

London Oxford Airport – Development

Technical Note – LinSig Assessment

1. This Technical Note has been prepared by Transport Planning Practice Limited to set out the results of the LinSig assessment undertaken at the junction of A4260 Banbury Road and Langford Lane, Kidlington. It is a signalised T-junction, therefore LinSig (Ver3) has been used to undertake the assessment. The assessment has been completed in response to the single point of objection made by Oxfordshire County Council (OCC), which is set out as follows:

Traffic impact

Assessment is made in the TA of the two roundabouts adjacent to the site, with the expected conclusion that both have spare capacity. One-day classified turning counts have been performed at several junctions, including the Langford Lane / A4260 signalised junction. Section 5.5.1 states that the generated traffic will account for less than 5% of the total traffic flow through that junction, and no further assessment is provided as a result. However, all the additional traffic will be on the Langford Lane arm, so the westbound AM peak flow increases by nearly 12% and the eastbound PM peak flow increases by a similar amount. It is considered that this level of increase justifies the need for a LinSig assessment of the junction as there are concerns over the capacity available. Indeed, the OCC response to the Oxford Technology Park application (14/02067/OUT), dated 25 February 2015, said "However, the junction of Langford Lane and the A4260 is showing as running close to capacity in future years." The absence of an assessment of this junction is a reason for objection. The generated traffic passing through the junction at the west end of Langford Lane will be similar, but the larger A44 signalised junction will be able to better accommodate the increased flows and full assessment is not considered necessary.

General Traffic Considerations in Response

2. Before setting out the technical assessment of the Langford Lane/Banbury Road (A4260) signal-controlled junction there are a number of aspects that need to be considered in response to the above objection from OCC which were noted within the submitted Transport Assessment and also the reference that has been made to the Peter Brett Transport Assessment work set out within the Transport Assessment for Oxford Technology Park (14/02067/OUT) dated December 2014.
 - a) Junction Operation
3. The Langford Lane/Banbury Road (A4260) signal-controlled junction operates using MOVA (Microprocessor Optimised Vehicle Actuation) which is an advanced form of controlling traffic light signals at isolated junctions to deal with fluctuations in traffic demands during the day and during peak periods. The system was originally designed by TRL during the 1980s, it is now a very well-established strategy for the control of traffic light signals at isolated junctions. The benefit of this system is that it adjusts the cycle time and stage choice/stage duration for each cycle to adapt to the traffic flows and movements. Within this form of operation delays to traffic are minimised.

b) Airport Traffic Flows

4. As set out within the Transport Assessment (Paragraphs 4.2.3 to 4.2.5 and Table 4.1) a comparison between the traffic flows surveyed by Peter Brett in 2013 with those surveyed for the application in 2022 on The Boulevard (the main access to London Oxford Airport and the development site). This showed that the 2022 traffic levels into and out of the Airport were only 62% and 55% of the traffic levels that were recorded in 2013.
5. Even adding on the proposed development traffic to the current (2022) traffic movements on The Boulevard would still be lower than the flows recorded in 2013. There has clearly been a significant reduction of traffic movements associated with the Airport since the assessment work undertaken by Peter Brett for the 2014 planning application for Oxford Technology Park. This reference to previous junction assessment work, undertaken 9 years ago, being the basis for OCC's objection.

c) Former Developed Land

6. The proposed development is on land that was previously developed and operational until being largely demolished recently. This had a large car parking area and had operational buildings. In the assessment that is within the Transport Assessment, all of these proposed development trips have been entirely considered to be new.
7. There has been no discounting applied to the proposed development trips from its former use. Noting the situation with historical traffic movements on the Boulevard, clearly there was a considerably greater number of trips partially associated with its former operational use, and the rest of the Airport operations.

d) OCC Local Transport and Connectivity Plan 2022-2050 (July 2022)

8. As set out within the Transport Assessment (sub-section 6.3) OCC's transport policy targets are:
 - By 2030 replace or remove 1 in 4 car trips in Oxfordshire, increase cycle trips to 1 million per week and reduce road fatalities and serious accidents by 50%.
 - By 2040 deliver a net zero transport network and replace or remove 1 out of 3 car trips in Oxfordshire.
9. On the basis of the above targets for Oxfordshire, the traditional traffic modelling approach to apply background traffic growth, add on additional development traffic, and assess future junction capacities ought to have a reconsidered approach, as future traffic volumes should be expected to be reduced from current levels.

Summary of General Traffic Considerations

10. The above factors, and the overall junction flow increases projected being less than 5%, all formed part of TPP's reasoning for excluding the need for a technical assessment of the Langford Lane/Banbury Road (A4260) signal-controlled junction within the Transport Assessment. However, as the County has raised this as an objection, we have undertaken this assessment to demonstrate that the junction would continue to provide adequate capacity with the proposed development at the year of opening and also in the future with the inclusion of traffic increases based on historical traffic growth trends.

Technical Junction Assessment - LinSig

11. The base year classified turning counts undertaken in 2022 were used with the application of growth factors to 2027 and 2043 for the future year scenarios.

Table 1: Growth Factors applied to 2022 Flows

Assessment year	Growth Factor
2027	1.0308
2043	1.1232

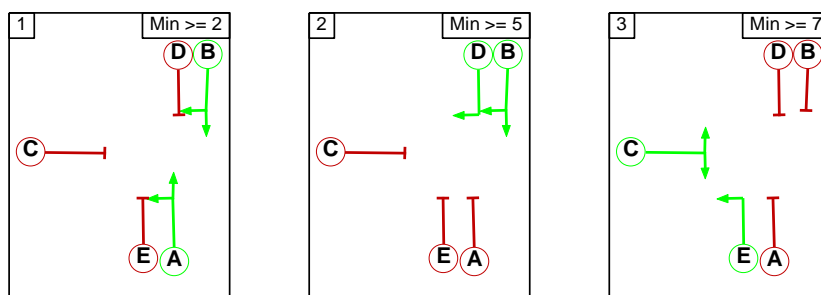
12. The background traffic growth would take into account developments occurring within the wider area as an appropriate means of including cumulative development schemes up to the future assessment year of 2043, 15 years after opening of the proposed development. In addition to the above background growth, established from recorded traffic growth in traffic flows within the area, the inclusion of the additional consented units within Oxford Technology Park that are yet to be constructed and occupied have also been taken into account. This aspect is relevant as these have a direct local impact on Langford Lane and cannot be simply factored into the wider traffic growth. The results of this provide a robust future assessment scenario for the junction assessment. It is also a consistent approach to that undertaken within the Transport Assessment.
13. The assessment has been undertaken for three scenarios as these are representative of indicating the impact of the development at year of opening and also the overall junction performance in the future 15 years after the development opening. Other intermediate scenarios could be examined, but these are considered unnecessary for the purposes of this assessment.
- (Opening Year) 2027 + Oxfordshire Technology Park – Future Opening Year Base
 - (Opening Year) 2027 + Oxfordshire Technology Park + Proposed Development – Development Impacts at Year of Opening
 - (Opening + 15 years) 2043 + Oxfordshire Technology Park + Proposed Development – Future Capacity Assessment
14. The junction operates on a MOVA controller, generating optimised cycle times during each period to minimise delay. On this basis, it is considered appropriate to utilise cycletime optimisation within the LinSig programme, with similar cycle times as previously used within the Oxford Technology Park application (14/02067/OUT) in respect of the opening year scenarios.

