East Anglia ONE North and East Anglia TWO Offshore Windfarms

Traffic and Transport Deadline 4 Clarification Note

Applicants: East Anglia ONE North Limited and East Anglia TWO Limited
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Applicable to East Anglia ONE North and East Anglia TWO

Revision Summary				
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001	13/01/2021	Paolo Pizzola	Ian MacKay/Lesley Jamieson	Rich Morris

Description of Revisions			
Rev	**Page**	**Section**	**Description**
001	n/a	n/a	Final for submission at Deadline 4

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Glossary of Acronyms

DCO	Development Consent Order
ES	Environmental Statement
ESC	East Suffolk Council
SCC	Suffolk County Council
SoCG	Statement of Common Ground
SZC	Sizewell C Nuclear Power Station

Glossary of Terminology

Applicant	East Anglia TWO Limited / East Anglia ONE North Limited
East Anglia ONE North project	The proposed project consisting of up to 67 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.
East Anglia TWO project	The proposed project consisting of up to 75 wind turbines, up to four offshore electrical platforms, up to one construction, operation and maintenance platform, inter-array cables, platform link cables, up to one operational meteorological mast, up to two offshore export cables, fibre optic cables, landfall infrastructure, onshore cables and ducts, onshore substation, and National Grid infrastructure.

1 Introduction

1. This clarification note has been prepared by East Anglia TWO Limited and East Anglia ONE North Limited (the Applicants) to clarify aspects of the East Anglia TWO and East Anglia ONE North Development Consent Order (DCO) applications (the Applications). In particular, it provides clarification on traffic and transport matters in relation to the East Anglia TWO project and the East Anglia ONE North project (the Projects).

2. This document is applicable to both the East Anglia ONE North and East Anglia TWO DCO applications, and therefore is endorsed with the yellow and blue icon used to identify materially identical documentation in accordance with the Examining Authority's procedural decisions on document management of 23rd December 2019 (PD-004). Whilst this document has been submitted to both Examinations, if it is read for one project submission there is no need to read it for the other project submission.

1.1 Purpose of this Clarification Note

3. East Suffolk Council (ESC) and Suffolk County Council (SCC) (the Councils) have expressed concerns relating to the existing arrangements at the A12/A109 junction (Friday Street junction) and the Applicants' use of the Friday Street junction during construction.

4. This note presents the measures proposed by the Applicants, in consultation with the Councils, to further improve the A12/A1094 Friday Street junction during the Projects' construction period by the installation of a temporary traffic signal control (i.e. traffic lights), complementing the measures presented within ***Chapter 26 Traffic and Transport*** of the Environmental Statement (ES) (APP-074). The scheme has been developed in consultation with the Councils as documented in the ***Draft Statement of Common Ground East Suffolk Council and Suffolk County Council*** (SoCG) ***– Rev 002*** (REP1-072).

5. Item LA-10.25 of the SoCG confirms, *"The Applicants have prepared a concept design for the temporary installation, operation and removal of traffic lights and associated highways signage at Friday Street junction. The Councils confirmed they are satisfied with the concept design and modelling and separately confirmed agreement in principle with the measures proposed".*

2 Additional Measures at the A12/A1094 Friday Street Junction

2.1 Mitigation Measures

6. ***Chapter 26 Traffic and Transport*** of the ES (APP-074) identifies the requirement for mitigation measures at the A12/A1094 Friday Street junction to address forecast road safety impacts during the Projects' construction phase. The Projects' mitigation measures that have been developed are proportionate to the scale of the forecast traffic impact from the Projects worst case traffic demand (with both Projects constructed simultaneously). The mitigation measures are detailed in the ES (APP-074) and consist of a reduction in the existing speed limit from 50mph to 40mph, improvements to signing and the provision of rumble strips on the A12 west approach.

2.2 Interaction with Sizewell C

7. The Applicants' ES notes that the developers of the Sizewell C New Nuclear Power Station (SZC) proposes to replace the Friday Street junction with a new four arm roundabout to tie-in with a bypass of the villages of Farnham and Strafford St. Andrew to the west of the A1094 to mitigate the construction impacts of the proposed SZC project.

8. The cumulative impacts and interfaces between the Projects and Sizewell C are presented in ***Sizewell Projects Cumulative Impact Assessment Clarification Note*** (REP2-009), which concludes that the SZC roundabout would provide a modern standard compliant solution at the Friday Street junction and would therefore be appropriate to mitigate the cumulative impacts of the traffic generated by both the Projects and SZC in the event that these Projects are constructed at the same time.

2.3 Additional Measures

9. The Councils have raised concerns on the existing configuration and operation of the junction, and through their Relevant Representations (RR-002 and RR-007) and the SoCG process made representations that the proposed mitigation may not be adequate.

10. The Applicants consider that the Projects' proposed mitigation proposed is necessary and adequate, however have sought to work with the Councils to develop additional measures that would improve the road safety baseline and in turn improve road safety during construction of the Projects..

11. To inform option development, at a meeting with the Councils on 17th October 2019, a basis of design for the additional measures Friday Street was agreed which contained the following objectives:

    1) Improve road safety (reduction in total collisions and severity ratio);
    2) Be deliverable prior to the commencement of construction of the Projects;
    3) Be deliverable within the highway boundary;
    4) Not prejudice a future two-village bypass (either by SCC or EDF Energy);
    5) Minimise delays to the travelling public (construction and operation); and
    6) Provide a cost-effective solution.

12. The following additional measures were discussed with the Councils to address their concerns:

    - A three arm-roundabout provided within the highway boundary was considered but concluded that it would not meet the objective of minimising delays to the travelling public due to limited reserve capacity on the A12 west arm;
    - Reduction in the existing speed limit along the A12 (from 50mph to 40mph) enforced by average speed cameras was also considered, and whilst the Applicants considered that it met all the stated objectives and provided an appropriate solution, the Councils were of the opinion that whilst the potential average speed camera scheme is likely to reduce speeds on the road and to be a more effective scheme than that proposed in the DCO they could not conclude that their concerns would be sufficiently addressed.
    - A traffic signal solution which would be able to be reinstated back to a priority junction with single lane dualling with minimal works. The traffic signal appraisal was reviewed with the Councils at meetings on 25th June 2020 and 20th July 2020 cumulating with the submission of technical note setting out the finalised concept design, road safety audit findings and junction capacity modelling). The note concluded that the traffic signal scheme would address all basis of design objectives.

13. Appendix A contains the technical appraisal of the three arm-roundabout scheme and the average speed camera scheme and Appendix B contains the technical appraisal of traffic signals.

14. Subsequently, the Councils confirmed agreement in principle that traffic signals at the junction (as detailed in Appendix B, sub Appendix B, Drawing No. TP-PB4842-SK002) would address their concerns on the existing junction and the Projects' use of the junction during construction. This agreement is reflected in ID LA-10.25 of the ***Councils' SoCG*** (REP1-072).

2.4 Delivery of Additional Measures

15. The Applicants will seek to enter into a Section 278 Agreement (Highways Act 1980) with Suffolk County Council (the relevant highway authority) in order to facilitate the works at the Applicants cost.

16. Discussions with the Councils are ongoing regarding the detail of the delivery arrangements, timing of the works and traffic management arrangements during establishment of the traffic signal solution.

Appendix A: Traffic Signal Appraisal

REPORT

East Anglia TWO and East Anglia ONE North

A12/A1094 Scheme Options Report

Client: Scottish Power Renewables

Reference: PB4842-RHD-ZZ-XX-RP-Z-0001

Status: S0/P01.01

Date: 28 January 2020

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Document title: East Anglia TWO and East Anglia ONE North

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Project number: PB4842
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Date / initials:	28.01.2020 / ADR

Classification
Confidential

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Appendices

1 Introduction

1.1.1 This report has been produced by Royal HaskoningDHV on behalf of ScottishPower Renewables and sets out the traffic modelling work undertaken to test potential scheme options for the junction of the A12 and A1094 (known as Friday Street).

1.2 Background

1.2.1 In November 2019 ScottishPower Renewables (henceforth referred to as 'the Applicant') submitted a Development Consent Order (DCO) Application for two new offshore windfarms, known as East Anglia TWO and East Anglia ONE North.

1.2.2 The Environmental Statement[1] (ES) for the proposed East Anglia TWO and East Anglia ONE North projects identified an existing road safety issue at the junction of the A12 and A1094 ('the junction') involving collisions between vehicles turning right from the A12 onto the A1094 and colliding with vehicles travelling south on the A12. Typically, such collisions are the result of either poor visibility of oncoming vehicles or poor gap acceptance.

1.2.3 A review of the existing highway environment established that forward visibility at this location is not compromised and in addition, all the collisions occurred during daylight conditions. It was therefore reasoned that the collisions are the result of car drivers taking risks when crossing in gaps in the traffic.

1.2.4 It was unclear from the collision records, and discussions with SCC the reasons underpinning this risk taking. It was therefore concluded that the increase in construction traffic (associated with the proposed East Anglia TWO and East Anglia ONE North projects) could potentially exacerbate this existing road safety issue and therefore a proportionate mitigation scheme was developed.

1.2.5 The mitigation scheme primarily comprised of a reduction in the existing speed limit from 50mph to 40mph with further improvements to signing and the provision of rumble strips.

1.2.6 The impact assessment presented within the ES concluded that with the addition of the mitigation measures, the residual road safety impact would be minor adverse. The rationale for this conclusion was informed by evidence published by the Transport Research Laboratory[2] (TRL) upon the effects of speed on the frequency of roads accidents that identifies:

"The results of the road-based and driver-based studies are mutually re-enforcing and provide clear evidence that, in any given situation, higher speeds mean more accidents and the higher the speed the more rapidly does accident frequency rise with increases in speed"

1.2.7 With regards to the benefits that can be accrued from a reduction in average speed, the evidence from the TRL report identifies:

[1] *ScottishPower Renewables (October 2019). East Anglia TWO Offshore Windfarm Environmental Statement - Chapter 26 Traffic and Transport*

[2] *The Transport Research Laboratory (2000). The effects of drivers' speed on the frequency of road accidents (TRL Report 421)*

"The percentage reduction in accident frequency achievable per 1mile/h reduction in average speed is between 2-7%... about 3% for the higher speed urban roads and rural main roads"

1.2.8 Suffolk County Council (SCC) as the local highway authority responsible for the junction, raised concerns that the mitigation may not be appropriate.

1.2.9 In response, the Applicant has engaged with SCC to develop 'enhanced' scheme options (outside the commitments within the ES and DCO process) that would accrue additional road safety benefits (in addition to those assessed in the ES). The aim of the enhanced scheme would be to reduce collisions, in contrast to the ES mitigation scheme, which has the aim of not increasing collisions (as a result of construction traffic demand).

1.2.10 It is anticipated that if an enhanced scheme could be agreed, this would alleviate SCC's concerns relating to additional traffic associated with the construction of the proposed East Anglia TWO and East Anglia ONE North projects.

1.2.11 At a meeting on 17 October 2019, a scheme basis of design was agreed with SCC which contained the following objectives:

1. Improve road safety (reduction in total collisions and severity ratio);
2. Be deliverable prior to the commencement of construction of the proposed East Anglia TWO and East Anglia ONE North projects;
3. Be deliverable within the highway boundary;
4. Not prejudice a future two-village bypass (either by SCC or EDF Energy);
5. Minimise delays to the travelling public (construction and operation); and
6. Provide a cost-effective solution.

1.2.12 Two scheme options were identified in liaison with SCC for further assessment to validate if they met the basis of design:

- the conversion of the existing junction to a three-arm roundabout; and
- a reduction in the existing speed limit along the A12 (from 50mph to 40mph) enforced by average speed cameras.

1.2.13 With regards to the reduction in speed limit, SCC requested that Royal HaskoningDHV (RHDHV) provide evidence to show that a reduction in the speed limit would not result in a lessening of available gaps for right turning traffic.

1.2.14 With regards to the three-arm roundabout, SCC noted that they had historically developed a design for a three-arm roundabout, that could be accommodated within the highway, but the entry path deflection was not standard (a copy of this plan is provided as **Appendix A**). This non-standard design gave rise to safety concerns and SCC requested that RHDHV investigate if the design could be improved.

1.2.15 At a meeting with SCC on 8 November 2019, work in progress was presented to SCC that demonstrated that:

- With a reduction in the speed limit to 40mph on the A12, there was no observable change to delays, queueing and available gaps; and
- A standard compliant three arm roundabout with capacity for future traffic growth or new development could not be provided within the highway boundary.

1.2.16 It was therefore asserted by the Applicant that:

- A standard three arm roundabout would fail to meet objective 3 of being deliverable within the highway boundary; and
- An average speed camera would meet all six of the agreed basis of design objectives and would therefore present the best scheme option.

1.2.17 SCC requested that the evidence base for the presentation (including detail of model calibration and associated output files) and outputs of future year scenarios with construction traffic added. SCC further requested this data was presented in a technical note to inform their position.

1.3 Scope

1.3.1 The scope of this report is to provide SCC with the traffic model inputs and outputs in support of a preferred scheme option choice.

1.3.2 Following this introduction, the report is structured as follows:

- **Section 2** – provides details of the modelling parameters used to assess the three-arm roundabout scheme and a summary of the modelling outputs;
- **Section 3** – provides details of the modelling parameters used to assess the speed reduction scheme and a summary of the modelling outputs; and
- **Section 4** – provides a summary.

2 Three Arm Roundabout Scheme

2.1 Introduction

2.1.1 To understand the impacts of the Three Arm Roundabout Scheme on junction capacity, industry standard software 'Junctions 8' has been utilised.

2.1.2 A review of the SCC three arm roundabout layout (**Appendix A**) has established it would not be possible to have a two-lane entry and exit to the roundabout for traffic travelling east to west on the A12 whilst maintaining standard compliant entry path deflection (within the highway boundary). A model was therefore developed to test if single lane entry would be appropriate (a reduced capacity standard design). **Sections 2.2** and **2.3** outline the modelling parameters and outputs respectively.

2.2 Model Parameters

2.2.1 The model has been progressed to a basic concept stage to present initial preliminary findings on capacity, delay and queuing to inform potential future detailed designs.

2.2.2 The geometric modelling parameters used to assess the single lane entry to a three-arm roundabout are detailed within **Table 2.1.** The geometric modelling parameters are largely based on the proposed SCC design with an Inscribed Circle Diameter (ICD) of 21 meters and an average approach road half width of 4m.

Table 2.1 Modelling parameters (Single lane entry)

Arm	Approach Road Half Width (m)	Entry Width (m)	Effective Flare Length (m)	Inscribed Circle Diameter (m)
A12 (east)	4	4	0	21
A1094	4	4	0	21
A12 (west)	4	4	0	21

2.2.3 Traffic flow data for the junction was captured for the ES. This data comprised of a Manual Classified Turning Count and was undertaken by an independent survey company on the 5 June 2019. Copies of this data are provided as **Appendix B** of this report.

2.2.4 For the purposes of assessing impacts within the ES, the surveyed traffic flows were factored to the future year of 2023 using growth factors supplied by WSP (consultants working on behalf of SCC).

2.2.5 **Table 2.3** and

2.2.6 **Table 2.3** present the forecast 2023 baseline vehicle turning counts with associated percentage of HGVs in brackets for the am and pm peak hours respectively.

Table 2.2 Forecast 2023 Traffic Turning Count Matrix (am peak hour)

	A12 east	A1094	A12 west
A12 east	-	89 (6%)	661 (4.2%)

A1094	44 (4.8%)	-	259 (3.3%)
A12 west	420 (6.8%)	252 (5%)	-

Table 2.3 Forecast 2023 Traffic Turning Count Matrix (pm peak hour)

	A12 east	A1094	A12 west
A12 east	-	66 (0%)	490 (3.0%)
A1094	77 (0%)	-	298 (0.4%)
A12 west	613 (1.9%)	300 (1.1%)	-

2.3 Modelling Results

2.3.1 The junction capacity assessments have been initially carried out using the baseline 2023 traffic flows outlined in

2.3.2 **Table 2.3**.

2.3.3 When assessing junction capacity, reference has been made to the Ratio of Flow to Capacity (RFC). RFC is the standard recognised threshold for roundabout junctions in the UK, typically reported by junction approach arm. When values for RFC are above 0.85, a junction is operating beyond desirable capacity and mitigation measures may be required.

2.3.4 The model results are summarised in **Table 2.4**, full model outputs are provided at **Appendix C**.

Table 2.4 Three Arm Roundabout Scheme with single lane approach, summary of results

Arm	Queue (Vehicles)		Delay (seconds)		RFC		Junction Delay (seconds)	
	am peak	pm peak	am peak	pm peak	am peak	pm peak	am peak	pm peak
A12 (east)	4.90	1.65	22.40	9.86	0.84	0.63	14.38	12.13
A1094	0.89	0.97	9.69	8.57	0.47	0.50		
A12 (west)	1.56	4.05	7.64	14.94	0.61	0.81		

2.3.5 The results demonstrate for the A12 (east) and A1094 arms would operate with spare capacity, however the A12 (east) arm would effectively be approaching capacity.

2.3.6 To improve capacity at roundabouts 'flare' is typically added to the approach arms. This flare effectively allows two vehicles to wait at the give-way line, thereby improving capacity. However, the flare is only likely to be effective where it will be efficiently utilised.

2.3.7 For the A12 east it can be noted from the flows presented in

2.3.8 **Table** 2.3 that approximately 88% of the traffic goes ahead (A12 east to west) with only 12% turning left from the A12 to the A1094.

2.3.9 Adding flare would have a theoretical benefit in the model as traffic would distribute across the two

lanes, however as the flows are imbalanced this would not be realised in reality. An alternative approach to testing the impact of adding flare has therefore been employed. This alternative approach removes the left turning traffic (A12 to A1094) from the model. The effectively simulates a short lane (flare). The results of this analysis are summarised in **Table 2.5**, full modelling outputs are provided at **Appendix C**.

Table 2.5 Three Arm Roundabout Scheme with single lane approach (no left turns), summary of results

Arm	Queue (Vehicles)		Delay (seconds)		RFC		Junction Delay (seconds)	
	am peak	pm peak	am peak	pm peak	am peak	pm peak	am peak	pm peak
A12 (east)	2.75	1.23	13.96	8.29	0.74	0.55	10.56	11.78
A1094	0.89	0.97	9.70	8.57	0.47	0.50		
A12 (west)	1.56	4.05	7.64	14.97	0.61	0.81		

2.3.10 The results demonstrate for the A12 (east) and A1094 the junction would operate with spare capacity. The results for the A12 (west) show an improvement, however, the RFC remains close to the theoretical capacity indicating limited opportunity for future growth and new development.

2.4 Conclusion

2.4.1 It can be concluded that a single lane approach would be appropriate for all arms with the exception of the A12 east. For the A12 east the model outputs indicate that a single lane approach (a reduced capacity standard design) would not allow for future traffic growth. For this arm a two-lane entry and exit would be required, which in order to be standard complaint would require a larger roundabout extending beyond the highway boundary.

3 Speed Reduction Scheme

3.1 Introduction

3.1.1 To understand the impacts of a reduction in the speed limit upon queuing and delay at the junction, industry standard software 'VISSIM' has been utilised.

3.1.2 VISSIM is a microscopic behaviour-based traffic simulation program. VISSIM includes a wide range of tools with the ability to assess interaction links and junctions to accurately model networks for base years and to test for network performance for forecast years. For the purpose of this assessment VISSIM version 11 (11.00-09) has been used to build the base model.

3.1.3 **Sections 3.2** and **3.3** outline the model parameters and outputs respectively. No changes have been made to the default VISSIM parameters unless stated otherwise within this report.

3.2 VISSIM Parameters

Vehicle Parameters

3.2.1 Vehicular parameters were reviewed in order to ensure the model reflects existing site conditions as accurately as possible. VISSIM sets default values for various vehicle characteristics such as vehicular dimensions, weights power distribution, maximum and minimum acceleration/ deceleration.

Simulation Parameters

3.2.2 Each of the model scenarios has a 15-minute warm-up period. The start of the morning am peak model represents 07:15, the start of the evening pm peak model represents 16:15.

3.2.3 The model covers a one hour thirty-minute period consisting of a 15-minute warm-up, a 60-minute peak and a 15-minute cool down. The model, therefore, runs for 5,400 seconds in total with the peak hour commencing at 900 seconds and finishing at 4,500 seconds totalling 3,600 seconds. The specific times for each peak period are shown in **Table 3.1**.

Table 3.1: Model Simulation Periods

Peak	15-minute warm-up	Peak hour	15-minute cool down	Total time period
AM Peak	07:15	07:30 - 08:30	08:30 – 08:45	07:15 – 08:45
PM Peak	16:15	16:30 – 17:30	17:30 – 17:45	16:15 – 17:45

3.2.4 Further simulation parameters changed from the default VISSIM settings are:

- Traffic regulation: is set to left-side traffic for UK Models; and
- Simulation resolution: time steps/simulation second has been set to 10 times steps which is an increase from the minimum required value of four. The increase in times steps per simulation second results in mathematically more accurate model behaviour during simulations.

Model Units

3.2.5 VISSIM model units are set to the recommended units for modelling in the UK which are as follows:

- Distance is set to metres (m) and kilometres (km);
- Speed to miles per hour (mph); and
- Acceleration to metres per second squared (m/s^2).

Base Model

3.2.6 The background used for building the base model utilises an OS Mastermap. The backgrounds are in AutoCAD (dwg.) file format loaded into VISSIM on a 1:1 scale to accurately model the existing highway infrastructure for the study area.

3.2.7 The VISSIM network is built using a series of links and connectors by defining lane widths, link lengths and number of lanes. The traffic enters the network through vehicle input points and uses defined static routes before leaving the network from the defined exit points.

Speed Limits and Desired Speed Distributions

3.2.8 The following speed limits have been used for each of the speed scenarios detailed below.

Scenario with existing 50mph speed limit

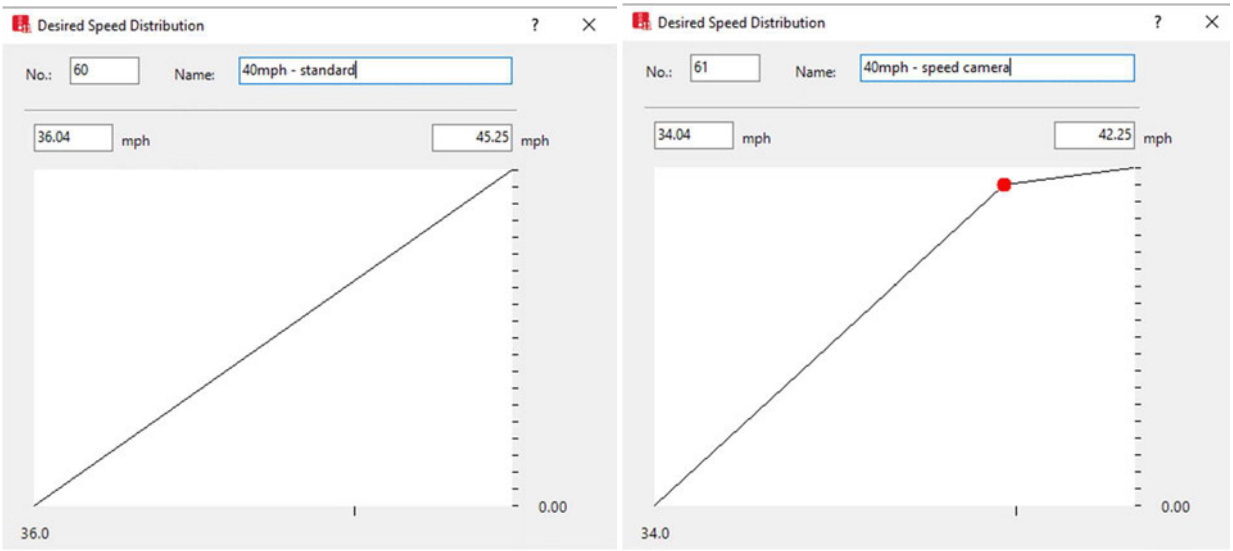
- A12: posted speed limit of 50mph; and
- A1094: posted speed limit of 40mph.

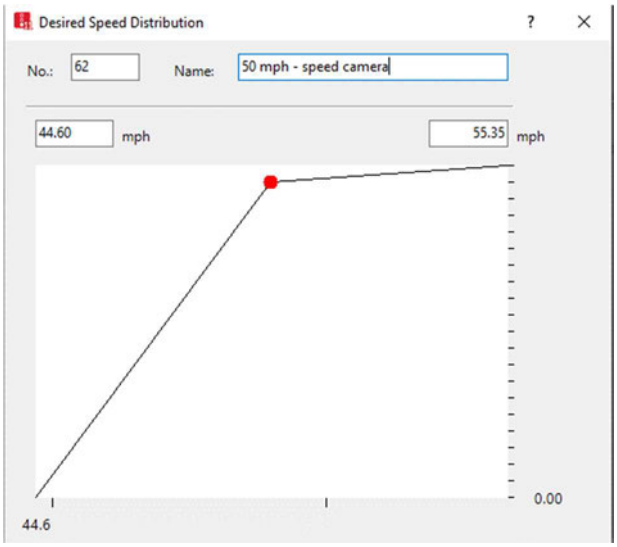
Scenario with reduced 40mph speed limit

- A12: proposed speed limit of 40mph; and
- A1094: posted speed limit of 40mph.

3.2.9 **Insert 1** provides an overview of the desired speed distributions for motorised traffic used for modelling purposes.

Insert 1: Desired Speed Distribution for Motorised Traffic





Traffic Data (Inputs, Compositions, Routing decisions)

3.2.10 Vehicle data including, vehicle mode, vehicle types, vehicle classes and vehicle compositions have not been changed from the VISSIM defaults of car and HGVs.

3.2.11 The traffic compositions for the 2023 baseline flows in the model were developed from the classified turning count survey data detailed within **section 2.2**.

3.2.12 The traffic compositions for the proposed development traffic were developed from those derived for the assessment of construction impacts within the ES (**Appendix B** provides a summary of these traffic flows). The proposed development traffic flows consider the worst-case scenario of the simultaneous construction of the proposed East Anglia TWO and East Anglia ONE North projects (referred to as Scenario 1).

3.2.13 As the study area is limited in scope, the resultant origin destination-based demand results in no route choice in the model and a static assignment method is used.

3.2.14 The traffic has been split into two categories for the purpose of forming the vehicle compositions inputs in the model, these are cars and HGVs.

Driving Behaviour Parameters

3.2.15 The driving behaviour parameters utilises the 'urban' (motorised) defaults with the exceptions of those parameters set out in **Table 3.2**

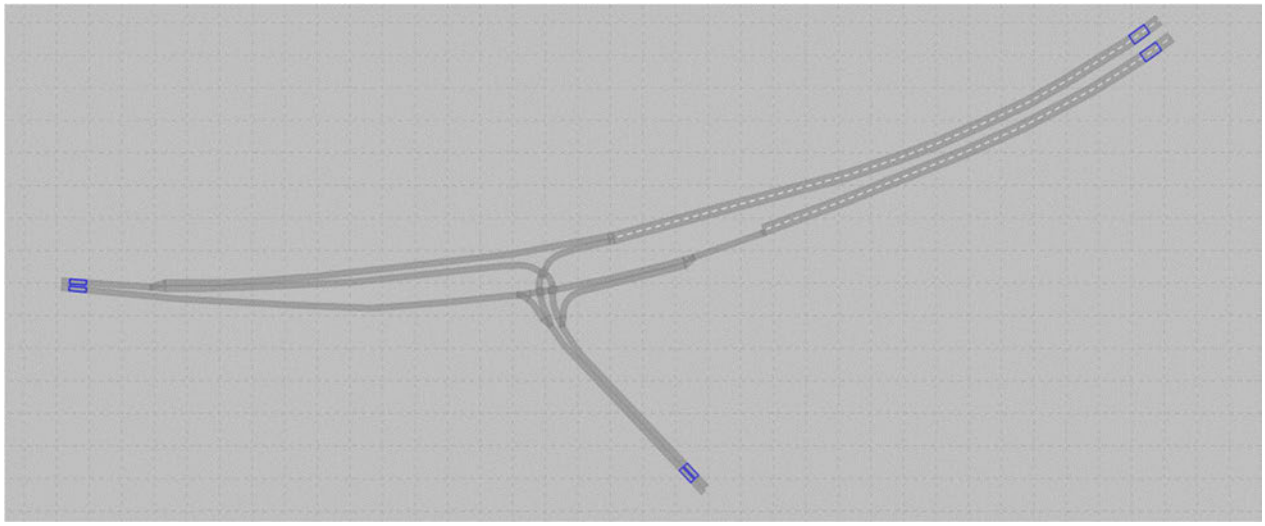
Table 3.2 Driving Behaviour Parameters

Parameter	Value Used
Numinteractobj	2
Advmerge	0

Network Structure

3.2.16 The model network for the assessment has been constructed using the background layers discussed in the background section. The network consists mainly of links (with one or more lanes) and connectors. The network is shown in **Insert 2**.

Insert 2: Overview of the A12 / A1094 Network in VISSIM



3.3 Modelling Results

3.3.1 The junction capacity assessments have been initially carried out using baseline 2023 traffic flows outlined in

3.3.2 **Table** 2.3. The modelling results are summarised in **Table 3.3** for queuing and

3.3.3

3.3.4

3.3.5 Table 3.4 for delays.

Table 3.3: 2023 baseline VISSIM modelling outputs, summary of queues

Scenario	Queues - A12 eastern arm, straight ahead (vehicles)		Queues - A12 western arm, right turn (vehicles)		Queues - A12 eastern arm, left turn (vehicles)		Queues - A1094, right turn (vehicles)		Queues - A1094, left turn (vehicles)	
	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max
AM peak										
50mph speed limit	0	3	1	7	0	3	0	2	0	3
40mph speed limit	0	4	1	7	0	3	0	3	0	4
PM peak										
50mph	0	3	0	6	0	2	0	2	0	3

Scenario	Queues - A12 eastern arm, straight ahead (vehicles)		Queues - A12 western arm, right turn (vehicles)		Queues - A12 eastern arm, left turn (vehicles)		Queues - A1094, right turn (vehicles)		Queues - A1094, left turn (vehicles)	
	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max
speed limit										
40mph speed limit	0	4	0	7	0	2	0	2	0	4

Table 3.4: 2023 baseline VISSIM modelling outputs, summary of delays

Scenario	Delay - A12 western arm to A1094 (s)		Delay – A12 western arm to A12 eastern arm (s)		Delay – A12 eastern arm to A12 western arm (s)		Delay – A12 eastern arm to A1094 (s)		Delay – A1094 to A12 eastern arm (s)		Delay – A1094 to A12 western arm (s)	
	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max
AM peak												
50mph speed limit	8	14	0	0	1	1	2	4	4	10	4	7
40mph speed limit	9	17	0	0	1	2	2	4	5	12	5	9
PM peak												
50mph speed limit	6	10	0	0	1	1	2	4	4	7	3	5
40mph speed limit	6	10	0	0	1	1	2	4	4	8	4	6

3.3.6 It can be noted that during the forecast baseline year of 2023, minimal queues would be experienced on any of the approach arms. The worst-case maximum queuing would occur on the right turn from the A12 to the A1094 with a seven-vehicle queue during the morning am peak. This maximum queue would not change as a result of the reduction in the speed limit.

3.3.7 It can be noted that during the forecast baseline year of 2023, average delays would be no more than eight seconds. The worst-case maximum delay would occur at the right turn from the A12 to A1094 and result in delays of up to 14s in the morning am peak. This maximum delay would be forecast to increase by three seconds as a result of the reduction in the speed limit.

3.3.8 When comparing the differences in the average and maximum queuing and delay for a reduction

in the speed limit from 50mph to 40mph, it can be concluded that differences are likely to be indiscernible. The video files shared with SCC on the 8 November 2019 also demonstrate no observable change in available gaps for right turning traffic (these files have been made available to SCC).

3.3.9 Recognising that the VISSIM modelling demonstrates that a reduction in speed limit would not have an adverse impact upon queuing, delay and gaps for turning traffic, a further model run has been undertaken to understand if the impact of the construction traffic for the proposed East Anglia TWO and East Anglia ONE North projects validates with the model outputs presented within the ES.

3.3.10 **Table 3.5** presents a comparison of the forecast change in queues between the 2023 baseline and 2023 baseline with the addition of the proposed development traffic. **Table 3.6** presents a comparison of the forecast change in delays for the same scenarios.

