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Our ref: 486-01/IJM-PD

Your ref:

29th April 2020

Dear Mared

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

I refer to your correspondence pertaining to matters presented in relation to the application reference P/19/0525 dated 16th April and the Mott Macdonald Technical Notes dated 4th March 2020 and 27th March 2020.

This response is therefore set out based on the above context.

Observed Traffic Flows

It is noted that Mott Macdonald accept the traffic counts included in the Aldi application and that Wrexham Council were advised of this in a memo dated 18th October 2019.

Traffic Growth Factors

It is noted that Mott Macdonald would have applied different growth factors to forecast a future assessment year. Cameron Rose Associates agree with the findings of Mott MacDonald that applying revised growth factors would have '*no significant impact on the assessment of the junction*' and therefore the results of the assessment are valid.

Generated Development Flows

It is noted that Mott MacDonald consider the trip rates adopted within the assessment to be robust.

It is also noted that the trip proportions and distributed adopted in the Transport Assessment are approved.

Crown Crossroads – LINSIG model

It is noted that Mott MacDonald agree that the LINSIG model produced by Cameron Rose Associates and presented in the Highway Update note to Wrexham Council dated 17/12/19, is accepted and considered to represent the latest Curtins S278 plans (065665-CUR-ZZ-XX-DR-R-9561-C01).

Mott MacDonald state that it is misleading for Cameron Rose Associates to present the Do Something scenario with the Aldi flows using the accurate LINSIG model against the model results presented in the Curtins Crown Crossroads technical note dated 18th October 2019. This was not done to be

misleading, but was intended to compare the operational performance of the Cross Crossroads with Aldi in operation, against the results presented by Curtins and approved by the Planning Inspector at the Home Farm appeal as an acceptable level of junction performance. These are presented below for comparison.

Table 1: Crown Crossroads – LINSIG Results – MOVA Benefit 8% - Cutins Model

Arm	AM Peak		PM Peak	
	2026 without Aldi		2026 without Aldi	
	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	98.8%	17	83.9%	7
B5373 Gresford Road	98.1%	19	83.2%	9
Llay Road	99.1%	32	84.7%	16
Rackery Lane	100.4%	26	84.4%	10
Chapel Lane	66.6%	4	27.9%	1
PRC	-11.6%		6.2%	

*Source: Table 3 Curtins Technical Note 18 October 2019

Re-running the 'without Aldi' flows through the accurate LINSIG model would result in the data presented in Table 2 below.

Table 2: Crown Crossroads – LINSIG Results – MOVA Benefit 8% - Accurate Model

Arm	AM Peak		PM Peak	
	2026 without Aldi		2026 without Aldi	
	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	95.7%	14	79.8%	7
B5373 Gresford Road	98.4%	19	80.9%	10
Llay Road	97.1%	30	81.5%	17
Rackery Lane	97.4%	21	81.4%	11
Chapel Lane	66.9%	4	33.0%	2
PRC	-9.4%		10.4%	

The addition of Aldi development traffic would result in the results illustrated in Table 3.

Table 3: Crown Crossroads – LINSIG Results – MOVA Benefit 8% - Accurate Model

Arm	AM Peak		PM Peak	
	2026 with Aldi		2026 with Aldi	
	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	98.1%	16	89.1%	9
B5373 Gresford Road	97.2%	19	89.9%	16
Llay Road	98.7%	32	90.1%	20
Rackery Lane	98.8%	22	90.5%	14
Chapel Lane	66.9%	4	33.0%	2
PRC	-9.8%		-0.6%	

Based on the above assessment Mott MacDonald state that 'Aldi should be asked to mitigate the impact of their development to ensure the PRC of the junction remains around 10% in the evening, It is unclear how this statement complies with policy and this approach is inconsistent with the approach taken on other sites within the Authority. In particular, Planning Policy Wales Chapter 8 and the supplementary Technical Advisory Note (TAN) 18.

It is however accepted that that a PRC of -0.6% in the PM peak, could be deemed as the Aldi development having an impact on the junctions performance i.e. resulting in a junction that operated within capacity without the development, operating at capacity with the development in place.

In order to improve the operational performance of the junction with the addition of development traffic Aldi propose to

- Increase the flare length on Straight Mile – a total of 60 metres (10 pcus); and
- Change the staging arrangement to minimise lost green time.

It is proposed to change the stage arrangement from that shown in Figure 1 to the staging arrangement shown in Figure 2. The modelling of the demand dependant stage (Chapel Lane – Phase E – Stage 4), will remain unchanged.

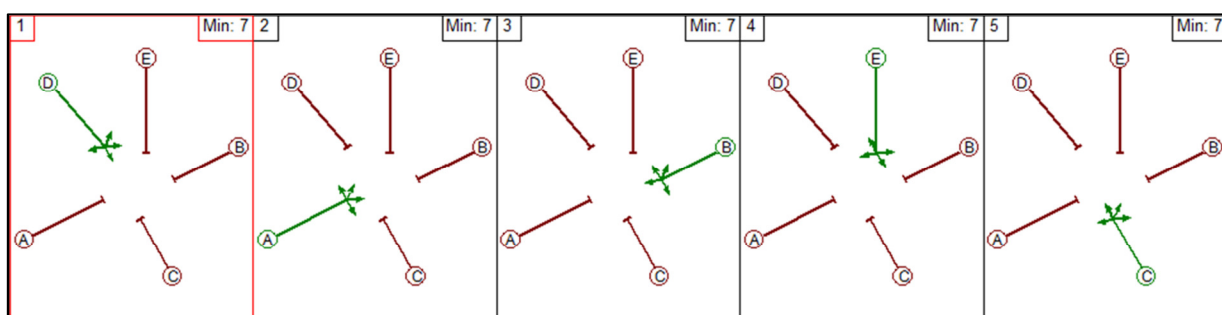


Figure 1: Staging Arrangement Proposed by Curtins

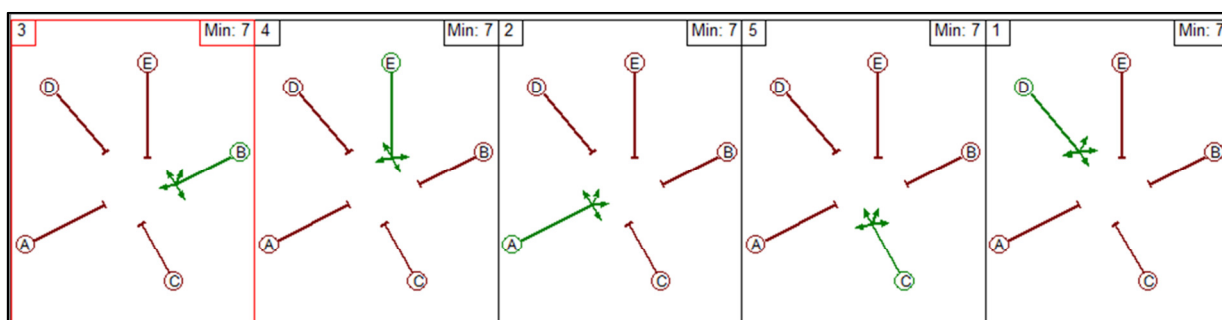


Figure 2: Staging Arrangement Proposed by Cameron Rose Associates

The results of these alterations on the operational performance of the junction are shown in Table 4.