Stages

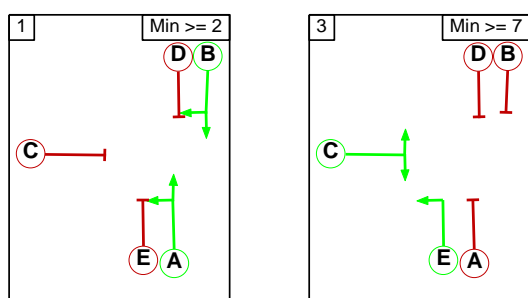
15. The AM peak hour has been assessed using three stages, with additional green time for the indicative right arrow from Banbury Road North due to the high right turning flows. During the PM peak hour, the right turning flow is considerably lower and represents only one vehicle per cycle on average. Therefore this stage is seldom triggered during the PM peak hour. This was similarly found by Peter Brett in their assessment of the junction in 2014.
16. The AM peak and PM Peak signal stages are shown in Inset 1.

Inset 1 – Peak Hour Traffic Signal Stages

AM Peak Hour



PM Peak Hour



Results

17. The full LinSig results for each of the traffic flow scenarios examined are provided within Appendix A.
18. A summary of the results for each of the scenarios is set out in Table 2. In order to mimic the characteristics of the MOVA controller, cycle time optimisation has been used to minimise delay while maintaining sufficient PRC within the junction for the most efficient operation. The cycle times within the 2027 Future Opening Year Base without the proposed development is the same as the baseline used within the Peter Brett assessment for the 2013 existing baseline without any development or growth which reflects the reduced traffic flows associated with the Airport described earlier.

Table 2: Summary LinSig results by scenario

Scenario	Cycle Time	PRC (%)
2027 + OTP AM Peak	42s	20.0%
2027 + OTP PM Peak	41s	12%
2027 + OTP + Prop Dev AM Peak	42s	20.0%
2027 + OTP + Prop Dev PM Peak	46s	6.6%
2043 + OTP + Prop Dev AM Peak	42s	20.5%
2043 + OTP + Prop Dev PM Peak	61s	5.3%

19. For the AM peak, the cycle time and PRC is maintained throughout all three scenarios, with the highest degree of saturation consistently 75%. During both of the 2027 opening year scenarios Banbury Road South has the highest degree of saturation and delay of 8.49-8.97 pcu/Hr, however, in the 2043 future year scenario the highest degree of saturation is predicted to be on the Banbury Road North arm, with a delay of 10.19 pcu/Hr. Therefore, the AM peak hour indicates that the junction has ample practical reserve capacity throughout all assessment scenarios without any need for the controller to extend the cycle time above 42 seconds to reduce the lost time during the peak.
20. In the PM peak, the optimum cycle time varies between 41 and 46 seconds in the 2027 opening year scenarios, where the highest degree of saturation is predicted to be 80.3% and 84.5%, respectively and occur on Langford Lane. The inclusion of background traffic growth to 2043 would increase the optimum cycle time to 61 seconds with the highest degree of saturation (85.5%) predicted to occur at Banbury Road North. It is noted that the additional time within the extended cycle time is distributed to the other arms of the junction to improve their capacity, particularly Langford Lane.
21. The PRC during the PM peak is predicted to change from 6.6% in 2027 with the proposed development to 5.3% in the 2043 future scenario. Delay is predicted to increase from 10.5 pcu/Hr to 12.81 pcu/Hr. Overall the junction is planned to continue operating within the appropriate parameters for practical reserve capacity and delay.
22. Whilst the above assessment indicates that the PM peak hour is more sensitive towards additional traffic flows from development and also background traffic growth, the signal junction controller, under MOVA operation, would have the ability to further increase the cycle time to minimise the overall amount of lost time during interstage periods. A typically accepted increase to a 90 second cycle would significantly improve the practical reserve capacity without significantly impacting on driver delays. Elongation of the cycle time to 120 seconds would further extend the capacity of the junction to accommodate further traffic if necessary. However this is normally regarded to increase delays and associated queues to an unacceptable level along with introducing the potential for inefficient queue dispersal during green phases.

Summary and Conclusion

23. It had been considered within the Transport Assessment that it was unnecessary for the capacity of the Langford Lane/Banbury Road (A4260) signal controlled junction as the overall traffic flows into the junction were not impacted by greater than 5%.
24. In addition other factors further supported this view:
 - a) Junction Operation – The signal junction operates under MOVA control to optimise timings and adjust on a cycle by cycle basis to accommodate changing traffic levels and minimise vehicle delays.
 - b) Airport Traffic Flows – The traffic movements into and out of the Airport have significantly reduced between 2013 and 2022, where the addition of the proposed development traffic would still result in lower traffic levels than experienced on the road network in 2013.
 - c) Former Developed Land – The proposed development is on previously developed land with a significant car parking area. No account has been taken of this within any of the assessment undertaken to ensure a robust assessment.
 - d) OCC Local Transport and Connectivity Plan 2022-2050 (July 2022) – The future traffic reduction targets set by OCC seek to significantly reduce vehicular traffic by 2040 across the County.

25. In respect of the assessment of the Langford Lane/Banbury Road (A4260) signal controlled junction this has been undertaken for the most relevant traffic flow scenarios using LinSig. The results of this analysis have been included. The AM peak hour assessment indicates that the junction has ample practical reserve capacity to accommodate additional traffic movements. The PM peak hour assessment shows that the addition of the proposed development has a limited impact that would result in the cycle time being extended by the controller within its MOVA optimisation. In respect of the future scenario in 2043 the junction would still be operating with adequate practical reserve capacity though further extending the cycle time to reduce the overall lost time though interstage periods. The junction does however have further ability to accommodate additional traffic movements beyond this through the controller's ability to extend the cycle time, if necessary, up to 90 seconds.
26. In conclusion, there are no capacity concerns indicated from the assessment undertaken within any of the assessment scenarios. Furthermore, the junction would be capable of accommodating further traffic increases beyond 2043. It should however be noted that OCC's targets are to reduce traffic movements significantly by 2040. Therefore a robust assessment has been undertaken within this note.