Table 3.5: 2023 base + proposed development VISSIM modelling outputs, summary of queues

Scenario	Queues - A12 eastern arm, straight ahead (vehicles)		Queues - A12 western arm, right turn (vehicles)		Queues - A12 eastern arm, left turn (vehicles)		Queues - A1094, right turn (vehicles)		Queues - A1094, left turn (vehicles)	
	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max
AM peak										
2023 baseline	0	4	1	7	0	3	0	3	0	4
2023 base + EA2 & EA1N	0	4	2	10	0	4	0	4	0	5
PM peak										
2023 baseline	0	4	0	7	0	2	0	2	0	4
2023 base + EA2 & EA1N	0	5	1	7	0	3	0	4	0	5

Table 3.6: 2023 base + proposed development VISSIM modelling outputs, summary of delays

Scenario	Delay - A12 western arm to A1094 (s)		Delay – A12 western arm to A12 east (s)		Delay – A12 eastern arm to A12 western arm (s)		Delay – A12 eastern arm to A1094 (s)		Delay – A1094 to A12 eastern arm (s)		Delay – A1094 to A12 western arm (s)	
	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max	Ave.	Max
AM peak												
2023 baseline	9	17	0	0	1	2	2	4	5	12	5	9
2023 base + EA2 & EA1N	14	37	0	0	1	1	3	6	6	12	5	10
PM peak												
2023 baseline	6	10	0	0	1	1	2	4	4	8	4	6
2023 base + EA2 & EA1N	7	10	0	0	1	1	2	4	5	10	5	7

3.3.11 It can be observed from a comparison of the queuing and delay results (presented within **Table 3.5** and **Table 3.6**) for the baseline results vs. 2023 baseline plus proposed development 2023 that there would be an indiscernible impact upon the junction performance with the exception of the right turn from the A12 to A1094. Vehicles right turning from the A12 to A1094 would be forecast to experience an increase in delays of up to 20 seconds. These modelling results (using VISSIM) correlate well with the modelling results presented within the ES (for which Junctions 8 was used), which highlighted that:

"With the addition of the proposed East Anglia TWO projects traffic the model indicates that the junction would continue to operate with spare capacity (with a maximum RFC of 0.81) and with queues of up to four vehicles. Delays would be expected to increase to a maximum of 40 seconds (from 21 seconds)"

3.3.12 To address this potential impact, the Outline Travel Plan3 for East Anglia TWO defined further mitigation measures:

"Potential further mitigation measures could include:

- *Scheduling of construction activities to smooth peak traffic demand;*
- *Increasing the employee to vehicle ratio through the use of minibus pickup or crew vans; or*
- *Increasing the employee to vehicle ratio through incentive measures"*

3.3.13 It is considered therefore that the mitigation proposed within the Outline Travel Plan to control employee movements within peak hours remains valid for a speed reduction scheme option.

[3] *ScottishPower Renewables (October 2019). East Anglia TWO Offshore Windfarm - Outline Travel Plan*

4 Summary

4.1.1 This report sets out the findings of modelling work undertaken to test potential scheme options for the junction of the A12 and A1094 (known as Friday Street).

4.1.2 ScottishPower Renewables has engaged with SCC to develop 'enhanced' scheme options that would accrue additional road safety benefits (in addition to those assessed in the ES). The aim of the enhanced scheme would be to reduce collisions, in contrast to the ES mitigation scheme, which has the aim of not increasing collisions (as a result of construction traffic demand).

4.1.3 The scope of this report is to provide SCC with the traffic model inputs and outputs in support of an enhanced scheme option choice, examining the following scheme options:

- The conversion of the existing junction to a three-arm roundabout; and
- A reduction in the existing speed limit along the A12 (from 50mph to 40mph) enforced by average speed cameras.

4.1.4 The following objectives were developed with SCC to inform option choice for an enhanced scheme:

1. Improve road safety (reduction in total collisions and severity ratio);
2. Be deliverable prior to the commencement of construction of the proposed East Anglia TWO and East Anglia ONE North projects;
3. Be deliverable within the highway boundary;
4. Not prejudice a future two-village bypass (either by SCC or EDF Energy);
5. Minimise delays to the travelling public (construction and operation); and
6. Provide a cost-effective solution.

4.1.5 This report provides the evidence base in support of a conclusion that:

- With a reduction in the speed limit to 40mph on the A12, there would be no observable change to delays, queueing and available gaps; and
- A three arm-roundabout provided within the highway boundary (a reduced capacity standard design) would not meet the objective of minimising delays to the travelling public.

4.2 Conclusion

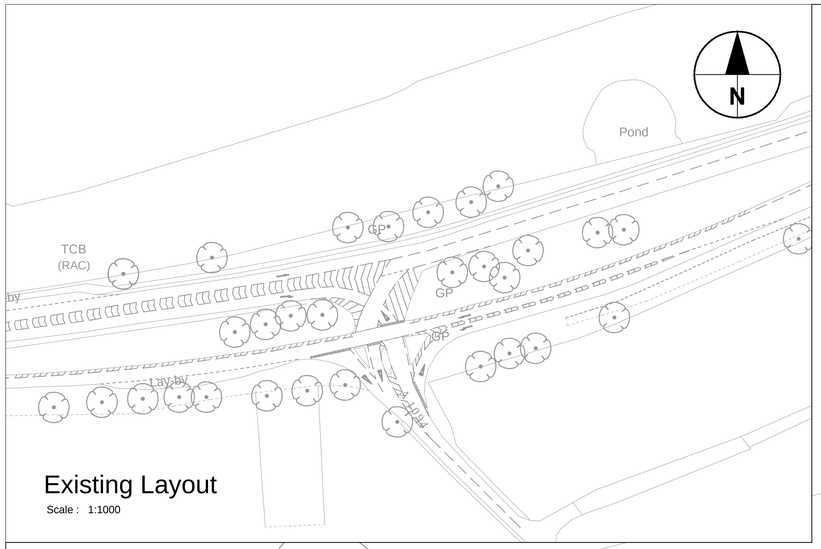
4.2.1 It is concluded that a scheme of average speed cameras meets all stated objectives and therefore provides the best solution for an enhanced road safety scheme.

4.2.2 On the basis of the report findings, it is concluded that a reduction in the speed limit could facilitate the road safety benefits as outlined within the TRL report to be accrued:

"The percentage reduction in accident frequency achievable per 1mile/h reduction in average speed is between 2-7%... about 3% for the higher speed urban roads and rural main roads"

Appendices

Appendix A



Existing Layout

Scale : 1:1000

CONCEPT ONLY

AECOM

PROJECT

A12 / A1094 JUNCTION SAFETY REVIEW

CLIENT

Suffolk Highways

Phoenic House Highways Depot,
3 Goddard Road,
Ipswich,
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CONSULTANT

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NOTES

1. ALL ITEMS SHOWN IN GREY ARE EXISTING UNLESS STATED OTHERWISE. ALL PROPOSED ITEMS ARE SHOWN IN BLUE UNLESS STATED OTHERWISE .
2. ALL NEW SIGNS AND ROAD MARKINGS PROPOSED ARE TO BE IN ACCORDANCE WITH "THE TRAFFIC SIGNS REGULATIONS AND GENERAL DIRECTIONS 2002" (TSRGD).
3. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY . ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE STATED. IF IN DOUBT CONTACT THE PROJECT MANAGER.
4. DESIGN BASED ON ORDNANCE SURVEY OBTAINED FROM SUFFOLK COUNTY COUNCIL.

KEY

- Existing kerb line / road marking
- Proposed kerb line / road marking
- Existing Tree
- Tree proposed to be removed

ISSUE/REVISION

0	14/01/2015	FIRST ISSUE
I/R	DATE	DESCRIPTION

PROJECT NUMBER

60343666 M001.026

SHEET TITLE

105 - PROPOSED LAYOUT
(OPTION 5 - ROUNDABOUT)

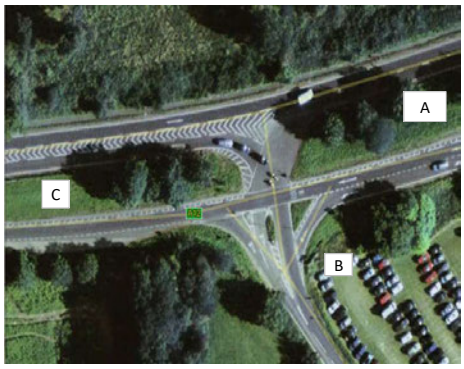
SHEET NUMBER

60343666-A12_A1094-DWG-0105

Original Drawing Size : A1 Dimensions : M
Scale : 1:200

Appendix B

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 north
6	B	A1094
3	C	A12 south

Growth Factor	AM Peak	PM Peak
All Vehicles	1.0578	1.0588

Surveyed Flows (2019)

AM Peak Traffic
Thursday 6th June 2019: 07:30AM - 08:30AM

Vehicles

From/To	A	B	C	Totals
A	0	79	599	678
B	40	0	237	277
C	370	226	0	596
Totals	410	305	836	1551

HGVs

From/To	A	B	C	Totals
A	0	5	26	31
B	2	0	8	10
C	27	12	0	39
Totals	29	17	34	80

Total

From/To	A	B	C	Totals
A	0	84	625	709
B	42	0	245	287
C	397	238	0	635
Totals	439	322	870	1631

%HGV

From/To	A	B	C	Average
A	0.0%	6.0%	4.2%	3%
B	4.8%	0.0%	3.3%	3%
C	6.8%	5.0%	0.0%	4%
Average	4%	4%	2%	3%

PM Peak Traffic
Thursday 6th June 2019: 4:30PM - 5:30PM

Vehicles

From/To	A	B	C	Totals
A	0	62	449	511
B	73	0	280	353
C	568	280	0	848
Totals	641	342	729	1712

HGVs

From/To	A	B	C	Totals
A	0	0	14	14
B	0	0	1	1
C	11	3	0	14
Totals	11	3	15	29

Total

From/To	A	B	C	Totals
A	0	62	463	525
B	73	0	281	354
C	579	283	0	862
Totals	652	345	744	1741

%HGV

From/To	A	B	C	Average
A	0.0%	0.0%	3.0%	1%
B	0.0%	0.0%	0.4%	0%
C	1.9%	1.1%	0.0%	1%
Average	1%	0%	1%	1%

Forecast Flows (2023)

Growth Factored Vehicles

From/To	A	B	C	Totals
A	0	84	634	717
B	42	0	251	293
C	391	239	0	630
Totals	434	323	884	1641

Growth Factored HGVs

From/To	A	B	C	Totals
A	0	5	28	33
B	2	0	8	11
C	29	13	0	41
Totals	31	18	36	85

Growth Factored Total

From/To	A	B	C	Totals
A	0	89	661	750
B	44	0	259	304
C	420	252	0	672
Totals	464	341	920	1725

%HGV

From/To	A	B	C	Average
A	0.0%	6.0%	4.2%	3%
B	4.8%	0.0%	3.3%	3%
C	6.8%	5.0%	0.0%	4%
Average	4%	4%	2%	3%

Growth Factored Vehicles

From/To	A	B	C	Totals
A	0	66	475	541
B	77	0	296	374
C	601	296	0	898
Totals	679	362	772	1813

Growth Factored HGVs

From/To	A	B	C	Totals
A	0	0	15	15
B	0	0	1	1
C	12	3	0	15
Totals	12	3	16	31

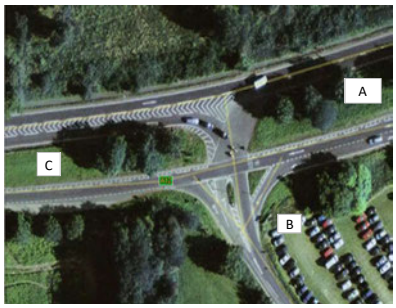
Growth Factored Total

From/To	A	B	C	Totals
A	0	66	490	556
B	77	0	298	375
C	613	300	0	913
Totals	690	365	788	1843

%HGV

From/To	A	B	C	Average
A	0.0%	0.0%	3.0%	1%
B	0.0%	0.0%	0.4%	0%
C	1.9%	1.1%	0.0%	1%
Average	1%	0%	1%	1%

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 east
6	B	A1094
3	C	A12 west

Growth Factor	AM Peak	PM Peak
All Vehicles	1.0578	1.0588

EA2 + EA1N Construction Traffic (2023) - 100% HGV Origin from A12 north

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	0	0
B	0	0	0	0
C	6	84	0	91
Totals	6	84	0	91

HGVs

From/To	A	B	C	Totals
A	0	8	0	8
B	8	0	0	8
C	0	0	0	0
Totals	8	8	0	17

Total

From/To	A	B	C	Totals
A	0	8	0	8
B	8	0	0	8
C	6	84	0	91
Totals	15	93	0	108

%HGV

From/To	A	B	C	Average
A	0.0%	100.0%	0.0%	33%
B	100.0%	0.0%	0.0%	33%
C	0.0%	0.0%	0.0%	0%
Average	33%	33%	0%	22%

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	6	6
B	0	0	84	84
C	0	0	0	0
Totals	0	0	91	91

HGVs

From/To	A	B	C	Totals
A	0	8	0	8
B	8	0	0	8
C	0	0	0	0
Totals	8	8	0	17

Total

From/To	A	B	C	Totals
A	0	8	6	15
B	8	0	84	93
C	0	0	0	0
Totals	8	8	91	108

%HGV

From/To	A	B	C	Average
A	0.0%	100.0%	0.0%	33%
B	100.0%	0.0%	0.0%	33%
C	0.0%	0.0%	0.0%	0%
Average	33%	33%	0%	22%

Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	84	634	717
B	42	0	251	293
C	398	324	0	721
Totals	440	407	884	1732

HGVs

From/To	A	B	C	Totals
A	0	14	28	41
B	11	0	8	19
C	29	13	0	41
Totals	39	26	36	102

Total

From/To	A	B	C	Totals
A	0	97	661	758
B	53	0	259	312
C	426	336	0	763
Totals	479	434	920	1833

%HGV

From/To	A	B	C	Average
A	0.0%	14.1%	4.2%	6%
B	20.0%	0.0%	3.3%	8%
C	6.7%	3.8%	0.0%	3%
Average	9%	6%	2%	6%

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	66	482	547
B	77	0	381	458
C	601	296	0	898
Totals	679	362	863	1904

HGVs

From/To	A	B	C	Totals
A	0	8	15	23
B	8	0	1	10
C	12	3	0	15
Totals	20	12	16	48

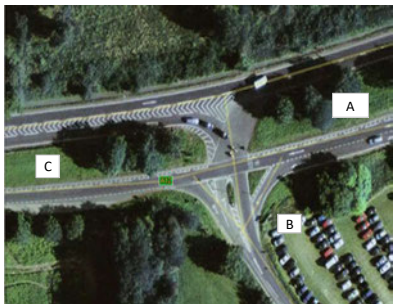
Total

From/To	A	B	C	Totals
A	0	74	497	571
B	86	0	382	468
C	613	300	0	913
Totals	699	374	879	1951

%HGV

From/To	A	B	C	Average
A	0.0%	11.4%	3.0%	5%
B	9.9%	0.0%	0.3%	3%
C	1.9%	1.1%	0.0%	1%
Average	4%	4%	1%	3%

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 east
6	B	A1094
3	C	A12 west

Growth Factor	AM Peak	PM Peak
All Vehicles	1.0578	1.0588

EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 South

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	0	0
B	0	0	0	0
C	6	84	0	91
Totals	6	84	0	91

HGVs

From/To	A	B	C	Totals
A	0	0	3	3
B	0	0	10	10
C	3	10	0	14
Totals	3	10	14	27

Total

From/To	A	B	C	Totals
A	0	0	3	3
B	0	0	10	10
C	10	94	0	104
Totals	10	94	14	118

%HGV

From/To	A	B	C	Average
A	0.0%	0.0%	100.0%	33%
B	0.0%	0.0%	100.0%	33%
C	35.1%	10.6%	0.0%	15%
Average	12%	4%	67%	27%

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	6	6
B	0	0	84	84
C	0	0	0	0
Totals	0	0	91	91

HGVs

From/To	A	B	C	Totals
A	0	0	3	3
B	0	0	10	10
C	3	10	0	14
Totals	3	10	14	27

Total

From/To	A	B	C	Totals
A	0	0	10	10
B	0	0	94	94
C	3	10	0	14
Totals	3	10	104	118

%HGV

From/To	A	B	C	Average
A	0.0%	0.0%	35.1%	12%
B	0.0%	0.0%	10.6%	4%
C	100.0%	100.0%	0.0%	67%
Average	33%	33%	15%	27%

Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 South

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	84	634	717
B	42	0	251	293
C	398	324	0	721
Totals	440	407	884	1732

HGVs

From/To	A	B	C	Totals
A	0	5	31	36
B	2	0	19	21
C	32	23	0	55
Totals	34	28	49	112

Total

From/To	A	B	C	Totals
A	0	89	665	753
B	44	0	269	314
C	430	346	0	776
Totals	474	435	934	1843

%HGV

From/To	A	B	C	Average
A	0.0%	6.0%	4.7%	4%
B	4.8%	0.0%	6.9%	4%
C	7.5%	6.6%	0.0%	5%
Average	4%	4%	4%	4%

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	66	482	547
B	77	0	381	458
C	601	296	0	898
Totals	679	362	863	1904

HGVs

From/To	A	B	C	Totals
A	0	0	18	18
B	0	0	11	11
C	15	13	0	28
Totals	15	13	29	58

Total

From/To	A	B	C	Totals
A	0	66	500	566
B	77	0	392	469
C	617	310	0	926
Totals	694	375	892	1961

%HGV

From/To	A	B	C	Average
A	0.0%	0.0%	3.7%	1%
B	0.0%	0.0%	2.8%	1%
C	2.5%	4.3%	0.0%	2%
Average	1%	1%	2%	1%

Appendix C

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]

Filename: J1 - A12 and A1094 - 3 arm Single Lane Rbout wo flaring Base.arc8
Path: C:\Users\304111\Box\PB4842 EA 1N and 2\PB4842 EA 1N and 2 Team\E. TECHNICAL DATA\E01 East Anglia ONE North & TWO\01 Technical Reports\13 Transport\TD\Calcs\Junctions\Junction 1 Concept
Report generation date: 20/12/2019 10:10:15

Summary of junction performance

	AM						PM					
	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS
Three arm roundabout with no flaring - Forecast (2023) Baseline Flows												
Arm 1	4.90	22.40	0.84	C	14.38	B	1.65	9.86	0.63	A	12.13	B
Arm 2	0.89	9.69	0.47	A			0.97	8.57	0.50	A		
Arm 3	1.56	7.64	0.61	A			4.05	14.97	0.81	B		
Three arm roundabout with no flaring - Forecast (2023) Baseline Flows (No left turn into A1094)												
Arm 1	2.75	13.96	0.74	B	10.56	B	1.23	8.29	0.55	A	11.78	B
Arm 2	0.89	9.70	0.47	A			0.97	8.57	0.50	A		
Arm 3	1.56	7.64	0.61	A			4.05	14.97	0.81	B		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages.

"D1 - Forecast (2023) Baseline Flows, AM " model duration: 07:15 - 08:45
"D3 - Forecast (2023) Baseline Flows, PM" model duration: 16:15 - 17:45
"D4 - Forecast (2023) Baseline Flows (No left turn into A1094), AM" model duration: 07:15 - 08:45
"D5 - Forecast (2023) Baseline Flows (No left turn into A1094), PM" model duration: 16:15 - 17:45

Run using Junctions 8.0.6.541 at 20/12/2019 10:10:14

File summary

Title	A12 / A1084 Friday Street Roundabout Junction Concept
Location	A12 / A1084 Friday Street Junction
Site Number	1
Date	04/12/2019
Version	1
Status	(new file)
Identifier	
Client	Scottish Power
Jobnumber	PB4842
Enumerator	304111
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Three arm roundabout with no flaring - Forecast (2023) Baseline Flows, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Three arm roundabout with no flaring	ARCADY	Three arm roundabout with the following parameters on all arms Approach half width = 4m Entry Width = 4m Effective Flare Legnth = 0m	✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Forecast (2023) Baseline Flows, AM	Forecast (2023) Baseline Flows	AM		ONE HOUR	07:15	08:45	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A12 / A1084 Friday Street	Roundabout	1,2,3				14.38	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	A12 East	
2	2	Friday Street	
3	3	A12 West	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	4.00	4.00	0.00	12.18	21.00	27.00	
2	4.00	4.00	0.00	18.20	21.00	49.00	
3	4.00	4.00	0.00	82.00	21.00	16.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.551	1186.565
2		(calculated)	(calculated)	0.523	1126.231
3		(calculated)	(calculated)	0.611	1315.690

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

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
1	ONE HOUR	✓	750.00	100.000
2	ONE HOUR	✓	303.00	100.000
3	ONE HOUR	✓	672.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:15-07:30	1	564.64	589.56		
07:15-07:30	2	228.11	236.14		
07:15-07:30	3	505.92	536.90		
07:30-07:45	1	674.23	703.99		
07:30-07:45	2	272.39	281.97		
07:30-07:45	3	604.11	641.12		
07:45-08:00	1	825.77	862.21		
07:45-08:00	2	333.61	345.35		
07:45-08:00	3	739.89	785.20		
08:00-08:15	1	825.77	862.21		
08:00-08:15	2	333.61	345.35		
08:00-08:15	3	739.89	785.20		
08:15-08:30	1	674.23	703.99		
08:15-08:30	2	272.39	281.97		
08:15-08:30	3	604.11	641.12		
08:30-08:45	1	564.64	589.56		
08:30-08:45	2	228.11	236.14		
08:30-08:45	3	505.92	536.90		

Turning Proportions

Turning Counts / Proportions (Veh/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	89.000	661.000
	2	44.000	0.000	259.000
	3	420.000	252.000	0.000

Turning Proportions (Veh) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.12	0.88
	2	0.15	0.00	0.85
	3	0.63	0.38	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.060	1.042
	2	1.048	1.000	1.033
	3	1.068	1.050	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	6.0	4.2
	2	4.8	0.0	3.3
	3	6.8	5.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
1	0.84	22.40	4.90	C	688.21	1032.32	229.61	13.35	2.55	229.65	13.35
2	0.47	9.69	0.89	A	278.04	417.06	53.54	7.70	0.59	53.54	7.70
3	0.61	7.64	1.56	A	616.64	924.96	96.27	6.24	1.07	96.28	6.25

Main Results for each time segment

Main results: (07:15-07:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	564.64	141.16	559.89	347.35	188.67	0.00	1031.78	890.90	0.547	0.00	1.19	7.555	A
2	228.11	57.03	226.61	255.11	493.45	0.00	827.99	674.30	0.276	0.00	0.38	5.972	A
3	505.92	126.48	503.11	687.16	32.91	0.00	1219.89	1180.63	0.415	0.00	0.70	5.004	A

Main results: (07:30-07:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	674.23	168.56	671.23	416.35	226.13	0.00	1011.01	890.90	0.667	1.19	1.94	10.499	B
2	272.39	68.10	271.76	305.79	591.58	0.00	776.29	674.30	0.351	0.38	0.53	7.126	A
3	604.11	151.03	603.02	823.88	39.46	0.00	1215.93	1180.63	0.497	0.70	0.98	5.862	A

Main results: (07:45-08:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	825.76	206.44	815.04	509.27	276.61	0.00	983.02	890.89	0.840	1.94	4.62	20.231	C
2	333.61	83.40	332.26	373.33	718.32	0.00	709.52	674.30	0.470	0.53	0.87	9.508	A
3	739.89	184.97	737.63	1002.33	48.25	0.00	1210.62	1180.63	0.611	0.98	1.54	7.574	A

Main results: (08:00-08:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	825.76	206.44	824.63	510.83	277.43	0.00	982.56	890.89	0.840	4.62	4.90	22.395	C
2	333.61	83.40	333.54	375.29	726.78	0.00	705.06	674.30	0.473	0.87	0.89	9.687	A
3	739.89	184.97	739.82	1011.89	48.44	0.00	1210.51	1180.63	0.611	1.54	1.56	7.645	A

Main results: (08:15-08:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	674.23	168.56	685.54	418.71	227.38	0.00	1010.32	890.90	0.667	4.90	2.08	11.443	B
2	272.39	68.10	273.72	308.72	604.19	0.00	769.65	674.30	0.354	0.89	0.55	7.280	A
3	604.11	151.03	606.33	838.16	39.75	0.00	1215.76	1180.63	0.497	1.56	1.00	5.930	A

Main results: (08:30-08:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	564.64	141.16	568.01	350.13	190.15	0.00	1030.96	890.90	0.548	2.08	1.23	7.832	A
2	228.11	57.03	228.79	257.55	500.60	0.00	824.22	674.30	0.277	0.55	0.39	6.054	A
3	505.92	126.48	507.06	696.17	33.22	0.00	1219.70	1180.63	0.415	1.00	0.72	5.059	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:15-07:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	16.85	1.12	7.555	A	A
2	5.46	0.36	5.972	A	A
3	10.18	0.68	5.004	A	A

Queueing Delay results: (07:30-07:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	27.38	1.83	10.499	B	B
2	7.79	0.52	7.126	A	A
3	14.21	0.95	5.862	A	A

Queueing Delay results: (07:45-08:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	60.04	4.00	20.231	C	C
2	12.51	0.83	9.508	A	A
3	22.10	1.47	7.574	A	A

Queueing Delay results: (08:00-08:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	71.80	4.79	22.395	C	C
2	13.22	0.88	9.687	A	A
3	23.24	1.55	7.645	A	A

Queueing Delay results: (08:15-08:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	34.15	2.28	11.443	B	B
2	8.61	0.57	7.280	A	A
3	15.53	1.04	5.930	A	A

Queueing Delay results: (08:30-08:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	19.38	1.29	7.832	A	A
2	5.95	0.40	6.054	A	A
3	11.01	0.73	5.059	A	A

Three arm roundabout with no flaring - Forecast (2023) Baseline Flows, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Three arm roundabout with no flaring	ARCADY	Three arm roundabout with the following parameters on all arms Approach half width = 4m Entry Width = 4m Effective Flare Legnth = 0m	✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Forecast (2023) Baseline Flows, PM	Forecast (2023) Baseline Flows	PM		ONE HOUR	16:15	17:45	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A12 / A1084 Friday Street	Roundabout	1,2,3				12.13	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	A12 East	
2	2	Friday Street	
3	3	A12 West	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	4.00	4.00	0.00	12.18	21.00	27.00	
2	4.00	4.00	0.00	18.20	21.00	49.00	
3	4.00	4.00	0.00	82.00	21.00	16.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.551	1186.565
2		(calculated)	(calculated)	0.523	1126.231
3		(calculated)	(calculated)	0.611	1315.690

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

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
1	ONE HOUR	✓	556.00	100.000
2	ONE HOUR	✓	375.00	100.000
3	ONE HOUR	✓	913.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:15-16:30	1	418.59	429.65		
16:15-16:30	2	282.32	283.22		
16:15-16:30	3	687.35	698.61		
16:30-16:45	1	499.83	513.05		
16:30-16:45	2	337.12	338.19		
16:30-16:45	3	820.77	834.21		
16:45-17:00	1	612.17	628.35		
16:45-17:00	2	412.88	414.20		
16:45-17:00	3	1005.23	1021.69		
17:00-17:15	1	612.17	628.35		
17:00-17:15	2	412.88	414.20		
17:00-17:15	3	1005.23	1021.69		
17:15-17:30	1	499.83	513.05		
17:15-17:30	2	337.12	338.19		
17:15-17:30	3	820.77	834.21		
17:30-17:45	1	418.59	429.65		
17:30-17:45	2	282.32	283.22		
17:30-17:45	3	687.35	698.61		

Turning Proportions

Turning Counts / Proportions (Veh/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	66.000	490.000
	2	77.000	0.000	298.000
	3	613.000	300.000	0.000

Turning Proportions (Veh) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.12	0.88
	2	0.21	0.00	0.79
	3	0.67	0.33	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.030
	2	1.000	1.000	1.004
	3	1.019	1.011	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	3.0
	2	0.0	0.0	0.4
	3	1.9	1.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
1	0.63	9.86	1.65	A	510.19	765.29	97.75	7.66	1.09	97.76	7.66
2	0.50	8.57	0.97	A	344.11	516.16	60.06	6.98	0.67	60.07	6.98
3	0.81	14.97	4.05	B	837.79	1256.68	206.18	9.84	2.29	206.22	9.85

Main Results for each time segment

Main results: (16:15-16:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	418.59	104.65	415.89	515.93	224.30	0.00	1034.17	939.91	0.405	0.00	0.67	5.799	A
2	282.32	70.58	280.58	273.67	366.53	0.00	925.70	677.53	0.305	0.00	0.43	5.566	A
3	687.36	171.84	682.62	589.49	57.61	0.00	1259.84	1210.81	0.546	0.00	1.18	6.186	A

Main results: (16:30-16:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	499.83	124.96	498.66	618.36	268.81	0.00	1010.00	939.91	0.495	0.67	0.97	7.025	A
2	337.12	84.28	336.43	328.01	439.47	0.00	886.50	677.53	0.380	0.43	0.61	6.536	A
3	820.77	205.19	818.09	706.82	69.08	0.00	1252.94	1210.81	0.655	1.18	1.85	8.227	A

Main results: (16:45-17:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	612.17	153.04	609.52	753.90	327.61	0.00	978.07	939.91	0.626	0.97	1.63	9.698	A
2	412.88	103.22	411.46	399.96	537.17	0.00	834.00	677.53	0.495	0.61	0.96	8.491	A
3	1005.23	251.31	997.02	864.14	84.49	0.00	1243.67	1210.81	0.808	1.85	3.91	14.135	B

Main results: (17:00-17:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	612.17	153.04	612.06	759.31	330.12	0.00	976.70	939.91	0.627	1.63	1.65	9.865	A
2	412.88	103.22	412.84	402.77	539.41	0.00	832.79	677.53	0.496	0.96	0.97	8.571	A
3	1005.23	251.31	1004.66	867.47	84.77	0.00	1243.50	1210.81	0.808	3.91	4.05	14.975	B

Main results: (17:15-17:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	499.83	124.96	502.45	626.22	272.45	0.00	1008.02	939.91	0.496	1.65	1.00	7.159	A
2	337.12	84.28	338.52	332.10	442.81	0.00	884.70	677.53	0.381	0.97	0.62	6.607	A
3	820.77	205.19	829.17	711.82	69.51	0.00	1252.68	1210.81	0.655	4.05	1.95	8.662	A

Main results: (17:30-17:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	418.59	104.65	419.82	521.58	226.82	0.00	1032.81	939.91	0.405	1.00	0.69	5.886	A
2	282.32	70.58	283.03	276.65	369.99	0.00	923.84	677.53	0.306	0.62	0.44	5.623	A
3	687.36	171.84	690.28	594.91	58.12	0.00	1259.54	1210.81	0.546	1.95	1.22	6.357	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:15-16:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	9.72	0.65	5.799	A	A
2	6.31	0.42	5.566	A	A
3	16.92	1.13	6.186	A	A

Queueing Delay results: (16:30-16:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	14.00	0.93	7.025	A	A
2	8.85	0.59	6.536	A	A
3	26.45	1.76	8.227	A	A

Queueing Delay results: (16:45-17:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	23.12	1.54	9.698	A	A
2	13.87	0.92	8.491	A	A
3	52.69	3.51	14.135	B	B

Queueing Delay results: (17:00-17:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	24.66	1.64	9.865	A	A
2	14.54	0.97	8.571	A	A
3	59.89	3.99	14.975	B	B

Queueing Delay results: (17:15-17:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	15.60	1.04	7.159	A	A
2	9.65	0.64	6.607	A	A
3	31.22	2.08	8.662	A	A

Queueing Delay results: (17:30-17:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	10.64	0.71	5.886	A	A
2	6.83	0.46	5.623	A	A
3	19.02	1.27	6.357	A	A

Three arm roundabout with no flaring - Forecast (2023) Baseline Flows (No left turn into A1094), AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Three arm roundabout with no flaring	ARCADY	Three arm roundabout with the following parameters on all arms Approach half width = 4m Entry Width = 4m Effective Flare Legnth = 0m	✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Forecast (2023) Baseline Flows (No left turn into A1094), AM	Forecast (2023) Baseline Flows (No left turn into A1094)	AM		ONE HOUR	07:15	08:45	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A12 / A1084 Friday Street	Roundabout	1,2,3				10.56	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	A12 East	
2	2	Friday Street	
3	3	A12 West	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	4.00	4.00	0.00	12.18	21.00	27.00	
2	4.00	4.00	0.00	18.20	21.00	49.00	
3	4.00	4.00	0.00	82.00	21.00	16.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.551	1186.565
2		(calculated)	(calculated)	0.523	1126.231
3		(calculated)	(calculated)	0.611	1315.690

