**15**	**4**	**94.5**	**454.1**	**0.1**	**548.7**	**-**	**-**	**-**	**-**
1/2+1/1	836	548	-	-	-	28.4	145.6	-	174.0	749.3	41.0	145.6	186.6
2/2+2/1	923	706	18	15	4	19.3	110.5	0.1	129.9	506.8	21.0	110.5	131.5
3/1	572	572	-	-	-	5.0	1.9	-	7.0	43.8	16.7	1.9	18.6
3/2	560	364	-	-	-	17.2	99.5	-	116.7	750.3	25.2	99.5	124.7
4/2+4/1	695	695	-	-	-	6.6	0.6	-	7.2	37.3	9.7	0.6	10.3
4/3	548	359	-	-	-	18.0	95.9	-	113.9	748.5	24.6	95.9	120.5
5/1	426	426	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	237	237	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	492	492	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	566	566	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	424	424	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1099	1099	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -71.0 Total Delay for Signalled Lanes (pcuHr): 548.73 Cycle Time (s): 120
PRC Over All Lanes (%): -71.0 Total Delay Over All Lanes(pcuHr): 548.73

Scenario 5: 'AM23 (No Peds)' (FG1: 'AM 2023', Plan 2: 'No Peds')

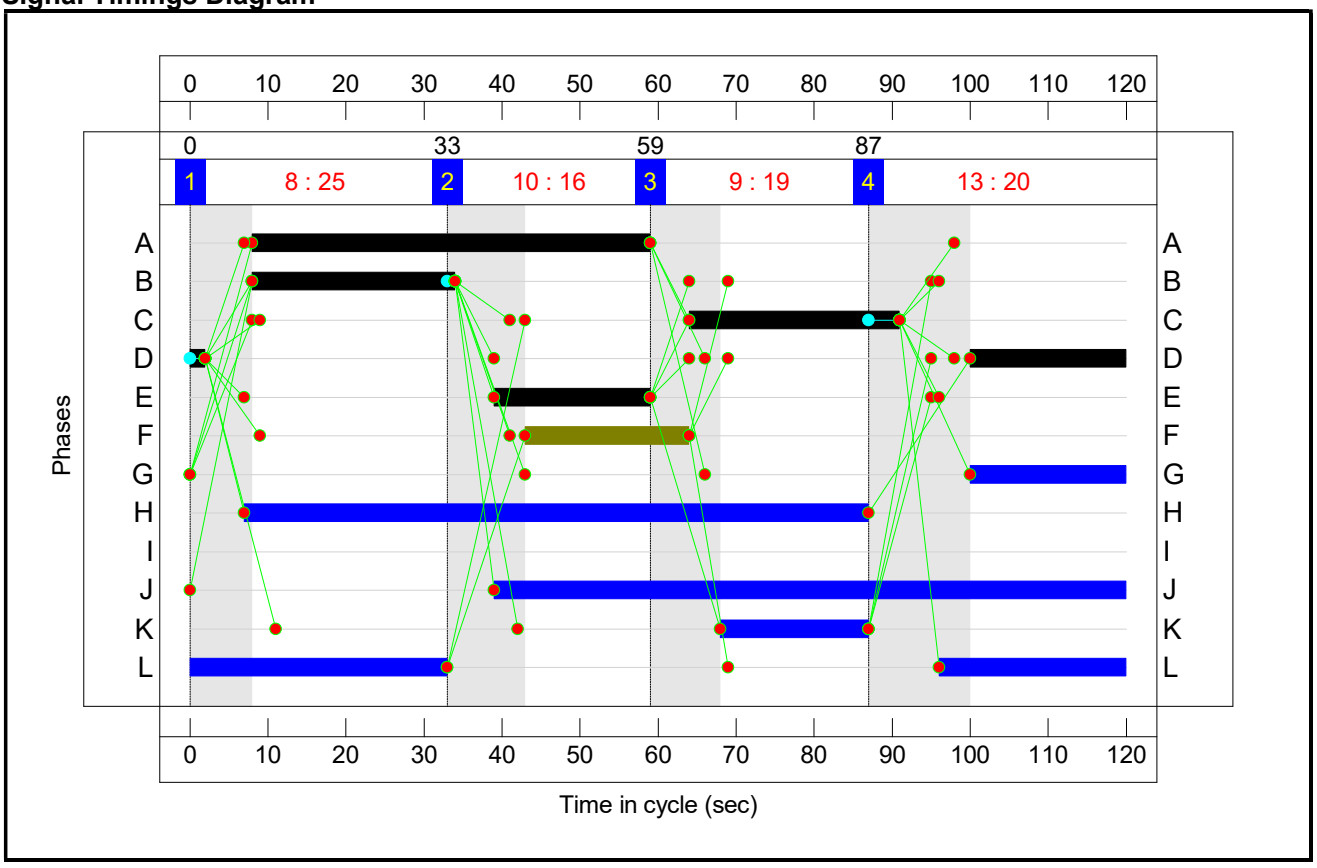
Stage Sequence Diagram



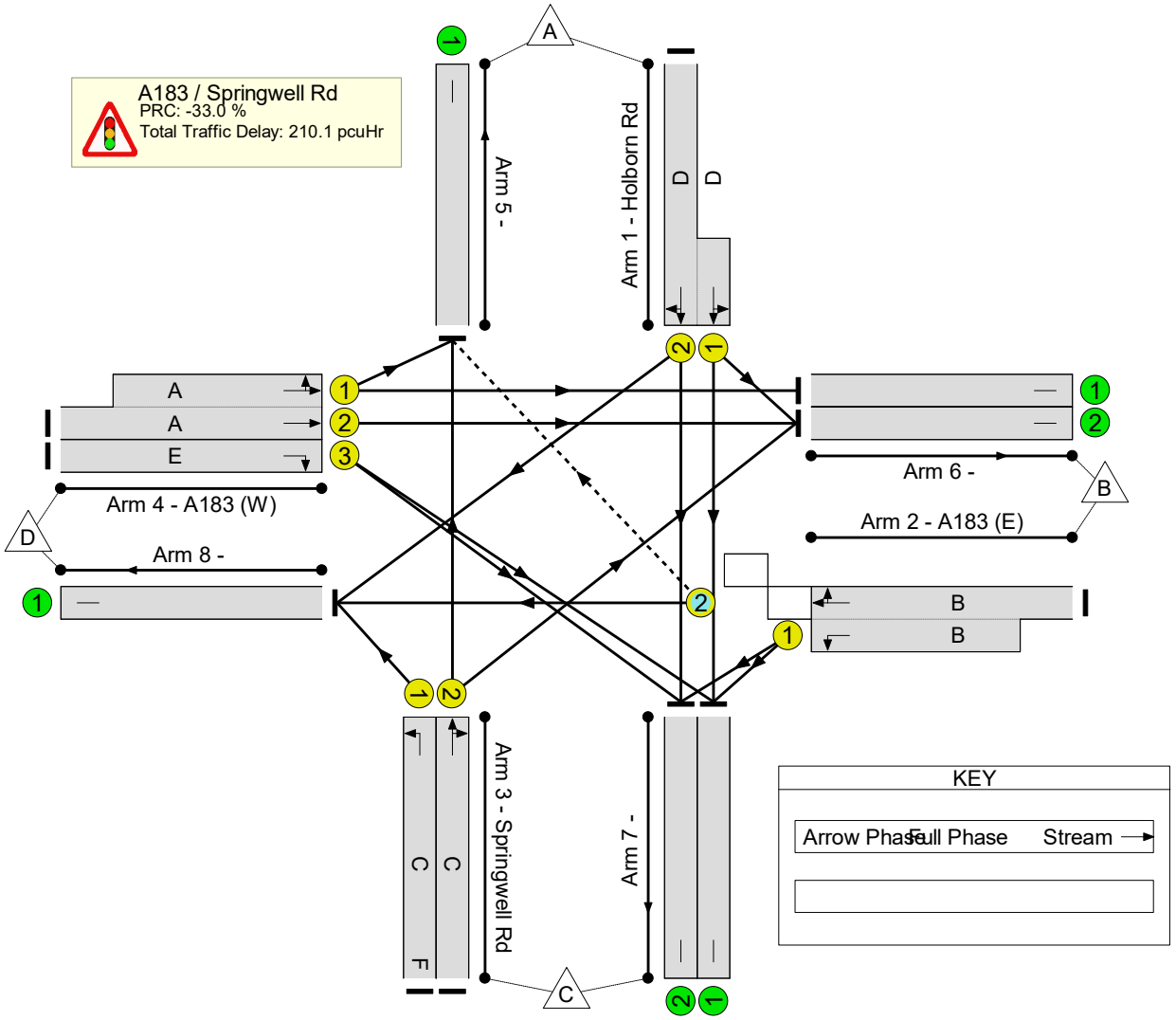
Stage Timings

Stage	1	2	3	4
Duration	25	16	19	20
Change Point	0	33	59	87

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

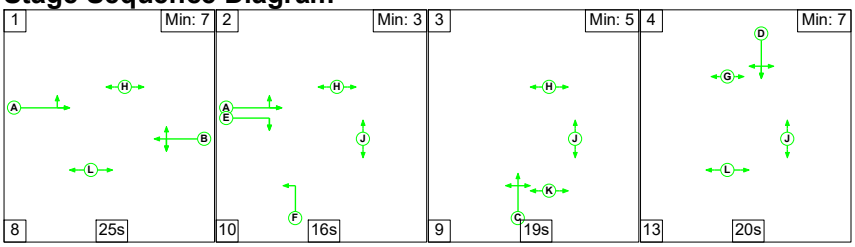
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**119.7%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**119.7%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	22	-	550	1850:1871	236+236	116.4 : 116.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	679	1879:1793	423+393	118.5 : 45.3%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	48	21	580	1794	733	79.2%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	27	-	520	1901	444	117.2%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	661	2055:1893	816+818	40.5 : 40.5%
