AM Peak							
Section	2017				2030 baseline		
	Mainline flow	Merge/diverge flow	Existing Section	DMRB Calculated Section	Mainline flow	Merge/diverge flow	DMRB Calculated Section
M25 J11 NB Offslip	5812	993	Type C - 3 lane downstream, 1 lane connector road and 4 lanes upstream	Type A - 4 lane downstream, 1 lane connector road and 4 lane upstream	6819	1165	Type C - 4 lane downstream, 1 lane connector road and 5 lane upstream
M25 J11 NB Onslip	5812	1570	Type F - 3 lane upstream, 2 lane connector road and 4 lanes downstream	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream	6819	1842	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream
M25 J11 SB Offslip	5155	1667	Type C - 3 lane downstream, 1 lane connector road and 4 lanes upstream	Type D - 3 lane downstream, 2 lane connetor road and 4 lane upstream	6048	1956	Type D - 4 lane downstream, 2 lane connetor road and 5 lane upstream
M25 J11 SB Onslip	5155	1044	Type F - 3 lane upstream, 2 lane connector road and 4 lanes downstream	Type E - 3 lane upstream, 1 lane connector road and 4 lane downstream	6048	1225	Type E - 4 lane upstream, 1 lane connector road and 5 lane downstream

PM Peak							
Section	2017				2030 baseline		
	Mainline flow	Merge/diverge flow	Existing Section	DMRB Calculated Section	Mainline flow	Merge/diverge flow	DMRB Calculated Section
M25 J11 NB Offslip	5294	885	Type C - 3 lane downstream, 1 lane connector road and 4 lanes upstream	Type C - 3 lane downstream, 1 lane connector road and 4 lane upstream	6215	1039	Type C - 4 lane downstream, 1 lane connector road and 5 lane upstream
M25 J11 NB Onslip	5294	1569	Type F - 3 lane upstream, 2 lane connector road and 4 lanes downstream	Type F - 3 lane upstream, 2 lane connector road and 4 lane downstream	6215	1842	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream
M25 J11 SB Offslip	5504	1131	Type C - 3 lane downstream, 1 lane connector road and 4 lanes upstream	Type A - 4 lane downstream, 1 lane connetor road and 4 lane upstream	6462	1328	Type C - 4 lane downstream, 1 lane connetor road and 5 lane upstream
M25 J11 SB Onslip	5504	1298	Type F - 3 lane upstream, 2 lane connector road and 4 lanes downstream	Type B - 4 lane upstream, 1 lane connector road and 4 lane downstream	6462	1524	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream

	2030 (with developments)			
Possible Additional merge/divergeflow	Mainline flow	Merge/diverge flow	DMRB Calculated Section	Additional Vehicles
200	6819	1176	Type C - 4 lane downstream, 1 lane connector road and 5 lane upstream	11
300	6819	1921	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream	79
950	6048	1973	Type D - 4 lane downstream, 2 lane connetor road and 5 lane upstream	17
1650	6048	1294	Type E - 4 lane upstream, 1 lane connector road and 5 lane downstream	69

	2030 (with developments)			
Possible Additional merge/divergeflow	Mainline flow	Merge/diverge flow	DMRB Calculated Section	Additional Vehicles
300	6215	1148	Type C - 4 lane downstream, 1 lane connector road and 5 lane upstream	109
850	6215	1916	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream	74
1100	6462	1402	Type D - 4 lane downstream, 2 lane connetor road and 5 lane upstream	74
900	6462	1580	Type F - 4 lane upstream, 2 lane connector road and 5 lane downstream	56

Interim Advice Note ##/05

Advice regarding the Assessment of Sites for Ramp Metering

Contents

1. Introduction

1.1 This Interim Advice Note, provides advice upon the circumstances where ramp metering may be of benefit in improving the flow of traffic on the main line carriageway of a motorway, in the vicinity of an entry merge from a slip road or interchange link at grade separated junctions. It draws on the experience gained to date from ramp metering schemes located on the M3, M6 and M27. The advice is therefore directed primarily at motorways, though it may be equally applicable in many respects to all purpose dual carriageway trunk roads.

1.2 Principles of Ramp Metering:

Section 2 of this Interim Advice Note explains the mechanism by which the speed and flow of main line traffic can be adversely affected by merging traffic from slip roads and interchange links. It describes how ramp metering seeks to minimise these effects by regulating the entry flow at merges in order to provide a degree of co-ordination between the main line and merging traffic streams.

1.3 An Overview of System Operation:

An overview of the operation of a ramp metering system is provided in Section 3. The various components of the system are described and an explanation is provided of the function of each.

1.4 Criteria for the Installation of Ramp Metering:

Criteria based on observed levels of congestion have been developed to assist in identifying merge locations where ramp metering may be of benefit. These criteria are set out in terms of vehicle speeds in the vicinity of the merge and are detailed in Section 4. Based upon operational experience at existing ramp metering sites, it has also been necessary to specify certain criteria in relation the traffic flow and physical layout of a site in order to determine the feasibility of ramp metering. These criteria relate to the volume and composition of traffic flow on the main line and merge, the type of merge arrangement and the length and gradient of the slip road/interchange link.

1.5 Economic Assessment:

In the case of schemes funded by the Highways Agency, it will be necessary to undertake a cost benefit analysis based upon the principles described in Section 5.

2. Principles of Ramp Metering

2.1 The problem ramp metering addresses:

2.1.1 For the purposes of this section the terms concentration and occupancy are used, these terms are similar as they both refer to the relationship between vehicles in terms of headway. They are not however completely interchangeable:

- Concentration refers to the amount of a length of carriageway covered by vehicles and is unrelated to speed, whereas;
- Occupancy is the amount of time a loop is covered by a vehicle expressed as a percentage. Where concentration over an area remains constant, the occupancy at a fixed point can alter as traffic bunches and as speed alters over an area.

2.1.2 When traffic flow on the main carriageway is high this means that the traffic concentration is also high. The concentration is the amount of carriageway covered by a vehicle. A high concentration directly equates to smaller distances between vehicles or a low headway, in such conditions the road's capacity is close to being reached and small changes in the nature of the traffic flow causes it to become volatile and susceptible to flow breakdown.

2.1.3 The introduction of traffic from the on ramp can cause vehicles to change lanes and bunch leading to higher concentration and lower headways. These shorter headways can be unsustainable at the speed of the main carriageway, for comfort and safety drivers will adjust their speed to account for the short stopping distances available. This adjustment of headway occurs over a distance of up to 2km after the on slip.

2.1.4 Often this adjustment of headway will cause following vehicles to brake, propagating a "wave" of braking vehicles in the traffic stream. Traffic concentration in the wave will be even higher. To compound the problem more vehicles will be entering the main carriageway boosting concentration even higher. If vehicles continue to join, ultimately the main carriageway speed will drop to a point where flow breakdown occurs. In this situation vehicles are stopping at the back of a queue and then driving off the front of the queue. This stationary traffic is typically seen between the merge area and approximately 2km downstream.

2.1.5 As a result of standing traffic, sometimes called a "phantom jam", the road effectively has its lowest throughput when the demand is at its highest.

2.1.6 Weather conditions, daylight, vehicle mix and gradients amongst other things can all affect the maximum throughput of any section of motorway.

2.2 How ramp metering addresses this problem:

2.2.1 To address this problem, ramp metering aims to maximise throughput on the main carriageway without disrupting the local road network. It does this by controlling the discharge of traffic from the slip road to reduce the interference of merging traffic on the main line flow thereby maintaining speeds at a higher level. Maintaining higher speeds will postpone the onset and duration of flow breakdown on the main carriageway. To do this it relies on the measurement of traffic conditions on the main carriageway and attempts to maintain this at a 'target occupancy' by restricting the flow from the on ramp.

2.2.2 By having stop lines with signal heads on the slip road, merging traffic can be held back as the target occupancy on the main carriageway is approached. The slip road behind the stop line is used as a buffer allowing traffic to be stored temporarily and then 'metered' out onto the main carriageway.

2.2.3 The amount of traffic which can be stored on the on ramp is finite and it is important that queues do not interfere with the local road network. In order to ensure that the best use is made of the available slip road space, a queue management system is included in the ramp metering system. The expected benefits of ramp metering are:

- Shorter journey times for vehicles on the main carriageway;
- Reduced congestion on the main carriageway;
- Improved journey time reliability for vehicles on the main carriageway;
- Improved safety.

2.2.4 The expected dis-benefits of ramp metering are delays to slip road traffic arising from stops at the signals.

3. An Overview of System Operation

3.1 The main control unit for an individual ramp metering site is contained in a cabinet at the junction near the ramp metering signals. The equipment in the cabinet monitors the inputs from the traffic detection loops on the main carriageway and from the queue length detectors on the on-ramp. It uses these inputs to select the most appropriate signal plan to achieve the target occupancy.

3.2 The system works through the use of stop lines in association with standard traffic light signal heads. The ramp metering site can operate in isolation without connection to external communications. However, it is also possible to control the settings and monitor the system from a terminal remote from the site. The information collected from the traffic detection loops includes; flows, speeds, occupancy, headway and four categories of vehicle lengths, for each lane of the main carriageway. The information used to operate the ramp metering system is occupancy, speed and flow. These are used in different ways depending on the configuration of the system. The other information collected is used to assist in configuring the system.

3.3 The important loops needed on the slip road for the ramp metering to work, are part of the queue detection and management system. This involves queue length detectors (loops) at regular intervals along the storage part of the slip road. Based on the information provided by these and the occupancy information supplied by the traffic detection loops on the main carriageway, the correct metering strategy is selected to make the best use of the storage available while trying to keep as close as possible to the target occupancy on the main carriageway.

3.4 Ultimately, if the queue on the on-ramp becomes too long, the final queue detection loops set at the beginning of the slip road at the junction with the local road network will trigger the ramp metering signals to change to green. This is known as a queue override and is designed to protect the stored traffic from interfering with the local road network. To see a typical ramp metering layout see Figure 2

3.5 Inductive loops are used for traffic detection for traffic on the main carriageway. The loops are used for both the operation of the system and for evaluation purposes.

3.6 The loops are in each running lane on the main carriageway and should be able to count traffic, measure speed, vehicle length, occupancy and headway.

3.7 The loops are usually placed both upstream and downstream of the merge area and ideally having one set of loops in the vicinity of the point where flow breaks down.

4. Criteria for the Installation of Ramp Metering

4.1 The criteria for assessing the suitability of a site for ramp metering relates to both the traffic and physical characteristics of the site. These criteria are set out in the following paragraphs and have been derived from experience gained with existing ramp metering schemes on the motorway network. Figure 1 contains a flowchart which illustrates the suggested procedure for evaluating the criteria at individual sites.

4.2 Traffic Characteristics:

4.2.1 Sites that may be suitable for ramp metering should show flow breakdown on the main line carriageway where average speeds drop below the 50kph threshold for at least one hour every workday, Monday to Friday. Moreover, the flow breakdown occurring on the main carriageway should only be attributable to the presence of the merge, ramp metering will not be effective in reducing congestion if the congestion:

- Commences upstream of the merge, (ramp metering can not solve a problem that is not caused by merging traffic.);
- Commences further than 2km downstream of the merge, (the problem is unlikely to be as a result of the merging traffic.);
- Lasts for less than one hour, (the costs of reducing delays to mainline traffic will not be sufficient to justify the costs of installing and operating ramp metering).

4.2.2 Slip road traffic flow should be high enough for it to have an impact on the main carriageway traffic (a minimum slip road flow of 400veh/lane/hr is suggested based on experience to date). If the slip road flow is lower than this, its interaction is unlikely to be enough to be the cause of flow breakdown on the main carriageway.

4.2.3 If the slip road demand is too high, ramp metering operation will be impeded because the queue over-ride algorithm will set the signals to green to prevent traffic queues on the slip road interfering with the local road network. A suggested maximum value from the experience to date is 900veh/lane/hr but ramp metering may work with higher slip road flows depending on factors such as the length of the slip road.

4.2.4 For ramp metering to work, the combined value of the upstream flow and the slip road flow should not be too large otherwise flow breakdown will occur at the merge. Hence the experience gained from the M6 and M3/M27 trials suggests that slip road flow should be at least 5% of the upstream flow and should not exceed 900veh/lane/hr.

4.2.5 During the installation of the ramp metering system queue length detectors will be installed on the slip road between its beginning at the local road junction to the ramp metering stop line, the ideal spacing for these loops is at 50m intervals.

4.2.6 See Figure 2 for a diagram of the layout of a typical ramp metering installation.

4.2.7 A high percentage of HGVs, i.e. more than 25%, on the slip road means that vehicles will take longer to reach mainline speeds, particularly if there is an uphill gradient. It is possible therefore that a high percentage of HGVs using the slip road could preclude the use of ramp metering.

4.2.8 Schemes for immediate implementation should be based on current data with no adjustment for traffic growth.

4.3 Data Collection:

4.3.1 A good example of the type of detection required is the MIDAS system which includes the installation of inductive loops at nominal 500m intervals and provides average values of speed, flow and occupancy every minute.

Without this type of data available for a site it is not possible to:

- Identify and assess the traffic problem;
- Control the algorithm and signals for ramp metering;
- Monitor the performance of the ramp metering.

4.3.2 If such a traffic detection system is present, the infrastructure must be deemed to be sufficiently robust with minimum malfunctioning loops, (e.g. it is essential that working loops exist upstream of the back of the queue, upstream of the merge area and downstream of the bottleneck).

4.3.3 If suitable traffic detection does not currently exist at a site, route managers should assess the suitability of their site for its installation prior to any implementation of ramp metering. Provision will add significantly to the cost of installing ramp metering. In this case, to assess the site's suitability for Ramp Metering, alternative traffic detection methods should be applied to get the necessary information.