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

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
1	ONE HOUR	✓	661.00	100.000
2	ONE HOUR	✓	303.00	100.000
3	ONE HOUR	✓	672.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:15-07:30	1	497.64	518.54		
07:15-07:30	2	228.11	236.14		
07:15-07:30	3	505.92	536.90		
07:30-07:45	1	594.23	619.18		
07:30-07:45	2	272.39	281.97		
07:30-07:45	3	604.11	641.12		
07:45-08:00	1	727.77	758.34		
07:45-08:00	2	333.61	345.35		
07:45-08:00	3	739.89	785.20		
08:00-08:15	1	727.77	758.34		
08:00-08:15	2	333.61	345.35		
08:00-08:15	3	739.89	785.20		
08:15-08:30	1	594.23	619.18		
08:15-08:30	2	272.39	281.97		
08:15-08:30	3	604.11	641.12		
08:30-08:45	1	497.64	518.54		
08:30-08:45	2	228.11	236.14		
08:30-08:45	3	505.92	536.90		

Turning Proportions

Turning Counts / Proportions (Veh/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	0.000	661.000
	2	44.000	0.000	259.000
	3	420.000	252.000	0.000

Turning Proportions (Veh) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.00	1.00
	2	0.15	0.00	0.85
	3	0.63	0.38	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.042
	2	1.048	1.000	1.033
	3	1.068	1.050	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	4.2
	2	4.8	0.0	3.3
	3	6.8	5.0	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
1	0.74	13.96	2.75	B	606.55	909.82	148.54	9.80	1.65	148.56	9.80
2	0.47	9.70	0.89	A	278.04	417.06	53.61	7.71	0.60	53.61	7.71
3	0.61	7.64	1.56	A	616.64	924.96	96.27	6.24	1.07	96.28	6.25

Main Results for each time segment

Main results: (07:15-07:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	497.64	124.41	493.98	347.35	188.67	0.00	1033.90	891.70	0.481	0.00	0.91	6.621	A
2	228.11	57.03	226.61	188.67	493.98	0.00	827.71	618.18	0.276	0.00	0.38	5.975	A
3	505.92	126.48	503.11	687.68	32.91	0.00	1219.89	1185.55	0.415	0.00	0.70	5.004	A

Main results: (07:30-07:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	594.23	148.56	592.33	416.35	226.13	0.00	1013.08	891.70	0.587	0.91	1.39	8.517	A
2	272.39	68.10	271.76	226.13	592.33	0.00	775.89	618.18	0.351	0.38	0.53	7.132	A
3	604.11	151.03	603.02	824.63	39.46	0.00	1215.93	1185.55	0.497	0.70	0.98	5.862	A

Main results: (07:45-08:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	727.77	181.94	722.60	509.26	276.61	0.00	985.04	891.70	0.739	1.39	2.68	13.454	B
2	333.61	83.40	332.24	276.61	722.60	0.00	707.26	618.18	0.472	0.53	0.88	9.564	A
3	739.89	184.97	737.63	1006.60	48.25	0.00	1210.62	1185.55	0.611	0.98	1.54	7.574	A

Main results: (08:00-08:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	727.77	181.94	727.48	510.83	277.43	0.00	984.58	891.70	0.739	2.68	2.75	13.960	B
2	333.61	83.40	333.56	277.43	727.48	0.00	704.69	618.18	0.473	0.88	0.89	9.697	A
3	739.89	184.97	739.82	1012.60	48.44	0.00	1210.51	1185.55	0.611	1.54	1.56	7.645	A

Main results: (08:15-08:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	594.23	148.56	599.43	418.71	227.38	0.00	1012.39	891.70	0.587	2.75	1.45	8.823	A
2	272.39	68.10	273.74	227.38	599.43	0.00	772.15	618.18	0.353	0.89	0.55	7.241	A
3	604.11	151.03	606.33	833.42	39.75	0.00	1215.75	1185.55	0.497	1.56	1.00	5.928	A

Main results: (08:30-08:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	497.64	124.41	499.68	350.13	190.15	0.00	1033.08	891.70	0.482	1.45	0.94	6.774	A
2	228.11	57.03	228.78	190.15	499.68	0.00	824.71	618.18	0.277	0.55	0.39	6.047	A
3	505.92	126.48	507.06	695.23	33.22	0.00	1219.70	1185.55	0.415	1.00	0.72	5.061	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:15-07:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	13.11	0.87	6.621	A	A
2	5.47	0.36	5.975	A	A
3	10.18	0.68	5.004	A	A

Queueing Delay results: (07:30-07:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	19.92	1.33	8.517	A	A
2	7.79	0.52	7.132	A	A
3	14.21	0.95	5.862	A	A

Queueing Delay results: (07:45-08:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	36.93	2.46	13.454	B	B
2	12.58	0.84	9.564	A	A
3	22.10	1.47	7.574	A	A

Queueing Delay results: (08:00-08:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	40.87	2.72	13.960	B	B
2	13.26	0.88	9.697	A	A
3	23.24	1.55	7.645	A	A

Queueing Delay results: (08:15-08:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	23.03	1.54	8.823	A	A
2	8.57	0.57	7.241	A	A
3	15.53	1.04	5.928	A	A

Queueing Delay results: (08:30-08:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	14.67	0.98	6.774	A	A
2	5.94	0.40	6.047	A	A
3	11.01	0.73	5.061	A	A

Three arm roundabout with no flaring - Forecast (2023) Baseline Flows (No left turn into A1094), PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Three arm roundabout with no flaring	ARCADY	Three arm roundabout with the following parameters on all arms Approach half width = 4m Entry Width = 4m Effective Flare Legnth = 0m	✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relations
Forecast (2023) Baseline Flows (No left turn into A1094), PM	Forecast (2023) Baseline Flows (No left turn into A1094)	PM		ONE HOUR	16:15	17:45	90	15				✓		

Junction Network

Junctions

Junction	Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (s)	Junction LOS
1	A12 / A1084 Friday Street	Roundabout	1,2,3				11.78	B

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Arm	Name	Description
1	1	A12 East	
2	2	Friday Street	
3	3	A12 West	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
1	0.00	99999.00		0.00
2	0.00	99999.00		0.00
3	0.00	99999.00		0.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	4.00	4.00	0.00	12.18	21.00	27.00	
2	4.00	4.00	0.00	18.20	21.00	49.00	
3	4.00	4.00	0.00	82.00	21.00	16.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.551	1186.565
2		(calculated)	(calculated)	0.523	1126.231
3		(calculated)	(calculated)	0.611	1315.690

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

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (Veh/hr)	Flow Scaling Factor (%)
1	ONE HOUR	✓	490.00	100.000
2	ONE HOUR	✓	375.00	100.000
3	ONE HOUR	✓	913.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:15-16:30	1	368.90	379.96		
16:15-16:30	2	282.32	283.22		
16:15-16:30	3	687.35	698.61		
16:30-16:45	1	440.50	453.71		
16:30-16:45	2	337.12	338.19		
16:30-16:45	3	820.77	834.21		
16:45-17:00	1	539.50	555.69		
16:45-17:00	2	412.88	414.20		
16:45-17:00	3	1005.23	1021.69		
17:00-17:15	1	539.50	555.69		
17:00-17:15	2	412.88	414.20		
17:00-17:15	3	1005.23	1021.69		
17:15-17:30	1	440.50	453.71		
17:15-17:30	2	337.12	338.19		
17:15-17:30	3	820.77	834.21		
17:30-17:45	1	368.90	379.96		
17:30-17:45	2	282.32	283.22		
17:30-17:45	3	687.35	698.61		

Turning Proportions

Turning Counts / Proportions (Veh/hr) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.000	0.000	490.000
	2	77.000	0.000	298.000
	3	613.000	300.000	0.000

Turning Proportions (Veh) - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.00	0.00	1.00
	2	0.21	0.00	0.79
	3	0.67	0.33	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To		
		1	2	3
From	1	1.000	1.000	1.030
	2	1.000	1.000	1.004
	3	1.019	1.011	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		1	2	3
From	1	0.0	0.0	3.0
	2	0.0	0.0	0.4
	3	1.9	1.1	0.0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (s)
1	0.55	8.29	1.23	A	449.63	674.45	76.01	6.76	0.84	76.02	6.76
2	0.50	8.57	0.97	A	344.11	516.16	60.07	6.98	0.67	60.08	6.98
3	0.81	14.97	4.05	B	837.79	1256.68	206.18	9.84	2.29	206.22	9.85

Main Results for each time segment

Main results: (16:15-16:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	368.90	92.22	366.69	515.93	224.30	0.00	1030.60	935.40	0.358	0.00	0.55	5.405	A
2	282.32	70.58	280.58	224.30	366.69	0.00	925.61	619.99	0.305	0.00	0.43	5.567	A
3	687.36	171.84	682.62	589.65	57.61	0.00	1259.84	1217.91	0.546	0.00	1.18	6.186	A

Main results: (16:30-16:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	440.50	110.12	439.63	618.36	268.81	0.00	1006.51	935.40	0.438	0.55	0.77	6.342	A
2	337.12	84.28	336.43	268.81	439.63	0.00	886.41	619.99	0.380	0.43	0.61	6.537	A
3	820.77	205.19	818.09	706.98	69.08	0.00	1252.94	1217.91	0.655	1.18	1.85	8.227	A

Main results: (16:45-17:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	539.50	134.88	537.71	753.89	327.61	0.00	974.69	935.40	0.554	0.77	1.22	8.204	A
2	412.88	103.22	411.46	327.61	537.71	0.00	833.70	619.99	0.495	0.61	0.96	8.497	A
3	1005.23	251.31	997.02	864.68	84.49	0.00	1243.67	1217.91	0.808	1.85	3.91	14.135	B

Main results: (17:00-17:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	539.50	134.88	539.44	759.31	330.12	0.00	973.33	935.40	0.554	1.22	1.23	8.294	A
2	412.88	103.22	412.84	330.12	539.44	0.00	832.77	619.99	0.496	0.96	0.97	8.571	A
3	1005.23	251.31	1004.66	867.51	84.77	0.00	1243.50	1217.91	0.808	3.91	4.05	14.975	B

Main results: (17:15-17:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	440.50	110.12	442.26	626.23	272.45	0.00	1004.54	935.40	0.439	1.23	0.79	6.424	A
2	337.12	84.28	338.52	272.45	442.26	0.00	885.00	619.99	0.381	0.97	0.62	6.603	A
3	820.77	205.19	829.17	711.27	69.51	0.00	1252.68	1217.91	0.655	4.05	1.95	8.661	A

Main results: (17:30-17:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (s)	LOS
1	368.90	92.22	369.80	521.58	226.82	0.00	1029.24	935.40	0.358	0.79	0.56	5.466	A
2	282.32	70.58	283.03	226.82	369.80	0.00	923.93	619.99	0.306	0.62	0.44	5.624	A
3	687.36	171.84	690.28	594.72	58.12	0.00	1259.54	1217.91	0.546	1.95	1.22	6.357	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:15-16:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	8.01	0.53	5.405	A	A
2	6.31	0.42	5.567	A	A
3	16.92	1.13	6.186	A	A

Queueing Delay results: (16:30-16:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	11.21	0.75	6.342	A	A
2	8.86	0.59	6.537	A	A
3	26.45	1.76	8.227	A	A

Queueing Delay results: (16:45-17:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	17.47	1.16	8.204	A	A
2	13.88	0.93	8.497	A	A
3	52.69	3.51	14.135	B	B

Queueing Delay results: (17:00-17:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	18.37	1.22	8.294	A	A
2	14.55	0.97	8.571	A	A
3	59.89	3.99	14.975	B	B

Queueing Delay results: (17:15-17:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	12.27	0.82	6.424	A	A
2	9.65	0.64	6.603	A	A
3	31.22	2.08	8.661	A	A

Queueing Delay results: (17:30-17:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1	8.68	0.58	5.466	A	A
2	6.83	0.46	5.624	A	A
3	19.02	1.27	6.357	A	A

Appendix B: Friday Street Note

REPORT

East Anglia TWO and East Anglia ONE North

A12/A1094 Traffic Signal Design Report

Client: Scottish Power Renewables

Reference: PB4842-RHD-ZZ-XX-RP-Z-0002

Status: Final/F1.0

Date: 22 July 2020

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Document short title:	A12 / A1094 Traffic Signal Report
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Date / initials:	21.07.2020 / ADR
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Date / initials:	21.07.2020 / ADR

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Appendices

1 Introduction

1.1.1 This report has been produced by Royal HaskoningDHV on behalf of ScottishPower Renewables and sets out details of work undertaken to evaluate the potential to convert the junction of the A12 and A1094 (known as Friday Street) from a priority junction with single lane dualling to a traffic signal controlled junction.

1.2 Background

1.2.1 In November 2019 ScottishPower Renewables (henceforth referred to as 'the Applicant') submitted a Development Consent Order (DCO) Application for two new offshore windfarms, known as East Anglia TWO and East Anglia ONE North.

1.2.2 ***Chapter 26 - Traffic and Transport*** of the Environmental Statement (ES) [APP- 074] for the proposed East Anglia TWO and East Anglia ONE North projects identified a package of mitigation measures at the junction of the A12 and A1094 ('the junction') consisting of a reduction in the existing speed limit from 50mph to 40mph, improvements to signing and the provision of rumble strips.

1.2.3 Suffolk County Council (SCC) as the local highway authority responsible for the junction, raised concerns that the mitigation may not be sufficient. In response, the Applicant has sought to work with SCC to develop a scheme (without prejudice to the commitments within the ES and DCO) that would improve the current road safety baseline with the objective of alleviating concerns relating to construction traffic.

1.2.4 At a meeting with SCC on 17 October 2019, a scheme basis of design was agreed which contained the following objectives:

1. Improve road safety (reduction in total collisions and severity ratio);
2. Be deliverable prior to the commencement of construction of the proposed East Anglia TWO and East Anglia ONE North projects;
3. Be deliverable within the highway boundary;
4. Not prejudice a future two-village bypass (either by SCC or EDF Energy);
5. Minimise delays to the travelling public (construction and operation); and
6. Provide a cost-effective solution.

1.2.5 Two scheme options were identified for further assessment to validate if they met the basis of design:

1. the conversion of the existing junction to a three-arm roundabout; and
2. a reduction in the existing speed limit along the A12 (from 50mph to 40mph) enforced by average speed cameras.

1.2.6 A technical note (ref: PB4842-RHD-ZZ-XX-RP-Z-0001) was submitted to SCC (24 February 2020) which set out the initial scheme findings for options 1 and 2. Recognising the constraints and scheme concerns relating to both scheme 1 and 2 an alternative scheme to signalise the junction was suggested by SCC as a way of potentially addressing the scheme basis of design objectives.

1.2.7 The Applicant agreed to investigate if a traffic signal solution could be developed that would meet the basis of design objectives.

1.3 Scope

1.3.1 The scope of this report is to provide SCC with findings of the work undertaken by Royal HaskoningDHV (RHDHV) on behalf of the Applicant to evaluate if a traffic signal solution for would address all of the scheme objectives.

2 Evaluation of Scheme Objectives

2.1 Introduction

2.1.1 Following consultation with SCC, a preliminary design was finalised (**Appendix A**) that outlines a proposed general arrangement for the conversion of the junction to traffic signal control. This layout has been developed in accordance with the requirements of the Design Manual for Roads and Bridges CD 123[1] (DMRB) and in liaison with SCC.

2.1.2 In addition, at the request of SCC, a general arrangement plan (**Appendix B**) showing the proposed amendments to speed limits and signage at and on the approach to the junction has been prepared in accordance with the Traffic Signs Regulations and General Directions 2016.

2.1.3 The following sections provide an appraisal of the junction design (outlined in **Appendix A**) against each of the six scheme basis of design objectives (outlined in **section 1.2**). It has also been agreed with SCC that in addition to the six agreed objectives, that an additional objective (objective 7) should be included for any traffic signal scheme that would ensure that: *a traffic signal controlled junction should be able to be converted back to a priority junction with single lane dualling with minimal works.*

2.2 Objective 1

2.2.1 Objective 1 states that, any scheme should:

> *"Improve road safety (reduction in total collisions and severity ratio)"*

2.2.2 In order to understand if the proposals would improve road safety it is necessary to understand the types of collisions occurring at the junction.

2.2.3 The ES [APP- 074] identified that during the study period, a total of 17 collisions have been recorded at this junction, resulting in 16 slight injuries and one serious injury. Eleven of the collisions involved vehicles turning across the path of traffic on the A12; nine of these involved vehicles turning right into the A1094 from the A12, including the serious collision, with the remaining two collisions occurring as vehicles turned right out of the A1094. Six of the collisions were rear end shunt type collisions; three within the central reserve, and three on the A1094 approach to the A12.

2.2.4 When considering the types of collisions occurring it can be noted nine collisions (out of a total of 14) involved vehicles turning right into the A1094 from the A12 and vehicles turning right from the A1094 on to the A12. Through the introduction of traffic signals, these types of collisions would not be expected to occur as the use of traffic signals would remove the potential for conflict between turning vehicles.

2.2.5 The remaining six collisions (out of a total of 14) that have historically occurred at the junction are attributed to rear end shunt type collisions. These types of collisions would not typically be mitigated by the introduction of traffic signals alone. The proposed layout (**Appendix A**) therefore details a number of applied road safety measures to reduce the potential for rear end shunts.

[1] *Design Manual for Roads and Bridges – CD 123 – Geometric design of at-grade priority and signal controlled junctions (January 2020)*

These measures include providing:

- High friction surfacing (commonly referred to as 'antiskid') on all junction approaches;
- Traffic signal ahead warning signs on all junction approaches; and
- A reduced speed limit from 50mph to 40mph on the A12 approaches to the junction (the A1094 is currently subject to a 40mph speed limit).

2.2.6 The application of high friction surfacing on all approaches would provide a higher level of friction reducing the distance vehicles need to stop (than compared to the existing road surface) and consequently potentially reducing the instances and severity of rear end shunt collisions.

2.2.7 The introduction of a traffic signal ahead warning signs and a reduced speed limit on the A12 would help make drivers aware of the new junction layout and the need to slow. These measures would also assist in potentially reducing the instances and severity of rear end shunt collisions.

2.2.8 In addition to the applied road safety measures, the proposals have been subject to an independent Stage 1 (preliminary design) Road Safety Audit (RSA). A copy of the RSA is provided within **Appendix C**

2.2.9 The RSA has identified a total of three problems[2], these are summarised within the following **Table 2.1** along with the design organisations (RHDHVs) response.

Table 2.1 Road safety audit problems and design organisation response

RSA Problem	RSA Recommendation	Design organisation response
Problem 1. Existing trees [on the A12 eastbound approach and A1094 nearside] could obscure the signal heads from approaching drivers, leading to the potential for late braking and rear end shunt collisions or junction overshoot.	The interaction between the existing trees and the location of the signal heads should be reviewed. Trees which reduce/ restrict the required forward visibility to the signal heads should have their crowns pruned or raised, providing sufficient forward visibility to the signal heads at all times. If it is not possible to prune or raise the crowns sufficiently, or if the trunk of the trees on the A12 are likely to obscure the offside signal head, the signal head should be relocated.	**Problem accepted.** With regards to the A1094, trees and vegetation potentially obscuring the nearside signal heads would be pruned to ensure sufficient forward visibility. With regards to the A12 eastbound approach, trees would be cut back and crowns raised, and/or the nearside signal head relocated.
Problem 2. Swept path analysis demonstrating that vehicles can safely enter/ leave the proposed maintenance lay-by has not be provided to the Audit Team. The geometry of the lay-by would require a vehicle to enter at a sharp angle of approach, or risk overrunning the verge to the east of the bay. This manoeuvre could result in sudden braking, or vehicle damage leading to safety	Swept path drawings should be prepared demonstrating that a vehicle can safely enter and leave the proposed maintenance lay-by without overrunning the adjacent kerbs/ verges. Where vehicles are unable to enter/ leave the lay-by without overrunning the adjacent kerbs/ verges, the geometry should be amended.	**Problem accepted.** Swept path analysis has been added to **Appendix A** that demonstrates that that a large 7.5 tonne panel van (typically used for traffic signal maintenance) can arrive and depart from the maintenance layby.

[2] *The term 'problem' is a formal road safety audit term that identifies an issue with the design as present that need to be addressed.*

RSA Problem	RSA Recommendation	Design organisation response
problems elsewhere on the network. A similar problem could arise as vehicles exit the lay-by.		
Problem 3: Existing 'No Entry' signs provided on the westbound ahead lane of the A12 do not appear to be replaced as part of the proposed junction improvements. It is acknowledged that the right turn movement from the A1094 onto the A12 westbound will be a controlled manoeuvre. However, there is still the potential that drivers who are unfamiliar with the layout could attempt to turn right onto the A12 westbound, against the flow of traffic. Turning right against the flow of traffic could result in nose to nose collisions or sudden braking and rear end shunts.	The 'No Entry' signs should be retained as part of the junction improvements, reducing the potential for nose to nose collisions or sudden braking and rear end shunts.	**Problem accepted.** It is not proposed to remove the existing No-Entry signs. These would be retained as part of the final layout.

2.2.10 It can be noted from **Table 2.1** that of the three problems identified within the RSA, all recommendations are accepted and could be addressed as part of a detailed design process.

2.2.11 It is therefore concluded that objective 1 is met.

2.3 Objective 2

2.3.1 Objective 2 states that, any scheme should:

> *"Be deliverable prior to the commencement of construction of the proposed East Anglia TWO and East Anglia ONE North projects"*

2.3.2 Much of the works, such as installing ducts, signs and traffic signals could be undertaken from the verge and central island and could therefore be completed without the need for lane closures. Those works that would require some form of traffic control would include the installation of islands, lining and surfacing. These works could however be completed off peak or a night and within a relatively short time period.

2.3.3 It is therefore concluded that objective 2 is met although Applicant and SCC will discuss the delivery timeframe of the traffic signal works in due course.

2.4 Objective 3

2.4.1 Objective 1 states that, any scheme should:

> *"Be deliverable within the highway boundary"*

2.4.2 It can be noted that all that the majority of works shown within **Appendix A** and **Appendix B** would

be within the Order limits and could therefore be delivered by the Applicant. There are a number of additional signs and resurfacing on the A1094 that would that would be located outside of the Order limits but would however be located within the public highway and could be undertaken by the Applicant under agreement with SCC.

2.4.3 It is therefore concluded that objective 3 is met. It is noted that a temporary speed limit reduction to 40mph may be required to Farnham, a distance of approximately 900m to the southwest of the junction. Whilst this does not require physical works outside the highway boundary, the Applicant is considering the appropriate means to secure this speed reduction.

2.5 Objective 4 and 7

2.5.1 Objective 4 states that, any scheme should:

"Not prejudice a future two-village bypass (either by SCC or EDF Energy)"

2.5.2 The proposals outlined in **Appendix A** and **B** have been developed on the basis that the majority of the works could either be quickly removed or left in-situ as part of a priority junction with single lane dualling (SLD). This approach has been developed to address objective 7 (*a traffic signal controlled junction should be able to be converted back to a priority junction with single lane dualling with minimal works*). By addressing objective 7, any proposal would by extension address objective 4.

2.5.3 **Table 2.2** provides a summary of the main elements of the proposals and whether these would need to be removed (to revert to a priority junction with SLD) or whether they could remain in-situ 'retained elements'.

Table 2.2 Elements to be removed/retained within a future priority junction with SLD

Elements	Retention/removal within a future priority junction with SLD
Lining work	Minor amendments would be required to the lining to convert the junction from a priority junction (with SLD) to a traffic signal controlled junction. These lining amendments could easily be undone to suit a return to a priority junction with SLD.
Signage	Give-way signs associated with the existing junction arrangement would need to be removed. In addition, new signage would be required to warn of the new arrangement. Post sockets (a socket installed in the ground that allows signposts to be lifted in and out) could be installed to allow existing priory junction signs to be quickly re-installed and the signs required for a traffic signal controlled arrangement to be unbolted and lifted out.
Installation of traffic signal equipment	The traffic signal equipment would include the traffic signal posts, controller cabinets and inductive loops. The inductive loops (and associated cabling) and signal controller could simply be left in-situ and de-energised. The traffic signals would be installed in post sockets and could therefore simply be unbolted and removed.
Amendments to the kerb line and islands on the A1094	The proposed amendments to the splitter islands and nearside kerb line would not require removal and could be left in-situ as part of a future priority junction with SLD.
A12 eastbound ahead splitter island	The ahead lane would be left in-situ as part of a future SLD arrangement as it would assist in removing an existing point of conflict between turning traffic.

Elements	Retention/removal within a future priority junction with SLD
Maintenance layby	A maintenance layby is required to provide maintenance operatives with a safe place to park off the highway whilst inspecting and maintaining the traffic signals. It is envisaged that this layby could simply be left in-situ.
A12 speed limit	In the event of the junction being returned to a priority junction with SLD it would be proposed that the proposed amendments to the existing speed limit would be retained to reduce the potential number and severity of collisions. This could be achieved by making a permanent traffic regulation order and rescinding the temporary traffic regulation order. Should SCC wish to revert to a 50mph speed limit the use of post sockets would allow for the quick replacement of the 50mph signs and removal of the 40mph signs.

2.5.4 **Appendix D** includes an indicative layout of how the junction could look if it was returned to a priority junction with SLD with the retained elements.

2.5.5 It is therefore concluded that objectives 4 and 7 are met.

2.6 Objective 5

2.6.1 Objective 5 states that, any scheme should:

"Minimise delays to the travelling public (construction and operation)"

2.6.2 To understand the potential for the introduction of traffic signals to lead to delays to the travelling public, industry standard software 'LinSig' Version 3 has been utilised to simulate the delays from the proposals.

2.6.3 Traffic flow data for the junction was captured for the ES [APP- 074]. This data comprised of a Manual Classified Turning Count and was undertaken by an independent survey company on the 5 June 2019.

2.6.4 For the purposes of assessing impacts within the ES, it was agreed with SCC that the surveyed traffic flows would be factored to the future year of 2023 (the earliest start of construction). SCC have requested that the assessment of a traffic signal option should also consider the potential impact upon the latest start date (2028).

2.6.5 To account for growth in traffic between 2019 and 2023 WSP (consultants working on behalf of SCC) supplied growth factors. These factors have been applied to the surveyed traffic flows to generate future year traffic flows. To generate 2028 future year traffic flows, growth factors have been derived by RHDHV (using the same inputs as WSP). **Appendix E** includes details of the surveyed traffic flows (2019), growth factors and future year traffic forecasts (2023 and 2028).

2.6.6 The ES considered the impact of two construction scenarios, namely the construction of East Anglia TWO and East Anglia ONE North concurrently (scenario 1) and in isolation (scenario 2). In order to consider a worst case, this report considers the impacts of scenario 1 only.

2.6.7 In addition to considering two potential construction scenarios, the ES also outlined that for the purpose of a worst case assessment, HGV distribution would be based upon an assumption of 100% of HGV traffic travelling via the A12 south or the A12 north. This worst case approach was

adopted as it was not possible (at the time of drafting the ES and this report) for the supply chain for materials to be informed by early contractor involvement.

2.6.8 This report therefore presents findings for both 100% of HGVs being distributed to the A12 north and also 100% of HGVs being distributed to the A12 south. **Appendix E** also details the forecast construction traffic for scenario 1 for 100% of HGVs coming from the north and for 100% of HGVs coming from the south.

2.6.9 **Table 2.3** and **Table 2.4** provide a summary of the forecast delays, queuing and capacity for the proposed junction in 2023 in the am and pm network peak hours with the addition of the scenario 1 construction traffic and 100% of HGV traffic distributed to the south and 100% to the north respectively.

2.6.10 **Table 2.5** and

2.6.11 **Table** 2.6 provides a summary of the forecast delays, queuing and capacity for the proposed junction in 2028 in the am and pm network peak hours with the addition of the scenario 1 construction traffic and 100% of HGV traffic distributed to the south and 100% to the north respectively.

2.6.12 Full LinSig modelling output files for all scenarios are provided within **Appendix F**.

2.6.13 When assessing junction capacity, reference has been made to the Degree of Saturation (DoS) and Practical Reserve Capacity (PRC). DoS and PRC are the standard recognised thresholds for signalised junctions in the UK, with DoS typically reported by junction approach arm and PRC for the whole junction. When values for DoS are above 90% and when PRC is less than 0% a junction is considered to be operating beyond desirable capacity and mitigation measures may be required.

2.6.14 When considering queuing, reference has been made to mean max queues (MMQ). A MMQ is the standard recognised way of expressing queue lengths and represents the maximum queue within a typical cycle averaged over all the cycles within a modelled time period. MMQs are typically expressed in passenger car units (PCUs) where one PCU is equivalent to approximately 5.75m.

Table 2.3 Junction modelling summary – Scenario 1 (100% A12 south) 2023

Arm	am peak (07:30 – 08:30)			pm peak (16:30 – 17:30)		
	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)
A12 east (ahead and left)	72.8	14.6	21.3	64.9	11.1	24.5
A1094 (all movements)	50.8	6.1	27.1	64.2	8.6	24.3
A12 west (right turn)	71.5	9.6	41.3	65.2	8.1	39.6
PRC (All Arms)	23.60%			37.90%		

Table 2.4 Junction modelling summary – Scenario 1 (100% A12 north) 2023

Arm	am peak (07:30 – 08:30)			pm peak (16:30 – 17:30)		
	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)
A12 east (ahead and left)	71.3	13.9	19.7	67.7	11.5	25.8
A1094 (all movements)	69.3	6.6	35.4	66.4	8	23.9
A12 west (right turn)	69.9	9	41.6	66.1	7.8	42.1
PRC (All Arms)	26.10%			32.80%		

Table 2.5 Junction modelling summary – Scenario 1 (100% A12 south) 2028

Arm	am peak (07:30 – 08:30)			pm peak (16:30 – 17:30)		
	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)
A12 east (ahead and left)	77.3	16.2	23	68.5	12.2	25.5
A1094 (all movements)	54.1	6.6	27.8	68	9.3	24.4
A12 west (right turn)	74.8	10.3	43.1	68.9	8.7	41.1
PRC (All Arms)	16.40%			30.70%		

Table 2.6 Junction modelling summary – Scenario 1 (100% A12 north) 2028

Arm	am peak (07:30 – 08:30)			pm peak (16:30 – 17:30)		
	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)	DoS (%)	MMQ (PCUs)	Average delay per PCU (s/pcu)
A12 east (ahead and left)	75.8	15.5	21.2	69.9	12.2	25.7
A1094 (all movements)	72.6	7.2	36.8	71.1	9	26.2
A12 west (right turn)	73.1	9.5	43.2	70.1	8.4	44.0
PRC (All Arms)	18.70%			26.60%		

2.6.15 The results demonstrate that for all scenarios the proposed junction would operate with significant

spare capacity. It can be noted that for all scenarios the greatest delay would be for vehicles waiting to turn right from the A12 on to the A1094 during the evening peak period (up to 44 seconds). However, a delay of up to 44 seconds is less than a standard signal cycle and is therefore not considered to be material.

2.6.16 With regards to queues the MMQ for the A12 right turn lane on to the A1094 would be 10.3 PCUs, whereas the length of the right turn lane is approximately 30 PCUs long. It can therefore be calculated that the existing right turn lane provides significant spare capacity to prevent blocking back on to the A12. The maximum queue on the A12 east would be 16.2 PCUs during the morning peak hour and 12.2 PCUs during the pm peak hour. The current left off slip would be blocked by a queue of 14 PCUs, it is therefore evident that for the worst case scenario, there would only be a short period (during the 90 second signal cycle) when the left turn lane may be blocked.

2.6.17 It is therefore concluded that objective 5 is met.

2.7 Objective 6

2.7.1 Objective 6 states that, any scheme should:

"Provide a cost-effective solution"

2.7.2 The proposed scheme costs are considered acceptable when compared to scheme 1 and 2 whilst also forecast to achieve equivalent or better mitigation results.

2.7.3 The scheme can also be easily returned to a priority junction with SLD and therefore provides a more cost effective solution for either SCC or EDF Energy to build a new four arm roundabout (to facilitate a future a two-villages bypass).

