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Our ref: 486-01/IJM-PD

Your ref:

7th October 2019

Dear Mr Douthwaite

Application Reference P/19/0525 – Erection of Aldi Foodstore - Gresford Road, Llay

I refer to your comments pertaining to matters presented in the application reference P/19/0525 dated 24th September and received on the 1st October.

Further to your response which we have now reviewed, we set out herein our response to the comments made. We trust this information is of sufficient detail for you to rescind the objection without further delay.

Operational Performance of Crown Crossroads

Comments made from the outset of the formal response from Wrexham County Borough Council pertaining to the Crown crossroads are fundamentally flawed; in that they completely ignore the consented improvement scheme for the junction. The highway officer's comments states with regard to the traffic attracted to the Aldi development:

'As the junction is already over capacity at peak hours the additional development traffic is likely to increase detriment to through flow of traffic on the highway particularly at peak hours'.

Cameron Rose Associates and the applicant have gone on record stating that they do consider that the Crown crossroads in its current form suffers from congestion and delay. This would of course be made worse with the addition of the residential and Aldi development proposals.

However, this existing junction form is not the junction form to be assessed as the Crown crossroads has an improvement scheme associated with it. This improvement scheme will be delivered through the residential development and Aldi and Cameron Rose Associates have stated that the construction of the Aldi Foodstore will not commence until the improvement scheme has been delivered. As such no reference should be made to the existing Crown crossroads operation but examination of this application reference P/19/0525 should be considered with due regard to the new base scenario, which is defined by the appeal consent under application reference P/2014/0905.

The traffic flows were queried by the LHA during the pre-application stages; however this query was fully answered in the email dated 27 June 2019. It is unclear why WCBC again reference this query as it has been answered and resolved.

With regard to the LHA reference to the *'degree of saturation figures are nearly 30% less than those provided by Home Farm residential application'*; again ignores the fundamentals that underpins Transport Assessment. Best practice for Transport Assessment clearly states that traffic flow data over five years old should not be used to inform the assessment process.

The traffic surveys undertaken for the Home Farm Residential application were undertaken on Thursday 11th September 2014. These surveys were undertaken between the hours of 0730 – 0930 and 1630 – 1830. Due to the date that these surveys were undertaken it is not appropriate to use this data in this application. Therefore new traffic data was collected as agreed during the pre-application meeting with Wrexham County Borough Council on the 31st January 2019.

Following the agreement to undertake new surveys, the month of February was avoided due to potential data inconsistencies that may occur in a non-neutral month. Accordingly, the traffic surveys were undertaken for the Aldi application on Friday 8th March and Saturday 9th March 2019: These surveys were undertaken between the hours of 0730 – 1000 for a Weekday AM, 1600 – 1830 for the Weekday PM and 1000 – 1600 on a Saturday. Queue data was also collected at the time of the traffic surveys and these were included in the Transport Assessment that accompanied the planning application. This data was used in the validation of the LINSIG base models which demonstrated that the models validated well against the observed queue lengths.

Changes in traffic flow over this five year period will inevitably change the results of any assessment process, which utilises the traffic models used to inform the residential application appeal proceedings.

Furthermore as the Local Highway Authority will be aware; the Home Farm residential application applied growth factors to calculate a 2019 and 2024 assessment year, adopting a methodology that is now considered outdated and has been superseded. The growth factors applied in the application were as follows:

- AM Peak:
 - 2014 – 2019 = 1.0502
 - 2014 – 2024 = 1.1127
- PM Peak
 - 2014 – 2019 = 1.0528
 - 2014 – 2024 = 1.1163

Adopting the current approved methodology for calculating growth factors, which is outlined in the Transport Assessment that accompanied the Aldi planning application, would result in the following growth factors:

- AM Peak:
 - 2014 – 2019 = 1.0486
 - 2014 – 2024 = 1.0977
- PM Peak
 - 2014 – 2019 = 1.0508
 - 2014 – 2024 = 1.0998

Coupled with the different traffic flow data and the use of current rather than superseded traffic growth factors will inevitably result in different results from the use of consistent traffic models. It is unclear why the LHA raise this in their response as a query as the reasons behind the differences are self-evident.

Notwithstanding the above and the submitted Transport Assessment; and whilst Cameron Rose Associates do not agree with the following method of assessment; it has been considered prudent to re-use the old traffic data from the 2014 surveys. However as the growth factor method has been superseded, this has not been adopted and therefore the above growth factors taken from the submitted Transport Assessment have been used growth traffic to the 2024 assessment year.

Additional LINSIG Model runs have thus been undertaken for the 2024 base plus committed plus Aldi, with the improvement scheme and MOVA based on the outdated 2014 traffic surveys used for the appeal.

The LINSIG models have been updated to reflect Curtins drawing no. 9562-C01 'Crown Crossroads MOVA Signal Design'. This includes modelling of the right turn ghost island facility from Straight Mile and the reduction of the non-blocking right turn storage from Llay Road, which were omitted from the original LINSIG models. This update within the model has removed the requirement for Stage 2, where the Straight Mile approach runs in its own unimpeded stage. The cycle time has been altered to 120 seconds with Chapel Lane being called once every other cycle in the AM peak and once every four cycles during the PM peak, as per that accepted by the appeal consent under application reference P/2014/0905.

The Home Farm Residential Application Staging arrangement and the Staging arrangement proposed by Cameron Rose Associates are presented below.

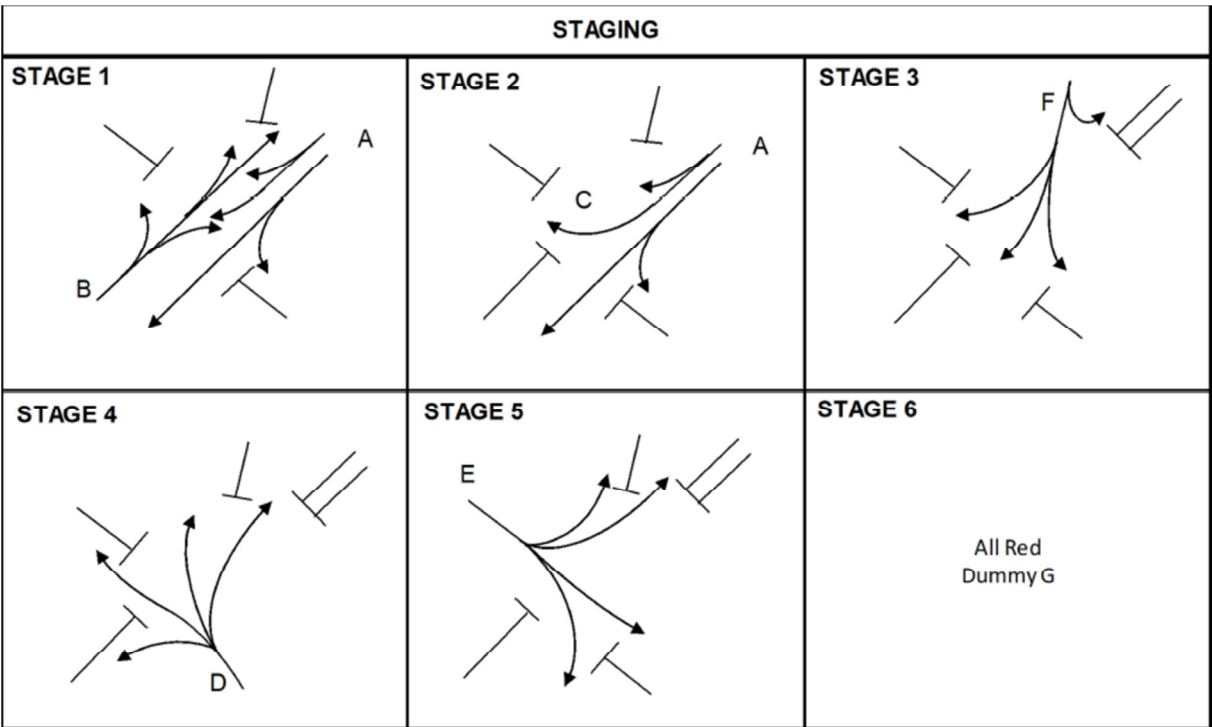


Figure 1: Crown Crossroads Staging Arrangement Proposed by Home Farm Residential Application