Table 4: Crown Crossroads – LINSIG Results – MOVA Benefit 8% - Aldi Mitigation

Arm	AM Peak		PM Peak	
	2026 with Aldi		2026 with Aldi	
	DoS	MMQ	DoS	MMQ
B5102 Straight Mile	94.1%	13	87.0%	8
B5373 Gresford Road	97.2%	19	87.8%	15
Llay Road	97.3%	29	87.9%	20
Rackery Lane	97.5%	21	88.1%	14
Chapel Lane	66.9%	4	33.0%	2
PRC	-8.3%		2.1%	

These results demonstrate that the proposed development offers betterment in the AM peak compared to the Curtins 2026 base scenario, with the PRC at the junction falling from -9.4% to -8.3%. Furthermore, based on Table 1 the results clearly demonstrate that the junction will operate better than the -11.6% PRC value accepted for the junction by the Planning Inspectorate; which sets the acceptable low bar for this junctions operation whether it be in the AM or PM peak.

During the PM peak the junction will continue to operate within capacity with a positive PRC of 2.1%. It is accepted that the proposed Aldi food store will reduce the PRC of the junction when compared to the Curtins Do Something scheme, however it is not considered necessary to mitigate further particularly given the robust parameters adopted in the Transport Assessment and noted by Mott MacDonald.

It should also be noted that the research submitted on MOVA in relation to the residential planning, inquiry, indicated improvement on junction throughput as a result of the introduction of MOVA in the range of 8% to 13%. The conservative 8% figure is presented in the above analysis.

As suggested previously Wrexham Council 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 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 required.

Carbon Footprint Analysis

Through public consultation and a review of the retail strategy for the town; it is evident that there is significant leakage of expenditure to surrounding towns associated with food shopping trips.

This shopping leakage results in an increase in food miles as customers travel out of Llay to access stores in Gwersyllt, Plas Coch Retail Park and Wrexham. Such trips are not considered to be representative of sustainable travel and sustainable land use planning. Therefore the delivery of a new discount food store in Llay will provide significant betterment to the sustainable nature of a food shop for residents.

In order to understand the benefits of reduced food mileage it is necessary to convert the mileage savings into tonnes of Carbon Dioxide (CO₂) emissions for an average car. For the purposes of this assessment (which is considered to be a robust assessment) the chosen car is an EU 2016 FORD All New C-Max, Model Year Pre 2016 1.5 TDCi Stop-Start (120PS). As this a modern car it benefits from the modern in-car carbon reduction functions and is therefore considered to be better than the majority of existing cars on the public highway.

The distance travelled from the centre of Llay (latitude/ longitude reference: 53°05'37.5"N 3°00'14.6"W) to the discount food store in Gwersyllt (latitude/ longitude reference: 53°04'21.6"N 3°01'09.1"W) is 2.3 miles.

The distance travelled from the centre of Llay (latitude/ longitude reference: 53°05'37.5"N 3°00'14.6"W) to the discount food store in Plas Coch Retail Park (latitude/ longitude reference: 53°03'29.9"N 3°00'24.2"W) is 4.1 miles.

The distance travelled from the centre of Llay (latitude/ longitude reference: 53°05'57.4"N 2°59'46.5"W) to the proposed discount food store in Llay (latitude/ longitude reference: 54°33'02.9"N 1°54'34.1"W) is

0.7 miles. Therefore shoppers travelling to Gwersyllt or Plas Coch Retail Park could reduce their food mileage by 1.6 miles and 3.4 miles respectively.

Using the online carbon footprint calculator at www.calculator.carbonfootprint.com it is possible to determine CO₂ emissions if they did not have to travel to either Gwersyllt or Plas Coch Retail Park.

Based on the Parking Eye data used in the Transport Assessment it is estimated that a foodstore would experience approximately 2,639 two way trips per day. On the premise that Llay residents shop for food at the aforementioned locations, it is considered that 70% of trips to the proposed discount food store during an average day travel to Gwersyllt or Plas Coch Retail Park.

On the basis of the above parameters it can be concluded that the proposed discount food store would save an estimated 1.09 tonnes of CO₂ emissions per day or 396 tonnes of CO₂ emissions per year.

This significant reduction in CO₂ emissions demonstrates that the proposed development provides significant betterment to sustainable travel improving the air quality and helping towards achieving CO₂ emission reduction targets within the County of Wrexham.

Road Safety Assessment

Bus Stop Location Review

It is noted that the proposed location of the bus stop on Gresford Road is accepted, in terms of its location and proximity to the proposed zebra crossing.

Site Access from Straight Mile

In association with the consented residential development (planning application P/2014/0905, there are proposals to reduce the speed limit on Straight Mile to 40 mph. This is illustrated on the approved s.278 drawings prepared by Curtins and specifically drawing 065665-CUR-ZZ-XX-DR-R-9561-C02.

Pedestrian Crossing

It is noted that the positioning of the proposed zebra crossing is deemed the most suitable. In order to ensure adequate visibility for pedestrians at the crossing, the existing vegetation on the northern side of the crossing point will be cut back.

HGV Movements

Whilst we appreciate Mott MacDonald are undertaking the assessment they are clearly not familiar with the site location. The left turn movement out of the site was not tracked as a low bridge on this route prevents HGV access: This is illustrated in the attached image. The height of the Aldi vehicle is 4.57 metres (15 feet).



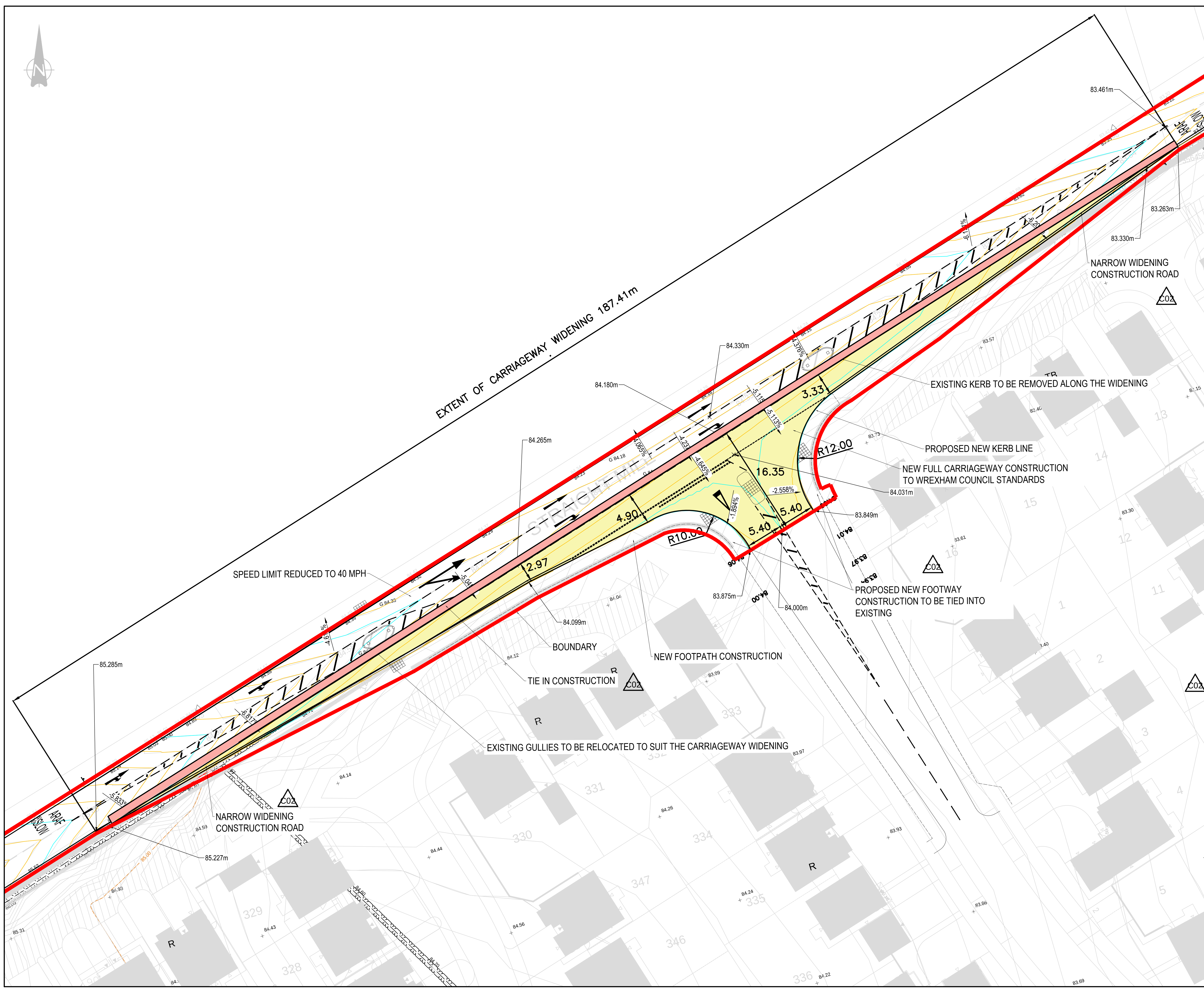
Figure 1: Low Bridge Preventing HGV Access from Gresford Road in a Southerly Direction.