4/3	A183 (W) Right	U	N/A	N/A	E		1	20	-	361	1723	302	119.7%
5/1		U	N/A	N/A	-		-	-	-	550	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	261	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	520	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	470	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	417	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1133	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**58**	**0**	**6**	**50.4**	**159.6**	**0.1**	**210.1**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**58**	**0**	**6**	**50.4**	**159.6**	**0.1**	**210.1**	**-**	**-**	**-**	**-**
1/2+1/1	550	473	-	-	-	12.5	42.0	-	54.5	356.5	18.7	42.0	60.7
2/2+2/1	679	601	58	0	6	10.6	41.5	0.1	52.2	276.9	16.7	41.5	58.2
3/1	580	580	-	-	-	5.0	1.9	-	6.9	42.6	16.8	1.9	18.6
3/2	520	444	-	-	-	10.1	41.4	-	51.4	355.9	19.9	41.4	61.2
4/2+4/1	661	661	-	-	-	4.3	0.3	-	4.6	25.0	7.5	0.3	7.9
4/3	361	302	-	-	-	8.1	32.5	-	40.6	404.9	14.0	32.5	46.5
5/1	479	479	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	261	261	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	493	493	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	412	412	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	366	366	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1049	1049	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -33.0 Total Delay for Signalled Lanes (pcuHr): 210.15 Cycle Time (s): 120
PRC Over All Lanes (%): -33.0 Total Delay Over All Lanes(pcuHr): 210.15