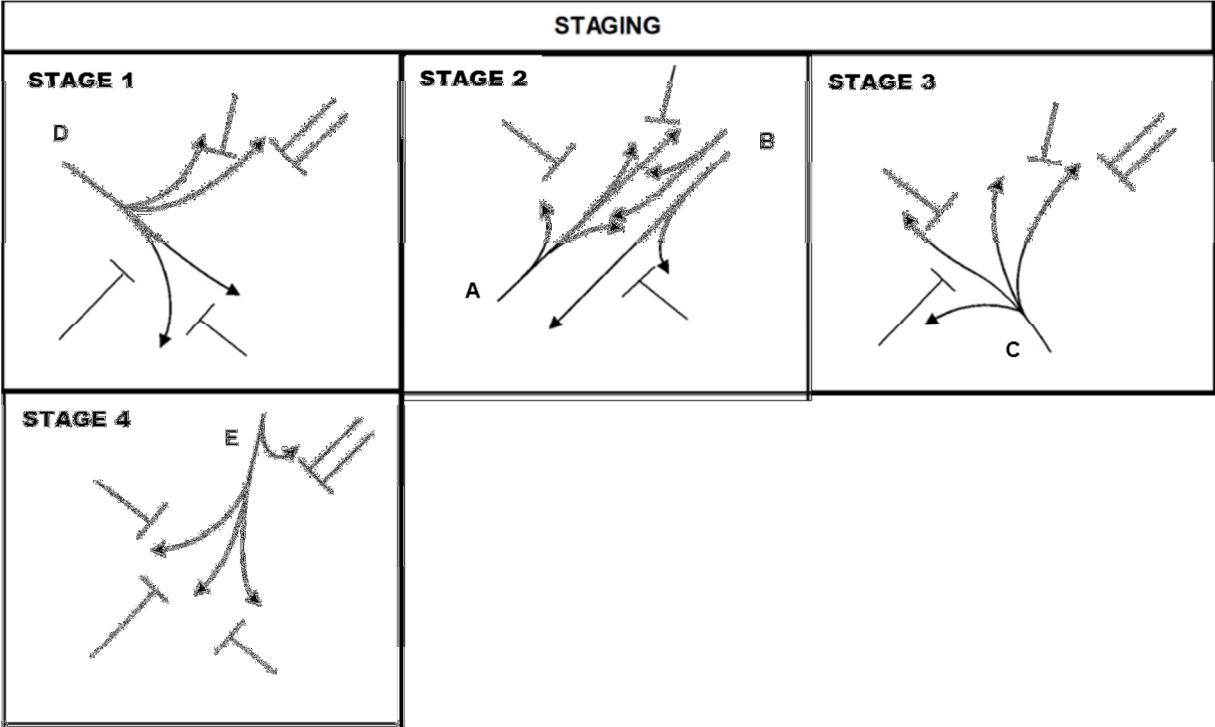


Figure 2: Crown Crossroads Staging Arrangement Proposed by Aldi Application

As defined by the appeal consent under application reference P/2014/0905, the saturation flows at the junction have been increased by 8% to reflect the benefits of MOVA.

The results of the LINSIG assessments are detailed below and included as an Appendix to this letter to allow further analysis. For ease of comparison the degree of saturation and associated queues accepted by the appeal consent under application reference P/2014/0905 have also been presented.

Table 1: Crown Crossroads – LINSIG Results – Accepted under appeal consent under application reference P/2014/0905

Arm	AM Peak				PM Peak			
	2026 Base (Existing Layout)		2026 Base + Development (Junction Improvement + MOVA)		2026 Base (Existing Layout)		2026 Base + Development (Junction Improvement + MOVA)	
	DoS	MMQ	DoS	MMQ	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	102.4%	20	100.3	16	104.1%	28	97.4%	21
B5373 Gresford Road	103.9%	27	102.6	27	103.7%	19	97.2%	15
Llay Road	106.0%	61	103.9	53	77.4%	14	98.4%	26
Rackery Lane	105.1%	41	103.5	37	105.4%	51	98.1%	29
Chapel Lane	27.5%	1	26.6	1	17.2%	1	18.6%	1

Source: Table 6.3 Home Farm, Gresford Road, Llay Proof of Evidence

Table 2: Crown Crossroads – LINSIG Results – CRA Revised Model adopting Home Farm Residential Application Traffic Flows for a 2024 Assessment

Arm	AM Peak		PM Peak	
	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	37.6%	5	53.6%	6
B5373 Gresford Road	90.5%	18	88.8%	17
Llay Road	90.9%	27	88.8%	21
Rackery Lane	91.0%	16	88.5%	22
Chapel Lane	22.7%	1	22.7%	1
PRC	-1.1		1.3	

The results using the out of date 2014 traffic data alongside current growth factor calculations and updating the model to reflect the section 278 design drawings; demonstrate that the junction will operate satisfactorily in the design year period. It should be noted that the corrections and junction optimisation by Cameron Rose Associates would be reflected by the installation signal engineer at the time of the up-grade. Whilst hard copies of the modelling process are provided as an appendix to this letter, Cameron Rose Associated would be happy to share the LINSIG electronic files for review.

It is therefore concluded that even when adopting the data from the Home Farm Residential application, which cannot be relied upon because of the age of the data, the results of the analysis demonstrate that with the Aldi in place the junction will operate within the acceptable levels defined by the appeal consent under application reference P/2014/0905.

The local Highway Authority may also wish to consider the use of low minimum green values on the Chapel Lane approach. This option is intended to reduce lost time and the ability to cycle through stages quickly to reduce vehicular delay. Currently phase minimums at traffic signal installations are usually set around seven seconds for traffic streams and as low as five seconds for pedestrian crossings, and are extended up to their maximums depending on prevailing traffic conditions. This option would allow the traffic phase minimums for Chapel Lane to be lowered during low demand periods, potentially as low as 2-3 seconds, in instances where perhaps only a single vehicle registers a demand on this approach. The lowered phase minimum would provide only enough green for that

vehicle to proceed before changing stage quickly to service another demand. This option would be particularly suited to installations controlled by MOVA as it assesses arrival rates and calculates the minimum green time required.