Due to site constraints the service yard cannot be relocated, however Aldi will accept a planning condition restricting service vehicle trips to non-peak shopping times thus avoiding conflicts with busy shopping trips. Due to the findings of the noise assessment we cannot restrict deliveries to out of hours due to residential impact. The noise assessment has defined delivery hours to 06:00 - 23:00. Aldi would accept a further restriction on these hours to restricting deliveries to the following periods 06.00 - 10.00 and 19.00 - 23.00.

Yours Sincerely

Iain Miller
Director

Enc. Drawing 065665-CUR-ZZ-XX-DR-R-9561-C02
LINSIG – Crown Crossroads_Curtins s278
LINSIG – Crown Crossroads_Aldi Mitigation



1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING.

Curtins

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S4

Drug Title:

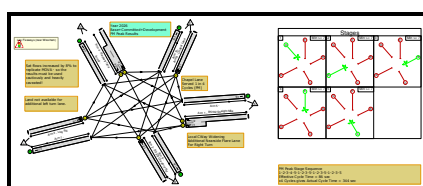
STRAIGHT MILE GIRT
GENERAL ARRANGEMENT

065665 - CUR - ZZ - XX - DR - D - 9501 -C02

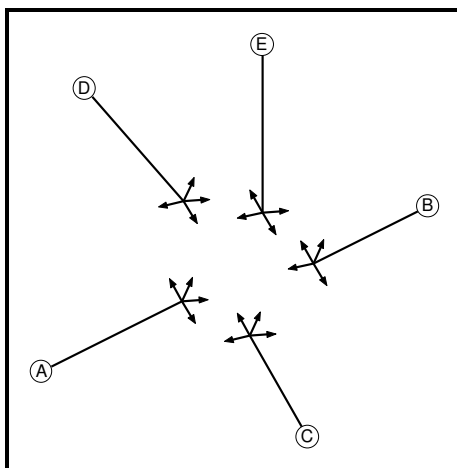
User and Project Details

Project:	Home Farm Residential Development
Title:	Crown Crossroads at Llay
Location:	Llay Wrexham LL12 0NT
File name:	Crown Crossroads_Curtins s278.lsg3x
Author:	GlanvilleJB
Company:	Curtins
Address:	Manchester
Notes:	Physical Junction Improvements and MOVA

Network Layout Diagram



Phase Diagram



Phase Input Data

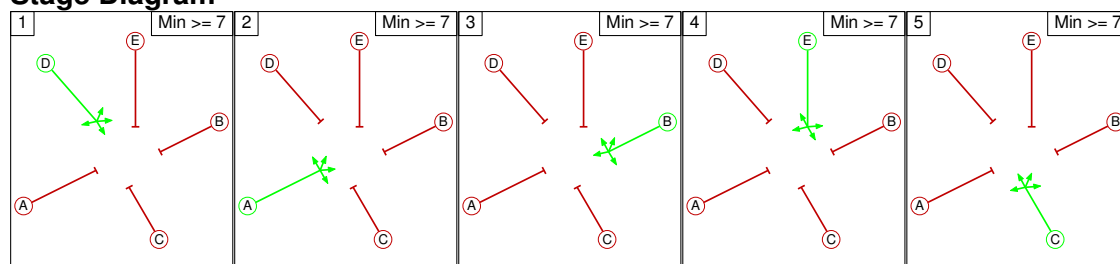
Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7

Phase Intergreens Matrix

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

Phases in Stage

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

Stage Diagram**Phase Delays**

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

Prohibited Stage Change

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

Give-Way Lane Input Data

Junction: Llay Fiveways (near Wrexham)
There are no Opposed Lanes in this Junction

Lane Input Data

Junction: Llay Fiveways (near Wrexham)												
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	7.0	User	2050	-	-	-	-	-
1/2 (B5102 Straight Mile)	U	B	2	3	60.0	User	2017	-	-	-	-	-
2/1 (B5373 Gresford Rd)	U	C	2	3	60.0	User	2079	-	-	-	-	-
3/1 (Llay Rd)	U	A	2	3	60.0	User	2106	-	-	-	-	-
4/1 (Rackery lane)	U	D	2	3	60.0	User	2012	-	-	-	-	-
4/2 (Rackery lane)	U	D	2	3	10.1	User	1860	-	-	-	-	-
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	1952	-	-	-	-	-
10/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM Peak 2014 Surveyed Flows'	07:45	08:45	01:00	
2: 'PM Peak 2014 Surveyed Flows'	16:45	17:45	01:00	
3: 'AM Peak 2019 Base'	07:45	08:45	01:00	
4: 'PM Peak 2019 Base'	16:45	17:45	01:00	
5: 'AM Peak 2019 Base + Com.+Dev.'	07:45	08:45	01:00	
6: 'PM Peak 2019 Base + Com.+Dev.'	16:45	17:45	01:00	
7: 'AM Peak 2024 Base'	07:45	08:45	01:00	
8: 'PM Peak 2024 Base'	16:45	17:45	01:00	
9: 'AM Peak 2026 Base + Com.+Dev.'	07:45	08:45	01:00	
10: 'PM Peak 2026 Base + Com.+Dev.'	16:45	17:45	01:00	
11: 'AM Dev 2026'	07:45	08:45	01:00	
12: 'PM Dev 2026'	16:45	17:45	01:00	
13: 'AM Base 2026'	07:45	08:45	01:00	
14: 'PM Base 2026'	16:45	17:45	01:00	
15: '2026 AM ALDI Traffic with Dev'	07:45	08:45	01:00	
16: '2026 PM ALDI Traffic with Dev'	16:45	17:45	01:00	
17: '2026 AM ALDI Traffic with Dev_with Aldi Store'	07:45	08:45	01:00	
18: '2026 PM ALDI Traffic with Dev_with Aldi Store'	16:45	17:45	01:00	