4.3.4 The traffic problem at the merge location should be assessed over a number of days (excluding school holidays and special events) by collecting and analysing data at the one minute level (if possible) and also by making observations of traffic behaviour on site.

4.4 Physical Characteristics:

4.4.1 This advice is based on current experience of junction layouts that are common on the network, for example using straight, two lane slip roads with tapered merges onto three lane main carriageways. If the site being considered has any of the following characteristics, a special case could be made and further advice sought:

- Lane gain from slip road;
- Single lane slip road;
- Motorway to motorway link; or
- Two or four lane carriageways.

4.4.2 With ramp metering in operation, the slip road should satisfy two requirements:

- It should be able to store a sufficient number of vehicles so that, when vehicles are queuing, vehicles do not back up beyond the start of the slip road (see Figure 2 “storage space”); and
- There should be a sufficient length from the stop line (when ramp metering is implemented) and the main carriageway for vehicles to accelerate. Stop line placement will be part of the design process.

4.4.3 For the purposes of site selection it is sufficient to ensure that the slip road from its junction with the local road to the tip of the nose marking is 300 metres. Then the merge area should be at least 205metres long. There is some flexibility in the 300 metre slip road length as it also depends on the flow of HGVs and the gradient of the slip road. This interaction can be seen in Figure 1.

4.4.4 Platoon size, vehicle acceleration and gradient are all factors which will be considered in the design guidance for the placement of the stop line.

4.5 Summary of Criteria:

4.5.1 Table 1 summarises the criteria set out above.

Table 1 – Criteria for the Installation of Ramp Metering.

Parameter	Minimum Value	Maximum value
Congestion (hours below 50kph per year)	250	No maximum value
Upstream mainline flows (vph across 3 lanes)	4000	5000
Slip road flows (vph per lane)	400	900
Slip road flow as percentage of upstream flow (%)	5	30
Average mainline speeds in congestion	No minimum value	70kph
Slip road length (local road to start of merge)	300metres	No maximum
Merge length	205metres	No maximum

Figure 1 - Flow chart process FC1 to assess whether ramp metering is likely to give benefits at a site

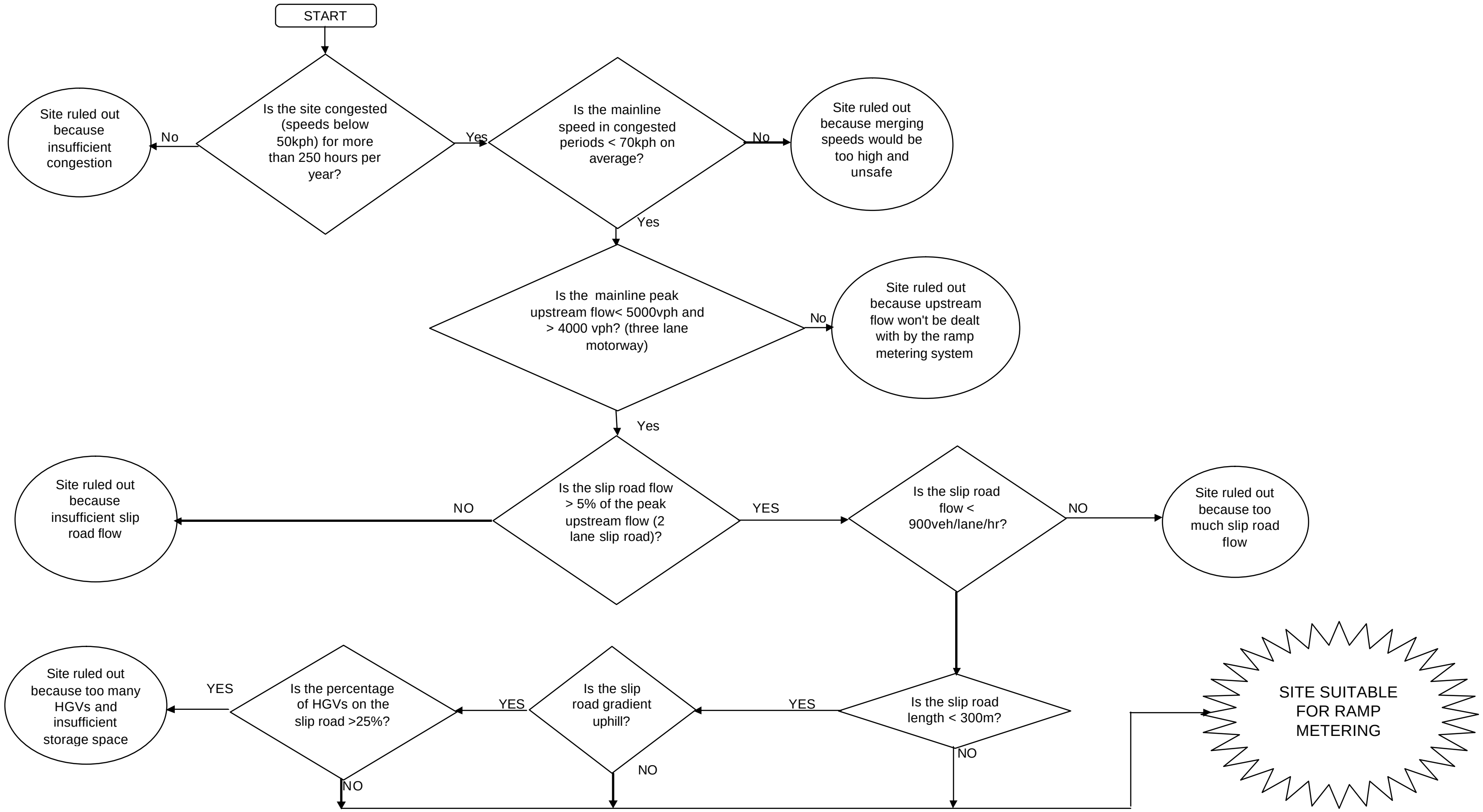
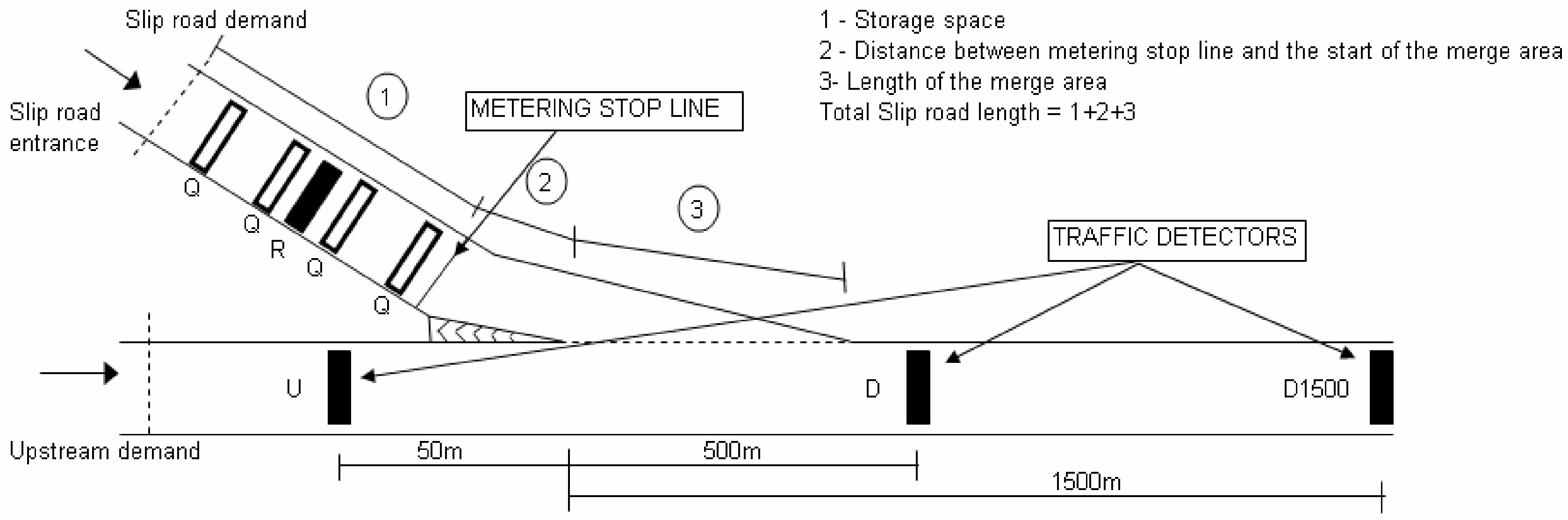


Figure 2 - General layout of a ramp metering site



U = Traffic detection loops upstream of merge location
D = Traffic detection loop downstream of merge location
D1500 = traffic detection loop 1500m downstream of merge location
R = Trafic detection loop on slip road
Q = Queue detection loop on slip road number dependant on slip road length, ideal spacing 50m

5. Next steps

5.1 Once the process outlined in these guidance notes has been completed, it should be known whether a site is suitable.

5.2 If the site is a Highways Agency road a cost benefit analysis should take place based on the supporting data available from Nanu Rayman at the Highways Agency. Once this analysis has been completed estimates of costs and benefits of implementing ramp metering at that site should be known.

When a site has been identified as suitable, a check should be made as to whether it lies within an Air Quality Management Area (AQMA) and if there is a property within 200 metres of the site. If this is the case air quality modelling will be required. Either Simon Price or Michele Hackman of the Highways Agency's Environmental Policy (EP) team can give guidance on how this should be carried out.

For more assistance regarding ramp metering, business case development and implementation, please contact:

Mr Nanu Rayman,

Highways Agency

Temple Quay House

Temple Quay

Bristol BS1 6HA

5.3 These notes may be revised as more information becomes available following implementation of ramp metering at further sites. It is hoped that more information on site characteristics and their interaction, as well as benefits can be obtained from this.

From:	Lansdown, Colin <Colin.Lansdown@highwaysengland.co.uk>
Sent:	27 March 2019 17:21
To:	Maheshwary, Palak
Subject:	RE: M25 Junction 11 - Ramp Metering Operation

Hi Palak,

Apologies for the delay in responding to your email.

Just in case you may not be aware Highways England have regional strategy and planning teams (planningse@highwaysengland.co.uk) who would be better placed to advise on traffic modelling for schemes which are likely to impact on both the HE and local authority roads.

However as your request is for operational information relating to Ramp Metering (RM) and not access to data I can respond, although please forgive me if I am stating the obvious.

RM uses traffic signals (Red, Amber, and Green (RAG)) and are phased (sequenced) in the same way as any other traffic signal (RAG) in the UK, having starting and stopping phases(sequence). The sequence is a single Green (free to go) to a single Amber (get ready to stop) then Red (stop), followed by Red and Amber (get ready to go) to single Green (go).

As for the cycle times both the starting and stopping Ambers are fixed for all RM sites in the UK which cannot be changed and is three seconds for stopping and two seconds (while still displaying the Red) for starting. RM varies the Red and Green times to achieve the optimum release levels (from the on-slip) according to capacity on the mainline (carriageway flow/occupancy). However there is a limited to how much flow can be managed by changing Red and Green times. This would be in the region of for a single lane ramp (on-slip) of about 1250+ vehicles per lane per hour, and 2500 for two lanes.

The trigger for RM activation of the signals is determined by predetermined threshold based on sufficient congestion (detected on the carriageway downstream) and lane 1 (being closet to the merge) up-stream speed. This ensures that it will only display aspects when there is a safe release speed (stopped vehicles can match mainline merging) and the mainline is either in flow breakdown or congested.

Specifically for M25 J11 Anticlockwise Lane 1 upstream speed is at or below 67Kph (42Mph) with downstream occupancy (whole carriageway) at or above 14% (roughly around 5,500 vph).
M25 J11 Clockwise Lane 1 upstream speed at or below 73Kph (45Mph) with downstream occupancy (whole carriageway) at or above 16.5% (roughly around 6,500 vph).

Hope this helps.

Kind regards.

Colin Lansdown, Project sponsor
Highways England | Temple Quay House | 2 The Square, Temple Quay | Bristol | BS1 6HA
Tel: +44 (0) 300 4704195
Web: http://www.highways.gov.uk
GTN: 0300 470 4195

From: Maheshwary, Palak [mailto:Palak.Maheshwary@arcadis.com]
Sent: 22 March 2019 09:57
To: Lansdown, Colin <Colin.Lansdown@highwaysengland.co.uk>
Cc: Carrignon, David <David.Carrignon@arcadis.com>
Subject: M25 Junction 11 - Ramp Metering Operation

Hi Colin,

Good Morning.

As part of the Runnymede Local Plan traffic modelling, Arcadis is preparing some junction analysis for M25 Junction 11.

Would it be possible to have some operational information on how the existing ramp metering on M25 junction 11 On-Slips operate? I am building a LinSig model, so my query is focussed on the phasing, cycle timing and trigger mechanism of the metering system.