Active Travel Act

We would like to take this opportunity to remind the Local Highway Authority that the proposal site falls within the red line boundary of the consented, on appeal; planning application reference P/2014/0905.

This application was judged along with its own Active Travel initiatives to be sound and was accordingly granted consent. It is therefore evident that the Active Travel initiatives for residential development on the application site are deemed acceptable; as such they would also be acceptable for this proposed retail development.

Notwithstanding this we identify below the infrastructure to be delivered by this application pursuant of the Active Travel Act.

1. Footway connection along the Straight Mile and Gresford Road frontage whilst maintaining existing trees;
2. Implementation of a zebra crossing in accordance with the same provision already consented under application reference P/2014/0905;
3. Installation of a bus stop on Gresford Road;
4. Provision of secure on-site illuminated and covered cycle parking spaces that benefit from natural surveillance; and
5. Implementation of a staff travel plan.

Should you require any further information at this stage please do not hesitate to contact me.

Should there be a specific requirement that Wrexham County Borough Council are seeking then we would of course be grateful if this could be elucidated. However we note nothing was identified to us through the pre-application process, which would have been beneficial and in accordance with best practice.

Bus Service Provision

Bus service reduction in rural areas has been symptomatic of the loss of the rural bus subsidy throughout the UK. However, this in no way infers that sites in rural areas are not accessible by bus, but simply are accessible by a reduced service.

Best practice adopted by Local Authorities has been not to seek support funding from developers to enhance services, as this in many cases has led to an increased service for an agreed period of time, for example five years; and thereafter the service has dropped away again due to its inability to be self-sustaining.

However, in the case of the development proposal and that of the consented neighbouring residential development an increased gravity is created which could in due course lead to increased viable bus services. It is this tangible benefit that new development brings for bus companies not short term gap funding.

Furthermore, the Local Highway Authority are reminded that the Planning Inspectorate did not infer any such requirement on the consented, on appeal; residential development. Therefore such a request aimed at this development pursuant to Section 106 of the Town and Country Planning Act would not pass the tests for requesting such a contribution.

Finally WCBC as Local Highway Authority present no information on what value of contribution is sought and do not provide any evidence to back up the request for the contribution.

HGV Swept Path Analysis

The HGV swept path analysis demonstrates the service vehicles exiting and entering the access / egress road at the earliest opportunity possible; this is consistent with best practice for a shared access / egress arrangement with customers.

The Local Highway Authority do not acknowledge the number of service vehicle manoeuvres that will take place and the period of time over which these manoeuvres will take place. As presented in the Transport Assessment at paragraph 3.5.2 approximately four HGV's will access the site per day. These arrivals and departures are outside of the peak shopping times and therefore would conflict with the least amount of traffic entering and exiting the store.

The proposal provides excellent inter-visibility into and out of the access road so that service vehicle drivers are able to determine whether it is safe to manoeuvre onto the access / egress road from the Gresford Road or the service yard.

Operational performance modelling of the site access junction presented in Table 6-2 of the Transport Assessment, which is accepted by the Local Highway Authority; clearly demonstrates that there will be no queuing at the site access. As such the service vehicle will be able to manoeuvre into and out of the site in an unfettered manner. The delay therefore incurred on Gresford Road would be geometric delay consistent with any slowing and manoeuvring of large vehicles into and out of junctions. For example the same argument could be placed on the residential street (Fair Oaks Crescent) opposite the site where a refuse collection vehicle turning in to the street takes the full width of the access road as illustrated below in **Figure 1**. Whilst this is an immediate example of this perfectly normal operation of a highway network there are many such examples of this occurring in the UK.

Accordingly, there is no evidence that this geometric delay consistent with any bell mouth junction will give rise to unacceptable or severe delays on Gresford Road. It is therefore concluded that the service vehicle manoeuvres do not give rise to tangible or perceptible congestion issues on Gresford Road.

Hedgerow Maintenance to Maintain Visibility

It is assumed that the Local Highway Authority currently maintain the Gresford Road frontage hedgerow to facilitate the required visibility splay from Home Farm. However, Cameron Rose Associates can confirm that the applicant (Aldi Foodstores) would be happy to maintain under licence from the LHA the future growth extents of the Gresford Road frontage hedgerow.

Zebra Crossing Provision

The provision of the proposed zebra crossing was identified and consented under application reference P/2014/0905 at appeal. This crossing position has therefore already been examined by the Planning Inspectorate and no issues were raised. It is therefore unclear why the LHA now raise this as an issue contrary to the Planning Inspectorates findings.

It is understood that there was an error in the drafting of the conditions for the implementation of consent P/2014/0905 and the inclusion of this zebra crossing at this location was missed. This was first raised in a pre-application meeting between the applicant, Cameron Rose Associates and Mr Douthwaite at WCBC's offices on Ruthin Road in Wrexham. At this time the applicant, Aldi Foodstores; agreed to pick these works up and implement them under a section 278 agreement pursuant to the Highways Act 1980.

The submitted landscaping plan clearly identifies that the hedgerow will be retained with rotational management as defined within the Landscaping Specification. It is considered that this reflects that which was previously consented under appeal and therefore it is not understood why this matter has been raised when it already benefits from an extant consent.

Proposed Bus Stop Provision

The applicant has proposed the provision of a bus stop as part of the Active Travel initiatives. The location opposite an existing bell mouth does not restrict forward or junction visibility, furthermore the presence of a bus within the bus stop does not give rise to restricted vehicular movements from the residential street.

It is therefore considered that the proposed bus stop which will experience limited bus services opposite a small residential street (Fairoaks Crescent); will not give rise to high statistical occurrence of vehicle conflict.

Notwithstanding this, the LHA indicate that consideration should be given to the stops relocation. Again it would be helpful if they could elucidate this recommendation. The applicant would be happy to install the stop at any practical point on Gresford Road in agreement with the LHA.

Pedestrian Access from the East

It is considered appropriate to encourage pedestrian to access the store from the proposed zebra crossing. Accordingly a dropped crossing and associated tactile paving has not been proposed at the site access and across Gresford Road at the point of the site.

However, this of course can be incorporated into the scheme if they LHA considered it appropriate to do so rather than encouraging the use of the safer zebra crossing option. In this regard we would be happy to meet with the LHA on site to discuss this matter further.

Left Turn Only from Straight Mile

The left turn into a private access cannot be controlled by way of a Traffic Regulation Order (TRO); therefore consistent with many left turn in only arrangement for private accesses; the geometry will prevent a right turn being achievable. It should be noted that a right turn manoeuvre would be made to be impossible, however if attempted the manoeuvre would not be illegal as the LHA suggest, as a TRO cannot be enforced on a private access.

Such geometric design is common place and has recently been installed on Parkgate Road in Chester and we would be happy to invite officers to this site to demonstrate the standard design and installation method of such an access.

The tight geometry of a left in only access also discourages high speed entry of vehicles and is again consistent with standard design practices, such as that consented and installed on Parkgate Road in Chester.

The boundary hedge can be maintained under licence as discussed above, this would improve visibility of the access on approach. This would also assist pedestrians in being able to see approaching vehicles if the hedgerow in the vicinity of the access was lowered to 600mm and maintained accordingly. As such a suitably worded condition is recommended to address this matter.