Scenario 1: 'AM Design 2026_' (FG15: '2026 AM ALDI Traffic with Dev', Plan 1: 'Chapel Ln in Every Other Cycle')

Traffic Flows, Desired

Desired Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	87	224	0	317
	B	10	0	83	247	4	344
	C	145	40	0	431	1	617
	D	175	155	287	0	1	618
	E	1	2	4	38	0	45
	Tot.	331	203	461	940	6	1941

Lane	Scenario 1: AM Design 2026_
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	93
1/2 (with short)	317(In) 224(Out)
2/1	344
3/1	617
4/1 (with short)	618(In) 331(Out)
4/2 (short)	287
5/1	331
6/1	203
7/1	461
8/1	940
9/1	45
10/1	6

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'PM Design 2026' (FG16: '2026 PM ALDI Traffic with Dev', Plan 4: 'Chapel in Every Four Cycle')**Traffic Flows, Desired****Desired Flow :**

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	22	141	176	0	339
	B	11	0	87	159	1	258
	C	87	111	0	316	9	523
	D	172	137	261	0	2	572
	E	1	2	4	5	0	12
	Tot.	271	272	493	656	12	1704

Traffic Lane Flows

Lane	Scenario 2: PM Design 2026
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	163
1/2 (with short)	339(In) 176(Out)
2/1	258
3/1	523
4/1 (with short)	572(In) 311(Out)
4/2 (short)	261
5/1	271
6/1	272
7/1	493
8/1	656
9/1	12
10/1	12

Lane Saturation Flows

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'AM Design 2026_with Aldi Store' (FG17: '2026 AM ALDI Traffic with Dev_with Aldi Store', Plan 1: 'Chapel Ln in Every Other Cycle')

Traffic Flows, Desired**Desired Flow :**

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	85	221	0	312
	B	18	0	89	255	4	366
	C	138	58	0	421	1	618
	D	166	165	271	0	1	603
	E	1	2	4	38	0	45
	Tot.	323	231	449	935	6	1944

Traffic Lane Flows

Lane	Scenario 3: AM Design 2026_with Aldi Store
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	91
1/2 (with short)	312(In) 221(Out)
2/1	366
3/1	618
4/1 (with short)	603(In) 332(Out)
4/2 (short)	271
5/1	323
6/1	231
7/1	449
8/1	935
9/1	45
10/1	6

Lane Saturation Flows

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'PM Design 2026_with Aldi Store' (FG18: '2026 PM ALDI Traffic with Dev_with Aldi Store', Plan 4: 'Chapel in Every Four Cycle')

Traffic Flows, Desired

Desired Flow :

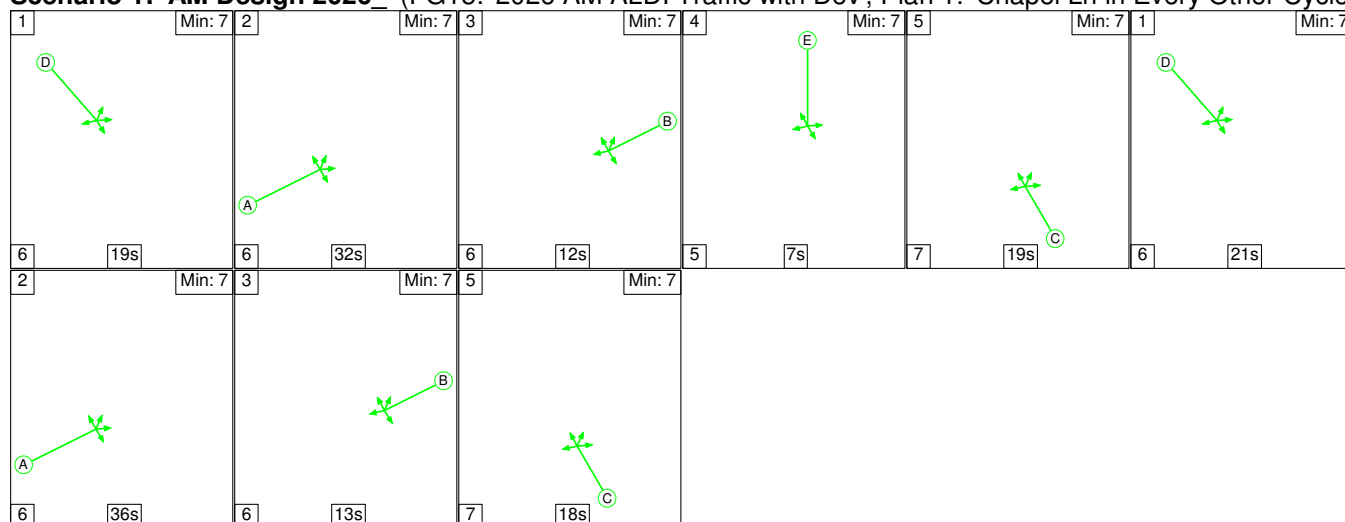
	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	22	136	163	0	321
	B	47	0	132	198	1	378
	C	75	149	0	301	9	534
	D	165	174	252	0	2	593
	E	1	2	4	5	0	12
	Tot.	288	347	524	667	12	1838

Traffic Lane Flows

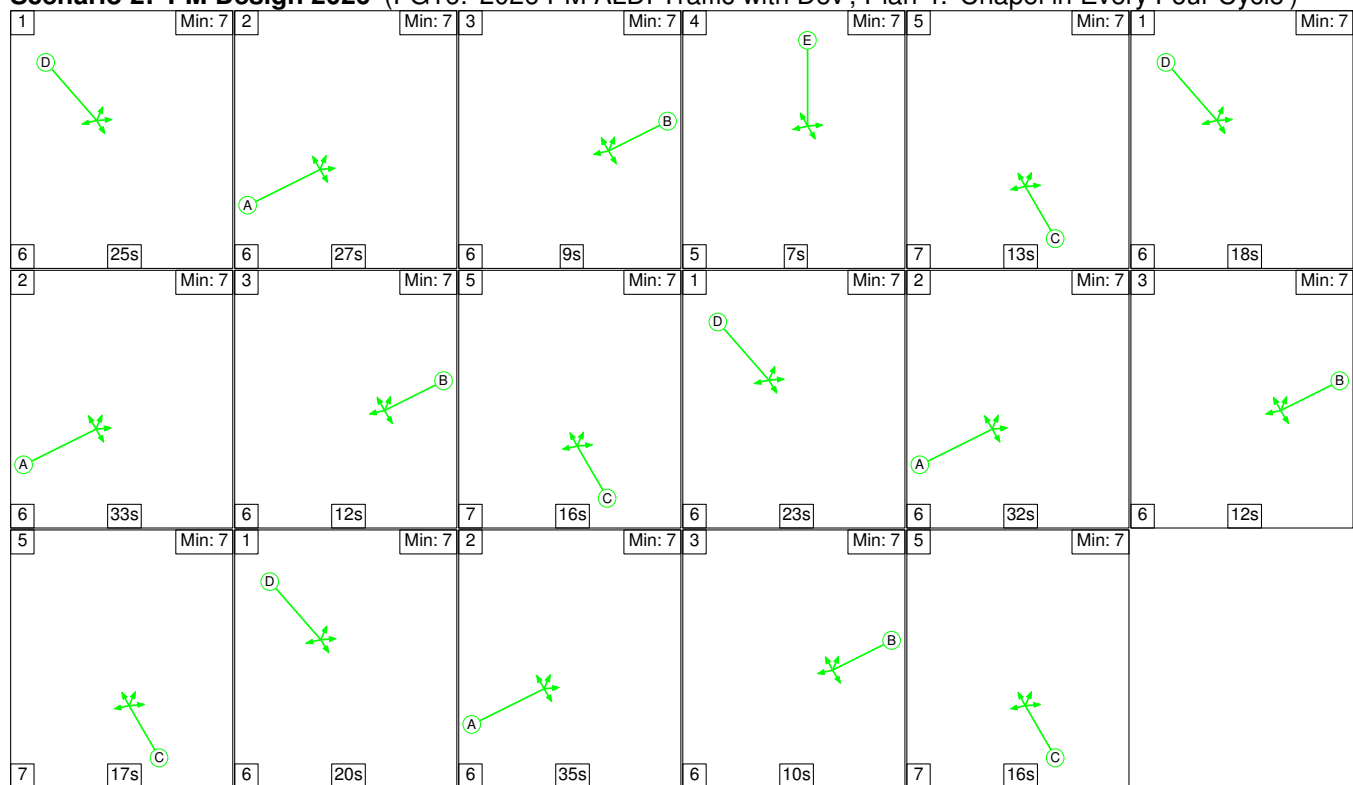
Lane	Scenario 4: PM Design 2026_with Aldi Store
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	158
1/2 (with short)	321(In) 163(Out)
2/1	378
3/1	534
4/1 (with short)	593(In) 341(Out)
4/2 (short)	252
5/1	288
6/1	347
7/1	524
8/1	667
9/1	12
10/1	12

