

Project

Redford Park Junction Improvement

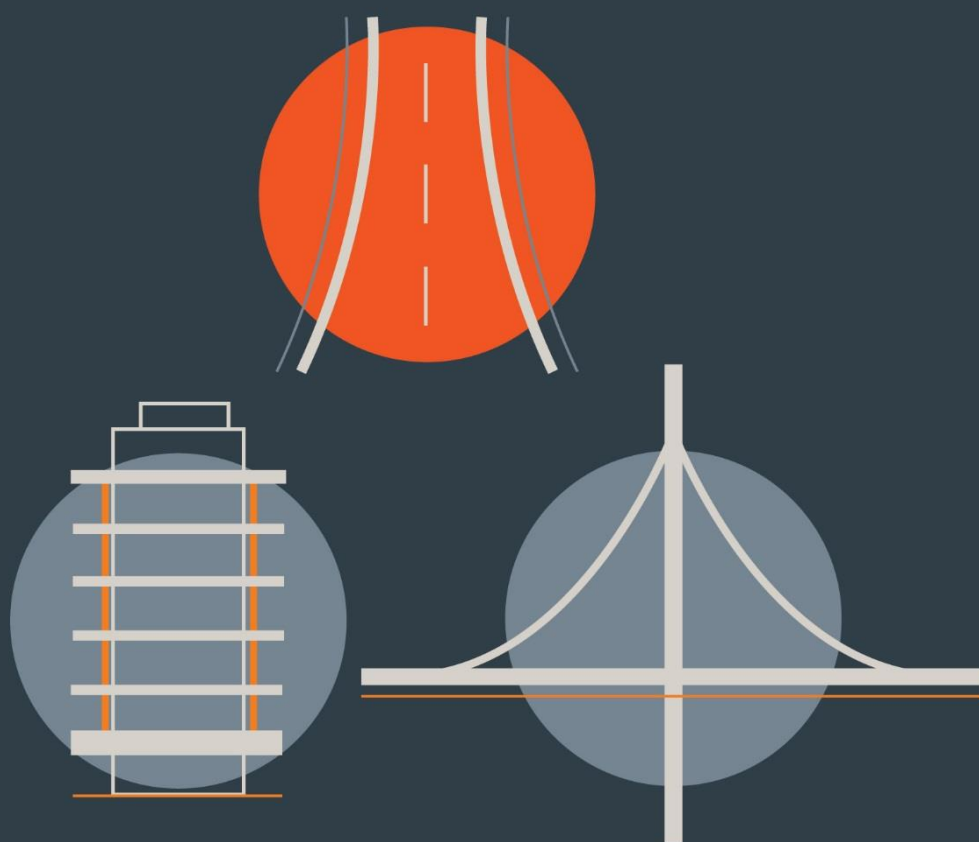
Report Title

Options Report

Client

Wicklow County Council

TRANSPORTATION



DBFL CONSULTING ENGINEERS

Document Control

Job Title: Redford Park Junction Assessment

Job Number: P190092

Report Ref: P190092-DBFL-RP-0001

Author: Jane Hennaghan

Reviewed by: Robert Kelly

Date: January 2022

Distribution: Client

Revision	Issue Date	Description	Prepared	Reviewed	Approved
1	May 2020	Draft for Client	JLH	RJK	RJK
2	July 2020	Final Draft	JLH	RJK	RJK
3	December 2020	Final	JLH	RJK	RJK
4	January 2022	Final	JLH	RJK	RJK

	Dublin Office	Cork Office	Waterford Office
 DBFL CONSULTING ENGINEERS	Ormond House Upper Ormond Quay Dublin 7, Ireland D07 W704	Phoenix House, Monahan Road, Cork, Ireland T12 H1XY	Unit 2 The Chandlery 1-2 O'Connell Street Waterford, Ireland X91 WF99
	+ 353 1 400 4000 info@dbfl.ie www.dbfl.ie	+ 353 21 202 4538 info@dbfl.ie www.dbfl.ie	+ 353 51 309 500 info@dbfl.ie www.dbfl.ie

DBFL Consulting Engineers disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and generally in accordance with ACEI SE 9101 Conditions of Engagement and taking account of the manpower, resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and DBFL Consulting Engineers accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

CONTENTS

1.0 INTRODUCTION.....	5
1.1 INTRODUCTION	5
1.2 SITE LOCATION	5
1.3 BACKGROUND	6
1.4 OBJECTIVES OF REPORT	7
1.5 REPORT STRUCTURE.....	8
2.0 POLICY CONTEXT.....	9
2.2 NATIONAL DEVELOPMENT PLAN (2021-2030).....	9
2.3 SMARTER TRAVEL – A SUSTAINABLE TRANSPORT FUTURE 2009 - 2020	10
2.4 CLIMATE ACTION PLAN (2021)	12
2.5 NATIONAL CYCLE MANUAL - 2011	13
2.6 DESIGN MANUAL FOR URBAN ROADS AND STREETS (2019).....	15
2.7 DRAFT PRELIMINARY DESIGN GUIDANCE BOOKLET FOR BUSCONNECTS CORE BUS CORRIDORS (2020)	16
2.8 TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2016-2035	18
2.9 DRAFT TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2022-204220	
2.10 GDA CYCLE NETWORK PLAN – DECEMBER 2013	22
2.11 DRAFT GDA CYCLE NETWORK PLAN 2021	23
2.12 WICKLOW COUNTY COUNCIL DEVELOPMENT PLAN – 2016 – 2022.....	24
3.0 EXISTING CONDITIONS.....	26
3.1 INTRODUCTION	26
3.2 EXISTING JUNCTION LAYOUT	26
3.3 TRAFFIC SURVEYS	29
3.4 EXISTING TRAFFIC CAPACITY.....	30
3.5 ACCIDENT STATISTICS.....	31
3.6 BUS ROUTES	32
4.0 DESIGN OPTIONS	34
4.1 INTRODUCTION	34
4.2 JUNCTION DESIGN OPTIONS	34
4.3 PROPOSED TRAFFIC CAPACITY	38
5.0 MULTI-CRITERIA ANALYSIS	41
5.1 INTRODUCTION	41
5.2 MCA CRITERIA	41
5.3 MULTI CRITERIA ANALYSIS ASSESSMENT	44

6.0	EMERGING PREFERRED OPTION	47
7.0	PROTECTED INTERSECTION STAGING PLAN	48
8.0	DESIGN OF BUS STOPS	59
8.1	INTRODUCTION	59
8.2	EXISTING BUS STOP LAYOUTS	59
8.3	PROPOSED BUS STOP OPTIONS	61
8.4	COMPARISON OF RESULTS.....	64
9.0	SUMMARY AND CONCLUSION	66
9.1	SUMMARY OF REPORT	66
9.2	CONCLUSION OF REPORT	67

APPENDICES

APPENDIX A Scheme Design Drawing

APPENDIX B MCA Tables

APPENDIX C Junction Modelling Reports

1.0 INTRODUCTION

1.1 INTRODUCTION

1.1.1 DBFL have been commissioned by Wicklow County Council (WCC) to undertake an Options Assessment for the R761/Redford Park/Blacklion Manor Road Signalised Junction (Redford Park Junction).

1.1.2 The junction is located within the Redford area of Greystones in County Wicklow. The junction currently operates as a 4-arm signal controlled junction.

1.1.3 The objectives of this report are as follows:

1. Review the current operation of the junction in terms of pedestrian and cycle safety;
2. Review the current operation for the junction in terms of traffic capacity; and
3. Undertake an assessment for improving the operation of the junction for both vehicular use and pedestrian and cycle movement and safety.

1.1.4 The purpose of this report, therefore, is to identify a number of junction design options for the Redford Park junction and to assess these options against Multiple Criteria in order to determine the preferred design option that meets the requirements of WCC.

1.2 SITE LOCATION

1.2.1 The junction is located within the Redford area in Greystones, County Wicklow. A site location map, shown in Figure 1-1, outlines the location of the Redford Park junction.



Figure 1-1: Scheme Location (Source: Google Maps)

1.3 BACKGROUND

1.3.1 The existing junction is located within an area of Greystones that experiences peaks in traffic flows, in particular, during morning and evening times. This is due to a number of factors, including the following:

Schools

- The junction is located in close proximity to three schools, the Greystones Educate Together National School, Temple Carrig School and Gaelscoil na gCloch Liath, all located along the Blacklion Manor Road. There are a number of car, pedestrian and cycle trips, therefore, accessing and egressing the schools for drop off and pick up times.

R761 Regional Road

- The R761, which routes through the junction in a north to south direction, is the main Regional Road from Greystones into Bray Town and also provides an access road to the M11 Motorway. The R761, approximately 25km in length, routes from Rathnew in the outskirts of Wicklow, travelling northwards through Kilcoole and Greystones terminating in Bray Town at the junction to the M11. This route is busy at peak times with a typical AADT of between 11,000 – 12,000 Vehicles.

Local Amenities

- The junction is located in close proximity to a number of amenities such as a local shops area off Blacklion Manor Road that includes a Lidl food store, a Circle K Garage off the R761 southern arm as well as a number of smaller retail shops. These amenities attract a number of vehicle movements throughout the day.

1.3.2 These local factors and their proximity to the junction are illustrated in the image in Figure 1-2 below.

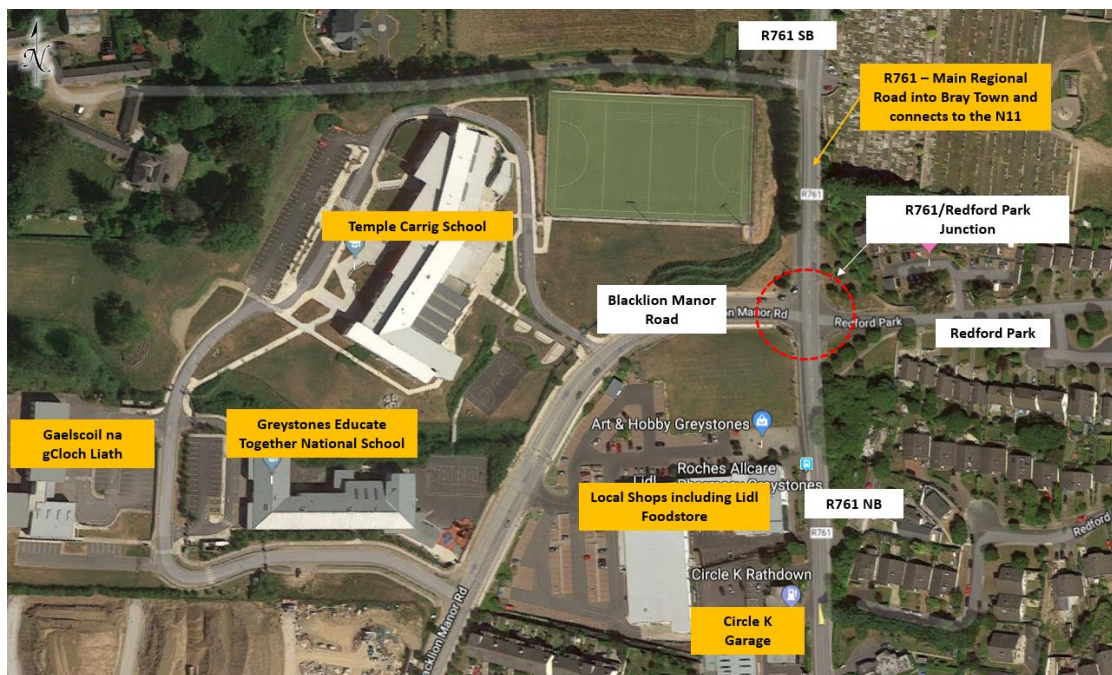


Figure 1-2: Location (Source: Google Maps)

1.4 OBJECTIVES OF REPORT

1.4.1 This report aims to consider a number of design options for the Redford Park Junction that will improve on the pedestrian and cycle facilities through the junction as well as improve the junction safety, capacity and operation. A preferred design option will be taken forward and finalised for Preliminary Design.

1.5 REPORT STRUCTURE

- 1.5.1 Following on from **Chapter 1** of this report, which details the Introduction and background to the scheme, **Chapter 2** outlines the relevant policy and guidance documents that justify the scheme on a National, Regional and Local basis.
- 1.5.2 **Chapter 3** details the Existing Conditions for the area including the existing roads, footpaths and cycle provision through the junction as well as existing amenities in the surrounding environment.
- 1.5.3 **Chapter 4** outlines the proposed design options for the Redford Park junction and gives the various advantages and disadvantages for each option proposed.
- 1.5.4 **Chapter 5** describes the Multi-Criteria Analysis (MCA) assessment criteria and details the MCA for each design option.
- 1.5.5 **Chapter 6** outlines the Emerging Preferred Option as a result of the MCA assessment.
- 1.5.6 **Chapter 7** outlines the design of bus stops south of the Redford Park junction which will be incorporated into the preferred design option for the junction.
- 1.5.7 **Chapter 8** provides a Summary of the report as well as a Conclusion.

2.0 POLICY CONTEXT

2.1.1 It is important that a review of current Policy is undertaken and used to inform the development of the options considered for the Redford Park Options Report.

2.1.2 The following policy documents and design guidance have been reviewed as part of this scheme.

2.2 NATIONAL DEVELOPMENT PLAN (2021-2030)

2.2.1 As part of Project Ireland 2040 the National Development Plan sets out the Government's over-arching investment strategy and budget for the period 2021-2030. It is an ambitious plan that balances the significant demand for public investment across all sectors and regions of Ireland with a major focus on improving the delivery of infrastructure projects to ensure speed of delivery and value for money.



2.2.2 The NDP sets out a significant level of investment, almost €165 billion, which will underpin the NPF and drive its implementation over the next nine years. The scale of the Transport-related requirements under the revised NDP amounts to c. €35 billion in total over 2021- 2030.

2.2.3 The National Planning Framework (NPF) recognises the importance of significant investment in sustainable mobility (active travel and public transport) networks if the NPF population growth targets are to be achieved. Investing in high-quality sustainable mobility will improve citizens' quality of life, support our transition to a low-carbon society and enhance our economic competitiveness.

2.2.4 With regard to Ireland's greenhouse gas emissions, the transport sector has been determined as a key contributor to this and is responsible for 20%. The NDP sets out an entire National Strategic Objective that is dedicated to "Sustainable Mobility" and has a range of policies and measures to promote the achievement of sustainable mobility. The following definitions of Sustainable Mobility have been outlined in the NDP:

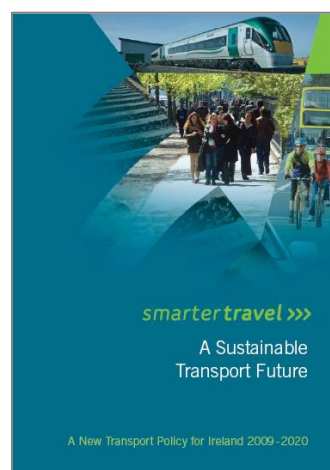
- Comfortable and affordable journeys to and from work, home, school, college, shops and leisure;
- Travelling by cleaner and greener transport; and
- A shift away from the private car to greater use of active travel (walking and cycling) and public transport.

2.2.5 The Government is firmly committed to encouraging the use of walking, cycling and other active travel methods, and this has been signalled by the recent increase in the active travel budget. Whole-of Government funding equivalent to 20% of the 2020 transport capital budget, or €360 million, has been committed annually for the period 2021-2025. In 2021, the NTA allocated just over €240 million to active travel infrastructure projects in Dublin, the Greater Dublin Area and regional cities.

2.2.6 This investment will help support the delivery of significant levels of new and improved walking and cycling infrastructure by 2025, as well as additional investment in Greenways. Successful delivery of planned projects and programmes should serve to encourage a shift in the population towards walking, cycling and scooting as transport modes as the decade progresses.

2.3 SMARTER TRAVEL – A SUSTAINABLE TRANSPORT FUTURE 2009 - 2020

2.3.1 Smarter Travel - A Sustainable Transport Future, was published in February 2009, and represents a new transport policy for Ireland for the period 2009-2020. The policy recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.



2.3.2 The policy is a direct response to the fact that continued growth in demand for road transport is not sustainable due to the resulting adverse impacts of increasing congestion levels, local air pollution, contribution to global

warming, and the additional negative impacts to health through promoting increasingly sedentary lifestyles.

2.3.3 The following five key goals form the basis of the Smarter Travel policy document:

- Improve quality of life and accessibility to transport for all and, in particular, for people with reduced mobility and those who may experience isolation due to lack of transport.
- Improve economic competitiveness through maximising the efficiency of the transport system and alleviating congestion and infrastructural bottlenecks.
- Minimise the negative impacts of transport on the local and global environment through reducing localised air pollutants and greenhouse gas emissions.
- Reduce overall travel demand and commuting distances travelled by the private car.
- Improve security of energy supply by reducing dependency on imported fossil fuels.

2.3.4 These aims will be achieved through 49 specific actions listed within the Smarter Travel Policy, which can be broadly grouped into 4 key areas:

- Actions to reduce distance travelled by private car and encourage smarter travel,
- Actions aimed at ensuring that alternatives to the private car are more widely available,
- Actions aimed at improving the fuel efficiency of motorised transport through improved fleet structure, energy efficient driving and alternative technologies, and
- Actions aimed at strengthening institutional arrangements.

2.3.5 The Smarter Travel policy also includes for a comprehensive range of supporting 'actions' including mode specific (e.g. walking, cycling and public transport etc.) and behaviour change initiatives which both encourage and provide for sustainable travel practices for all journeys.

2.4 CLIMATE ACTION PLAN (2021)

2.4.1 The Climate Action Plan 2021 sets out a major programme for change in response to reducing Ireland's greenhouse gas emissions. The proposals outlined in the Plan are aimed at achieving a net zero carbon energy system within Ireland and it is envisaged that these proposals will also have associated positive economic and societal benefits, including cleaner air, warmer homes and a more sustainable economy in the longer term.



2.4.2 Ireland's transport system plays a critical role in realising the ambitious targets of the Climate Action Plan. Consequently, to make growth less transport intensive a number of key policies are identified, including the expansion of walking, cycling and public transport to promote modal shift. The measures to deliver on the transport related targets set out in the Climate Action Plan cover the following:

- Sustainability;
- System Efficiency and Demand Management;
- Fleet Electrification;
- Renewable and Alternative Transport Fuels for Freight;
- Use of Green Hydrogen and other Emerging Technologies.

2.5 NATIONAL CYCLE MANUAL - 2011

2.5.1 The National Cycle Manual is a national guidance document that details the principles of sustainable safety that offers a safe traffic environment for all road users including cyclists. The manual provides guidance on integrating the bicycle in to the design of urban areas. The manual sets out five principles of Sustainable Safety:



1. **Functionality:** The principle of functionality is that the design which is fit for purpose is safer. Urban streets, roads and spaces are always multi – functional.
2. **Homogeneity:** The principle of Homogeneity is that reducing the relative speed, mass and directional differences of different road users sharing the same space increases safety.
3. **Legibility:** The principle of Legibility is that a road environment that all road users can read and understand is safer. A legible design will be self-evident, self-explanatory and self-enforcing.
4. **Forgivingness:** The principle of Forgivingness (Passive Safety) is that environments that contribute to benign outcomes of accidents are safer.
5. **Self-Awareness:** The principle of Self-Awareness is that where road users are aware of their own abilities and limitations to negotiate a road environment, the environment is safer.

2.5.2 The width of a cycle facility as well as the type of facility proposed (Integrated or Segregated) are two key factors for providing adequate, safe facilities and a sub-standard cycle lane/track is never recommended.

2.5.3 The designed width of a cycle facility is comprised of the effective width as well as clearances that are required in different circumstances. The Width Calculator table provides details for determining the actual width required for cycle lanes and tracks. It comprises of three main factors, A,B and C, as well as an additional factor, D, which is only relevant in certain circumstances. The width calculator table is illustrated in Figure 2-1.

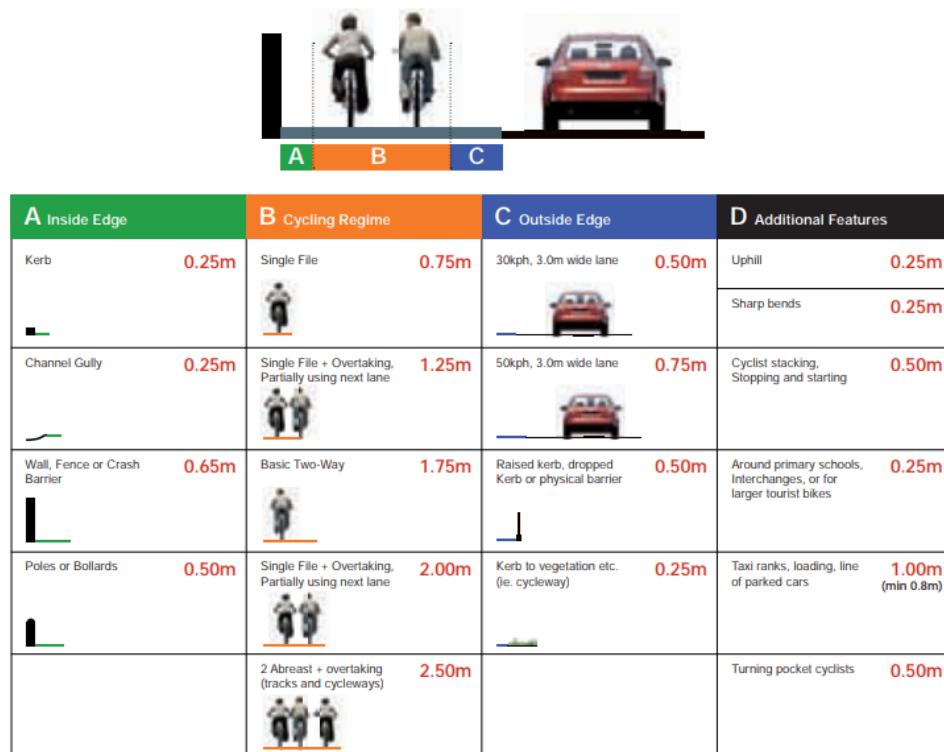


Figure 2-1: Cycle width calculator – National Cycle Manual (Source: NCM)

2.5.4 In terms of the type of facility proposed, integrated or segregated, there are a number of factors considered for determining the type of facility most appropriate. Segregated facilities are recommended in the following circumstances:

- The traffic regime cannot be rendered suitable for integrated cycling;
- To preclude traffic from queuing or parking on the facility;
- To confer an advantage on cyclists.

2.5.5 A guidance graph is illustrated in Figure 2-2 that sets out relevant factors for determining the type of facility to provide.

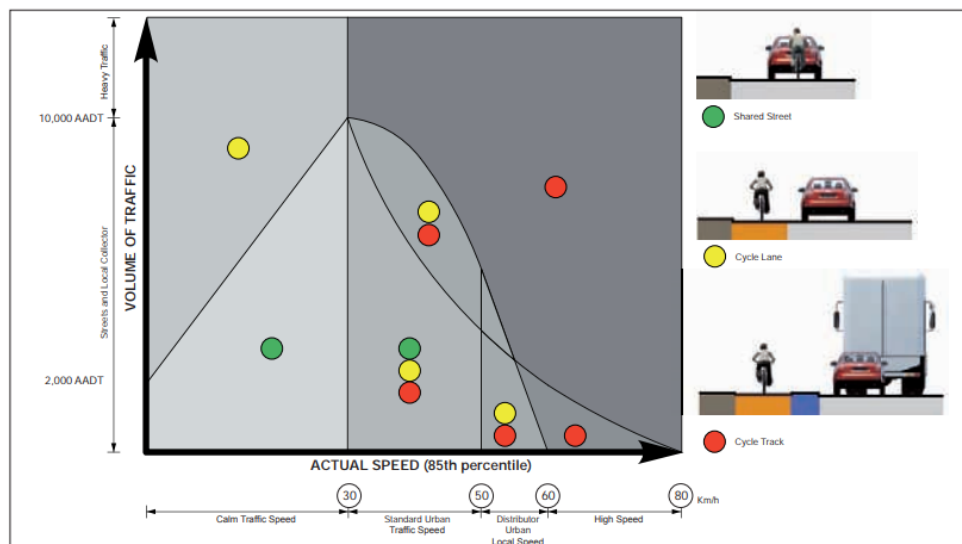
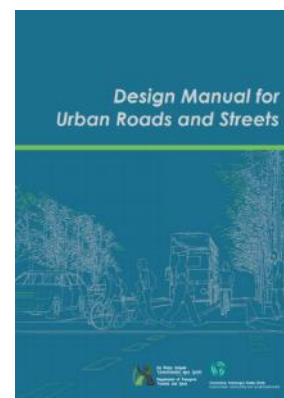


Figure 2-2: Guidance graph for determining type of cycle facility (Source: NCM)

2.5.6 The graph determines the type of facility necessary, whether the facility is shared, cycle lane or cycle track, based on vehicle speed and AADT of the road.

2.6 DESIGN MANUAL FOR URBAN ROADS AND STREETS (2019)

2.6.1 DMURS provides guidance relating to the design of urban roads and streets. It presents a series of principles, approaches and standards that are necessary to achieve balanced, best practice design outcomes with regard to street networks and individual streets.



2.6.2 The manual places a significant emphasis on car dominance in Ireland and the implications this has had regarding the pedestrian and cycle environment. The document encourages more sustainable travel patterns and safer streets by proposing a hierarchy for user priorities. This hierarchy places pedestrians at the top, indicating that walking is the most sustainable form of transport and that by prioritising pedestrians first, the number of short car journeys can be reduced and public transport made more accessible.

2.6.3 Second in the hierarchy are cyclists with public transport third in the hierarchy and private motor vehicles at the bottom. By placing private vehicles at the bottom of the hierarchy, the document indicates that there

should be a balance on street networks and cars should no longer take priority over the needs of other users.

- 2.6.4 The manual emphasises that narrow carriageways are one of the most effective design measures that calm traffic. Standard width of an arterial and link street is 3.25m, however, this may be reduced to 3m where lower design speeds are being applied. Desirable footpath widths are between 2m – 4m. The 2m width should be implemented to allow for low to moderate pedestrian activity. A 3m – 4m footpath should be implemented to allow for moderate to high pedestrian activity.
- 2.6.5 The focus of the manual is to create a place – based sustainable street network that balances the pedestrian and vehicle movements. The manual references the different types of street networks, including arterial streets, link streets, local streets, and highlights the importance of movement.

2.7 DRAFT PRELIMINARY DESIGN GUIDANCE BOOKLET FOR BUSCONNECTS CORE BUS CORRIDORS (2020)

- 2.7.1 The Draft Preliminary Design Guidance Booklet for BusConnects has recently been produced to assist with the design of typical corridor scenarios and layouts.
- 2.7.2 The purpose of the booklet is to complement, and not supersede, existing guidance documents relating to the design of urban streets, bus facilities, cycle facilities and public realm.
- 2.7.3 The aim of the design booklet is to provide guidance for the various design teams involved in the CBC Project and ensure a consistent design approach across the project. The document focuses on the engineering geometry and CBC operation, whilst acknowledging that the design evolution will result in the rationalisation of junction and link layouts, presenting opportunities to increase the public realm footprint and improve the placemaking offering of the CBC network.
- 2.7.4 The booklet also recognises that the CBC project is being planned and designed within the context of an existing city, with known constraints. The document therefore provides guidance, however a more flexible approach to the design of CBCs, utilising engineering judgement, may be necessary

in some locations due to these constraints. The optimum CBC cross section is shown in Figure 2-3.

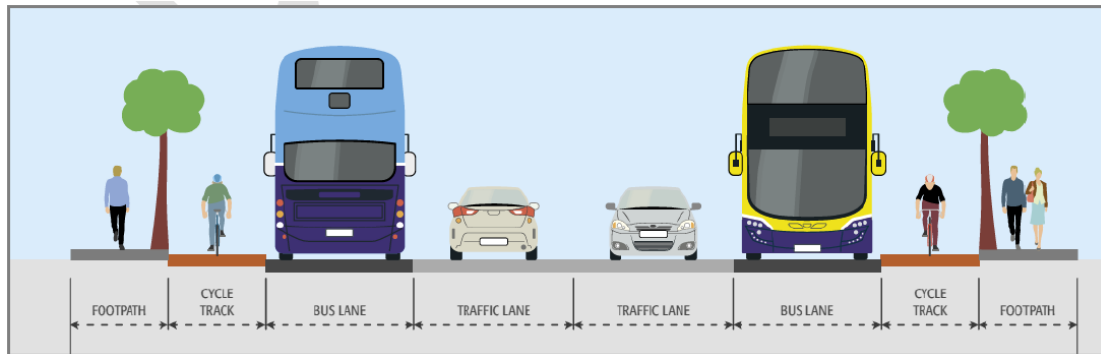


Figure 2-3: Optimum CBC Cross Section (Source: Preliminary Design Guidance Booklet)

2.7.5 With regards to junction design, the design booklet states that the preferred layout for signalised junctions within the CBC project is the protected 'Dutch-style' junction, shown in Figure 2-4, which provides physical kerb buildouts to protect cyclists through the junction.