Conclusion

The consultation response has been reviewed and carefully considered with additional assessment work being undertaken. It has been demonstrated above that all the matter raised by Wrexham County Borough Council as Local Highway Authority can be addressed. Accordingly, there are no outstanding substantive reasons to raise an objection to the development proposals submitted under planning application reference P/2019/0525.

7th October 2019
Mr P. Douthwaite

Yours Sincerely

A handwritten signature in black ink, appearing to read 'Iain Miller', with a large, sweeping loop at the end.

Iain Miller
Director

Enc. LINSIG Model Outputs



APPENDICES



APPENDIX A

CROWN CROSSROADS – LINSIG RESULTS – CRA REVISED MODEL ADOPTING HOME FARM RESIDENTIAL APPLICATION TRAFFIC FLOWS

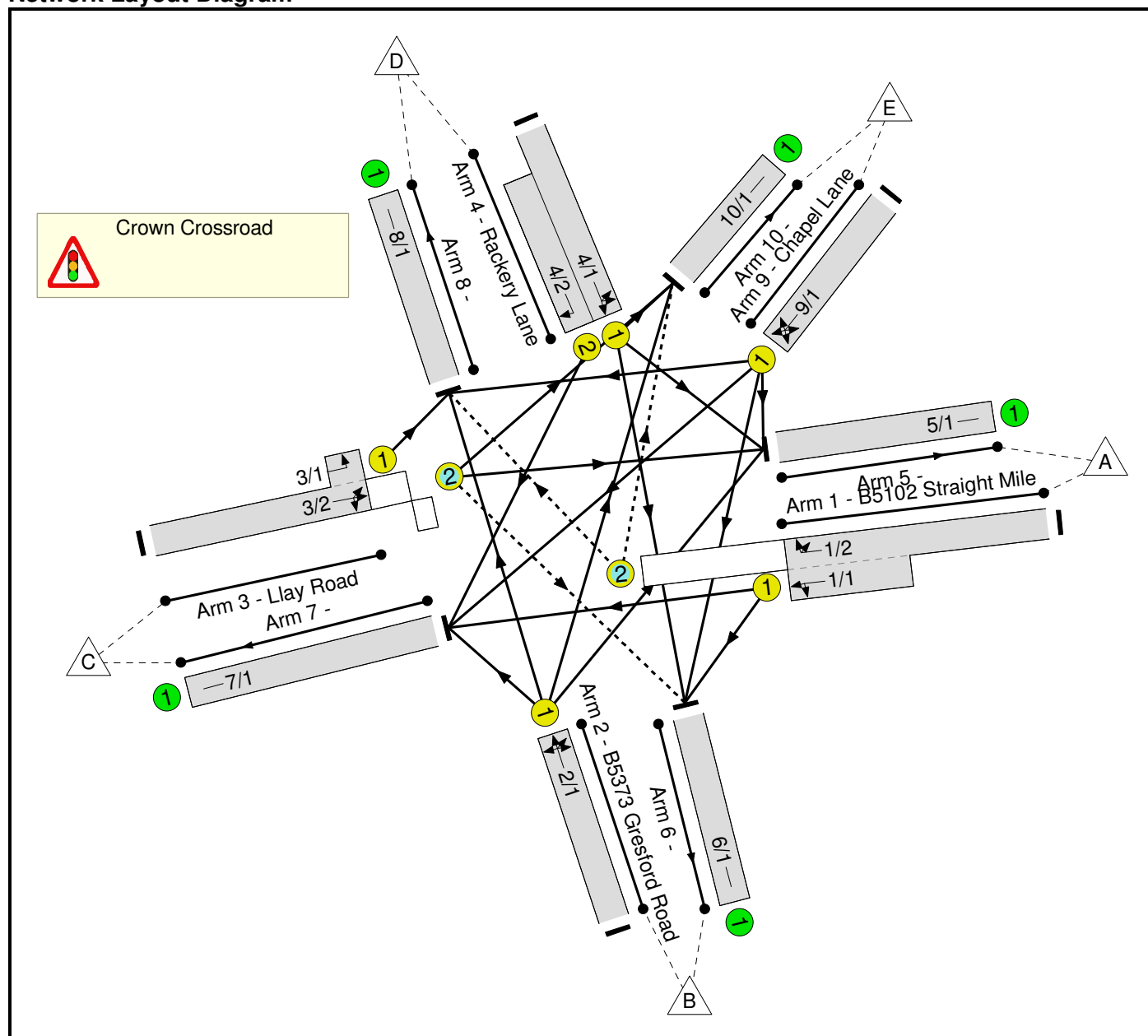
Full Input Data And Results

Full Input Data And Results

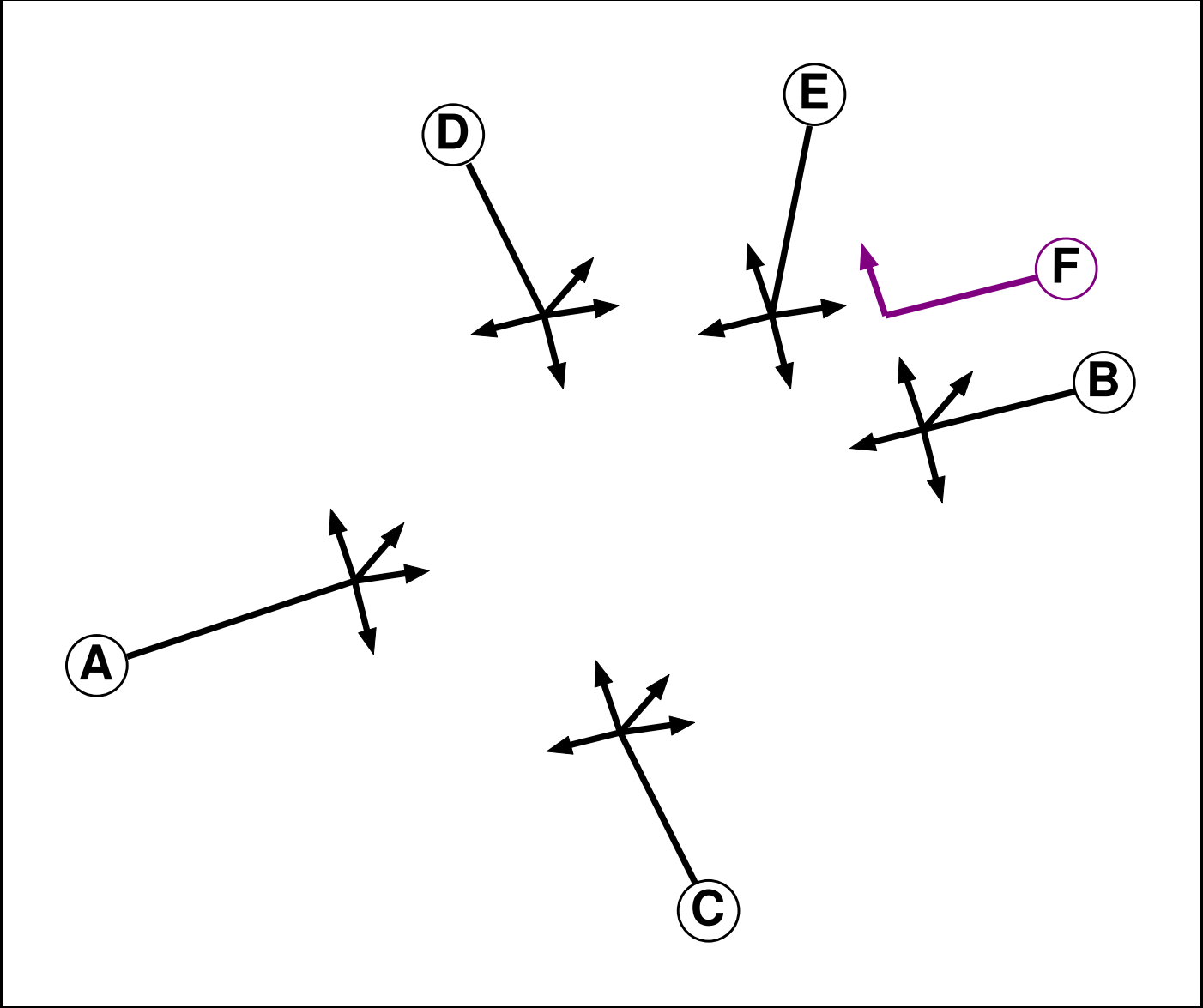
User and Project Details

Project:	Aldi, Llay
Title:	Crown Crossroads
Location:	
File name:	Crown Crossroads_Proposed MOVA_Home Farm Flows_B+C+D.lsg3x
Author:	
Company:	Cameron Rose Associates
Address:	
Notes:	Junction Improvements in association with Committed Development P/2014/0905

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	Ind. Arrow	B	4	4

Full Input Data And Results

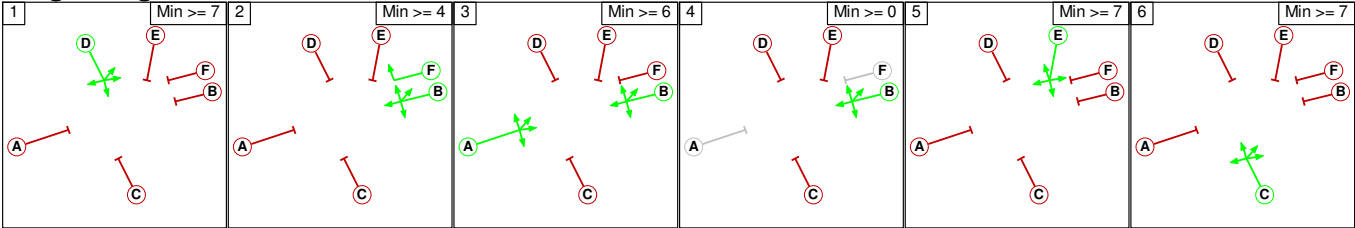
Phase Intergreens Matrix

Terminating Phase	Starting Phase						
		A	B	C	D	E	F
	A		-	5	6	10	5
	B	-		7	8	5	-
	C	7	5		5	8	5
	D	5	6	5		9	6
	E	7	5	7	8		5
	F	5	-	7	6	5	

Phases in Stage

Stage No.	Phases in Stage
1	D
2	B F
3	A B
4	B
5	E
6	C

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
3	5	B	Losing	5	5
3	6	A	Losing	2	2

Prohibited Stage Change

From Stage	To Stage						
		1	2	3	4	5	6
	1		6	6	6	9	5
	2	8		5	0	5	7
	3	8	5		0	10	7
	4	8	0	2		5	7
	5	8	5	7	5		7
	6	5	5	7	5	8	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Crown Crossroad											
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 (B5102 Straight Mile)	8/1 (Right)	1439	0	3/2	1.09	To 5/1 (Ahead) To 10/1 (Ahead)	7.00	-	0.50	7	7.00
	10/1 (U-Turn)	1439	0	3/2	1.09	To 5/1 (Ahead) To 10/1 (Ahead)					
3/2 (Llay Road)	6/1 (Right)	1439	0	1/2	1.09	None	3.00	1.00	0.50	3	3.00

Full Input Data And Results

Lane Input Data

Junction: Crown Crossroad												
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 (B5102 Straight Mile)	U	B	2	3	6.0	User	2013	-	-	-	-	-
1/2 (B5102 Straight Mile)	O	B F	2	3	60.0	User	2056	-	-	-	-	-