Scenario 6: 'AM43 (No Peds)' (FG2: 'AM 2043', Plan 2: 'No Peds')

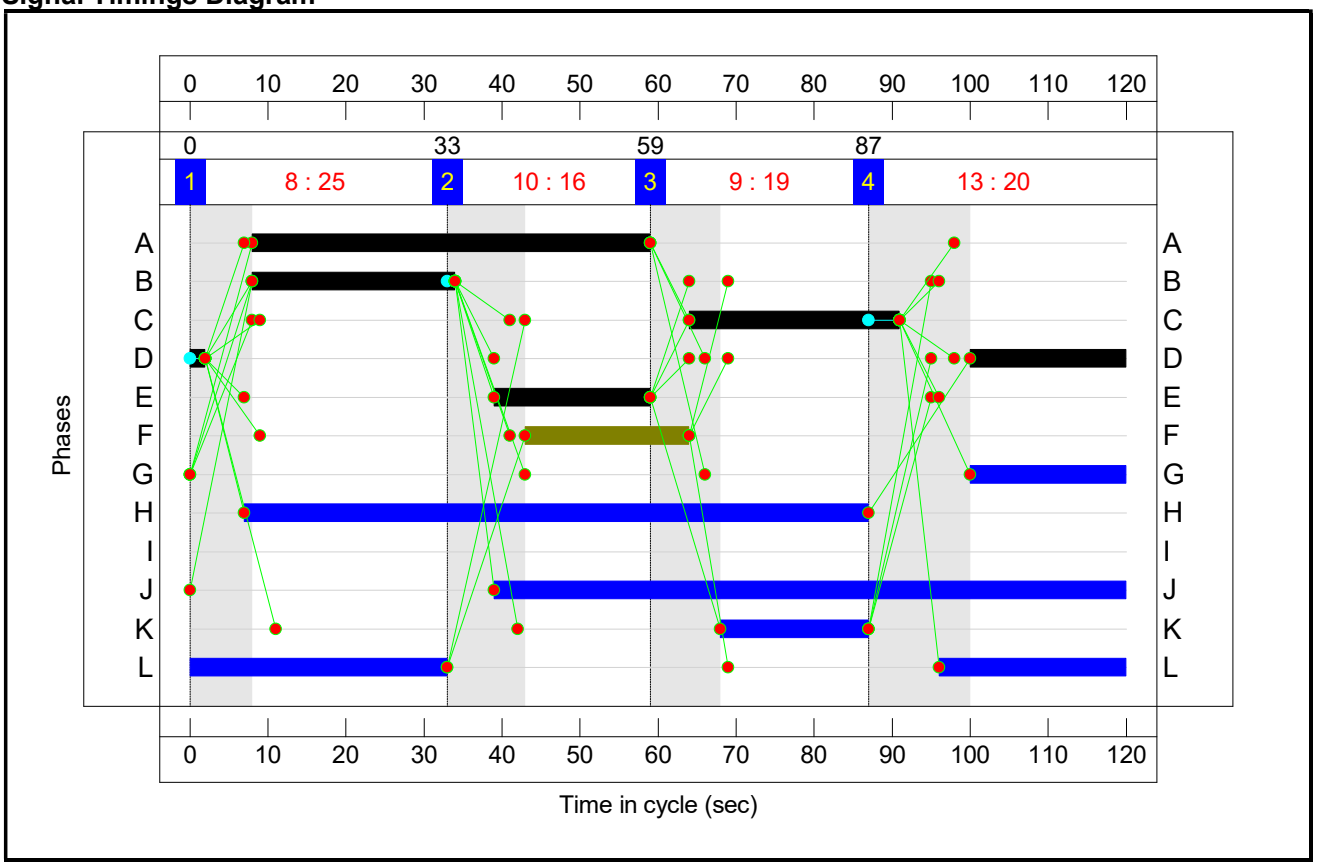
Stage Sequence Diagram



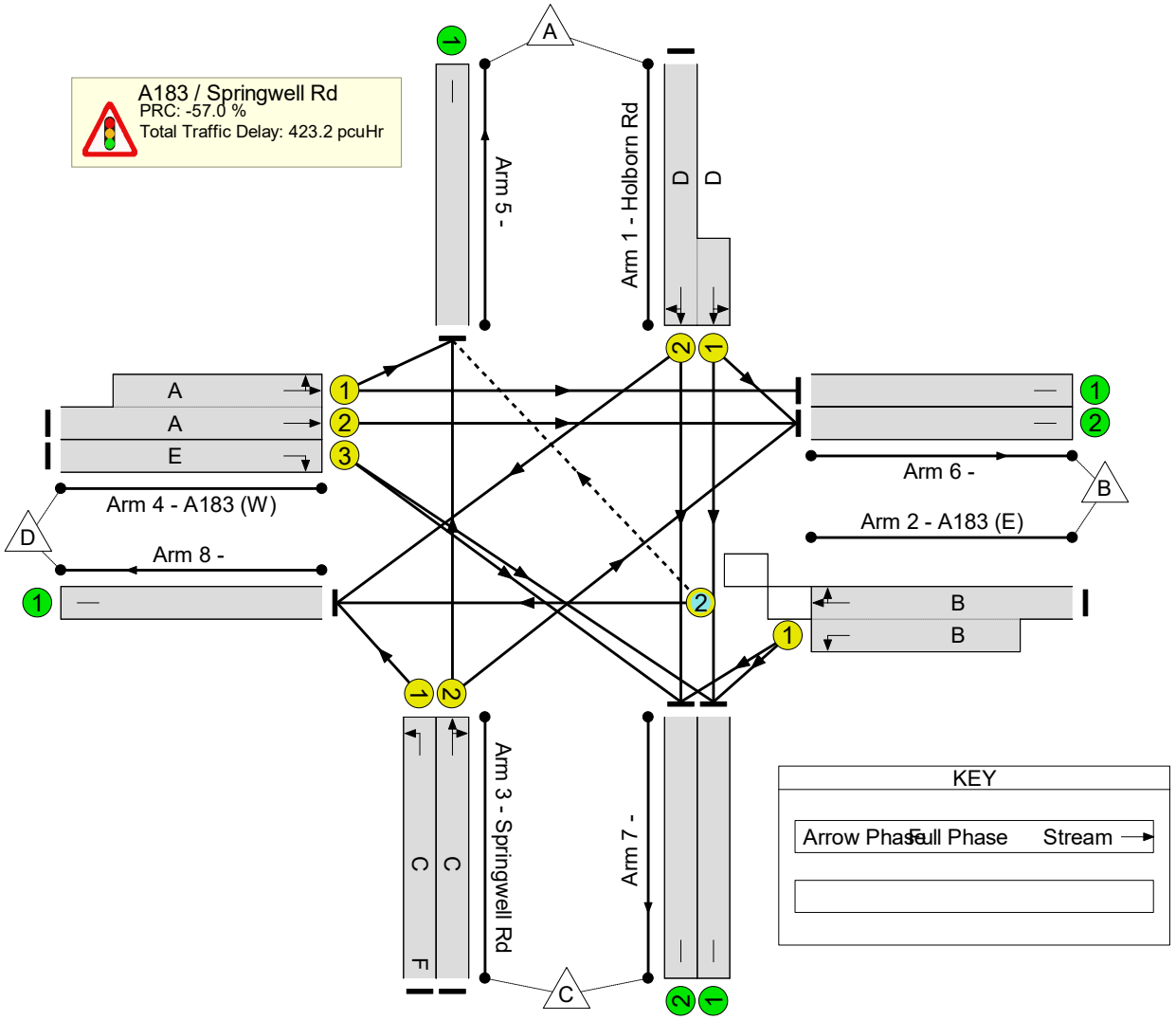
Stage Timings

Stage	1	2	3	4
Duration	25	16	19	20
Change Point	0	33	59	87

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

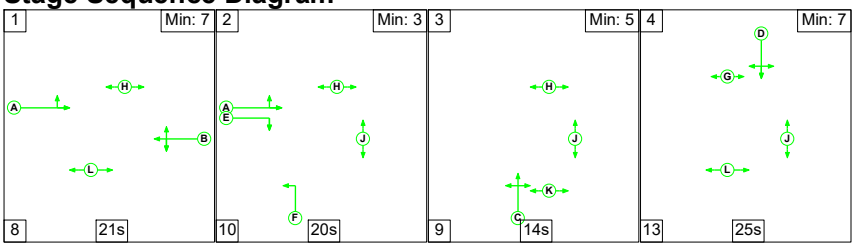
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.3%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**141.3%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	22	-	649	1850:1871	236+236	137.4 : 137.4%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	26	-	802	1879:1793	423+383	140.0 : 54.8%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	48	21	684	1794	733	93.4%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	27	-	614	1901	444	138.4%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	780	2055:1893	818+818	47.7 : 47.7%
4/3	A183 (W) Right	U	N/A	N/A	E		1	20	-	426	1723	302	141.3%
5/1		U	N/A	N/A	-		-	-	-	650	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	307	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	614	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	556	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	491	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1337	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**58**	**0**	**6**	**78.0**	**345.0**	**0.2**	**423.2**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**58**	**0**	**6**	**78.0**	**345.0**	**0.2**	**423.2**	**-**	**-**	**-**	**-**
1/2+1/1	649	472	-	-	-	20.6	90.2	-	110.8	614.8	28.5	90.2	118.7
2/2+2/1	802	633	58	0	6	16.6	97.8	0.2	114.6	514.3	21.8	97.8	119.5
3/1	684	684	-	-	-	6.5	5.7	-	12.2	64.0	21.7	5.7	27.4
3/2	614	444	-	-	-	16.7	87.0	-	103.7	607.8	27.4	87.0	114.4
4/2+4/1	780	780	-	-	-	5.2	0.5	-	5.7	26.1	9.2	0.5	9.7
4/3	426	302	-	-	-	12.4	63.9	-	76.3	644.8	18.3	63.9	82.3
5/1	492	492	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	307	307	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	552	552	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	429	429	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	382	382	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1152	1152	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -57.0 Total Delay for Signalled Lanes (pcuHr): 423.20 Cycle Time (s): 120
PRC Over All Lanes (%): -57.0 Total Delay Over All Lanes(pcuHr): 423.20