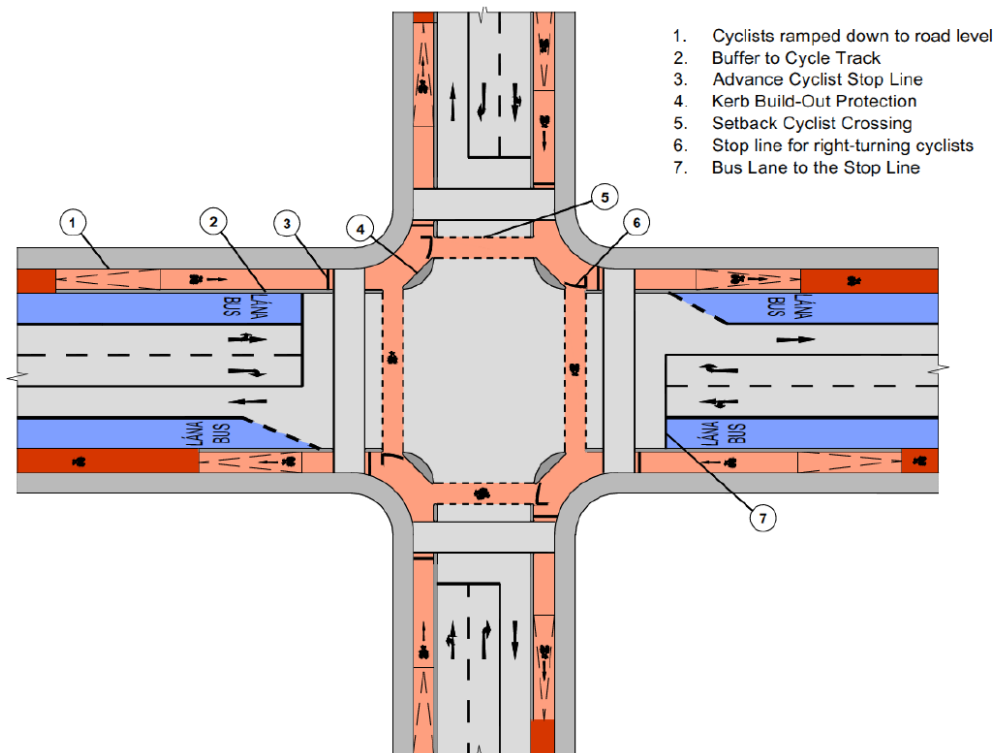


Figure 2-4: Dutch-Style Junction Design (Source: Preliminary Design Guidance Booklet)

2.7.6 The design guidance states that the preferred approach at 'Dutch-style' junctions is to continue the bus lane to the stop line to provide continuous bus priority. A number of variations to this layout to cater for left-turning vehicles, may be permitted based on site specific parameter (e.g. available spaces) and led by traffic modelling. Bus Priority Signals (or Pre-Signals) may also be considered in certain circumstances, being utilised on the approaches to junctions to give priority to buses and/or to gate general traffic at signals.

2.7.7 With regard to bus stops, Island Bus Stops, such as that illustrated in **Figure 2-5** are the preferred bus stop option to be used as standard on the CBC project where space constraints allow.

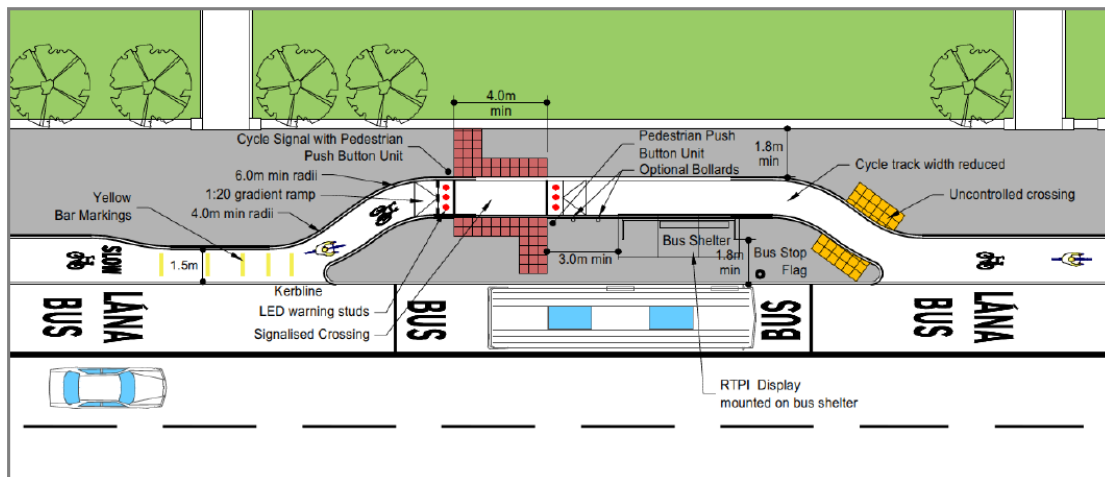


Figure 2-5: Island Bus Stop Arrangement (Source: Preliminary Design Guidance Booklet)

2.8 TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2016-2035

2.8.1 The purpose of this strategy is 'to contribute to the economic, social and cultural progress of the Greater Dublin Area by providing for the efficient, effective and sustainable movement of people and goods.'

2.8.2 This transport strategy provides a framework for the planning and delivery of transport infrastructure and services in the Greater Dublin Area (GDA).



2.8.3 There is an onus on the Authority to take full account of current prevailing policies and plans made at central government level, in transport, planning and in other sectors as well as other regional level plans. On review of these policies, the following key messages have emerged:

- Transport must be a key consideration in land use planning;
- In the short term, funding for large scale transport projects will be limited;
- Addressing urban congestion is a priority;
- The capacity of the strategic road network must be protected;
- A significant reduction in the share of trips undertaken by car is required, particularly in relation to short trips and commuter trips;
- An associated increase in walking, cycling and public transport is also required;
- A safe cycling network, with extensive coverage in metropolitan Dublin and in other towns, is needed to cater for the increased use of cycling that is already occurring and to reduce the dominance of the private car in meeting travel needs;
- The enhancement of the pedestrian environment, including measures to overcome severance and to increase permeability, is a priority.

2.8.4 In terms of cycle infrastructure, the GDA cycle network plan proposes to expand the urban cycle network to over 1,485km in length and will provide over 1,300km of new connections between towns in the rural areas of the GDA. Recognising the need for a safe cycling network, it is intended that many of the key cycling route will be developed as segregated facilities, with cyclists separated from vehicular traffic through the use of kerb separators or by having the cycleway at a higher level than the road carriageway.

2.8.5 In terms of walking and issues raised relating to provision for pedestrians, it is intended to:

- Provide a safer, more comfortable and more convenient walking environment for those with mobility, visual and hearing impairments, and for those using buggies and prams;

- Enhance pedestrian movement along the strategic pedestrian routes by widening footpaths where appropriate, providing better surfacing and by removing unnecessary poles, signs, street cabinets, advertising and other street clutter;
- Revise road junction layouts, where appropriate, to provide dedicated pedestrian crossings, reduce pedestrian crossing distances, provide more direct pedestrian route and reduce the speed of turning traffic;
- Cooperate with other agencies in the enforcement of laws in relation to parking on footpaths;
- Ensure that permeability and accessibility of public transport stops and stations for local communities is maintained and enhanced.

2.9 DRAFT TRANSPORT STRATEGY FOR THE GREATER DUBLIN AREA 2022-2042

2.9.1 The Draft Greater Dublin Area Transport Strategy 2022-2042 has arisen from a review of the original 2016 strategy. The updated document *"sets out the framework for investment in transport infrastructure and services over the next twenty years"*.



2.9.2 The overall aim of the Transport Strategy is *"To provide a sustainable, accessible and effective transport system for the Greater Dublin Area which meets the region's climate change requirements, serves the needs of urban and rural communities, and supports economic growth"*.

2.9.3 Four primary objectives have been identified as part of the Draft Greater Dublin Area Transport Strategy 2022-2028. These are:

- **An Enhanced Natural and Built Environment** - To Create a better environment and meet our environmental obligations by transitioning to a clean, low emission transport system, reducing car

dependency, and increasing walking, cycling and public transport use.

- **Connected Communities and a Better Quality of Life** – To enhance the health and quality of life of our society by improving connectivity between people and places, delivering safe and integrated transport options, and increasing opportunities for walking and cycling.
- **A Strong Sustainable Economy** – To support economic activity and growth by improving the opportunity for people to travel for work or business where and when they need to, and facilitating the efficient movement of goods.
- **An Inclusive Transport System** – To deliver a high quality, equitable and accessible transport system, which caters for the needs of all members of society.

2.9.4 With regards to cycling, the Strategy acknowledges the growth in cycling in the Greater Dublin Area since the mid-2000s and the need to provide a coherent network of cycle facilities linking origins and destinations to cater for trips within communities. Measures for cycling outlined in the Strategy of particular relevance to this scheme include:

- **Measure CYC1 – GDA Cycle Network** It is the intention of the NTA and the local authorities to deliver a safe, comprehensive, attractive and legible cycle network in accordance with the updated Greater Dublin Area cycle Network.
- **Measure CYC2 – Cycle Infrastructure Design** It is the intention of the NTA to ensure that cycle infrastructure in the GDA provides an appropriate quality of service for all users, through the implementation of the design guidance contained in the latest version of the National Cycle Manual.

2.9.5 In terms of walking, the Strategy highlights the importance of good quality pedestrian facilities while recognising that walking forms some part of most journeys. Plans to provide a better walking environment include:

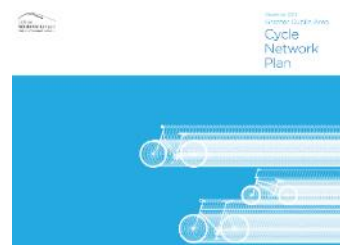
- Improving footpaths to ensure they are of sufficient width, adequately lit, serve both sides of the road in most urban areas, have good quality surfacing and are free of unnecessary clutter.

- Improving junctions to reduce the distance pedestrians have to cross and the number of times they must stop and wait during a crossing.
- Optimising crossing times for pedestrians at signalised junctions.
- Installing additional pedestrian crossing points where requirements are identified.
- Expanding and improving wayfinding systems.

2.9.6 The draft of the Transport Strategy is currently out for public consultation until 17th December 2021.

2.10 GDA CYCLE NETWORK PLAN – DECEMBER 2013

2.10.1 The GDA Cycle Network Plan is a document, prepared on behalf of the National Transport Authority, that identifies and determines a consistent, clear and logical cycle network within the Greater Dublin Area.



2.10.2 The plan aims to ensure that cycling as a transport mode is supported, enhanced and exploited in order to achieve strategic objectives and reach national goals. The steps undertaken within the plan include the following:

1. Collate existing and planned network information;
2. Undertake quality of service review;
3. Identify gaps in existing network;
4. Cycle travel demand assessment;
5. Develop cycle network plan;
6. Target quality of service for routes;
7. Develop design concepts.

2.10.3 These seven steps proposed are in line with the National Cycle Manual methods for designing a Cycle Network.

2.10.4 The GDA Cycle Network map, shown in Figure 2-6, outlines the proposals for the Greystones area, which route through the Redford Park Junction. This shows that there is a proposed primary/secondary route (G1) along the R761 NB arm that extends back into Greystones Town. This route joins into the Inter-Urban route (W4) at the Redford Park junction that continues

along the R761 SB arm into Bray. The Blacklion Manor Road and Redford Park are proposed as Feeder routes that connect the primary and secondary cycle network together.



Figure 2-6: GDA Cycle Network Plan for Greystones (Source: GDA Cycle Network Plan)

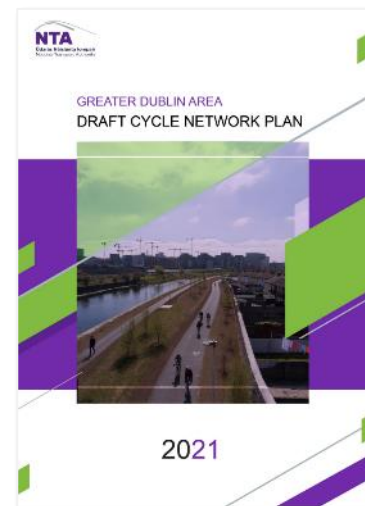
2.11 DRAFT GDA CYCLE NETWORK PLAN 2021

2.11.1 The Draft Greater Dublin Area Cycle Network Plan 2021 has arisen as an update to the original 2013 plan, with input from local authorities within the GDA.

2.11.2 While the original 2013 GDA Cycle Network Plan focuses on identifying the routes required to provide an adequate network for cyclists, the updated 2021 plan seeks to enhance and strengthen local accessibility and permeability.

2.11.3 As part of the updated Plan, four manageable goals have been identified to create and improved and inclusive cycle network. These goals are as follows:

- Increase participation;



- Improve safety and accessibility;
- Improve connectivity;
- Create a navigable and coherent network.

2.11.4 The GDA Cycle Network map, shown in Figure 2-7, outlines the proposals for Greystones, including the proposed scheme junction.

2.11.5 Both the Blacklion Manor Road and R761 propose a Secondary Cycle Route along its length. The Draft plan only outlines the Strategic Network, therefore, the local Redford Park arm is not included within this plan at this level.



Figure 2-7: Draft 2021 GDA Cycle Network Plan for Greystones (Source: Draft GDA Cycle Network Plan 2021)

2.12 WICKLOW COUNTY COUNCIL DEVELOPMENT PLAN – 2016 – 2022

2.12.1 The vision for County Wicklow is to be a cohesive community of people enjoying distinct but interrelated urban and rural environments. With regard to transportation, the vision is to integrate lane use planning with transportation planning with the aims of reducing the distance that people need to travel to works, shops, schools and places of recreation and social interaction, facilitating the sustainable transportation of goods and the delivery of improved public transport.

2.12.2 The provision of walking and cycling routes within and connecting towns and villages to each other forms an essential part of a linked-up transport system, involving a variety of transport modes, where public transport can be availed of. The objective for walking and cycling within the development plan are:

TR9 – To improve existing or provide new foot and cycleways on existing public roads, as funding allows.

TR10 – to require all new regional and local roads to include foot and cycleways, except in cases where shared road space is provided.

TR11 – To facilitate the development of foot and cycleways off road in order to achieve the most direct route to the principal destination while ensuring that personal safety, particularly at night time, is of the utmost priority.

TR12 – To encourage the provision of secure covered bicycle-parking facilities at strategic locations such as town centres, neighbourhood centres, community facilities and transport nodes.

TR13 – To facilitate the development of cycling and walking amenity routes throughout the County.

3.0 EXISTING CONDITIONS

3.1 INTRODUCTION

3.1.1 This section of the report discusses the existing conditions of the road network for the scheme including the traffic, pedestrian and cycling environment.

3.2 EXISTING JUNCTION LAYOUT

3.2.1 Detailed below are the existing layout and characteristics for the Redford Park junction, including the existing road layout as well as the existing provision of the pedestrian and cycle facilities.

Road Layout

3.2.2 The Redford Park junction is a 4 arm signal controlled junction. The road network surrounding the junction is illustrated in Figure 3-1 below.

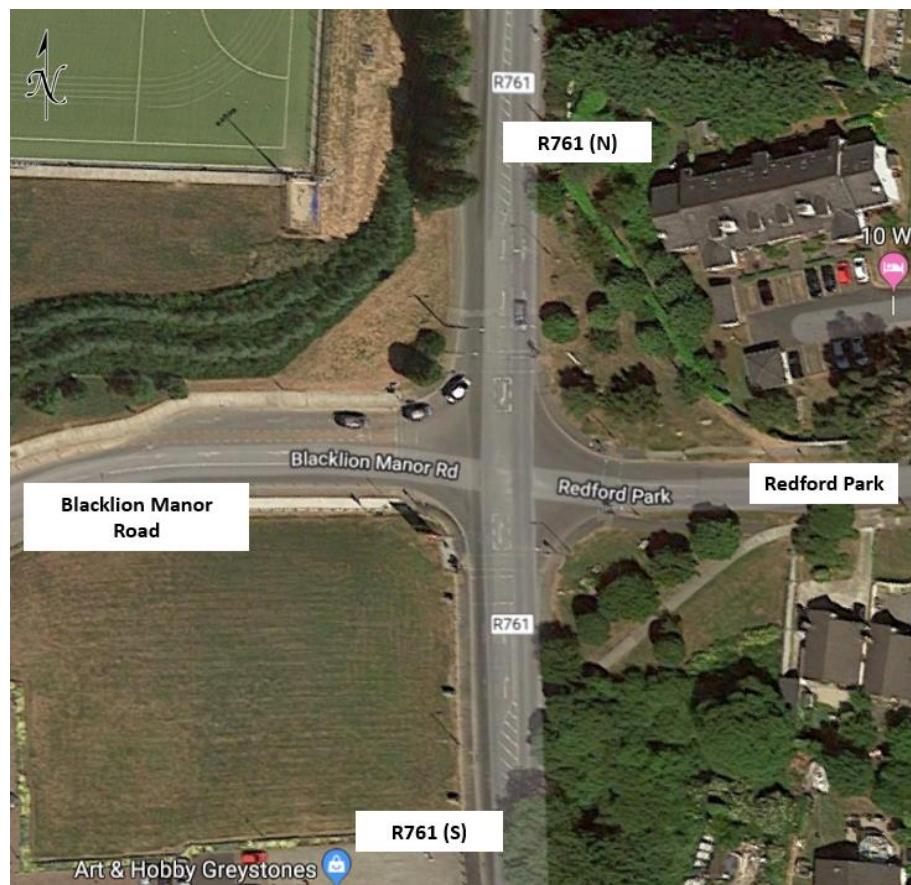


Figure 3-1: R761 / Blacklion Manor Road / Redford Park Junction

3.2.3 The R761 is a Regional Road in County Wicklow that routes in a north – south direction from Rathnew, through Kilcoole and Greystones before terminating in Bray. At the Redford Park Junction, the R761 has a speed limit of 50kph and has one lane in each direction on the approach to the junction. At the junction, both the northern and southern arms are allocated with one long lane and one flare lane for right turning vehicles.



Figure 3-2: R761 Regional Road at the Redford Park Junction

3.2.4 The Blacklion Manor Road is a recently constructed distributor road in Greystones. The road runs over a short distance, approximately 800m, and connects Chapel Road to the Redford Park Junction. The road operates with the function to provide for new development in the north western side of Greystones. The road typically takes the form of a single general traffic lane in both directions. At the junction, the road provides one long lane and one flare lane for left turning vehicles.



Figure 3-3: Blacklion Manor Road

3.2.5 The Redford Park road is a residential access road situated on the north eastern side of Greystones. The road is approximately 7m in width and has one lane in both directions at the junction.



Figure 3-4: Redford Park

Cycle Facilities

3.2.6 There are off road cycle tracks in place along the Blacklion Manor Road. These are located on both sides of the road, with bollards provided along the cycle lanes for protection from vehicles.



Figure 3-5: Cycle Facilities along Blacklion Manor Road

3.2.7 There are no cycle facilities on the R761 or the Redford Park road.

Pedestrian Facilities

3.2.8 There are footpath facilities on all roads approaching the Redford Park Junction with signalised pedestrian crossings on all arms. Footpaths at the junction are narrow in places considering the high volume of pedestrian

activity from the three schools along Blacklion Manor Road, as shown in Figure 3-6.



Figure 3-6: High Volume of Pedestrians at Redford Park Junction

3.3 TRAFFIC SURVEYS

- 3.3.1 Traffic count data was obtained from WCC for the junction. This data was taken directly from the traffic controller with traffic volumes taken for the 26th November 2019 which represented a mid-week period during school operating times.
- 3.3.2 Shown in Figure 3-7 below are the AM (08:00 – 09:00) and PM (16:00 – 17:00) peak hour traffic flows through the Redford Park junction.

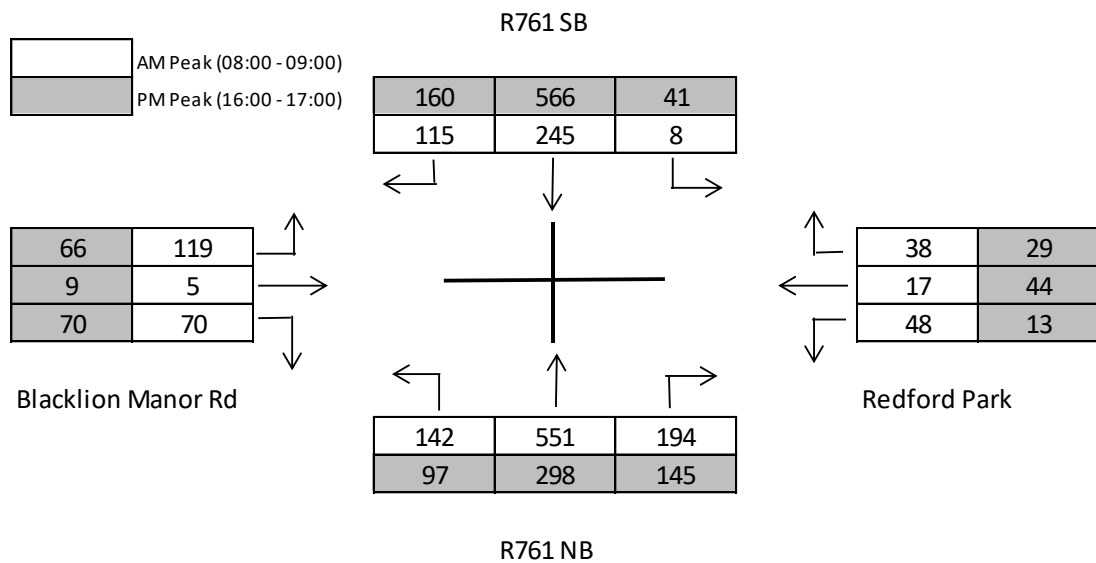


Figure 3-7: 2019 AM and PM Peak Traffic Flows for Redford Park Junction

3.3.3 Results for the AM peak hour show a high level of vehicular flow on the R761 NB arm with a total of 887 vehicles. Traffic flow for the R761 SB arm is lower in the AM peak as compared with the PM peak, showing a total vehicular flow of 368 in the AM peak and 767 in the PM peak.

3.3.4 The Blacklion Manor Road arm and the Redford Park arm show low traffic flows in both peak hours.

3.4 EXISTING TRAFFIC CAPACITY

3.4.1 A traffic model was developed for the Redford Park junction in order to determine the existing capacity at the junction. The TRL Software TRANSYT was used for the analysis. The junction was tested for the AM peak (08:00 – 09:00) and the PM peak (16:00 – 17:00). Results for the analysis for the AM peak hour and PM peak hour are outlined in Table 3-1 and Table 3-2 respectively.

Table 3-1: AM Base TRANSYT Results for the Redford Park Junction

AM Base Signalised Junction 2019 08:00 - 09:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
08:00-09:00	Redford Park	Straight, Left, Right	43	66.07	4.2	23
	Blacklion Manor Road	Left	22	42.09	3.63	20
		Straight, Right	22	53.78	2.66	15
	R761 NB	Straight, Left	76	33.26	27.88	153
		Right	26	13.74	2.04	11
	R761 SB	Straight, Left	27	27.3	7.43	41
Right		15	17.52	2.54	14	

Table 3-2: PM Base TRANSYT Results for the Redford Park Junction

PM Base Signalised Junction 2019 16:00 - 17:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
16:00-17:00	Redford Park	Straight, Left, Right	36	63.92	3.42	19
	Blacklion Manor Road	Left	12	40.54	2.01	11
		Straight, Right	23	54.02	2.8	15
	R761 NB	Straight, Left	43	27.8	12.67	70
		Right	19	15.76	2.02	11
	R761 SB	Straight, Left	66	35.92	22.55	124
Right		21	17.81	3.03	17	

3.4.2 Results show that during the AM peak hour, queuing is evident within the junction, in particular, on the R761 NB arm with a Degree of Saturation (DOS) of 76% and an average queue length of 27.8pcu which equates to

153m. It was noted on site during the AM peak hour that this arm does queue back. Results show that during the PM peak hour, the junction operates overall within capacity. Queueing is evident, however, on the R761 SB arm with a DOS of 66% and an average queue length of 22.5pcus which equates to 124m average queue length.

3.5 ACCIDENT STATISTICS

- 3.5.1 As part of this assessment, the Road Safety Authority (RSA) accident database was reviewed in order to ascertain the safety record along the proposed scheme route.
- 3.5.2 The data reviewed on the website covers an 11 year period from 2005 – 2016 inclusive and indicates basic information on all reported incidents. It is noted that information relating to reported collisions for the years 2017 to present is not yet available on the RSA database website.

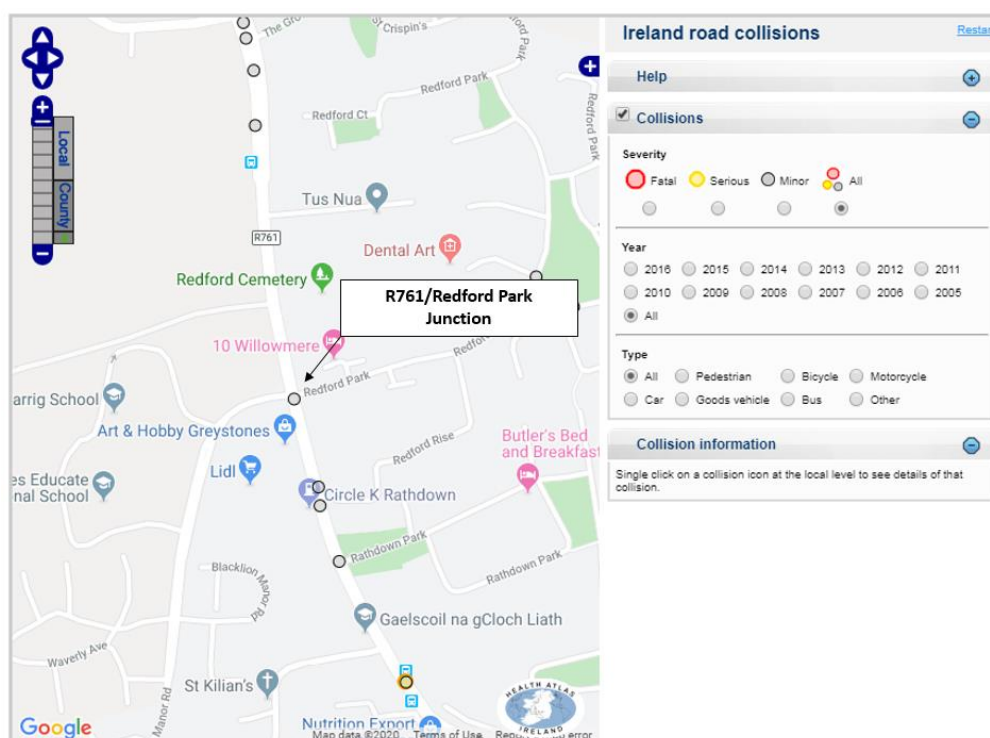


Figure 3-8: RSA Road Collision Database 2005 – 2015 (Source: RSA)

- 3.5.3 The graph in Figure 3-8 outlines that between the years of 2005 – 2016 there has been one collision recorded at the Redford Park junction. This collision, involving a rear end with a car, occurred in 2010 and was classed as minor in nature.

3.6 BUS ROUTES

- 3.6.1 Dublin Bus currently operates a bus route (84) through the Redford Park junction. This service routes between Newcastle and Blackrock, travelling through Kilcoole, Greystones and Bray. This service operates daily on an hourly basis.
- 3.6.2 Transport for Ireland operates a bus route (No.184) through the Redford Park junction along the R761 in a north to south direction. This service operates between Bray Train Station and Newtownmountkennedy, serving the Greystones Train Station and Delgany. This service operates daily and runs every 30 minutes approximately.
- 3.6.3 As part of the proposed Bus Connects scheme, there are a number of local and peak time services that are proposed to route from Greystones and along the R761 through the Redford Park junction, continuing to Bray and the City Centre. These services, as displayed in Figure 3-9, are the following:
- Route L1 – This is a Local Route that loops between Greystones and Bray, routing through Newcastle in a clockwise direction.
- Route L2 – This is a Local Route that loops between Greystones and Bray, routing through Newcastle in an anticlockwise direction.
- Route X1 & X2 – These are Peak Only/Express Routes. Route X1 routes through Kilcoole, Southern Cross and the City Centre. Route X2 route through Newcastle, Kilcoole, Southern Cross and the City Centre.



Figure 3-9: Bus Connects Proposals for Greystones

4.0 DESIGN OPTIONS

4.1 INTRODUCTION

4.1.1 This section focuses and details the design options considered for the Redford Park junction. These options have been developed to improve the overall junction layout for pedestrian and cycle safety as well as traffic movements.

4.2 JUNCTION DESIGN OPTIONS

4.2.1 A total of three design options were considered for this junction. These are as follows and are detailed below;

Option A – Continental Roundabout

Option B – Upgraded Signalised Junction

Option C – Cycle Protected Signalised Junction

OPTION A – CONTINENTAL ROUNDABOUT

4.2.1 Option A, shown in Figure 4-1 and detailed further in Appendix A of this report, proposes a continental style roundabout with zebra crossings proposed on all arms and 90 degree approach lanes to the roundabout. Each arm has a single lane approach to the roundabout as per the National Cycle Manual and international best practice.

4.2.2 This option proposes a shared cycle and pedestrian path around the roundabout with footpaths and cycle tracks proposed on approach.

4.2.3 The Continental Roundabout option is appropriate for AADT levels below 25,000. The AADT for the junction is between 18,000 – 19,000 vehicles. Therefore, this option is considered acceptable at the Redford Park junction.

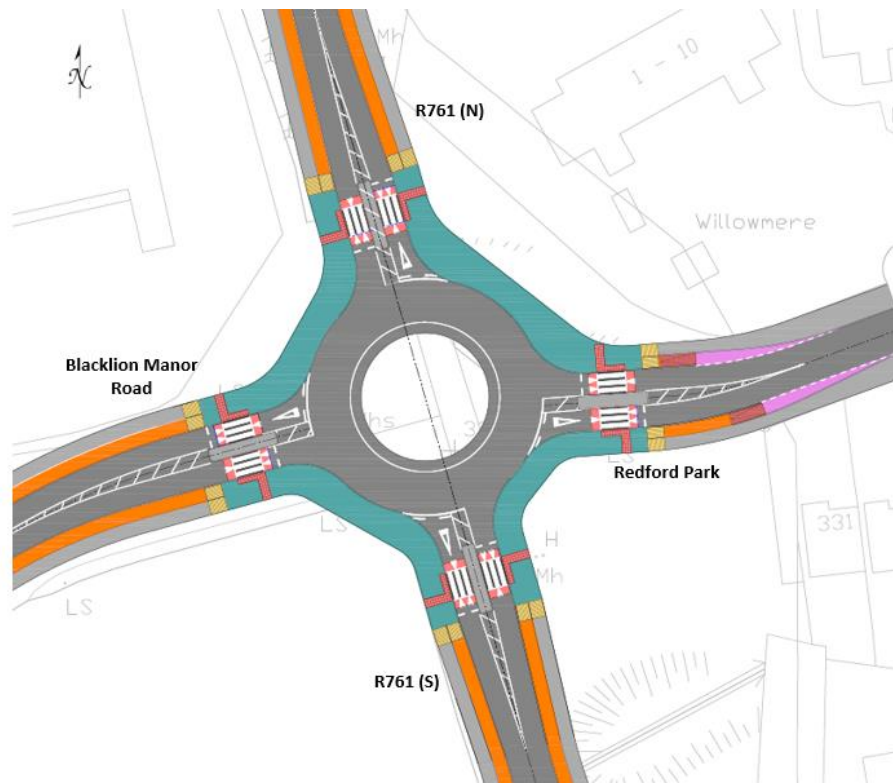


Figure 4-1: Option A – Continental Roundabout

4.2.4 Table 4-1 below outlines the Opportunities and Constraints for Option A – Continental Roundabout.

Table 4-1: Opportunities and Constraints for Option A

OPPORTUNITIES FOR OPTION A	CONSTRAINTS FOR OPTION A
Improvement in footpaths and crossing facilities. Pedestrians afforded priority.	Requires additional infrastructure and expenditure in comparison to Option B and Option C.
Improvement in cycle lane facilities at the junction	Reduction in traffic capacity
Improvement in road safety with reduced traffic speeds through the roundabout	Possibility of conflict between pedestrians and cyclists
Reduction in vehicle / cycle conflict	
Does not require additional land take	

OPTION B – UPGRADED SIGNALISED JUNCTION

4.2.5 Option B, shown in Figure 4-2 and detailed further in Appendix A of this report, considers the upgrade of the existing signalised junction to incorporate proposals for pedestrian and cycle improvements through the

junction as well as improvements to vehicular movements through updated signal timings.