Thank you

Kind Regards,

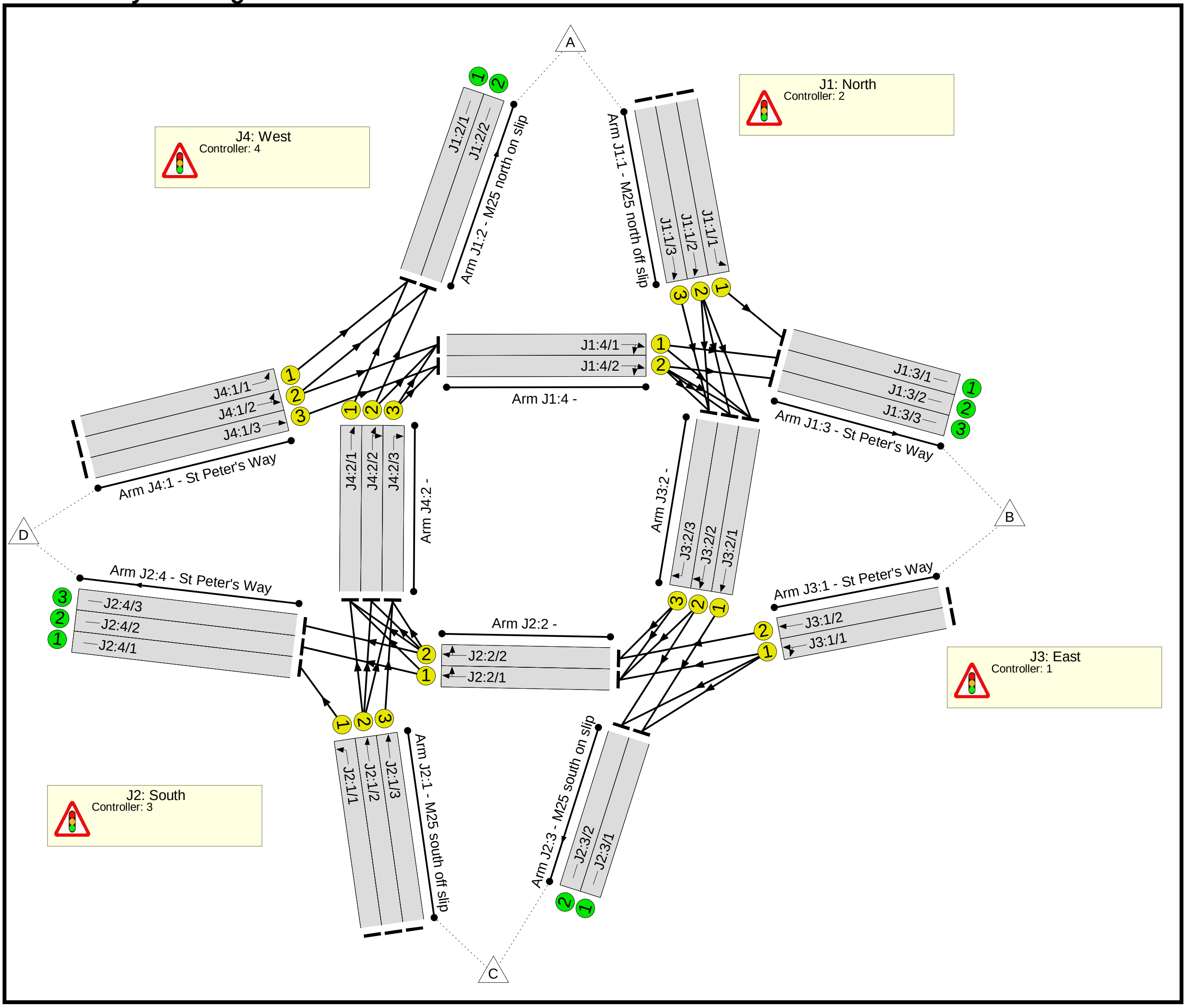
Palak Maheshwary
Consultant (Traffic and Transportation)
ARCADIS Consulting (UK Limited) | Bernard Weatherill House, 8 Mint Walk, Croydon CR0 1EA | UK
www.arcadis.com

Full Input Data And Results

User and Project Details

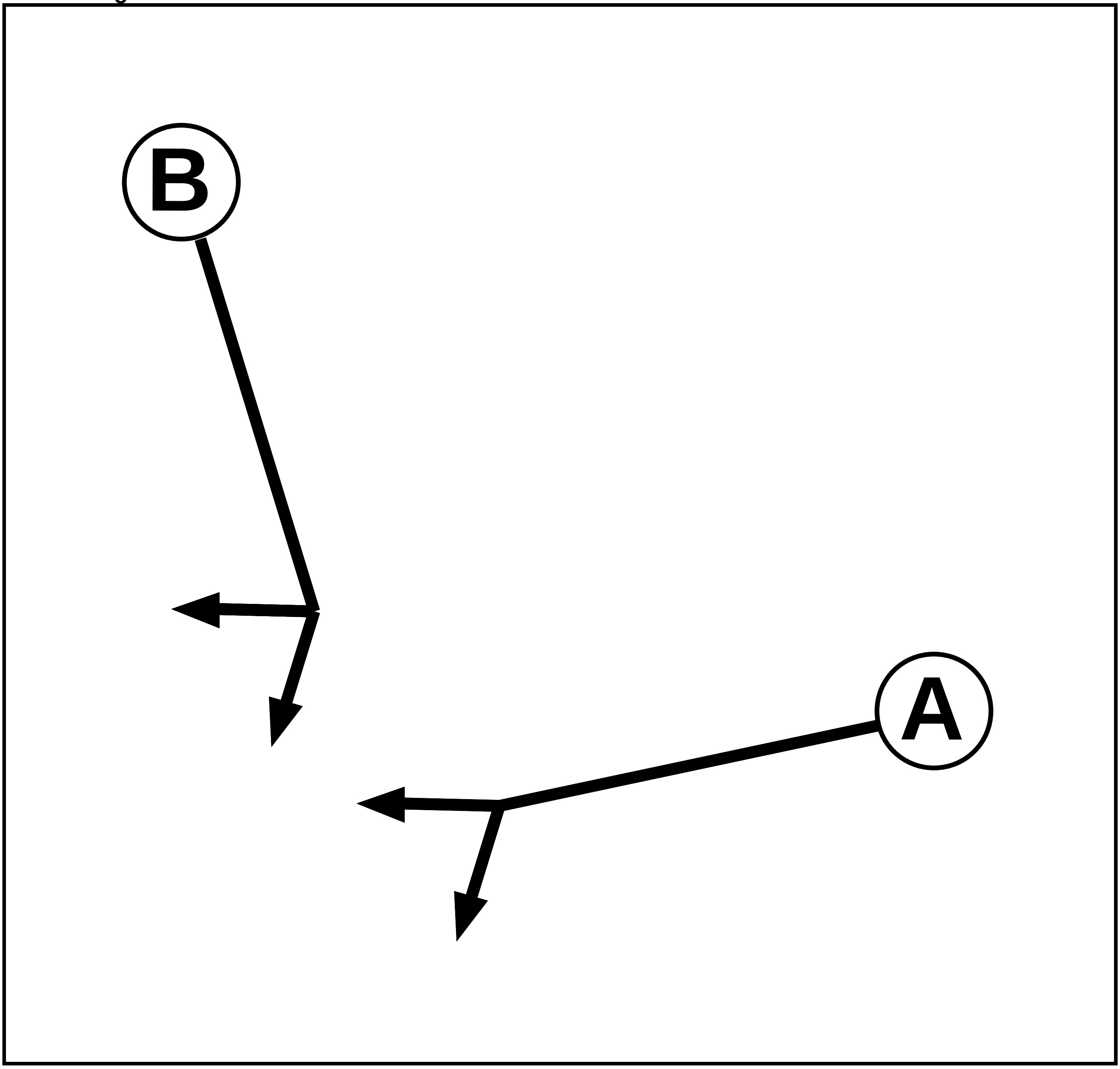
Project:	
Title:	
Location:	
Additional detail:	
File name:	M25J11_Merge and Diverge sections.lsg3x
Author:	
Company:	
Address:	

Network Layout Diagram



C1 - East

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		-9999	7
B	Traffic		-9999	7

Full Input Data And Results

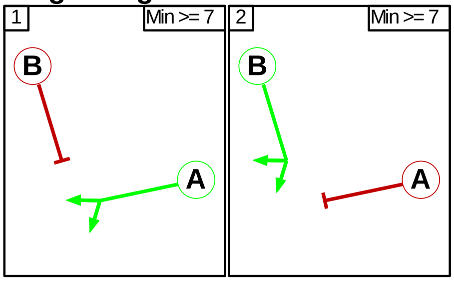
Phase Intergreens Matrix

	Starting Phase		
Terminating Phase		A	B
	A		5
	B	5	

Phases in Stage

Stage No.	Phases in Stage
1	A
2	B

Stage Diagram



Phase Delays

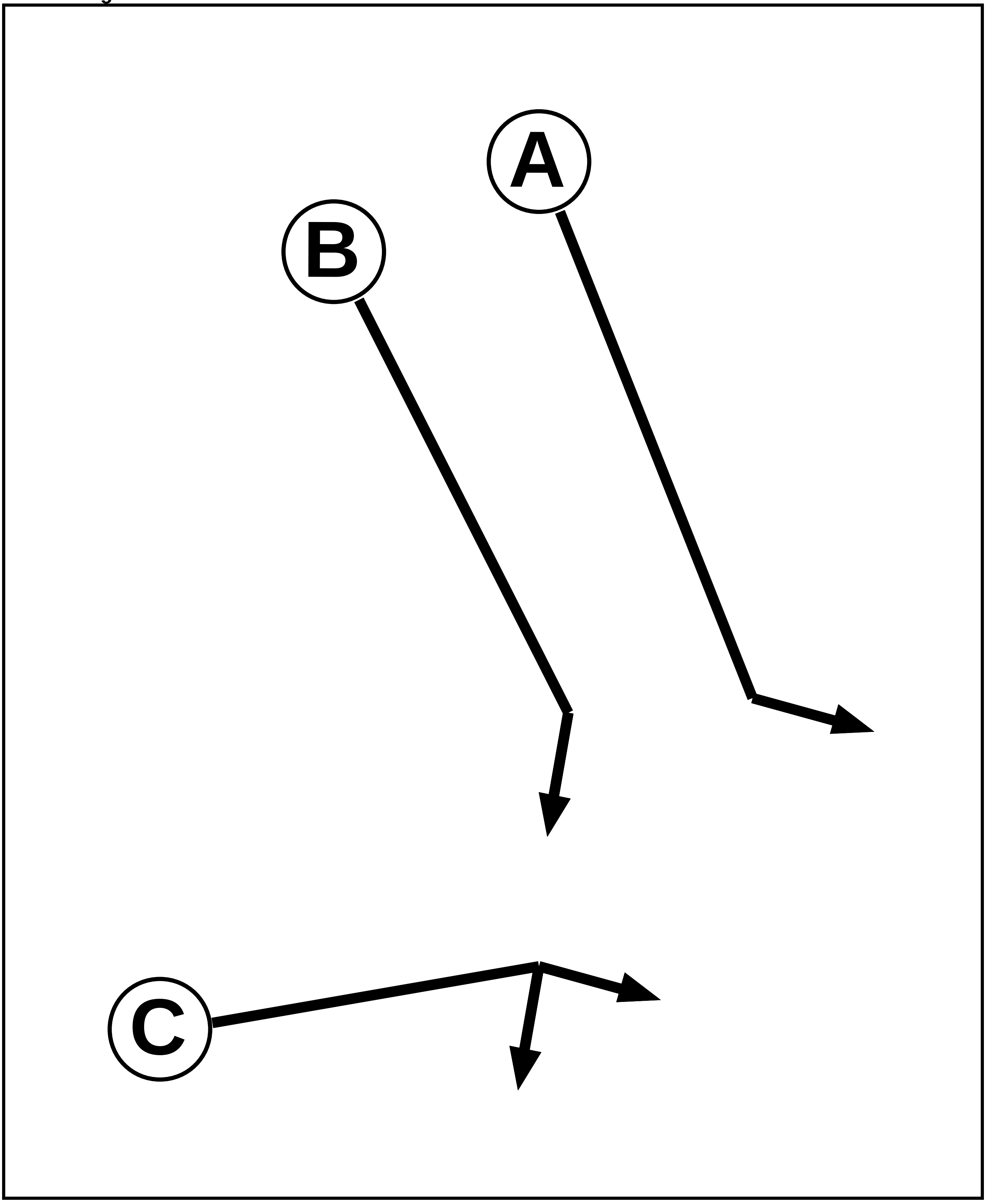
Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

	To Stage		
From Stage		1	2
	1		5
	2	5	

C2 - North

Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		-9999	7
B	Traffic		-9999	7
C	Traffic		-9999	7