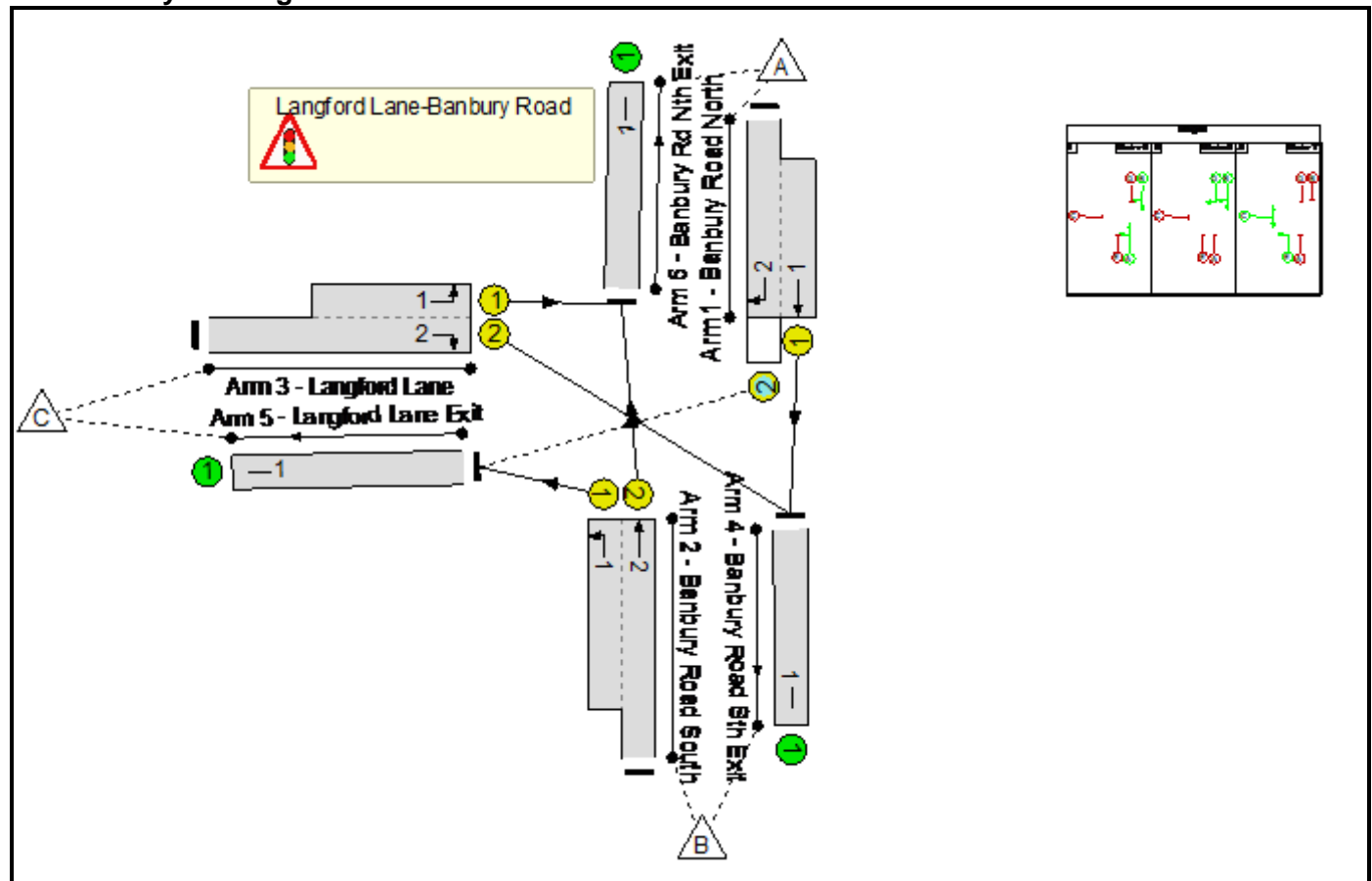
Appendix A – LinSig Analysis

Full Input Data And Results
Full Input Data And Results

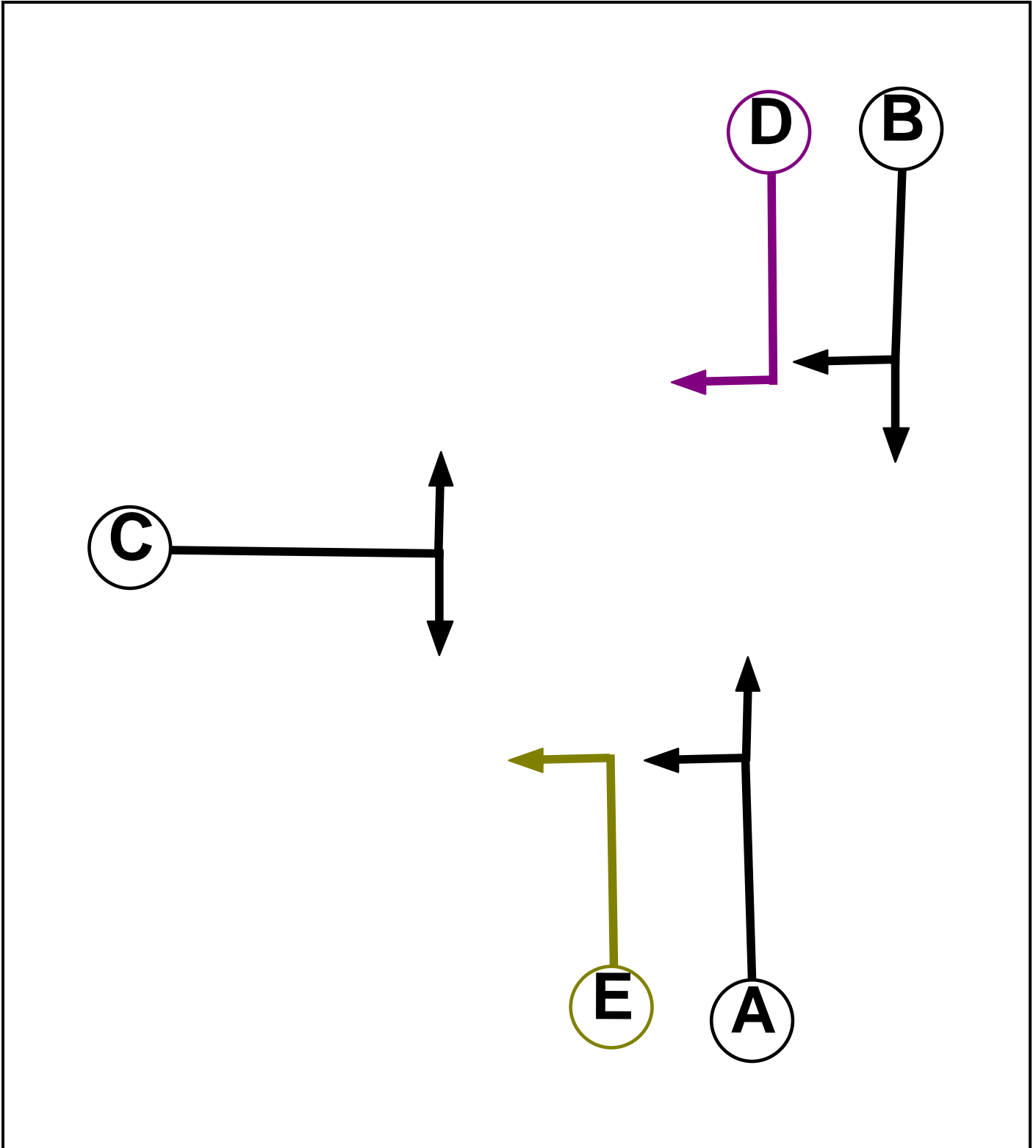
Project and User Details

Project:	London Oxford Airport
Title:	Langford Lane/Banbury Road T Junction
Location:	
Additional detail:	
File name:	Langford Rd - Banbury Rd T Junction Geo Sat Flows.lsg3x
Author:	Caroline Symonds
Company:	TPP
Address:	
Linsig Version:	3, 2, 39, 0