Scenario 7: 'PM23 (No Peds)' (FG3: 'PM 2023', Plan 2: 'No Peds')

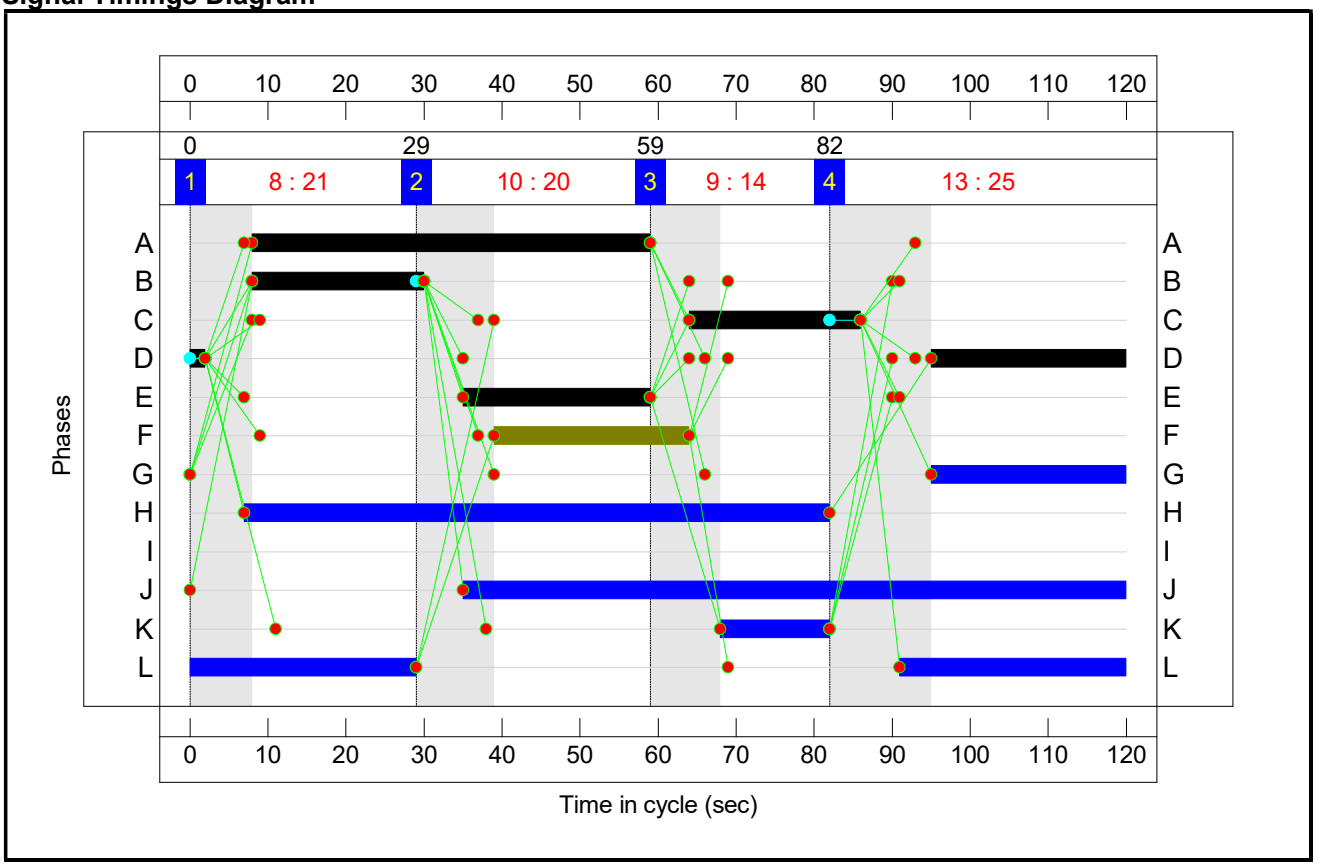
Stage Sequence Diagram



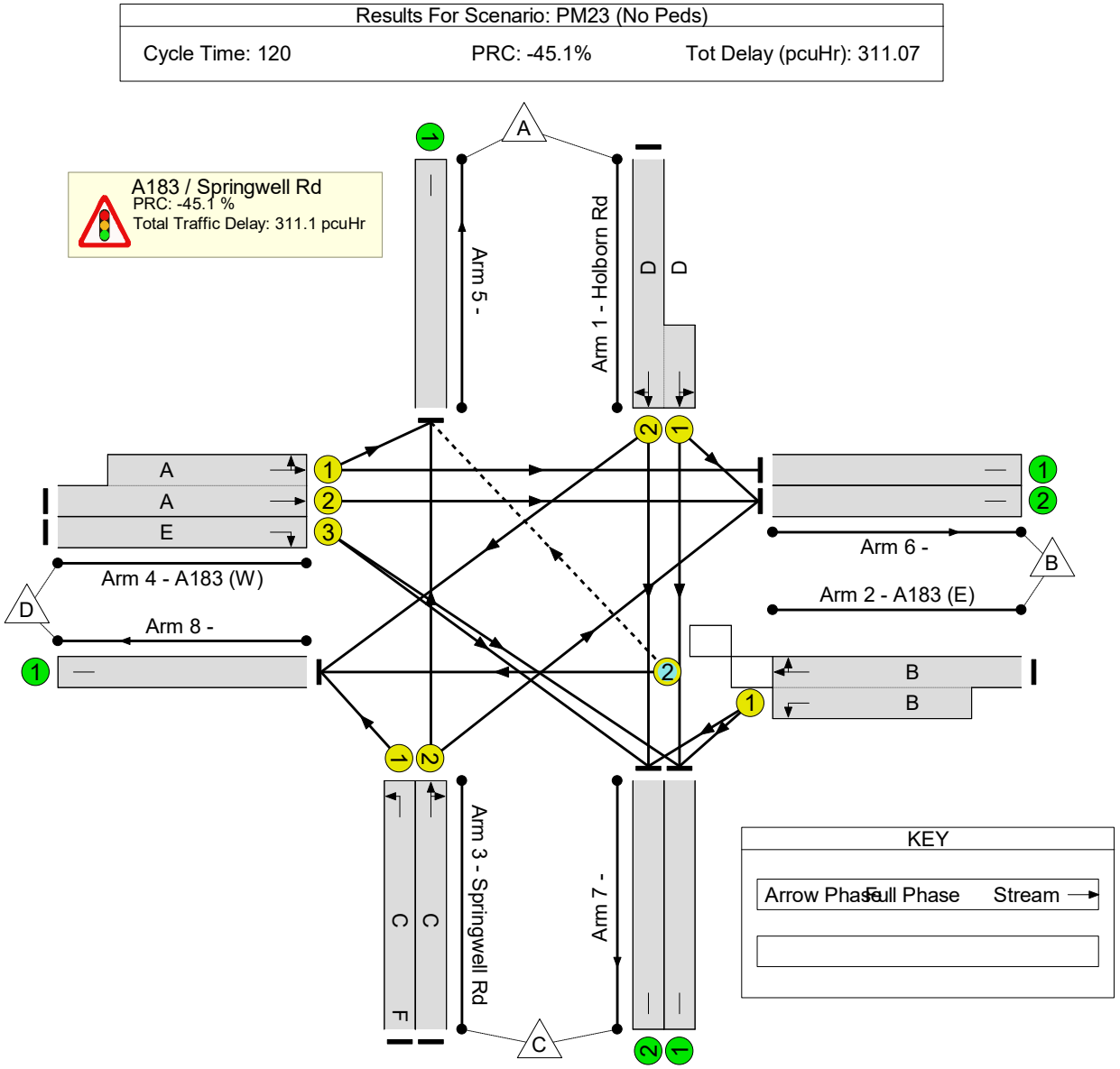
Stage Timings

Stage	1	2	3	4
Duration	21	20	14	25
Change Point	0	29	59	82

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

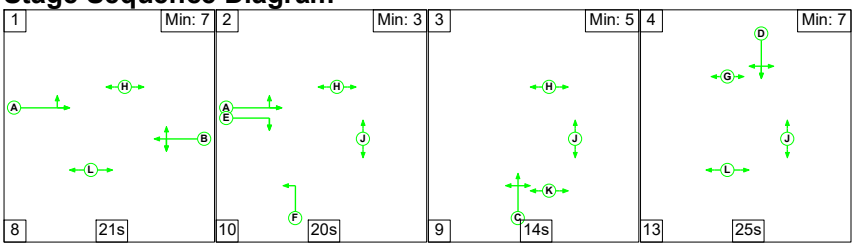
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.6%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**130.6%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	27	-	708	1815:1879	274+274	129.3 : 129.3%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	782	1891:1793	362+344	125.8 : 94.9%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	25	485	1794	718	67.6%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	475	1898	364	130.6%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	589	2055:1882	813+810	36.3 : 36.3%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	464	1723	359	129.3%
5/1		U	N/A	N/A	-		-	-	-	504	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	200	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	483	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	673	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	489	