2/1 (B5373 Gresford Road)	U	C	2	3	60.0	User	2067	-	-	-	-	-
3/1 (Llay Road)	U	A	2	3	1.7	User	1867	-	-	-	-	-
3/2 (Llay Road)	O	A	2	3	60.0	User	2076	-	-	-	-	-
4/1 (Rackery Lane)	U	D	2	3	60.0	User	2020	-	-	-	-	-
4/2 (Rackery Lane)	U	D	2	3	10.1	User	1910	-	-	-	-	-
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	-	-	-	-	-	-
9/1 (Chapel Lane)	U	E	2	3	60.0	User	2114	-	-	-	-	-
10/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2024 Base plus Committed Development AM Peak Flows'	07:45	08:45	01:00	
2: '2024 Base plus Committed Development PM Peak Flows'	16:30	17:30	01:00	
3: '2024 Base plus Committed plus Development AM Peak Flows'	07:45	08:45	01:00	
4: '2024 Base plus Committed plus Development PM Peak Flows'	16:30	17:30	01:00	

Scenario 1: '2024 B+C+D - AM' (FG3: '2024 Base plus Committed plus Development AM Peak Flows', Plan 3: 'AM Peak (CT 240)_Revised')

Traffic Flows, Desired

Desired Flow :

	Destination						
Origin	A	A	B	C	D	E	Tot.
	A	0	9	74	210	0	293
	B	27	0	107	276	3	413
	C	117	72	0	530	3	722
	D	174	147	316	0	1	638
	E	2	1	6	7	0	16
	Tot.	320	229	503	1023	7	2082

Traffic Lane Flows

Lane	Scenario 1: 2024 B+C+D - AM
Junction: Crown Crossroad	
1/1 (short)	83
1/2 (with short)	293(In) 210(Out)
2/1	413
3/1 (short)	530
3/2 (with short)	722(In) 192(Out)
4/1 (with short)	638(In) 322(Out)
4/2 (short)	316
5/1	320
6/1	229
7/1	503
8/1	1023
9/1	16
10/1	7

Lane Saturation Flows

Junction: Crown Crossroad								
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 (B5102 Straight Mile Lane 1)	This lane uses a directly entered Saturation Flow						2013	2013
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2056	2056
2/1 (B5373 Gresford Road Lane 1)	This lane uses a directly entered Saturation Flow						2067	2067
3/1 (Llay Road Lane 1)	This lane uses a directly entered Saturation Flow						1867	1867
3/2 (Llay Road Lane 2)	This lane uses a directly entered Saturation Flow						2076	2076
4/1 (Rackery Lane Lane 1)	This lane uses a directly entered Saturation Flow						2020	2020
4/2 (Rackery Lane Lane 2)	This lane uses a directly entered Saturation Flow						1910	1910
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
9/1 (Chapel Lane Lane 1)	This lane uses a directly entered Saturation Flow						2114	2114
10/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: '2024 B+C+D - PM' (FG4: '2024 Base plus Committed plus Development PM Peak Flows', Plan 4: 'PM Peak (CT 480)_Revised')