Lane Saturation Flows

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Stage Sequence Diagram**Scenario 1: 'AM Design 2026_ '** (FG15: '2026 AM ALDI Traffic with Dev', Plan 1: 'Chapel Ln in Every Other Cycle')

Item	Lane Description	Full Phase	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Uniform Delay (pcuHr)	Rand + Oversat 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 at Llay	-	-	-	-	-	98.4%	25.4	32.6	58.0	-	-	-	-
Llay Fiveways (near Wrexham)	-	-	-	-	-	98.4%	25.4	32.6	58.0	-	-	-	-
1/2+1/1	B5102 Straight Mile Left Ahead Right Right2	B	317	2017:2050	331	95.7%	4.5	6.0	10.5	119.4	8.2	6.0	14.2
2/1	B5373 Gresford Rd Right Left Ahead Right2	C	344	2079	349	98.4%	4.6	8.0	12.6	131.9	11.3	8.0	19.3
3/1	Llay Rd Ahead Right Left Left2	A	617	2106	635	97.1%	6.9	8.6	15.5	90.7	21.3	8.6	29.9
4/1+4/2	Rackery lane Left Ahead Right Left2	D	618	2012:1860	634	97.4%	8.0	9.0	17.0	98.9	12.0	9.0	21.0
9/1	Chapel Lane Left Left2 Right Right2	E	45	1952	67	66.9%	1.4	0.9	2.3	185.2	2.9	0.9	3.8
C1 PRC for Signalled Lanes (%): -9.4 Total Delay for Signalled Lanes (pcuHr): 57.96 Cycle Time (s): 232 PRC Over All Lanes (%): -9.4 Total Delay Over All Lanes(pcuHr): 57.96													

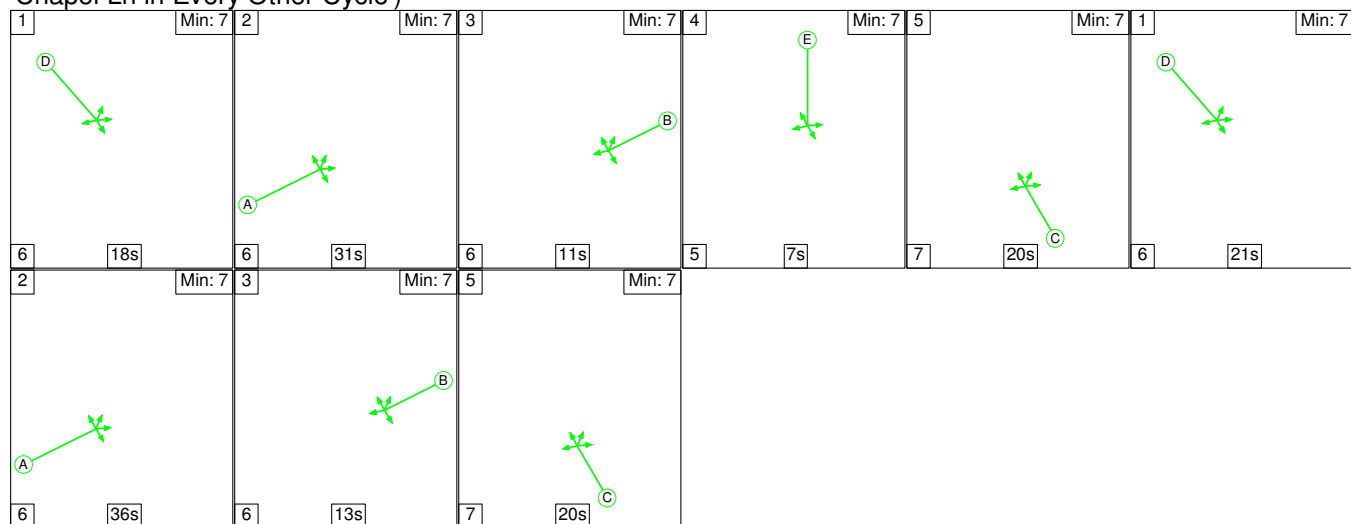
Stage Sequence Diagram**Scenario 2: 'PM Design 2026'** (FG16: '2026 PM ALDI Traffic with Dev', Plan 4: 'Chapel in Every Four Cycle')

Network Results

Item	Lane Description	Full Phase	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Uniform Delay (pcuHr)	Rand + Oversat 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 at Llay	-	-	-	-	-	81.5%	19.5	8.4	27.9	-	-	-	-
Llay Fiveways (near Wrexham)	-	-	-	-	-	81.5%	19.5	8.4	27.9	-	-	-	-
1/2+1/1	B5102 Straight Mile Left Ahead Right Right2	B	339	2017:2050	425	79.8%	4.4	1.9	6.3	66.7	5.3	1.9	7.2
2/1	B5373 Gresford Rd Right Left Ahead Right2	C	258	2079	319	80.9%	3.2	2.0	5.1	71.7	7.9	2.0	9.9
3/1	Llay Rd Ahead Right Left Left2	A	523	2106	642	81.5%	5.0	2.1	7.2	49.2	14.7	2.1	16.8
4/1+4/2	Rackery lane Left Ahead Right Left2	D	572	2012:1860	702	81.4%	6.3	2.1	8.4	52.8	8.6	2.1	10.8
9/1	Chapel Lane Left Left2 Right Right2	E	12	1952	36	33.0%	0.7	0.2	0.9	281.0	1.4	0.2	1.7
C1			PRC for Signalled Lanes (%):		10.4	Total Delay for Signalled Lanes (pcuHr):			27.91	Cycle Time (s): 430			
			PRC Over All Lanes (%):		10.4	Total Delay Over All Lanes(pcuHr):			27.91				