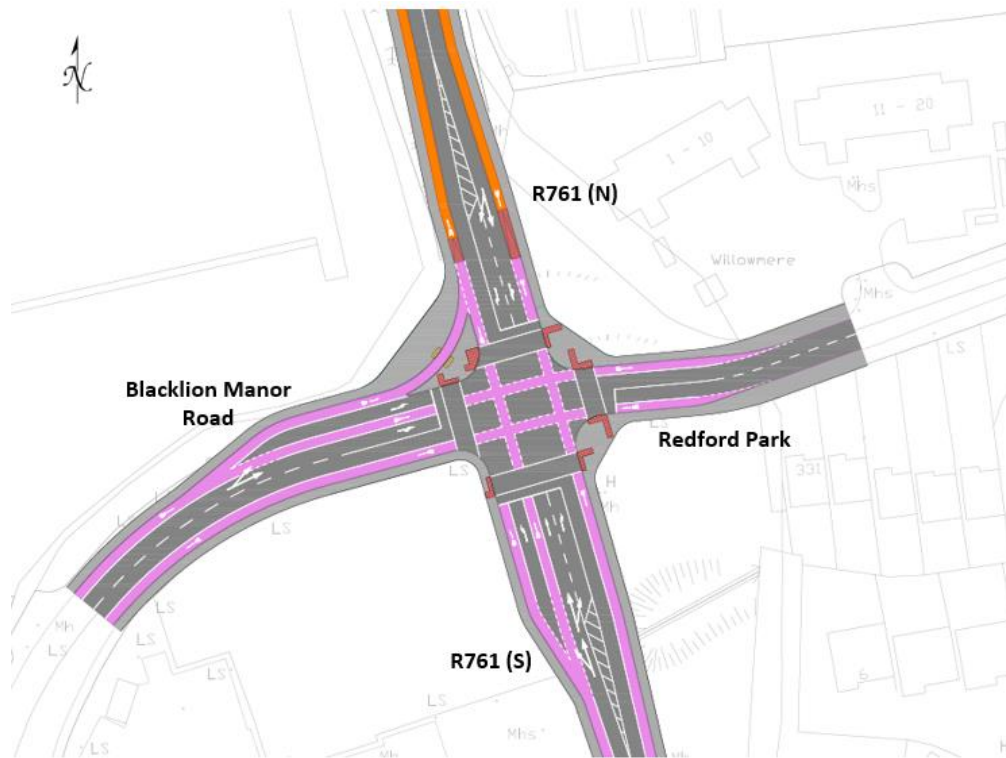


Figure 4-2: Option B – Signalised Junction

- 4.2.6 This option proposes cycle lanes on the R761 arms as well as the Blacklion Manor Road arm. Cycle lanes are proposed on the Redford Park arm on approach to the junction. Upgraded footpaths and crossings are proposed at the junction for improved pedestrian movement.
- 4.2.7 Footpath build outs and reduced turning radii provide a more compact junction with reduced pedestrian crossing distances.
- 4.2.8 Table 4-2 below outlines the Opportunities and Constraints for Option B – Signalised Junction.

Table 4-2: Opportunities and Constraints for Option B

OPPORTUNITIES FOR OPTION B	CONSTRAINTS FOR OPTION B
Improvement in footpaths and crossing facilities	No protection for cyclists at the junction
Improvement in cycle lane facilities through the junction	
Improvement in traffic capacity with upgraded signals and staging	

OPTION C – CYCLE PROTECTED SIGNALISED JUNCTION

4.2.9 Option C, shown in Figure 4-3 and detailed further in Appendix A of this report, considers the upgrade of the existing signalised junction to incorporate proposals for pedestrian and cycle improvements through the junction as well as improvements to vehicular movements through upgraded signal timings.

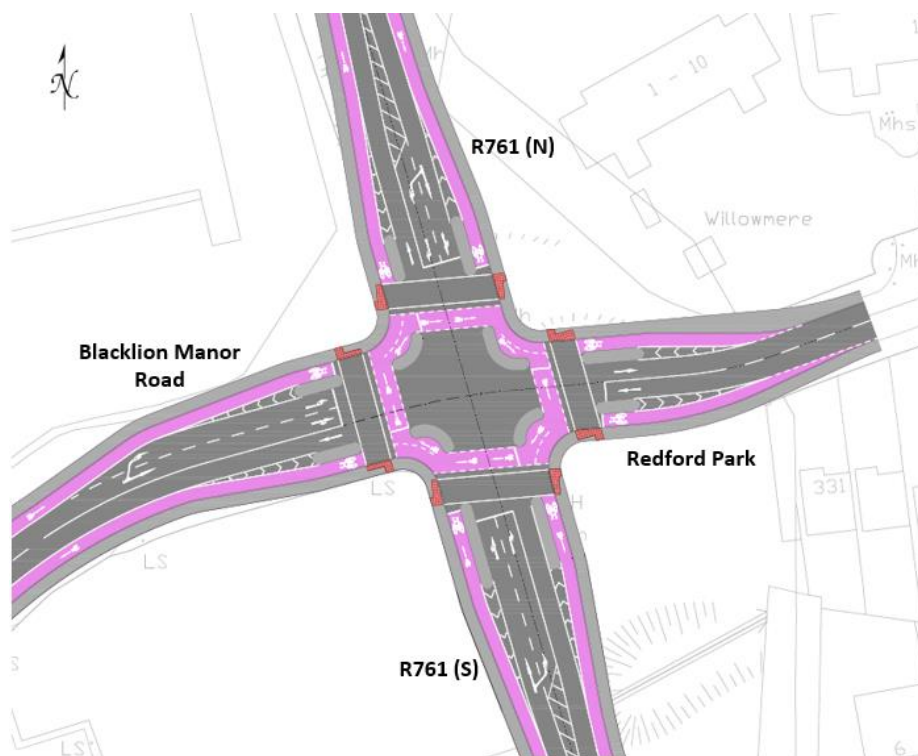


Figure 4-3: Option C – Cycle Protected Signalised Junction

4.2.10 This option proposes cycle lanes on the R761 and Blacklion Manor Road arm of the junction. Cycle lanes are proposed on the Redford Park arm on approach to the junction only.

4.2.11 Islands are proposed at the corners of the junction. These islands have the purpose of protecting cyclists as they travel through the junction, in particular, in relation to possible conflict with left turning vehicles.

4.2.12 Upgraded footpaths and crossings are proposed at the junction for improved pedestrian movement.

4.2.13 Table 4-3 below outlines the Opportunities and Constraints for Option C – Cycle Protected Signalised Junction.

Table 4-3: Opportunities and Constraints for Option C

OPPORTUNITIES FOR OPTION C	CONSTRAINTS FOR OPTION C
Improvement in footpaths and crossing facilities	Requires additional infrastructure and expenditure in comparison to Option B.
Improvement in cycle lane facilities through the junction	
Improvement in traffic capacity with upgraded signals and staging	
Additional protection/segregation for cyclists	

4.2.1 All three options as detailed in this section were subject to an options appraisal through Multi Criteria Analysis. This is discussed in Chapter 5.

4.3 PROPOSED TRAFFIC CAPACITY

4.3.1 A junction analysis exercise was undertaken on the design options in order to determine how these options operated in terms of traffic capacity. The Base 2019 traffic flows outlined above were utilised for this analysis.

4.3.2 Option A, Continental Roundabout, was assessed using the TRL software ARCADY. Option B and Option C, Signalised junctions, were assessed using the TRL software TRANSYT.

4.3.3 Results for the Continental Roundabout, outlined in Table 4-4 below, indicate that the roundabout would operate over capacity in the AM peak hour on the R761 NB arm with an excessive queue length of 185pcu and in the PM peak hour on the R761 SB arm with a queue length of 95.6pcu.

Table 4-4: ARCADY results for proposed Continental Roundabout option

	AM Peak Hour			PM Peak Hour		
	Queue (pcu)	Delay (s)	RFC	Queue (pcu)	Delay (s)	RFC
Redford Park	0.3	8.14	0.19	0.3	9.98	0.19
R761 NB	185.3	882.9	1.38	6	38.49	0.86
Blacklion Manor Road	0.8	13.14	0.41	0.4	9.78	0.28
R761 SB	1.6	14.17	0.59	95.6	495.58	1.24

4.3.4 Results for the proposed signalised junction options for the AM peak and PM peak are outlined in Table 4-5 and Table 4-6 respectively. The signal timings

and cycle time for the junction have been altered from the existing scenario in order to improve traffic capacity through the junction. The cycle time used for this assessment was 120 seconds with the pedestrian crossing being called every cycle, ie, every 2 minutes over the peak hour.

Table 4-5: AM TRANSYT results for proposed signalised junction options

AM Proposed Signalised Junction 08:00 - 09:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
08:00-09:00	Redford Park	Straight, Left, Right	50	59.91	3.48	19
	Blacklion Manor Road	Left	36	44.43	3.28	18
		Straight, Right	34	53.8	2.4	13
	R761 NB	Left	17	20.18	1.96	11
		Straight	64	26.96	14.17	78
		Right	28	14.53	2.05	11
	R761 SB	Straight, Left	30	24.84	5.69	31
		Right	16	16.55	1.9	10

Table 4-6: PM TRANSYT results for proposed signalised junction options

PM Proposed Signalised Junction 16:00 - 17:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
16:00-17:00	Redford Park	Straight, Left, Right	41	56.79	2.82	16
	Blacklion Manor Road	Left	20	41.37	1.79	10
		Straight, Right	36	54.33	2.54	14
	R761 NB	Left	12	21.69	1.67	9
		Straight	35	24.61	6.88	38
		Right	21	16.23	2.03	11
	R761 SB	Straight, Left	72	35.09	17.77	98
		Right	23	17.5	2.66	15

4.3.5 Results for the AM peak hour show that the junction operates within capacity with the highest DOS of 64% recorded along the R761 NB arm, similar to the existing scenario. The average queue length has reduced on this arm to 78m in comparison to the existing scenario which displayed an average queue length of 153m on this arm.

4.3.6 For the PM peak hour, the junction operates within capacity and displays the highest DOS of 72% on the R761 SB arm and an average queue length of 98m. This has reduced in comparison to the existing scenario which displayed an average queue length of 124m on this arm.

- 4.3.7 It is noted that the staging arrangement used for the TRANSYT assessment of Option B (signalised junction) does not cater for any form of cycle signal within the staging plan. Option C (Cycle Protected Signalised Junction) would require an alternative signal and staging plan from Option B in order to cater for the cycle movements through the junction. This alternative staging arrangement is provided in detail in Section 7 of this report.

5.0 MULTI-CRITERIA ANALYSIS

5.1 INTRODUCTION

- 5.1.1 In order to determine the preferable design option for each junction, it is necessary to undertake an options appraisal. This appraisal is based on a number of criteria as set out by the Department of Transport, Tourism and Sport (DTTAS).
- 5.1.2 An MCA is used to describe any structured approach to determine overall preferences among alternative options, where the options should accomplish multiple objectives.
- 5.1.3 The 'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes' published by the DTTAS, March 2016, requires schemes to undergo a 'Multi-Criteria Analysis' (MCA) under the following criteria:
- **Economy:** The impacts of a transport investment on economic growth and competitiveness are assessed under the economic impact and economic efficiency criteria;
 - **Integration:** Integration considers the extent to which the project being evaluated promotes Integration of transport networks and is compatible with a range of Government policies, including national and spatial planning policy;
 - **Safety:** Safety is concerned with the impact of the investment on the number of transport related accidents;
 - **Environment:** Environment embraces a range of impacts, such as emissions to air, noise and ecological and architectural impacts;
 - **Physical Activity:** This relates to the health benefits derived from using different transport modes.

5.2 MCA CRITERIA

- 5.2.1 Table 5-1 below outlines the MCA criteria and sub-criteria. These sub-criteria are discussed in more detail below.

Table 5-1: MCA Assessment Criteria

Assessment Criteria	Assessment Sub-Criteria
1. Economy	1a. Capital Cost 1b. Transport Quality & Reliability
2. Integration	2a. Cycle Network Integration 2b. Pedestrian Network Integration 2c. Traffic Network Integration
3. Safety	3a. Road Safety 3b. Pedestrian Safety 3c. Cycle Safety
4. Environment	4a. Flora & Fauna 4b. Soils, Geology & Hydrology 4c. Landscape & Visual 4d. Air Quality, Noise & Vibration 4e. Land Use Character
5. Physical Activity	5a. Health Benefits

1. Economy

1a. Capital Cost: Capital Cost estimates consist of both the indicative infrastructure cost estimate and land acquisition costs. At this early stage, specific estimates have not been produced but professional judgement has been used based on an understanding of the level of works required and also any potential land acquisition.

1b. Transport Quality & Reliability: This criterion assesses the reliability and quality of facilities proposed from a sustainable transport perspective and relates to the accessibility and reliability for movement of people through the junction via quality cycle and pedestrian facilities.

2. Integration

2a. Cycle Network Integration: This criterion assesses the options for the practicality of achieving integrated high-quality cycle facilities in line with the GDA Cycle Network Plan.

2b. Pedestrian Network Integration: This criterion assesses the options for the practicality of achieving high quality pedestrian facilities.

2c. Traffic Network Integration: This criterion assesses the options for the practicality of achieving integrated junction design layouts that balance the requirements of vehicular traffic with the needs of vulnerable road users. This criteria also assesses the impact that each design option would have on the traffic capacity of the junction.

3. Safety

- 3a. Road Safety:** This criterion addresses the road safety for all users, including vehicular traffic.
- 3b. Pedestrian Safety:** This criterion addresses the design options for safety of pedestrian facilities.
- 3c. Cycle Safety:** This criterion addresses the design options for safety of cycle facilities.

4. Environment

- 4a. Flora & Fauna:** This criterion assesses the impact on specific flora or fauna or on defined habitats should the construction, presence or the operation of transport infrastructure impact on this.
- 4b. Soils, Geology & Hydrology:** This criterion assesses the impact of the options on soil and geology as a result of land-take and possible ground excavation.
- 4c. Landscape & Visual:** This criterion assesses the potential to impact on townscape/streetscape quality.
- 4d. Air Quality, Noise & Vibration:** This criterion assesses the impact of a route in terms of its proximity to quality of air and noise environment.
- 4e. Land Use Character:** This criteria assesses each option in terms of the impact that the proposals have on the character of the street and existing land uses nearby.

5. Physical Activity

- 5a. Health Benefits:** This criterion is based on the quality of the cycle and pedestrian facilities proposed and whether users will be encouraged to take up more sustainable travel modes as a result, ie, are the facilities proposed of high quality to attract users.

5.2.2 For each option proposed, a summary table in Project Appraisal Balance Sheet (PABS) format has been prepared which collates and summarises the appraisal of the options under each of the assessment criteria.

5.2.3 For each assessment criterion considered, options have been relatively compared against each other based on a five point scale, ranging from

having 'significant advantages' to having 'significant disadvantages' over other design options. For illustrative purposes, this five-point scale is colour coded as presented in Table 5-2, with advantageous options graded to 'dark green' and disadvantageous options graded to 'red'.

Table 5-2: MCA Colour Coded Ranking Scale

Colour	Description
Dark Green	Significant advantages over other options
Light Green	Some advantages over other options
Yellow	Neutral compared to other options
Orange	Some disadvantages compared to other options
Red	Significant disadvantages compared to other options

5.3 MULTI CRITERIA ANALYSIS ASSESSMENT

5.3.1 Shown below in Table 5-3 is the MCA results for the Redford Park junction options.

Table 5-3: MCA Assessment for Redford Park Junction

		Existing Scenario	Op A - Continental Roundabout	Op B - Signalised Junction	Op C - Protected Intersection
Economy	Capital Cost	Orange	Yellow	Light Green	Light Green
	Transport Quality & Reliability	Yellow	Light Green	Light Green	Light Green
Integration	Cycle Network	Yellow	Light Green	Light Green	Light Green
	Pedestrian Network	Yellow	Light Green	Light Green	Light Green
	Traffic Network	Yellow	Yellow	Light Green	Light Green
Safety	Road Safety	Yellow	Light Green	Yellow	Yellow
	Pedestrian Safety	Light Green	Yellow	Light Green	Light Green
	Cycle Safety	Red	Light Green	Yellow	Light Green
Environment	Flora & Fauna	Yellow	Yellow	Yellow	Yellow
	Soils, Geology & Hydrology	Yellow	Yellow	Yellow	Yellow
	Landscape & Visual	Yellow	Light Green	Yellow	Yellow
	Air Quality, Noise & Vibration	Light Green	Yellow	Light Green	Light Green
	Land Use Character	Light Green	Yellow	Light Green	Light Green
Physical Activity	Health Benefits	Red	Yellow	Light Green	Light Green

5.3.2 In terms of 'Economy', Option B and Option C emerge with advantages over other options. For Capital Cost, Option A shows some disadvantages over other options as this will involve a conversion of the existing signal controlled junction to a roundabout which will inevitably provide a higher capital cost.

For Transport Quality, all three options proposed provide for advantages over the existing scenario as all options propose good quality pedestrian and cycle facilities as compared with the existing scenario.

- 5.3.3 In terms of 'Integration', for the Cycle Network Integration, Option B and Option C proposes advantages over other options. These options propose high quality dedicated cycle lanes through the junction which align with the GDA Proposed Cycle Network Plan for cycle facilities through this junction. Option A shows disadvantages for Cycle Network Integration as this option proposes a shared path through the roundabout which may not integrate as well as other options that propose dedicated cycle facilities.
- 5.3.4 For the Pedestrian Network Integration, all three options show advantages in comparison to the existing scenario. All options propose good quality pedestrian facilities with upgraded footpaths and crossings on all arms.
- 5.3.5 For the Traffic Network Integration, Option A shows disadvantages over other options. Traffic capacity is reduced at the junction as a result of this option. Option B and Option C show some advantages for Traffic Integration.
- 5.3.6 In terms of 'Safety', for Road Safety, Option A shows advantages over other options. Provision of a Continental Roundabout will slow traffic speeds on approach to the junction, and therefore will improve road safety.
- 5.3.7 For Pedestrian Safety, Option B and Option C shows some advantages. These options propose dedicated footpaths for pedestrians through the junction, whereas, Option A, Continental Roundabout, proposes pedestrians to share the path with cyclists, which may create conflict points.
- 5.3.8 For Cycle Safety, the existing scenario shows significant disadvantages over other options due to the lack or current cycle provision through the junction. Option B shows some disadvantages over other options due to the possible conflict point between cyclists and left turning vehicles at the junction. Option A and Option C provide forms of protection for cyclists and therefore show advantages over Option B and the existing layout.
- 5.3.9 In terms of 'Environment' the first two sub criteria 'Flora and Fauna' and 'Soils, Geology & Hydrology' were not considered to have an impact for these options, therefore, all options were given a neutral rating.

- 5.3.10 For Landscape and Visual, Option A shows some advantages over other options. This option provides a small continental roundabout with one lane approaches which allows for large areas surrounding the roundabout to be given back to possible urban design and landscape.
- 5.3.11 For Air Quality, Noise & Vibration, Option A shows disadvantages over other options. This option shows high levels of traffic queueing on some arms, which will have an impact on the air quality and noise for the surrounding residential area. All other options show advantages for this criteria.
- 5.3.12 For Land Use Character, Option A shows some disadvantages over other options. This option is not in keeping with the surrounding land use character of the area, with traffic capacity issues and queue lengths potentially impacting on access to and from the various amenities surrounding the junction.
- 5.3.13 In terms of 'Physical Activity', for Health Benefits, Option B and Option C show some advantages over other options. The quality of cycle facilities proposed for these options will attract users to the route and encourage people to cycle and walk. Option A shows some disadvantages. A shared path may not attract as many users as other options proposed.
- 5.3.14 Table 5-4 shows a summary of results for the 5 main criteria.

Table 5-4: Summary of MCA Assessment

	Existing Scenario	Op A - Continental Roundabout	Op B - Signalised Junction	Op C - Protected Junction
Economy	Green	Yellow	Green	Green
Integration	Yellow	Yellow	Green	Green
Safety	Red	Green	Yellow	Green
Environment	Green	Yellow	Green	Green
Health Benefits	Red	Yellow	Green	Green

- 5.3.15 The overall summary results for the MCA show that from the Options assessed, Option C, Cycle Protected Junction, emerges as the preferred design option for the junction. It is noted that Option B, Signalised Junction, also shows good advantages in the majority of criteria assessed, however, shows some disadvantages over Option C in terms of Cycle Safety.

6.0 EMERGING PREFERRED OPTION

- 6.1.1 Option C, Protected Intersection, emerges as the preferred option following the Multi-Criteria Analysis. It is noted that the concept for a Cycle Protected Signalised Junction is relatively new in Ireland. A design guidance has been developed by the National Transport Authority (NTA) as part of the Bus Connects scheme. These standards will be applied to this junction operation. A proposed staging plan has been considered and is outlined in Section 7 below.
- 6.1.2 Option C has been taken forward as the preferred design option for the Redford Park junction.

7.0 PROTECTED INTERSECTION STAGING PLAN

- 7.1.1 A preliminary staging plan for the Protected Intersection style junction has been developed as part of this Options Assessment. This staging plan has been developed in line with the current NTA design guidance as part of the BusConnects proposals and provides staging arrangements for all modes of travel including vehicles, cyclists and pedestrians.
- 7.1.2 It is noted that should NTA guidance change in relation to the staging arrangements of these junction types, this staging plan may be altered to accommodate these changes.
- 7.1.3 The potential staging plan proposed is outlined from Figure 7-1 to Figure 7-7 inclusive.

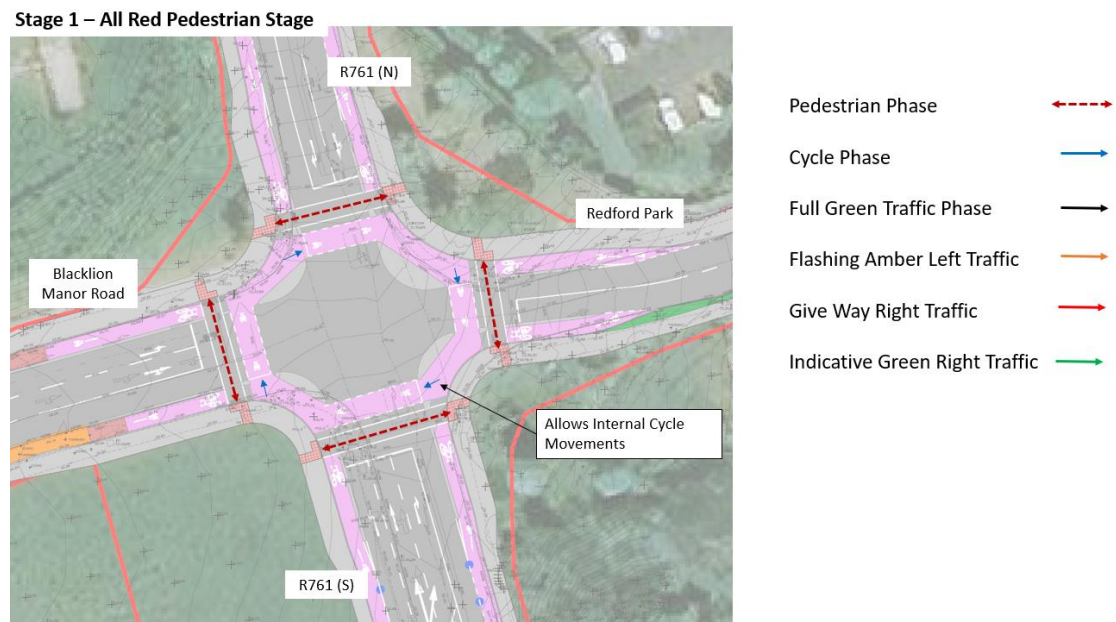


Figure 7-1: Stage 1 – All Red Pedestrian Stage

Stage 2 – Advanced Cycle Stage for R761 arms



- Pedestrian Phase ← - - - - - →
- Cycle Phase →
- Full Green Traffic Phase →
- Flashing Amber Left Traffic →
- Give Way Right Traffic →
- Indicative Green Right Traffic →

Figure 7-2: Stage 2 – Advanced cycle stage for R761 arms

Stage 3 – Straight & Left for R761 arms



- Pedestrian Phase ← - - - - - →
- Cycle Phase →
- Full Green Traffic Phase →
- Flashing Amber Left Traffic →
- Give Way Right Traffic →
- Indicative Green Right Traffic →

Figure 7-3: Stage 3 – Straight & Left for R761 arms

Stage 4 – Right Turn Movements for R761 arms

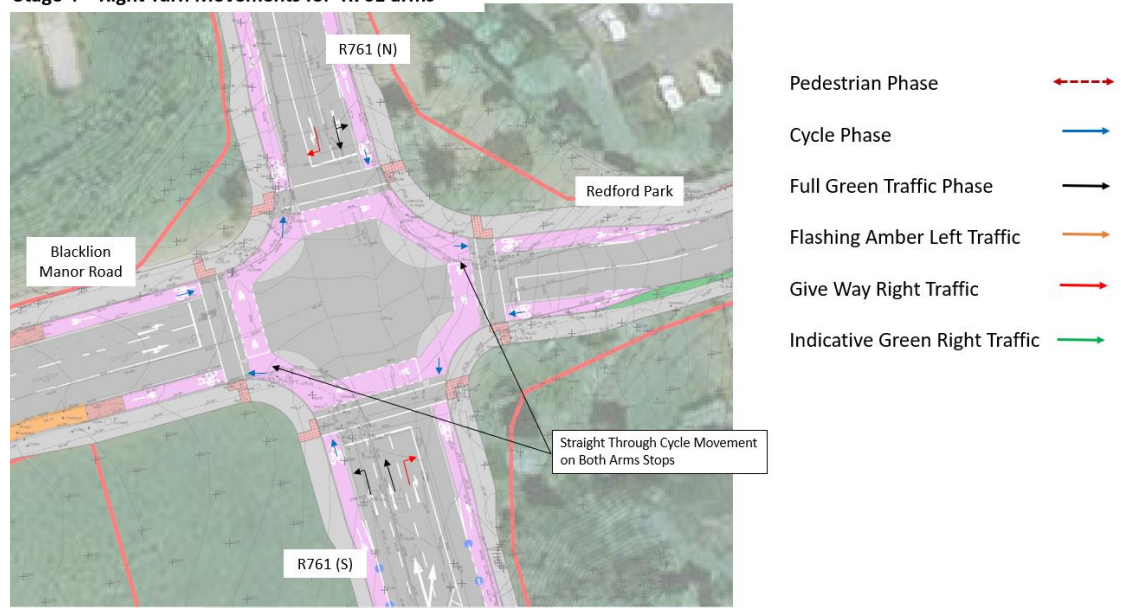


Figure 7-4: Stage 4 – Right turn for R761 arms

Stage 5 – Indicative Arrow Right Turn Movements for R761 arms

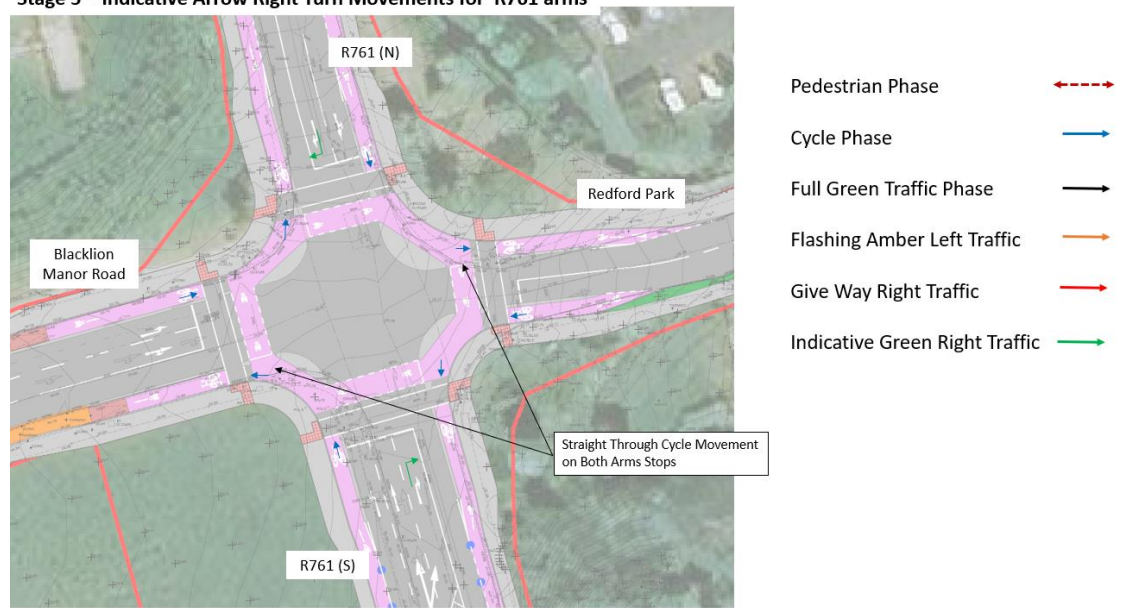


Figure 7-5: Stage 5 – Indicative Green for Right Turn R761 arms

Stage 6 – Blacklion Manor Road arm



- Pedestrian Phase ← - - - - - →
- Cycle Phase →
- Full Green Traffic Phase →
- Flashing Amber Left Traffic →
- Give Way Right Traffic →
- Indicative Green Right Traffic →

Figure 7-6: Stage 6 – Blacklion Manor Road arm

Stage 7 – Redford Park arm



- Pedestrian Phase ← - - - - - →
- Cycle Phase →
- Full Green Traffic Phase →
- Flashing Amber Left Traffic →
- Give Way Right Traffic →
- Indicative Green Right Traffic →

Figure 7-7: Stage 7 – Redford Park arm

7.1.4 This staging plan incorporates advanced cycle phases, flashing amber left turning movements as well as an all-red pedestrian stage at the beginning of the stage sequence.