Network Layout Diagram



Phase Diagram



Full Input Data And Results

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	Ind. Arrow	B	5	5
E	Filter	A	5	0

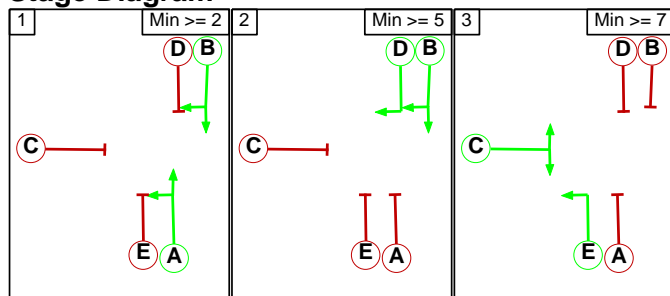
Phase Intergreens Matrix

		Starting Phase				
		A	B	C	D	E
Terminating Phase	A	-	6	5	-	-
	B	-	6	-	6	-
	C	6	6	-	6	-
	D	6	-	6	-	-
	E	-	5	-	5	-

Phases in Stage

Stage No.	Phases in Stage
1	A B
2	B D
3	C E

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage		
		1	2	3
From Stage	1	-	5	6
	2	6	-	6
	3	11	X	-

Full Input Data And Results

Give-Way Lane Input Data

Junction: Langford Lane-Banbury Road											
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)
1/2 (Banbury Road North)	5/1 (Right)	1400	0	2/1	1.10	All	2.00	-	0.50	2	2.00
				2/2	1.10	All					

Full Input Data And Results

Lane Input Data

Junction: Langford Lane-Banbury Road												
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 (Banbury Road North)	U	B	2	3	21.7	Geom	-	3.35	0.00	Y	Arm 4 Ahead	Inf
1/2 (Banbury Road North)	O	B D	2	3	60.0	Geom	-	3.35	0.00	N	Arm 5 Right	18.00
2/1 (Banbury Road South)	U	A E	2	3	11.3	Geom	-	3.45	0.00	Y	Arm 5 Left	23.70
2/2 (Banbury Road South)	U	A	2	3	60.0	Geom	-	3.45	0.00	N	Arm 6 Ahead	Inf
3/1 (Langford Lane)	U	C	2	3	7.0	Geom	-	3.25	0.00	Y	Arm 6 Left	20.00
3/2 (Langford Lane)	U	C	2	3	60.0	Geom	-	3.25	0.00	N	Arm 4 Right	20.00
4/1 (Banbury Road Sth Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (Langford Lane Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (Banbury Rd Nth Exit)	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2027 Base AM + OTP'	07:45	08:45	01:00	
2: '2027 Base PM + OTP'	16:30	17:30	01:00	
3: '2027 Base AM + OTP + Dev'	07:45	08:45	01:00	
4: '2027 Base PM + OTP + Dev'	16:30	17:30	01:00	
5: '2043 Base AM + OTP + Dev'	07:45	08:45	01:00	
6: '2043 Base PM + OTP + Dev'	16:30	17:30	01:00	

Full Input Data And Results

Traffic Flows, Desired

FG1: '2027 Base AM + OTP'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	407	353	760
	B	300	0	536	836
	C	68	382	0	450
	Tot.	368	789	889	2046

FG2: '2027 Base PM + OTP'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	301	56	357
	B	410	0	310	720
	C	349	562	0	911
	Tot.	759	863	366	1988

FG3: '2027 Base AM + OTP + Dev'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	407	390	797
	B	300	0	584	884
	C	71	386	0	457
	Tot.	371	793	974	2138

FG4: '2027 Base PM + OTP + Dev'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	301	59	360
	B	410	0	314	724
	C	386	611	0	997
	Tot.	796	912	373	2081

Full Input Data And Results

FG5: '2043 Base AM + OTP + Dev'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	444	418	862
	B	327	0	628	955
	C	77	419	0	496
	Tot.	404	863	1046	2313

FG6: '2043 Base PM + OTP + Dev'

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	328	64	392
	B	447	0	341	788
	C	414	656	0	1070
	Tot.	861	984	405	2250