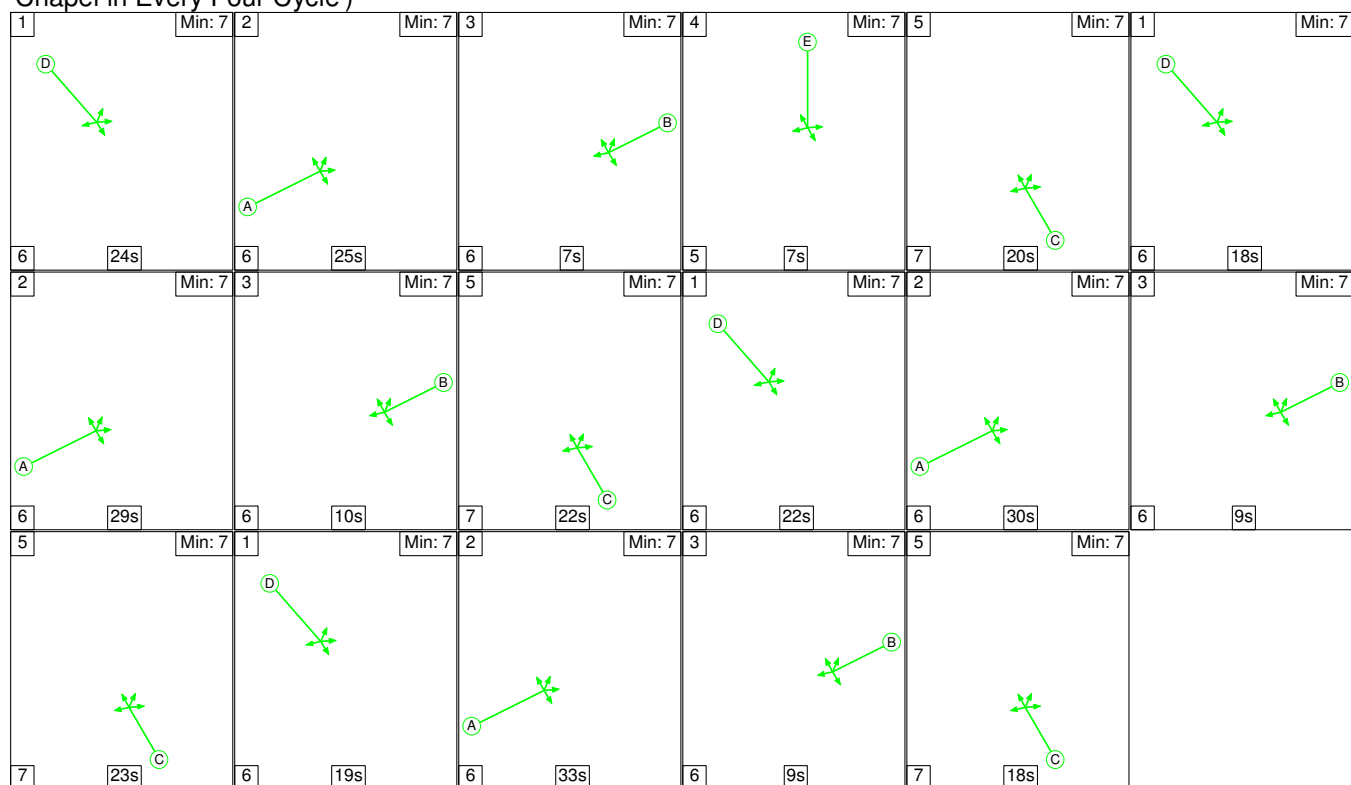
Stage Sequence Diagram

Scenario 3: 'AM Design 2026_with Aldi Store' (FG17: '2026 AM ALDI Traffic with Dev_with Aldi Store', Plan 1: 'Chapel Ln in Every Other Cycle')



Network Results

Item	Lane Description	Full Phase	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Uniform Delay (pcuHr)	Rand + Oversat 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 at Llay	-	-	-	-	-	98.8%	25.5	36.8	62.3	-	-	-	-
Llay Fiveways (near Wrexham)	-	-	-	-	-	98.8%	25.5	36.8	62.3	-	-	-	-
1/2+1/1	B5102 Straight Mile Left Ahead Right Right2	B	312	2017:2050	318	98.1%	4.4	7.4	11.8	136.7	8.0	7.4	15.5
2/1	B5373 Gresford Rd Right Left Ahead Right2	C	366	2079	376	97.2%	4.8	7.3	12.1	119.2	11.8	7.3	19.1
3/1	Llay Rd Ahead Right Left Left2	A	618	2106	626	98.7%	7.0	10.5	17.5	102.0	21.3	10.5	31.8
4/1+4/2	Rackery lane Left Ahead Right Left2	D	603	2012:1860	610	98.8%	7.9	10.6	18.5	110.4	11.8	10.6	22.4
9/1	Chapel Lane Left Left2 Right Right2	E	45	1952	67	66.9%	1.4	0.9	2.3	185.2	2.9	0.9	3.8
C1			PRC for Signalled Lanes (%):		-9.8	Total Delay for Signalled Lanes (pcuHr):			62.28	Cycle Time (s): 232			
			PRC Over All Lanes (%):		-9.8	Total Delay Over All Lanes(pcuHr):			62.28				

Stage Sequence Diagram**Scenario 4: 'PM Design 2026_with Aldi Store'** (FG18: '2026 PM ALDI Traffic with Dev_with Aldi Store', Plan 4: 'Chapel in Every Four Cycle')

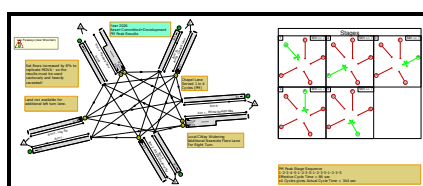
Network Results

Item	Lane Description	Full Phase	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Uniform Delay (pcuHr)	Rand + Oversat 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 at Llay	-	-	-	-	-	90.5%	21.6	15.7	37.3	-	-	-	-
Llay Fiveways (near Wrexham)	-	-	-	-	-	90.5%	21.6	15.7	37.3	-	-	-	-
1/2+1/1	B5102 Straight Mile Left Ahead Right Right2	B	321	2017:2050	360	89.1%	4.3	3.5	7.8	87.3	5.1	3.5	8.5
2/1	B5373 Gresford Rd Right Left Ahead Right2	C	378	2079	421	89.9%	4.4	3.8	8.2	77.8	11.8	3.8	15.5
3/1	Llay Rd Ahead Right Left Left2	A	534	2106	593	90.1%	5.5	4.0	9.5	64.2	16.0	4.0	20.0
4/1+4/2	Rackery lane Left Ahead Right Left2	D	593	2012:1860	655	90.5%	6.7	4.2	10.9	66.1	9.9	4.2	14.2
9/1	Chapel Lane Left Left2 Right Right2	E	12	1952	36	33.0%	0.7	0.2	0.9	281.0	1.4	0.2	1.7
C1			PRC for Signalled Lanes (%):		-0.6	Total Delay for Signalled Lanes (pcuHr):			37.30	Cycle Time (s): 430			
			PRC Over All Lanes (%):		-0.6	Total Delay Over All Lanes(pcuHr):			37.30				