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1154	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**33**	**0**	**4**	**63.7**	**247.3**	**0.1**	**311.1**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**33**	**0**	**4**	**63.7**	**247.3**	**0.1**	**311.1**	**-**	**-**	**-**	**-**
1/2+1/1	708	548	-	-	-	19.8	82.3	-	102.1	519.2	29.3	82.3	111.6
2/2+2/1	782	688	33	0	4	13.1	51.4	0.1	64.5	297.0	15.2	51.4	66.6
3/1	485	485	-	-	-	4.0	1.0	-	5.0	37.3	13.2	1.0	14.2
3/2	475	364	-	-	-	11.4	57.7	-	69.1	523.7	19.5	57.7	77.2
4/2+4/1	589	589	-	-	-	3.7	0.3	-	4.0	24.4	6.5	0.3	6.8
4/3	464	359	-	-	-	11.7	54.6	-	66.3	514.7	19.0	54.6	73.6
5/1	409	409	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	200	200	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	440	440	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	558	558	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	415	415	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1011	1011	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -45.1 Total Delay for Signalled Lanes (pcuHr): 311.07 Cycle Time (s): 120
PRC Over All Lanes (%): -45.1 Total Delay Over All Lanes(pcuHr): 311.07

Scenario 8: 'PM43 (No Peds)' (FG4: 'PM 2043', Plan 2: 'No Peds')