7.1.5 Stage 1 of the proposed staging plan accommodates an all red traffic / all green pedestrian stage.

- 7.1.6 Stage 2 of the proposed staging plan provides an advanced cycle stage for the R761 arms. This allows cyclists to advance first through the junction before vehicular traffic which reduces potential conflict further.
- 7.1.7 Stage 3 of the proposed staging plan runs the straight and left turn movements for the R761 north and south arm. The left turn movements are provided with a flashing amber rather than a full green in this stage as the cycle green light is continued during this stage for straight ahead cycle movements.
- 7.1.8 Stage 4 of the proposed staging plan continues the R761 arms which includes for the right turn movements as well as continuing the straight and left turn movements. The straight ahead cycle movements for the R761 are stopped during this stage in order to avoid potential conflict between cyclists and right turning vehicle movements.
- 7.1.9 Stage 5 provides an indicative green arrow for the right turn movements on the R761 to allow unopposed movements for right turners.
- 7.1.10 Stage 6 of the proposed staging plan runs the Blacklion Manor Road arm. It is noted that the advanced cycle green for the Blacklion Manor Road arm can be run within the previous stage (Stage 5) and so does not require isolated green time for this.
- 7.1.11 Stage 7 of the proposed staging plan runs the Redford Park arm. It is noted that the advanced cycle green for the Redford Park arm can be run within the previous stage (Stage 6) and so does not require isolated green time for this.
- 7.1.12 The staging plan was analysed using the TRANSYT software in order to determine the traffic capacity impact at the junction for both the AM and PM peak hours. The TRANSYT staging plan is illustrated in Figure 7-8 below. The cycle time proposed for the junction is 120 seconds. The pedestrian stage is being run every second cycle, ie, every 4 minutes over the hour. The staging is optimised for green time. Table 7-1 outlines the phasing allocation for each arm within the junction.
- 7.1.13 It is noted that in order to make a comparison between this proposed junction layout and the existing scenario, the 2019 traffic data was used in

this assessment. Up to date survey data has not been available within the period of 2020 to present due to the ongoing pandemic.

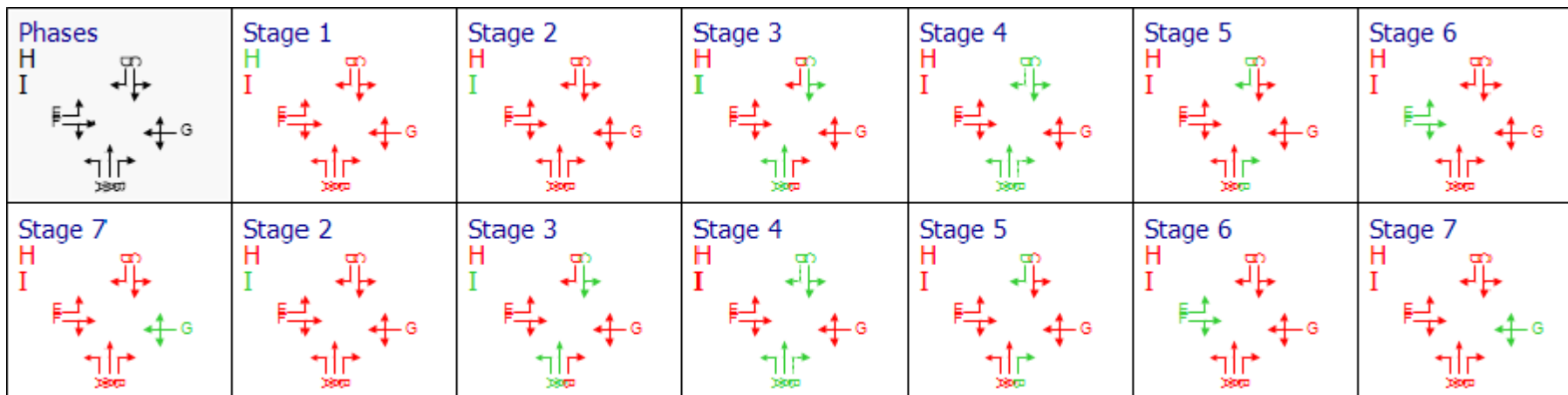


Figure 7-8: TRANSYT Staging Plan for Cycle Protected Intersection

Stage	Phase	Arm	Direction
1	H	All Arms	Pedestrian Crossing
2	I	R761 (N) & R761 (S)	Advanced Cycle Phase
3	A	R761 (S)	Straight/Left
	C	R761 (N)	Straight/Left
4	A	R761 (S)	Straight/Left
	C	R761 (N)	Straight/Left
	B	R761 (S)	Right (Give Way)
5	D	R761 (N)	Right (Give Way)
	B	R761 (S)	Right
6	D	R761 (N)	Right
	E	Blacklion Manor Road	Left
7	F	Blacklion Manor Road	Straight/Right
	G	Redford Park	Left/Straight/Right

Table 7-1: Staging & Phasing Allocation for TRANSYT Staging Plan

7.1.14 Results for the TRANSYT assessment of the Cycle Protected Intersection for both the AM peak hour (08:00 – 09:00) and PM peak hour (16:00 – 17:00) are outlined below in Table 7-2 and Table 7-3 respectively.

Table 7-2: AM TRANSYT Results for the Cycle Protected Signalised Junction

AM Proposed Cycle Protected Signalised Junction 08:00 - 09:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
08:00-09:00	Redford Park	Straight, Left, Right	48	58.5	3.6	19.8
	Blacklion Manor Road	Left	40	48	3.7	20.3
		Straight, Right	21	43.7	2.3	12.6
	R761 NB	Left	19	24.8	2	11
		Straight	71	33	14.4	79.2
		Right	31	15.7	2	11
	R761 SB	Straight, Left	33	29.5	7	38.5
		Right	18	22.6	2.6	14.3

Table 7-3: PM TRANSYT Results for the Cycle Protected Signalised Junction

PM Proposed Cycle Protected Signalised Junction 16:00 - 17:00						
Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Mean Delay per Veh (s)	Mean max queue (PCU)	Mean max queue (m)
16:00-17:00	Redford Park	Straight, Left, Right	40	55.7	2.8	15.4
	Blacklion Manor Road	Left	28	48.6	2	11
		Straight, Right	27	48	2.5	13.7
	R761 NB	Left	12	23.5	1.8	9.9
		Straight	36	26.1	6.2	34.1
		Right	22	18.1	2	11
	R761 SB	Straight, Left	75	39	22.5	123.7
		Right	24	20.4	3	16.5

7.1.15 The results for the AM peak hour show that overall the junction operates within capacity for all arms. The R761 (NB) arm operates with the highest degree of saturation of 71% for the straight ahead movement. This has a mean max queue length of almost 80m.

7.1.16 The results for the PM peak hour show that overall the junction operates within capacity for all arms. The R761 (SB) operates with the highest degree of saturation of 75% with a mean max queue length of 123.7m.

7.1.17 A comparison of TRANSYT results was undertaken between the Existing Scenario, the Proposed Signalised Junction as well as the Proposed Cycle Protected Junction assessments. It is noted that the Existing Scenario has a cycle time of 146 seconds and runs the pedestrian stage every 2nd cycle over the hour. The Proposed Signalised Junction has a reduced cycle time of 120

seconds and runs the pedestrian stage every cycle. The Proposed Cycle Protected Junction has a proposed cycle time of 120 seconds and runs the pedestrian stage every 2nd cycle, similar to the existing scenario.

- 7.1.18 Shown in Figure 7-9 and Figure 7-10 below are the comparison graphs for all three scenarios tested with the Degree of Saturation (%) displayed for all scenarios.
- 7.1.19 Results show that for the AM peak hour, overall, the Proposed Cycle Protected Signalised Junction is comparable to the performance of the existing scenario for most arms within the junction. The Proposed Cycle Scenario has a lower DOS for the R761 (NB) arm with slightly higher DOS for the other arms. The Proposed Cycle Scenario shows slightly higher saturation levels in comparison to the Signalised Junction Scenario. This increase accounts for the additional cycle advanced stage within the staging sequence. Overall, the AM peak hour shows minor increments in saturation levels between the three scenarios tested.
- 7.1.20 Results show that for the PM peak hour, the Protected Cycle Scenario shows the lowest saturation for most of the arms within the junction with the exception of the R761 (NB) arm. Overall, all three scenarios do not vary significantly in terms of saturation levels within the junction.
- 7.1.21 The overall advantages for all modes of travel for the Cycle Protected Signalised Junction, in particular for cyclists, in comparison to other options assessed results in this option providing the more favourable option as was noted and assessed within the Options Assessment in Section 5.

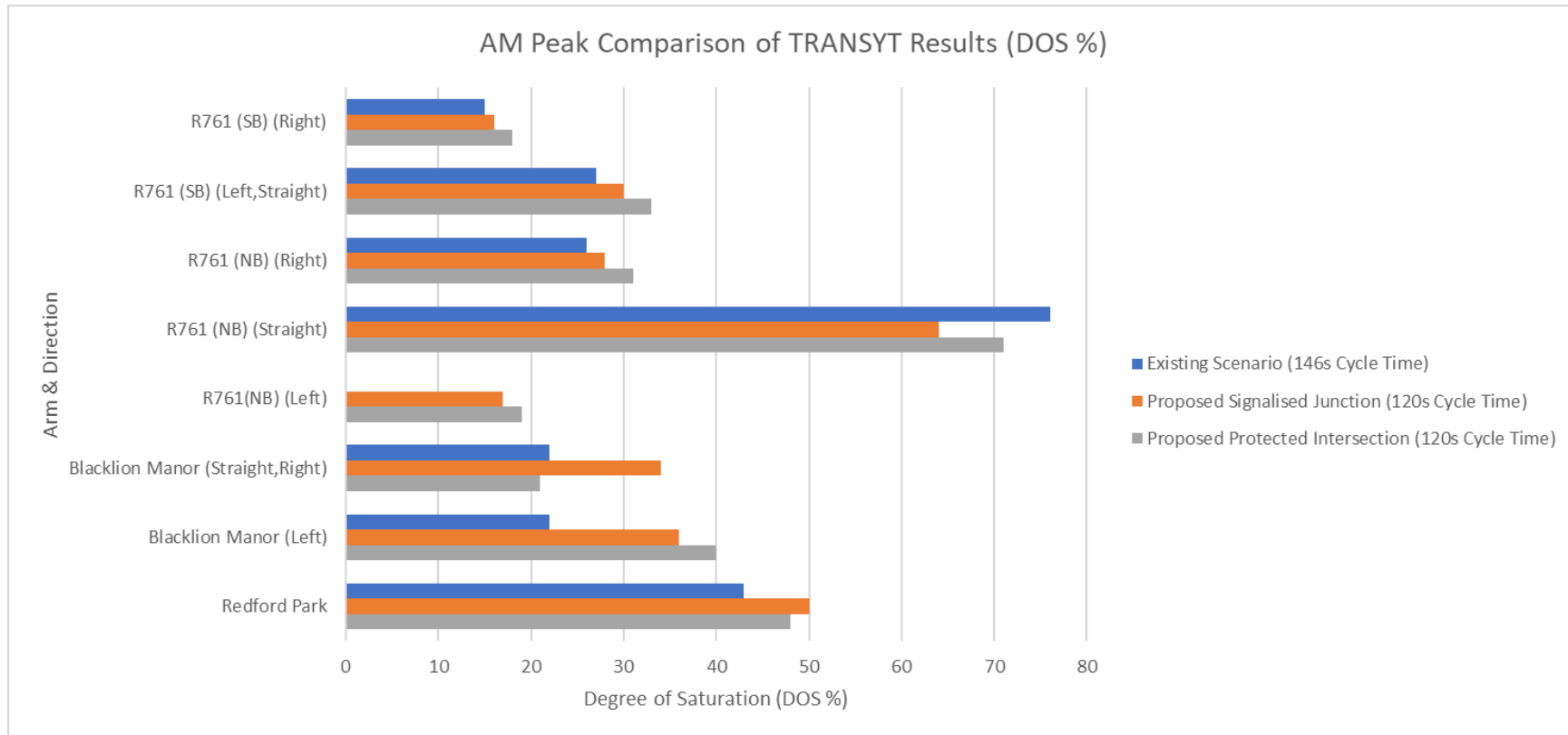


Figure 7-9: AM Peak Comparison of TRANSYT Results (DOS %)

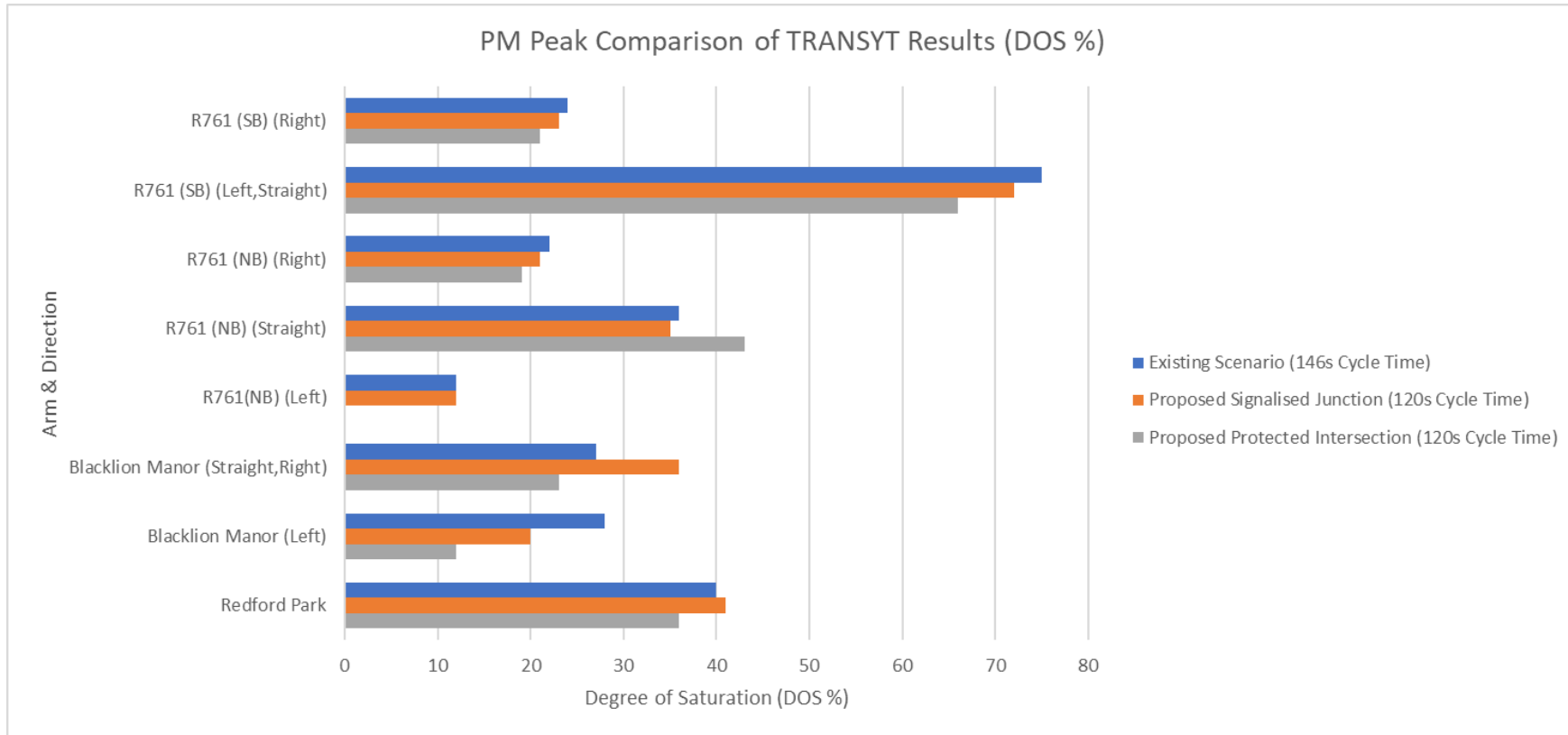


Figure 7-10: PM Peak Comparison of TRANSYT Results (DOS %)

8.0 DESIGN OF BUS STOPS

8.1 INTRODUCTION

8.1.1 As part of the upgrade of the Redford Park Junction, two bus stops located on the R761 NB arm have been included in the design. The current layout of the bus stops result in a number of issues for pedestrians, cyclists and motorists. A number of design options has therefore been considered as part of the upgrade of these stops.

8.2 EXISTING BUS STOP LAYOUTS

8.2.1 The bus stops are located on both sides of the R761 NB arm south of the Redford Park junction and are shown below in Figure 8-1.



Figure 8-1: Location of Bus Stops included in Junction Design

8.2.2 As shown in Figure 8-1, the bus stops are located on both the outbound (travelling northbound along the R761) and the Inbound (travelling southbound along the R761) side of the R761.

8.2.3 Figure 8-2 outlines the existing layout of these bus stops.

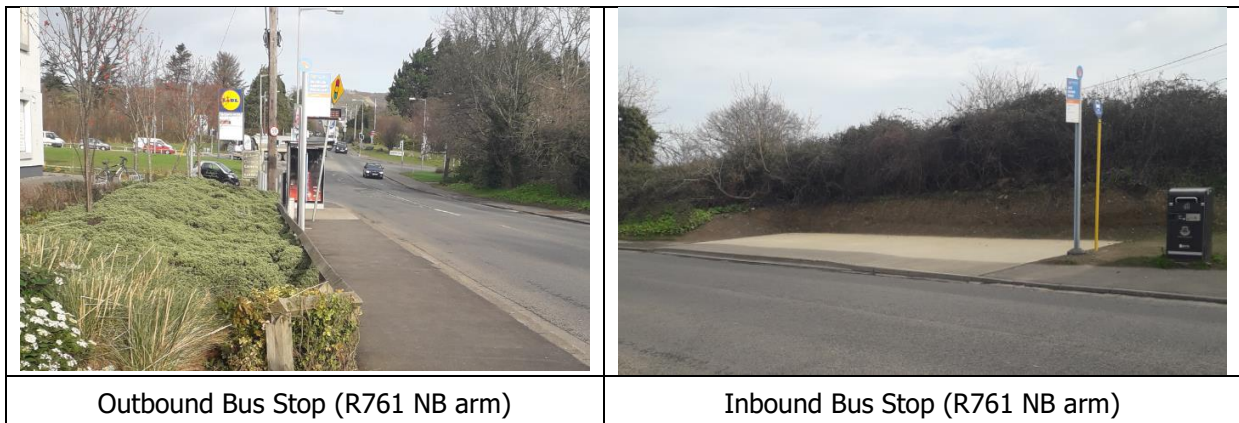


Figure 8-2: Existing Layout for the Outbound and Inbound Bus Stops on the R761

8.2.4 As shown in Figure 8-2, the outbound bus stop currently operates as an 'In-Line' type of stop where buses stop within the traffic lane in order to collect and disembark passengers. The inbound bus stop also operates as an 'In-Line' type of stop. This bus stop has recently been improved to provide temporary widening of the path area to accommodate the high volume of pedestrians waiting at this stop.

8.2.5 It has been noted on site that there are a number of constraints and issues at these stops, these are the following:

- **Location of bus stops:** The bus stops are located very close to the Redford Park signalised junction. When a bus stops at these stops, in particular, at the Outbound stop, this currently impacts on the operational performance of the junction.
- **Availability of Land:** Although land is available both sides of the road carriageway, this is restricted on the Outbound side by company buildings and on the Inbound side by a residential property.
- **Lack of cycle facilities:** There are no current cycle lane facilities that run along the R761 through the bus stops. It is a requirement in this scheme to accommodate improved facilities for pedestrians and cyclists, which includes cycle lane facilities along this section of the R761.

8.3 PROPOSED BUS STOP OPTIONS

8.3.1 A total of 3 design options were considered and developed for this assessment. These are detailed below with opportunities and constraints identified for each option.

Option 1: In-Line Bus Stop with Cycle Lane and Floating Island

8.3.2 Figure 8-3 below outlines Option 1 for the bus stops along the R761. This option considers in-line bus stops with a cycle lane behind the bus stop and a floating island for passengers to wait, board and exit from the bus. A formal crossing is also proposed for pedestrians to cross over the cycle lane from the footpath to the island.

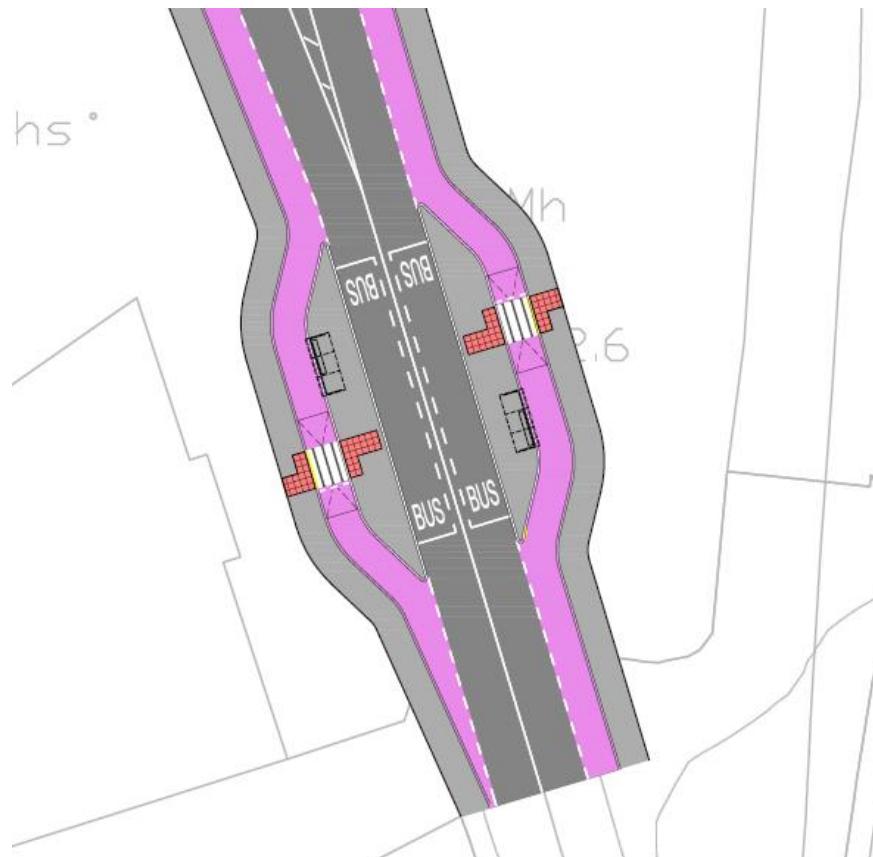


Figure 8-3: In-Line Bus Stop with Cycle Track behind Bus Stop

8.3.3 The following opportunities and constraints have been identified for Option 1.

Table 8-1: Opportunities and Constraints for Option 1 – In-Line Bus Stop

OPPORTUNITIES FOR OPTION 1	CONSTRAINTS FOR OPTION 1
In-Line bus stops are preferred option for the bus in order to avoid delays.	Increased risk of conflict between cyclist and pedestrian
Reduced risk of conflict between bus and cyclist	In-Line option for these bus stops may cause traffic delays, in particular, during peak times.

Option 2: Lay-By Bus Stop with Cycle Lane and Floating Island

8.3.4 Figure 8-4 below outlines Option 2 for the bus stops along the R761. This option considers lay-by bus stops with a cycle lane behind the bus stop and a floating island for passengers to wait, board and exit from the bus.

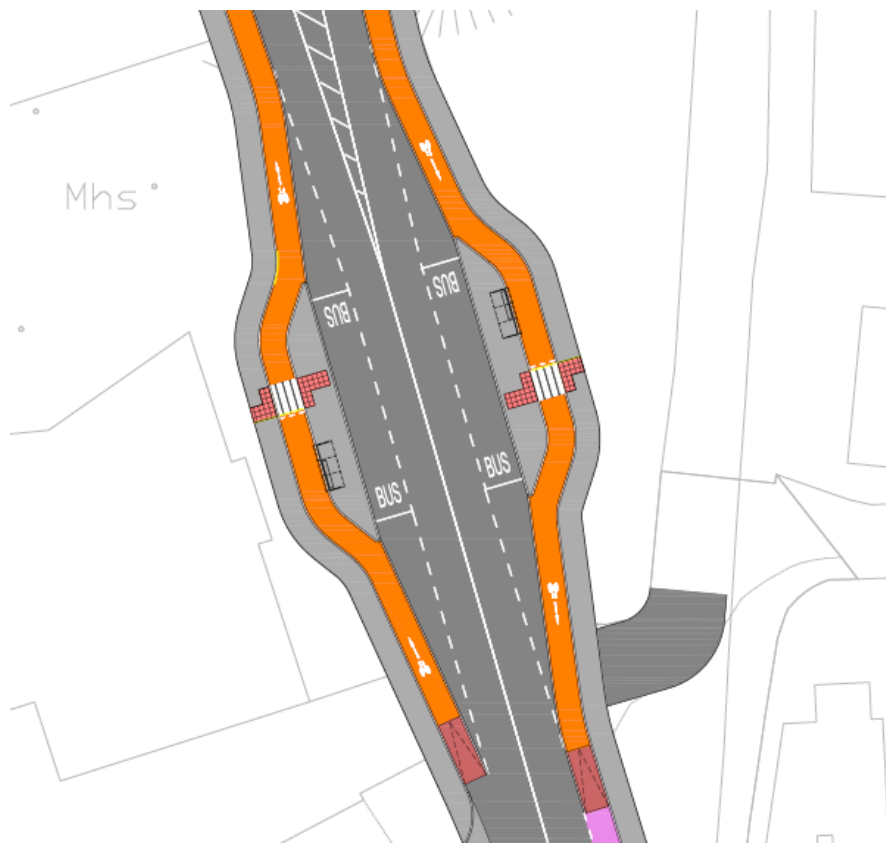


Figure 8-4: Lay-by Bus Stop with Cycle Lane behind Bus Stop

8.3.1 The following opportunities and constraints have been identified for Option 2.

Table 8-2: Opportunities and Constraints for Option 2 – Lay-By Bus Stop

OPPORTUNITIES FOR OPTION 2	CONSTRAINTS FOR OPTION 2
Improvement in traffic movements along the R761 with lay-by bus stops	Delay for buses entering back into the traffic lanes.
Reduced risk of conflict between bus and cyclist	Increased risk of conflict between cyclist and pedestrian
	Possible Land Take constraints with Lay-by bus option.

Option 3: Lay-By Bus Stop with Cycle Lane on Road

8.3.2 Figure 8-5 below outlines Option 3 for the bus stops along the R761. This option considers lay-by bus stops with on road cycle lanes and light forms of segregation, where feasible.



Figure 8-5: Lay-By Bus Stops with Cycle Lanes on Road

- 8.3.1 It is noted that this option provides reduced segregation for cyclists from general road traffic in comparison to other options that route the cycle lane behind the bus stop.
- 8.3.2 In order to provide and improve safety for cyclists for this option, bollards have been considered where feasible along the R761 south arm for cyclists.
- 8.3.3 The following opportunities and constraints have been identified for Option 3.

Table 8-3: Opportunities and Constraints for Option 3 – Lay-By Bus Stop

OPPORTUNITIES FOR OPTION 3	CONSTRAINTS FOR OPTION 3
Improvement in traffic movements along the R761 with lay-by bus stops	Delay for buses entering back into the traffic lanes.
Reduced risk of conflict between cyclist and pedestrian	Increased risk of conflict between cyclist and bus.
	Increased risk of conflict between cyclist and general traffic with advisory on road cycle lanes.

8.4 COMPARISON OF RESULTS

- 8.4.1 Option 1 considers an In-Line bus stop design with segregated cycle facilities located behind the bus stop, as per the preferred NTA guidance. This type of bus stop may result in short term delays for general road traffic when a bus is stopped, however, these are short term in nature. There are no land take requirements on either side of the road for this option.
- 8.4.2 Option 2 considers a Lay-By bus stop design. This option provides cycle facilities behind the bus stop with a floating island for bus passengers. This option requires significant space to allow for both a lay-by bus stop as well as a dedicated off road cycle lane and floating island. The outbound bus stop, in particular, would result in the footpath being located directly adjacent to an existing building which would encroach significantly in terms of land take required. Therefore, this option would not be feasible in terms of land take requirement. Lay-by bus stops are also not the preferred NTA

design option due to delays in bus movement when emerging from the bus stop.

8.4.3 Option 3 considers a Lay-By bus stop design. This option provides on road cycle lanes with light segregation, which route past the lay-by bus stop. A lay-by bus stop design would improve on traffic movements along the R761, however, bus delays may occur for buses trying to emerge back into general traffic. The on road advisory cycle lane also increases the potential conflict between traffic and cyclists.

8.4.4 Option 1 is considered to be the preferable option for these bus stops. This option achieves an in-line bus stop on both sides of the road with segregated cycle facilities located behind the bus stop. This option provides improved pedestrian waiting area with bus shelters for both bus stops and waiting areas.