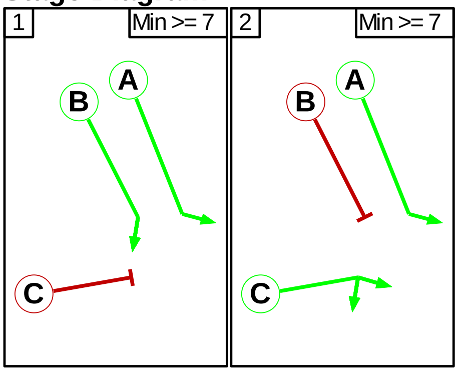
Phase Intergreens Matrix

	Starting Phase			
		A	B	C
Terminating Phase	A		-	-
	B	-		7
	C	-	5	

Phases in Stage

Stage No.	Phases in Stage
1	A B
2	A C

Stage Diagram



Phase Delays

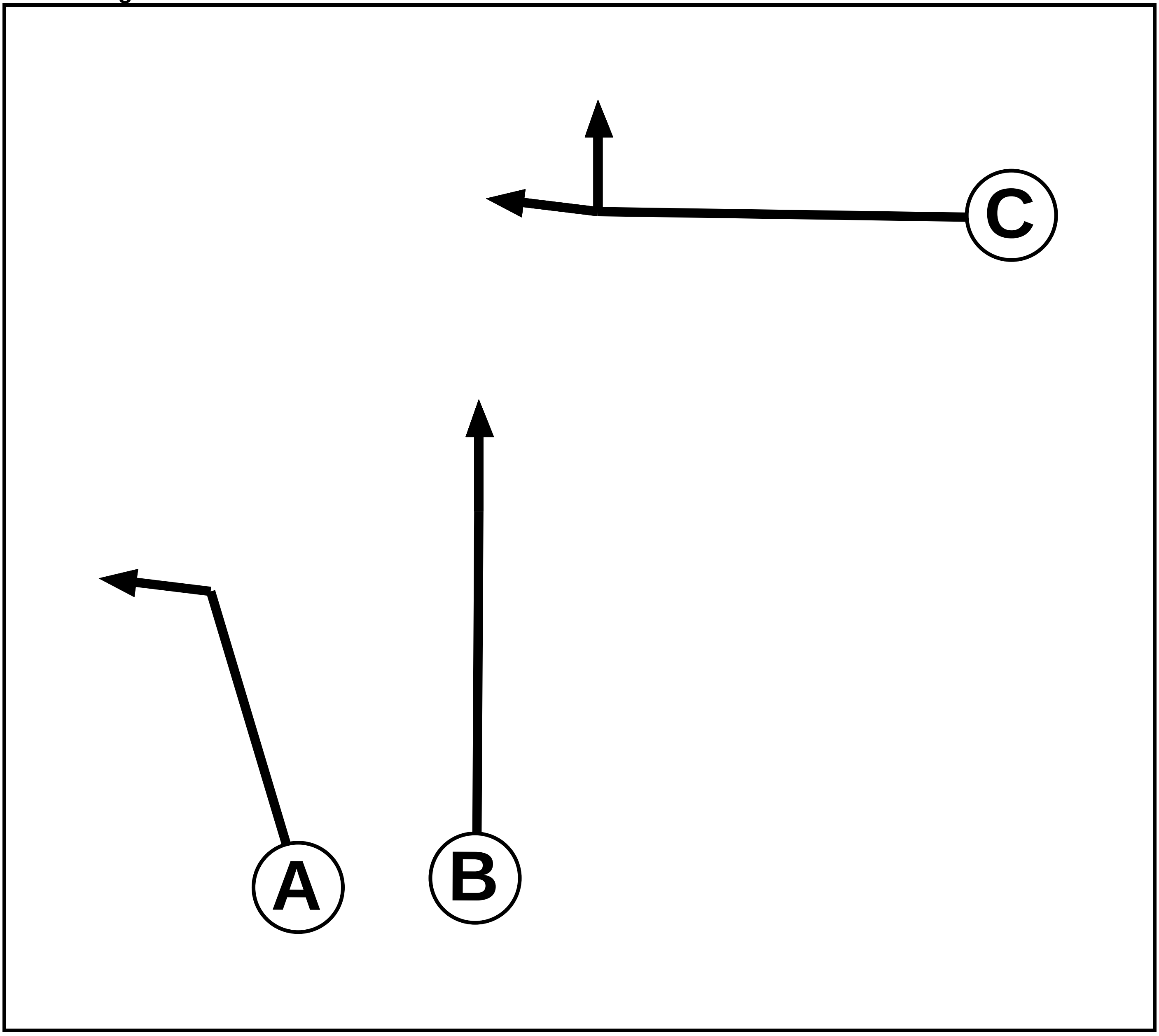
Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

	To Stage		
		1	2
From Stage	1		7
	2	5	

C3 - South

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		-9999	7
B	Traffic		-9999	7
C	Traffic		-9999	7

Full Input Data And Results

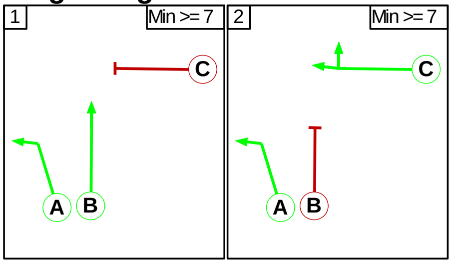
Phase Intergreens Matrix

		Starting Phase		
		A	B	C
Terminating Phase	A		-	-
	B	-		7
	C	-	5	

Phases in Stage

Stage No.	Phases in Stage
1	A B
2	A C

Stage Diagram



Phase Delays

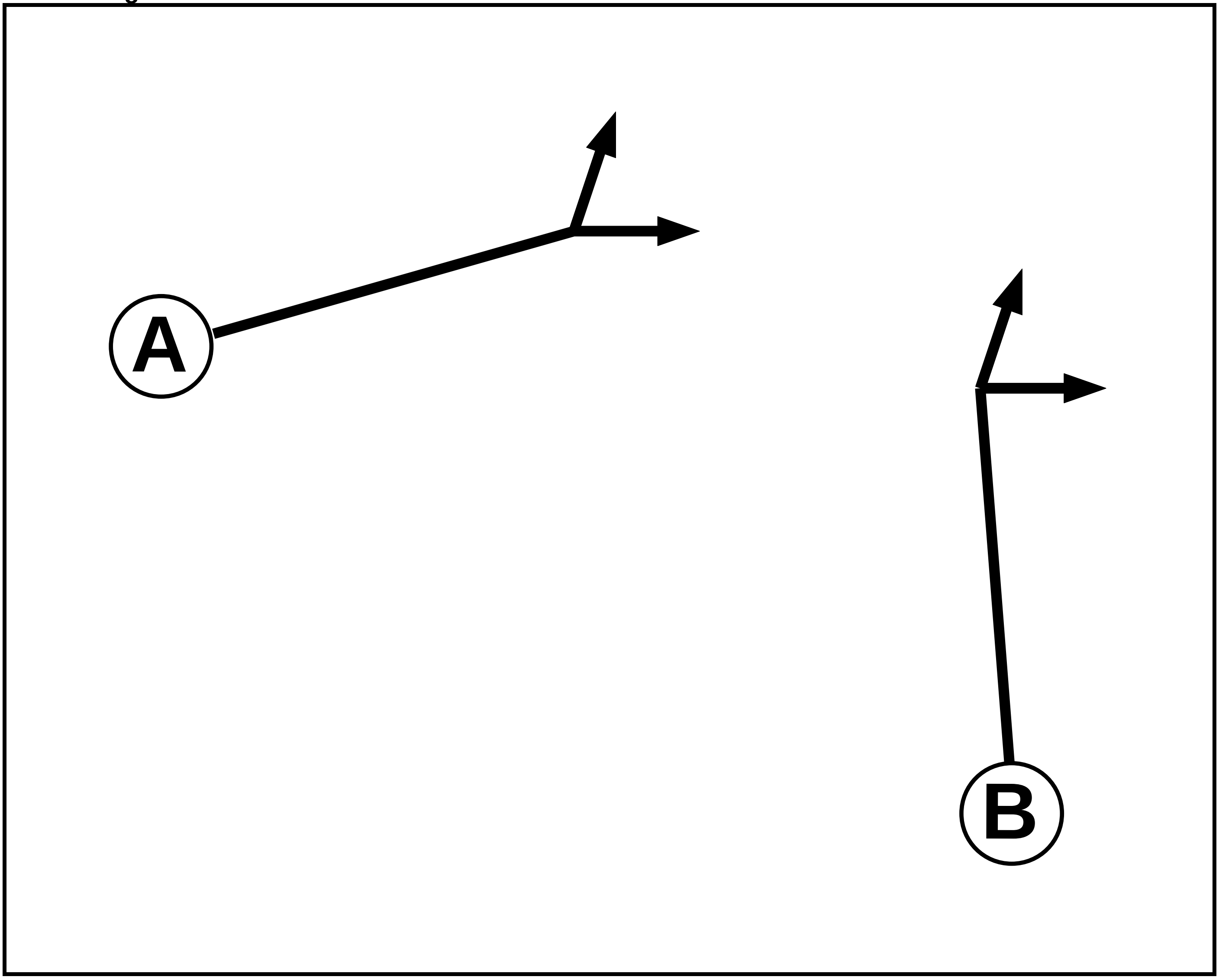
Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

		To Stage	
		1	2
From Stage	1		7
	2	5	

C4 - West

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		-9999	7
B	Traffic		-9999	7

Phase Intergreens Matrix

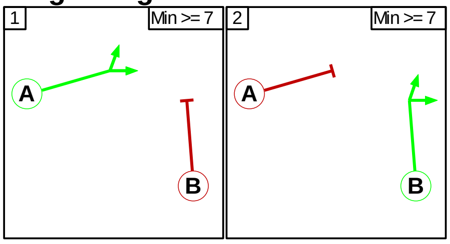
	Starting Phase		
Terminating Phase		A	B
	A		5
	B	5	

Phases in Stage

Stage No.	Phases in Stage
1	A
2	B

Full Input Data And Results

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
From Stage	1		5
	2	5	

Full Input Data And Results

Give-Way Lane Input Data

Junction: J1: North
There are no Opposed Lanes in this Junction

Junction: J2: South
There are no Opposed Lanes in this Junction

Junction: J3: East
There are no Opposed Lanes in this Junction

Junction: J4: West
There are no Opposed Lanes in this Junction

Full Input Data And Results

Lane Input Data

Junction: J1: North												
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)**
J1:1/1 (M25 north off slip)	U	A	2	3	60.0	User	1900	-	-	-	-	-
J1:1/2 (M25 north off slip)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J1:1/3 (M25 north off slip)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J1:2/1 (M25 north on slip)	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:2/2 (M25 north on slip)	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:3/1 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:3/2 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:3/3 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-
J1:4/1	U	C	2	3	25.2	User	1900	-	-	-	-	-
J1:4/2	U	C	2	3	25.2	User	1900	-	-	-	-	-

Full Input Data And Results

Junction: J2: South												
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)**
J2:1/1 (M25 south off slip)	U	A	2	3	60.0	User	1900	-	-	-	-	-
J2:1/2 (M25 south off slip)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J2:1/3 (M25 south off slip)	U	B	2	3	60.0	User	1900	-	-	-	-	-
J2:2/1	U	C	2	3	21.7	User	1900	-	-	-	-	-
J2:2/2	U	C	2	3	21.7	User	1900	-	-	-	-	-
J2:3/1 (M25 south on slip)	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:3/2 (M25 south on slip)	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:4/1 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:4/2 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-
J2:4/3 (St Peter's Way)	U		2	3	60.0	Inf	-	-	-	-	-	-

Junction: J3: East												
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)**
J3:1/1 (St Peter's Way)	U	A	2	3	60.0	User	1800	-	-	-	-	-
J3:1/2 (St Peter's Way)	U	A	2	3	60.0	User	1800	-	-	-	-	-
J3:2/1	U	B	2	3	18.3	User	1900	-	-	-	-	-
J3:2/2	U	B	2	3	18.3	User	1900	-	-	-	-	-
J3:2/3	U	B	2	3	18.3	User	1900	-	-	-	-	-

Full Input Data And Results

Junction: J4: West													
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)**
J4:1/1 (St Peter's Way)	U	A	2	3	60.0	User	1900	-	-	-	-	-
J4:1/2 (St Peter's Way)	U	A	2	3	60.0	User	1800	-	-	-	-	-
J4:1/3 (St Peter's Way)	U	A	2	3	60.0	User	1800	-	-	-	-	-
J4:2/1	U	B	2	3	17.4	User	1900	-	-	-	-	-
J4:2/2	U	B	2	3	17.4	User	1900	-	-	-	-	-
J4:2/3	U	B	2	3	17.4	User	1900	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2030 with non-committed developments AM'	07:15	08:15	01:00	
2: '2030 with non-committed developments PM'	17:15	18:15	01:00	

Scenario 1: '2030 AM' (FG1: '2030 with non-committed developments AM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	1087	1	889	1977
	B	738	0	394	105	1237
	C	38	326	0	796	1160
	D	1138	144	878	0	2160
	Tot.	1914	1557	1273	1790	6534

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 1: 2030 AM
Junction: J1: North	
J1:1/1	1087
J1:1/2	445
J1:1/3	445
J1:2/1	1156
J1:2/2	758
J1:3/1	1087
J1:3/2	331
J1:3/3	139
J1:4/1	607
J1:4/2	741
Junction: J2: South	
J2:1/1	796
J2:1/2	182
J2:1/3	182
J2:2/1	804
J2:2/2	928
J2:3/1	919
J2:3/2	354
J2:4/1	796
J2:4/2	612
J2:4/3	382
Junction: J3: East	
J3:1/1	622
J3:1/2	615
J3:2/1	525
J3:2/2	633
J3:2/3	610
Junction: J4: West	
J4:1/1	756
J4:1/2	711
J4:1/3	693
J4:2/1	400
J4:2/2	407
J4:2/3	295

Lane Saturation Flows

Junction: J1: North								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1 (M25 north off slip Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J1:1/2 (M25 north off slip Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J1:1/3 (M25 north off slip Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/1 (M25 north on slip Lane 1)	Infinite Saturation Flow						Inf	Inf
J1:2/2 (M25 north on slip Lane 2)	Infinite Saturation Flow						Inf	Inf
J1:3/1 (St Peter's Way Lane 1)	Infinite Saturation Flow						Inf	Inf
J1:3/2 (St Peter's Way Lane 2)	Infinite Saturation Flow						Inf	Inf
J1:3/3 (St Peter's Way Lane 3)	Infinite Saturation Flow						Inf	Inf
J1:4/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:4/2	This lane uses a directly entered Saturation Flow						1900	1900

Junction: J2: South								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1 (M25 south off slip Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:1/2 (M25 south off slip Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:1/3 (M25 south off slip Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/1 (M25 south on slip Lane 1)	Infinite Saturation Flow						Inf	Inf
J2:3/2 (M25 south on slip Lane 2)	Infinite Saturation Flow						Inf	Inf
J2:4/1 (St Peter's Way Lane 1)	Infinite Saturation Flow						Inf	Inf
J2:4/2 (St Peter's Way Lane 2)	Infinite Saturation Flow						Inf	Inf
J2:4/3 (St Peter's Way Lane 3)	Infinite Saturation Flow						Inf	Inf

Full Input Data And Results

Junction: J3: East								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J3:1/1 (St Peter's Way Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J3:1/2 (St Peter's Way Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J3:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J3:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J3:2/3	This lane uses a directly entered Saturation Flow						1900	1900

Junction: J4: West								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J4:1/1 (St Peter's Way Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J4:1/2 (St Peter's Way Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J4:1/3 (St Peter's Way Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J4:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J4:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J4:2/3	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 2: '2030 PM' (FG2: '2030 with non-committed developments PM', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