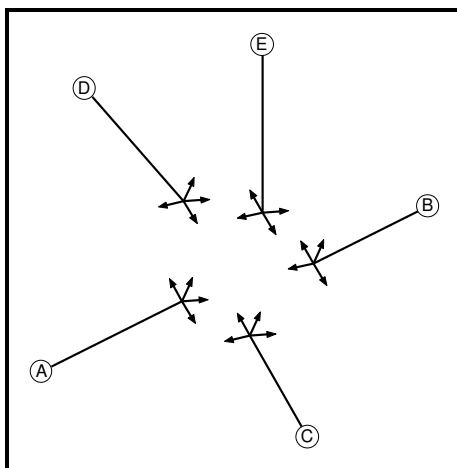
User and Project Details

Project:	Home Farm Residential Development
Title:	Crown Crossroads at Llay
Location:	Llay Wrexham LL12 0NT
File name:	Crown Crossroads_Aldi Mitigation.lsg3x
Author:	GlanvilleJB
Company:	Curtins
Address:	Manchester
Notes:	Physical Junction Improvements and MOVA

Network Layout Diagram



Phase Diagram



Phase Input Data

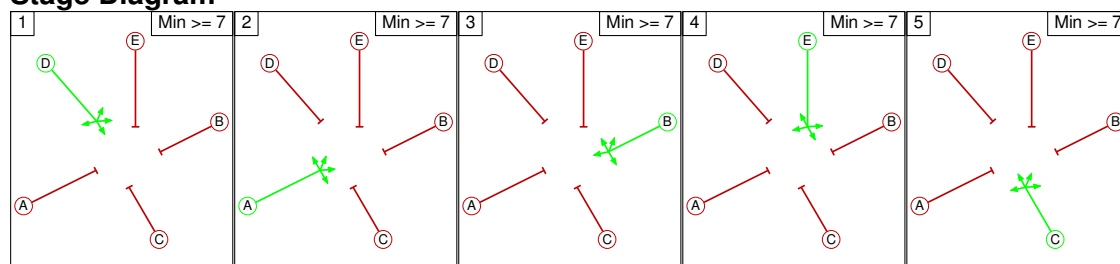
Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7

Phase Intergreens Matrix

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

Phases in Stage

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

Stage Diagram**Phase Delays**

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

Prohibited Stage Change

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

Give-Way Lane Input Data

Junction: Llay Fiveways (near Wrexham)
There are no Opposed Lanes in this Junction

Lane Input Data

Junction: Llay Fiveways (near Wrexham)												
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	10.4	User	2050	-	-	-	-	-
1/2 (B5102 Straight Mile)	U	B	2	3	60.0	User	2017	-	-	-	-	-
2/1 (B5373 Gresford Rd)	U	C	2	3	60.0	User	2079	-	-	-	-	-
3/1 (Llay Rd)	U	A	2	3	60.0	User	2106	-	-	-	-	-
4/1 (Rackery lane)	U	D	2	3	60.0	User	2012	-	-	-	-	-
4/2 (Rackery lane)	U	D	2	3	10.1	User	1860	-	-	-	-	-
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	1952	-	-	-	-	-
10/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'AM Peak 2014 Surveyed Flows'	07:45	08:45	01:00	
2: 'PM Peak 2014 Surveyed Flows'	16:45	17:45	01:00	
3: 'AM Peak 2019 Base'	07:45	08:45	01:00	
4: 'PM Peak 2019 Base'	16:45	17:45	01:00	
5: 'AM Peak 2019 Base + Com.+Dev.'	07:45	08:45	01:00	
6: 'PM Peak 2019 Base + Com.+Dev.'	16:45	17:45	01:00	
7: 'AM Peak 2024 Base'	07:45	08:45	01:00	
8: 'PM Peak 2024 Base'	16:45	17:45	01:00	
9: 'AM Peak 2026 Base + Com.+Dev.'	07:45	08:45	01:00	
10: 'PM Peak 2026 Base + Com.+Dev.'	16:45	17:45	01:00	
11: 'AM Dev 2026'	07:45	08:45	01:00	
12: 'PM Dev 2026'	16:45	17:45	01:00	
13: 'AM Base 2026'	07:45	08:45	01:00	
14: 'PM Base 2026'	16:45	17:45	01:00	
15: '2026 AM ALDI Traffic with Dev'	07:45	08:45	01:00	
16: '2026 PM ALDI Traffic with Dev'	16:45	17:45	01:00	
17: '2026 AM ALDI Traffic with Dev_with Aldi Store'	07:45	08:45	01:00	
18: '2026 PM ALDI Traffic with Dev_with Aldi Store'	16:45	17:45	01:00	

Scenario 1: 'AM Design 2026_with Aldi Store' (FG17: '2026 AM ALDI Traffic with Dev_with Aldi Store', Plan 1: 'Chapel Ln in Every Other Cycle')

Traffic Flows, Desired**Desired Flow :**

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	6	85	221	0	312
	B	18	0	89	255	4	366
	C	138	58	0	421	1	618
	D	166	165	271	0	1	603
	E	1	2	4	38	0	45
	Tot.	323	231	449	935	6	1944

Traffic Lane Flows

Lane	Scenario 1: AM Design 2026_with Aldi Store
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	91
1/2 (with short)	312(In) 221(Out)
2/1	366
3/1	618
4/1 (with short)	603(In) 332(Out)
4/2 (short)	271
5/1	323
6/1	231
7/1	449
8/1	935
9/1	45
10/1	6

Lane Saturation Flows

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'PM Design 2026_with Aldi Store' (FG18: '2026 PM ALDI Traffic with Dev_with Aldi Store', Plan 4: 'Chapel in Every Four Cycle')

Traffic Flows, Desired

Desired Flow :

	Destination						
		A	B	C	D	E	Tot.
Origin	A	0	22	136	163	0	321
	B	47	0	132	198	1	378
	C	75	149	0	301	9	534
	D	165	174	252	0	2	593
	E	1	2	4	5	0	12
	Tot.	288	347	524	667	12	1838

Traffic Lane Flows

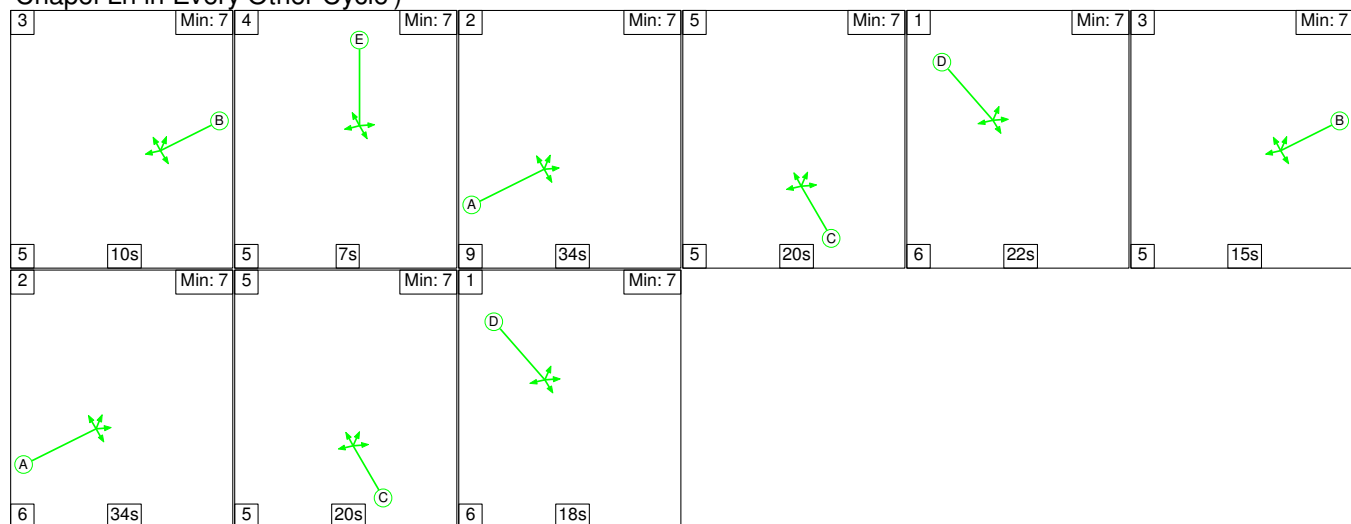
Lane	Scenario 2: PM Design 2026_with Aldi Store
Junction: Llay Fiveways (near Wrexham)	
1/1 (short)	158
1/2 (with short)	321(In) 163(Out)
2/1	378
3/1	534
4/1 (with short)	593(In) 341(Out)
4/2 (short)	252
5/1	288
6/1	347
7/1	524
8/1	667
9/1	12
10/1	12