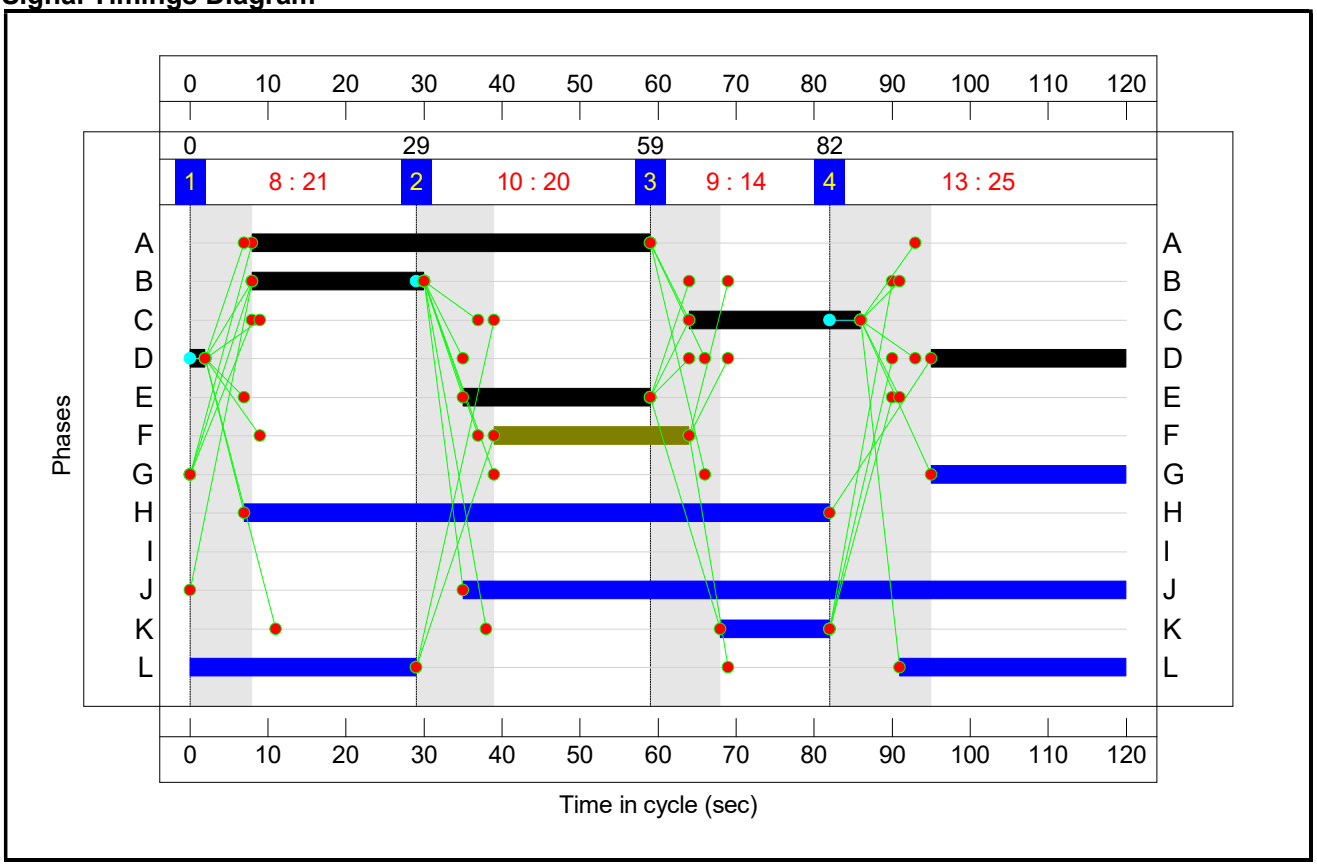
Stage Sequence Diagram



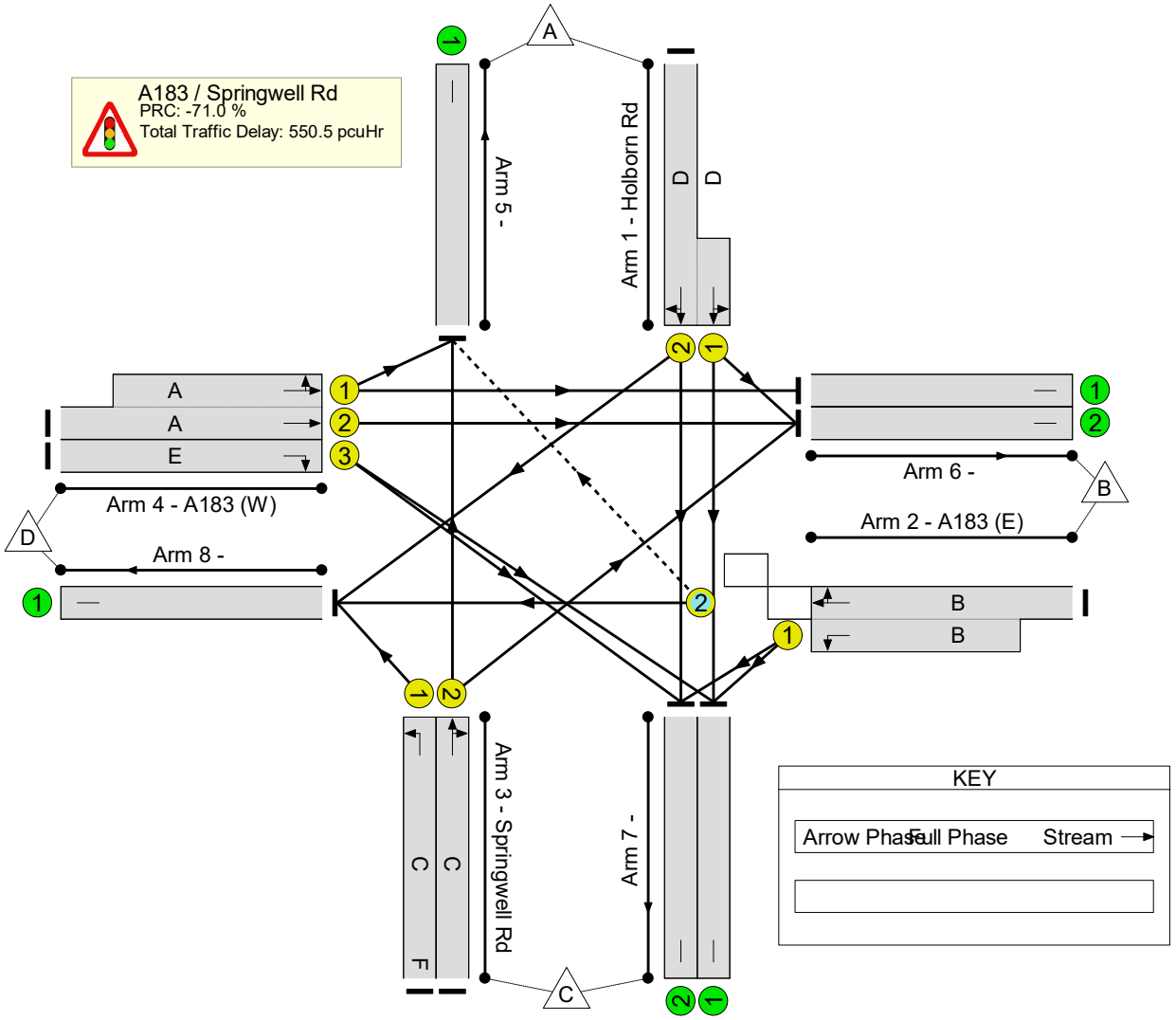
Stage Timings

Stage	1	2	3	4
Duration	21	20	14	25
Change Point	0	29	59	82

Signal Timings Diagram



Network Layout Diagram



Assumptions

Phase delays added to reduce lost time within interstages. These may not be required if on-crossing detection and variable intergreens used after pedestrians.

Pedestrian minimums set to 5 seconds, assuming nearside displays.

The right-turn from the west was assumed to be filly signal-controlled, due to the separater island between the right-turn and ahead lanes.

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Option F	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.9%**
A183 / Springwell Rd	-	-	**N/A**	-	-		-	-	-	-	-	-	**153.9%**
1/2+1/1	Holborn Rd Left Ahead Right	U	N/A	N/A	D		1	27	-	836	1815:1879	274+274	152.6 : 152.6%
2/2+2/1	A183 (E) Right Left Ahead	O+U	N/A	N/A	B		1	22	-	923	1891:1793	362+342	148.4 : 112.5%
3/1	Springwell Rd Left	U	N/A	N/A	C	F	1	47	25	572	1794	718	79.7%
3/2	Springwell Rd Ahead Right	U	N/A	N/A	C		1	22	-	560	1898	364	153.9%
4/2+4/1	A183 (W) Left Ahead	U	N/A	N/A	A		1	51	-	695	2055:1882	808+810	43.0 : 43.0%
4/3	A183 (W) Right	U	N/A	N/A	E		1	24	-	548	1723	359	152.7%
5/1		U	N/A	N/A	-		-	-	-	594	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	237	Inf	Inf	0.0%