Traffic Flows, Desired

Desired Flow :

	Destination						
Origin		A	B	C	D	E	Tot.
	A	0	25	148	212	1	386
	B	43	0	120	208	0	371
	C	99	139	0	336	4	578
	D	212	225	433	0	2	872
	E	2	2	3	1	0	8
	Tot.	356	391	704	757	7	2215

Traffic Lane Flows

Lane	Scenario 2: 2024 B+C+D - PM
Junction: Crown Crossroad	
1/1 (short)	173
1/2 (with short)	386(In) 213(Out)
2/1	371
3/1 (short)	336
3/2 (with short)	578(In) 242(Out)
4/1 (with short)	872(In) 439(Out)
4/2 (short)	433
5/1	356
6/1	391
7/1	704
8/1	757
9/1	8
10/1	7

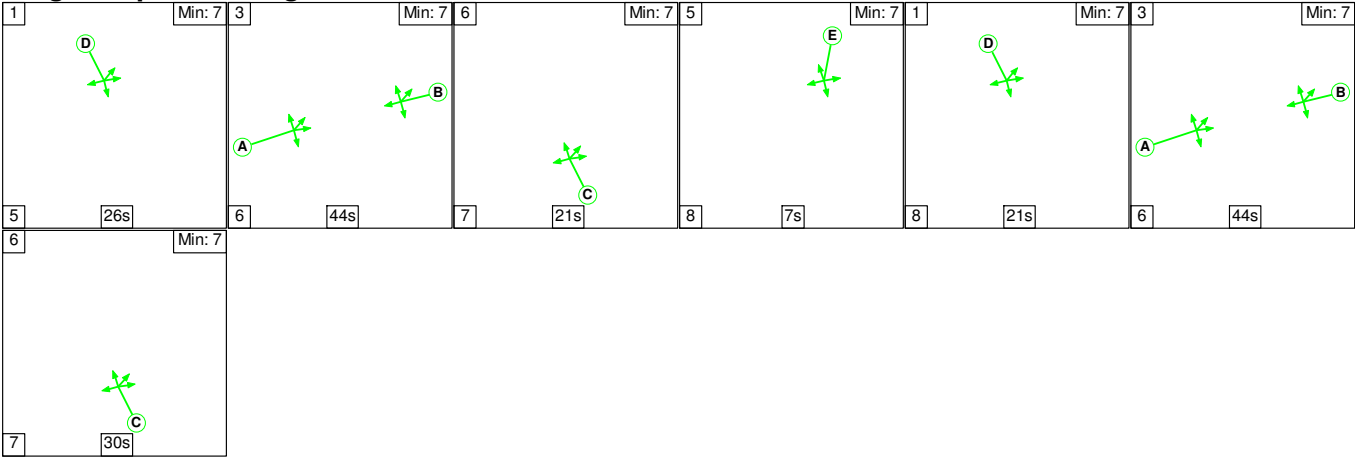
Lane Saturation Flows

Junction: Crown Crossroad								
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 (B5102 Straight Mile Lane 1)	This lane uses a directly entered Saturation Flow						2013	2013
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2056	2056
2/1 (B5373 Gresford Road Lane 1)	This lane uses a directly entered Saturation Flow						2067	2067
3/1 (Llay Road Lane 1)	This lane uses a directly entered Saturation Flow						1867	1867
3/2 (Llay Road Lane 2)	This lane uses a directly entered Saturation Flow						2076	2076
4/1 (Rackery Lane Lane 1)	This lane uses a directly entered Saturation Flow						2020	2020
4/2 (Rackery Lane Lane 2)	This lane uses a directly entered Saturation Flow						1910	1910
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
9/1 (Chapel Lane Lane 1)	This lane uses a directly entered Saturation Flow						2114	2114
10/1	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Scenario 1: '2024 B+C+D - AM' (FG3: '2024 Base plus Committed plus Development AM Peak Flows', Plan 3: 'AM Peak (CT 240)_Revised')