2.7.4 It is therefore concluded that objective 6 is met.

3 Summary

3.1.1 This report sets out the findings of work undertaken to test the potential for the installation of traffic signals at the junction of the A12 and A1094 (known as Friday Street).

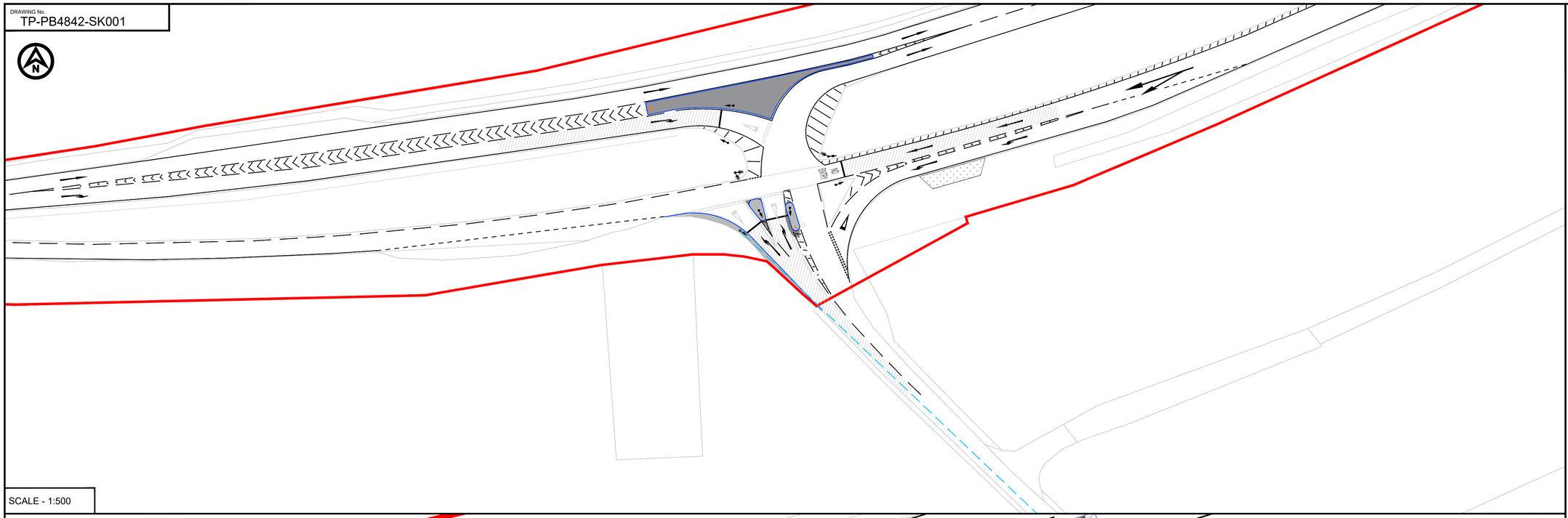
3.1.2 The Applicant have worked with SCC to develop a scheme that would improve the current road safety baseline with the objective of alleviating concerns relating to future construction traffic.

3.1.3 This report provides the evidence base that the introduction of a traffic signal junction would address all seven of the agreed basis of design objectives.

Appendices

Appendix A

DRAWING No.
TP-PB4842-SK001



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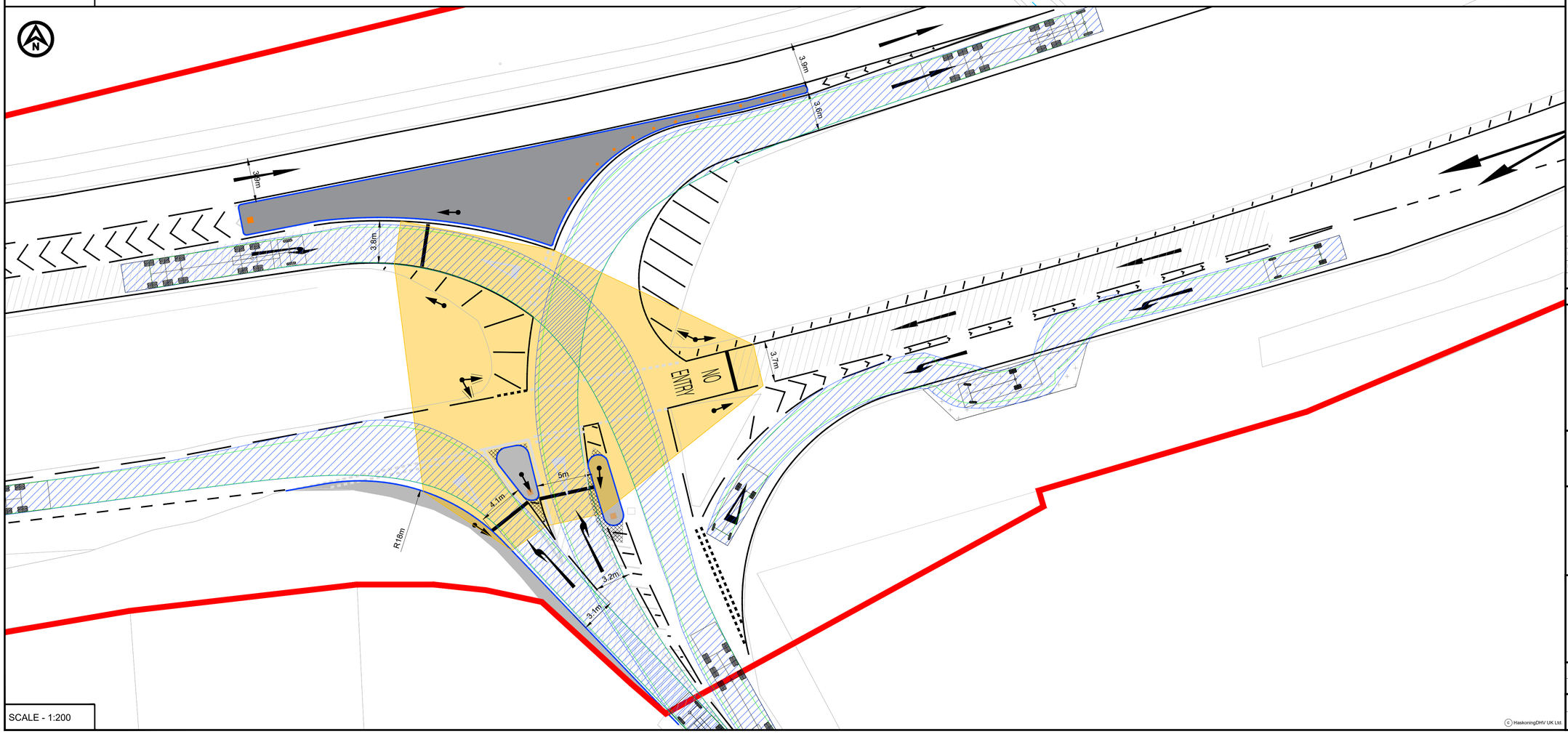


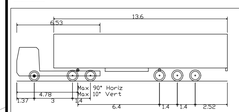
SCALE - 1:200

NOTES

1. Do not scale from this drawing. all dimensions are in metres unless noted otherwise.
2. This drawing has been based upon Ordnance Survey Maps and Royal HaskoningDHV can not guarentee the accuracy of data..

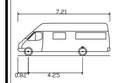
KEY

- ORDER LIMITS
- EXISTING ROAD ALIGNMENT
- NEW KERB LINE
- EXISTING ROAD MARKING TO BE RETAINED/REFRESHED
- EXISTING ROAD MARKING TO BE REMOVED
- DMRB STOPPING SIGHT DISTANCE FOR 40MPH (120m)
- PRIMARY SIGNAL HEAD
- SECONDARY SIGNAL HEAD
- REFLECTIVE MARKER POSTS
- ILLUMINATED BOLLARD
- EXISTING SPLITTER ISLAND TO BE REMOVED
- HIGH FRICTION BLACK SURFACING, 50m BACK FROM THE STOP LINE
- JUNCTION INTERVISIBILITY ZONE
- MAINTENANCE LAYBY
- MAX. LEGAL ARTICULATED HGV SWEPT PATH (FORWARD GEAR)



Max Legal Length (UK) Articulated Vehicle (16.5m)

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.581m
Min Body Ground Clearance	0.411m
Max Track Width	2.300m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.530m



7.5t Panel Van

Overall Length	7.210m
Overall Width	2.192m
Overall Body Height	2.544m
Min Body Ground Clearance	0.316m
Track Width	1.865m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	7.400m

DRAFT

REV	DATE	DESCRIPTION	BY	CHK	APP
D.03	14.07.20	LARGE (7.5t) VAN SPA ADDED	RNE	ADR	ADR
D.02	02.07.20	A1094 - LEFT TURN LANE ADDED	RNE	ADR	ADR
D.01	24.06.20	FIRST ISSUE	SKT	ADR	ADR

REVISIONS

CLIENT

SCOTTISHPOWER RENEWABLES

PROJECT

EAST ANGLIA TWO AND EAST ANGLIA ONE NORTH

TITLE

A12/A1094 FRIDAY STREET PROPOSED TRAFFIC SIGNAL LAYOUT

Enterprise House,
Delta Way, Egham,
Surrey, TW20 8RX
Tel +44(0)1932 569569
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
SKT	ADR	ADR

DATE	SCALE AT A1	AUTOCAD REF.
24.06.20	VARIES	

DRAWING No.	REVISION
TP-PB4842-SK001	D0.3
CLIENT DWG No.	

Appendix B

DRAWING No.
TP-PB4842-SK002

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

INSTALL NEW INFORMATION SIGN

Straight Ahead Traffic Not Signal Controlled

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

ALL EXISTING 50mph REPEATER SIGNS UNTIL FARNHAM 30mph SPEED LIMIT CHANGE TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40 mph) SPEED LIMIT REPEATER SIGNS.

TOTAL OF 3 LOCATIONS APPROXIMATELY 136m, 372m AND 565m WEST OF INDICATIVE ARROWHEAD.

INSTALL NEW DIAG 543 TRAFFIC LIGHT WARNING SIGN.

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670V40 (40mph) SPEED LIMIT REPEATER SIGN.

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

INSTALL NEW DIRECTIONAL WARNING SIGNS FOR LANE MERGING.

RELOCATE EXISTING NSL SIGN 60m TO THE EAST.

EXISTING 50mph REPEATER SIGN TO BE REMOVED.

GIVE WAY SIGNS TO BE REMOVED.

EXISTING 40mph / 50mph TERMINAL SPEED LIMIT SIGNS TO BE REMOVED.

EXISTING 40mph / 50mph TERMINAL SPEED LIMIT SIGNS TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGNS.

INSTALL NEW DIAG 543 TRAFFIC LIGHT WARNING SIGN.

CLEAR VISIBILITY FROM END OF QUEUE TO THE START OF 50mph SPEED LIMIT. DMRB REQUIRES 160m MINIMUM STOPPING SIGHT DISTANCE FOR 50mph

171.6m

NEW DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN AND DIAG 878 CAMERA SIGN

EXISTING ACCIDENT SITE SIGNS

INSTALL (2x) NEW DIAG 670v40 (40mph) TERMINAL SIGNS

EXISTING TOURIST INFORMATION SIGN

EXISTING SPEED CAMERA WITH MIN OF 100m CLEAR VISIBILITY.

INSTALL NEW DIAG 543 TRAFFIC LIGHT WARNING SIGN

EXISTING 50mph REPEATER SIGN TO BE REMOVED AND REPLACED WITH DIAG 670v40 (40mph) SPEED LIMIT REPEATER SIGN.

GREEN LINE INDICATES WORST CASE MEAN MAX QUEUE OF 16.2 PCUS (93.15m)

Yew Tree Cottage
Well
Friday Street Farm
Farm Cottage
Ward Bdy
Def
153
51
11.9m
17.1m

SCALE - 1:1000

NOTES

1. Do not scale from this drawing. all dimensions are in metres unless noted otherwise.
2. This drawing has been based upon Ordnance Survey Maps and Royal HaskoningDHV can not guarantee the accuracy of data.
3. For proposed junction amendments please see Drawing No. TP-PB4842- Sketch 001.

KEY

- ORDER LIMITS
- EXISTING/ PROPOSED TRAFFIC SIGN LOCATION
- WORST CASE MEAN MAXIMUM QUEUE LENGTH (A12 EAST ONLY)

DRAFT

REV	DATE	DESCRIPTION	BY	CHK	APP
D.03	14.07.20	REPEATER SIGNS NOTE AMENDED	RNE	ADR	ADR
D.02	08.07.20	UPDATED TO SCC COMMENTS	RNE	ADR	ADR
D.01	06.07.20	FIRST ISSUE	RNE	ADR	ADR

REVISIONS

CLIENT

SCOTTISHPOWER RENEWABLES

PROJECT

EAST ANGLIA TWO AND EAST ANGLIA ONE NORTH

TITLE

A12/A1094 FRIDAY STREET PROPOSED SIGNAGE LAYOUT

Enterprise House,
Delta Way, Egham,
Surrey, TW20 8RX
Tel +44(0)1932 569566
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
RNE	ADR	ADR

DATE	SCALE AT A1	AUTOCAD REF.
06.07.20	1:1000	

DRAWING No. TP-PB4842-SK002

CLIENT DWG No.

REVISION D0.3

Appendix C

A12/ A1094 Friday Street Road Safety Scheme

Stage 1 Road Safety Audit

Client: Scottish PowerRenewables

Reference: PB4842-RHD-R-001-R-001

Status: 0.1/Final

Date: 10 July 2020

Royal HaskoningDHV

Enhancing Society Together

HASKONINGDHV UK LTD.

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info.birmingham@uk.rhdhv.com **E**
royalhaskoningdhv.com **W**

Document title: A12/ A1094 Friday Street Road Safety Scheme

Document short title: EA2 - A12/ A1094 RSA1
Reference: PB4842-RHD-R-001-R-001
Status: 0.1/Final
Date: 10 July 2020
Project name: East Anglia TWO
Project number: PB4842
Author(s): Vicky Seaton

Drafted by: Vicky Seaton

Checked by: Bryn Buck

Date / initials: 09.07.2020 / BB

Approved by: Vicky Seaton

Date / initials: 10.07.2020 / VS

Classification
Project related

Table of Contents

Table of Figures

Appendices

1 Introduction

1.1.1 Royal HaskoningDHV has been appointed by Scottish PowerRenewables to undertake a Stage 1 Road Safety Audit. This Audit refers to the proposed signalisation of the existing A12/ A1094 Friday Street junction near Saxmundham, Suffolk. The proposals are in relation to the proposed East Anglia TWO project. The location of the highway extents of this Road Safety Audit are shown on **Figure 1** of this report.

1.1.2 The Audit Team for this Stage 1 Road Safety Audit was as follows:

Audit Team Leader
Vicky Seaton, BSc (Hons), MSoRSA, MCIHT, HE CoC
HaskoningDHV UK Limited

Audit Team Member
Bryn Buck, MIHE
HaskoningDHV UK Limited

1.1.3 The Road Safety Audit took place on Thursday 9th July 2020, in accordance with information provided by Sam Taylor of Royal HaskoningDHV's Peterborough office. The Road Safety Audit comprised an examination of documents listed in **Appendix A** of this report.

1.1.4 A site visit was undertaken on Monday 6th July 2020 between 13:15 and 14:00. Weather conditions during the site visit were overcast and the surface conditions were dry. The site visit was carried out during the Covid-19 pandemic and as a result, traffic conditions during the site visit may not have been typical for the location and time of day.

1.1.5 The terms of reference for the Road Safety Audit are described in GG 119[1]. The Road Safety Audit has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the design to any other criteria.

1.1.6 A summary of Personal Injury Collision (PIC) data has been provided to the Audit Team within the Audit Brief supplied as part of the Audit package. The data was obtained from the local highway authority for the period between the 1st February 2013 and the 1st February 2018. During that period, a total of 17 collisions have been recorded at the A12/ A1094 junction, resulting in 16 'slight' injuries and one 'serious' injury.

1.1.7 It is notable that wleven of the recorded collisions involved vehicles turning right across the path of traffic on the A12; nine of these involved vehicles turning right into the A1094 from the A12, including the 'serious' collision. The remaining two collisions involving right turning traffic occurred as vehicles turned right out of the A1094.

1.1.8 Six of the collisions were rear end shunt type collisions; three of which took place within the central reserve and three on the A1094 approach to the A12.

[1] *GG 119 Road Safety Audit (Formerly HD 19/ 15), Revision 2, January 2020*

1.1.9 Given the age of the PIC data (five years to the start of February 2018), the Audit Team has as part of this report, undertaken an updated review of the collision data on the CrashMap[2] website. The review, which focussed on the period between 1st February 2018 and the 31st December 2019 identified one additional collision. The collision, which took place in June 2018, resulted in 'slight' injury an appears to have occurred as a vehicle turned right from the A12 onto the A1094.

1.1.10 Notably, the CrashMap databased only contains collisions up to December 2019. As such, further details relating to any collisions in the vicinity of the proposed scheme would require independent verification by the client should the Local Highway Authority have any concerns relating to the collision history at this location.

1.1.11 Any recommendations included within this report should not be regarded as being prescriptive design solutions to the problems identified. They are only to indicate a proportionate and viable means of eliminating or mitigating the identified problem in accordance with GG 119, and in no way imply that a formal design process has been undertaken.

1.1.12 There may be alternative means of addressing a problem which would be equally as acceptable or superior in achieving the desired degree of mitigation, and these should be considered when responding to this report.

[2] *www.crashmap.co.uk*

2 Issues Arising from this Stage 1 Road Safety Audit

A1 Local Alignment

2.1.1 The Audit Team did not identify any local alignment related safety issues at this stage.

A2 General

A2.1 Landscaping

A2.1.1 Problem 1

Location: Multiple locations as follows:

- A12 eastbound central reserve; and
- A1094 Friday Street northbound, nearside lane approach.

Summary: Insufficient visibility of signal heads could lead to sudden braking, resulting in rear end shunt type collisions.

Description: Existing trees could obscure the signal heads from approaching drivers, leading to the potential for late braking and rear end shunt collisions or junction overshoot.

A12 looking east, showing existing trees within central reserve which may obscure the offside signal head

A1094 looking north, showing existing tree (marked by arrow) which could obscure the nearside signal head

RECOMMENDATION

The interaction between the existing trees and the location of the signal heads should be reviewed. Trees which reduce/ restrict the required forward visibility to the signal heads should have their crowns pruned or raised, providing sufficient forward visibility to the signal heads at all times. If it is not possible to prune or raise the crowns sufficiently, or if the trunk of the trees on the A12 are likely to obscure the offside signal head, the signal head should be relocated.

A2.2 Lay-bys

A2.2.1 Problem 2

Location: A12 westbound, proposed maintenance lay-by.

Summary: Failure to provide sufficient geometry could lead to conflict between vehicular movements or kerb overrunning, creating the potential for collisions between road users.

Description: Swept path analysis demonstrating that vehicles can safely enter/ leave the proposed maintenance lay-by has not be provided to the Audit Team. The geometry of the lay-by would require a vehicle to enter at a sharp angle of approach, or risk overrunning the verge to the east of the bay. This manoeuvre could result in sudden braking, or vehicle damage leading to safety problems elsewhere on the network. A similar problem could arise as vehicles exit the lay-by.

RECOMMENDATION

Swept path drawings should be prepared demonstrating that a vehicle can safely enter and leave the proposed maintenance lay-by without overrunning the adjacent kerbs/ verges. Where vehicles are unable to enter/ leave the lay-by without overrunning the adjacent kerbs/ verges, the geometry should be amended.

A3 Junctions

2.1.2 The Audit Team did not identify any junction related safety issues at this stage.

A4 Walking, Cycling and Horse-Riding [redacted]

2.1.3 The Audit Team did not identify any walking, cycling or horse-riding related safety issues at this stage.

A5 Traffic Signs, Carriageway Markings and Lighting

A5.1 Traffic Signs

A5.1.1 Problem 3

Location: A12 westbound, ahead lane.

Summary: Insufficient signage could result in driver confusion and nose to nose collisions or sudden braking, leading to rear end shunt collisions.

Description: Existing 'No Entry' signs provided on the westbound ahead lane of the A12 do not appear to be replaced as part of the proposed junction improvements. It is acknowledged that the right turn movement from the A1094 onto the A12 westbound will be a controlled manoeuvre. However, there is still the potential that drivers who are unfamiliar with the layout could attempt to turn right onto the A12 westbound, against the flow of traffic.

Turning right against the flow of traffic could result in nose to nose collisions or sudden braking and rear end shunts.

A1094 looking east towards A12, showing existing 'No Entry' signs (circled)

RECOMMENDATION

The 'No Entry' signs should be retained as part of the junction improvements, reducing the potential for nose to nose collisions or sudden braking and rear end shunts.

3 Audit Team Statement

3.1.1 We certify that this Stage 1 Road Safety Audit has been carried out in accordance with GG 119.

Audit Team Leader

Vicky Seaton, BSc (Hons), MSoRSA, MCIHT, HE CoC
Principal Transport Planner
Royal HaskoningDHV
5th Floor Newater House
11 Newhall Street
Birmingham

Signed: [redacted]

Dated: 10.07.2020

Road Safety Audit Team Member

Bryn Buck, MIHE
Senior Technician & Road Safety Auditor
Royal HaskoningDHV
9th Floor, Manchester One
Portland Street
Manchester
M1 3LF
United Kingdom

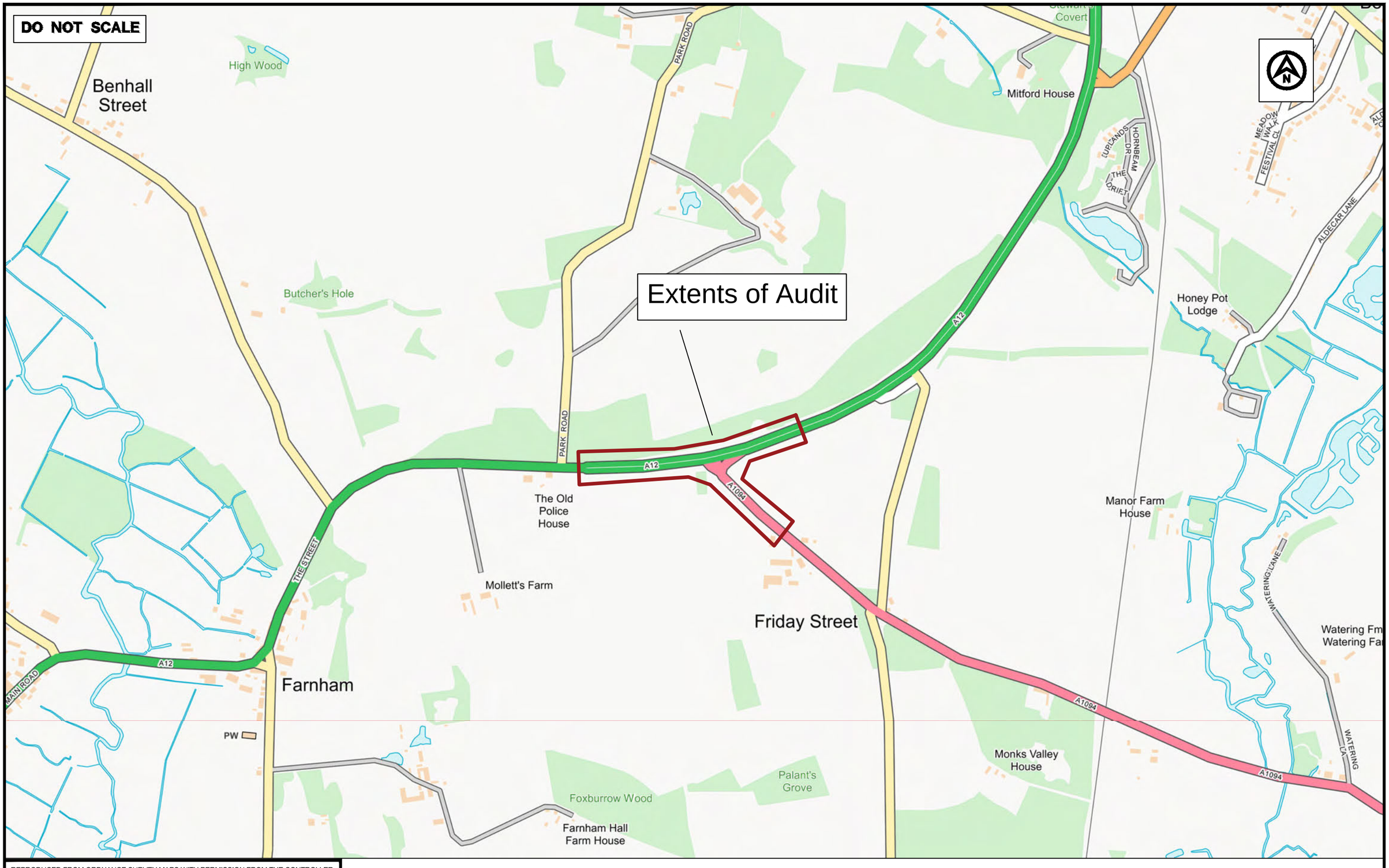
Signed: [redacted]

Date: 10.07.2020

Figures

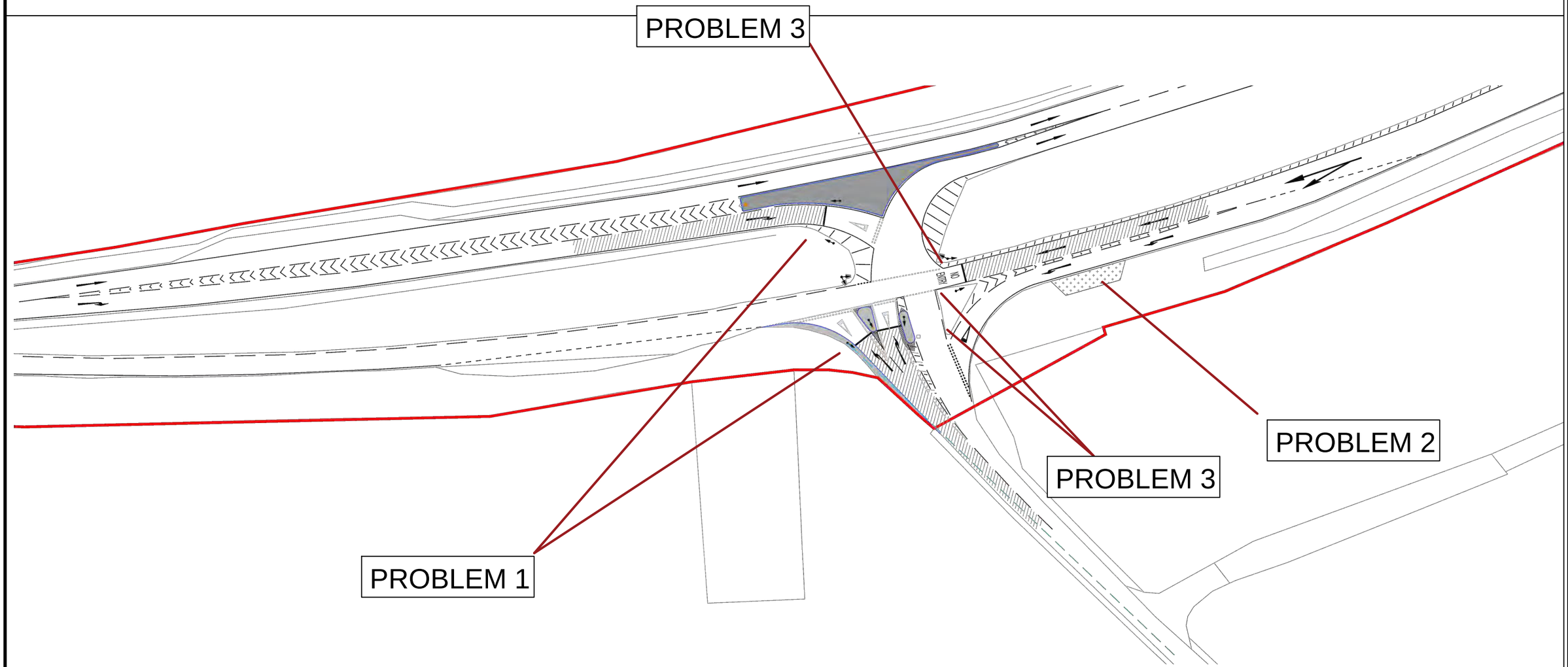
Royal HaskoningDHV

DO NOT SCALE



TITLE: SITE LOCATION PLAN	PROJECT: A12/ A1094 FRIDAY STREET JUNCTION STAGE 1 ROAD SAFETY AUDIT	Royal HaskoningDHV Enhancing Society Together	DRAWN VS	CHECKED BB	APPROVED VS
			DATE 10.07.2020	SCALE AT A1 NTS	REF. -
			DRAWING No. FIGURE 1		REVISION

Drawing based on TP-PB4848-SK001 - A12/ A1094 Friday Street Proposed Traffic Signal Layout



TITLE: PROBLEM LOCATION PLAN	PROJECT: A12/ A1094 FRIDAY STREET JUNCTION STAGE 1 ROAD SAFETY AUDIT	Royal HaskoningDHV Enhancing Society Together	DRAWN: VS	CHECKED: BB	APPROVED: VS
			DATE: 10.07.2020	SCALE AT A1: NTS	REF.: -
			DRAWING No.: FIGURE 2		REVISION:

Appendix A

Documents Forming the Audit Brief

Royal HaskoningDHV

APPENDIX A

Documents Forming the Audit Brief

DRAWING NUMBER	DRAWING TITLE
TP-PB4642-SK001 – D0.2	A12/ A1094 Friday Street Proposed Traffic Signal Layout
TP-PB4842-SK002 – D0.2	A12/ A1094 Friday Street Proposed Signage Layout

DOCUMENTS	DETAILS (where appropriate)
☒ Safety Audit Brief	
☐ Site Location Plan	
☐ Traffic signal details	
☐ Departures from standard	
☐ Previous Road Safety Audits	
☐ Previous Designer Responses	
☒ Collision data	Within Audit Brief
☐ Collision plot	
☒ Traffic flow / modelling data	Linsig outputs
☐ Pedestrian flow / modelling data	
☐ Speed survey data	
☐ Other documents	

Appendix D

DRAWING No.
TP-PB4842-SK003

SCALE - 1:500

SCALE - 1:200

3.8m

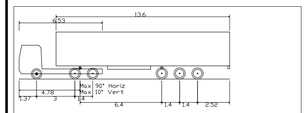
NO ENTRY

NOTES

1. Do not scale from this drawing. all dimensions are in metres unless noted otherwise.
2. This drawing has been based upon Ordnance Survey Maps and Royal HaskoningDHV can not guarentee the accuracy of data..

KEY

- ORDER LIMITS
- EXISTING ROAD ALIGNMENT
- NEW KERB LINE
- EXISTING ROAD MARKING TO BE RETAINED/REFRESHED
- REFLECTIVE MARKER POSTS
- ILLUMINATED BOLLARD
- HIGH FRICTION BLACK SURFACING, 50m BACK FROM THE STOP LINE
- MAINTENANCE LAYBY
- MAX. LEGAL ARTICULATED HGV SWEPT PATH (FORWARD GEAR)



Max Legal Length (UK) Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.581m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.530m

DRAFT

REV	DATE	DESCRIPTION	BY	CHK	APP
D.01	08.07.20	FIRST ISSUE	RNE	ADR	ADR

REVISIONS

CLIENT

SCOTTISHPOWER RENEWABLES

PROJECT

EAST ANGLIA TWO AND EAST ANGLIA ONE NORTH

TITLE

A12/A1094 FRIDAY STREET PROPOSED GIVEWAY LAYOUT

Enterprise House,
Delta Way, Egham,
Surrey, TW20 8RX
Tel +44(0)1932 569569
www.royalhaskoningdhv.com

Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
RNE	ADR	ADR

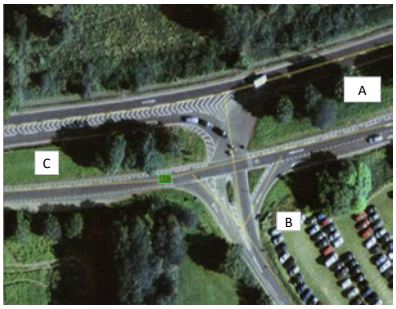
DATE	SCALE AT A1	AUTOCAD REF.
08.07.20	VARIES	

DRAWING No. TP-PB4842-SK003 — REVISION D0.1

CLIENT DWG No.