6/2		U	N/A	N/A	-		-	-	-	569	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	794	Inf	Inf	0.0%
7/2		U	N/A	N/A	-		-	-	-	578	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1362	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Option F	**-**	**-**	**33**	**0**	**4**	**95.8**	**454.5**	**0.1**	**550.5**	**-**	**-**	**-**	**-**
A183 / Springwell Rd	**-**	**-**	**33**	**0**	**4**	**95.8**	**454.5**	**0.1**	**550.5**	**-**	**-**	**-**	**-**
1/2+1/1	836	548	-	-	-	30.3	145.6	-	175.9	757.4	41.9	145.6	187.5
2/2+2/1	923	705	33	0	4	20.5	111.2	0.1	131.9	514.3	21.0	111.2	132.2
3/1	572	572	-	-	-	5.0	1.9	-	7.0	43.8	16.7	1.9	18.6
3/2	560	364	-	-	-	18.1	99.5	-	117.7	756.4	26.9	99.5	126.4
4/2+4/1	695	695	-	-	-	4.5	0.4	-	4.9	25.4	8.0	0.4	8.4
4/3	548	359	-	-	-	17.3	95.9	-	113.2	743.7	24.6	95.9	120.5
5/1	426	426	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	237	237	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/2	492	492	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	565	565	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/2	424	424	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1099	1099	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -71.0 Total Delay for Signalled Lanes (pcuHr): 550.47 Cycle Time (s): 120
PRC Over All Lanes (%): -71.0 Total Delay Over All Lanes(pcuHr): 550.47