	Destination					
Origin		A	B	C	D	Tot.
	A	0	896	6	472	1374
	B	714	0	480	80	1274
	C	16	473	0	645	1134
	D	1144	377	1062	0	2583
	Tot.	1874	1746	1548	1197	6365

Full Input Data And Results

Traffic Lane Flows

Lane	Scenario 2: 2030 PM
Junction: J1: North	
J1:1/1	896
J1:1/2	238
J1:1/3	240
J1:2/1	1294
J1:2/2	580
J1:3/1	896
J1:3/2	486
J1:3/3	364
J1:4/1	919
J1:4/2	993
Junction: J2: South	
J2:1/1	645
J2:1/2	244
J2:1/3	245
J2:2/1	476
J2:2/2	790
J2:3/1	1063
J2:3/2	485
J2:4/1	645
J2:4/2	329
J2:4/3	223
Junction: J3: East	
J3:1/1	641
J3:1/2	633
J3:2/1	583
J3:2/2	550
J3:2/3	407
Junction: J4: West	
J4:1/1	901
J4:1/2	848
J4:1/3	834
J4:2/1	393
J4:2/2	405
J4:2/3	405

Lane Saturation Flows

Junction: J1: North								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J1:1/1 (M25 north off slip Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J1:1/2 (M25 north off slip Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J1:1/3 (M25 north off slip Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J1:2/1 (M25 north on slip Lane 1)	Infinite Saturation Flow						Inf	Inf
J1:2/2 (M25 north on slip Lane 2)	Infinite Saturation Flow						Inf	Inf
J1:3/1 (St Peter's Way Lane 1)	Infinite Saturation Flow						Inf	Inf
J1:3/2 (St Peter's Way Lane 2)	Infinite Saturation Flow						Inf	Inf
J1:3/3 (St Peter's Way Lane 3)	Infinite Saturation Flow						Inf	Inf
J1:4/1	This lane uses a directly entered Saturation Flow						1900	1900
J1:4/2	This lane uses a directly entered Saturation Flow						1900	1900

Junction: J2: South								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J2:1/1 (M25 south off slip Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J2:1/2 (M25 south off slip Lane 2)	This lane uses a directly entered Saturation Flow						1900	1900
J2:1/3 (M25 south off slip Lane 3)	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J2:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J2:3/1 (M25 south on slip Lane 1)	Infinite Saturation Flow						Inf	Inf
J2:3/2 (M25 south on slip Lane 2)	Infinite Saturation Flow						Inf	Inf
J2:4/1 (St Peter's Way Lane 1)	Infinite Saturation Flow						Inf	Inf
J2:4/2 (St Peter's Way Lane 2)	Infinite Saturation Flow						Inf	Inf
J2:4/3 (St Peter's Way Lane 3)	Infinite Saturation Flow						Inf	Inf

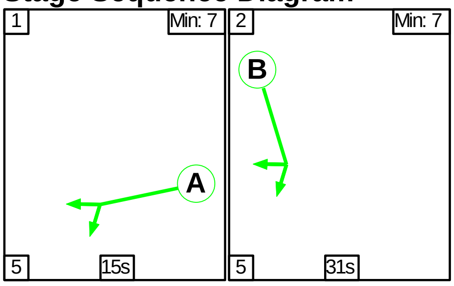
Full Input Data And Results

Junction: J3: East								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J3:1/1 (St Peter's Way Lane 1)	This lane uses a directly entered Saturation Flow						1800	1800
J3:1/2 (St Peter's Way Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J3:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J3:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J3:2/3	This lane uses a directly entered Saturation Flow						1900	1900

Junction: J4: West								
Lane	**Lane Width (m)**	**Gradient**	**Nearside Lane**	**Allowed Turns**	**Turning Radius (m)**	**Turning Prop.**	**Sat Flow (PCU/Hr)**	**Flared Sat Flow (PCU/Hr)**
J4:1/1 (St Peter's Way Lane 1)	This lane uses a directly entered Saturation Flow						1900	1900
J4:1/2 (St Peter's Way Lane 2)	This lane uses a directly entered Saturation Flow						1800	1800
J4:1/3 (St Peter's Way Lane 3)	This lane uses a directly entered Saturation Flow						1800	1800
J4:2/1	This lane uses a directly entered Saturation Flow						1900	1900
J4:2/2	This lane uses a directly entered Saturation Flow						1900	1900
J4:2/3	This lane uses a directly entered Saturation Flow						1900	1900

Scenario 1: '2030 AM' (FG1: '2030 with non-committed developments AM', Plan 1: 'Network Control Plan 1')
C1 - East