Appendix E

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 east
6	B	A1094
3	C	A12 west

	AM Peak	PM peak
Growth Factor (2019 - 2023)	1.0578	1.0588
Growth Factor (2019 - 2028)	1.1244	1.1212

Surveyed Flows (2019)

AM Peak Traffic (PCUs)
Thursday 6th June 2019: 07:30AM - 08:30AM

From/To	A	B	C	Totals
A	0	88	646	733
B	44	0	250	294
C	419	249	0	668
Totals	463	337	896	1695

PM Peak Traffic (PCUs)
Thursday 6th June 2019: 4:30PM - 5:30PM

From/To	A	B	C	Totals
A	0	61	475	537
B	73	0	279	352
C	586	286	0	872
Totals	659	347	754	1761

Forecast Flows (2023)

From/To	A	B	C	Totals
A	0	93	683	776
B	46	0	264	310
C	444	263	0	707
Totals	490	356	947	1793

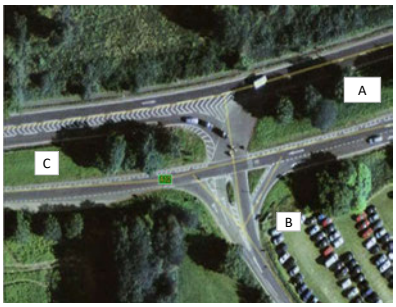
From/To	A	B	C	Totals
A	0	65	503	568
B	77	0	295	373
C	621	302	0	923
Totals	698	367	799	1864

Forecast Flows (2028)

From/To	A	B	C	Totals
A	0	98	726	825
B	49	0	281	330
C	472	280	0	752
Totals	521	378	1007	1906

From/To	A	B	C	Totals
A	0	69	533	602
B	82	0	313	395
C	657	320	0	977
Totals	739	389	846	1974

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 east
6	B	A1094
3	C	A12 west

	AM Peak	PM peak
Growth Factor (2019 - 2023)	1.0578	1.0588
Growth Factor (2019 - 2028)	1.1244	1.1212

EA2 + EA1N Construction Traffic - 100% HGV Origin from A12 north

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	0	0
B	0	0	0	0
C	6	84	0	91
Totals	6	84	0	91

HGVs

From/To	A	B	C	Totals
A	0	8	0	8
B	8	0	0	8
C	0	0	0	0
Totals	8	8	0	17

PCUs

From/To	A	B	C	Totals
A	0	19	0	19
B	19	0	0	19
C	6	84	0	91
Totals	26	104	0	130

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	6	6
B	0	0	84	84
C	0	0	0	0
Totals	0	0	91	91

HGVs

From/To	A	B	C	Totals
A	0	8	0	8
B	8	0	0	8
C	0	0	0	0
Totals	8	8	0	17

PCUs

From/To	A	B	C	Totals
A	0	19	6	26
B	19	0	84	104
C	0	0	0	0
Totals	19	19	91	130

EA2 + EA1N Construction Traffic 100% HGV Origin from A12 South

AM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	0	0
B	0	0	0	0
C	6	84	0	91
Totals	6	84	0	91

HGVs

From/To	A	B	C	Totals
A	0	0	3	3
B	0	0	10	10
C	3	10	0	14
Totals	3	10	14	27

PCUs

From/To	A	B	C	Totals
A	0	0	8	8
B	0	0	23	23
C	14	108	0	122
Totals	14	108	31	153

PM Peak Traffic

Vehicles

From/To	A	B	C	Totals
A	0	0	6	6
B	0	0	84	84
C	0	0	0	0
Totals	0	0	91	91

HGVs

From/To	A	B	C	Totals
A	0	0	3	3
B	0	0	10	10
C	3	10	0	14
Totals	3	10	14	27

PCUs

From/To	A	B	C	Totals
A	0	0	14	14
B	0	0	108	108
C	8	23	0	31
Totals	8	23	122	153

Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north

From/To	A	B	C	Totals
A	0	112	683	795
B	66	0	264	330
C	450	348	0	798
Totals	516	460	947	1923

From/To	A	B	C	Totals
A	0	84	510	594
B	97	0	380	477
C	621	302	0	923
Totals	717	387	890	1994

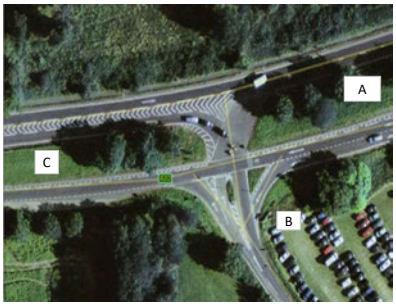
Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south

From/To	A	B	C	Totals
A	0	93	691	784
B	46	0	287	334
C	458	371	0	829
Totals	504	463	978	1946

From/To	A	B	C	Totals
A	0	65	518	583
B	77	0	403	480
C	629	325	0	954
Totals	706	390	921	2017

Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north

Junction 1 - A12 / A1094 Junction



Notes

Link	Arm	Road Name
2	A	A12 east
6	B	A1094
3	C	A12 west

	AM Peak	PM peak
Growth Factor (2019 - 2023)	1.0578	1.0588
Growth Factor (2019 - 2028)	1.1244	1.1212

From/To	A	B	C	Totals
A	0	118	726	844
B	69	0	281	349
C	478	364	0	842
Totals	547	482	1007	2036

From/To	A	B	C	Totals
A	0	88	539	628
B	101	0	397	499
C	657	320	0	977
Totals	759	408	937	2104

Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south

From/To	A	B	C	Totals
A	0	98	734	833
B	49	0	304	353
C	486	388	0	873
Totals	535	486	1038	2059

From/To	A	B	C	Totals
A	0	69	547	616
B	82	0	420	502
C	665	343	0	1008
Totals	747	412	968	2127

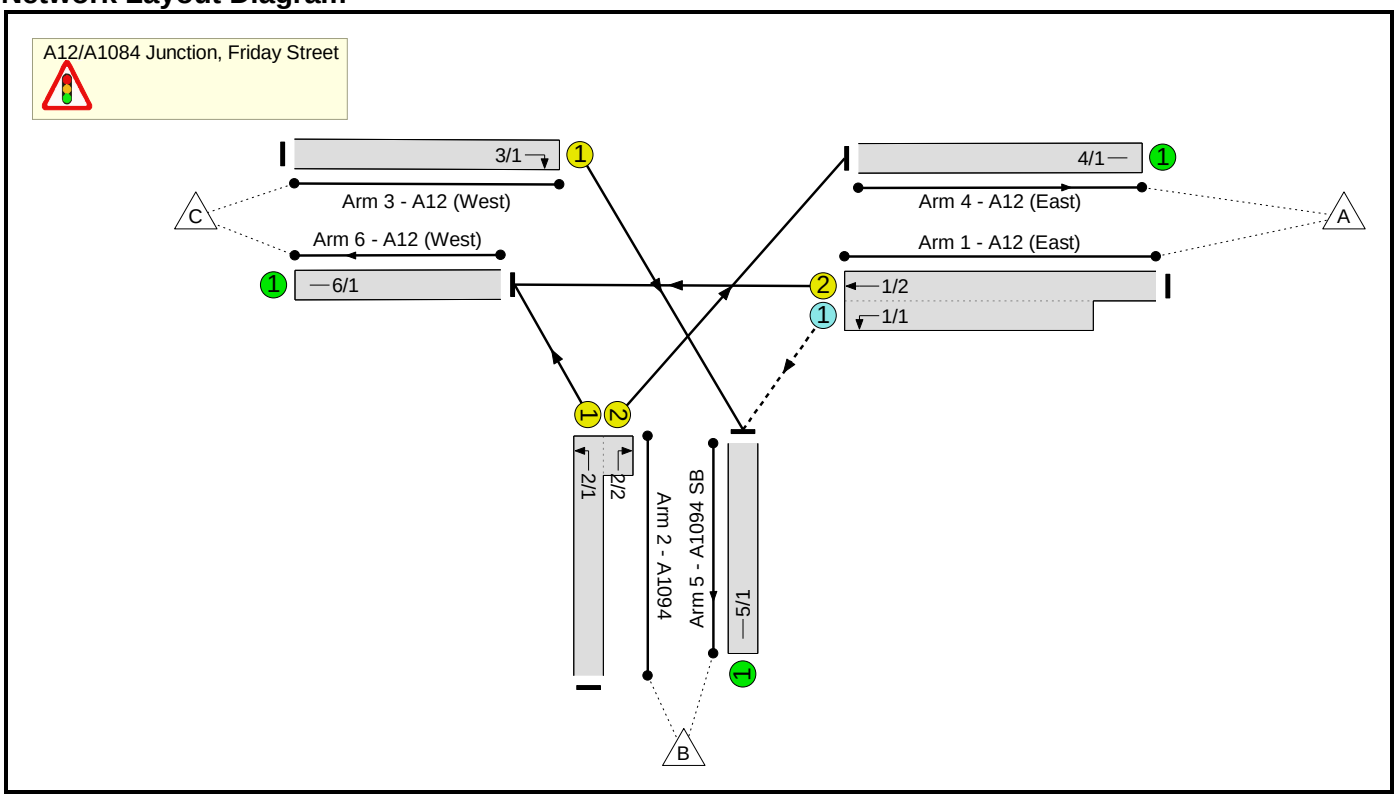
Appendix F

Full Input Data And Results

User and Project Details

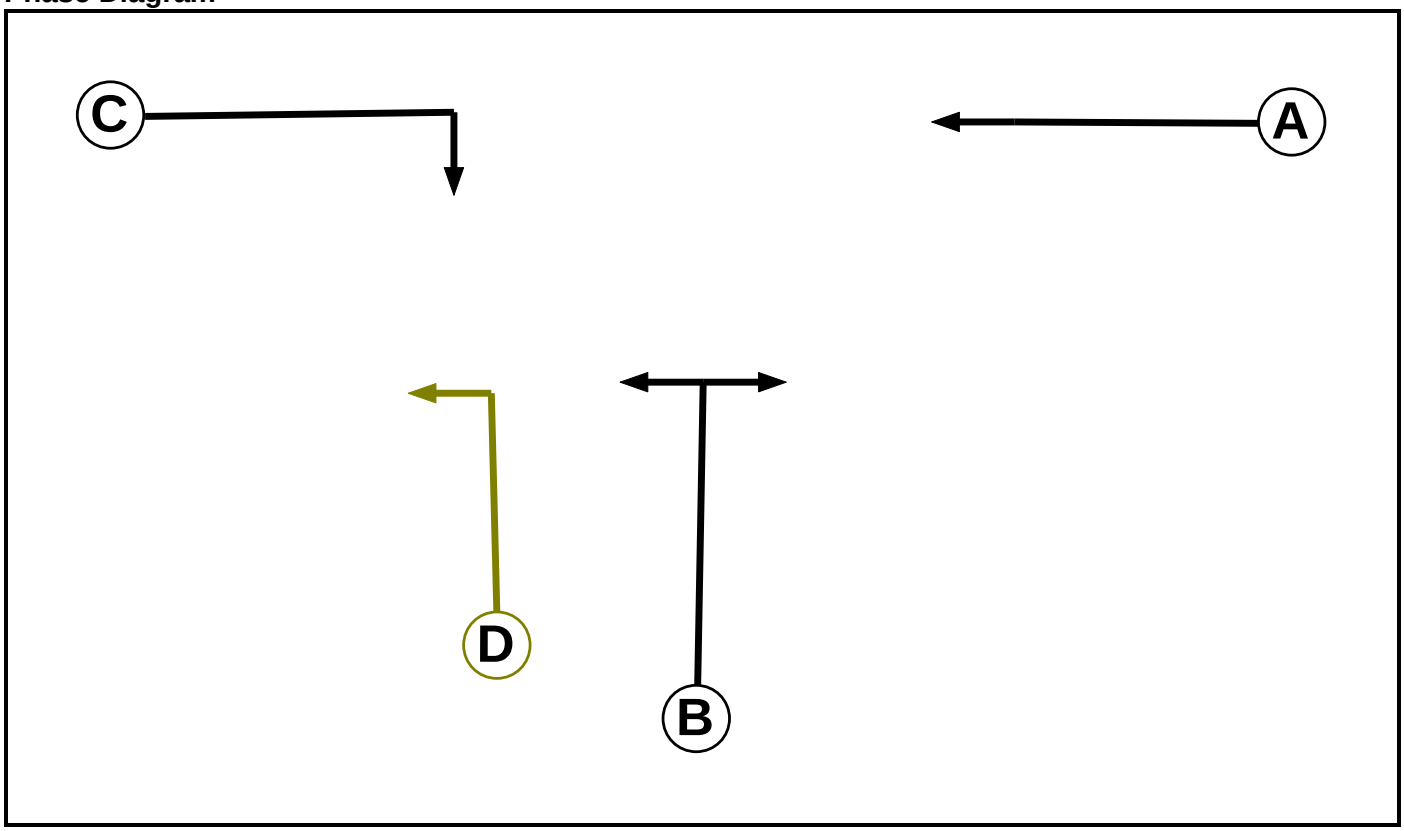
Project:	**PB4842 EA1N and EA2**
Title:	**A12/A1094, Friday Street Signalisation**
Location:	A12/A1094 Junction, Friday Street
Site Ref(s):	Friday Street
Additional detail:	
File name:	Friday Street - A1012 Left Slip (All Scenarios) .lsg3x
Author:	
Company:	Royal HaskoningDHV
Address:	

Network Layout Diagram



Full Input Data And Results

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	Filter	B	4	0

Phase Intergreens Matrix

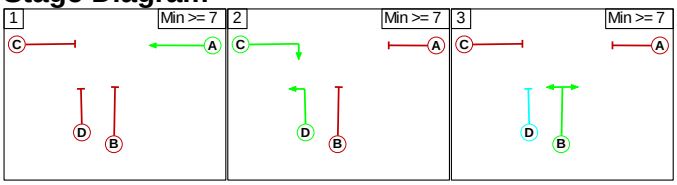
		Starting Phase			
		A	B	C	D
Terminating Phase	A		6	5	5
	B	5		5	-
	C	6	5		-
	D	5	-	-	

Phases in Stage

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

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

Full Input Data And Results

Give-Way Lane Input Data

Junction: A12/A1084 Junction, Friday Street

Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
1/1 (A12 (East))	5/1 (Left)	715	0	3/1	0.22	All	-	-	-	-	-

Full Input Data And Results

Lane Input Data

Junction: A12/A1084 Junction, Friday Street

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 (A12 (East))	O		2	3	14.3	Geom	-	2.90	0.00	Y	Arm 5 Left	19.00
1/2 (A12 (East))	U	A	2	3	60.0	Geom	-	3.65	0.00	Y	Arm 6 Ahead	Inf
2/1 (A1094)	U	B D	2	3	60.0	Geom	-	3.10	1.40	Y	Arm 6 Left	18.00
2/2 (A1094)	U	B	2	3	2.0	Geom	-	3.20	1.40	Y	Arm 4 Right	16.00
3/1 (A12 (West))	U	C	2	3	60.0	Geom	-	3.65	0.00	Y	Arm 5 Right	25.00
4/1 (A12 (East))	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1 (A1094 SB)	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (A12 (West))	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north'	07:30	08:30	01:00	
2: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north'	16:30	17:30	01:00	
3: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south'	07:30	08:30	01:00	
4: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south'	16:30	17:30	01:00	
5: 'Forecast 2023 Morning Peak'	07:30	08:30	01:00	
6: 'Forecast 2023 Evening Peak'	16:30	17:30	01:00	
7: 'Forecast 2028 Morning Peak'	07:30	08:30	01:00	
8: 'Forecast 2028 Evening Peak'	16:30	17:30	01:00	
9: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north'	07:30	08:30	01:00	
10: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north'	16:30	17:30	01:00	
11: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south'	07:30	08:30	01:00	
12: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south'	16:30	17:30	01:00	

Scenario 1: 'With Construction Traffic 100% A12 North Morning Peak' (FG1: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	112	683	795
	B	66	0	264	330
	C	0	348	0	348
	Tot.	66	460	947	1473

Traffic Lane Flows

Lane	Scenario 1: With Construction Traffic 100% A12 North Morning Peak
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	112
1/2 (with short)	795(In) 683(Out)
2/1 (with short)	330(In) 264(Out)
2/2 (short)	66
3/1	348
4/1	66
5/1	460
6/1	947

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'With Construction Traffic 100% A12 North Evening Peak' (FG2: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	84	510	594
	B	97	0	380	477
	C	0	302	0	302
	Tot.	97	386	890	1373

Traffic Lane Flows

Lane	**Scenario 2: With Construction Traffic 100% A12 North Evening Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	84
1/2 (with short)	594(In) 510(Out)
2/1 (with short)	477(In) 380(Out)
2/2 (short)	97
3/1	302
4/1	97
5/1	386
6/1	890

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 3: 'With Construction Traffic 100% A12 South Morning Peak' (FG3: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	93	691	784
	B	46	0	287	333
	C	0	371	0	371
	Tot.	46	464	978	1488

Traffic Lane Flows

Lane	**Scenario 3: With Construction Traffic 100% A12 South Morning Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	93
1/2 (with short)	784(In) 691(Out)
2/1 (with short)	333(In) 287(Out)
2/2 (short)	46
3/1	371
4/1	46
5/1	464
6/1	978

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 4: 'With Construction Traffic 100% A12 South Evening Peak' (FG4: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	65	518	583
	B	77	0	403	480
	C	0	325	0	325
	Tot.	77	390	921	1388

Traffic Lane Flows

Lane	**Scenario 4: With Construction Traffic 100% A12 South Evening Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	65
1/2 (with short)	583(In) 518(Out)
2/1 (with short)	480(In) 403(Out)
2/2 (short)	77
3/1	325
4/1	77
5/1	390
6/1	921

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 5: 'Forecast 2023 Morning Peak' (FG5: 'Forecast 2023 Morning Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	93	683	776
	B	46	0	264	310
	C	0	263	0	263
	Tot.	46	356	947	1349

Traffic Lane Flows

Lane	Scenario 5: Forecast 2023 Morning Peak
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	93
1/2 (with short)	776(In) 683(Out)
2/1 (with short)	310(In) 264(Out)
2/2 (short)	46
3/1	263
4/1	46
5/1	356
6/1	947

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 6: 'Forecast 2023 Evening Peak' (FG6: 'Forecast 2023 Evening Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	65	503	568
	B	77	0	295	372
	C	0	302	0	302
	Tot.	77	367	798	1242

Traffic Lane Flows

Lane	Scenario 6: Forecast 2023 Evening Peak
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	65
1/2 (with short)	568(In) 503(Out)
2/1 (with short)	372(In) 295(Out)
2/2 (short)	77
3/1	302
4/1	77
5/1	367
6/1	798

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 7: '2028 with Construction Traffic 100% A12 North Morning Peak' (FG9: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	118	726	844
	B	69	0	281	350
	C	0	364	0	364
	Tot.	69	482	1007	1558

Traffic Lane Flows

Lane	**Scenario 7: 2028 with Construction Traffic 100% A12 North Morning Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	118
1/2 (with short)	844(In) 726(Out)
2/1 (with short)	350(In) 281(Out)
2/2 (short)	69
3/1	364
4/1	69
5/1	482
6/1	1007

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 8: '2028 with Construction Traffic 100% A12 North Evening Peak' (FG10: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	88	539	627
	B	101	0	397	498
	C	0	320	0	320
	Tot.	101	408	936	1445

Traffic Lane Flows

Lane	**Scenario 8: 2028 with Construction Traffic 100% A12 North Evening Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	88
1/2 (with short)	627(In) 539(Out)
2/1 (with short)	498(In) 397(Out)
2/2 (short)	101
3/1	320
4/1	101
5/1	408
6/1	936

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 9: '2028 with Construction Traffic 100% A12 South Morning Peak' (FG11: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	98	734	832
	B	49	0	304	353
	C	0	388	0	388
	Tot.	49	486	1038	1573

Traffic Lane Flows

Lane	**Scenario 9: 2028 with Construction Traffic 100% A12 South Morning Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	98
1/2 (with short)	832(In) 734(Out)
2/1 (with short)	353(In) 304(Out)
2/2 (short)	49
3/1	388
4/1	49
5/1	486
6/1	1038

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 10: '2028 with Construction Traffic 100% A12 South Evening Peak' (FG12: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	69	547	616
	B	82	0	420	502
	C	0	343	0	343
	Tot.	82	412	967	1461

Traffic Lane Flows

Lane	**Scenario 10: 2028 with Construction Traffic 100% A12 South Evening Peak**
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	69
1/2 (with short)	616(In) 547(Out)
2/1 (with short)	502(In) 420(Out)
2/2 (short)	82
3/1	343
4/1	82
5/1	412
6/1	967

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 11: 'Forecast 2028 Morning Peak' (FG7: 'Forecast 2028 Morning Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	98	726	824
	B	49	0	281	330
	C	0	280	0	280
	Tot.	49	378	1007	1434

Traffic Lane Flows

Lane	Scenario 11: Forecast 2028 Morning Peak
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	98
1/2 (with short)	824(In) 726(Out)
2/1 (with short)	330(In) 281(Out)
2/2 (short)	49
3/1	280
4/1	49
5/1	378
6/1	1007

Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 12: 'Forecast 2028 Evening Peak' (FG8: 'Forecast 2028 Evening Peak', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	69	533	602
	B	82	0	313	395
	C	0	320	0	320
	Tot.	82	389	846	1317

Traffic Lane Flows

Lane	Scenario 12: Forecast 2028 Evening Peak
Junction: A12/A1084 Junction, Friday Street	
1/1 (short)	69
1/2 (with short)	602(In) 533(Out)
2/1 (with short)	395(In) 313(Out)
2/2 (short)	82
3/1	320
4/1	82
5/1	389
6/1	846

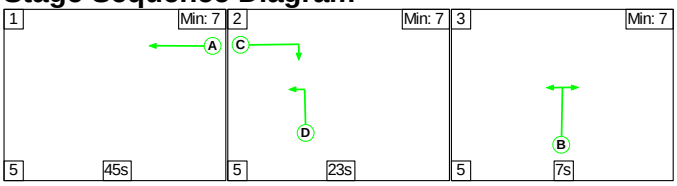
Full Input Data And Results

Lane Saturation Flows

Junction: A12/A1084 Junction, Friday Street								
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 (A12 (East))	2.90	0.00	Y	Arm 5 Left	19.00	100.0 %	1766	1766
1/2 (A12 (East))	3.65	0.00	Y	Arm 6 Ahead	Inf	100.0 %	1980	1980
2/1 (A1094)	3.10	1.40	Y	Arm 6 Left	18.00	100.0 %	1723	1723
2/2 (A1094)	3.20	1.40	Y	Arm 4 Right	16.00	100.0 %	1715	1715
3/1 (A12 (West))	3.65	0.00	Y	Arm 5 Right	25.00	100.0 %	1868	1868
4/1 (A12 (East) Lane 1)	Infinite Saturation Flow						Inf	Inf
5/1 (A1094 SB Lane 1)	Infinite Saturation Flow						Inf	Inf
6/1 (A12 (West) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'With Construction Traffic 100% A12 North Morning Peak' (FG1: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram

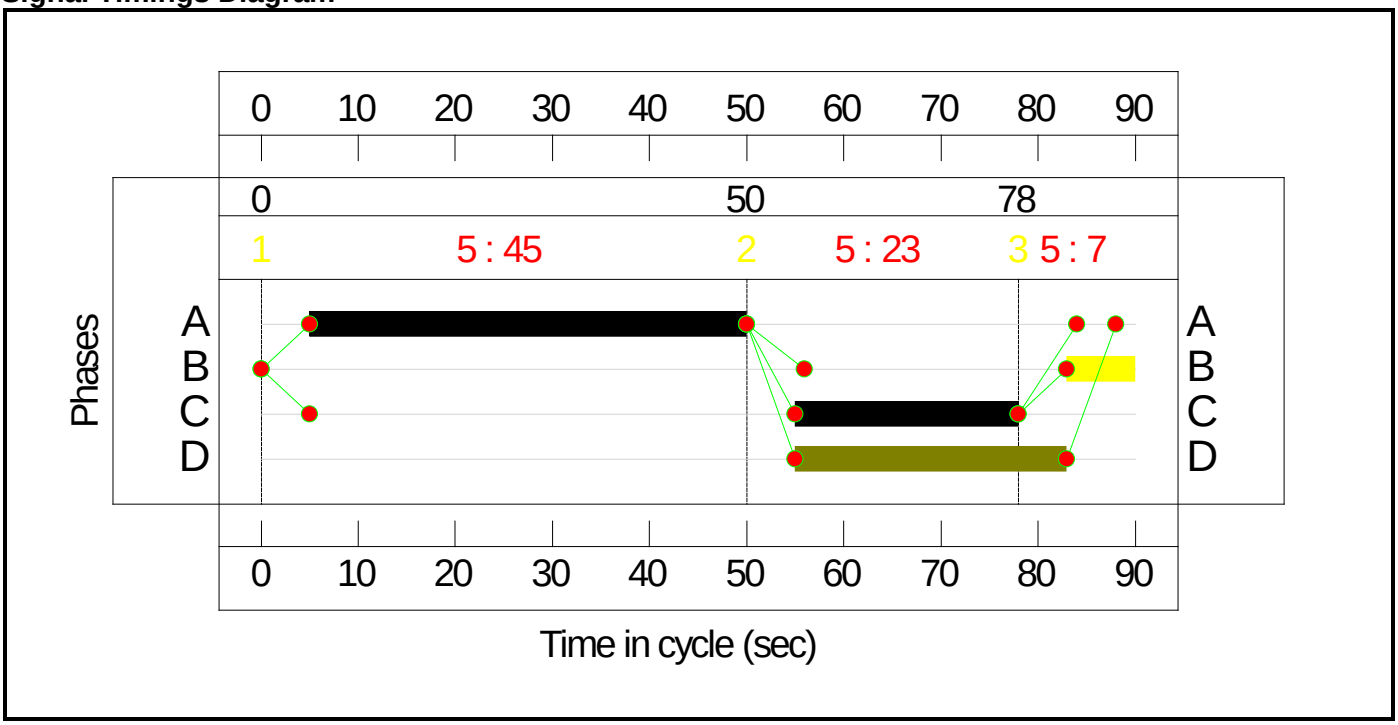


Stage Timings

Stage	1	2	3
Duration	45	23	7
Change Point	0	50	78

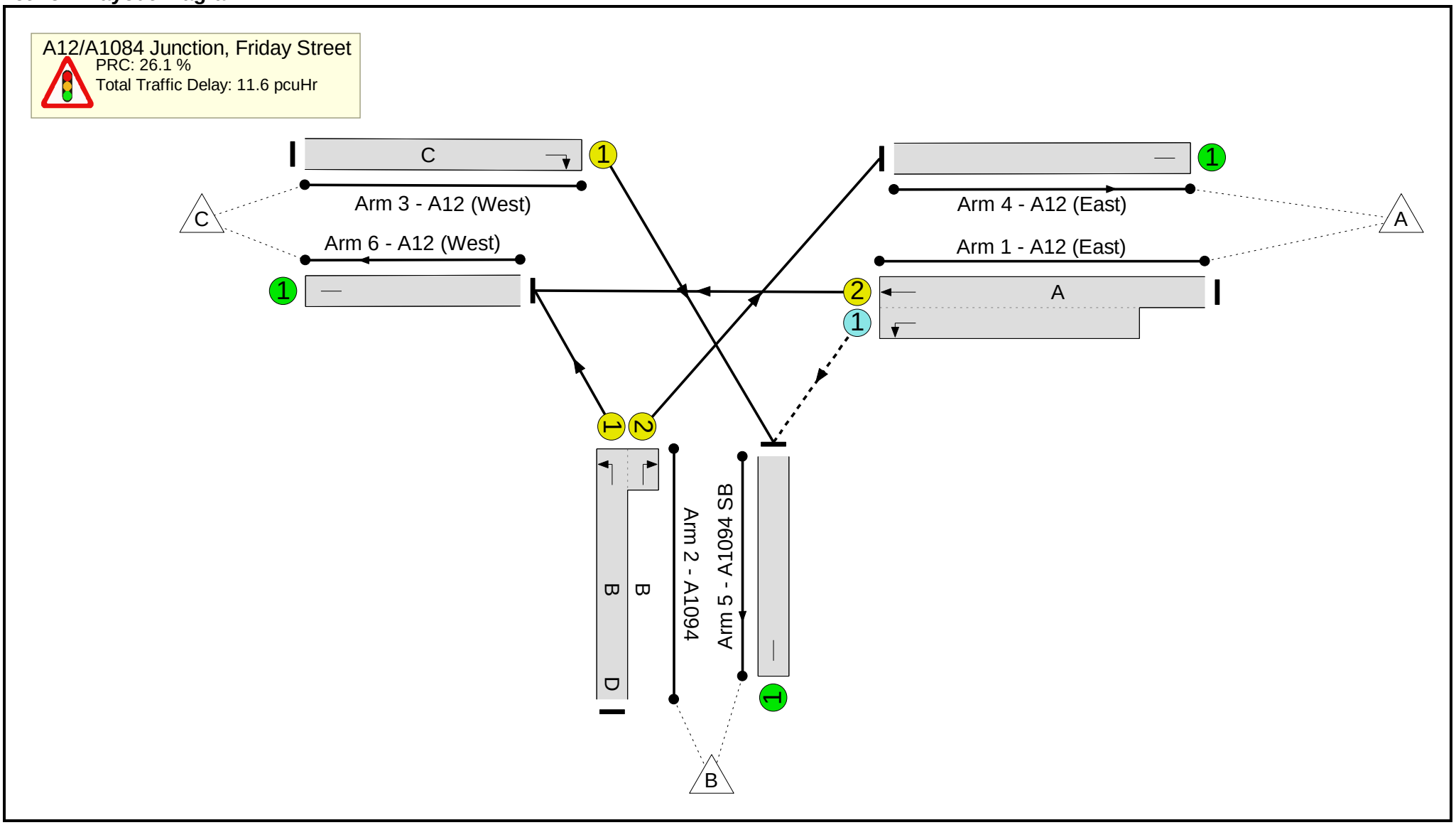
Full Input Data And Results

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**71.3%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**71.3%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	45	-	795	1980:1766	957+157	71.3 : 71.3%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	35:7	28	330	1723:1715	381+95	69.3 : 69.3%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	348	1868	498	69.9%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	66	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	460	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	947	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**30**	**82**	**0**	**8.1**	**3.5**	**0.0**	**11.6**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**30**	**82**	**0**	**8.1**	**3.5**	**0.0**	**11.6**	**-**	**-**	**-**	**-**
1/2+1/1	795	795	30	82	0	3.1	1.2	-	4.4	19.7	12.7	1.2	13.9
2/1+2/2	330	330	-	-	-	2.1	1.1	-	3.2	35.4	5.5	1.1	6.6
3/1	348	348	-	-	-	2.9	1.1	-	4.0	41.6	7.8	1.1	9.0
4/1	66	66	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	460	460	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	947	947	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

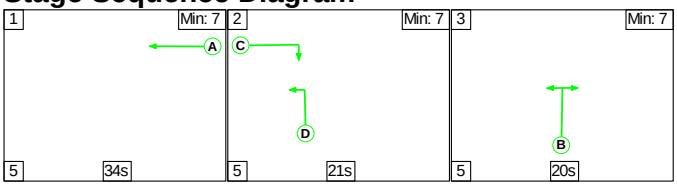
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	26.1	Total Delay for Signalled Lanes (pcuHr):	11.61	Cycle Time (s):	90	
	PRC Over All Lanes (%):	26.1	Total Delay Over All Lanes(pcuHr):	11.61			

Full Input Data And Results

Scenario 2: 'With Construction Traffic 100% A12 North Evening Peak' (FG2: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