9.0 SUMMARY AND CONCLUSION

9.1 SUMMARY OF REPORT

- 9.1.1 DBFL were commissioned by Wicklow County Council (WCC) to undertake an Options Assessment for the R761/Redford Park/Blacklion Manor Road Junction (Redford Park Junction).
- 9.1.2 The objectives for the scheme were to improve the junction for pedestrians and cyclists as well as for vehicular movements. The purpose of the report was to identify a number of junction design options that would accommodate the objectives and to assess these options against Multi-Criteria Analysis to determine the preferred design option that meets the requirements of WCC.
- 9.1.3 The junction is located within the Redford area in Greystones, County Wicklow. Existing traffic flows through the junction are high during peak times; this is due to a number of factors including that it is located close to three primary schools, as well as local shops including a large Lidl store. The R761, which runs through the junction from Greystones to Bray, is one of the main traffic routes to the M11 Motorway.
- 9.1.4 The junction, at present, is a wide junction with large radii at the corners. Footpaths are provided on all arms, however, they are narrow in places particularly considering the large volume of pedestrians that emerge from the schools. Cycle lanes are provided on the Blacklion Manor Road arm. Cycle facilities are not provided on the R761 or the Redford Park arm of the junction.
- 9.1.5 A total of 3 design options were developed for this assessment. Option A proposed a Continental Roundabout, Option B proposed an Upgraded Signalised Junction and Option C proposed a Cycle Protected Signalised Junction. These options were assessed in detail using Multi-Criteria Analysis (MCA).
- 9.1.6 The MCA appraisal was based on a number of criteria set out within the Department of Transport, Tourism & Sport (DTTAS). The criteria used for the MCA included Economy, Integration, Safety, Environment and Physical Activity with relevant sub criteria for each main criteria.

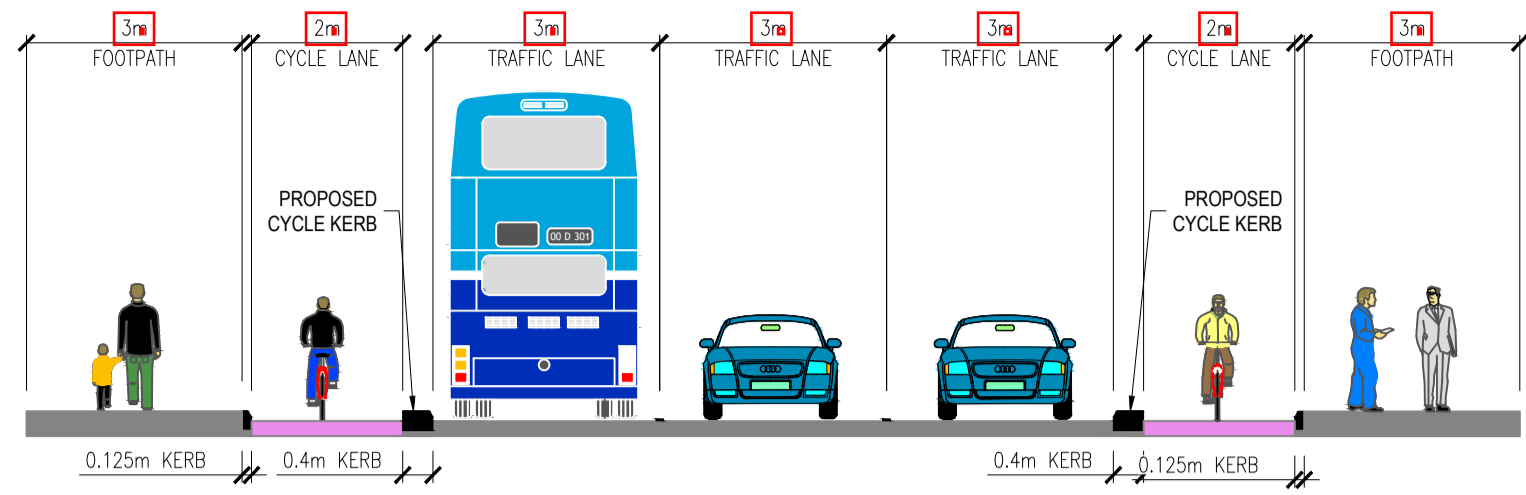
- 9.1.7 The three options were assessed within the MCA as well as the Existing Scenario.
- 9.1.8 The results of the MCA indicated that both Option B (Upgraded Signalised Junction) and Option C (Cycle Protected Signalised Junction) emerged as the preferred options over Option A (Continental Roundabout). Option B showed slight disadvantages in terms of cycle safety as compared with Option C which provides protected islands for cyclists through the junction. Option C emerged as the preferred option.
- 9.1.9 A comparison was undertaken for the junction capacity analysis between the existing scenario as well as the Standard Signalised Junction and Cycle Protected Signalised Junction. Results showed that, overall, there were minor differences between the existing scenario and the Cycle Protected junction with the Signalised Junction performing best overall in terms of capacity. The Signalised Junction does not, however, cater for any form of cycle priority in comparison to the Cycle Protected Junction. Therefore, as per the MCA assessment, the Cycle Protected Junction provides the more favourable option.
- 9.1.10 Two bus stops along the R761 arm south of the Redford Park junction were also considered for improvement for this assessment. A total of three design options were developed with Option 1 (In-line bus stop with segregated cycle facility) emerging as the preferred option.

9.2 CONCLUSION OF REPORT

- 9.2.1 This Options Report concludes that the preferred option for the Redford Park Junction is Option C, Cycle Protected Junction. The preferred option for the bus stops along the R761 is Option 1, In-line bus stop with segregated cycle facilities.

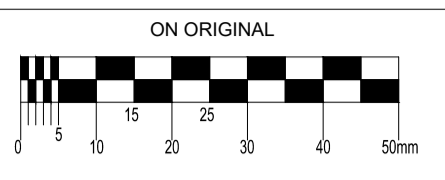
APPENDICES

APPENDIX A- SCHEME DESIGN DRAWING



R761 TO BLACKLION MANOR ROAD
LINK SECTION TYPICAL CROSS SECTION A - A
SCALE 1:100

© COPYRIGHT OF THIS DRAWING IS RESERVED BY DBFL CONSULTING ENGINEERS. NO PART SHALL BE REPRODUCED OR TRANSMITTED WITHOUT THEIR WRITTEN PERMISSION.



- NOTES:**
1. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH THE TII SPECIFICATION FOR ROAD WORKS UNLESS OVERRIDDEN BY LOCAL OVERSEEING AUTHORITY'S STANDARDS
 2. ALL ROAD MARKINGS & SIGNS SHALL COMPLY FULLY WITH THE TRAFFIC SIGNS MANUAL PUBLISHED BY THE DEPARTMENT OF TRANSPORT.
 3. SIGNS & MARKINGS: CONTRACTOR TO CONFIRM PRECISE SETTING OUT WITH EMPLOYERS REPRESENTATIVE PRIOR TO COMPLETION.
 4. ALL TRAFFIC MANAGEMENT TO COMPLY FULLY WITH THE PROVISIONS OF CHAPTER 8 OF THE TRAFFIC SIGNS MANUAL
 5. ALL CO-ORDINATES ARE TO IRISH TRANSVERSE MERCATOR.
 6. ALL LEVELS ARE TO ORDNANCE DATUM AND ARE IN METRES
 7. ALL PEDESTRIAN, CYCLE AND VEHICULAR ROUTES MUST BE RETAINED IN ACCORDANCE WITH APPROVED TRAFFIC MANAGEMENT PLAN.

- LEGEND**
- PROPOSED ROAD
 - PROPOSED FOOTPATH
 - EXISTING FOOTPATH TO BE RETAINED
 - PROPOSED CYCLE LANE
 - PROPOSED CYCLE TRACK
 - GRASS VERGE/LANDSCAPED AREA

ORDNANCE SURVEY IRELAND LICENCE
No EN 0017922
© ORDNANCE SURVEY IRELAND
GOVERNMENT OF IRELAND

P01	19-04-2022	PRELIMINARY DESIGN ISSUE	GJS	JH
rev	date	description	by	chkd.
		A - Approved		
		B - Approved with comments		
		C - Do not use		
client approval				
suitability		issue purpose		
S2 - INFORMATION		PRELIMINARY DESIGN ISSUE		

DBFL Consulting Engineers
Civil, Structural & Transportation Engineering
www.dbfl.ie

DUBLIN OFFICE: Ormond House, Upper Ormond Quay, Dublin 7, D07 W704
PHONE +353 1 450 4000

CORK OFFICE: Phoenix House, Monahan Road, Cork, T12 H1XV
PHONE +353 (0) 21 2024538

WATERFORD OFFICE: Suite 10 The Arbut, Marzana Gate, Canada Street, Waterford, X91 W028
PHONE +353 51 300 500

project ref.			
REDFORD PARK			
drawing title			
PROTECTED SIGNALISED JUNCTION			
client			
WICKLOW COUNTY COUNCIL			
designed by	author	scale	sheet size
JH	OWF	1:500	A1
drawing no.	revision		
190092-DBFL-RD-SP-DR-C-1901	P01		

APPENDIX B- MCA TABLES

Appraisal Criteria	Sub-Criteria	Existing Scenario	Option A - Continental Roundabout	Option B - Signalised Junction	Option C - Protected Intersection
Economy	Capital Cost	The existing scenario will provide the lowest cost option and is a Do Nothing scenario	Option A requires the removal of the existing signalised junction and the construction of a roundabout. Therefore this option shows some disadvantages over other options	Option B proposes to retain the signalised junction and undertake minor amendments such as including for improved pedestrian and cycle infrastructure. Therefore, this option provides some advantages over options in terms of capital cost.	Option C proposes to retain the signalised junction and undertake minor amendments such as including for improved pedestrian and cycle infrastructure. Therefore, this option provides some advantages over options in terms of capital cost.
	Rank				
	Transport Quality & Reliability	The existing layout does not currently provide for transport reliability or any quality facilities for sustainable travel modes	This option shows advantages over the existing scenario. This option provides adequate cycle and pedestrian facilities through the junction that provide good quality and reliability in comparison	This option shows advantages over other options. This option provides segregated facilities for pedestrians and cyclists through the junction.	This option shows advantages over other options. This option provides segregated facilities for pedestrians and cyclists through the junction.
	Rank				
Integration	Cycle Network	The existing scenario does not provide any cycle facilities through the junction and therefore does not integrate well with the GDA Cycle Network Plan proposals	This option proposes a shared path through the junction. This does not integrate as well as other options in terms of the GDA Cycle Network Plan that proposes a Primary/Secondary Route through the junction	This option shows some advantages over other options. This option proposes segregated cycle facilities through the junction and is therefore in line with the GDA Cycle Network Plan Proposals	This option shows some advantages over other options. This option proposes segregated cycle facilities through the junction and is therefore in line with the GDA Cycle Network Plan Proposals
	Rank				
	Pedestrian Network	The existing environment for pedestrians is good, however, crossing distances are long and footpaths through the junction are narrow in some locations. Therefore, this option shows some disadvantages over other options.	This option integrates well. This option proposes upgraded crossings on all arms as well as reduced crossing widths for pedestrians in comparison to the existing layout.	This option integrates well. This option proposes upgraded crossings on all arms as well as reduced crossing widths for pedestrians in comparison to the existing layout.	This option integrates well. This option proposes upgraded crossings on all arms as well as reduced crossing widths for pedestrians in comparison to the existing layout.
	Rank				
Safety	Traffic Network	The existing scenario, with the current signal arrangement, does not integrate well into the surrounding road network	This option does not integrate well into the surrounding traffic network and is expected to show some queuing through the junction	This option would integrate well within the road network, with optimised signal arrangement	This option would integrate well within the road network, with optimised signal arrangement
	Rank				
	Road Safety	This option shows some disadvantages over other options. The existing scenario provides for a signal controlled junction with large radii which may encourage speeding through the junction.	This option shows some advantages over other options. This option proposes a roundabout with reduced traffic lanes on all arms which will slow traffic speeds considerably	This option shows some disadvantages over other options. This option proposes a signalised junction with two to three traffic lanes on each arm. This may encourage traffic speeds through the junction.	This option shows some disadvantages over other options. This option proposes a signalised junction with two to three traffic lanes on each arm. This may encourage traffic speeds through the junction.
	Rank				
Safety	Pedestrian Safety	The existing scenario provides a separate path for pedestrians through the junction and does not mix with cyclists, therefore , this option shows advantages over other options.	This option provides a shared path for pedestrians and cyclists through the junction. Considering the potential high volume of cyclists and pedestrians using this junction, this option therefore shows some disadvantages over other options.	This option provides a separate path for pedestrians through the junction and does not mix with cyclists, therefore , this option shows advantages over other options.	This option provides a separate path for pedestrians through the junction and does not mix with cyclists, therefore , this option shows advantages over other options.
	Rank				
	Cycle Safety	This option shows significant disadvantages over other options. This option does not provide cycle facilities through the junction.	This option shows some advantages over other options. This option provides off road shared cycle facilities which protects cyclists through the junction from vehicular traffic. There is a possibility of conflict with pedestrians for this option	This option shows some disadvantages over other options. This option proposes on road cycle lanes through the junction. There is potential conflict between cyclists and left turning traffic .	This option provides significant advantages over other options. This option proposes cycle lanes through the junction, however, proposes protected islands for cyclists to cycle behind, which reduces the conflict between cyclists and left turning traffic. This option also does not conflict with pedestrians
	Rank				
Environment	Flora and Fauna	The existing scenario will not impact on any flora and fauna surrounding the junction	It is not envisaged that this option will impact on the flora and fauna surrounding the junction	It is not envisaged that this option will impact on the flora and fauna surrounding the junction	It is not envisaged that this option will impact on the flora and fauna surrounding the junction
	Rank				
	Soils, Geology & Hydrology	The existing scenario does not impact on the soils or geology within the junction	It is not envisaged that this option will impact on the soils, geology or hydrology of the junction	It is not envisaged that this option will impact on the soils, geology or hydrology of the junction	It is not envisaged that this option will impact on the soils, geology or hydrology of the junction
	Rank				
	Landscape & Visual	The existing scenario shows some disadvantages over other options, this option retains the existing signalised junction and does not show any level of urban realm surrounding the junction	This option provides a small continental roundabout with one lane approaches which allows for large areas surrounding the roundabout to be given back to possible urban design , therefore , this option provides some advantages over other options	This option proposes to retain the signalised junction , however, proposes to upgrade the junction with reduced radii. This option shows slight disadvantages over other option A as it would not provide as good a visual aspect as this option.	This option proposes to retain the signalised junction , however, proposes to upgrade the junction with reduced radii. This option shows slight disadvantages over other option A as it would not provide as good a visual aspect as this option.
	Rank				
	Air Quality, Noise and Vibration	The existing scenario will not impact on the air quality or noise within the area .	This option shows some disadvantages over other options , this option reduces traffic capacity through the junction which increases queuing on some arms . This would have an impact on the air quality and noise within the surrounding area.	The proposed signalised junction shows some advantages over other options, this option retains and optimises the signals which will result in improved traffic capacity through the junction with reduced queue lengths	The proposed signalised junction shows some advantages over other options, this option retains and optimises the signals which will result in improved traffic capacity through the junction with reduced queue lengths
	Rank				
Physical Activity	Land Use Character	The existing scenario shows some advantages over other options . Signalised junction is in keeping with the surrounding land use character of the area and WCC future proposals	This option is not in keeping with the surrounding land use character of the area, as this option may provide some traffic capacity issues which may impact on access to and from the various amenities surrounding the junction.	This option shows some advantages over other options. This option will result in improved traffic capacity which may result in lower queue lengths . Therefore this may impact well on access to and from the surrounding amenities	This option shows some advantages over other options. This option will result in improved traffic capacity which may result in lower queue lengths . Therefore this may impact well on access to and from the surrounding amenities
	Rank				
Physical Activity	Health Benefits	The existing scenario does not provide for any cycle facilities through the junction, therefore , does not encourage users to take up sustainable modes of travel.	This option shows disadvantages , although this option provides good facilities for both cyclists and pedestrians, the facilities are not considered as high quality as other options.	This option shows some advantages over other options . This option provides high quality cycle and pedestrian facilities to encourage use of sustainable modes	This option shows some advantages over other options . This option provides high quality cycle and pedestrian facilities to encourage use of sustainable modes
	Rank				

APPENDIX C- JUNCTION MODELLING REPORTS

TRANSYT 15

Version: 15.5.2.7994
© Copyright TRL Limited, 2018

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: 190092 Existing Signals - Scenario B_JH.t15
Path: G:\2019\p190092\calcs\transyt
Report generation date: 23/04/2020 10:28:14

»A4 - 2020 8-9 AM : D5 - 2020 8-9 AM* :
»A5 - 2020 4-5 PM : D4 - 2020 4-5 PM* :

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	23/04/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	HEADOFFICE\mcgeoughp
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display level of service results	Display blocking and starvation results	Display end of red and green queue results	Display excess queue results	Display separate uniform and random results	Display unweighted results	Display TRANSYT 12 style timings	Display effective greens in results	Display Red-With-Amber	Display End-Of-Green Amber

Units

Cost units	Speed units	Distance units	Fuel economy units	Fuel rate units	Mass units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
£	kph	m	mpg	l/h	kg	PCU	PCU	perHour	s	-Hour	perHour

Sorting

			(HH:mm)			- hr/hr)					sed PRC	ised PRC	all PRC	capa city
4	23/04/2020 10:27:51	23/04/2020 10:27:52	08:00	293	252.76	16.49	75.57	4/1	0	0	4/1	19/1	4/1	✓

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 8-9 AM		D5	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 8-9 AM				08:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
293		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
------	------------	-----------------	----------------------------------	-----------------------------	-------------------------

Bus	1.00	Default	0.94	30	85
-----	------	---------	------	----	----

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2050	✓		Normal	
2	1				23.00	✓	Sum of lanes	1989	✓		Normal	
	2				23.00	✓	Sum of lanes	2005	✓		Normal	
4	1				12.00	✓	Sum of lanes	2083	✓		Normal	
	2				12.00	✓	Sum of lanes	2059	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2101	✓		Normal	
	2				20.00	✓	Sum of lanes	2067	✓	✓	Normal	
8	1			✓	209.23						Normal	
9	1			✓	366.47						Normal	
10	1			✓	349.28						Normal	
11	1			✓	349.37						Normal	

18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connect or turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	83	39.19		2050
2	1	2	(untitled)		✓	N/A	N/A	0	3.00	✓	100	45.54		1989
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	93	56.01		2005
4	1	1	(untitled)		✓	N/A	N/A	0	3.50	✓	20	28.91		2083
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	66.51		2059
6	1	1	(untitled)		✓	N/A	N/A	0	3.50	✓	3	25.69		2101
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	80.57		2067
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	293

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	103	103
2	1	119	119
	2	75	75
4	1	693	693
	2	194	194
6	1	253	253
	2	115	115
8	1	207	207
9	1	274	274
10	1	363	363
11	1	708	708
18	1	194	194
19	1	887	887
20	1	368	368

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement

4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	25.11	30.00	✓	Nearside	25.69
9	1	1	4/1	9/1	43.98	30.00	✓	Nearside	28.91
10	1	1	1/1	10/1	41.91	30.00	✓	Nearside	39.19
11	1	1	4/1	11/1	41.92	30.00	✓	Straight	Straight Movement
8	1	2	4/2	8/1	25.11	30.00	✓	Offside	66.51
9	1	2	1/1	9/1	43.98	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.91	30.00	✓	Straight	Straight Movement
11	1	2	1/1	11/1	41.92	30.00	✓	Offside	84.44
8	1	3	2/2	8/1	25.11	30.00	✓	Straight	Straight Movement
9	1	3	6/2	9/1	43.98	30.00	✓	Offside	80.57
10	1	3	2/2	10/1	41.91	30.00	✓	Offside	56.01
11	1	3	2/1	11/1	41.92	30.00	✓	Nearside	45.54

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
4	2	AllTraffic		
6	2	Movement		

Give Way Data - All Movements - Conflicts

Traffic Stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
2		TrafficStream	6/1	100	0.00		0	0

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
6	2	1	9/1	1200	2067	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	5	70	119
	2	17	0	48	38
	3	142	194	0	551
	4	115	8	245	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	17
	6		2	4	1/1, 11/1	Normal	38
	10		1	4	18/1, 2/1, 11/1	Normal	119
	11		2	3	1/1, 10/1	Normal	48
	12		4	1	20/1, 6/2, 9/1	Normal	115
	13		3	1	19/1, 4/1, 9/1	Normal	142
	14		3	4	19/1, 4/1, 11/1	Normal	551
	15		3	2	19/1, 4/2, 8/1	Normal	194
	16		1	2	18/1, 2/2, 8/1	Normal	5
	17		1	3	18/1, 2/2, 10/1	Normal	70
	18		4	2	20/1, 6/1, 8/1	Normal	8
19		4	3	20/1, 6/1, 10/1	Normal	245	

Signal Timings

Network Default: 293s cycle time; 293 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	293

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	A, B, C, D	1
	2	B, D, E	1
	3	E, F	1
	4	G	1
	5	H	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 1, 2, 3, 4, 5	47, 65, 96, 113, 199, 213, 242, 269, 281

Intergreen Matrix for Controller Stream 1

		To							
		A	B	C	D	E	F	G	H
From	A					7	7	7	6
	B						6	6	6
	C						7	7	6
	D						6	6	6
	E	6						6	6
	F	6	6	6	6			6	6
	G	6	6	6	6	6	6		6
	H	12	12	12	12	12	12	12	

Banned Stage transitions for Controller Stream 1

		To				
		1	2	3	4	5
From	1					
	2					
	3					
	4					
	5					

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	102	113	11	248	269	21
2	1		1	E	54	96	42	206	242	36
2	2		1	F	71	96	25	219	242	23
4	1		1	A	119	199	80	0	47	47
4	2		1	B	119	213	94	0	65	65
6	1		1	C	119	199	80	0	47	47
6	2		1	D	119	213	94	0	65	65

	10	1	0	Unrestricted	363	Unrestricted	293	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	708	Unrestricted	293	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	11	715	194	1800	293	0.18	0.22	0.80	0.14	0.04	0.18
	19	1	63	43	887	1800	293	9.88	21.97	117.40	34.55	4.59	39.14
	20	1	20	340	368	1800	293	0.26	0.03	0.23	0.37	0.00	0.37

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s (per cycle))
08:00-09:00	1	1	103	103	0		2050	238	43		108	0.00	32
	2	1	119	119	0		1989	543	22		311	0.04	78
		2	75	75	0		2005	342	22		311	0.04	48
	4	1	693	693	0		2083	917	76		19	0.42	127
		2	194	194	0		1371	753	26		249	0.42	159
	6	1	253	253	0		2101	925	27		229	0.00	127
		2	115	115	0		1372	754	15		490	0.00	159
	8	1	207	207	0		Unrestricted	Unrestricted	0		Unrestricted	0.77	293
	9	1	274	274	0		Unrestricted	Unrestricted	0		Unrestricted	0.72	293
	10	1	363	363	0		Unrestricted	Unrestricted	0		Unrestricted	0.55	293
	11	1	708	708	0		Unrestricted	Unrestricted	0		Unrestricted	0.60	293
	18	1	194	194	0		1800	1757	11		715	0.00	293
	19	1	887	887	0		1800	1411	63		43	0.00	293
20	1	368	368	0		1800	1800	20		340	0.00	293	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	1	1	12.00	66.07	1.89	26.84	95.78	98.65	1.24
	2	1	2.76	42.09	1.39	19.76	75.45	89.78	1.13
		2	2.76	53.78	1.12	15.91	85.86	64.39	0.81
	4	1	1.44	33.26	6.40	90.91	84.31	584.27	7.33
		2	1.44	13.74	0.74	10.52	30.40	58.97	0.74
	6	1	2.40	27.30	1.92	27.24	62.79	158.86	1.99
		2	2.40	17.52	0.56	7.95	48.91	56.24	0.71
	8	1	25.11	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.98	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.91	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.92	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.18	0.01	0.14	1.80	3.49	0.04
	19	1	12.91	9.88	2.43	34.55	41.30	366.37	4.59
20	1	7.85	0.26	0.03	0.37	0.00	0.00	0.00	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))	Estimated blocking
	1	1	0.00	4.20	17.39	24.14	0.00	0.00	

08:00-09:00	2	1	0.00	3.63	4.00	90.84	0.00	0.00	
		2	0.00	2.66	4.00	66.39	0.00	0.00	
	4	1	0.00	27.88	2.09	1336.00	0.00	0.00	
		2	0.00	2.04	2.00	102.23	0.00	0.00	
	6	1	0.00	7.43	3.48	213.63	0.00	0.00	
		2	0.00	2.54	3.00	84.58	0.00	0.00	
	8	1	0.00	0.00	36.39	0.00	0.00	102.00	
	9	1	0.00	0.00	63.73	0.00	0.00	70.00	
	10	1	0.00	0.00	60.74	0.00	0.00	16.00	
	11	1	0.00	0.00	60.76	0.00	0.00	13.00	
	18	1	0.00	0.22	27.79	0.80	0.00	7.00	
	19	1	0.00	21.97	18.71	117.40	0.00	237.00	
20	1	0.00	0.03	11.37	0.23	0.00	89.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	0.00	0.00	✓	4.20	0.16	4.00	1.00	0.00	28.08
	2	1	0.00	0.00	✓	3.63	0.03	3.63	1.00	0.00	20.88
		2	0.00	0.00	✓	2.66	0.03	2.57	1.00	0.00	16.72
	4	1	0.00	0.00	✓	27.89	1.16	11.77	1.00	0.00	98.23
		2	0.00	0.00	✓	2.04	0.04	2.04	1.00	0.00	11.26
	6	1	0.00	0.00	✓	7.43	0.05	6.59	1.00	0.00	29.23
		2	0.00	0.00	✓	2.54	0.01	2.54	1.00	0.00	8.65
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.22			1.00	0.00	0.18
19	1	0.00	0.00	✓	21.97			1.00	0.00	39.14	
20	1	0.00	0.00	✓	0.03			1.00	0.00	0.37	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU - hr/hr)	High est DOS (%)	Item with high est DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over all PRC	Network within capacity
4	23/04/2020 10:27:51	23/04/2020 10:27:52	08:00	293	252.76	16.49	75.57	4/1	0	0	4/1	19/1	4/1	✓

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
--------------	--------------------------	--------------------------------	-----------------------------------	----------------------------	------------------------	-----------------------------------	-----------------------------------	------------------------------

08:00-09:00	76	19	4553	2781	13.04	234.19	18.57	252.76
-------------	----	----	------	------	-------	--------	-------	--------

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s (per cycle))
08:00-09:00	4553	4553	0		76		19	2781

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	18.48	13.04	16.49	234.19	32.53	1481.03	18.57

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))
08:00-09:00	1336.00	0.00	534.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	0.00	0.00	✓	1.00	0.00	0.00	252.76

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	101.0	117.8	106.1
	2	122.1	0.0	120.0	120.0
	3	101.5	63.1	0.0	99.4
	4	72.0	62.9	79.7	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	17	122.05	17	122.05
6	2	4	38	120.00	38	120.00
10	1	4	119	106.13	119	106.13
11	2	3	48	119.99	48	119.99
12	4	1	115	72.00	115	72.00
13	3	1	142	101.46	142	101.46
14	3	4	551	99.41	551	99.41
15	3	2	194	63.08	194	63.08
16	1	2	5	101.01	5	101.01
17	1	3	70	117.81	70	117.81
18	4	2	8	62.91	8	62.91
19	4	3	245	79.71	245	79.71

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU		QUEUES	WEIGHTS		PENALTIES	P.I.	
Arm	Traffic Stream	Name	Traffic mode	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual greens (per cycle)	Wasted time total (s per cycle)	Degree of saturation (%)	Practical reserve capacity (%)	Journey Time (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
1	1			1	G	103	2050	32	0.00	43	108	78.07	66.07	95.78	4.20	100	100	0.00	28.08
2	1			1	E	119	1989	78	0.00	22	311	44.85	42.09	75.45	3.63	100	100	0.00	20.88
	2			1	F	75	2005	48	0.00	22	311	56.54	53.78	85.86	2.66	100	100	0.00	16.72
4	1			1	A	693 <	2083	127	0.00	76	19	34.70	33.26	84.31	27.88 +	100	100	0.00	98.23
	2			1	B	194 <	1371	159	0.00	26	249	15.18	13.74	30.40	2.04 +	100	100	0.00	11.26
6	1			1	C	253 <	2101	127	0.00	27	229	29.70	27.30	62.79	7.43 +	100	100	0.00	29.23
	2			1	D	115	1372	159	0.00	15	490	19.92	17.52	48.91	2.54	100	100	0.00	8.65
8	1					207	Unrestricted	293	102.00	0	Unrestricted	25.11	0.00	0.00	0.00	100	100	0.00	0.00
9	1					274	Unrestricted	293	70.00	0	Unrestricted	43.98	0.00	0.00	0.00	100	100	0.00	0.00
10	1					363	Unrestricted	293	16.00	0	Unrestricted	41.91	0.00	0.00	0.00	100	100	0.00	0.00
11	1					708	Unrestricted	293	13.00	0	Unrestricted	41.92	0.00	0.00	0.00	100	100	0.00	0.00
18	1					194	1800	293	7.00	11	715	19.36	0.18	1.80	0.22	100	100	0.00	0.18
19	1					887 <	1800	293	237.00	63	43	22.78	9.88	41.30	21.97 +	100	100	0.00	39.14
20	1					368	1800	293	89.00	20	340	8.10	0.26	0.00	0.03	100	100	0.00	0.37

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	701.12	39.86	17.59	16.49	234.19	18.57	0.00	252.76
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	701.12	39.86	17.59	16.49	234.19	18.57	0.00	252.76

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A5 - 2020 4-5 PM
D4 - 2020 4-5 PM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU - hr/hr)	High est DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalled PRC	Item with worst unsignalled PRC	Item with worst over all PRC	Network within capacity
5	23/04/2020 10:27:44	23/04/2020 10:27:44	16:00	293	225.67	14.79	65.78	6/1	0	0	6/1	20/1	6/1	✓

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 4-5 PM		D4	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 4-5 PM				16:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
293		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2076	✓		Normal	
2	1				23.00	✓	Sum of lanes	1989	✓		Normal	
	2				23.00	✓	Sum of lanes	2007	✓		Normal	
4	1				12.00	✓	Sum of lanes	2078	✓		Normal	