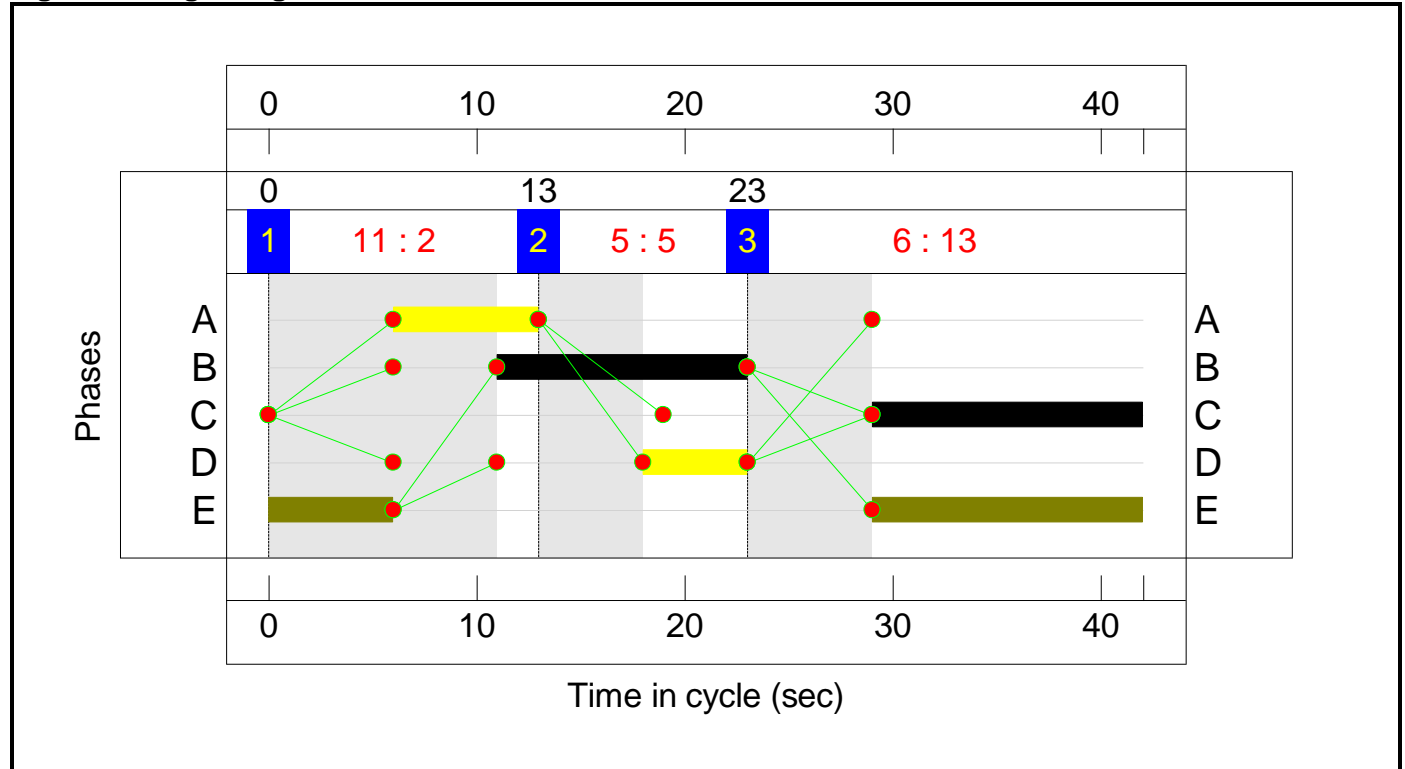
Full Input Data And Results

Scenario 1: 'Scenario 1' (FG1: '2027 Base AM + OTP', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage	1	2	3
Duration	2	5	13
Change Point	0	13	23

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	75.0%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	75.0%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	12	5	760	1929:1950	562+604	62.8 : 67.4%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	7:26	19	836	2100:1843	400+1139	75.0 : 47.1%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	13	-	450	1935:1805	639+114	59.8 : 59.8%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	789	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	889	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	368	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: Langford Lane/Banbury Road T Junction	-	-	23	313	17	6.0	2.3	0.2	8.4	-	-	-	-
Langford Lane-Banbury Road	-	-	23	313	17	6.0	2.3	0.2	8.4	-	-	-	-
1/2+1/1	760	760	23	313	17	2.7	0.9	0.2	3.8	17.9	4.1	0.9	5.0
2/2+2/1	836	836	-	-	-	1.9	0.6	-	2.5	10.7	3.2	0.6	3.8
3/2+3/1	450	450	-	-	-	1.4	0.7	-	2.2	17.3	3.6	0.7	4.3
4/1	789	789	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	889	889	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	368	368	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	20.0	Total Delay for Signalled Lanes (pcuHr):	8.43	Cycle Time (s):	42
	PRC Over All Lanes (%):	20.0	Total Delay Over All Lanes(pcuHr):	8.43		

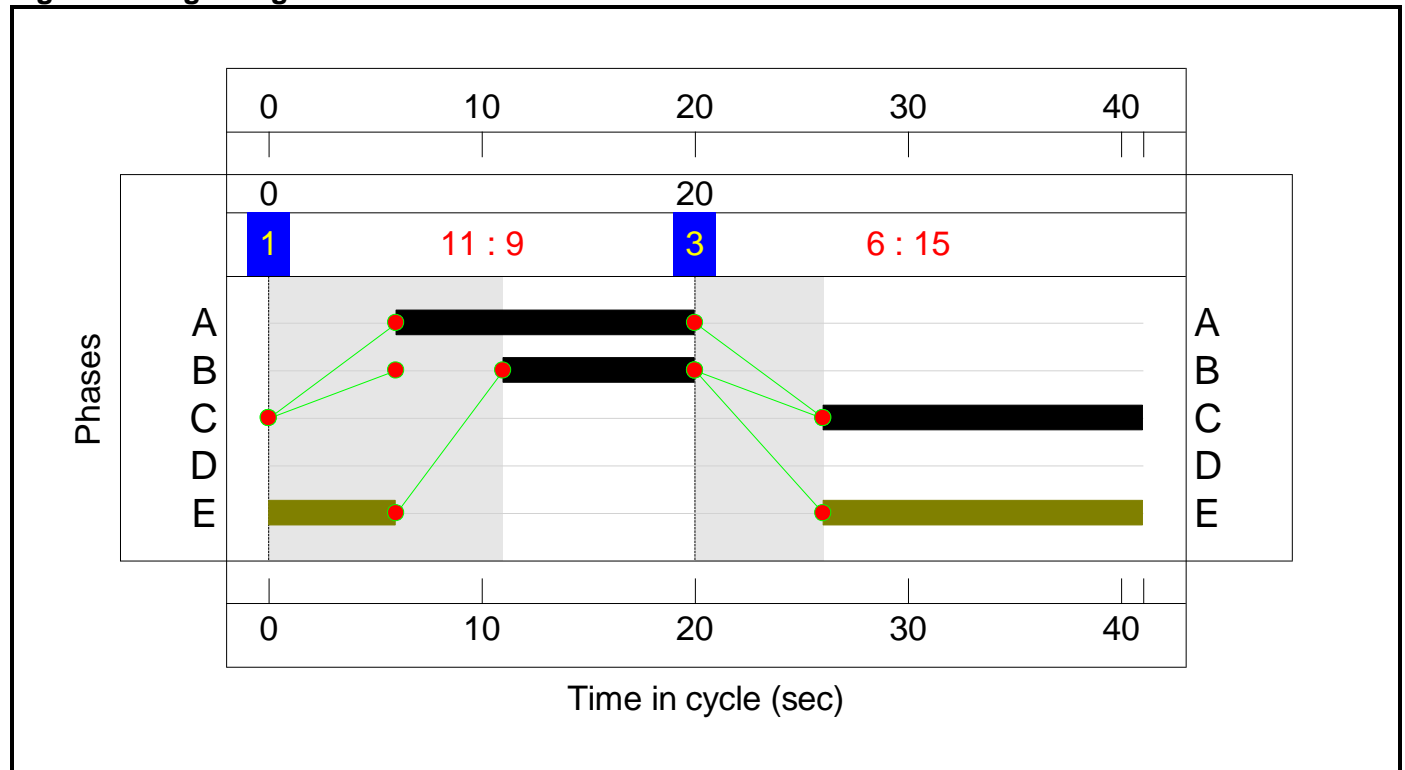
Full Input Data And Results

Scenario 2: 'Scenario 2' (FG2: '2027 Base PM + OTP', Plan 2: 'Network Control Plan 2')

Stage Timings

Stage	1	3
Duration	9	15
Change Point	0	20

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	80.3%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	80.3%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	9	0	357	1929:1950	178+476	31.5 : 63.3%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	14:35	21	720	2100:1843	768+581	53.4 : 53.4%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	15	-	911	1935:1805	700+434	80.3 : 80.3%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	863	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	366	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	759	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: Langford Lane/Banbury Road T Junction	-	-	56	0	0	5.1	3.2	0.0	8.4	-	-	-	-
Langford Lane-Banbury Road	-	-	56	0	0	5.1	3.2	0.0	8.4	-	-	-	-
1/2+1/1	357	357	56	0	0	1.3	0.6	0.0	2.0	20.0	3.0	0.6	3.6
2/2+2/1	720	720	-	-	-	1.2	0.6	-	1.8	8.9	3.6	0.6	4.2
3/2+3/1	911	911	-	-	-	2.6	2.0	-	4.6	18.2	5.5	2.0	7.5
4/1	863	863	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	366	366	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	759	759	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	12.0	Total Delay for Signalled Lanes (pcuHr):	8.36	Cycle Time (s):	41
	PRC Over All Lanes (%):	12.0	Total Delay Over All Lanes(pcuHr):	8.36		