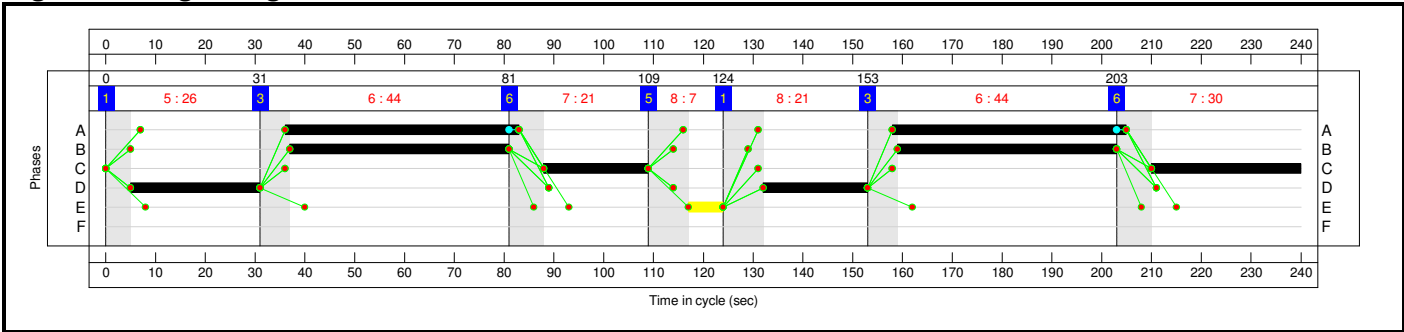
Stage Sequence Diagram



Stage Timings

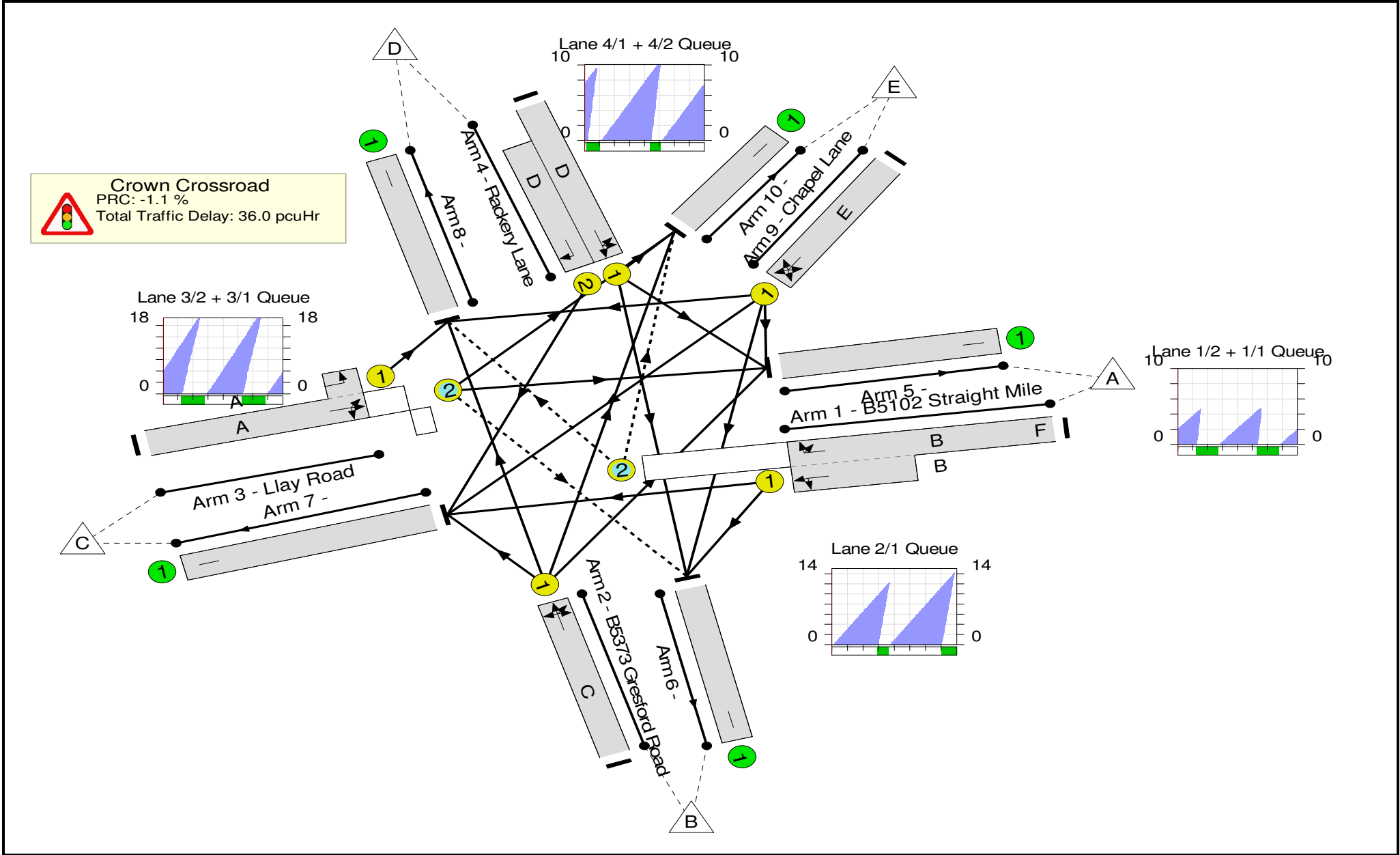
Stage	1	3	6	5	1	3	6
Duration	26	44	21	7	21	44	30
Change Point	0	31	81	109	124	153	203

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

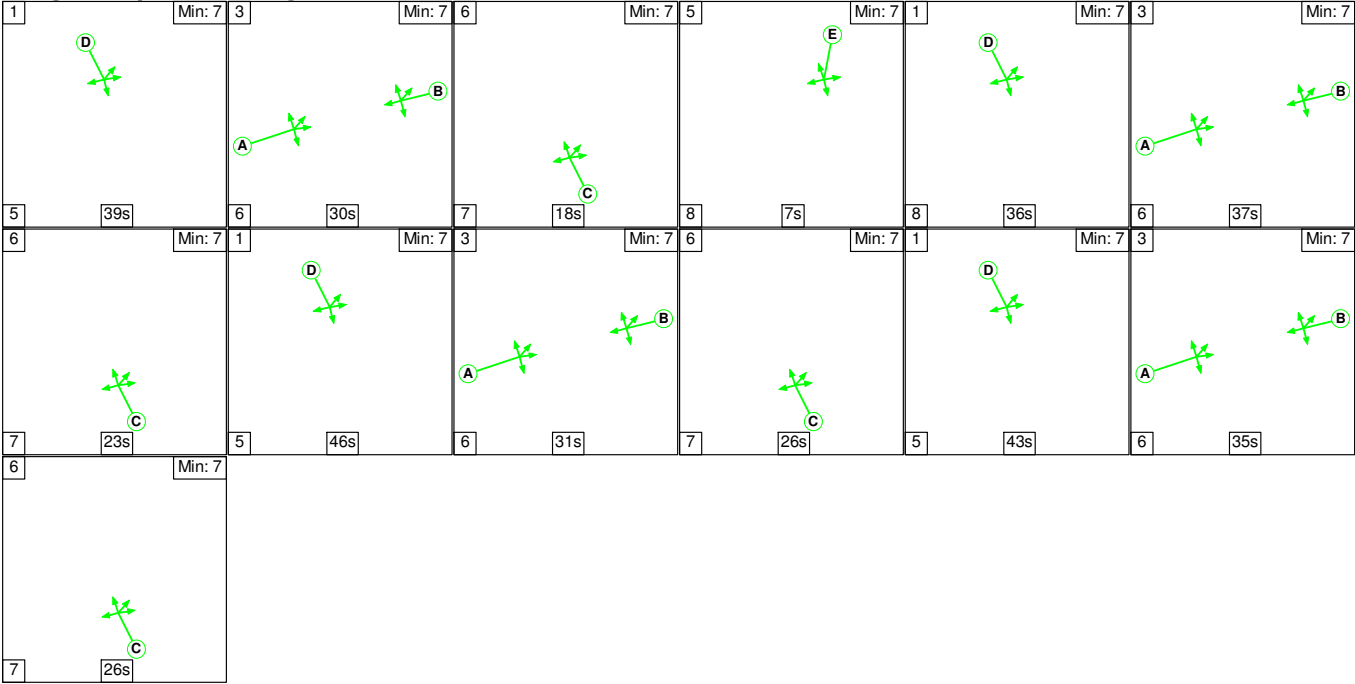
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Crown Crossroads	-	-	N/A	-	-		-	-	-	-	-	-	91.0%
Crown Crossroad	-	-	N/A	-	-		-	-	-	-	-	-	91.0%
1/2+1/1	B5102 Straight Mile Left Ahead Right U-Turn	O+U	N/A	N/A	B	F	2	88	0	293	2056:2013	558+221	37.6 : 37.6%
2/1	B5373 Gresford Road Right Left Ahead Right2	U	N/A	N/A	C		2	51	-	413	2067	456	90.5%
3/2+3/1	Llay Road Ahead Right Left Ahead2	O+U	N/A	N/A	A		2	94	-	722	2076:1867	211+583	90.9 : 90.9%
4/1+4/2	Rackery Lane Left Ahead Right Left2	U	N/A	N/A	D		2	47	-	638	2020:1910	354+347	91.0 : 91.0%
5/1		U	N/A	N/A	-		-	-	-	320	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	229	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	503	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	1023	Inf	Inf	0.0%
9/1	Chapel Lane U-Turn Left Ahead Right	U	N/A	N/A	E		1	7	-	16	2114	70	22.7%
10/1		U	N/A	N/A	-		-	-	-	7	Inf	Inf	0.0%

Full Input Data And Results

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: Crown Crossroads	-	-	205	70	7	22.5	13.3	0.2	36.0	-	-	-	-
Crown Crossroad	-	-	205	70	7	22.5	13.3	0.2	36.0	-	-	-	-
1/2+1/1	293	293	205	0	5	2.1	0.3	0.2	2.6	31.5	5.0	0.3	5.3
2/1	413	413	-	-	-	5.2	4.0	-	9.3	80.7	14.2	4.0	18.2
3/2+3/1	722	722	0	70	2	6.6	4.4	0.0	11.1	55.2	22.4	4.4	26.9
4/1+4/2	638	638	-	-	-	8.1	4.4	-	12.5	70.6	11.5	4.4	16.0
5/1	320	320	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	229	229	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	503	503	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	1023	1023	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
9/1	16	16	-	-	-	0.5	0.1	-	0.6	145.9	1.0	0.1	1.2
10/1	7	7	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
C1 PRC for Signalled Lanes (%): -1.1 Total Delay for Signalled Lanes (pcuHr): 36.05 Cycle Time (s): 240 PRC Over All Lanes (%): -1.1 Total Delay Over All Lanes(pcuHr): 36.05													