	2				12.00	✓	Sum of lanes	2059	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2096	✓		Normal	
	2				20.00	✓	Sum of lanes	2067	✓	✓	Normal	
8	1			✓	209.23						Normal	
9	1			✓	366.47						Normal	
10	1			✓	349.28						Normal	
11	1			✓	349.37						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connect or turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	49	39.19		2076
2	1	2	(untitled)		✓	N/A	N/A	0	3.00	✓	100	45.54		1989
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	89	56.01		2007
4	1	1	(untitled)		✓	N/A	N/A	0	3.50	✓	25	28.91		2078
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	66.51		2059
6	1	1	(untitled)		✓	N/A	N/A	0	3.50	✓	7	25.69		2096
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	80.57		2067
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		

	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	293

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	86	86
2	1	66	66
	2	79	79
4	1	395	395
	2	145	145
6	1	607	607
	2	160	160
8	1	195	195
9	1	301	301
10	1	649	649
11	1	393	393
18	1	145	145
19	1	540	540
20	1	767	767

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	25.11	30.00	✓	Nearside	25.69
9	1	1	4/1	9/1	43.98	30.00	✓	Nearside	28.91
10	1	1	1/1	10/1	41.91	30.00	✓	Nearside	39.19
11	1	1	4/1	11/1	41.92	30.00	✓	Straight	Straight Movement
8	1	2	4/2	8/1	25.11	30.00	✓	Offside	66.51
9	1	2	1/1	9/1	43.98	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.91	30.00	✓	Straight	Straight Movement
11	1	2	1/1	11/1	41.92	30.00	✓	Offside	84.44
8	1	3	2/2	8/1	25.11	30.00	✓	Straight	Straight Movement
9	1	3	6/2	9/1	43.98	30.00	✓	Offside	80.57
10	1	3	2/2	10/1	41.91	30.00	✓	Offside	56.01
11	1	3	2/1	11/1	41.92	30.00	✓	Nearside	45.54

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
4	2	AllTraffic		
6	2	Movement		

Give Way Data - All Movements - Conflicts

Traffic Stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
2		TrafficStream	6/1	100	0.00		0	0

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
6	2	1	9/1	1200	2067	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

	To				
	1	2	3	4	
From	1	0	9	70	66
	2	44	0	13	29
	3	97	145	0	298
	4	160	41	566	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	44
	6		2	4	1/1, 11/1	Normal	29
	10		1	4	18/1, 2/1, 11/1	Normal	66
	11		2	3	1/1, 10/1	Normal	13
	12		4	1	20/1, 6/2, 9/1	Normal	160
	13		3	1	19/1, 4/1, 9/1	Normal	97
	14		3	4	19/1, 4/1, 11/1	Normal	298
	15		3	2	19/1, 4/2, 8/1	Normal	145
	16		1	2	18/1, 2/2, 8/1	Normal	9
	17		1	3	18/1, 2/2, 10/1	Normal	70
	18		4	2	20/1, 6/1, 8/1	Normal	41
19		4	3	20/1, 6/1, 10/1	Normal	566	

Signal Timings

Network Default: 293s cycle time; 293 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	293

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	A, B, C, D	1
	2	B, D, E	1
	3	E, F	1
	4	G	1
	5	H	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 1, 2, 3, 4, 5	47, 65, 96, 113, 199, 213, 242, 269, 281

Intergreen Matrix for Controller Stream 1

		To							
		A	B	C	D	E	F	G	H
From	A					7	7	7	6
	B						6	6	6
	C						7	7	6
	D						6	6	6
	E	6						6	6
	F	6	6	6	6			6	6
	G	6	6	6	6	6	6		6
	H	12	12	12	12	12	12	12	

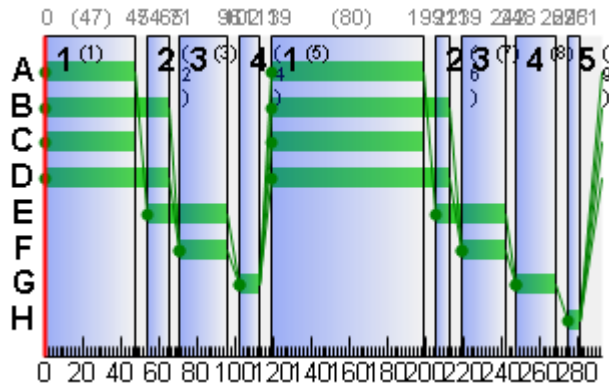
Banned Stage transitions for Controller Stream 1

		To				
		1	2	3	4	5
From	1					
	2					
	3					
	4					
	5					

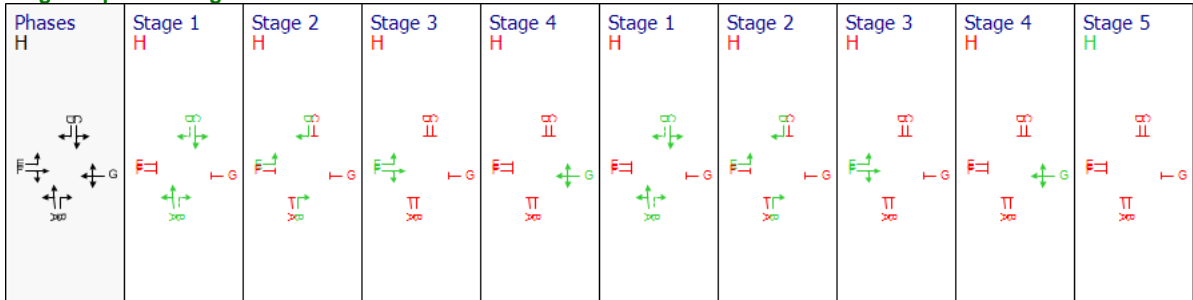
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	102	113	11	248	269	21
2	1		1	E	54	96	42	206	242	36
2	2		1	F	71	96	25	219	242	23
4	1		1	A	119	199	80	0	47	47
4	2		1	B	119	213	94	0	65	65
6	1		1	C	119	199	80	0	47	47
6	2		1	D	119	213	94	0	65	65

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
16:00-17:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
16:00-17:00	1	1	36	152	86	2076	32	63.92	3.42	19.66	21.68	1.01	22.70
	2	1	12	641	66	1989	78	40.54	2.01	50.17	10.55	0.61	11.17
		2	23	290	79	2007	48	54.02	2.80	69.99	16.83	0.85	17.68

						- hr/hr)								all PRC	
5	23/04/2 020 10:27:4 4	23/04/2 020 10:27:4 4	16:00	293	225.67	14.79	65.78	6/1	0	0	6/1	20/1	6/1	✓	

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
16:00-17:00	66	37	4528	2781	11.76	210.07	15.60	225.67

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s (per cycle))
16:00-17:00	4528	4528	0		66		37	2781

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
16:00-17:00	18.03	11.76	14.79	210.07	27.48	1244.07	15.60

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))
16:00-17:00	648.21	0.00	555.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
16:00-17:00	0.00	0.00	✓	1.00	0.00	0.00	225.67

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	101.2	118.0	104.5
	2	119.9	0.0	117.8	117.8
	3	89.3	58.4	0.0	87.2
	4	73.6	72.8	89.6	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	44	119.90	44	119.90
6	2	4	29	117.85	29	117.85
10	1	4	66	104.49	66	104.49
11	2	3	13	117.84	13	117.84
12	4	1	160	73.58	160	73.58

13	3	1	97	89.27	97	89.27
14	3	4	298	87.22	298	87.22
15	3	2	145	58.36	145	58.36
16	1	2	9	101.16	9	101.16
17	1	3	70	117.96	70	117.96
18	4	2	41	72.82	41	72.82
19	4	3	566	89.63	566	89.63

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic mode	SIGNALS		FLOWS		PERFORMANCE				PER PCU		QUEUES		WEIGHTS		PENALTIES	P.I.
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Wasted time total (s per cycle)	Degree of saturation (%)	Practical reserve capacity (%)	Journey Time (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
1	1			1	G	86	2076	32	0.00	36	152	75.92	63.92	93.80	3.42	100	100	0.00	22.70
2	1			1	E	66	1989	78	0.00	12	641	43.30	40.54	74.14	2.01	100	100	0.00	11.17
	2			1	F	79	2007	48	0.00	23	290	56.78	54.02	85.93	2.80	100	100	0.00	17.68
4	1			1	A	395 <	2078	127	0.00	43	108	29.24	27.80	68.34	12.67 +	100	100	0.00	46.70
	2			1	B	145 <	1371	159	0.00	19	368	17.20	15.76	41.12	2.02 +	100	100	0.00	9.76
6	1			1	C	607 <	2096	127	0.00	66	37	38.32	35.92	79.63	22.55 +	100	100	0.00	92.06
	2			1	D	160 <	1372	159	0.00	21	324	20.21	17.81	48.18	3.03 +	100	100	0.00	12.20
8	1					195	Unrestricted	293	98.00	0	Unrestricted	25.11	0.00	0.00	0.00	100	100	0.00	0.00
9	1					301	Unrestricted	293	52.00	0	Unrestricted	43.98	0.00	0.00	0.00	100	100	0.00	0.00
10	1					649	Unrestricted	293	23.00	0	Unrestricted	41.91	0.00	0.00	0.00	100	100	0.00	0.00
11	1					393	Unrestricted	293	17.00	0	Unrestricted	41.92	0.00	0.00	0.00	100	100	0.00	0.00
18	1					145	1800	293	1.00	8	1013	19.27	0.09	0.22	0.04	100	100	0.00	0.06
19	1					540	1800	293	167.00	34	161	16.05	3.14	17.14	6.84	100	100	0.00	7.86
20	1					767	1800	293	197.00	45	100	9.40	1.55	8.31	5.94	100	100	0.00	5.49

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	680.27	37.47	18.16	14.79	210.07	15.60	0.00	225.67
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	680.27	37.47	18.16	14.79	210.07	15.60	0.00	225.67

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- **P.I. = PERFORMANCE INDEX**

Junctions 9
ARCADY 9 - Roundabout Module
Version: 9.0.0.4211 [] © Copyright TRL Limited, 2020
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: 190092 Roundabout Option.j9
Path: G:\2019\p190092\calcs\Arcady
Report generation date: 22/04/2020 15:50:31

»2020, AM
 »2020, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	2020							
1 - Redford Park	0.3	8.14	0.19	A	0.3	9.98	0.19	A
2 - R761 South	185.3	882.90	1.38	F	6.0	38.49	0.86	E
3 - Blacklion Manor Road	0.8	13.14	0.41	B	0.4	9.78	0.28	A
4 - R761 North	1.6	14.17	0.59	B	95.6	495.58	1.24	F

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

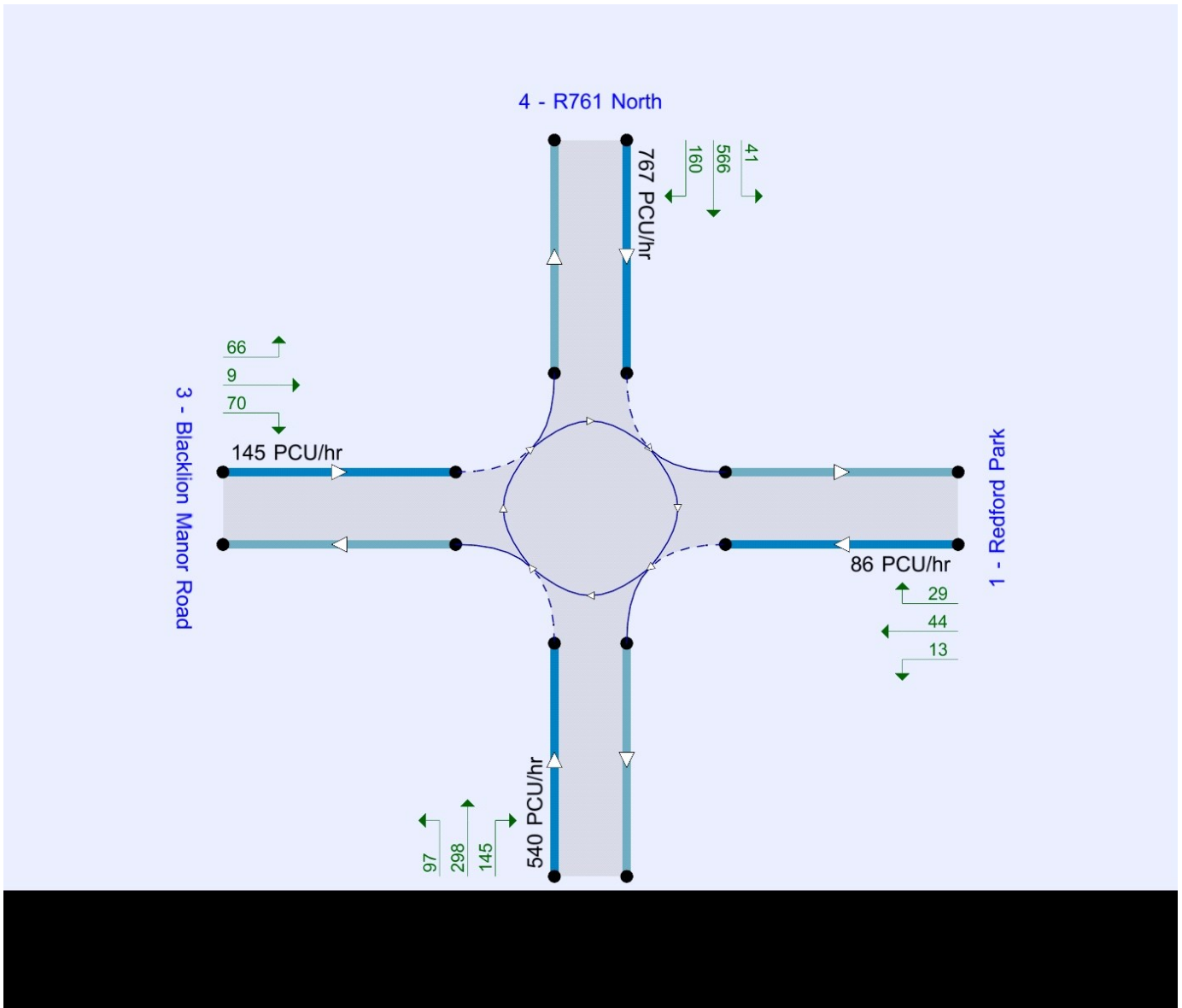
File summary

File Description

Title	(untitled)
Location	
Site number	
Date	12/03/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	HEADOFFICE"mcgeoughp
Description	

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	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)
2020	AM	ONE HOUR	08:00	09:30	15
2020	PM	ONE HOUR	17:00	18:30	15

2020, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1 - untitled	untitled	Standard Roundabout	510.13	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Redford Park	
2	R761 South	
3	Blacklion Manor Road	
4	R761 North	

Capacity Options

Arm	Minimum capacity (PCU/hr)	Maximum capacity (PCU/hr)
1 - Redford Park	0.00	99999.00
2 - R761 South	0.00	99999.00
3 - Blacklion Manor Road	0.00	99999.00
4 - R761 North	0.00	99999.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Redford Park	3.00	3.00	0.0	9.0	33.0	45.0	
2 - R761 South	3.00	3.00	0.0	9.0	33.0	52.0	
3 - Blacklion Manor Road	3.00	3.00	0.0	9.0	33.0	52.0	
4 - R761 North	3.00	3.00	0.0	9.0	33.0	52.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Redford Park	0.438	807.359
2 - R761 South	0.426	785.279
3 - Blacklion Manor Road	0.426	785.279
4 - R761 North	0.426	785.279

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

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)
D1	2020	AM	ONE HOUR	08:00	09:30	15

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Redford Park		✓	103.00	100.000
2 - R761 South		✓	887.00	100.000
3 - Blacklion Manor Road		✓	194.00	100.000
4 - R761 North		✓	368.00	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		1 - Redford Park	2 - R761 South	3 - Blacklion Manor Road	4 - R761 North
From	1 - Redford Park	0.000	48.000	17.000	38.000
	2 - R761 South	194.000	0.000	142.000	551.000
	3 - Blacklion Manor Road	5.000	70.000	0.000	119.000
	4 - R761 North	8.000	245.000	115.000	0.000

Vehicle Mix

Heavy Vehicle proportion

		To			
From		1 - Redford Park	2 - R761 South	3 - Blacklion Manor Road	4 - R761 North
	1 - Redford Park	10	10	10	10
	2 - R761 South	10	10	10	10
	3 - Blacklion Manor Road	10	10	10	10
	4 - R761 North	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - Redford Park	0.19	8.14	0.3	A
2 - R761 South	1.38	882.90	185.3	F
3 - Blacklion Manor Road	0.41	13.14	0.8	B
4 - R761 North	0.59	14.17	1.6	B

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	77.54	320.39	666.95	0.116	76.97	0.1	6.707	A
2 - R761 South	667.78	126.80	731.23	0.913	637.76	7.5	35.335	E
3 - Blacklion Manor Road	146.05	564.06	544.84	0.268	144.47	0.4	9.853	A
4 - R761 North	277.05	195.34	702.01	0.395	274.23	0.7	9.196	A

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	92.59	385.23	638.53	0.145	92.43	0.2	7.249	A
2 - R761 South	797.39	152.38	720.32	1.107	706.81	30.2	113.317	F
3 - Blacklion Manor Road	174.40	627.76	517.69	0.337	173.79	0.5	11.494	B
4 - R761 North	330.82	221.78	690.74	0.479	329.69	1.0	10.930	B

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	113.41	470.98	600.95	0.189	113.13	0.3	8.114	A
2 - R761 South	976.61	186.34	705.85	1.384	704.96	98.1	339.490	F
3 - Blacklion Manor Road	213.60	633.84	515.10	0.415	212.75	0.8	13.059	B
4 - R761 North	405.18	236.43	684.50	0.592	402.97	1.5	13.952	B

Main results: (08:45-09:00)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	113.41	473.32	599.93	0.189	113.40	0.3	8.139	A
2 - R761 South	976.61	187.14	705.51	1.384	705.33	165.9	676.793	F
3 - Blacklion Manor Road	213.60	634.25	514.92	0.415	213.56	0.8	13.136	B
4 - R761 North	405.18	236.83	684.33	0.592	405.07	1.6	14.165	B

Main results: (09:00-09:15)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	92.59	388.91	636.92	0.145	92.86	0.2	7.281	A
2 - R761 South	797.39	153.63	719.79	1.108	719.54	185.3	880.023	F
3 - Blacklion Manor Road	174.40	638.60	513.07	0.340	175.18	0.6	11.746	B
4 - R761 North	330.82	225.10	689.33	0.480	332.94	1.0	11.178	B

Main results: (09:15-09:30)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	77.54	325.07	664.90	0.117	77.71	0.1	6.747	A
2 - R761 South	667.78	128.44	730.53	0.914	726.22	170.7	882.897	F
3 - Blacklion Manor Road	146.05	638.63	513.06	0.285	146.58	0.4	10.821	B
4 - R761 North	277.05	215.50	693.42	0.400	278.22	0.7	9.566	A

2020, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Junction Network

Junctions

Junction	Name	Junction Type	Junction Delay (s)	Junction LOS
1 - untitled	untitled	Standard Roundabout	262.14	F

Junction Network Options

[same as above]

Arms

Arms

[same as above]

Capacity Options

[same as above]

Roundabout Geometry

[same as above]

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Model start time (HH:mm)	Model finish time (HH:mm)	Time segment length (min)
D2	2020	PM	ONE HOUR	17:00	18:30	15

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Redford Park		✓	86.00	100.000
2 - R761 South		✓	540.00	100.000
3 - Blacklion Manor Road		✓	145.00	100.000
4 - R761 North		✓	767.00	100.000

Origin-Destination Data

Demand (PCU/hr)

From	To			
	1 - Redford Park	2 - R761 South	3 - Blacklion Manor Road	4 - R761 North
1 - Redford Park	0.000	13.000	44.000	29.000
2 - R761 South	145.000	0.000	97.000	298.000
3 - Blacklion Manor Road	9.000	70.000	0.000	66.000
4 - R761 North	41.000	566.000	160.000	0.000

Vehicle Mix

Heavy Vehicle proportion

From	To			
	1 - Redford Park	2 - R761 South	3 - Blacklion Manor Road	4 - R761 North
1 - Redford Park	10	10	10	10
2 - R761 South	10	10	10	10
3 - Blacklion Manor Road	10	10	10	10
4 - R761 North	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
1 - Redford Park	0.19	9.98	0.3	A
2 - R761 South	0.86	38.49	6.0	E
3 - Blacklion Manor Road	0.28	9.78	0.4	A
4 - R761 North	1.24	495.58	95.6	F

Main Results for each time segment

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	64.75	583.55	551.62	0.117	64.17	0.1	8.111	A
2 - R761 South	406.54	171.55	712.15	0.571	400.87	1.4	12.508	B
3 - Blacklion Manor Road	109.16	350.50	635.87	0.172	108.26	0.2	7.493	A
4 - R761 North	577.44	166.63	714.25	0.808	561.29	4.0	23.869	C

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	77.31	682.73	508.15	0.152	77.11	0.2	9.183	A
2 - R761 South	485.45	202.08	699.14	0.694	481.69	2.4	17.890	C
3 - Blacklion Manor Road	130.35	421.17	605.75	0.215	130.06	0.3	8.319	A
4 - R761 North	689.52	200.21	699.94	0.985	654.95	12.7	61.345	F

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

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	94.69	718.31	492.56	0.192	94.43	0.3	9.940	A
2 - R761 South	594.55	221.53	690.85	0.861	582.27	5.4	33.132	D
3 - Blacklion Manor Road	159.65	509.52	568.09	0.281	159.15	0.4	9.672	A
4 - R761 North	844.48	243.06	681.67	1.239	677.71	54.4	193.816	F

Main results: (17:45-18:00)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	94.69	720.43	491.63	0.193	94.68	0.3	9.975	A
2 - R761 South	594.55	222.16	690.58	0.861	592.41	6.0	38.487	E
3 - Blacklion Manor Road	159.65	517.92	564.51	0.283	159.62	0.4	9.780	A
4 - R761 North	844.48	246.04	680.40	1.241	679.70	95.6	405.457	F

Main results: (18:00-18:15)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	77.31	715.84	493.64	0.157	77.53	0.2	9.521	A
2 - R761 South	485.45	209.65	695.91	0.698	498.49	2.7	21.202	C
3 - Blacklion Manor Road	130.35	435.09	599.82	0.217	130.84	0.3	8.452	A
4 - R761 North	689.52	205.14	697.84	0.988	689.54	95.6	495.583	F

Main results: (18:15-18:30)

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
1 - Redford Park	64.75	719.88	491.87	0.132	64.90	0.2	9.277	A
2 - R761 South	406.54	202.09	699.14	0.581	411.02	1.6	13.951	B
3 - Blacklion Manor Road	109.16	359.07	632.22	0.173	109.47	0.2	7.578	A
4 - R761 North	577.44	170.01	712.81	0.810	704.70	63.7	408.846	F

TRANSYT 15

Version: 15.5.2.7994
© Copyright TRL Limited, 2018

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: 190092 Proposed Signals_JH.t15
Path: G:\2019\p190092\calcs\transyt
Report generation date: 23/04/2020 10:44:54

»A4 - 2020 8-9 AM : D5 - 2020 8-9 AM* :
»A5 - 2020 4-5 PM : D4 - 2020 4-5 PM* :

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	23/04/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	HEADOFFICE\mcgeoughp
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display level of service results	Display blocking and starvation results	Display end of red and green queue results	Display excess queue results	Display separate uniform and random results	Display unweighted results	Display TRANSYT 12 style timings	Display effective greens in results	Display Red-With-Amber	Display End-Of-Green Amber

Units

Cost units	Speed units	Distance units	Fuel economy units	Fuel rate units	Mass units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
£	kph	m	mpg	l/h	kg	PCU	PCU	perHour	s	-Hour	perHour

Sorting

			(HH:mm)			- hr/hr)					sed PRC	ised PRC	all PRC	capa city
4	23/04/2020 10:43:59	23/04/2020 10:44:00	08:00	120	218.29	14.14	64.10	4/2	0	0	4/2	19/1	4/2	✓

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 8-9 AM		D5	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 8-9 AM				08:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
------	------------	-----------------	----------------------------------	-----------------------------	-------------------------

Bus	1.00	Default	0.94	30	85
-----	------	---------	------	----	----

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2051	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2010	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2105	✓	✓	Normal	
8	1			✓	210.77						Normal	
9	1			✓	363.21						Normal	
10	1			✓	353.16						Normal	

11	1			✓	348.70								Normal	
18	1			✓	159.81	✓	Sum of lanes	1800					Normal	
19	1			✓	107.58	✓	Sum of lanes	1800					Normal	
20	1			✓	65.40	✓	Sum of lanes	1800					Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connect or turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	83	40.10		2051
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	93	62.68		2010
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		

18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	120

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	103	103
2	1	119	119
	2	75	75
4	1	142	142
	2	551	551
	3	194	194
6	1	253	253
	2	115	115
8	1	207	207
9	1	274	274
10	1	363	363
11	1	708	708
18	1	194	194
19	1	887	887
20	1	368	368

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	25.29	30.00	✓	Nearside	32.33
9	1	1	4/1	9/1	43.59	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	42.38	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	25.29	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.59	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	42.38	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	25.29	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.59	30.00	✓	Straight	Straight Movement
10	1	3	2/2	10/1	42.38	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2105	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

1	Unspecified						Absolute
---	-------------	--	--	--	--	--	----------

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	A, B, C, D	1
	2	B, D, E	1
	3	E, F	1
	4	G	1
	5	H	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5	47, 59, 77, 94, 106

Intergreen Matrix for Controller Stream 1

		To							
		A	B	C	D	E	F	G	H
From	A					7	7	7	6
	B						6	6	6
	C						7	7	6
	D						6	6	6
	E	6						6	6
	F	6	6	6	6			6	6
	G	6	6	6	6	6	6		6
	H	13	13	13	13	13	13	13	

Banned Stage transitions for Controller Stream 1

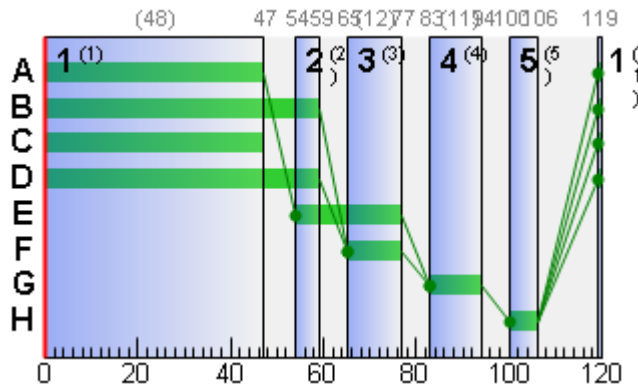
		To				
		1	2	3	4	5
From	1					
	2					
	3					
	4					
	5					

Traffic Stream Green Times

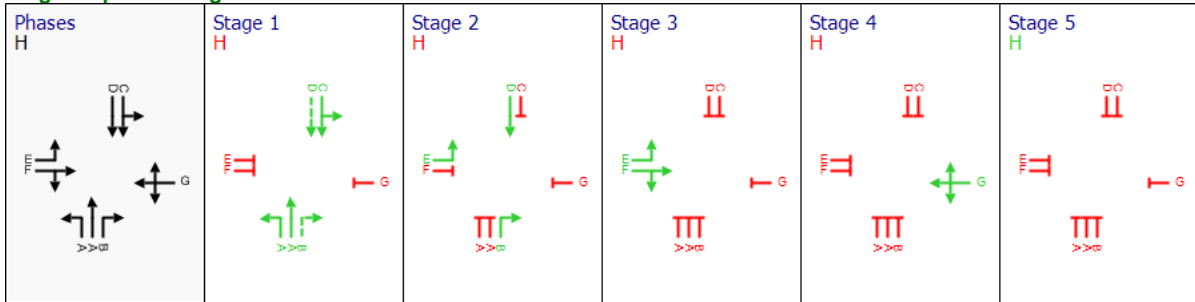
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1
-----	----------------	--------------	-------------------	-------	----------------

					Start	End	Duration
1	1		1	G	83	94	11
2	1		1	E	54	77	23
2	2		1	F	65	77	12
4	1		1	A	119	47	48
4	2		1	A	119	47	48
4	3		1	B	119	59	60
6	1		1	C	119	47	48
6	2		1	D	119	59	60

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
08:00-09:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	50	79	103	2051	11	59.91	3.48	20.03	24.34	1.30	25.64
		2	36	149	119	1644	23	44.43	3.28	81.89	20.85	1.28	22.14
	2	2	34	161	75	2010	12	53.80	2.40	60.06	15.92	0.89	16.81

	4	1	17	423	142	2019	48	20.18	1.96	97.76	11.30	0.74	12.04
		2	64	40	551	2105	48	26.96	14.17	679.06	58.60	4.98	63.58
		3	28	222	194	1366	60	14.53	2.05	102.70	11.12	0.86	11.98
	6	1	30	201	253	2069	48	24.84	5.69	163.48	24.79	2.11	26.90
		2	16	448	115	1378	60	16.55	1.90	63.36	7.51	0.77	8.28
	8	1	0	Unrestricted	207	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	274	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	363	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	708	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	11	707	194	1800	120	0.21	0.22	0.80	0.16	0.06	0.23
	19	1	63	44	887	1800	120	7.38	12.84	68.65	25.83	4.51	30.34
	20	1	20	340	368	1800	120	0.26	0.03	0.23	0.37	0.00	0.37