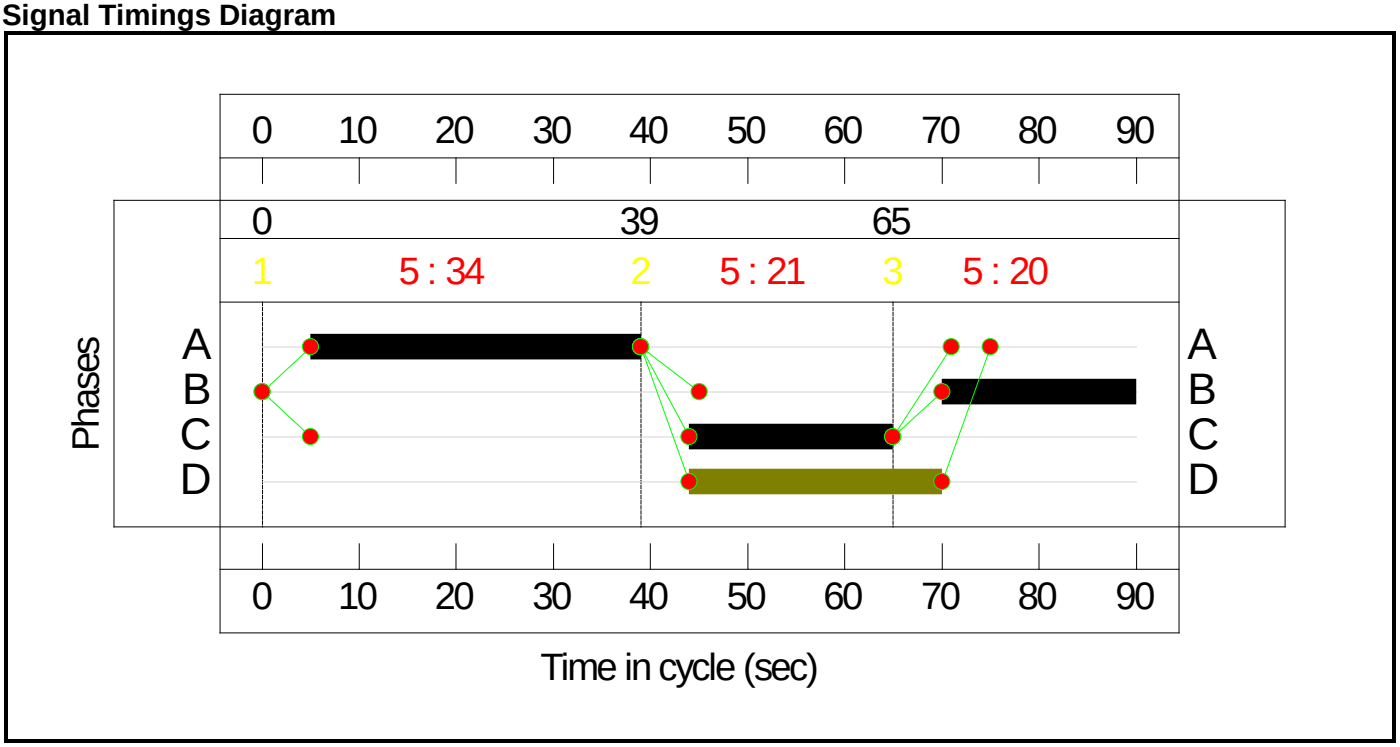
Stage Sequence Diagram



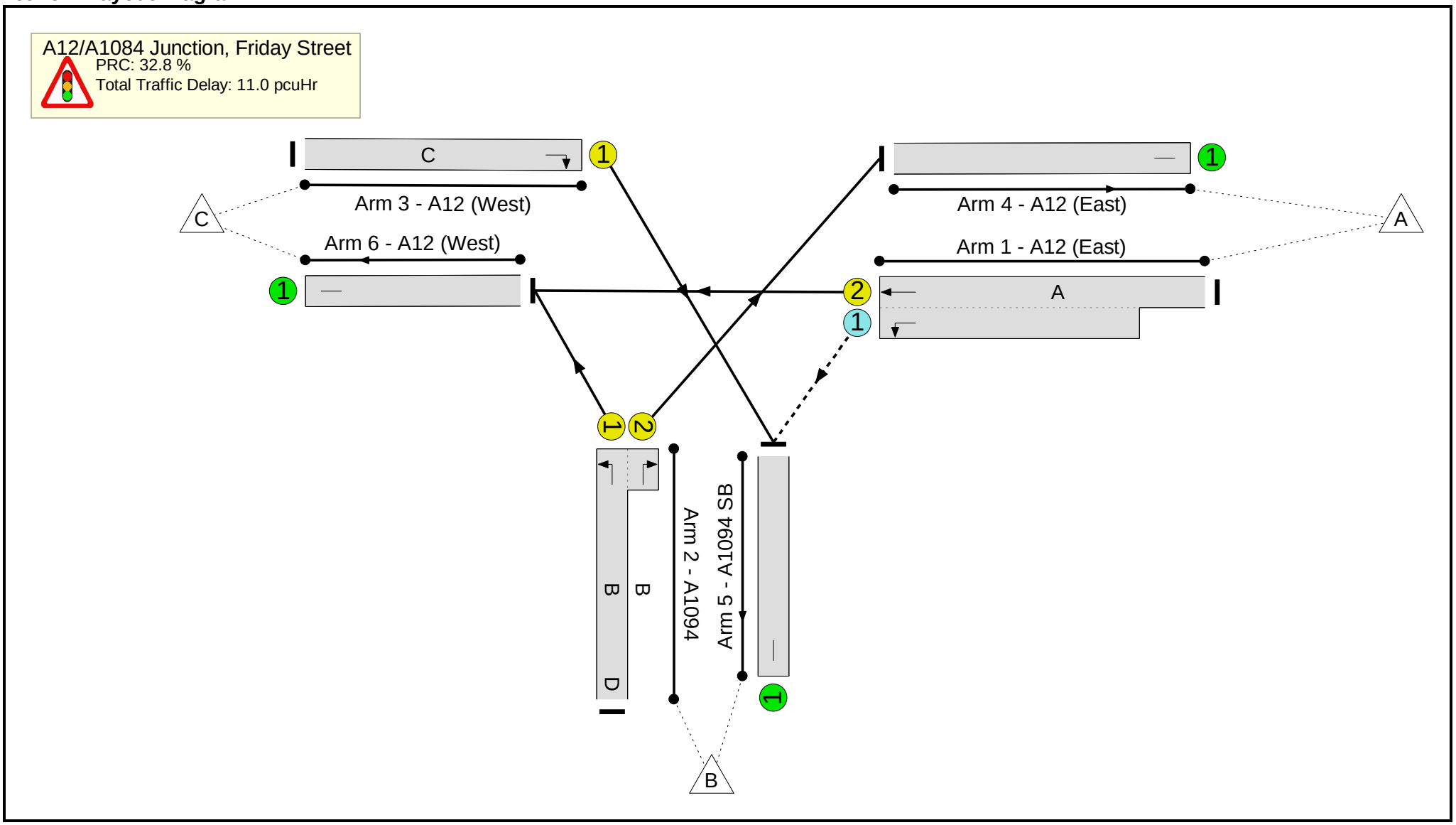
Stage Timings

Stage	1	2	3
Duration	34	21	20
Change Point	0	39	65

Signal Timings Diagram



Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**67.7%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**67.7%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	34	-	594	1980:1766	753+124	67.7 : 67.7%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	46:20	26	477	1723:1715	572+146	66.4 : 66.4%
3/1	A12 (West) Right	U	N/A	N/A	C		1	21	-	302	1868	457	66.1%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	97	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	386	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	890	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**21**	**63**	**0**	**8.0**	**3.0**	**0.0**	**11.0**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**21**	**63**	**0**	**8.0**	**3.0**	**0.0**	**11.0**	**-**	**-**	**-**	**-**
1/2+1/1	594	594	21	63	0	3.2	1.0	-	4.2	25.8	10.5	1.0	11.5
2/1+2/2	477	477	-	-	-	2.2	1.0	-	3.2	23.9	7.0	1.0	8.0
3/1	302	302	-	-	-	2.6	1.0	-	3.5	42.1	6.8	1.0	7.8
4/1	97	97	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	386	386	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	890	890	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

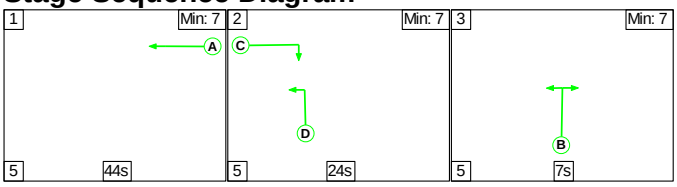
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	32.8	Total Delay for Signalled Lanes (pcuHr):	10.95	Cycle Time (s):	90	
	PRC Over All Lanes (%):	32.8	Total Delay Over All Lanes(pcuHr):	10.95			

Full Input Data And Results

Scenario 3: 'With Construction Traffic 100% A12 South Morning Peak' (FG3: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

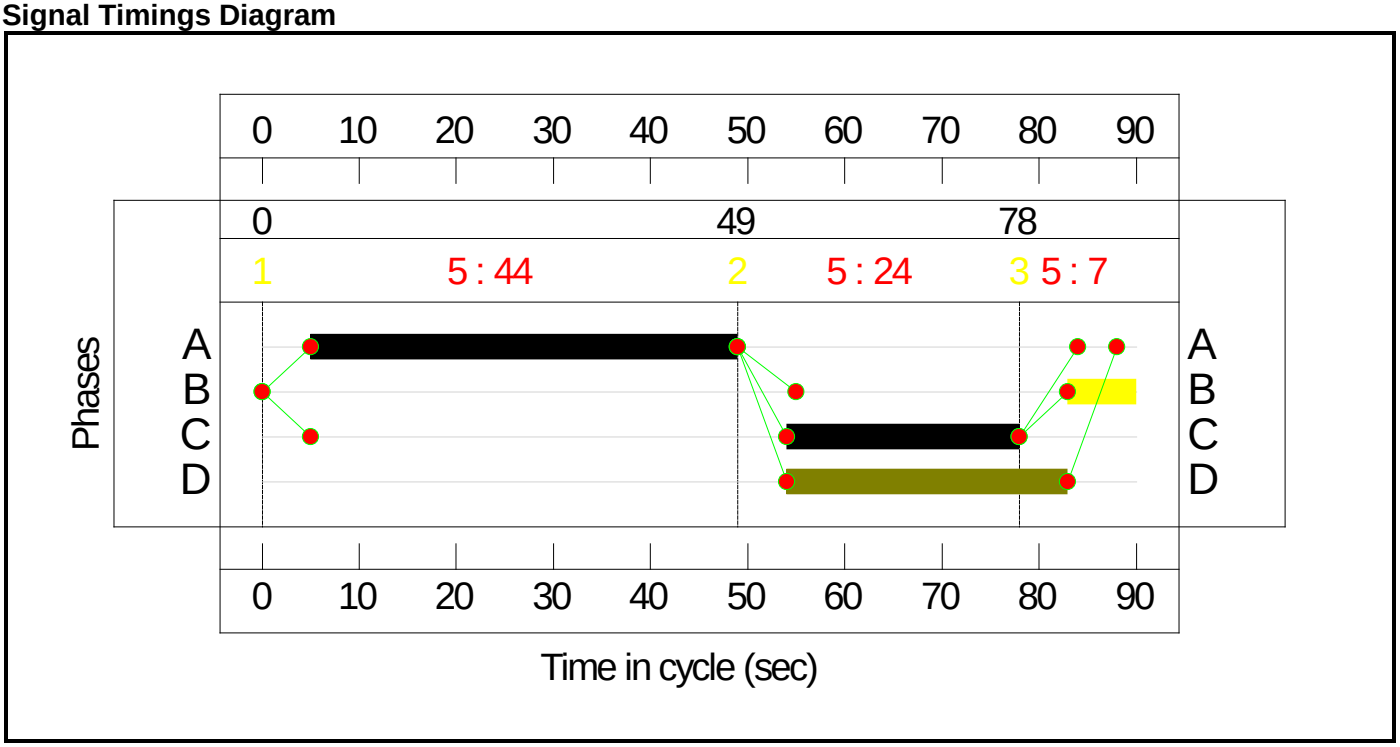
Stage Sequence Diagram



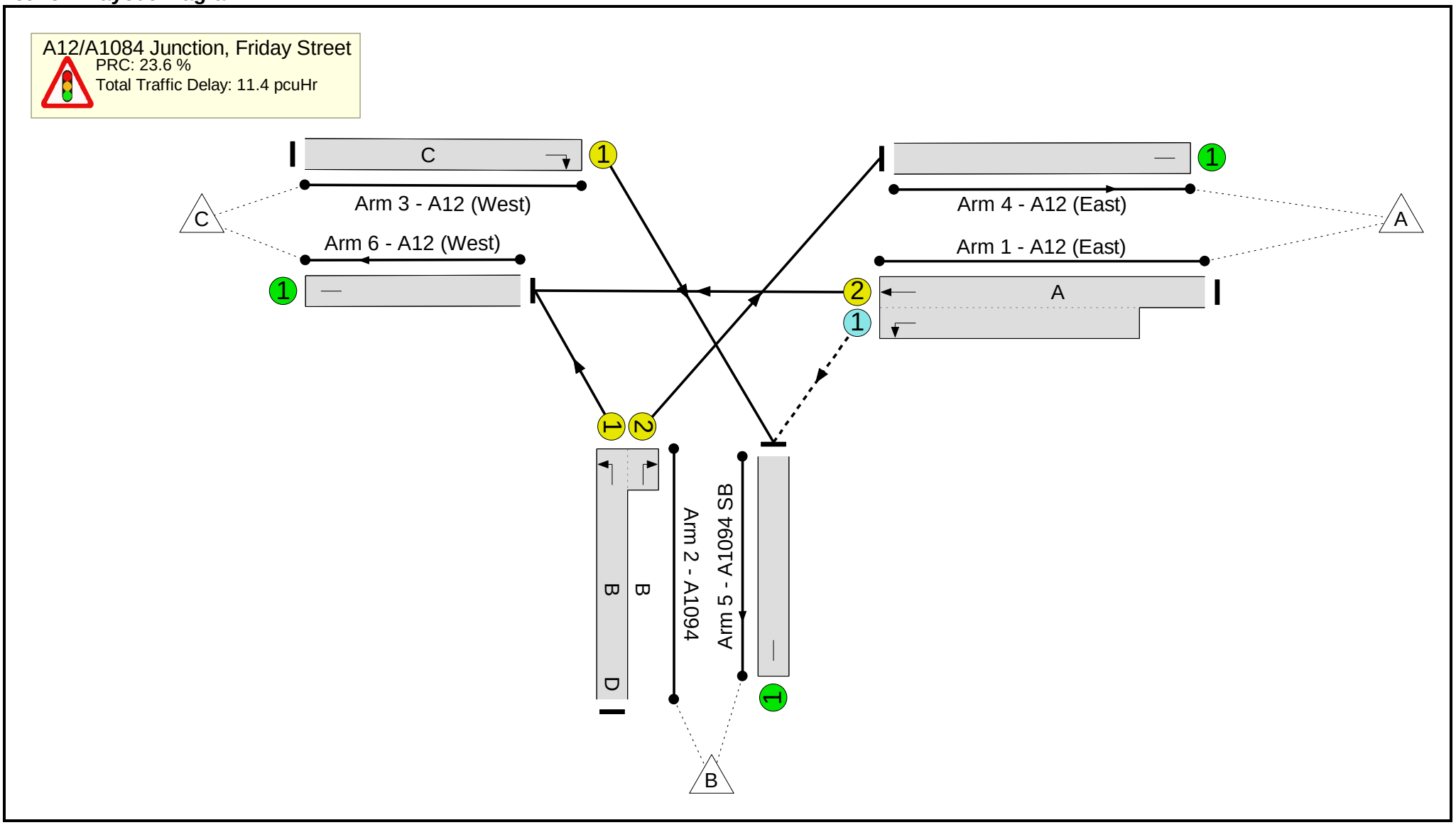
Stage Timings

Stage	1	2	3
Duration	44	24	7
Change Point	0	49	78

Signal Timings Diagram



Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**72.8%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**72.8%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	44	-	784	1980:1766	949+128	72.8 : 72.8%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	36:7	29	333	1723:1715	565+91	50.8 : 50.8%
3/1	A12 (West) Right	U	N/A	N/A	C		1	24	-	371	1868	519	71.5%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	46	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	464	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	978	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**26**	**67**	**0**	**8.3**	**3.1**	**0.0**	**11.4**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**26**	**67**	**0**	**8.3**	**3.1**	**0.0**	**11.4**	**-**	**-**	**-**	**-**
1/2+1/1	784	784	26	67	0	3.3	1.3	-	4.6	21.3	13.2	1.3	14.6
2/1+2/2	333	333	-	-	-	2.0	0.5	-	2.5	27.1	5.6	0.5	6.1
3/1	371	371	-	-	-	3.0	1.2	-	4.3	41.3	8.3	1.2	9.6
4/1	46	46	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	464	464	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	978	978	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

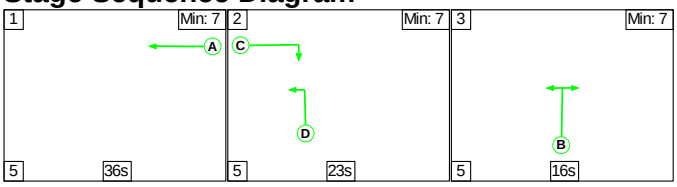
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	23.6	Total Delay for Signalled Lanes (pcuHr):	11.41	Cycle Time (s):	90	
	PRC Over All Lanes (%):	23.6	Total Delay Over All Lanes(pcuHr):	11.41			

Full Input Data And Results

Scenario 4: 'With Construction Traffic 100% A12 South Evening Peak' (FG4: 'Forecast Flows + EA2 + EA1N Construction Traffic (2023) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

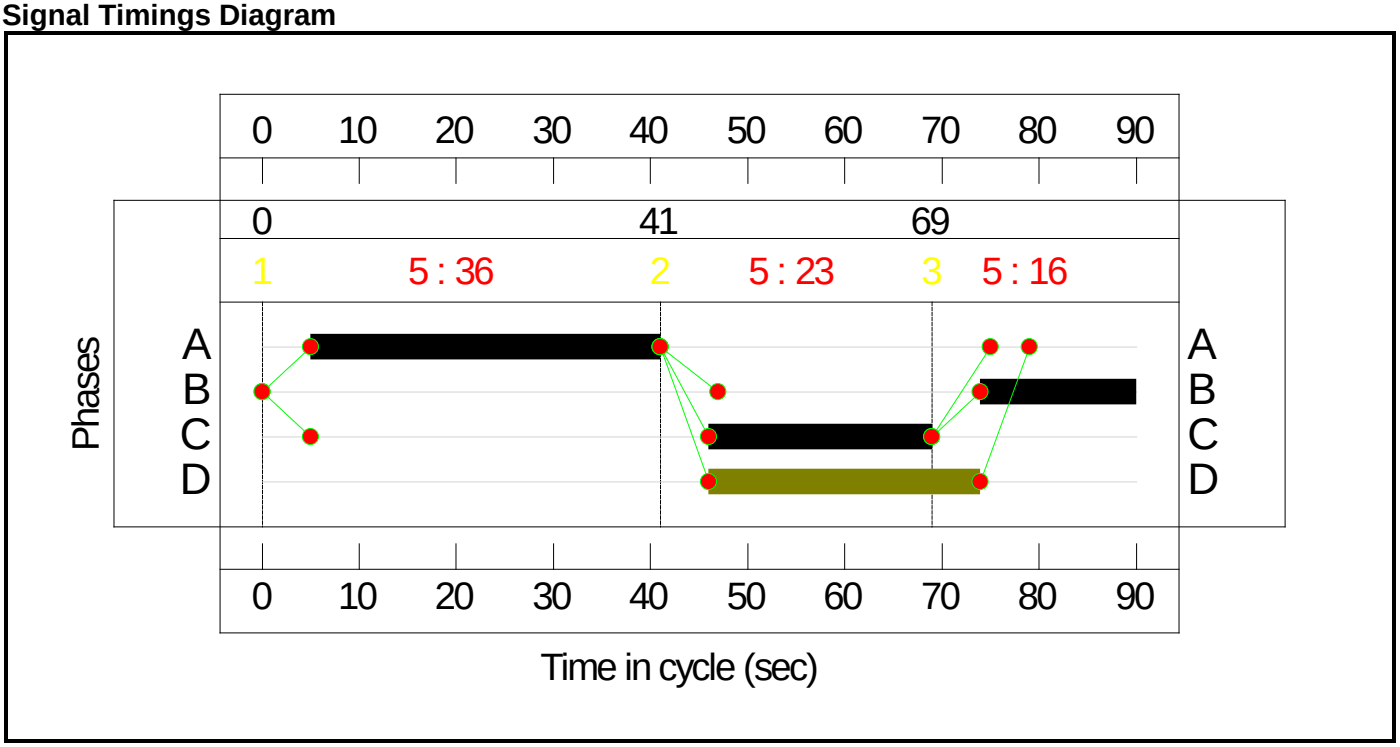
Stage Sequence Diagram



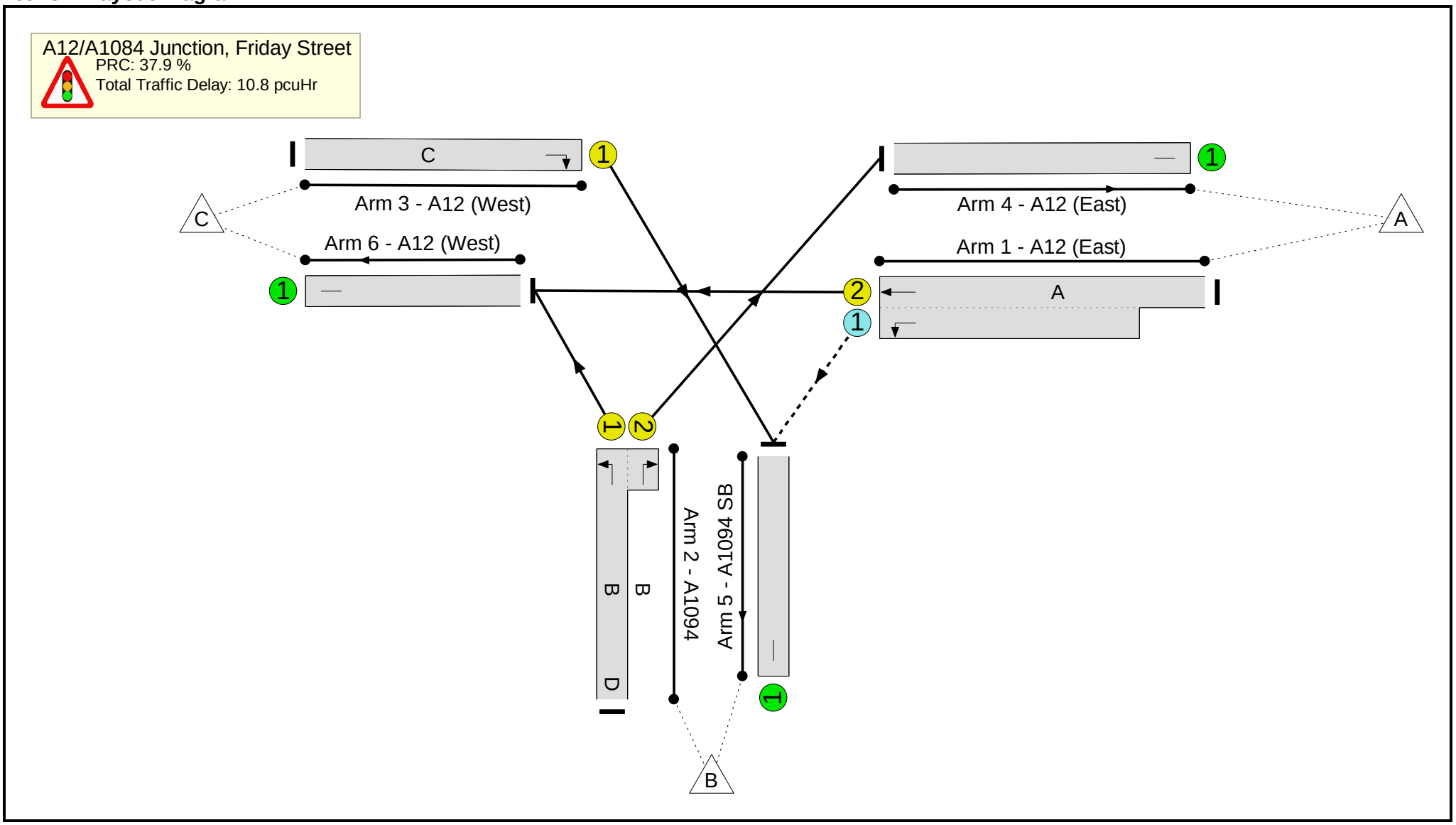
Stage Timings

Stage	1	2	3
Duration	36	23	16
Change Point	0	41	69

Signal Timings Diagram



Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.2%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.2%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	36	-	583	1980:1766	798+100	64.9 : 64.9%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	44:16	28	480	1723:1715	627+120	64.2 : 64.2%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	325	1868	498	65.2%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	77	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	390	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	921	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**17**	**48**	**0**	**8.0**	**2.7**	**0.0**	**10.8**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**17**	**48**	**0**	**8.0**	**2.7**	**0.0**	**10.8**	**-**	**-**	**-**	**-**
1/2+1/1	583	583	17	48	0	3.0	0.9	-	4.0	24.5	10.2	0.9	11.1
2/1+2/2	480	480	-	-	-	2.3	0.9	-	3.2	24.3	7.8	0.9	8.6
3/1	325	325	-	-	-	2.6	0.9	-	3.6	39.6	7.1	0.9	8.1
4/1	77	77	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	390	390	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	921	921	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

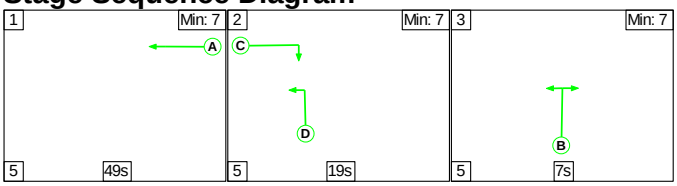
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	37.9	Total Delay for Signalled Lanes (pcuHr):	10.77	Cycle Time (s):	90
	PRC Over All Lanes (%):	37.9	Total Delay Over All Lanes(pcuHr):	10.77		

Full Input Data And Results

Scenario 5: 'Forecast 2023 Morning Peak' (FG5: 'Forecast 2023 Morning Peak', Plan 1: 'Network Control Plan 1')

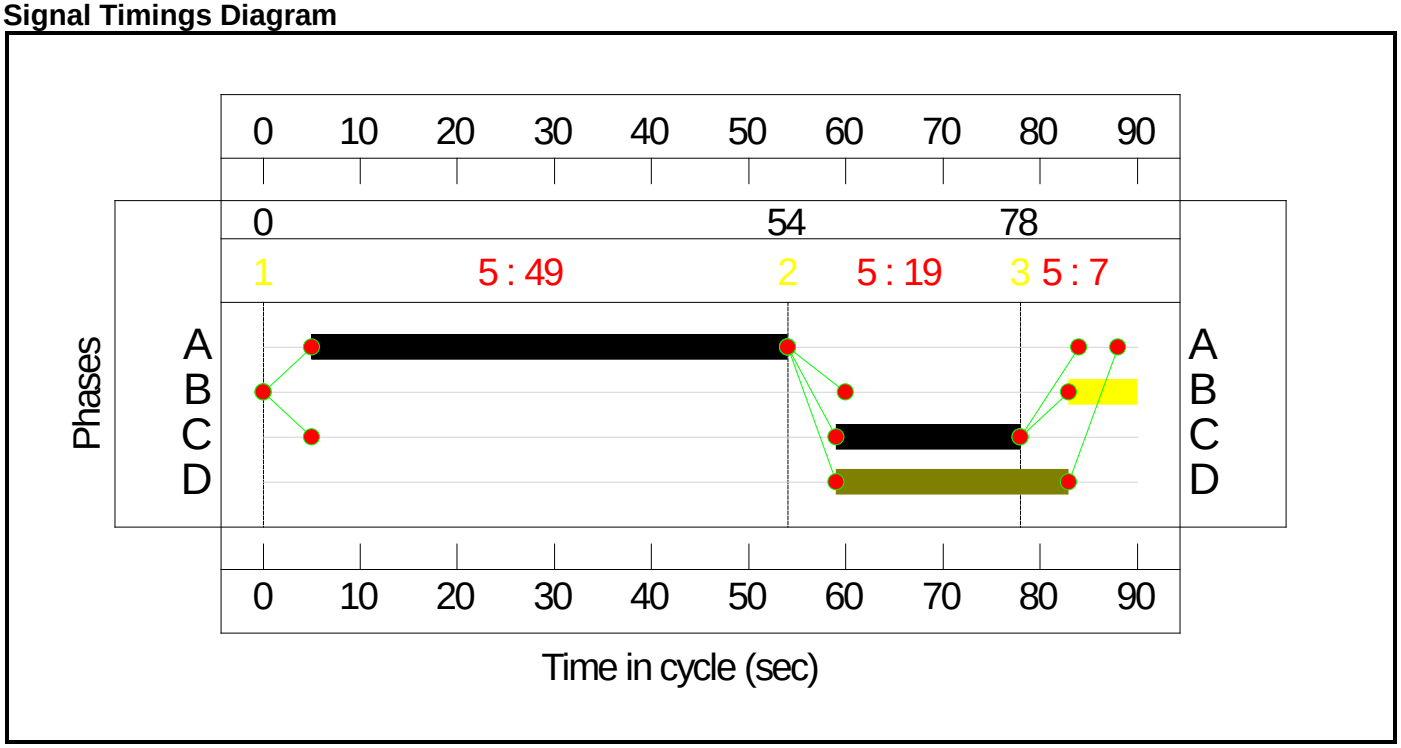
Stage Sequence Diagram



Stage Timings

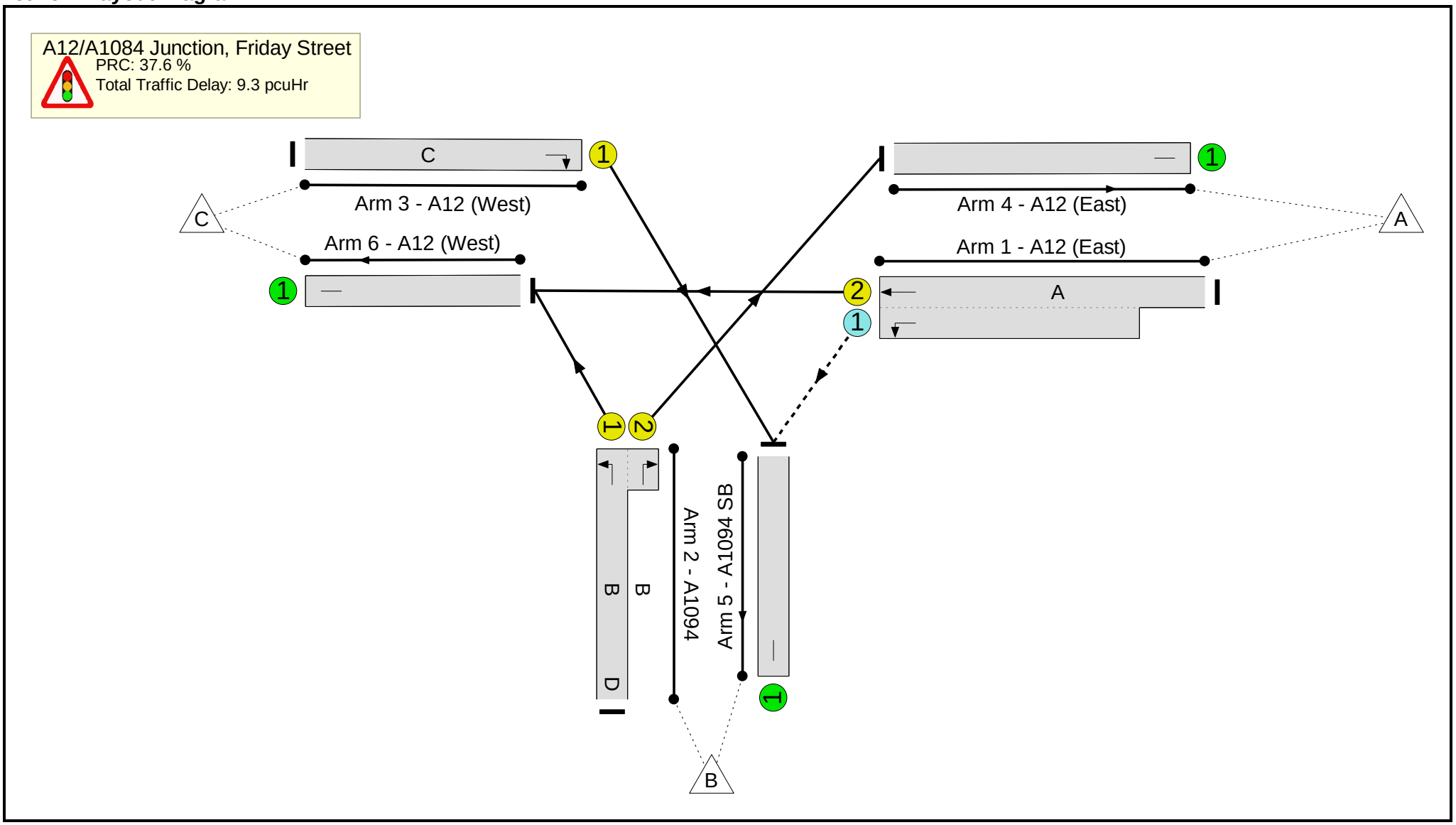
Stage	1	2	3
Duration	49	19	7
Change Point	0	54	78