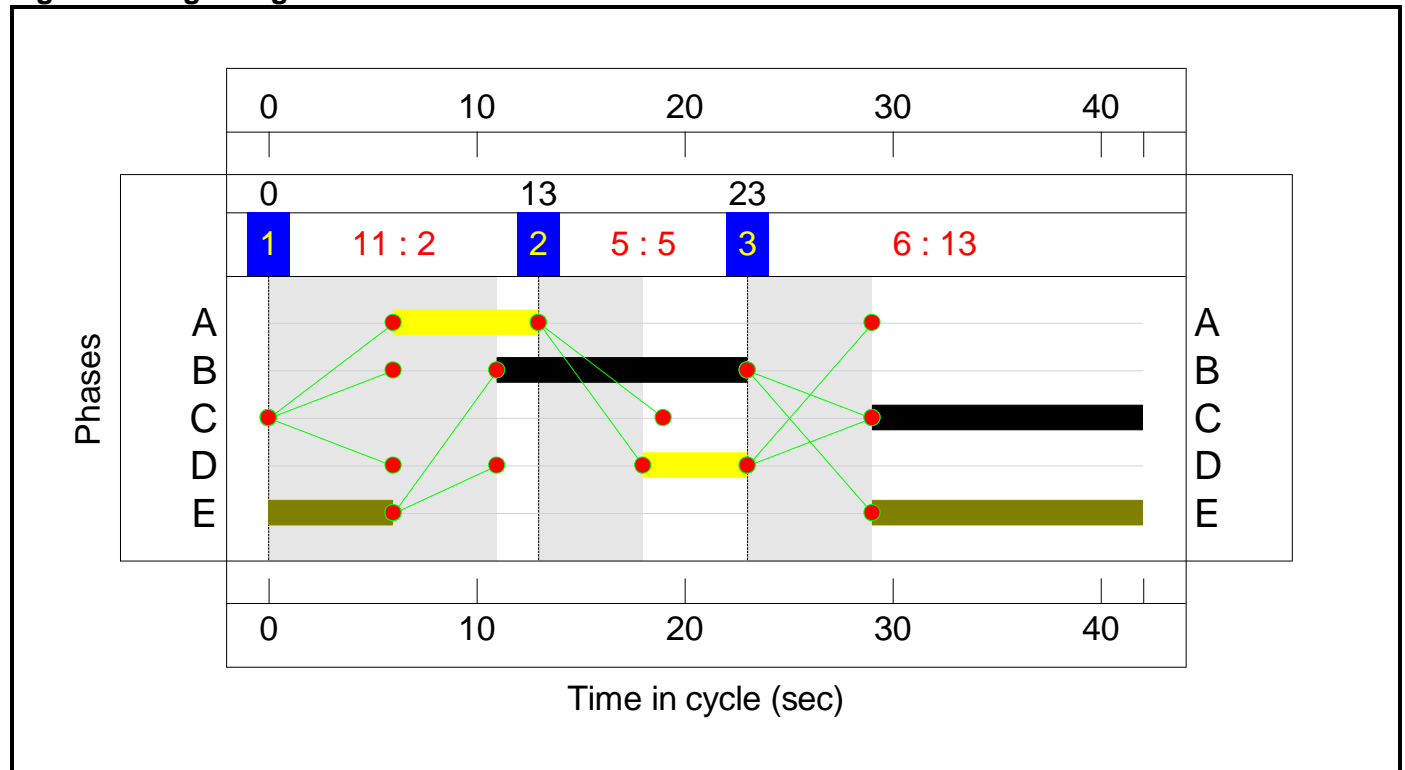
Full Input Data And Results

Scenario 3: 'Scenario 3' (FG3: '2027 Base AM + OTP + Dev', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage	1	2	3
Duration	2	5	13
Change Point	0	13	23

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	75.0%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	75.0%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	12	5	797	1929:1950	559+604	69.7 : 67.4%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	7:26	19	884	2100:1843	400+1143	75.0 : 51.1%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	13	-	457	1935:1805	638+117	60.5 : 60.5%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	793	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	974	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	371	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: Langford Lane/Banbury Road T Junction	-	-	20	351	19	6.2	2.5	0.2	9.0	-	-	-	-
Langford Lane-Banbury Road	-	-	20	351	19	6.2	2.5	0.2	9.0	-	-	-	-
1/2+1/1	797	797	20	351	19	2.8	1.1	0.2	4.1	18.6	4.1	1.1	5.2
2/2+2/1	884	884	-	-	-	2.0	0.7	-	2.6	10.8	3.4	0.7	4.1
3/2+3/1	457	457	-	-	-	1.4	0.8	-	2.2	17.4	3.6	0.8	4.4
4/1	793	793	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	974	974	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	371	371	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	20.0	Total Delay for Signalled Lanes (pcuHr):	8.97	Cycle Time (s):	42
	PRC Over All Lanes (%):	20.0	Total Delay Over All Lanes(pcuHr):	8.97		