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual greens (per cycle)
08:00-09:00	1	1	103	103	0		2051	205	50		79	0.00	11
	2	1	119	119	0		1644	329	36		149	0.05	23
		2	75	75	0		2010	218	34		161	0.05	12
	4	1	142	142	0		2019	824	17		423	0.41	48
		2	551	551	0		2105	860	64		40	0.41	48
	6	3	194	194	0		1366	694	28		222	0.41	60
		1	253	253	0		2069	845	30		201	0.00	48
	8	2	115	115	0		1378	701	16		448	0.00	60
		1	207	207	0		Unrestricted	Unrestricted	0		Unrestricted	0.83	120
	9	1	274	274	0		Unrestricted	Unrestricted	0		Unrestricted	0.76	120
	10	1	363	363	0		Unrestricted	Unrestricted	0		Unrestricted	0.51	120
	11	1	708	708	0		Unrestricted	Unrestricted	0		Unrestricted	0.61	120
	18	1	194	194	0		1800	1740	11		707	0.00	120
19	1	887	887	0		1800	1415	63		44	0.00	120	
20	1	368	368	0		1800	1800	20		340	0.00	120	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	1	1	12.00	59.91	1.71	24.34	100.32	103.33	1.30
	2	1	2.76	44.43	1.47	20.85	85.99	102.33	1.28
		2	2.76	53.80	1.12	15.92	94.91	71.18	0.89
	4	1	1.44	20.18	0.80	11.30	41.31	58.65	0.74
		2	1.44	26.96	4.13	58.60	72.03	396.91	4.98
	6	3	1.44	14.53	0.78	11.12	35.26	68.40	0.86
		1	2.40	24.84	1.75	24.79	66.41	168.02	2.11

		2	2.40	16.55	0.53	7.51	53.39	61.40	0.77
8		1	25.29	0.00	0.00	0.00	0.00	0.00	0.00
9		1	43.59	0.00	0.00	0.00	0.00	0.00	0.00
10		1	42.38	0.00	0.00	0.00	0.00	0.00	0.00
11		1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
18		1	19.18	0.21	0.01	0.16	2.57	4.98	0.06
19		1	12.91	7.38	1.82	25.83	40.55	359.70	4.51
20		1	7.85	0.26	0.03	0.37	0.00	0.00	0.00

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))	Estimated blocking
08:00-09:00	1	1	0.00	3.48	17.39	20.03	0.00	0.00	
	2	1	0.00	3.28	4.00	81.89	0.00	0.00	
		2	0.00	2.40	4.00	60.06	0.00	0.00	
	4	1	0.00	1.96	2.00	97.76	0.00	0.00	
		2	0.00	14.17	2.09	679.06	0.00	0.00	
		3	0.00	2.05	2.00	102.70	0.00	0.00	
	6	1	0.00	5.69	3.48	163.48	0.00	0.00	
		2	0.00	1.90	3.00	63.36	0.00	0.00	
	8	1	0.00	0.00	36.66	0.00	0.00	45.00	
	9	1	0.00	0.00	63.17	0.00	0.00	29.00	
	10	1	0.00	0.00	61.42	0.00	0.00	4.00	
	11	1	0.00	0.00	60.64	0.00	0.00	6.00	
	18	1	0.00	0.22	27.79	0.80	0.00	4.00	
19	1	0.00	12.84	18.71	68.65	0.00	85.00		
20	1	0.00	0.03	11.37	0.23	0.00	32.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	0.00	0.00	✓	3.48	0.25	3.34	1.00	0.00	25.64
	2	1	0.00	0.00	✓	3.28	0.10	3.28	1.00	0.00	22.14
		2	0.00	0.00	✓	2.40	0.09	2.32	1.00	0.00	16.81
	4	1	0.00	0.00	✓	1.96	0.02	1.96	1.00	0.00	12.04
		2	0.00	0.00	✓	14.17	0.57	8.09	1.00	0.00	63.58
		3	0.00	0.00	✓	2.05	0.05	2.05	1.00	0.00	11.98
	6	1	0.00	0.00	✓	5.69	0.06	5.05	1.00	0.00	26.90
		2	0.00	0.00	✓	1.90	0.02	1.90	1.00	0.00	8.28
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.22			1.00	0.00	0.23
19	1	0.00	0.00	✓	12.84			1.00	0.00	30.34	
20	1	0.00	0.00	✓	0.03			1.00	0.00	0.37	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU - hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalled PRC	Item with worst unsignalled PRC	Item with worst over all PRC	Network within capacity
4	23/04/2020 10:43:59	23/04/2020 10:44:00	08:00	120	218.29	14.14	64.10	4/2	0	0	4/2	19/1	4/2	✓

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	64	40	4553	1150	11.18	200.80	17.49	218.29

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
08:00-09:00	4553	4553	0		64		40	1150

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	18.49	11.18	14.14	200.80	30.64	1394.92	17.49

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle))
08:00-09:00	679.06	0.00	205.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	0.00	0.00	✓	1.00	0.00	0.00	218.29

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	101.2	118.3	108.4
	2	115.5	0.0	114.3	113.8
	3	85.5	61.6	0.0	90.5
	4	70.6	60.6	77.7	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	17	115.50	17	115.50

6	2	4	38	113.76	38	113.76
10	1	4	119	108.42	119	108.42
11	2	3	48	114.29	48	114.29
12	4	1	115	70.64	115	70.64
16	1	2	5	101.24	5	101.24
17	1	3	70	118.33	70	118.33
18	4	2	8	60.64	8	60.64
19	4	3	245	77.73	245	77.73
20	3	1	142	85.50	142	85.50
21	3	4	551	90.54	551	90.54
22	3	2	194	61.55	194	61.55

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	WEIGHTS		PENALTIES	P.I.
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual greens (per cycle)	Wasted time total (s per cycle)	Degree of saturation (%)	Practical reserve capacity (%)	Journey Time (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
1	1			1	G	103	2051	11	0.00	50	79	71.91	59.91	100.32	3.48	100	100	0.00	25.64
2	1			1	E	119	1644	23	0.00	36	149	47.19	44.43	85.99	3.28	100	100	0.00	22.14
	2			1	F	75	2010	12	0.00	34	161	56.56	53.80	94.91	2.40	100	100	0.00	16.81
4	1			1	A	142	2019	48	0.00	17	423	21.62	20.18	41.31	1.96	100	100	0.00	12.04
	2			1	A	551 <	2105	48	0.00	64	40	28.40	26.96	72.03	14.17 +	100	100	0.00	63.58
	3			1	B	194 <	1366	60	0.00	28	222	15.97	14.53	35.26	2.05 +	100	100	0.00	11.98
6	1			1	C	253 <	2069	48	0.00	30	201	27.24	24.84	66.41	5.69 +	100	100	0.00	26.90
	2			1	D	115	1378	60	0.00	16	448	18.95	16.55	53.39	1.90	100	100	0.00	8.28
8	1					207	Unrestricted	120	45.00	0	Unrestricted	25.29	0.00	0.00	0.00	100	100	0.00	0.00
9	1					274	Unrestricted	120	29.00	0	Unrestricted	43.59	0.00	0.00	0.00	100	100	0.00	0.00
10	1					363	Unrestricted	120	4.00	0	Unrestricted	42.38	0.00	0.00	0.00	100	100	0.00	0.00
11	1					708	Unrestricted	120	6.00	0	Unrestricted	41.84	0.00	0.00	0.00	100	100	0.00	0.00
18	1					194	1800	120	4.00	11	707	19.39	0.21	2.57	0.22	100	100	0.00	0.23
19	1					887	1800	120	85.00	63	44	20.29	7.38	40.55	12.84	100	100	0.00	30.34
20	1					368	1800	120	32.00	20	340	8.10	0.26	0.00	0.03	100	100	0.00	0.37

Network Results

Distance travelled (PCU-km/hr)	Time spent	Mean journey	Total delay	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue	Performance Index (£ per hr)
--------------------------------	------------	--------------	-------------	-----------------------------------	-----------------------------------	--------------	------------------------------

		(PCU-hr/hr)	speed (kph)	(PCU-hr/hr)			penalty (£ per hr)	
Normal traffic	701.48	37.52	18.69	14.14	200.80	17.49	0.00	218.29
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	701.48	37.52	18.69	14.14	200.80	17.49	0.00	218.29

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A5 - 2020 4-5 PM

D4 - 2020 4-5 PM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU - hr/hr)	High est DOS (%)	Item with high est DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalled PRC	Item with worst unsignalled PRC	Item with worst over all PRC	Network within capacity
5	23/04/2020 10:44:03	23/04/2020 10:44:04	16:00	120	209.41	13.67	71.85	6/1	0	0	6/1	20/1	6/1	✓

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 4-5 PM		D4	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 4-5 PM				16:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ⁻²)	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	120

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	86	86
2	1	66	66
	2	79	79
4	1	97	97
	2	298	298
	3	145	145
6	1	607	607
	2	160	160

8	1	195	195
9	1	301	301
10	1	649	649
11	1	393	393
18	1	145	145
19	1	540	540
20	1	767	767

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	25.29	30.00	✓	Nearside	32.33
9	1	1	4/1	9/1	43.59	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	42.38	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	25.29	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.59	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	42.38	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	25.29	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.59	30.00	✓	Straight	Straight Movement

10	1	3	2/2	10/1	42.38	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2105	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

From	To			
	1	2	3	4
1	0	9	70	66
2	44	0	13	29
3	97	145	0	298
4	160	41	566	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	44
	6		2	4	1/1, 11/1	Normal	29
	10		1	4	18/1, 2/1, 11/1	Normal	66
	11		2	3	1/1, 10/1	Normal	13
	12		4	1	20/1, 6/2, 9/1	Normal	160
	16		1	2	18/1, 2/2, 8/1	Normal	9
	17		1	3	18/1, 2/2, 10/1	Normal	70
	18		4	2	20/1, 6/1, 8/1	Normal	41
	19		4	3	20/1, 6/1, 10/1	Normal	566
	20		3	1	19/1, 4/1, 9/1	Normal	97
	21		3	4	19/1, 4/2, 11/1	Normal	298
	22		3	2	19/1, 4/3, 8/1	Normal	145

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	NetworkDefault	120

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	A, B, C, D	1
	2	B, D, E	1
	3	E, F	1
	4	G	1
	5	H	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5	47, 59, 77, 94, 106

Intergreen Matrix for Controller Stream 1

		To							
		A	B	C	D	E	F	G	H
From	A					7	7	7	6
	B						6	6	6
	C						7	7	6
	D						6	6	6
	E	6						6	6
	F	6	6	6	6			6	6
	G	6	6	6	6	6	6		6
	H	13	13	13	13	13	13	13	

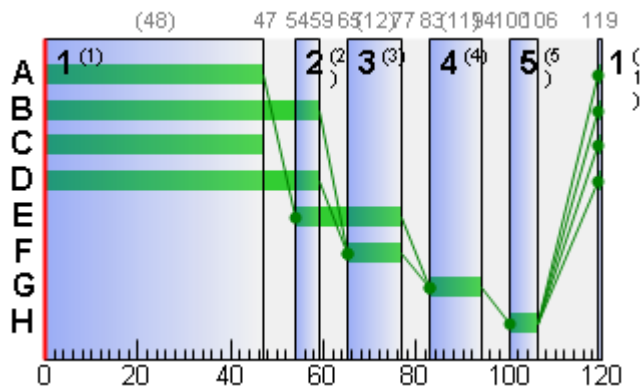
Banned Stage transitions for Controller Stream 1

		To				
		1	2	3	4	5
From	1					
	2					
	3					
	4					
	5					

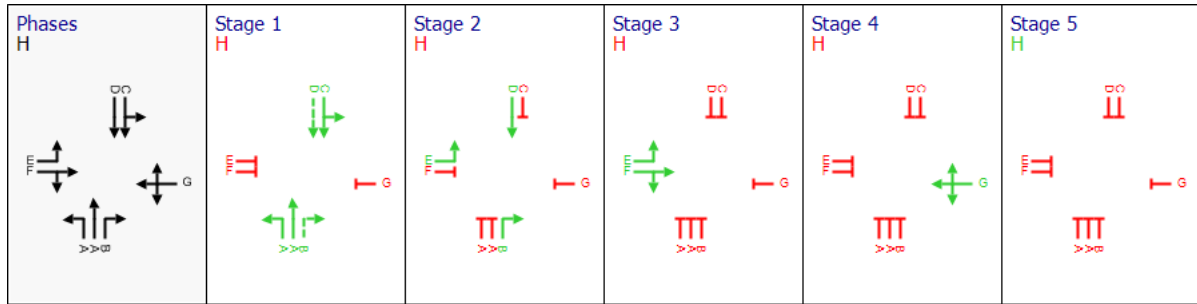
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1		1	G	83	94	11
2	1		1	E	54	77	23
2	2		1	F	65	77	12
4	1		1	A	119	47	48
4	2		1	A	119	47	48
4	3		1	B	119	59	60
6	1		1	C	119	47	48
6	2		1	D	119	59	60

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
16:00-17:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)	
16:00-17:00	1	1	41	117	86	2077	11	56.79	2.82	16.22	19.26	1.05	20.31	
	2	1	20	348	66	1644	23	41.37	1.79	44.63	10.77	0.68	11.45	
		2	36	148	79	2012	12	54.33	2.54	63.45	16.93	0.94	17.88	
	4	1	12	665	97	2019	48	21.69	1.67	83.46	8.30	0.63	8.93	
		2	35	160	298	2105	48	24.61	6.88	329.46	28.93	2.49	31.42	
		3	21	331	145	1366	60	16.23	2.03	101.38	9.28	0.88	10.16	
	6	1	72	25	607	2069	48	35.09	17.77	510.76	84.02	6.56	90.58	
		2	23	294	160	1378	60	17.50	2.66	88.53	11.04	1.12	12.16	
	8	1	0	Unrestricted	195	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	301	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	649	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	393	Unrestricted	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	8	1008	145	1800	120	0.10	0.04	0.16	0.06	0.01	0.07	
19	1	34	168	540	1800	120	1.54	2.79	14.89	3.28	0.93	4.21		
20	1	43	111	767	1800	120	0.74	0.16	1.39	2.24	0.00	2.24		

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s per cycle)
--------------	-----	----------------	-----------------------------------	------------------------------	---------------------------	-----------------------	------------------------------	------------------------------	--------------------------	------------------------	--------------------------------	-----------------------	----------------------------

16:00-17:00	1	1	86	86	0		2077	208	41		117	0.00	11
	2	1	66	66	0		1644	329	20		348	0.01	23
		2	79	79	0		2012	218	36		148	0.01	12
	4	1	97	97	0		2019	824	12		665	0.21	48
		2	298	298	0		2105	860	35		160	0.21	48
		3	145	145	0		1366	694	21		331	0.21	60
	6	1	607	607	0		2069	845	72		25	0.00	48
		2	160	160	0		1378	701	23		294	0.00	60
	8	1	195	195	0		Unrestricted	Unrestricted	0		Unrestricted	0.83	120
	9	1	301	301	0		Unrestricted	Unrestricted	0		Unrestricted	0.62	120
	10	1	649	649	0		Unrestricted	Unrestricted	0		Unrestricted	0.72	120
	11	1	393	393	0		Unrestricted	Unrestricted	0		Unrestricted	0.60	120
	18	1	145	145	0		1800	1785	8		1008	0.00	120
	19	1	540	540	0		1800	1606	34		168	0.00	120
20	1	767	767	0		1800	1800	43		111	0.00	120	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
16:00-17:00	1	1	12.00	56.79	1.36	19.26	97.34	83.71	1.05
	2	1	2.76	41.37	0.76	10.77	82.45	54.42	0.68
		2	2.76	54.33	1.19	16.93	95.36	75.34	0.94
	4	1	1.44	21.69	0.58	8.30	51.62	50.07	0.63
		2	1.44	24.61	2.04	28.93	66.51	198.20	2.49
		3	1.44	16.23	0.65	9.28	48.42	70.21	0.88
	6	1	2.40	35.09	5.92	84.02	86.25	523.54	6.56
		2	2.40	17.50	0.78	11.04	55.69	89.11	1.12
	8	1	25.29	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.59	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	42.38	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.10	0.00	0.06	0.53	0.77	0.01
	19	1	12.91	1.54	0.23	3.28	13.73	74.16	0.93
20	1	7.85	0.74	0.16	2.24	0.00	0.00	0.00	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)	Estimated blocking
16:00-17:00	1	1	0.00	2.82	17.39	16.22	0.00	0.00	
	2	1	0.00	1.79	4.00	44.63	0.00	0.00	
		2	0.00	2.54	4.00	63.45	0.00	0.00	
	4	1	0.00	1.67	2.00	83.46	0.00	0.00	
		2	0.00	6.88	2.09	329.46	0.00	0.00	
		3	0.00	2.03	2.00	101.38	0.00	0.00	
	6	1	0.00	17.77	3.48	510.76	0.00	0.00	
		2	0.00	2.66	3.00	88.53	0.00	0.00	
	8	1	0.00	0.00	36.66	0.00	0.00	43.00	
	9	1	0.00	0.00	63.17	0.00	0.00	16.00	
	10	1	0.00	0.00	61.42	0.00	0.00	13.00	
	11	1	0.00	0.00	60.64	0.00	0.00	11.00	
	18	1	0.00	0.04	27.79	0.16	0.00	1.00	

	19	1	0.00	2.79	18.71	14.89	0.00	58.00	
	20	1	0.00	0.16	11.37	1.39	0.00	85.00	

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
16:00-17:00	1	1	0.00	0.00	✓	2.82	0.15	2.73	1.00	0.00	20.31
	2	1	0.00	0.00	✓	1.79	0.03	1.79	1.00	0.00	11.45
		2	0.00	0.00	✓	2.54	0.10	2.45	1.00	0.00	17.88
	4	1	0.00	0.00	✓	1.67	0.01	1.67	1.00	0.00	8.93
		2	0.00	0.00	✓	6.88	0.09	5.20	1.00	0.00	31.42
		3	0.00	0.00	✓	2.03	0.03	2.03	1.00	0.00	10.16
	6	1	0.00	0.00	✓	17.77	0.91	12.88	1.00	0.00	90.58
		2	0.00	0.00	✓	2.66	0.03	2.66	1.00	0.00	12.16
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.04			1.00	0.00	0.07
19	1	0.00	0.00	✓	2.79			1.00	0.00	4.21	
20	1	0.00	0.00	✓	0.16			1.00	0.00	2.24	

Network Results

Run Summary

Analysis used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU - hr/hr)	High est DOS (%)	Item with high est DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalled PRC	Item with worst unsignalled PRC	Item with worst over all PRC	Network within capacity
5	23/04/2020 10:44:03	23/04/2020 10:44:04	16:00	120	209.41	13.67	71.85	6/1	0	0	6/1	20/1	6/1	✓

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
16:00-17:00	72	25	4528	1150	10.87	194.12	15.29	209.41

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s (per cycle))
16:00-17:00	4528	4528	0		72		25	1150

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
16:00-17:00	18.07	10.87	13.67	194.12	26.93	1219.54	15.29

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))
16:00-17:00	510.76	0.00	227.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
16:00-17:00	0.00	0.00	✓	1.00	0.00	0.00	209.41

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	101.7	118.7	105.3
	2	112.4	0.0	111.2	110.6
	3	81.2	57.4	0.0	82.3
	4	72.1	71.4	88.5	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	44	112.37	44	112.37
6	2	4	29	110.63	29	110.63
10	1	4	66	105.25	66	105.25
11	2	3	13	111.17	13	111.17
12	4	1	160	72.07	160	72.07
16	1	2	9	101.66	9	101.66
17	1	3	70	118.75	70	118.75
18	4	2	41	71.37	41	71.37
19	4	3	566	88.46	566	88.46
20	3	1	97	81.16	97	81.16
21	3	4	298	82.34	298	82.34
22	3	2	145	57.41	145	57.41

Final Prediction Table

Traffic Stream Results

			SIGNALS		FLOWS		PERFORMANCE				PER PCU		QUES	WEIGHTS		PENALTIES	P.I.	
Arm	Traffic Stream Name	Traffic Node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Wasted time total (s per cycle)	Degree of saturation (%)	Practical reserve capacity (%)	Journey Time (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.

1	1		1	G	86	2077	11	0.00	41	117	68.79	56.79	97.34	2.82	100	100	0.00	20.31
2	1		1	E	66	1644	23	0.00	20	348	44.13	41.37	82.45	1.79	100	100	0.00	11.45
	2		1	F	79	2012	12	0.00	36	148	57.09	54.33	95.36	2.54	100	100	0.00	17.88
4	1		1	A	97	2019	48	0.00	12	665	23.13	21.69	51.62	1.67	100	100	0.00	8.93
	2		1	A	298 <	2105	48	0.00	35	160	26.05	24.61	66.51	6.88 +	100	100	0.00	31.42
	3		1	B	145 <	1366	60	0.00	21	331	17.67	16.23	48.42	2.03 +	100	100	0.00	10.16
6	1		1	C	607 <	2069	48	0.00	72	25	37.49	35.09	86.25	17.77 +	100	100	0.00	90.58
	2		1	D	160	1378	60	0.00	23	294	19.90	17.50	55.69	2.66	100	100	0.00	12.16
8	1				195	Unrestricted	120	43.00	0	Unrestricted	25.29	0.00	0.00	0.00	100	100	0.00	0.00
9	1				301	Unrestricted	120	16.00	0	Unrestricted	43.59	0.00	0.00	0.00	100	100	0.00	0.00
10	1				649	Unrestricted	120	13.00	0	Unrestricted	42.38	0.00	0.00	0.00	100	100	0.00	0.00
11	1				393	Unrestricted	120	11.00	0	Unrestricted	41.84	0.00	0.00	0.00	100	100	0.00	0.00
18	1				145	1800	120	1.00	8	1008	19.27	0.10	0.53	0.04	100	100	0.00	0.07
19	1				540	1800	120	58.00	34	168	14.45	1.54	13.73	2.79	100	100	0.00	4.21
20	1				767	1800	120	85.00	43	111	8.59	0.74	0.00	0.16	100	100	0.00	2.24

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	681.85	36.40	18.73	13.67	194.12	15.29	0.00	209.41
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	681.85	36.40	18.73	13.67	194.12	15.29	0.00	209.41

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- **P.I. = PERFORMANCE INDEX**

<h1>TRANSYT 15</h1>
Version: 15.5.2.7994 © Copyright TRL Limited, 2018
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 software@trl.co.uk www.trisoftware.co.uk
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: 190092 Proposed Signals_EMJ_120seconds_ped2ndcycle.t15
Path: G:\2019\p190092\calcs\transyt
Report generation date: 10/01/2022 15:40:04

- »A1 - 2017 Base AM : D1 - 2017 Base AM* :
- »A2 - 2017 Base PM : D2 - 2017 Base PM* :
- »A3 - 2020 7-8 AM : D3 - 2020 6-7 AM* :
- »A4 - 2020 4-5 PM : D4 - 2020 4-5 PM* :
- »A5 - 2020 8-9 AM : D5 - 2020 8-9 AM* :

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	28/11/2019
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	HEADOFFICE\mcgeoughp
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display level of service results	Display blocking and starvation results	Display end of red and green queue results	Display excess queue results	Display separate uniform and random results	Display unweighted results	Display TRANSYT 12 style timings	Display effective greens in results	Display Red-With-Amber	Display End-Of-Green Amber

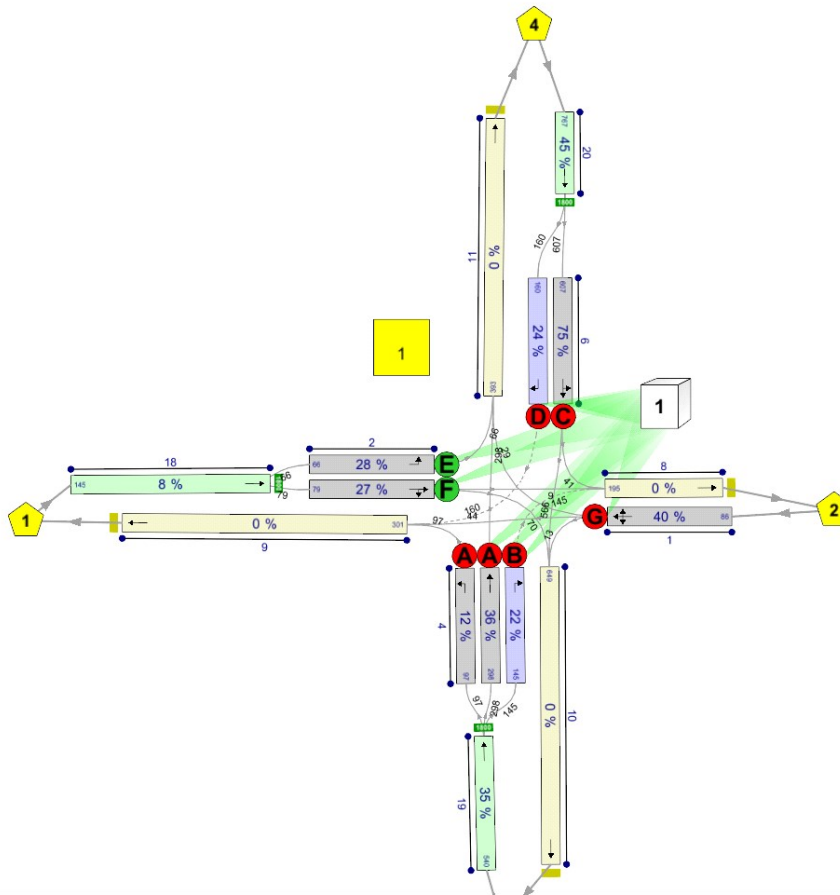
Units

Cost units	Speed units	Distance units	Fuel economy units	Fuel rate units	Mass units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
£	kph	m	mpg	l/h	kg	PCU	PCU	perHour	s	-Hour	perHour

Sorting

Show names instead of IDs	Sorting direction	Sorting type	Ignore prefixes when sorting	Analysis/demand set sorting	Link grouping	Source grouping	Colour Analysis/Demand Sets
	Ascending	Numerical		ID	Normal	Normal	✓

Network Diagrams



A1 - 2017 Base AM

D1 - 2017 Base AM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
1	10/01/2022 15:39:28	10/01/2022 15:39:31	08:00	120	218.26	14.29	60.08	6/1	0	0	6/1	19/1	6/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2017 Base AM		D1	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2017 Base AM				08:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2050	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2013	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2073	✓	✓	Normal	
8	1			✓	207.10						Normal	
9	1			✓	360.14						Normal	
10	1			✓	349.62						Normal	
11	1			✓	348.70						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connector turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	85	40.10		2050
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	88	62.68		2013
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	96.34		2073
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	240

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	82	82
2	1	125	125
	2	151	151
4	1	119	119
	2	367	367
	3	51	51
6	1	404	404
	2	98	98
8	1	96	96
9	1	229	229
10	1	552	552
11	1	520	520
18	1	276	276
19	1	537	537
20	1	502	502

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	24.85	30.00	✓	Nearside	33.17
9	1	1	4/1	9/1	43.22	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	41.95	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	24.85	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.22	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.95	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	24.85	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.22	30.00	✓	Offside	96.34
10	1	3	2/2	10/1	41.95	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2073	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	18	133	125
	2	12	0	42	28
	3	119	51	0	367
	4	98	27	377	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	12
	6		2	4	1/1, 11/1	Normal	28
	10		1	4	18/1, 2/1, 11/1	Normal	125
	11		2	3	1/1, 10/1	Normal	42
	12		4	1	20/1, 6/2, 9/1	Normal	98
	16		1	2	18/1, 2/2, 8/1	Normal	18
	17		1	3	18/1, 2/2, 10/1	Normal	133
	18		4	2	20/1, 6/1, 8/1	Normal	27
	19		4	3	20/1, 6/1, 10/1	Normal	377
	20		3	1	19/1, 4/1, 9/1	Normal	119
	21		3	4	19/1, 4/2, 11/1	Normal	367
	22		3	2	19/1, 4/3, 8/1	Normal	51

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	Manual	240

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown
	I	(untitled)	7	300	0	0	Cycle

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	H	1
	2	I	1
	3	A, C, I	1
	4	A, B, C, D	1
	5	B, D	1
	6	E, F	1
	7	G	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7	24, 40, 46, 81, 82, 125, 146, 154, 160, 189, 190, 238, 11

Intergreen Matrix for Controller Stream 1

		To								
		A	B	C	D	E	F	G	H	I
From	A					7	7	7	7	
	B						6	6	7	
	C						7	7	7	
	D					6	6	6	7	
	E	6			6			6	7	
	F	6	6	6	6			6	7	
	G	6	6	6	6	6	6		7	7
	H	15	15	15	15	15	15	15		15
	I							7	7	

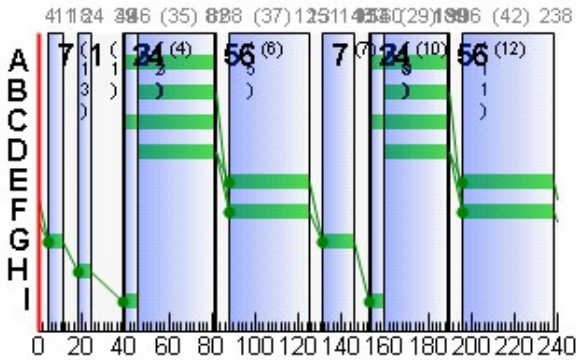
Banned Stage transitions for Controller Stream 1

		To						
		1	2	3	4	5	6	7
From	1							
	2							
	3							
	4							
	5							
	6							
	7							

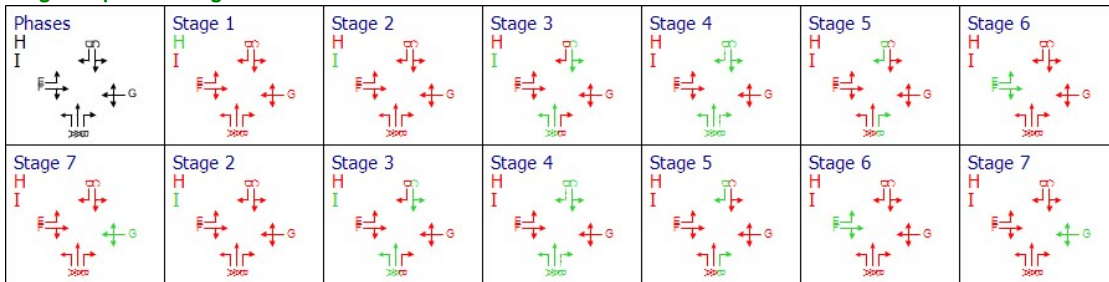
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	131	146	15	4	11	7
2	1		1	E	88	125	37	196	238	42
2	2		1	F	88	125	37	196	238	42
4	1		1	A	40	81	41	154	189	35
4	2		1	A	40	81	41	154	189	35
4	3		1	B	46	82	36	160	190	30
6	1		1	C	40	81	41	154	189	35
6	2		1	D	46	82	36	160	190	30