Full Input Data And Results
Scenario 2: '2024 B+C+D - PM' (FG4: '2024 Base plus Committed plus Development PM Peak Flows', Plan 4: 'PM Peak (CT 480)_Revised')

Stage Sequence Diagram

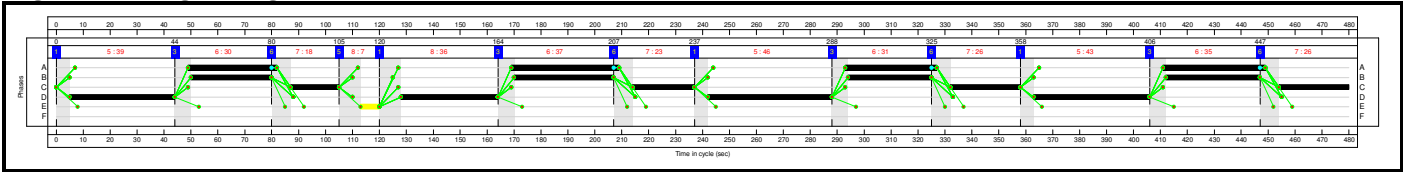


Stage Timings

Stage	1	3	6	5	1	3	6	1	3	6
Duration	39	30	18	7	36	37	23	46	31	26
Change Point	0	44	80	105	120	164	207	237	288	325

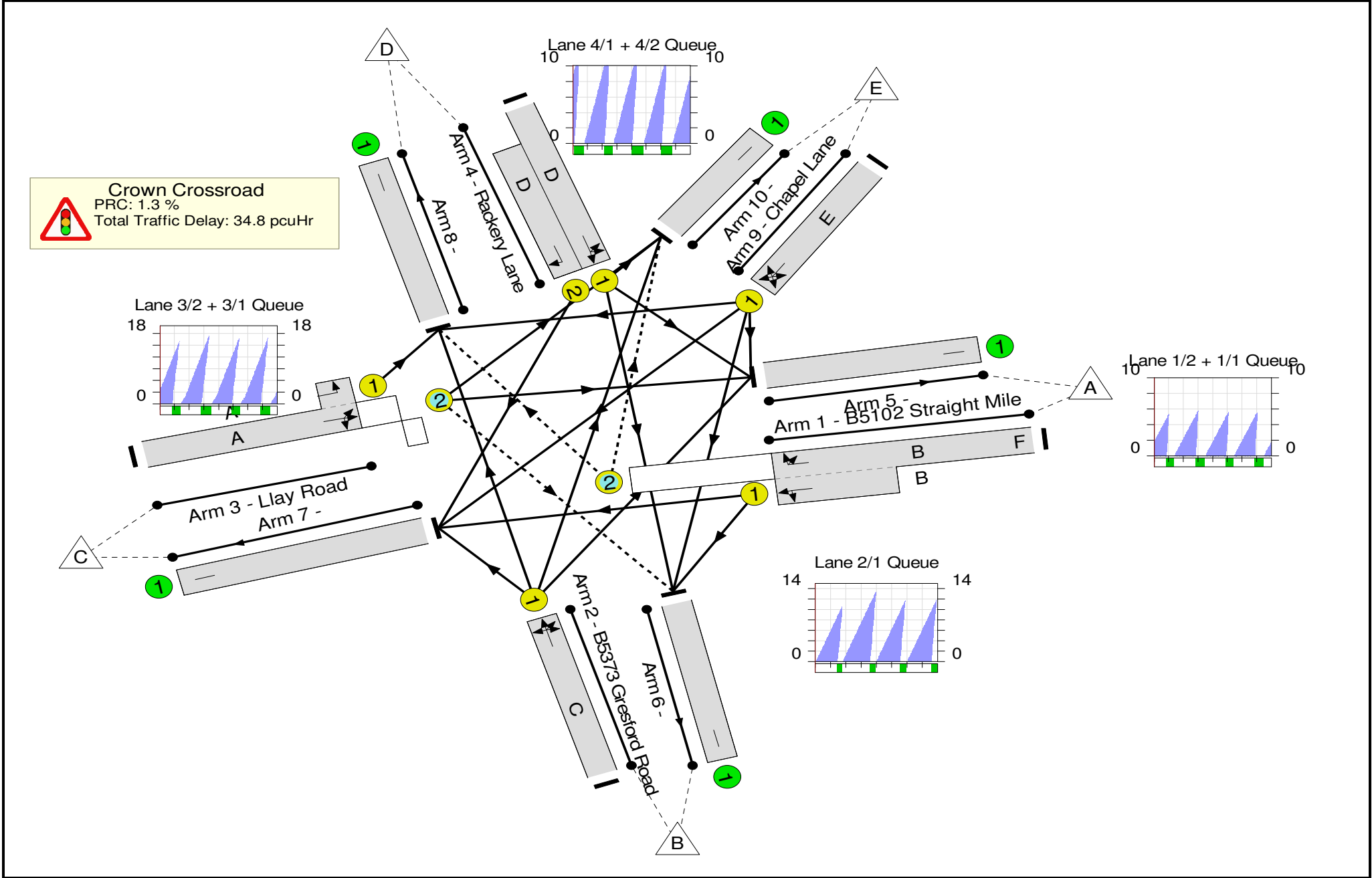
Stage	1	3	6							
Duration	43	35	26							
Change Point	358	406	447							

Signal Timings Diagram



Full Input Data And Results

Network Layout 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: Crown Crossroads	-	-	N/A	-	-		-	-	-	-	-	-	88.8%
Crown Crossroad	-	-	N/A	-	-		-	-	-	-	-	-	88.8%
1/2+1/1	B5102 Straight Mile Left Ahead Right U-Turn	O+U	N/A	N/A	B	F	4	133	0	386	2056:2013	398+323	53.6 : 53.6%
2/1	B5373 Gresford Road Right Left Ahead Right2	U	N/A	N/A	C		4	93	-	371	2067	418	88.8%
3/2+3/1	Llay Road Ahead Right Left Ahead2	O+U	N/A	N/A	A		4	145	-	578	2076:1867	272+378	88.8 : 88.8%
4/1+4/2	Rackery Lane Left Ahead Right Left2	U	N/A	N/A	D		4	164	-	872	2020:1910	496+489	88.5 : 88.5%
5/1		U	N/A	N/A	-		-	-	-	356	Inf	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	391	Inf	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	704	Inf	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	757	Inf	Inf	0.0%
9/1	Chapel Lane U-Turn Left Ahead Right	U	N/A	N/A	E		1	7	-	8	2114	35	22.7%
10/1		U	N/A	N/A	-		-	-	-	7	Inf	Inf	0.0%

Full Input Data And Results

[illegible]