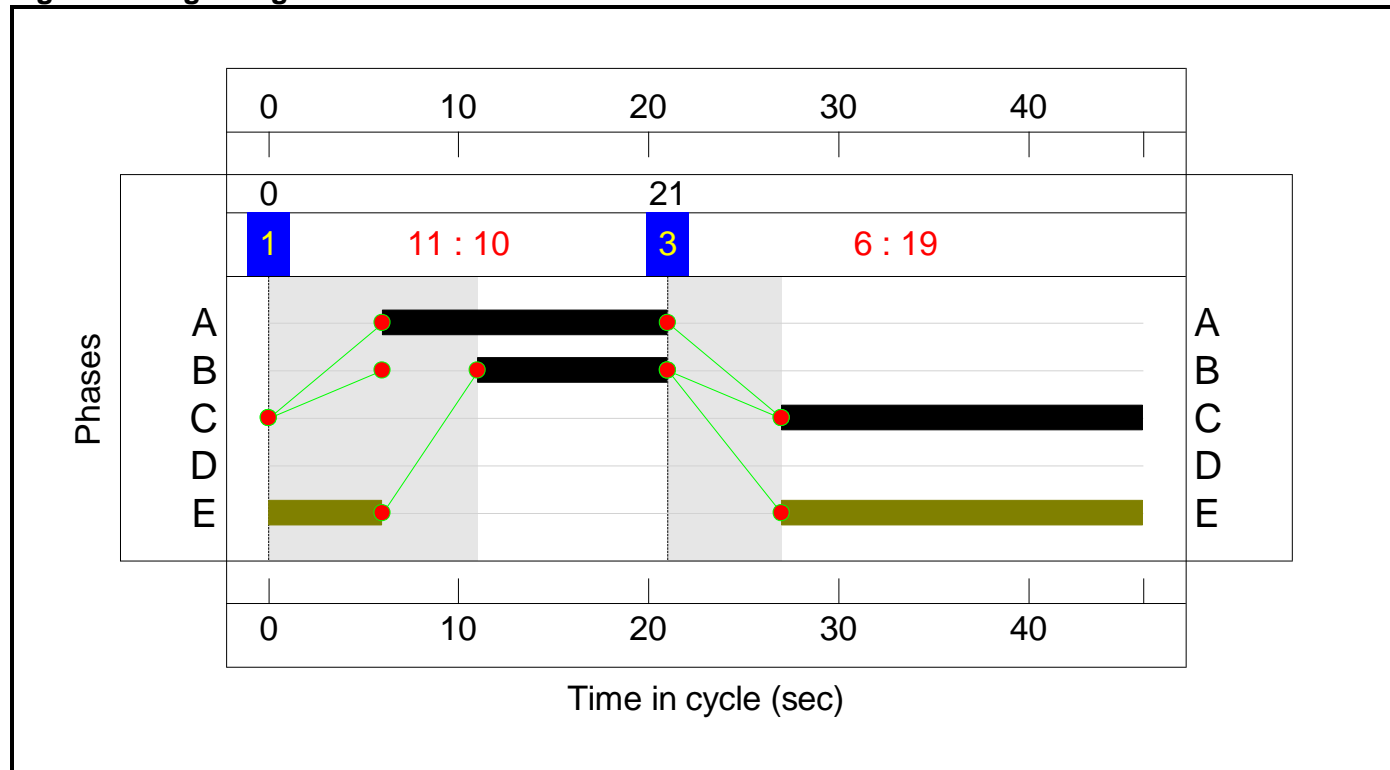
Full Input Data And Results

Scenario 4: 'Scenario 4' (FG4: '2027 Base PM + OTP + Dev', Plan 2: 'Network Control Plan 2')

Stage Timings

Stage	1	3
Duration	10	19
Change Point	0	21

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	84.5%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	84.5%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	10	0	360	1929:1950	171+382	34.6 : 78.9%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	15:40	25	724	2100:1843	730+559	56.1 : 56.1%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	19	-	997	1935:1805	723+457	84.5 : 84.5%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	912	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	373	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	796	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: Langford Lane/Banbury Road T Junction	-	-	59	0	0	5.8	4.2	0.1	10.0	-	-	-	-
Langford Lane-Banbury Road	-	-	59	0	0	5.8	4.2	0.1	10.0	-	-	-	-
1/2+1/1	360	360	59	0	0	1.5	0.9	0.1	2.5	25.3	3.4	0.9	4.4
2/2+2/1	724	724	-	-	-	1.4	0.6	-	2.1	10.2	4.2	0.6	4.9
3/2+3/1	997	997	-	-	-	2.8	2.6	-	5.5	19.7	6.3	2.6	8.9
4/1	912	912	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	373	373	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	796	796	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	6.6	Total Delay for Signalled Lanes (pcuHr):	10.05	Cycle Time (s):	46
	PRC Over All Lanes (%):	6.6	Total Delay Over All Lanes(pcuHr):	10.05		

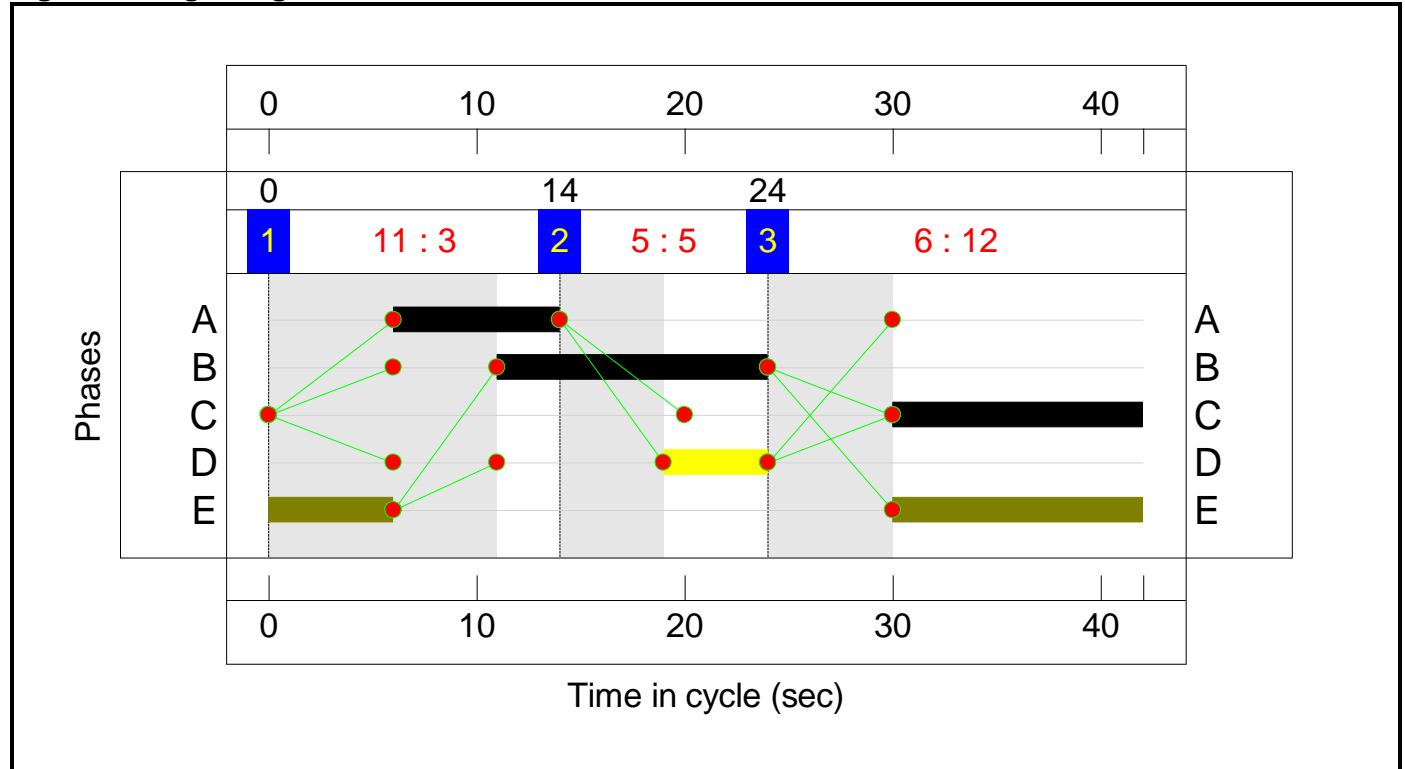
Full Input Data And Results

Scenario 5: 'Scenario 5' (FG5: '2043 Base AM + OTP + Dev', Plan 1: 'Network Control Plan 1')