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.4%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.4%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	49	-	776	1980:1766	1044+142	65.4 : 65.4%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	31:7	24	310	1723:1715	518+90	50.9 : 50.9%
3/1	A12 (West) Right	U	N/A	N/A	C		1	19	-	263	1868	415	63.4%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	46	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	356	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	947	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**21**	**72**	**0**	**7.0**	**2.3**	**0.0**	**9.3**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**21**	**72**	**0**	**7.0**	**2.3**	**0.0**	**9.3**	**-**	**-**	**-**	**-**
1/2+1/1	776	776	21	72	0	2.6	0.9	-	3.5	16.3	11.6	0.9	12.5
2/1+2/2	310	310	-	-	-	2.1	0.5	-	2.6	30.7	5.6	0.5	6.1
3/1	263	263	-	-	-	2.3	0.9	-	3.2	43.4	5.9	0.9	6.8
4/1	46	46	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	356	356	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	947	947	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

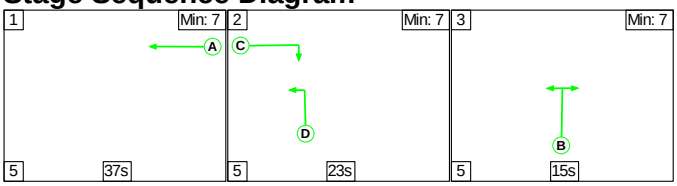
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	37.6	Total Delay for Signalled Lanes (pcuHr):	9.33	Cycle Time (s):	90	
	PRC Over All Lanes (%):	37.6	Total Delay Over All Lanes(pcuHr):	9.33			

Full Input Data And Results

Scenario 6: 'Forecast 2023 Evening Peak' (FG6: 'Forecast 2023 Evening Peak', Plan 1: 'Network Control Plan 1')

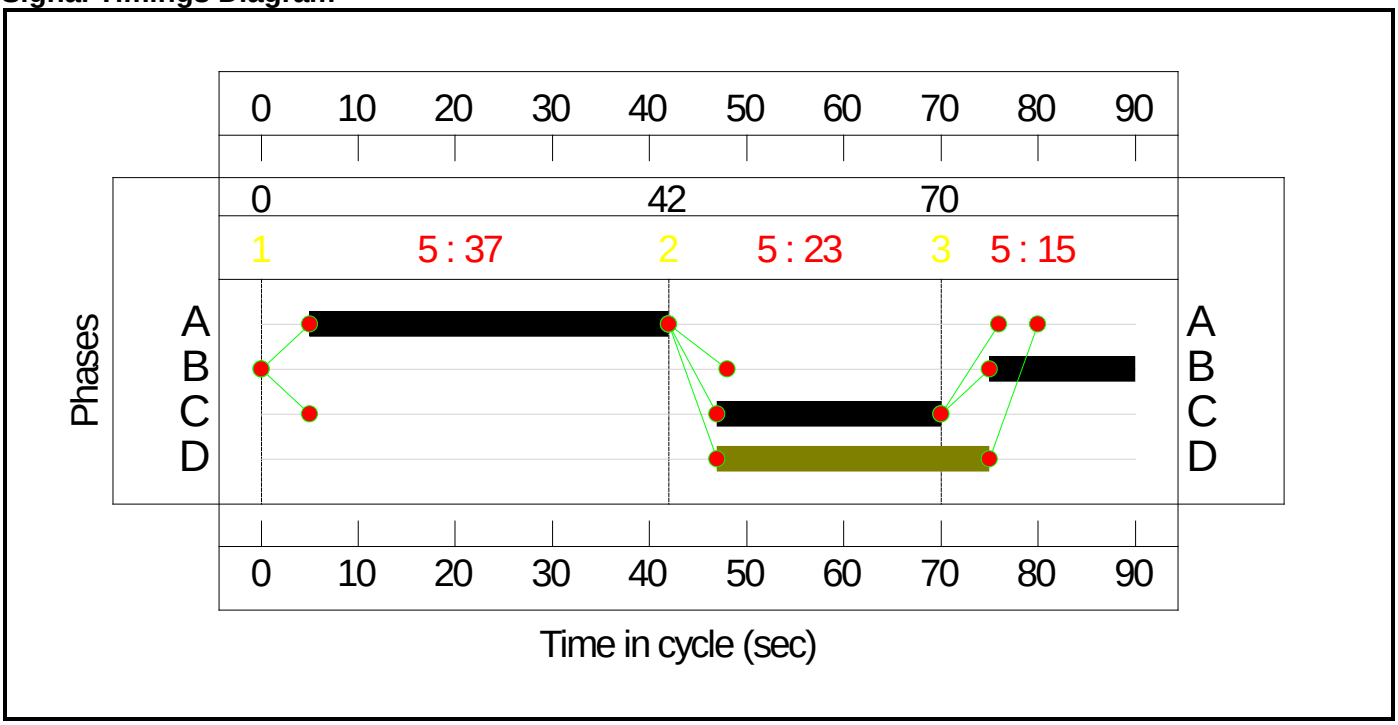
Stage Sequence Diagram



Stage Timings

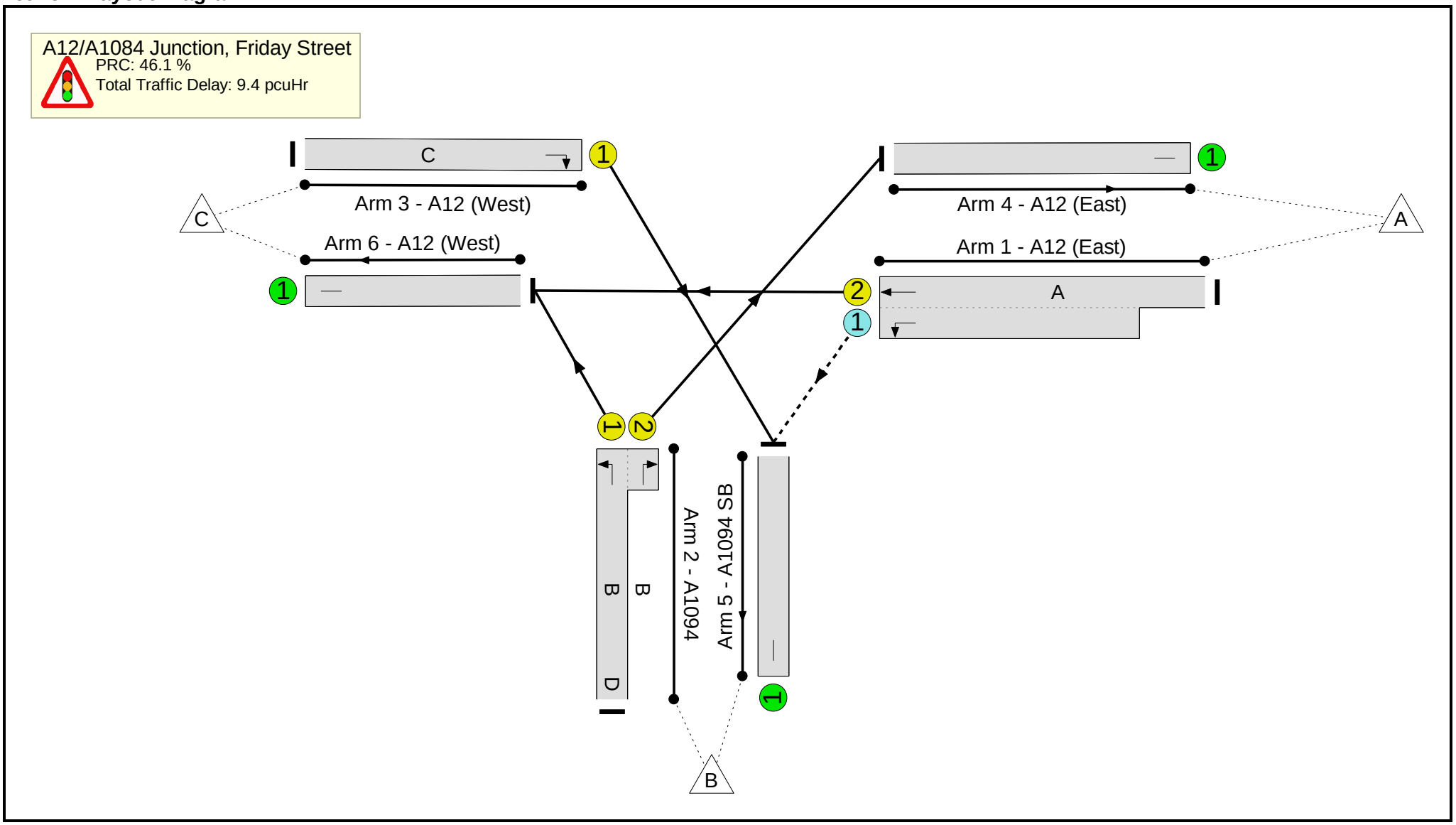
Stage	1	2	3
Duration	37	23	15
Change Point	0	42	70

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**61.6%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**61.6%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	37	-	568	1980:1766	817+106	61.6 : 61.6%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	43:15	28	372	1723:1715	488+128	60.4 : 60.4%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	302	1868	498	60.6%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	77	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	367	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	798	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**17**	**48**	**0**	**7.1**	**2.3**	**0.0**	**9.4**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**17**	**48**	**0**	**7.1**	**2.3**	**0.0**	**9.4**	**-**	**-**	**-**	**-**
1/2+1/1	568	568	17	48	0	2.8	0.8	-	3.6	22.9	9.6	0.8	10.4
2/1+2/2	372	372	-	-	-	1.9	0.8	-	2.6	25.3	5.4	0.8	6.1
3/1	302	302	-	-	-	2.4	0.8	-	3.2	38.0	6.5	0.8	7.3
4/1	77	77	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	367	367	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	798	798	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

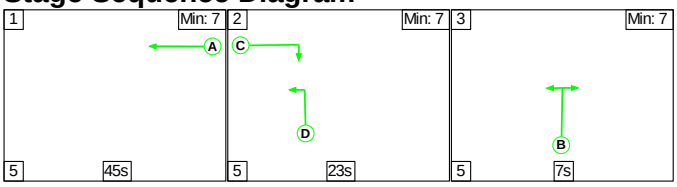
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	46.1	Total Delay for Signalled Lanes (pcuHr):	9.42	Cycle Time (s):	90	
	PRC Over All Lanes (%):	46.1	Total Delay Over All Lanes(pcuHr):	9.42			

Full Input Data And Results

Scenario 7: '2028 with Construction Traffic 100% A12 North Morning Peak' (FG9: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

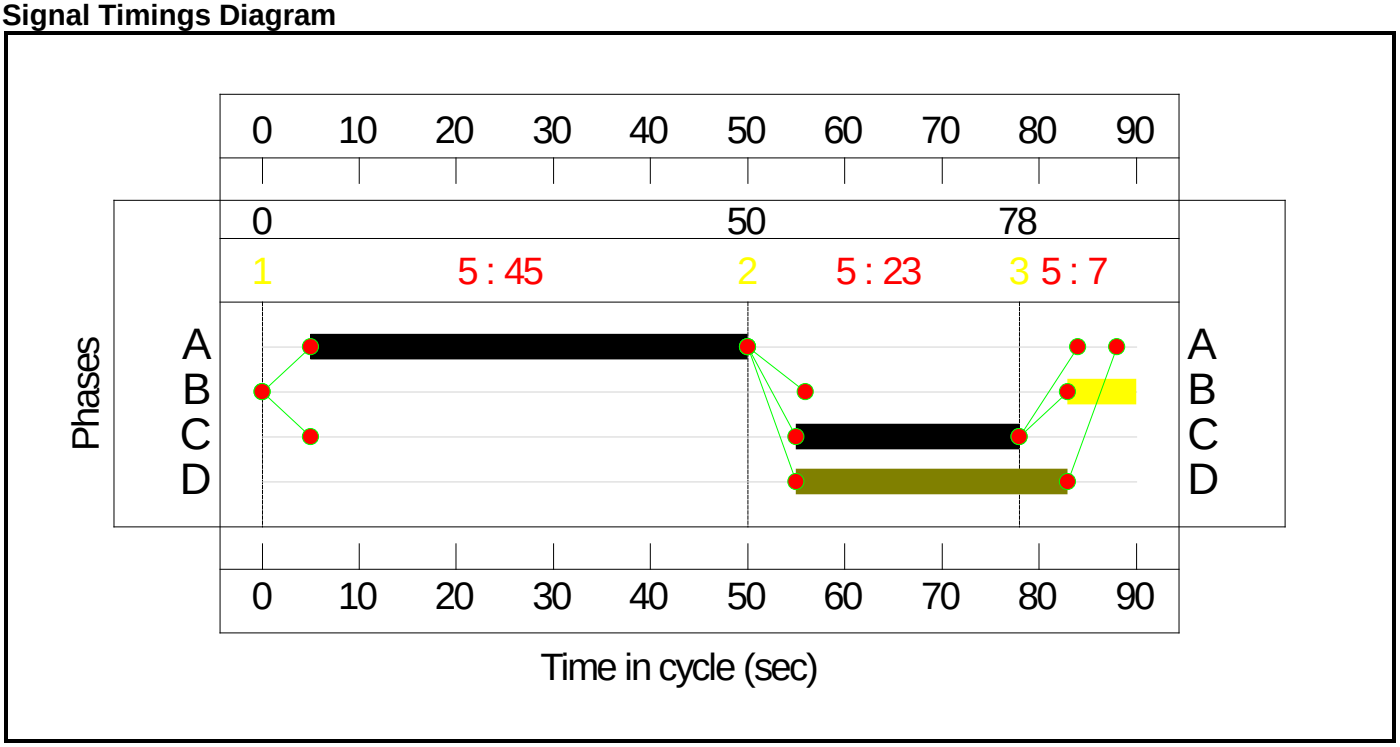
Stage Sequence Diagram



Stage Timings

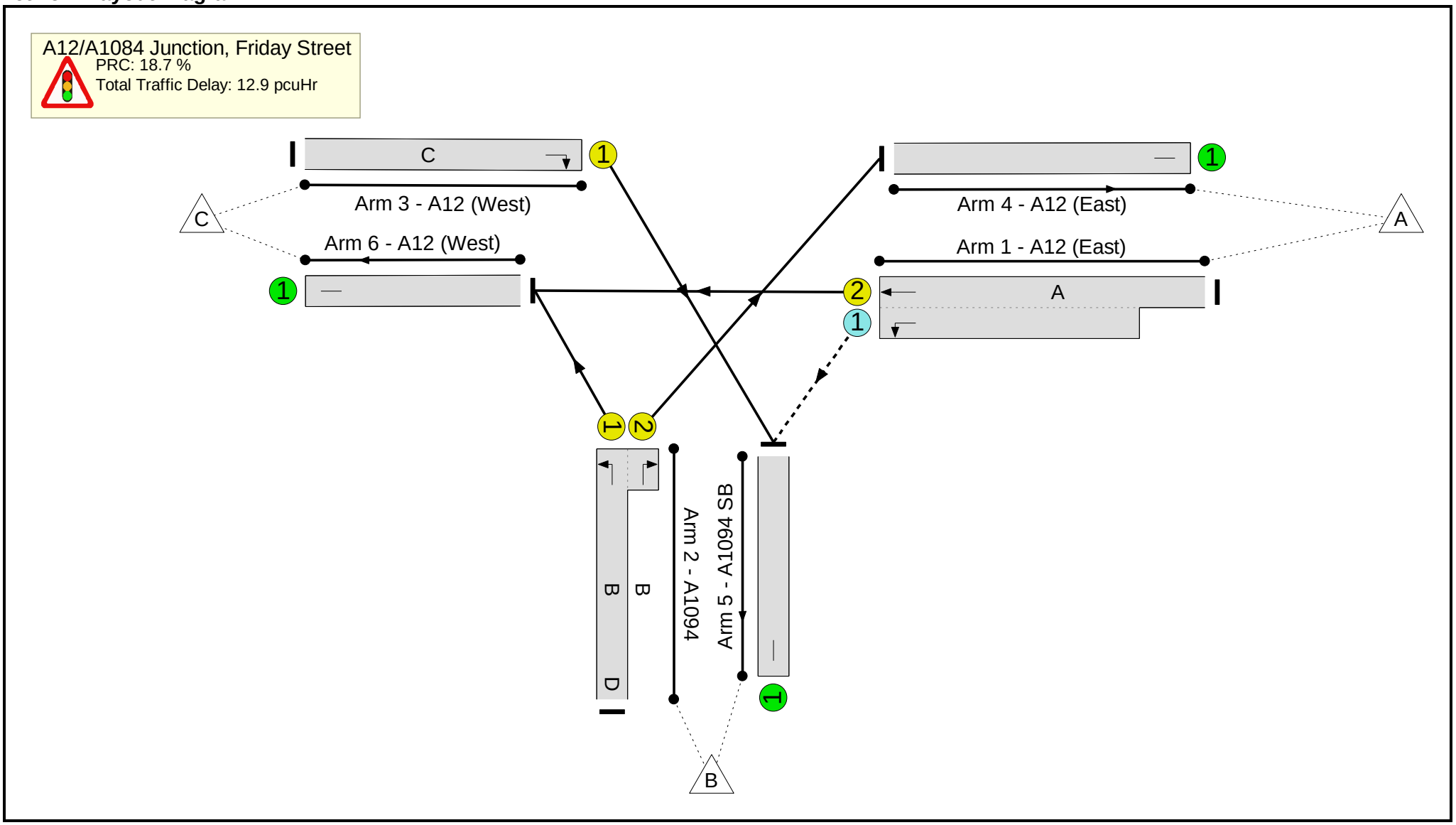
Stage	1	2	3
Duration	45	23	7
Change Point	0	50	78

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.8%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**75.8%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	45	-	844	1980:1766	958+156	75.8 : 75.8%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	35:7	28	350	1723:1715	387+95	72.6 : 72.6%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	364	1868	498	73.1%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	69	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	482	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	1007	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**31**	**87**	**0**	**8.7**	**4.2**	**0.0**	**12.9**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**31**	**87**	**0**	**8.7**	**4.2**	**0.0**	**12.9**	**-**	**-**	**-**	**-**
1/2+1/1	844	844	31	87	0	3.4	1.5	-	5.0	21.2	13.9	1.5	15.5
2/1+2/2	350	350	-	-	-	2.3	1.3	-	3.6	36.8	5.9	1.3	7.2
3/1	364	364	-	-	-	3.0	1.3	-	4.4	43.2	8.2	1.3	9.5
4/1	69	69	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	482	482	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1007	1007	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

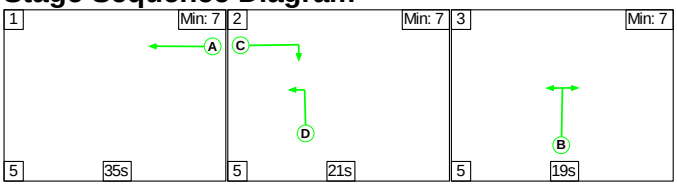
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	18.7	Total Delay for Signalled Lanes (pcuHr):	12.92	Cycle Time (s):	90	
	PRC Over All Lanes (%):	18.7	Total Delay Over All Lanes(pcuHr):	12.92			

Full Input Data And Results

Scenario 8: '2028 with Construction Traffic 100% A12 North Evening Peak' (FG10: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 north', Plan 1: 'Network Control Plan 1')

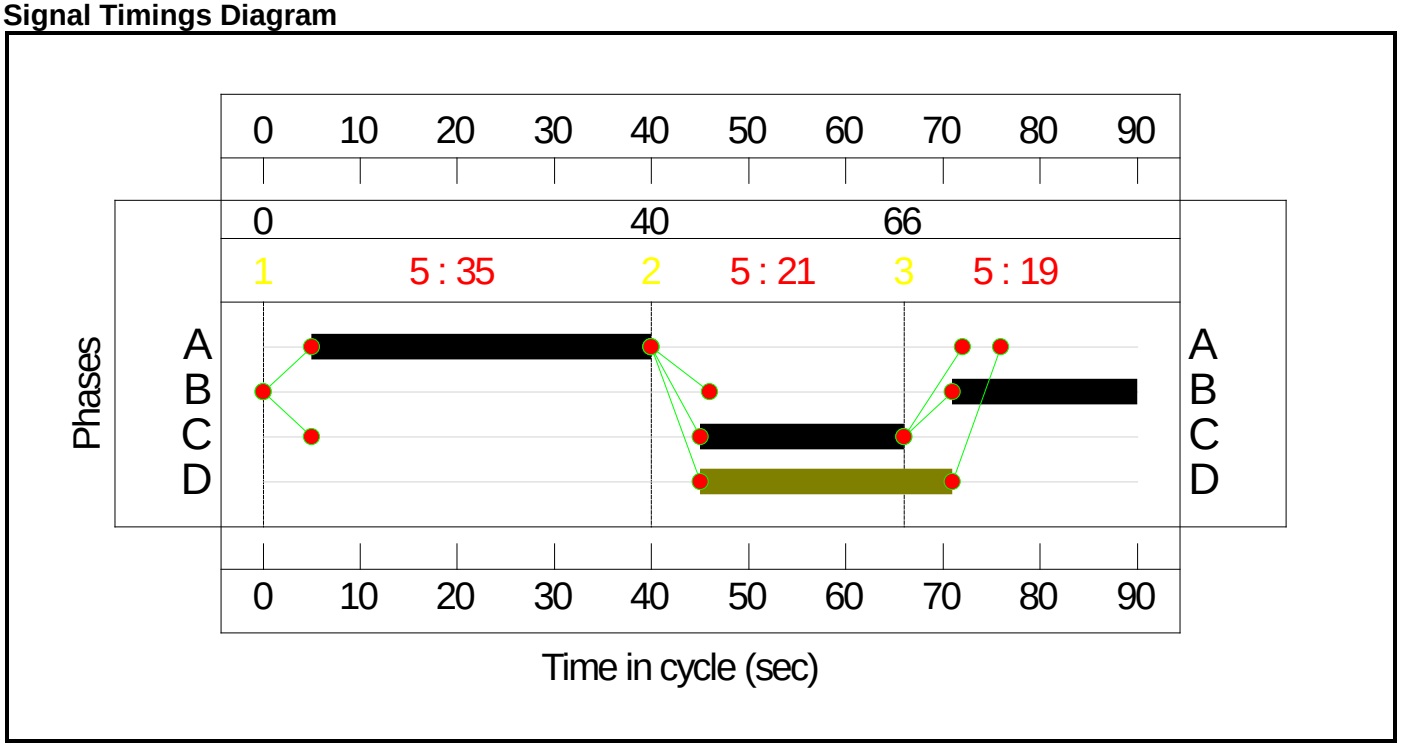
Stage Sequence Diagram



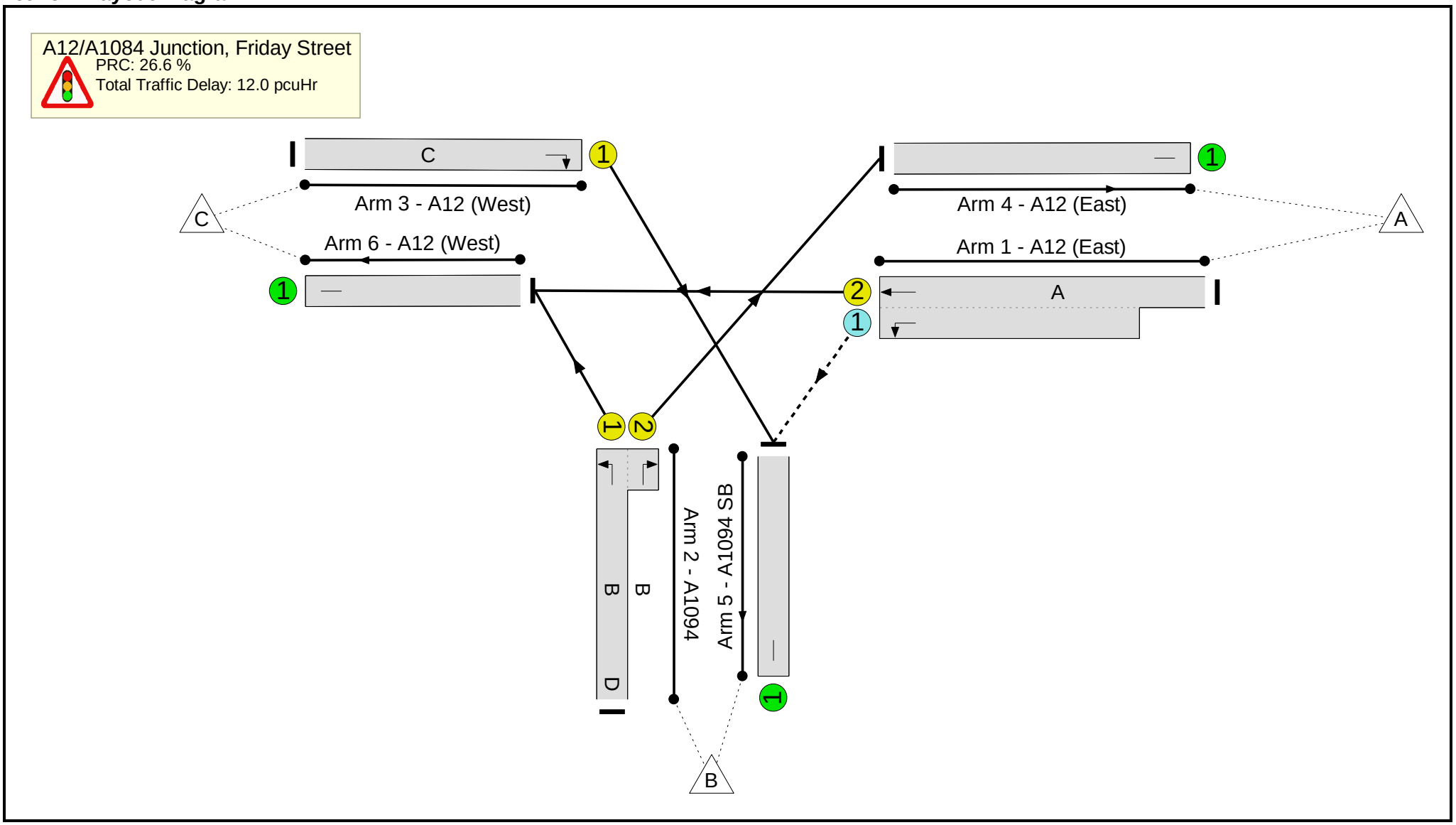
Stage Timings

Stage	1	2	3
Duration	35	21	19
Change Point	0	40	66

Signal Timings Diagram



Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**71.1%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**71.1%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	35	-	627	1980:1766	772+126	69.9 : 69.9%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	45:19	26	498	1723:1715	558+142	71.1 : 71.1%
3/1	A12 (West) Right	U	N/A	N/A	C		1	21	-	320	1868	457	70.1%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	101	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	408	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	936	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**22**	**66**	**0**	**8.5**	**3.5**	**0.0**	**12.0**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**22**	**66**	**0**	**8.5**	**3.5**	**0.0**	**12.0**	**-**	**-**	**-**	**-**
1/2+1/1	627	627	22	66	0	3.3	1.1	-	4.5	25.7	11.1	1.1	12.2
2/1+2/2	498	498	-	-	-	2.4	1.2	-	3.6	26.2	7.8	1.2	9.0
3/1	320	320	-	-	-	2.8	1.2	-	3.9	44.0	7.3	1.2	8.4
4/1	101	101	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	408	408	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	936	936	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

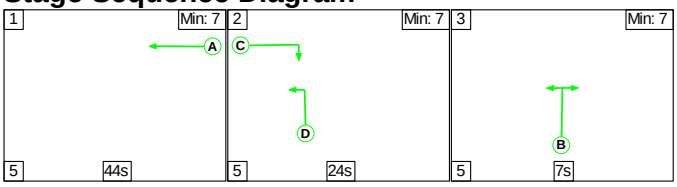
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	26.6	Total Delay for Signalled Lanes (pcuHr):	12.02	Cycle Time (s):	90	
	PRC Over All Lanes (%):	26.6	Total Delay Over All Lanes(pcuHr):	12.02			

Full Input Data And Results

Scenario 9: '2028 with Construction Traffic 100% A12 South Morning Peak' (FG11: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