Stage Sequence Diagram

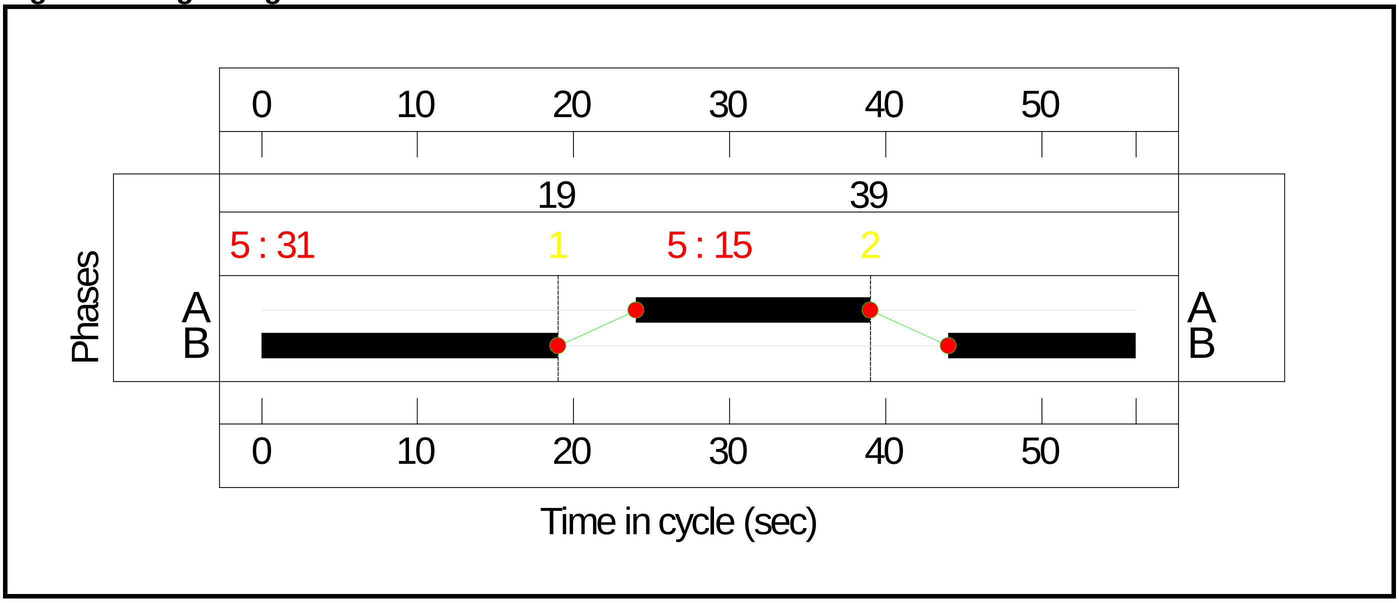


Stage Timings

Stage	1	2
Duration	15	31
Change Point	19	39

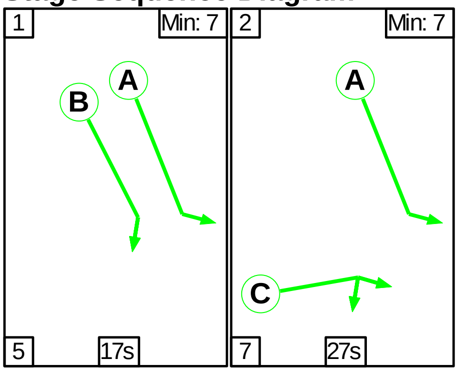
Full Input Data And Results

Signal Timings Diagram



C2 - North

Stage Sequence Diagram

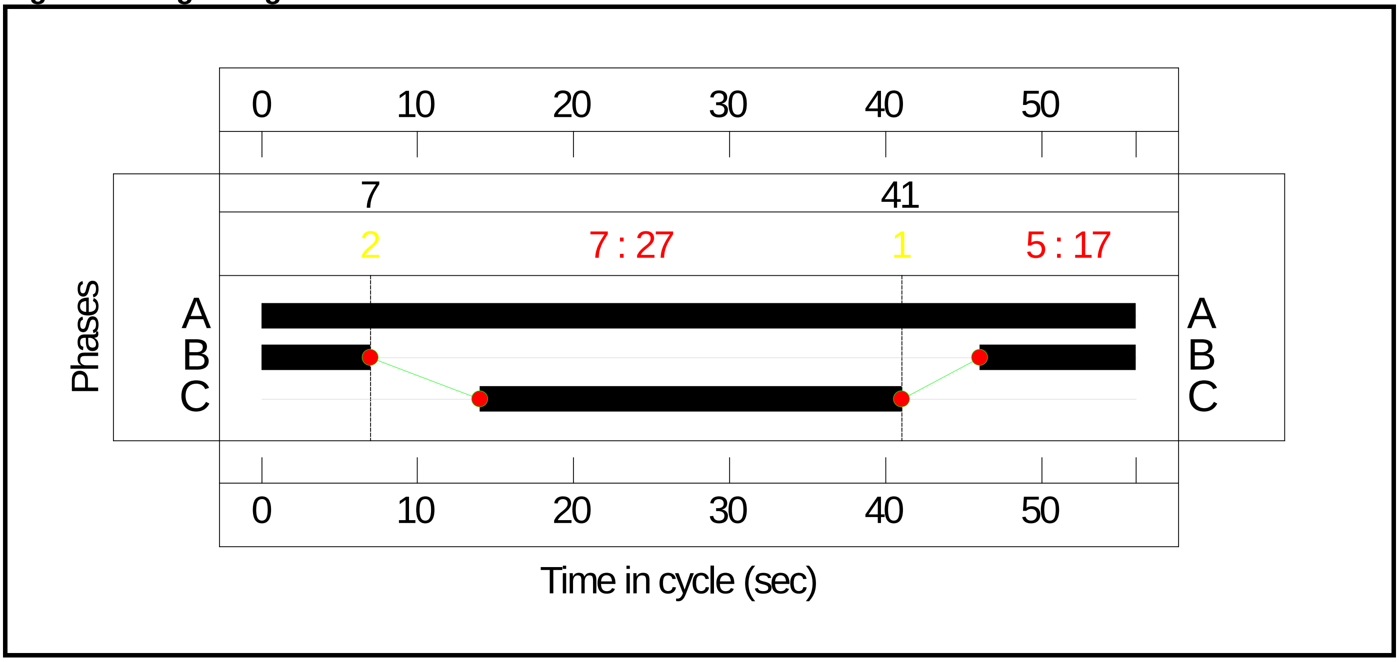


Stage Timings

Stage	1	2
Duration	17	27
Change Point	41	7

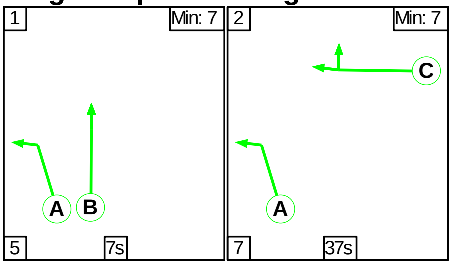
Full Input Data And Results

Signal Timings Diagram



C3 - South

Stage Sequence Diagram

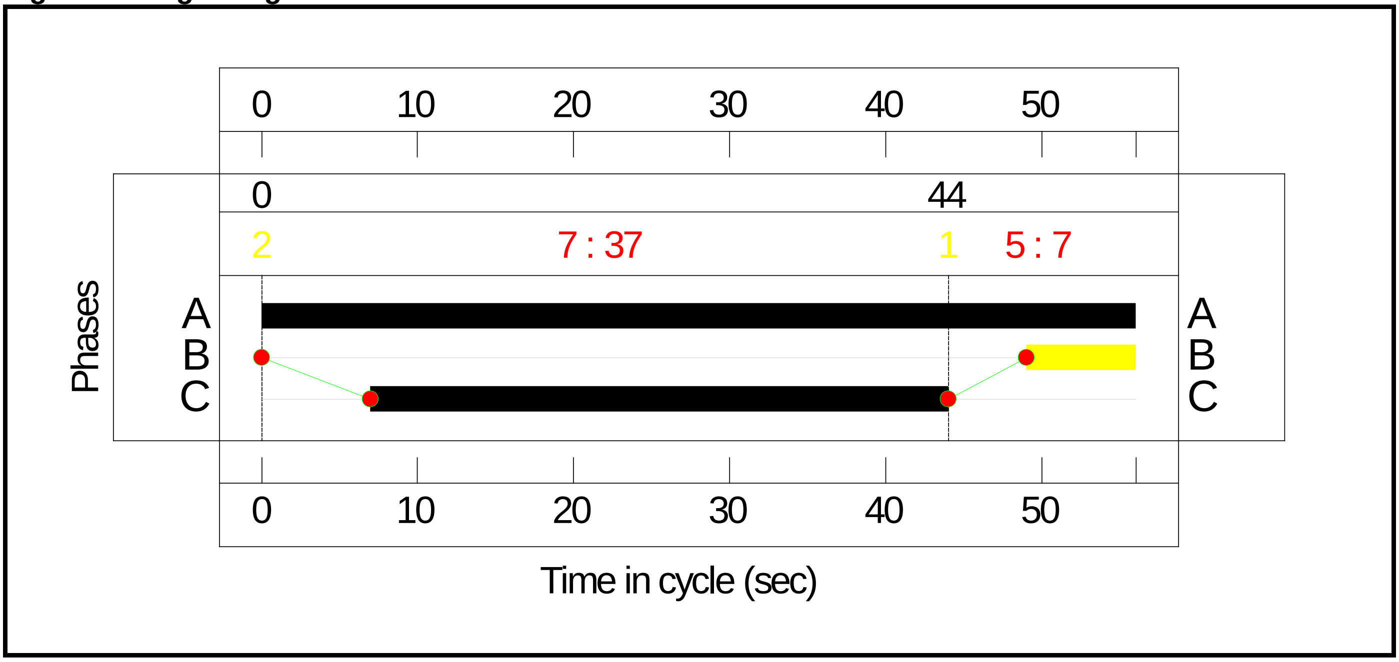


Stage Timings

Stage	1	2
Duration	7	37
Change Point	44	0

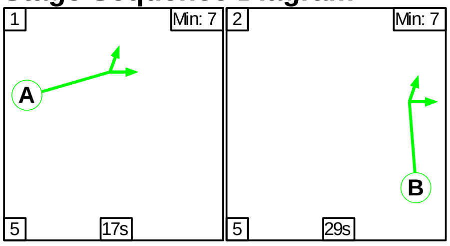
Full Input Data And Results

Signal Timings Diagram



C4 - West

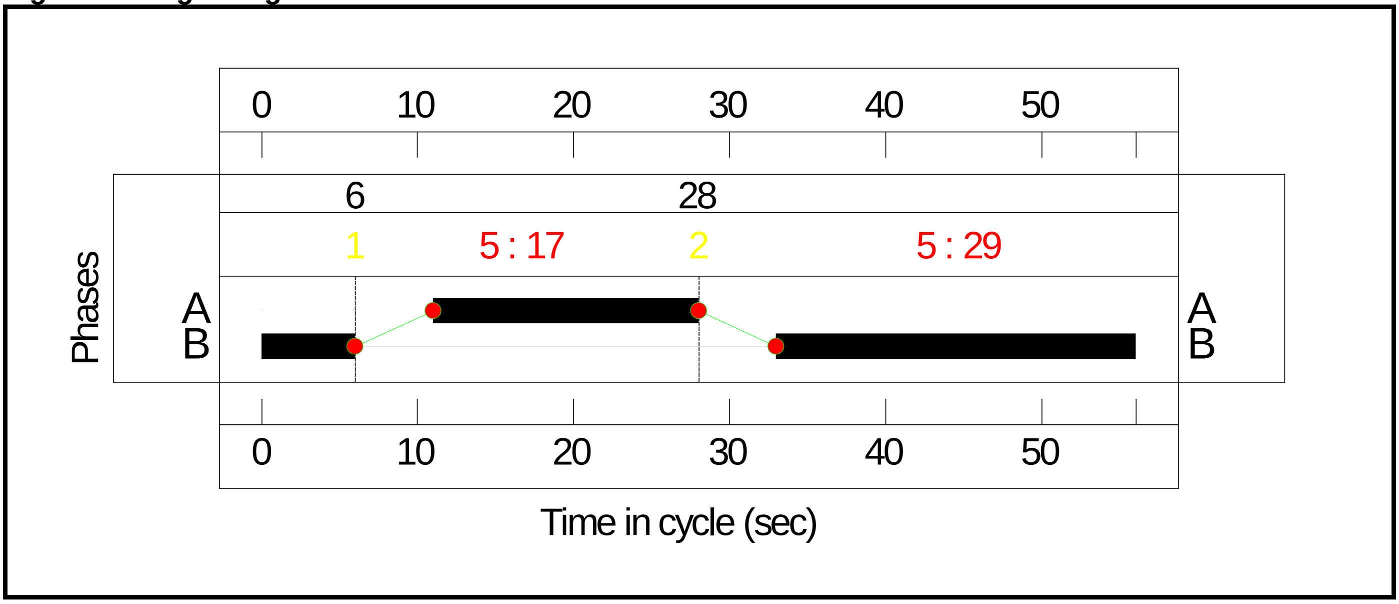
Stage Sequence Diagram



Stage Timings

Stage	1	2
Duration	17	29
Change Point	6	28

Signal Timings Diagram

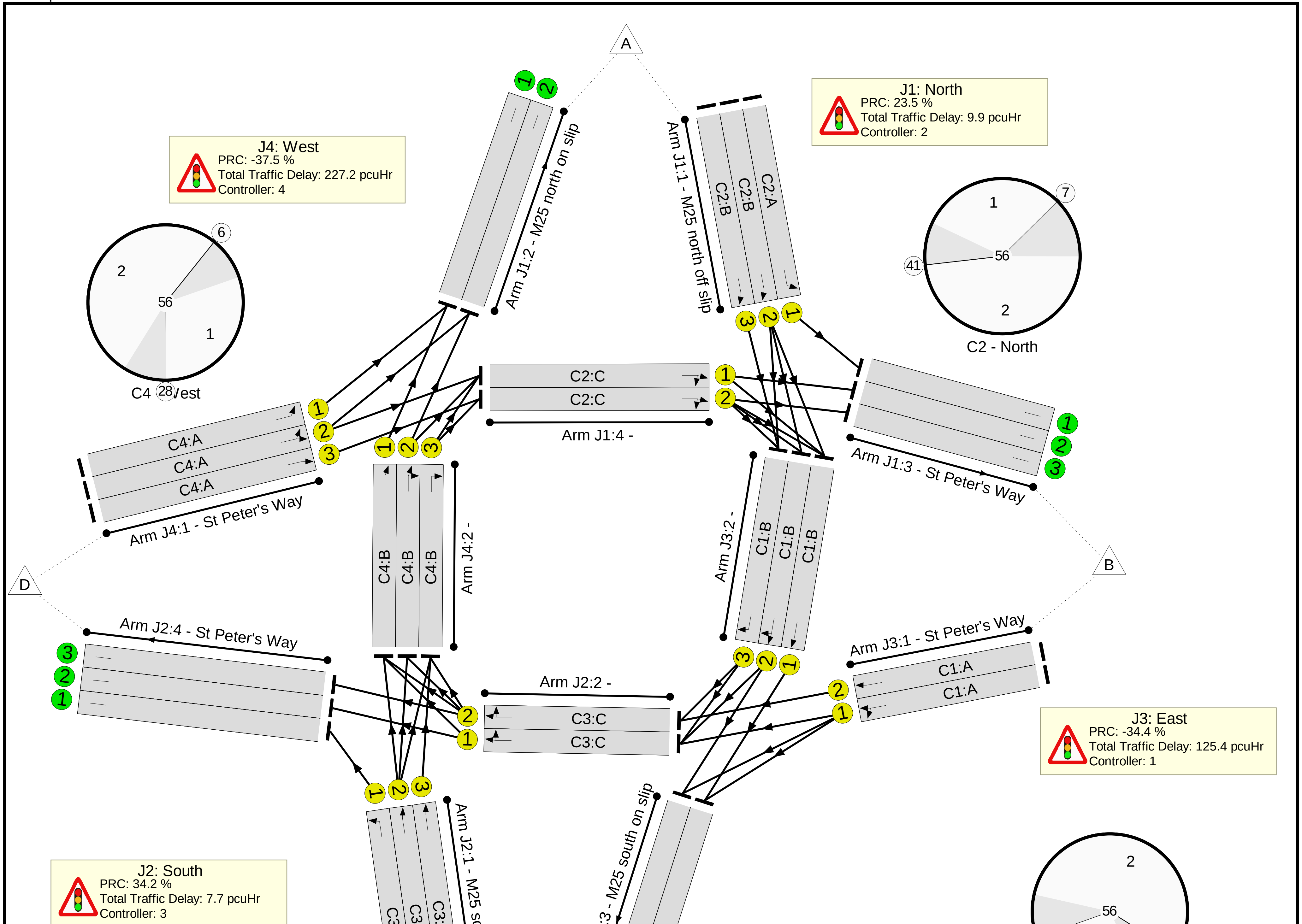


Full Input Data And Results

Full Input Data And Results

Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

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	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**123.8%**
J1: North	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**72.9%**
1/1	M25 north off slip Left	U	N/A	N/A	C2:A		1	56	-	1087	1900	1900	57.2%
1/2	M25 north off slip Ahead	U	N/A	N/A	C2:B		1	17	-	445	1900	611	72.9%
1/3	M25 north off slip Ahead	U	N/A	N/A	C2:B		1	17	-	445	1900	611	72.9%
2/1	M25 north on slip	U	N/A	N/A	-		-	-	-	1156	Inf	Inf	0.0%
2/2	M25 north on slip	U	N/A	N/A	-		-	-	-	758	Inf	Inf	0.0%
3/1	St Peter's Way	U	N/A	N/A	-		-	-	-	1087	Inf	Inf	0.0%
3/2	St Peter's Way	U	N/A	N/A	-		-	-	-	331	Inf	Inf	0.0%
3/3	St Peter's Way	U	N/A	N/A	-		-	-	-	139	Inf	Inf	0.0%
4/1	Ahead Right	U	N/A	N/A	C2:C		1	27	-	607	1900	950	57.4%
4/2	Ahead Right	U	N/A	N/A	C2:C		1	27	-	741	1900	950	66.0%
J2: South	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**67.1%**
1/1	M25 south off slip Left	U	N/A	N/A	C3:A		1	56	-	796	1900	1900	41.9%
1/2	M25 south off slip Ahead	U	N/A	N/A	C3:B		1	7	-	182	1900	271	67.1%
1/3	M25 south off slip Ahead	U	N/A	N/A	C3:B		1	7	-	182	1900	271	67.1%
2/1	Ahead Right	U	N/A	N/A	C3:C		1	37	-	804	1900	1289	59.3%
2/2	Ahead Right	U	N/A	N/A	C3:C		1	37	-	928	1900	1289	64.2%
3/1	M25 south on slip	U	N/A	N/A	-		-	-	-	919	Inf	Inf	0.0%
3/2	M25 south on slip	U	N/A	N/A	-		-	-	-	354	Inf	Inf	0.0%

Full Input Data And Results

4/1	St Peter's Way	U	N/A	N/A	-		-	-	-	796	Inf	Inf	0.0%
4/2	St Peter's Way	U	N/A	N/A	-		-	-	-	612	Inf	Inf	0.0%
4/3	St Peter's Way	U	N/A	N/A	-		-	-	-	382	Inf	Inf	0.0%
J3: East	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**120.9%**
1/1	St Peter's Way Ahead Left	U	N/A	N/A	C1:A		1	15	-	622	1800	514	120.9%
1/2	St Peter's Way Ahead	U	N/A	N/A	C1:A		1	15	-	615	1800	514	119.6%
2/1	Ahead	U	N/A	N/A	C1:B		1	31	-	525	1900	1086	39.8%
2/2	Right Ahead	U	N/A	N/A	C1:B		1	31	-	633	1900	1086	52.9%
2/3	Right	U	N/A	N/A	C1:B		1	31	-	610	1900	1086	56.2%
J4: West	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**123.8%**
1/1	St Peter's Way Left	U	N/A	N/A	C4:A		1	17	-	756	1900	611	123.8%
1/2	St Peter's Way Left Ahead	U	N/A	N/A	C4:A		1	17	-	711	1800	579	122.9%
1/3	St Peter's Way Ahead	U	N/A	N/A	C4:A		1	17	-	693	1800	579	119.8%
2/1	Ahead	U	N/A	N/A	C4:B		1	29	-	400	1900	1018	33.0%
2/2	Ahead Right	U	N/A	N/A	C4:B		1	29	-	407	1900	1018	34.2%
2/3	Right	U	N/A	N/A	C4:B		1	29	-	295	1900	1018	29.0%

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	**-**	**-**	**0**	**0**	**0**	**45.2**	**325.1**	**0.0**	**370.2**	**-**	**-**	**-**	**-**
J1: North	**-**	**-**	**0**	**0**	**0**	**5.0**	**4.9**	**0.0**	**9.9**	**-**	**-**	**-**	**-**
1/1	1087	1087	-	-	-	0.0	0.7	-	0.7	2.2	0.0	0.7	0.7
1/2	445	445	-	-	-	2.1	1.3	-	3.4	27.5	6.1	1.3	7.4
1/3	445	445	-	-	-	2.1	1.3	-	3.4	27.5	6.1	1.3	7.4
2/1	947	947	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
2/2	628	628	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/1	1087	1087	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	321	321	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/3	124	124	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	546	546	-	-	-	0.6	0.7	-	1.3	8.5	4.5	0.7	5.2
4/2	627	627	-	-	-	0.2	1.0	-	1.2	6.7	0.8	1.0	1.8
J2: South	**-**	**-**	**0**	**0**	**0**	**3.7**	**4.0**	**0.0**	**7.7**	**-**	**-**	**-**	**-**
1/1	796	796	-	-	-	0.0	0.4	-	0.4	1.6	0.0	0.4	0.4
1/2	182	182	-	-	-	1.2	1.0	-	2.1	42.4	2.7	1.0	3.7
1/3	182	182	-	-	-	1.2	1.0	-	2.1	42.4	2.7	1.0	3.7
2/1	765	765	-	-	-	0.6	0.7	-	1.3	6.3	9.2	0.7	9.9
2/2	827	827	-	-	-	0.8	0.9	-	1.7	7.4	4.9	0.9	5.8
3/1	758	758	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	296	296	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	796	796	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/2	606	606	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/3	371	371	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
J3: East	**-**	**-**	**0**	**0**	**0**	**14.0**	**111.4**	**0.0**	**125.4**	**-**	**-**	**-**	**-**
1/1	622	514	-	-	-	5.8	56.6	-	62.4	361.2	11.4	56.6	68.0
1/2	615	514	-	-	-	5.6	53.2	-	58.9	344.5	11.1	53.2	64.4