Stage Timings

Stage	1	2	3
Duration	3	5	12
Change Point	0	14	24

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	74.7%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	74.7%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	13	5	862	1929:1950	560+650	74.7 : 68.3%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	8:26	18	955	2100:1843	450+1142	72.7 : 55.0%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	12	-	496	1935:1805	599+110	70.0 : 70.0%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	863	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	1046	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	404	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: Langford Lane/Banbury Road T Junction	-	-	21	367	30	6.8	3.1	0.3	10.2	-	-	-	-
Langford Lane-Banbury Road	-	-	21	367	30	6.8	3.1	0.3	10.2	-	-	-	-
1/2+1/1	862	862	21	367	30	3.0	1.2	0.3	4.5	18.7	4.4	1.2	5.7
2/2+2/1	955	955	-	-	-	2.1	0.7	-	2.9	10.8	3.8	0.7	4.6
3/2+3/1	496	496	-	-	-	1.7	1.2	-	2.9	20.8	4.3	1.2	5.5
4/1	863	863	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	1046	1046	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	404	404	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	20.5	Total Delay for Signalled Lanes (pcuHr):	10.19	Cycle Time (s):	42
	PRC Over All Lanes (%):	20.5	Total Delay Over All Lanes(pcuHr):	10.19		

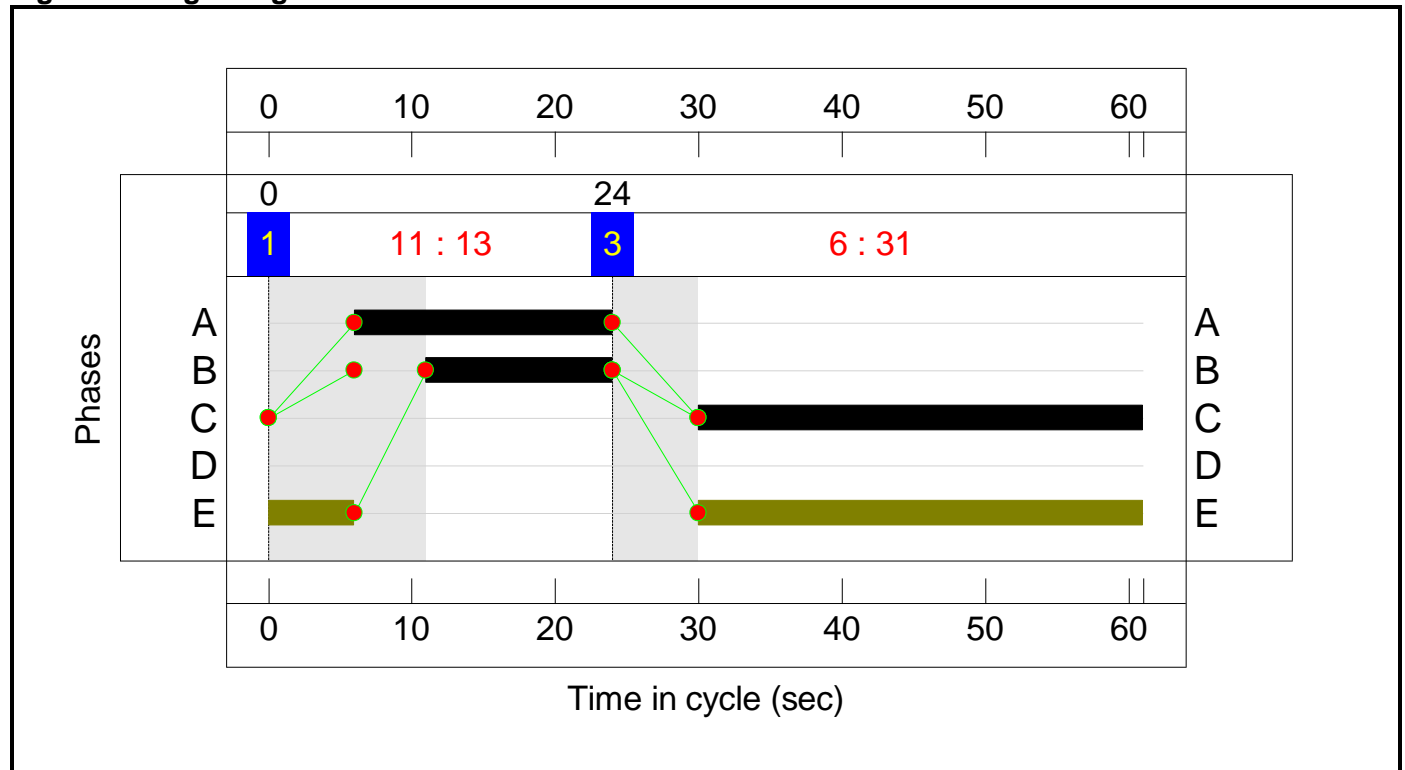
Full Input Data And Results

Scenario 6: 'Scenario 6' (FG6: '2043 Base PM + OTP + Dev', Plan 2: 'Network Control Plan 2')

Stage Timings

Stage	1	3
Duration	13	31
Change Point	0	24

Signal Timings Diagram



Full Input Data And Results

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: Langford Lane/Banbury Road T Junction	-	-	N/A	-	-		-	-	-	-	-	-	85.5%
Langford Lane-Banbury Road	-	-	N/A	-	-		-	-	-	-	-	-	85.5%
1/2+1/1	Banbury Road North Ahead Right	O+U	N/A	N/A	B	D	1	13	0	392	1929:1950	162+384	39.6 : 85.5%
2/2+2/1	Banbury Road South Left Ahead	U	N/A	N/A	A	E	1	18:55	37	788	2100:1843	654+499	68.3 : 68.3%
3/2+3/1	Langford Lane Right Left	U	N/A	N/A	C		1	31	-	1070	1935:1805	773+488	84.9 : 84.9%
4/1	Banbury Road Sth Exit	U	N/A	N/A	-		-	-	-	984	Inf	Inf	0.0%
5/1	Langford Lane Exit	U	N/A	N/A	-		-	-	-	405	Inf	Inf	0.0%
6/1	Banbury Rd Nth Exit	U	N/A	N/A	-		-	-	-	861	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: Langford Lane/Banbury Road T Junction	-	-	61	0	3	7.6	5.1	0.1	12.8	-	-	-	-
Langford Lane-Banbury Road	-	-	61	0	3	7.6	5.1	0.1	12.8	-	-	-	-
1/2+1/1	392	392	61	0	3	2.3	1.3	0.1	3.7	34.2	5.1	1.3	6.4
2/2+2/1	788	788	-	-	-	2.3	1.1	-	3.4	15.4	6.6	1.1	7.7
3/2+3/1	1070	1070	-	-	-	3.0	2.7	-	5.7	19.2	9.4	2.7	12.1
4/1	984	984	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	405	405	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	861	861	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	5.3	Total Delay for Signalled Lanes (pcuHr):	12.81	Cycle Time (s):	61
	PRC Over All Lanes (%):	5.3	Total Delay Over All Lanes(pcuHr):	12.81		