Lane Saturation Flows

Junction: Llay Fiveways (near Wrexham)								
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						2050	2050
1/2 (B5102 Straight Mile Lane 2)	This lane uses a directly entered Saturation Flow						2017	2017
2/1 (B5373 Gresford Rd Lane 1)	This lane uses a directly entered Saturation Flow						2079	2079
3/1 (Llay Rd Lane 1)	This lane uses a directly entered Saturation Flow						2106	2106
4/1 (Rackery lane Lane 1)	This lane uses a directly entered Saturation Flow						2012	2012
4/2 (Rackery lane Lane 2)	This lane uses a directly entered Saturation Flow						1860	1860
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						1952	1952
10/1	Infinite Saturation Flow						Inf	Inf

Stage Sequence Diagram

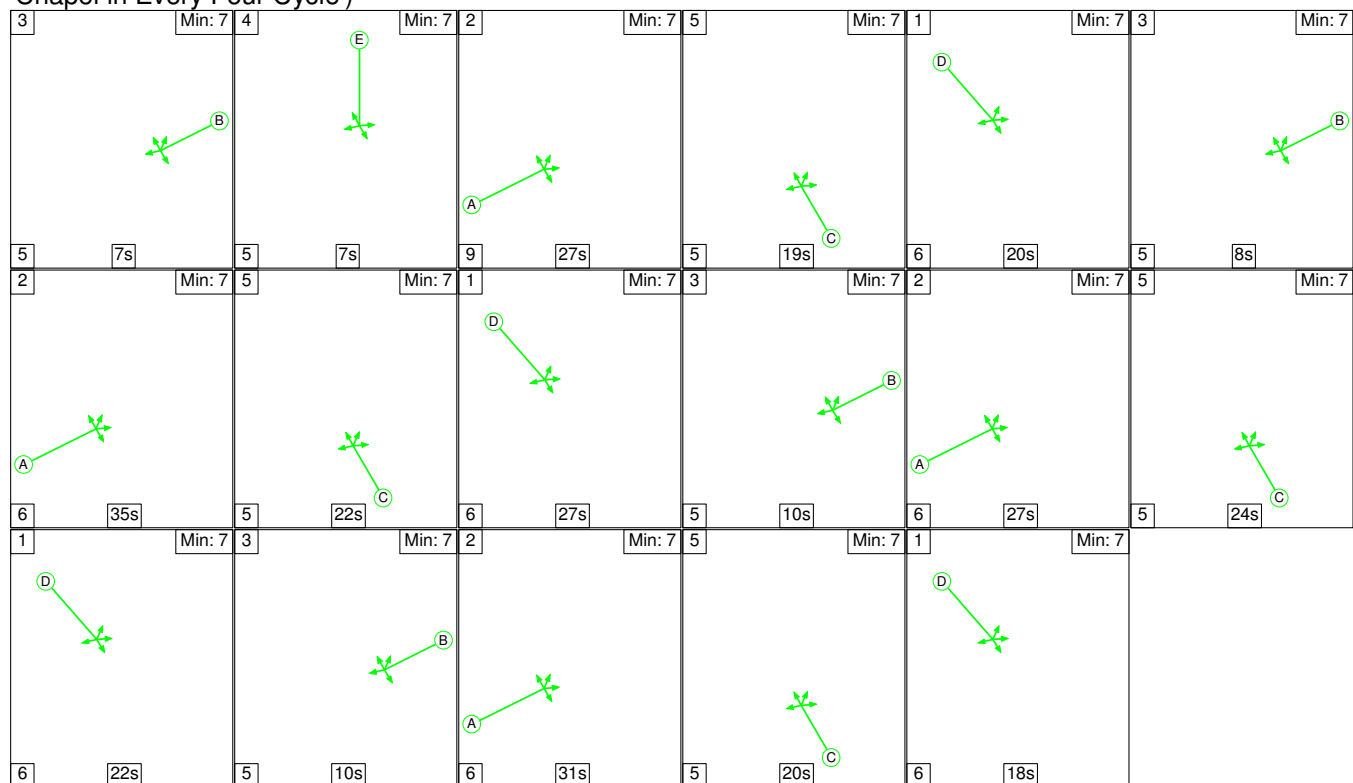
Scenario 1: 'AM Design 2026_with Aldi Store' (FG17: '2026 AM ALDI Traffic with Dev_with Aldi Store', Plan 1: 'Chapel Ln in Every Other Cycle')



Item	Lane Description	Full Phase	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Uniform Delay (pcuHr)	Rand + Oversat 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 at Llay	-	-	-	-	-	97.5%	25.3	31.3	56.6	-	-	-	-
Llay Fiveways (near Wrexham)	-	-	-	-	-	97.5%	25.3	31.3	56.6	-	-	-	-
1/2+1/1	B5102 Straight Mile Left Ahead Right Right2	B	312	2017:2050	331	94.1%	4.5	5.2	9.7	112.0	8.0	5.2	13.2
2/1	B5373 Gresford Rd Right Left Ahead Right2	C	366	2079	376	97.2%	4.8	7.3	12.1	119.2	12.0	7.3	19.3
3/1	Llay Rd Ahead Right Left Left2	A	618	2106	635	97.3%	6.9	8.8	15.7	91.4	20.3	8.8	29.1
4/1+4/2	Rackery lane Left Ahead Right Left2	D	603	2012:1860	619	97.5%	7.8	9.0	16.7	100.0	12.1	9.0	21.1
9/1	Chapel Lane Left Left2 Right Right2	E	45	1952	67	66.9%	1.4	0.9	2.3	185.2	2.9	0.9	3.8
C1 PRC for Signalled Lanes (%): -8.3 Total Delay for Signalled Lanes (pcuHr): 56.59 Cycle Time (s): 232 PRC Over All Lanes (%): -8.3 Total Delay Over All Lanes(pcuHr): 56.59													

Stage Sequence Diagram

Scenario 2: 'PM Design 2026_with Aldi Store' (FG18: '2026 PM ALDI Traffic with Dev_with Aldi Store', Plan 4: 'Chapel in Every Four Cycle')



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