Full Input Data And Results

2/1	433	433	-	-	-	1.5	0.3	-	1.8	15.2	6.7	0.3	7.0
2/2	575	575	-	-	-	0.9	0.6	-	1.4	9.0	4.6	0.6	5.1
2/3	610	610	-	-	-	0.2	0.6	-	0.8	4.9	7.7	0.6	8.3
J4: West	**-**	**-**	**0**	**0**	**0**	**22.5**	**204.8**	**0.0**	**227.2**	**-**	**-**	**-**	**-**
1/1	756	611	-	-	-	7.6	75.2	-	82.8	394.3	14.0	75.2	89.2
1/2	711	579	-	-	-	7.1	68.8	-	75.9	384.2	13.1	68.8	81.9
1/3	693	579	-	-	-	6.5	60.1	-	66.6	346.1	12.6	60.1	72.7
2/1	336	336	-	-	-	0.5	0.2	-	0.7	7.5	1.4	0.2	1.7
2/2	348	348	-	-	-	0.4	0.3	-	0.7	7.3	1.4	0.3	1.7
2/3	295	295	-	-	-	0.3	0.2	-	0.5	6.4	3.2	0.2	3.4

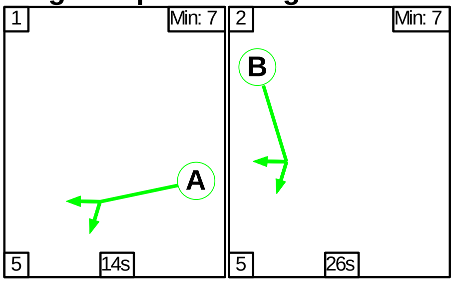
C1 - East	PRC for Signalled Lanes (%):	-34.4	Total Delay for Signalled Lanes (pcuHr):	125.35	Cycle Time (s):	56
C2 - North	PRC for Signalled Lanes (%):	23.5	Total Delay for Signalled Lanes (pcuHr):	9.93	Cycle Time (s):	56
C3 - South	PRC for Signalled Lanes (%):	34.2	Total Delay for Signalled Lanes (pcuHr):	7.70	Cycle Time (s):	56
C4 - West	PRC for Signalled Lanes (%):	-37.5	Total Delay for Signalled Lanes (pcuHr):	227.24	Cycle Time (s):	56
	PRC Over All Lanes (%):	-37.5	Total Delay Over All Lanes(pcuHr):	370.22		

Full Input Data And Results

Scenario 2: '2030 PM' (FG2: '2030 with non-committed developments PM', Plan 1: 'Network Control Plan 1')

C1 - East

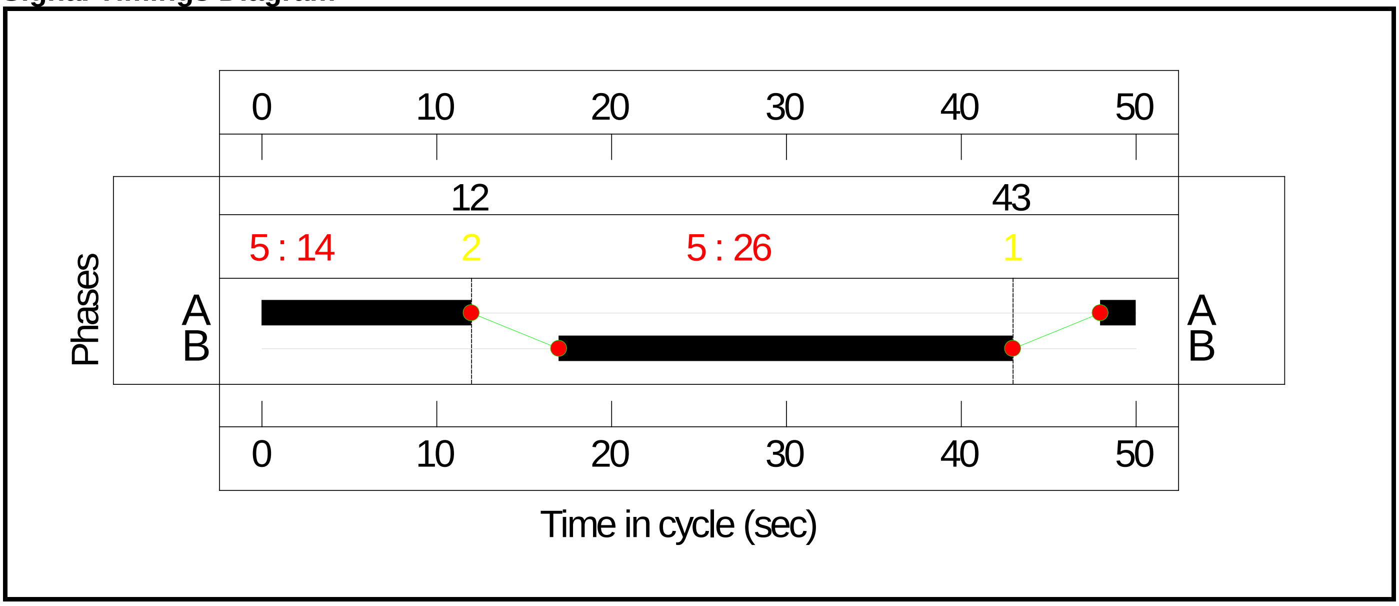
Stage Sequence Diagram



Stage Timings

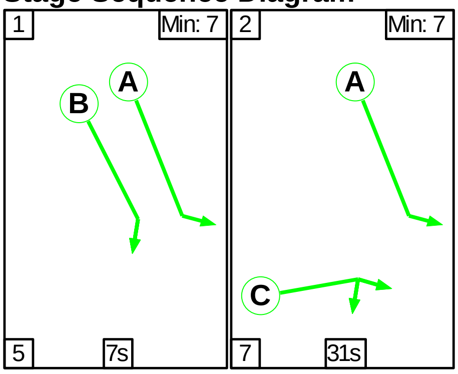
Stage	1	2
Duration	14	26
Change Point	43	12

Signal Timings Diagram



C2 - North

Stage Sequence Diagram

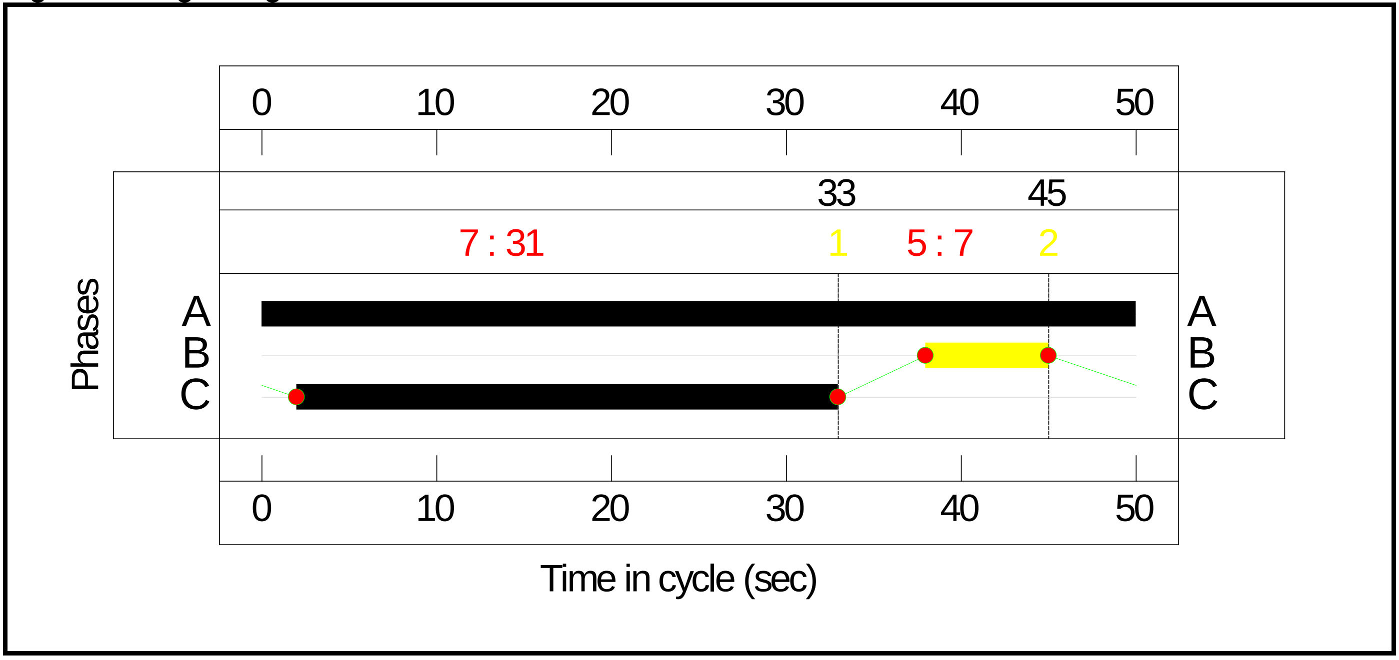


Full Input Data And Results

Stage Timings

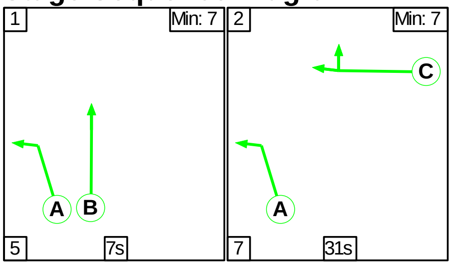
Stage	1	2
Duration	7	31
Change Point	33	45