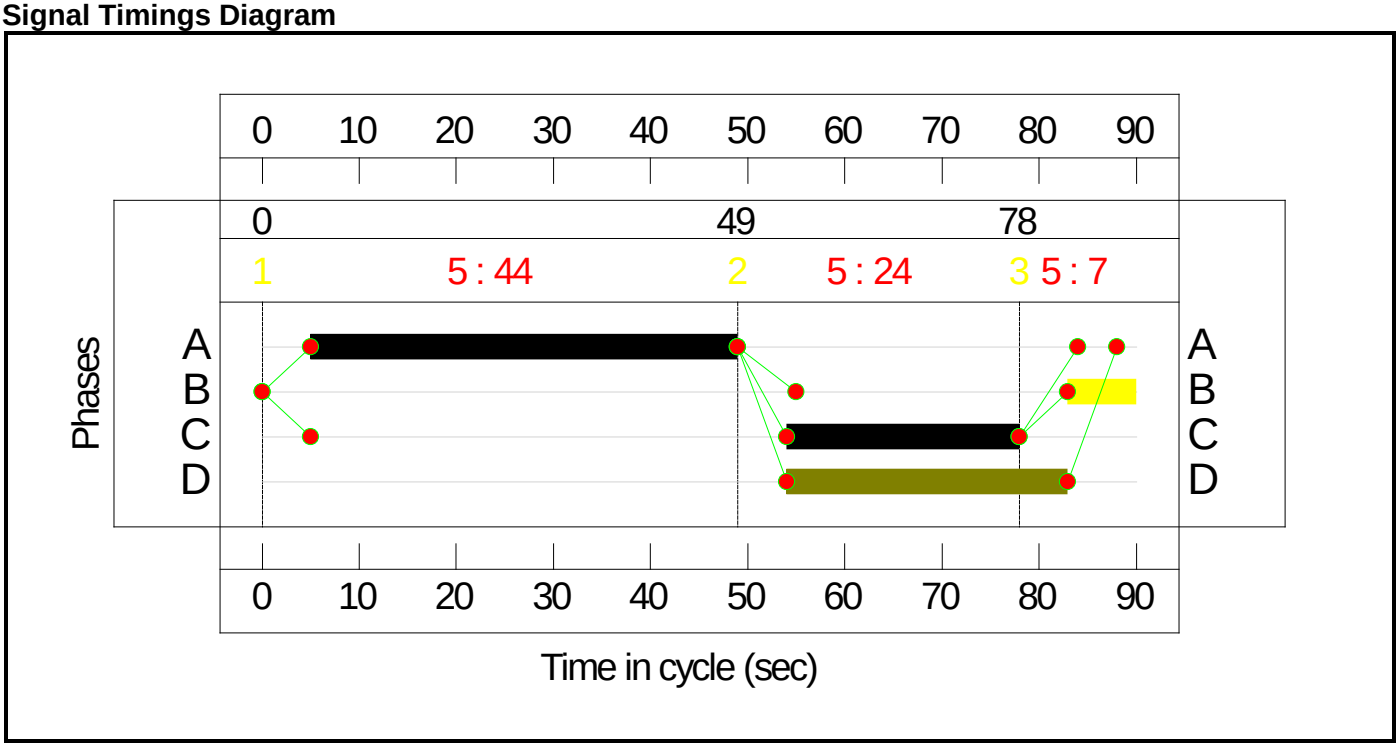
Stage Sequence Diagram



Stage Timings

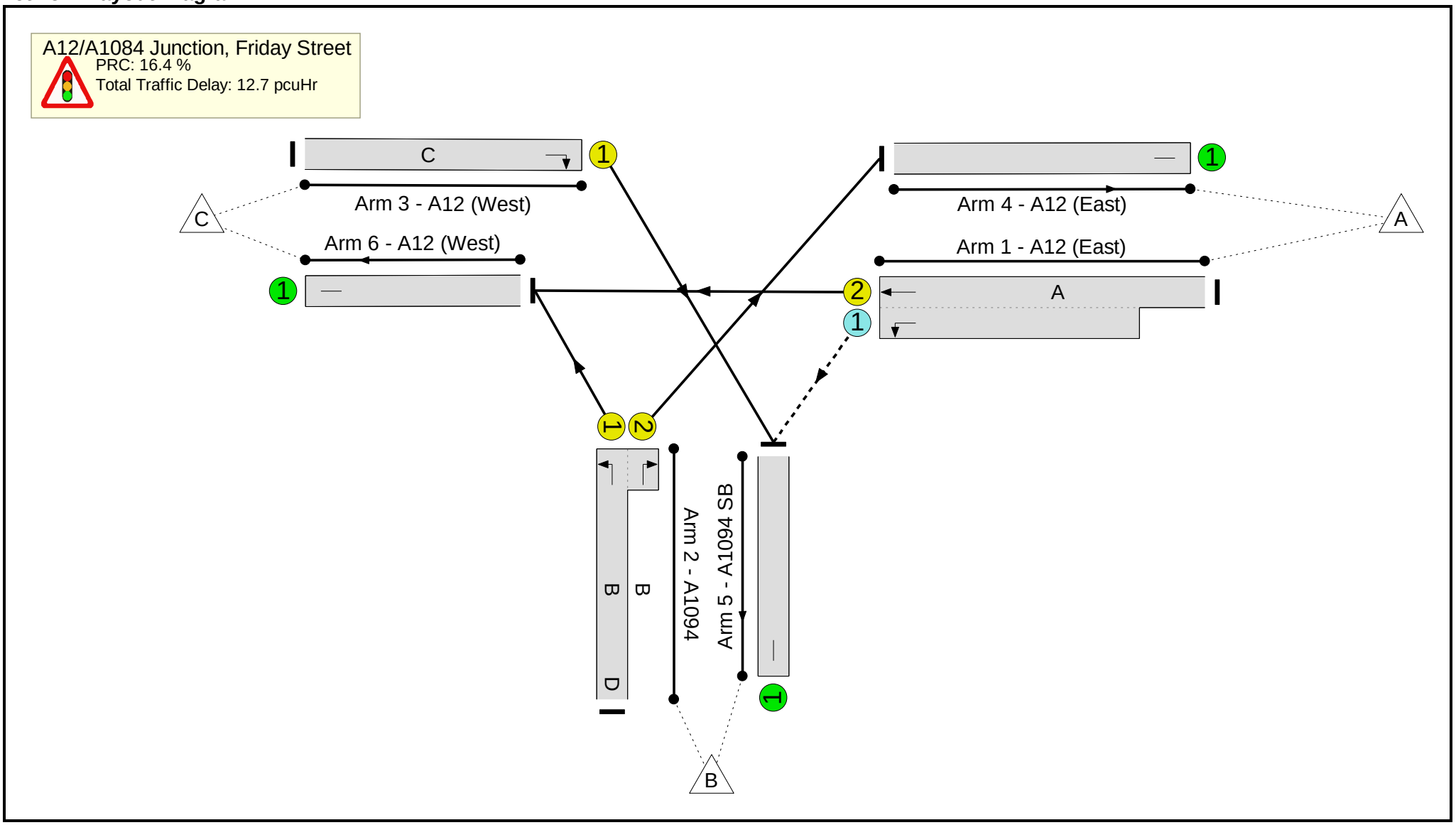
Stage	1	2	3
Duration	44	24	7
Change Point	0	49	78

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.3%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**77.3%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	44	-	832	1980:1766	950+127	77.3 : 77.3%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	36:7	29	353	1723:1715	562+91	54.1 : 54.1%
3/1	A12 (West) Right	U	N/A	N/A	C		1	24	-	388	1868	519	74.8%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	49	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	486	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	1038	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**27**	**71**	**0**	**9.0**	**3.7**	**0.0**	**12.7**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**27**	**71**	**0**	**9.0**	**3.7**	**0.0**	**12.7**	**-**	**-**	**-**	**-**
1/2+1/1	832	832	27	71	0	3.6	1.7	-	5.3	23.0	14.5	1.7	16.2
2/1+2/2	353	353	-	-	-	2.1	0.6	-	2.7	27.8	6.1	0.6	6.6
3/1	388	388	-	-	-	3.2	1.5	-	4.6	43.1	8.8	1.5	10.3
4/1	49	49	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	486	486	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1038	1038	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

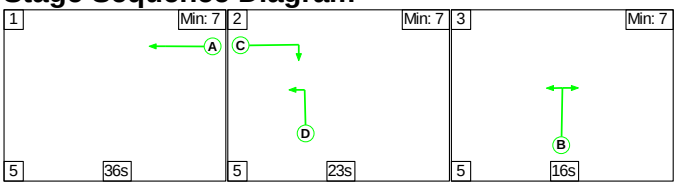
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	16.4	Total Delay for Signalled Lanes (pcuHr):	12.70	Cycle Time (s):	90
	PRC Over All Lanes (%):	16.4	Total Delay Over All Lanes(pcuHr):	12.70		

Full Input Data And Results

Scenario 10: '2028 with Construction Traffic 100% A12 South Evening Peak' (FG12: 'Forecast Flows + EA2 + EA1N Construction Traffic (2028) 100% HGV Origin from A12 south', Plan 1: 'Network Control Plan 1')

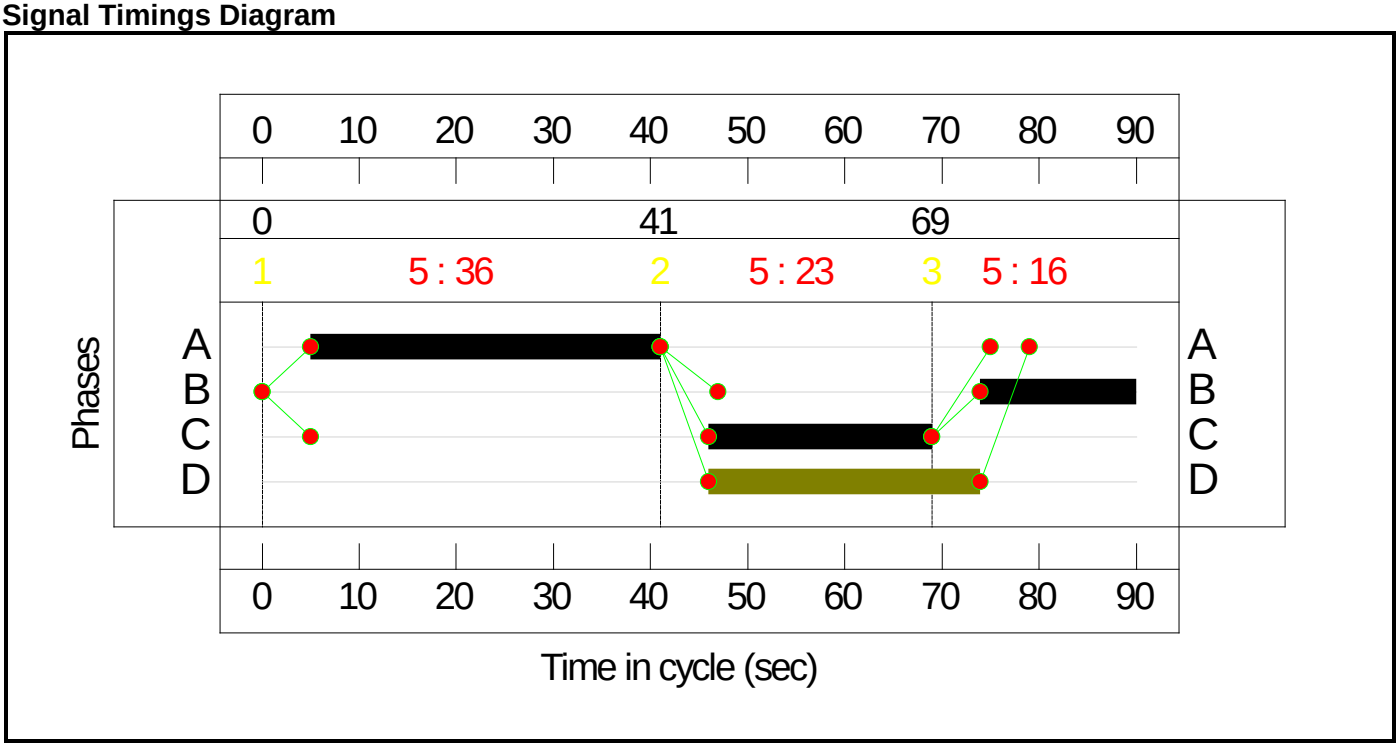
Stage Sequence Diagram



Stage Timings

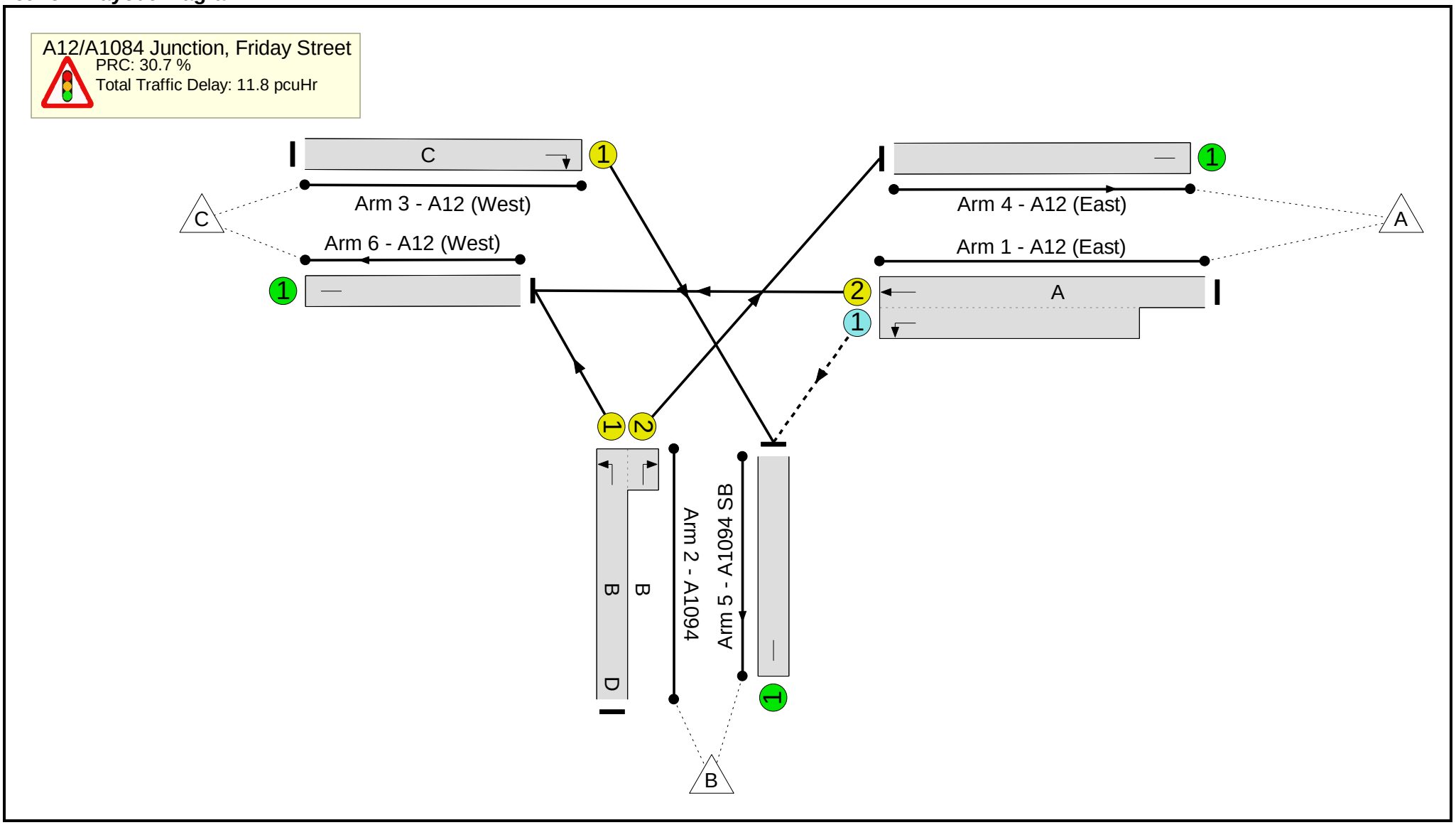
Stage	1	2	3
Duration	36	23	16
Change Point	0	41	69

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**68.9%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**68.9%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	36	-	616	1980:1766	798+101	68.5 : 68.5%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	44:16	28	502	1723:1715	618+121	68.0 : 68.0%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	343	1868	498	68.9%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	82	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	412	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	967	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**18**	**51**	**0**	**8.6**	**3.2**	**0.0**	**11.8**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**18**	**51**	**0**	**8.6**	**3.2**	**0.0**	**11.8**	**-**	**-**	**-**	**-**
1/2+1/1	616	616	18	51	0	3.3	1.1	-	4.4	25.5	11.1	1.1	12.2
2/1+2/2	502	502	-	-	-	2.5	1.1	-	3.5	25.4	8.3	1.1	9.3
3/1	343	343	-	-	-	2.8	1.1	-	3.9	41.1	7.6	1.1	8.7
4/1	82	82	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	412	412	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	967	967	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

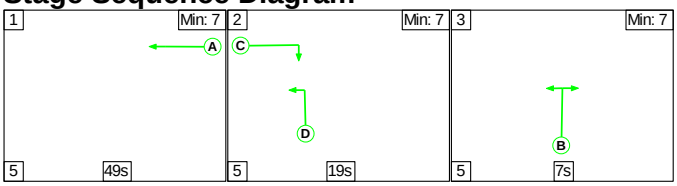
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	30.7	Total Delay for Signalled Lanes (pcuHr):	11.82	Cycle Time (s):	90	
	PRC Over All Lanes (%):	30.7	Total Delay Over All Lanes(pcuHr):	11.82			

Full Input Data And Results

Scenario 11: 'Forecast 2028 Morning Peak' (FG7: 'Forecast 2028 Morning Peak', Plan 1: 'Network Control Plan 1')

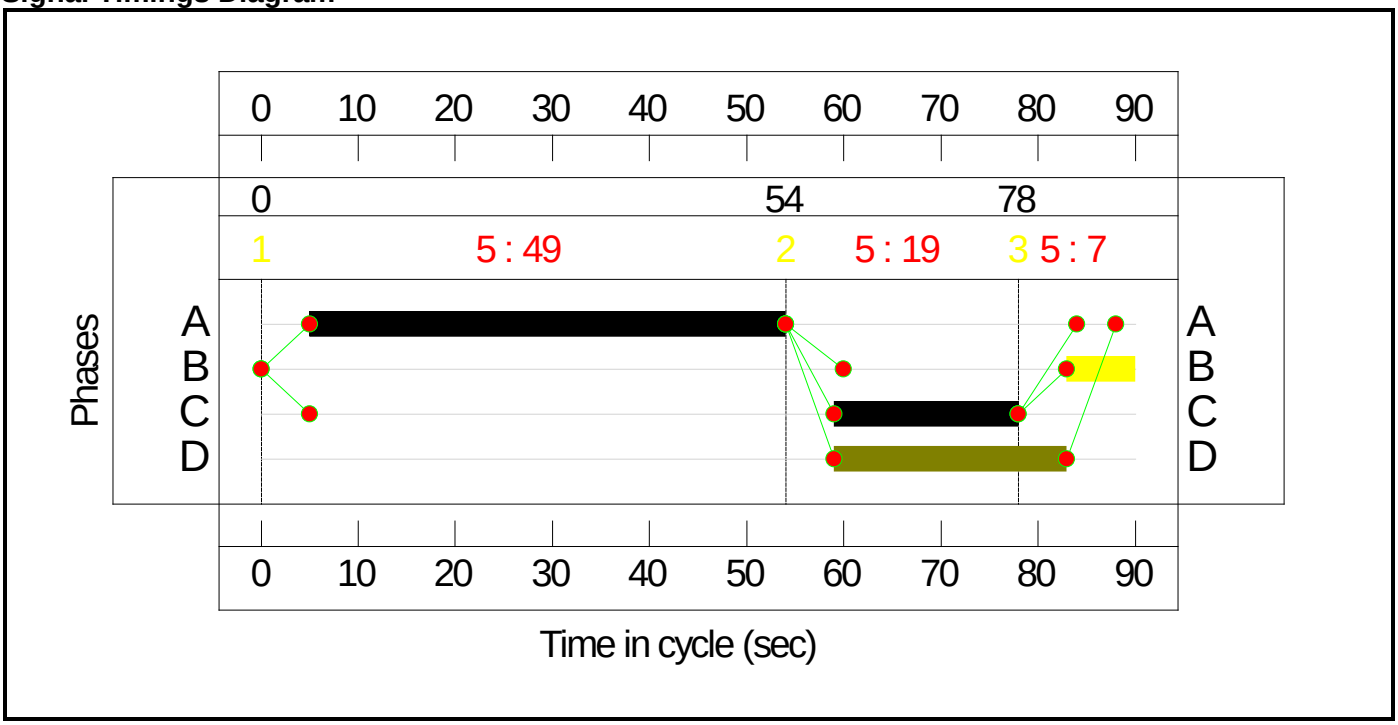
Stage Sequence Diagram



Stage Timings

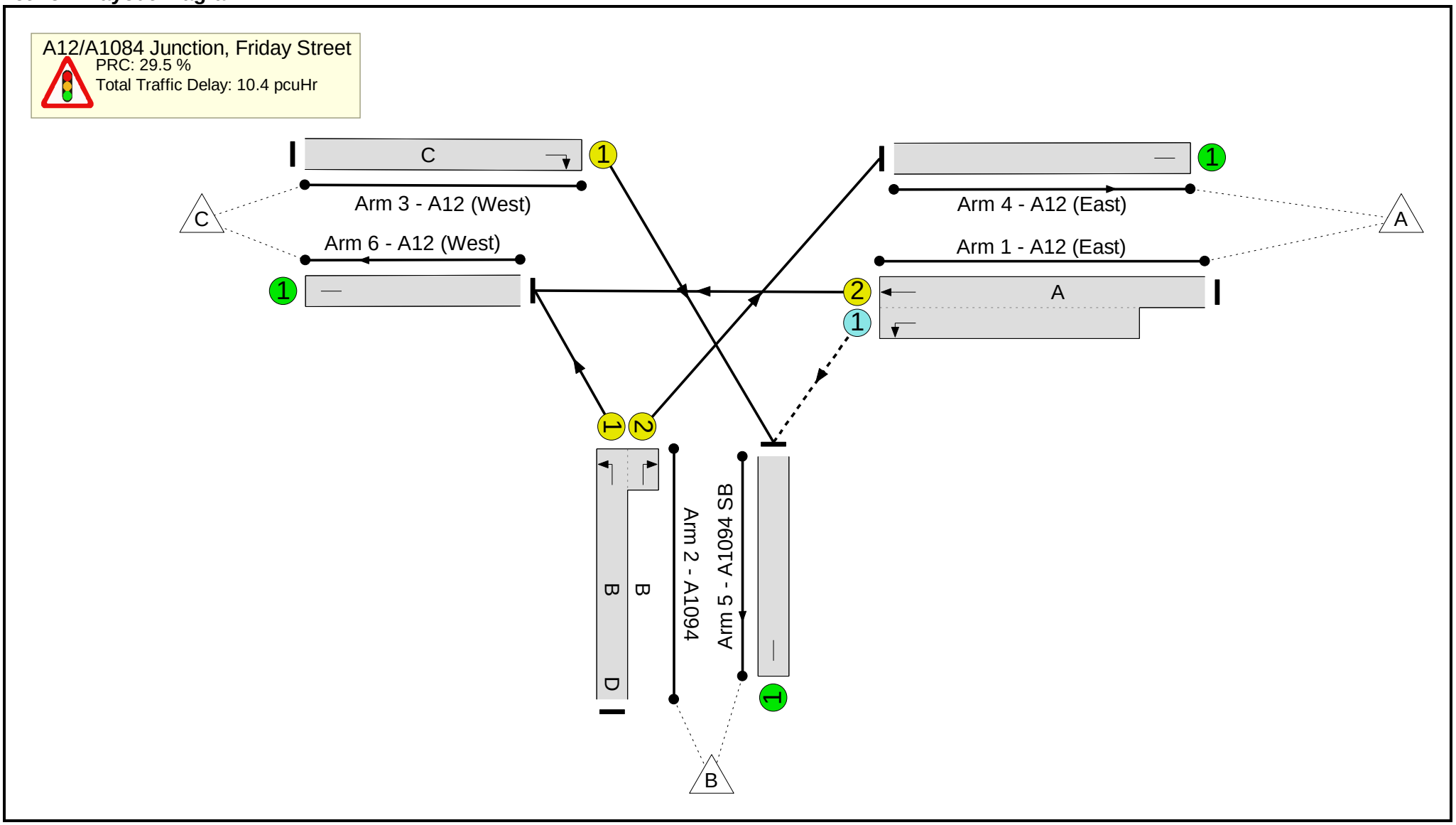
Stage	1	2	3
Duration	49	19	7
Change Point	0	54	78

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**69.5%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**69.5%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	49	-	824	1980:1766	1045+141	69.5 : 69.5%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	31:7	24	330	1723:1715	518+90	54.2 : 54.2%
3/1	A12 (West) Right	U	N/A	N/A	C		1	19	-	280	1868	415	67.5%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	49	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	378	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	1007	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**22**	**76**	**0**	**7.6**	**2.7**	**0.0**	**10.4**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**22**	**76**	**0**	**7.6**	**2.7**	**0.0**	**10.4**	**-**	**-**	**-**	**-**
1/2+1/1	824	824	22	76	0	2.8	1.1	-	4.0	17.3	12.7	1.1	13.8
2/1+2/2	330	330	-	-	-	2.3	0.6	-	2.9	31.4	6.1	0.6	6.7
3/1	280	280	-	-	-	2.5	1.0	-	3.5	45.2	6.4	1.0	7.4
4/1	49	49	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	378	378	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1007	1007	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

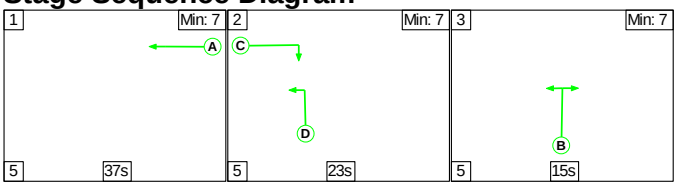
Full Input Data And Results

C1	PRC for Signalled Lanes (%):	29.5	Total Delay for Signalled Lanes (pcuHr):	10.35	Cycle Time (s):	90	
	PRC Over All Lanes (%):	29.5	Total Delay Over All Lanes(pcuHr):	10.35			

Full Input Data And Results

Scenario 12: 'Forecast 2028 Evening Peak' (FG8: 'Forecast 2028 Evening Peak', Plan 1: 'Network Control Plan 1')

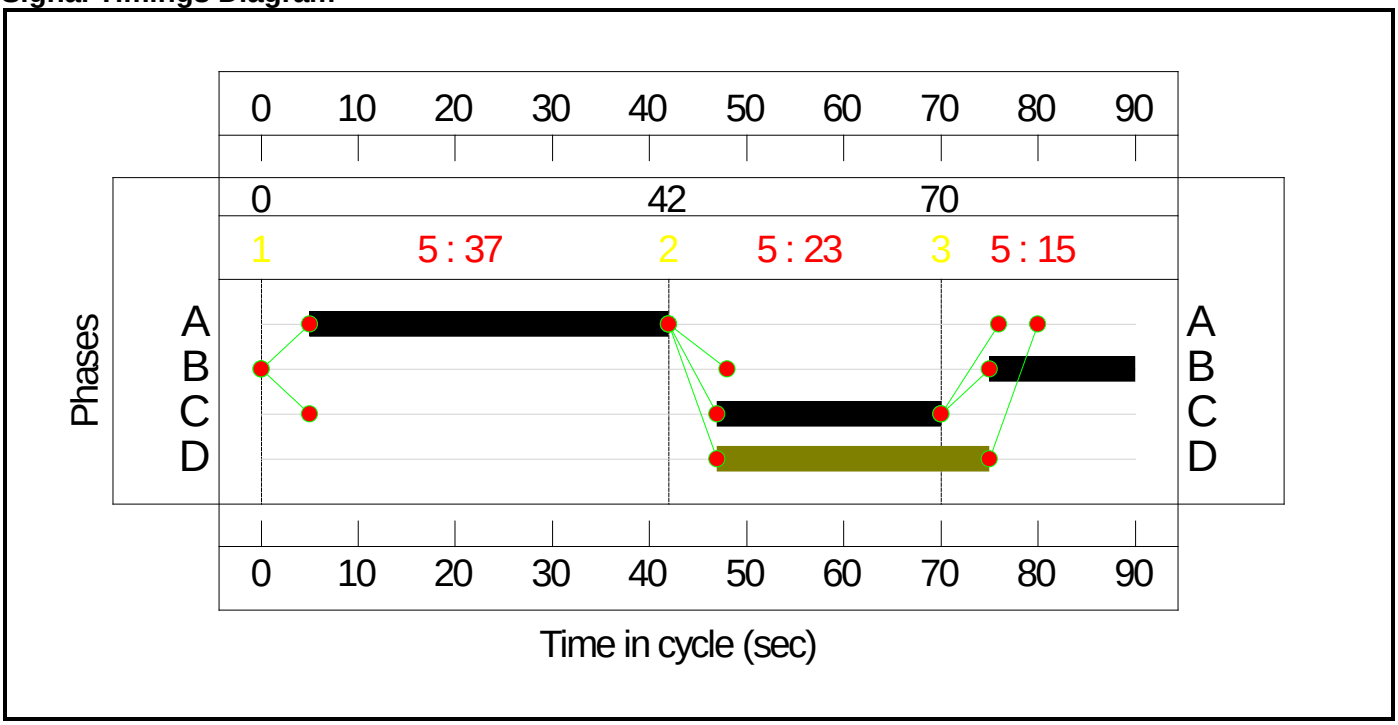
Stage Sequence Diagram



Stage Timings

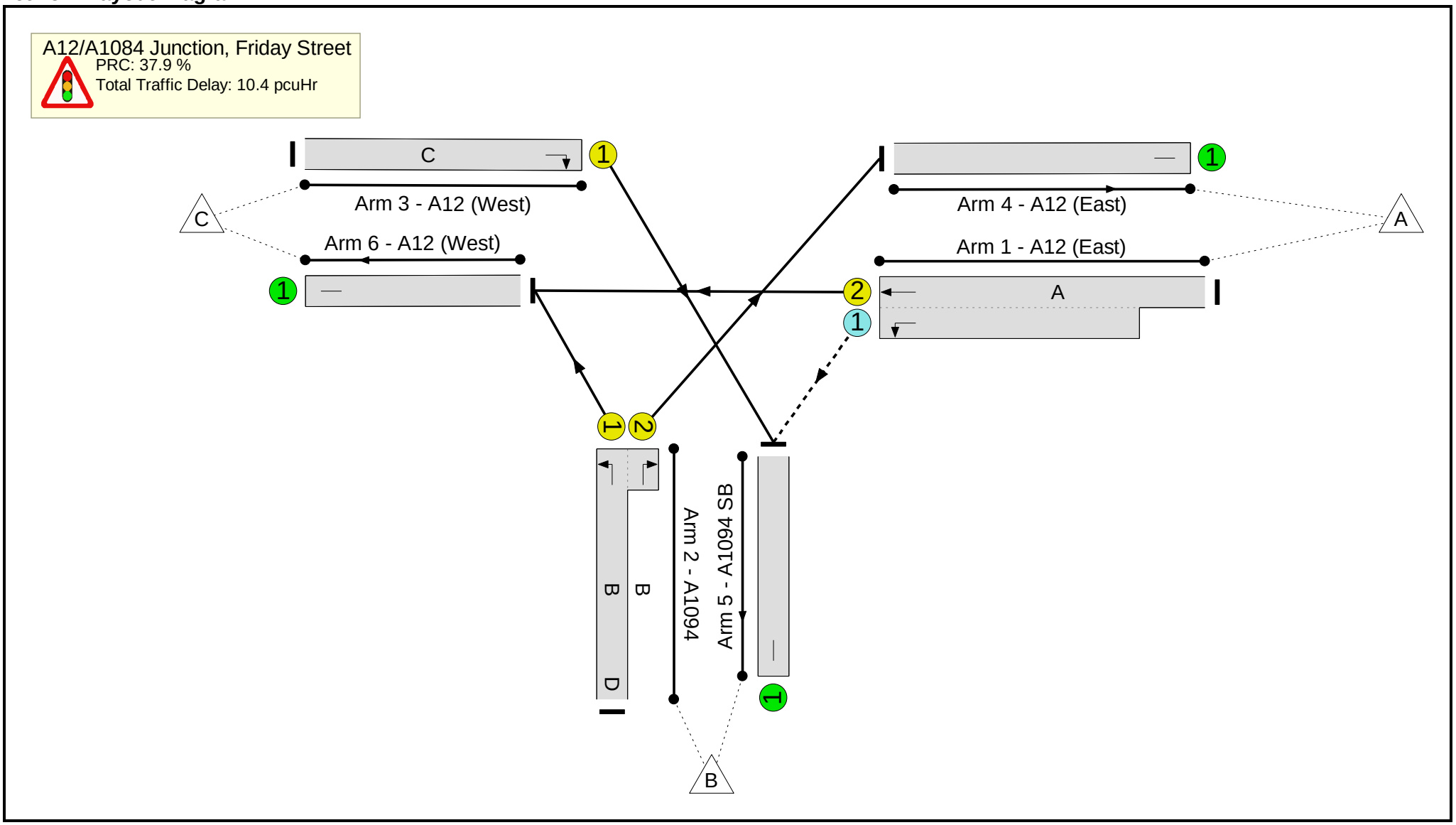
Stage	1	2	3
Duration	37	23	15
Change Point	0	42	70

Signal Timings Diagram



Full Input Data And Results

Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.3%**
A12/A1084 Junction, Friday Street	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**65.3%**
1/2+1/1	A12 (East) Left Ahead	U+O	N/A	N/A	A -		1	37	-	602	1980:1766	817+106	65.3 : 65.3%
2/1+2/2	A1094 Right Left	U	N/A	N/A	B	D	1	43:15	28	395	1723:1715	487+128	64.2 : 64.2%
3/1	A12 (West) Right	U	N/A	N/A	C		1	23	-	320	1868	498	64.2%
4/1	A12 (East)	U	N/A	N/A	-		-	-	-	82	Inf	Inf	0.0%
5/1	A1094 SB	U	N/A	N/A	-		-	-	-	389	Inf	Inf	0.0%
6/1	A12 (West)	U	N/A	N/A	-		-	-	-	846	Inf	Inf	0.0%

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: A12/A1094, Friday Street Signalisation	**-**	**-**	**18**	**51**	**0**	**7.6**	**2.7**	**0.0**	**10.4**	**-**	**-**	**-**	**-**
A12/A1084 Junction, Friday Street	**-**	**-**	**18**	**51**	**0**	**7.6**	**2.7**	**0.0**	**10.4**	**-**	**-**	**-**	**-**
1/2+1/1	602	602	18	51	0	3.0	0.9	-	4.0	23.8	10.5	0.9	11.4
2/1+2/2	395	395	-	-	-	2.0	0.9	-	2.9	26.3	5.8	0.9	6.7
3/1	320	320	-	-	-	2.6	0.9	-	3.5	39.2	7.0	0.9	7.9
4/1	82	82	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	389	389	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	846	846	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

Full Input Data And Results

C1	PRC for Signalled Lanes (%):	37.9	Total Delay for Signalled Lanes (pcuHr):	10.35	Cycle Time (s):	90	
	PRC Over All Lanes (%):	37.9	Total Delay Over All Lanes(pcuHr):	10.35			