Signal Timings Diagram



C3 - South

Stage Sequence Diagram

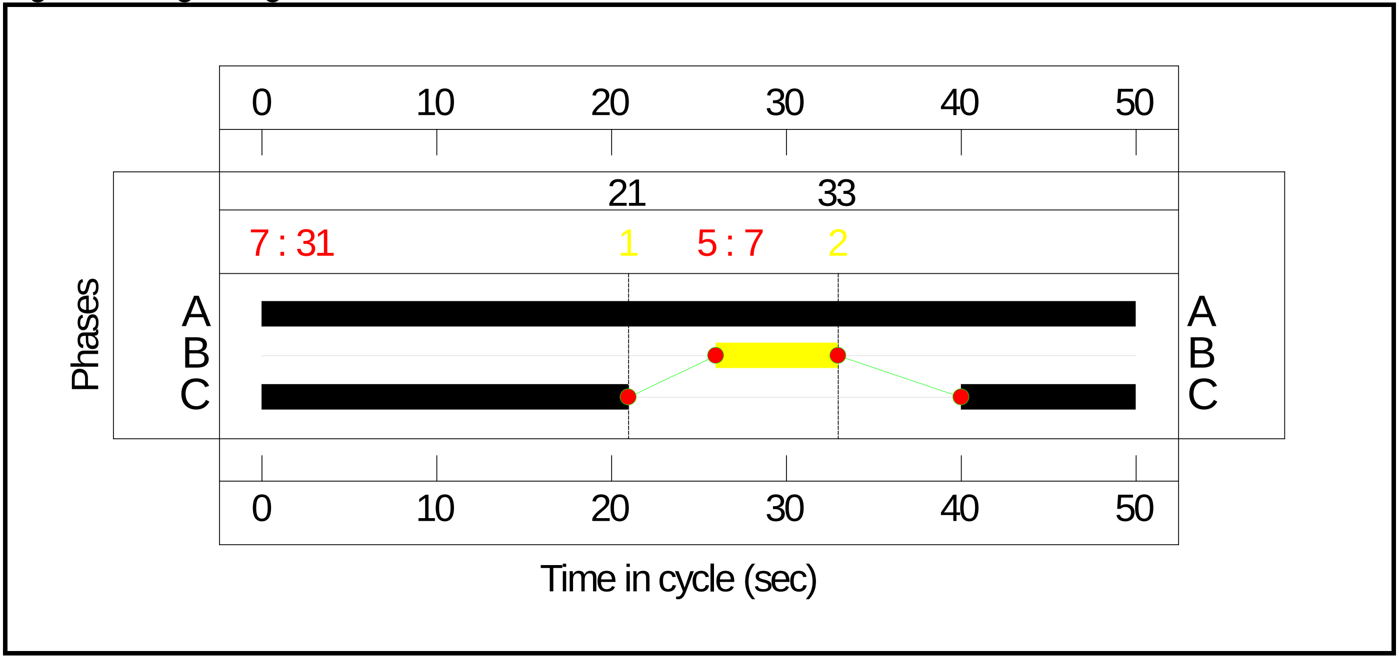


Stage Timings

Stage	1	2
Duration	7	31
Change Point	21	33

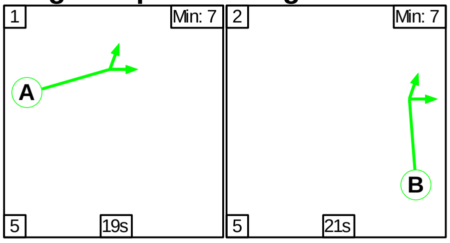
Full Input Data And Results

Signal Timings Diagram



C4 - West

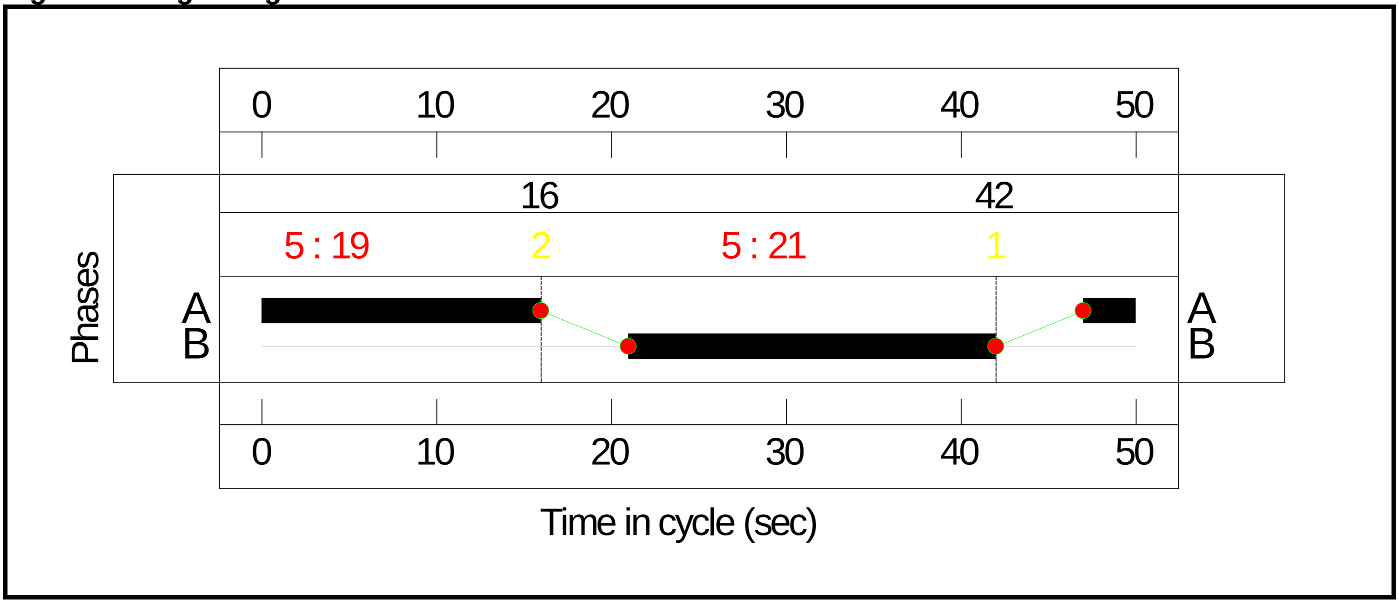
Stage Sequence Diagram



Stage Timings

Stage	1	2
Duration	19	21
Change Point	42	16

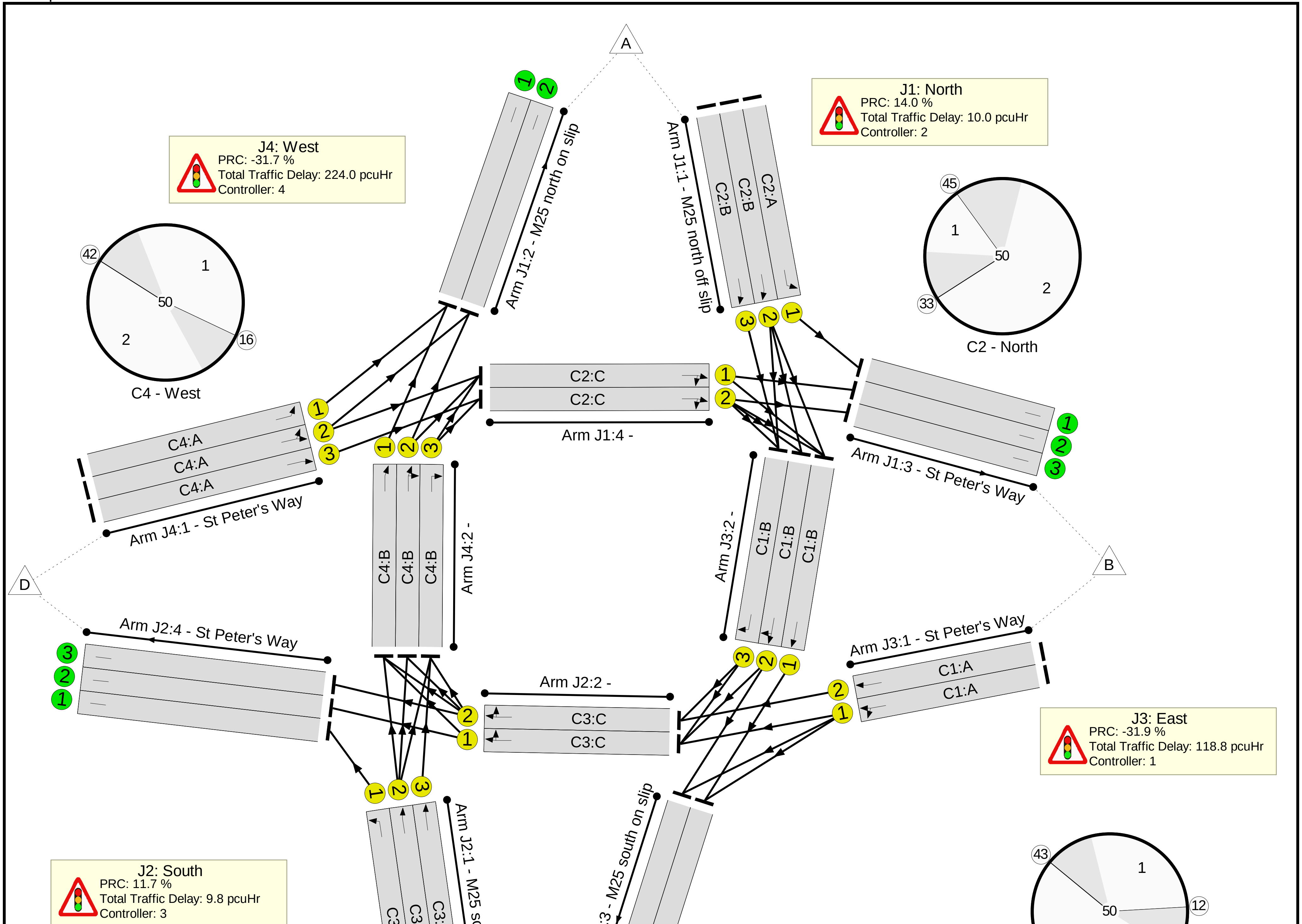
Signal Timings Diagram



Full Input Data And Results

Full Input Data And Results
Network Layout Diagram

Full Input Data And Results



Full Input Data And Results

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	-	-	**N/A**	-	-		-	-	-	-	-	-	**118.7%**
J1: North	-	-	**N/A**	-	-		-	-	-	-	-	-	**78.9%**
1/1	M25 north off slip Left	U	N/A	N/A	C2:A		1	50	-	896	1900	1900	47.2%
1/2	M25 north off slip Ahead	U	N/A	N/A	C2:B		1	7	-	238	1900	304	78.3%
1/3	M25 north off slip Ahead	U	N/A	N/A	C2:B		1	7	-	240	1900	304	78.9%
2/1	M25 north on slip	U	N/A	N/A	-		-	-	-	1294	Inf	Inf	0.0%
2/2	M25 north on slip	U	N/A	N/A	-		-	-	-	580	Inf	Inf	0.0%
3/1	St Peter's Way	U	N/A	N/A	-		-	-	-	896	Inf	Inf	0.0%
3/2	St Peter's Way	U	N/A	N/A	-		-	-	-	486	Inf	Inf	0.0%
3/3	St Peter's Way	U	N/A	N/A	-		-	-	-	364	Inf	Inf	0.0%
4/1	Ahead Right	U	N/A	N/A	C2:C		1	31	-	919	1900	1216	68.1%
4/2	Ahead Right	U	N/A	N/A	C2:C		1	31	-	993	1900	1216	72.3%
J2: South	-	-	**N/A**	-	-		-	-	-	-	-	-	**80.6%**
1/1	M25 south off slip Left	U	N/A	N/A	C3:A		1	50	-	645	1900	1900	33.9%
1/2	M25 south off slip Ahead	U	N/A	N/A	C3:B		1	7	-	244	1900	304	80.3%
1/3	M25 south off slip Ahead	U	N/A	N/A	C3:B		1	7	-	245	1900	304	80.6%
2/1	Ahead Right	U	N/A	N/A	C3:C		1	31	-	476	1900	1216	37.1%
2/2	Ahead Right	U	N/A	N/A	C3:C		1	31	-	790	1900	1216	57.3%
3/1	M25 south on slip	U	N/A	N/A	-		-	-	-	1063	Inf	Inf	0.0%
3/2	M25 south on slip	U	N/A	N/A	-		-	-	-	485	Inf	Inf	0.0%

Full Input Data And Results

4/1	St Peter's Way	U	N/A	N/A	-		-	-	-	645	Inf	Inf	0.0%
4/2	St Peter's Way	U	N/A	N/A	-		-	-	-	329	Inf	Inf	0.0%
4/3	St Peter's Way	U	N/A	N/A	-		-	-	-	223	Inf	Inf	0.0%
J3: East	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**118.7%**
1/1	St Peter's Way Ahead Left	U	N/A	N/A	C1:A		1	14	-	641	1800	540	118.7%
1/2	St Peter's Way Ahead	U	N/A	N/A	C1:A		1	14	-	633	1800	540	117.2%
2/1	Ahead	U	N/A	N/A	C1:B		1	26	-	583	1900	1026	48.5%
2/2	Right Ahead	U	N/A	N/A	C1:B		1	26	-	550	1900	1026	47.2%
2/3	Right	U	N/A	N/A	C1:B		1	26	-	407	1900	1026	39.7%
J4: West	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**118.6%**
1/1	St Peter's Way Left	U	N/A	N/A	C4:A		1	19	-	901	1900	760	118.6%
1/2	St Peter's Way Left Ahead	U	N/A	N/A	C4:A		1	19	-	848	1800	720	117.8%
1/3	St Peter's Way Ahead	U	N/A	N/A	C4:A		1	19	-	834	1800	720	115.8%
2/1	Ahead	U	N/A	N/A	C4:B		1	21	-	393	1900	836	40.0%
2/2	Ahead Right	U	N/A	N/A	C4:B		1	21	-	405	1900	836	42.7%
2/3	Right	U	N/A	N/A	C4:B		1	21	-	405	1900	836	48.4%

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	**-**	**-**	**0**	**0**	**0**	**44.4**	**318.1**	**0.0**	**362.5**	**-**	**-**	**-**	**-**
J1: North	**-**	**-**	**0**	**0**	**0**	**3.7**	**6.3**	**0.0**	**10.0**	**-**	**-**	**-**	**-**
1/1	896	896	-	-	-	0.0	0.4	-	0.4	1.8	0.0	0.4	0.4
1/2	238	238	-	-	-	1.3	1.7	-	3.0	46.1	3.2	1.7	4.9
1/3	240	240	-	-	-	1.3	1.8	-	3.1	46.8	3.2	1.8	5.0
2/1	1095	1095	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
2/2	495	495	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/1	896	896	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	460	460	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/3	336	336	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	828	828	-	-	-	0.8	1.1	-	1.8	8.0	6.5	1.1	7.6
4/2	879	879	-	-	-	0.3	1.3	-	1.6	6.5	2.2	1.3	3.5
J2: South	**-**	**-**	**0**	**0**	**0**	**4.7**	**5.1**	**0.0**	**9.8**	**-**	**-**	**-**	**-**
1/1	645	645	-	-	-	0.0	0.3	-	0.3	1.4	0.0	0.3	0.3
1/2	244	244	-	-	-	1.4	1.9	-	3.3	48.5	3.3	1.9	5.2
1/3	245	245	-	-	-	1.4	1.9	-	3.3	48.9	3.3	1.9	5.2
2/1	451	451	-	-	-	1.2	0.3	-	1.5	12.2	4.5	0.3	4.8
2/2	697	697	-	-	-	0.7	0.7	-	1.4	7.0	2.8	0.7	3.4
3/1	902	902	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
3/2	419	419	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/1	645	645	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/2	327	327	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
4/3	213	213	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
J3: East	**-**	**-**	**0**	**0**	**0**	**14.3**	**104.4**	**0.0**	**118.8**	**-**	**-**	**-**	**-**
1/1	641	540	-	-	-	5.7	53.5	-	59.2	332.6	10.3	53.5	63.8
1/2	633	540	-	-	-	5.5	49.7	-	55.2	313.7	10.1	49.7	59.8

Full Input Data And Results

2/1	498	498	-	-	-	0.1	0.5	-	0.5	3.8	1.1	0.5	1.6
2/2	484	484	-	-	-	0.5	0.4	-	0.9	6.8	2.9	0.4	3.3
2/3	407	407	-	-	-	2.6	0.3	-	2.9	26.0	5.7	0.3	6.0
J4: West	**-**	**-**	**0**	**0**	**0**	**21.6**	**202.3**	**0.0**	**224.0**	**-**	**-**	**-**	**-**
1/1	901	760	-	-	-	7.3	73.6	-	80.9	323.2	14.5	73.6	88.0
1/2	848	720	-	-	-	6.8	67.2	-	73.9	313.9	13.6	67.2	80.7
1/3	834	720	-	-	-	6.4	60.4	-	66.8	288.4	13.2	60.4	73.6
2/1	335	335	-	-	-	0.5	0.3	-	0.8	8.7	4.2	0.3	4.6
2/2	357	357	-	-	-	0.4	0.4	-	0.8	7.8	3.3	0.4	3.7
2/3	405	405	-	-	-	0.2	0.5	-	0.7	6.2	4.4	0.5	4.9

C1 - East	PRC for Signalled Lanes (%):	-31.9	Total Delay for Signalled Lanes (pcuHr):	118.76	Cycle Time (s):	50
C2 - North	PRC for Signalled Lanes (%):	14.0	Total Delay for Signalled Lanes (pcuHr):	10.03	Cycle Time (s):	50
C3 - South	PRC for Signalled Lanes (%):	11.7	Total Delay for Signalled Lanes (pcuHr):	9.76	Cycle Time (s):	50
C4 - West	PRC for Signalled Lanes (%):	-31.7	Total Delay for Signalled Lanes (pcuHr):	223.95	Cycle Time (s):	50
	PRC Over All Lanes (%):	-31.9	Total Delay Over All Lanes(pcuHr):	362.50		