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
08:00-09:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)	
08:00-09:00	1	1	40	125	82	2050	22	56.96	2.93	16.87	18.42	1.00	19.42	
	2	1	23	299	125	1644	79	29.81	3.12	78.07	14.70	1.10	15.80	
		2	22	305	151	2013	79	29.60	4.00	99.97	17.63	1.32	18.94	
	4	1	18	396	119	2019	76	27.11	2.02	101.00	12.72	0.76	13.48	
		2	54	68	367	2105	76	32.39	11.12	532.98	46.88	3.57	50.45	
		3	15	512	51	1225	66	29.71	0.93	46.65	5.98	0.38	6.36	
	6	1	60	50	404	2069	76	38.39	12.91	371.03	61.18	4.33	65.51	
		2	28	219	98	1226	66	35.97	2.64	88.05	13.90	0.96	14.86	
	8	1	0	Unrestricted	96	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	229	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	552	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	520	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	16	472	276	1800	240	0.25	0.32	1.16	0.27	0.07	0.33	0.33
	19	1	38	139	537	1800	240	4.93	7.27	38.88	10.44	1.90	12.34	12.34
20	1	28	223	502	1800	240	0.39	0.05	0.47	0.77	0.00	0.77	0.77	

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s per cycle)
08:00-09:00	1	1	82	82	0		2050	205	40		125	0.00	22
	2	1	125	125	0		1644	555	23		299	0.04	79
		2	151	151	0		2013	679	22		305	0.04	79
	4	1	119	119	0		2019	656	18		396	0.41	76
		2	367	367	0		2105	684	54		68	0.41	76
		3	51	51	0		1225	347	15		512	0.41	66
	6	1	404	404	0		2069	672	60		50	0.00	76
		2	98	98	0		1226	347	28		219	0.00	66
	8	1	96	96	0		Unrestricted	Unrestricted	0		Unrestricted	0.95	240
	9	1	229	229	0		Unrestricted	Unrestricted	0		Unrestricted	0.99	240
	10	1	552	552	0		Unrestricted	Unrestricted	0		Unrestricted	0.62	240
	11	1	520	520	0		Unrestricted	Unrestricted	0		Unrestricted	0.65	240
	18	1	276	276	0		1800	1755	16		472	0.00	240
	19	1	537	537	0		1800	1425	38		139	0.00	240
20	1	502	502	0		1800	1800	28		223	0.00	240	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	1	1	12.00	56.96	1.30	18.42	96.94	79.49	1.00
	2	1	2.76	29.81	1.04	14.70	69.98	87.47	1.10
		2	2.76	29.60	1.24	17.63	69.54	105.00	1.32
	4	1	1.44	27.11	0.90	12.72	50.93	60.60	0.76
		2	1.44	32.39	3.30	46.88	77.56	284.65	3.57
		3	1.44	29.71	0.42	5.98	59.28	30.24	0.38
	6	1	2.40	38.39	4.31	61.18	85.44	345.18	4.33
		2	2.40	35.97	0.98	13.90	78.17	76.61	0.96
	8	1	24.85	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.22	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.95	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.25	0.02	0.27	1.91	5.28	0.07
	19	1	12.91	4.93	0.73	10.44	28.25	151.70	1.90
20	1	7.85	0.39	0.05	0.77	0.00	0.00	0.00	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))	Estimated blocking
08:00-09:00	1	1	0.00	2.93	17.39	16.87	0.00	0.00	
	2	1	0.00	3.12	4.00	78.07	0.00	0.00	
		2	0.00	4.00	4.00	99.97	0.00	0.00	
	4	1	0.00	2.02	2.00	101.00	0.00	0.00	
		2	0.00	11.12	2.09	532.98	0.00	0.00	
		3	0.00	0.93	2.00	46.65	0.00	48.00	
	6	1	0.00	12.91	3.48	371.03	0.00	0.00	
		2	0.00	2.64	3.00	88.05	0.00	0.00	
	8	1	0.00	0.00	36.02	0.00	0.00	133.00	
	9	1	0.00	0.00	62.63	0.00	0.00	103.00	
	10	1	0.00	0.00	60.80	0.00	0.00	9.00	
	11	1	0.00	0.00	60.64	0.00	0.00	13.00	
	18	1	0.00	0.32	27.79	1.16	0.00	6.00	
	19	1	0.00	7.27	18.71	38.88	0.00	161.00	
20	1	0.00	0.05	11.37	0.47	0.00	148.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	0.00	0.00	✓	2.93	0.13	2.84	1.00	0.00	19.42
	2	1	0.00	0.00	✓	3.12	0.03	3.12	1.00	0.00	15.80
		2	0.00	0.00	✓	4.00	0.03	3.76	1.00	0.00	18.94
	4	1	0.00	0.00	✓	2.02	0.02	2.02	1.00	0.00	13.48
		2	0.00	0.00	✓	11.12	0.31	6.48	1.00	0.00	50.45
		3	0.00	0.00	✓	0.93	0.01	0.93	1.00	0.00	6.36
	6	1	0.00	0.00	✓	12.91	0.45	10.55	1.00	0.00	65.51
		2	0.00	0.00	✓	2.64	0.06	2.64	1.00	0.00	14.86
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.32			1.00	0.00	0.33
	19	1	0.00	0.00	✓	7.27			1.00	0.00	12.34
20	1	0.00	0.00	✓	0.05			1.00	0.00	0.77	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
1	10/01/2022 15:39:28	10/01/2022 15:39:31	08:00	120	218.26	14.29	60.08	6/1	0	0	6/1	19/1	6/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	60	50	4109	2220	12.52	202.89	15.38	218.26

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
08:00-09:00	4109	4109	0		60		50	2220

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	18.76	12.52	14.29	202.89	29.84	1226.23	15.38

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)
08:00-09:00	532.98	0.00	621.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	0.00	0.00	✓	1.00	0.00	0.00	218.26

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	76.6	93.7	93.8
	2	112.2	0.0	110.9	110.8
	3	89.6	73.8	0.0	93.5
	4	89.8	73.9	91.0	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	12	112.17	12	112.17
6	2	4	28	110.80	28	110.80
10	1	4	125	93.84	125	93.84
11	2	3	42	110.91	42	110.91
12	4	1	98	89.82	98	89.82
16	1	2	18	76.63	18	76.63
17	1	3	133	93.73	133	93.73
18	4	2	27	73.88	27	73.88
19	4	3	377	90.98	377	90.98
20	3	1	119	89.60	119	89.60
21	3	4	367	93.51	367	93.51
22	3	2	51	73.84	51	73.84

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	D wei mu
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	
1	1			1	G	82	2050	22	0.00	40	125	68.96	56.96	96.94	2.93	
2	1			1	E	125	1644	79	0.00	23	299	32.57	29.81	69.98	3.12	
	2			1	F	151	2013	79	0.00	22	305	32.36	29.60	69.54	4.00	
4	1			1	A	119 <	2019	76	0.00	18	396	28.55	27.11	50.93	2.02 +	
	2			1	A	367 <	2105	76	0.00	54	68	33.83	32.39	77.56	11.12 +	
	3			1	B	51	1225	66	48.00	15	512	31.15	29.71	59.28	0.93	
6	1			1	C	404 <	2069	76	0.00	60	50	40.79	38.39	85.44	12.91 +	
	2			1	D	98	1226	66	0.00	28	219	38.37	35.97	78.17	2.64	
8	1					96	Unrestricted	240	133.00	0	Unrestricted	24.85	0.00	0.00	0.00	
9	1					229	Unrestricted	240	103.00	0	Unrestricted	43.22	0.00	0.00	0.00	
10	1					552	Unrestricted	240	9.00	0	Unrestricted	41.95	0.00	0.00	0.00	
11	1					520	Unrestricted	240	13.00	0	Unrestricted	41.84	0.00	0.00	0.00	
18	1					276	1800	240	6.00	16	472	19.42	0.25	1.91	0.32	
19	1					537	1800	240	161.00	38	139	17.84	4.93	28.25	7.27	
20	1					502	1800	240	148.00	28	223	8.23	0.39	0.00	0.05	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	642.41	35.70	17.99	14.29	202.89	15.38	0.00	218.26
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	642.41	35.70	17.99	14.29	202.89	15.38	0.00	218.26

- 1 < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- 1 * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- 1 ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- 1 + = average link/traffic stream excess queue is greater than 0
- 1 P.I. = PERFORMANCE INDEX

A2 - 2017 Base PM

D2 - 2017 Base PM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
2	10/01/2022 15:39:31	10/01/2022 15:39:36	15:00	120	235.24	15.42	69.68	4/2	0	0	4/2	19/1	4/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2017 Base PM		D2	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2017 Base PM				15:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2051	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2010	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2073	✓	✓	Normal	
8	1			✓	207.10						Normal	
9	1			✓	360.14						Normal	
10	1			✓	349.62						Normal	
11	1			✓	348.70						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connector turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	84	40.10		2051
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	93	62.68		2010
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	96.34		2073
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	240

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	137	137
2	1	177	177
	2	112	112
4	1	113	113
	2	440	440
	3	21	21
6	1	273	273
	2	107	107
8	1	38	38
9	1	242	242
10	1	432	432
11	1	668	668
18	1	289	289
19	1	574	574
20	1	380	380

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	24.85	30.00	✓	Nearside	33.17
9	1	1	4/1	9/1	43.22	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	41.95	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	24.85	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.22	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.95	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	24.85	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.22	30.00	✓	Offside	96.34
10	1	3	2/2	10/1	41.95	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2073	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	8	104	177
	2	22	0	64	51
	3	113	21	0	440
	4	107	9	264	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	22
	6		2	4	1/1, 11/1	Normal	51
	10		1	4	18/1, 2/1, 11/1	Normal	177
	11		2	3	1/1, 10/1	Normal	64
	12		4	1	20/1, 6/2, 9/1	Normal	107
	16		1	2	18/1, 2/2, 8/1	Normal	8
	17		1	3	18/1, 2/2, 10/1	Normal	104
	18		4	2	20/1, 6/1, 8/1	Normal	9
	19		4	3	20/1, 6/1, 10/1	Normal	264
	20		3	1	19/1, 4/1, 9/1	Normal	113
	21		3	4	19/1, 4/2, 11/1	Normal	440
	22		3	2	19/1, 4/3, 8/1	Normal	21

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	Manual	240

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown
	I	(untitled)	7	300	0	0	Cycle

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	H	1
	2	I	1
	3	A, C, I	1
	4	A, B, C, D	1
	5	B, D	1
	6	E, F	1
	7	G	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7	29, 45, 51, 80, 81, 121, 146, 154, 160, 189, 190, 238, 16

Intergreen Matrix for Controller Stream 1

		To								
		A	B	C	D	E	F	G	H	I
From	A					7	7	7	7	
	B						6	6	7	
	C						7	7	7	
	D					6	6	6	7	
	E	6			6			6	7	
	F	6	6	6	6			6	7	
	G	6	6	6	6	6	6		7	7
	H	15	15	15	15	15	15	15		15
	I							7	7	

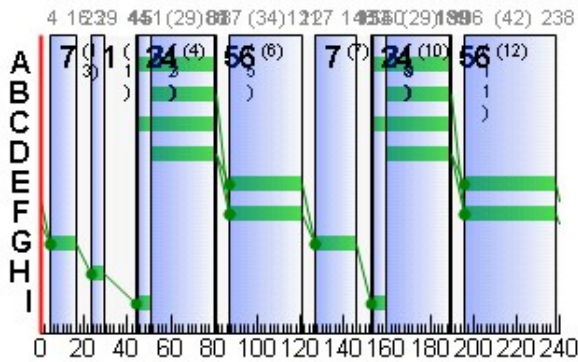
Banned Stage transitions for Controller Stream 1

		To						
		1	2	3	4	5	6	7
From	1							
	2							
	3							
	4							
	5							
	6							
	7							

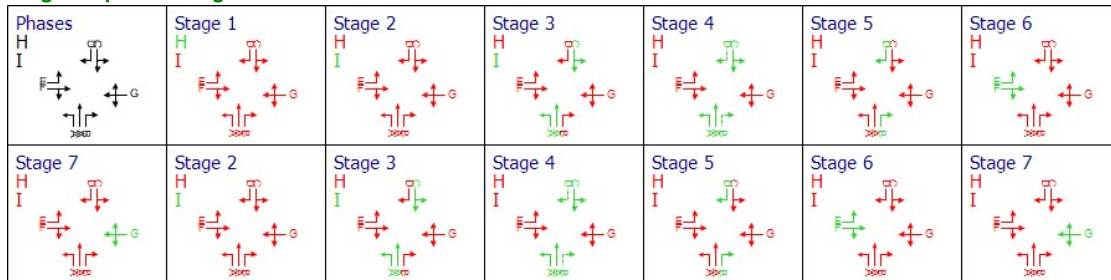
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	127	146	19	4	16	12
2	1		1	E	87	121	34	196	238	42
2	2		1	F	87	121	34	196	238	42
4	1		1	A	45	80	35	154	189	35
4	2		1	A	45	80	35	154	189	35
4	3		1	B	51	81	30	160	190	30
6	1		1	C	45	80	35	154	189	35
6	2		1	D	51	81	30	160	190	30

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
15:00-16:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)	
15:00-16:00	1	1	49	85	137	2051	31	53.99	4.68	26.91	29.18	1.64	30.82	
	2	1	33	172	177	1644	76	31.93	4.08	102.04	22.29	1.52	23.81	
		2	17	425	112	2010	76	29.47	2.55	63.72	13.02	0.93	13.94	
	4	1	19	382	113	2019	70	29.33	2.02	101.07	13.07	0.76	13.83	
		2	70	29	440	2105	70	39.79	15.45	740.52	69.05	5.02	74.07	
		3	7	1259	21	1227	60	30.96	0.40	19.90	2.56	0.15	2.72	
	6	1	44	105	273	2069	70	36.70	8.44	242.54	39.52	2.77	42.29	
		2	34	167	107	1228	60	39.65	3.06	101.92	16.73	1.10	17.84	
	8	1	0	Unrestricted	38	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	242	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	432	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	668	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	18	412	289	1800	240	0.89	1.46	5.27	1.01	0.31	1.32	
19	1	40	124	574	1800	240	5.32	8.43	45.04	12.04	2.08	14.12		
20	1	21	321	380	1800	240	0.30	0.35	3.04	0.44	0.04	0.49		

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s (per cycle))
15:00-16:00	1	1	137	137	0		2051	282	49		85	0.00	31
	2	1	177	177	0		1644	534	33		172	0.16	76
		2	112	112	0		2010	653	17		425	0.16	76
	4	1	113	113	0		2019	606	19		382	0.40	70
		2	440	440	0		2105	632	70		29	0.40	70
		3	21	21	0		1227	317	7		1259	0.40	60
	6	1	273	273	0		2069	621	44		105	0.02	70
		2	107	107	0		1228	317	34		167	0.02	60
	8	1	38	38	0		Unrestricted	Unrestricted	0		Unrestricted	0.96	240
	9	1	242	242	0		Unrestricted	Unrestricted	0		Unrestricted	0.95	240
	10	1	432	432	0		Unrestricted	Unrestricted	0		Unrestricted	0.55	240
	11	1	668	668	0		Unrestricted	Unrestricted	0		Unrestricted	0.61	240
	18	1	289	289	0		1800	1643	18		412	0.00	240
19	1	574	574	0		1800	1427	40		124	0.00	240	
20	1	380	380	0		1800	1778	21		321	0.00	240	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
15:00-16:00	1	1	12.00	53.99	2.05	29.18	95.60	130.97	1.64
	2	1	2.76	31.93	1.57	22.29	68.29	120.88	1.52
		2	2.76	29.47	0.92	13.02	66.01	73.93	0.93
	4	1	1.44	29.33	0.92	13.07	53.66	60.64	0.76
		2	1.44	39.79	4.86	69.05	90.92	400.05	5.02
		3	1.44	30.96	0.18	2.56	57.22	12.02	0.15
	6	1	2.40	36.70	2.78	39.52	80.84	220.68	2.77
		2	2.40	39.65	1.18	16.73	82.16	87.91	1.10
	8	1	24.85	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.22	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.95	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.89	0.07	1.01	8.55	24.70	0.31
19	1	12.91	5.32	0.85	12.04	28.89	165.85	2.08	
20	1	7.85	0.30	0.03	0.44	0.89	3.38	0.04	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)	Estimated blocking
15:00-16:00	1	1	0.00	4.68	17.39	26.91	0.00	0.00	
	2	1	0.00	4.08	4.00	102.04	0.00	0.00	
		2	0.00	2.55	4.00	63.72	0.00	5.00	
	4	1	0.00	2.02	2.00	101.07	0.00	0.00	
		2	0.00	15.45	2.09	740.52	0.00	0.00	
		3	0.00	0.40	2.00	19.90	0.00	44.00	
	6	1	0.00	8.44	3.48	242.54	0.00	0.00	
		2	0.00	3.06	3.00	101.92	0.00	0.00	
	8	1	0.00	0.00	36.02	0.00	0.00	195.00	
	9	1	0.00	0.00	62.63	0.00	0.00	86.00	
	10	1	0.00	0.00	60.80	0.00	0.00	8.00	
	11	1	0.00	0.00	60.64	0.00	0.00	10.00	
	18	1	0.00	1.46	27.79	5.27	0.00	20.91	
19	1	0.00	8.43	18.71	45.04	0.00	192.00		
20	1	0.00	0.35	11.37	3.04	0.00	107.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
15:00-16:00	1	1	0.00	0.00	✓	4.68	0.23	4.41	1.00	0.00	30.82
	2	1	0.00	0.00	✓	4.08	0.08	4.08	1.00	0.00	23.81
		2	0.00	0.00	✓	2.55	0.02	2.55	1.00	0.00	13.94
	4	1	0.00	0.00	✓	2.02	0.02	2.02	1.00	0.00	13.83
		2	0.00	0.00	✓	15.46	0.79	8.58	1.00	0.00	74.07
		3	0.00	0.00	✓	0.40	0.00	0.40	1.00	0.00	2.72
	6	1	0.00	0.00	✓	8.44	0.17	7.38	1.00	0.00	42.29
		2	0.00	0.00	✓	3.06	0.09	3.06	1.00	0.00	17.84
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	1.46			1.00	0.00	1.32
19	1	0.00	0.00	✓	8.43			1.00	0.00	14.12	
20	1	0.00	0.00	✓	0.35			1.00	0.00	0.49	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
2	10/01/2022 15:39:31	10/01/2022 15:39:36	15:00	120	235.24	15.42	69.68	4/2	0	0	4/2	19/1	4/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
15:00-16:00	70	29	4003	2193	13.87	218.93	16.31	235.24

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
15:00-16:00	4003	4003	0		70		29	2193

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
15:00-16:00	19.38	13.87	15.42	218.93	32.50	1301.00	16.31

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)
15:00-16:00	740.52	0.00	667.91

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
15:00-16:00	0.00	0.00	✓	1.00	0.00	0.00	235.24

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	77.1	94.2	96.6
	2	109.2	0.0	107.9	107.8
	3	92.2	75.5	0.0	101.3
	4	93.4	72.1	89.2	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	22	109.21	22	109.21
6	2	4	51	107.84	51	107.84
10	1	4	177	96.59	177	96.59
11	2	3	64	107.95	64	107.95
12	4	1	107	93.41	107	93.41
16	1	2	8	77.14	8	77.14
17	1	3	104	94.25	104	94.25
18	4	2	9	72.10	9	72.10
19	4	3	264	89.20	264	89.20
20	3	1	113	92.21	113	92.21
21	3	4	440	101.30	440	101.30
22	3	2	21	75.48	21	75.48

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	D wei mu
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	
1	1			1	G	137	2051	31	0.00	49	85	65.99	53.99	95.60	4.68	
2	1			1	E	177 <	1644	76	0.00	33	172	34.69	31.93	68.29	4.08 +	
	2			1	F	112	2010	76	5.00	17	425	32.23	29.47	66.01	2.55	
4	1			1	A	113 <	2019	70	0.00	19	382	30.77	29.33	53.66	2.02 +	
	2			1	A	440 <	2105	70	0.00	70	29	41.23	39.79	90.92	15.45 +	
	3			1	B	21	1227	60	44.00	7	1259	32.40	30.96	57.22	0.40	
6	1			1	C	273 <	2069	70	0.00	44	105	39.10	36.70	80.84	8.44 +	
	2			1	D	107 <	1228	60	0.00	34	167	42.05	39.65	82.16	3.06 +	
8	1					38	Unrestricted	240	195.00	0	Unrestricted	24.85	0.00	0.00	0.00	
9	1					242	Unrestricted	240	86.00	0	Unrestricted	43.22	0.00	0.00	0.00	
10	1					432	Unrestricted	240	8.00	0	Unrestricted	41.95	0.00	0.00	0.00	
11	1					668	Unrestricted	240	10.00	0	Unrestricted	41.84	0.00	0.00	0.00	
18	1					289	1800	240	20.91	18	412	20.06	0.89	8.55	1.46	
19	1					574	1800	240	192.00	40	124	18.23	5.32	28.89	8.43	
20	1					380	1800	240	107.00	21	321	8.14	0.30	0.89	0.35	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	646.61	36.97	17.49	15.42	218.93	16.31	0.00	235.24
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	646.61	36.97	17.49	15.42	218.93	16.31	0.00	235.24

- 1 < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- 1 * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- 1 ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- 1 + = average link/traffic stream excess queue is greater than 0
- 1 P.I. = PERFORMANCE INDEX

A3 - 2020 7-8 AM

D3 - 2020 6-7 AM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
3	10/01/2022 15:39:36	10/01/2022 15:39:40	06:00	120	818.94	55.54	105.07	19/1	1	7	4/2	19/1	19/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 7-8 AM		D3	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 6-7 AM				06:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2051	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2010	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2073	✓	✓	Normal	
8	1			✓	207.10						Normal	
9	1			✓	360.14						Normal	
10	1			✓	349.62						Normal	
11	1			✓	348.70						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connector turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	84	40.10		2051
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	93	62.68		2010
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	96.34		2073
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	240

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	119	119
2	1	175	175
	2	111	111
4	1	157	157
	2	609	609
	3	119	119
6	1	190	190
	2	135	135
8	1	133	133
9	1	311	311
10	1	343	343
11	1	828	828
18	1	286	286
19	1	885	885
20	1	325	325

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	24.85	30.00	✓	Nearside	33.17
9	1	1	4/1	9/1	43.22	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	41.95	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	24.85	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.22	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.95	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	24.85	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.22	30.00	✓	Offside	96.34
10	1	3	2/2	10/1	41.95	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2073	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	8	103	175
	2	19	0	56	44
	3	157	119	0	609
	4	135	6	184	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	19
	6		2	4	1/1, 11/1	Normal	44
	10		1	4	18/1, 2/1, 11/1	Normal	175
	11		2	3	1/1, 10/1	Normal	56
	12		4	1	20/1, 6/2, 9/1	Normal	135
	16		1	2	18/1, 2/2, 8/1	Normal	8
	17		1	3	18/1, 2/2, 10/1	Normal	103
	18		4	2	20/1, 6/1, 8/1	Normal	6
	19		4	3	20/1, 6/1, 10/1	Normal	184
	20		3	1	19/1, 4/1, 9/1	Normal	157
	21		3	4	19/1, 4/2, 11/1	Normal	609
	22		3	2	19/1, 4/3, 8/1	Normal	119

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	Manual	240

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown
	I	(untitled)	7	300	0	0	Cycle

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	H	1
	2	I	1
	3	A, C, I	1
	4	A, B, C, D	1
	5	B, D	1
	6	E, F	1
	7	G	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7	35, 51, 57, 86, 91, 129, 146, 154, 160, 193, 210, 2, 22

Intergreen Matrix for Controller Stream 1

		To								
		A	B	C	D	E	F	G	H	I
From	A					7	7	7	7	
	B						6	6	7	
	C						7	7	7	
	D					6	6	6	7	
	E	6			6			6	7	
	F	6	6	6	6			6	7	
	G	6	6	6	6	6	6		7	7
	H	15	15	15	15	15	15	15		15
	I							7	7	

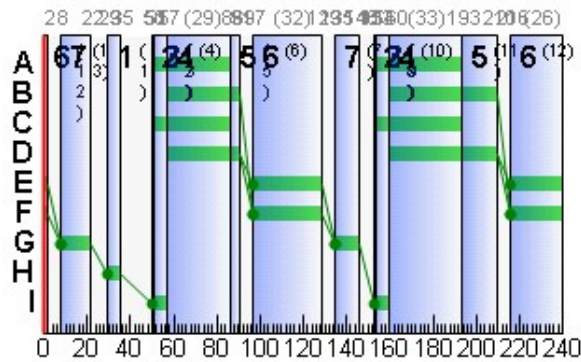
Banned Stage transitions for Controller Stream 1

		To						
		1	2	3	4	5	6	7
From	1							
	2							
	3							
	4							
	5							
	6							
	7							

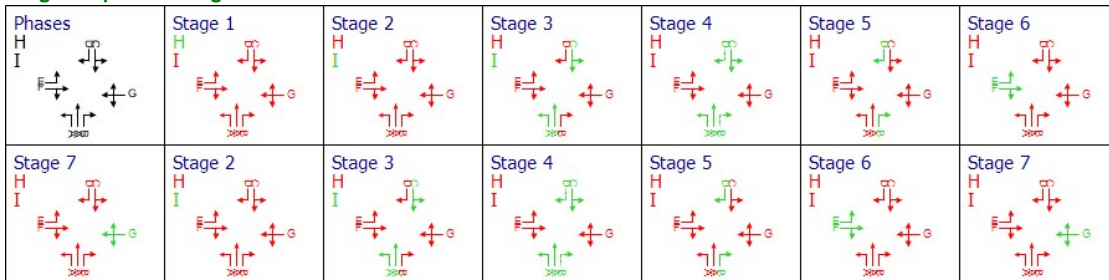
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	135	146	11	8	22	14
2	1		1	E	97	129	32	216	2	26
2	2		1	F	97	129	32	216	2	26
4	1		1	A	51	86	35	154	193	39
4	2		1	A	51	86	35	154	193	39
4	3		1	B	57	91	34	160	210	50
6	1		1	C	51	86	35	154	193	39
6	2		1	D	57	91	34	160	210	50

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
06:00-07:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
06:00-07:00	1	1	52	75	119	2051	25	58.51	4.17	23.99	27.46	1.48	28.95
	2	1	43	111	175	1644	58	39.75	4.16	103.93	27.44	1.58	29.01
		2	22	307	111	2010	58	36.09	2.57	64.21	15.80	0.97	16.77
	4	1	23	285	149	2019	74	29.99	2.04	101.81	17.68	0.77	18.44
		2	87	4	580	2105	74	49.41	17.53	839.78	112.97	6.15	119.11
		3	22	303	113	1416	84	14.89	1.32	66.09	6.65	0.38	7.03
	6	1	29	210	190	2069	74	32.82	5.18	148.88	24.60	1.70	26.30
		2	26	240	135	1423	84	29.25	3.05	101.58	15.58	1.21	16.78
	8	1	0	Unrestricted	127	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	303	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	343	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	799	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	18	387	286	1800	240	1.69	1.93	6.94	1.91	0.53	2.45
19	1	105	-14	885	1800	240	154.12	84.42	451.21	538.01	15.31	553.32	
20	1	19	378	325	1800	240	0.48	1.11	9.72	0.62	0.17	0.79	

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s (per cycle))
06:00-07:00	1	1	119	119	0		2051	231	52		75	0.00	25
	2	1	175	175	0		1644	411	43		111	0.26	58
		2	111	111	0		2010	503	22		307	0.26	58
	4	1	149	149	8	✓	2019	639	23		285	1.05	74
		2	580	580	29	✓	2105	667	87		4	1.05	74
		3	113	113	6	✓	1416	507	22		303	1.05	84
	6	1	190	190	0		2069	655	29		210	0.08	74
		2	135	135	0		1423	510	26		240	0.08	84
	8	1	127	127	6	✓	Unrestricted	Unrestricted	0		Unrestricted	0.94	240
	9	1	303	303	8	✓	Unrestricted	Unrestricted	0		Unrestricted	0.88	240
	10	1	343	343	0		Unrestricted	Unrestricted	0		Unrestricted	0.51	240
	11	1	799	799	29	✓	Unrestricted	Unrestricted	0		Unrestricted	0.60	240
	18	1	286	286	0		1800	1546	18		387	0.00	240
19	1	885	842	0		1800	842	105	✓	-14	0.00	240	
20	1	325	325	0		1800	1725	19		378	0.00	240	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
06:00-07:00	1	1	12.00	58.51	1.93	27.46	99.42	118.30	1.48
	2	1	2.76	39.75	1.93	27.44	71.83	125.71	1.58
		2	2.76	36.09	1.11	15.80	69.41	77.04	0.97
	4	1	1.44	29.99	1.24	17.68	40.88	61.09	0.77
		2	1.44	49.41	7.96	112.97	84.60	490.35	6.15
		3	1.44	14.89	0.47	6.65	26.87	30.43	0.38
	6	1	2.40	32.82	1.73	24.60	71.26	135.40	1.70
		2	2.40	29.25	1.10	15.58	71.37	96.35	1.21
	8	1	24.85	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.22	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.95	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	1.69	0.13	1.91	14.89	42.57	0.53
	19	1	12.91	154.12	37.89	538.01	144.96	1220.94	15.31
20	1	7.85	0.48	0.04	0.62	4.16	13.53	0.17	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)	Estimated blocking
06:00-07:00	1	1	0.00	4.17	17.39	23.99	0.00	0.00	
	2	1	0.00	4.16	4.00	103.93	0.00	0.00	
		2	0.00	2.57	4.00	64.21	0.00	6.00	
	4	1	0.00	2.04	2.00	101.81	0.00	0.00	
		2	0.00	17.53	2.09	839.78	0.00	0.00	
		3	0.00	1.32	2.00	66.09	0.00	0.00	
	6	1	0.00	5.18	3.48	148.88	0.00	0.00	
		2	0.00	3.05	3.00	101.58	0.00	0.00	
	8	1	0.00	0.00	36.02	0.00	0.00	119.00	
	9	1	0.00	0.00	62.63	0.00	0.00	67.00	
	10	1	0.00	0.00	60.80	0.00	0.00	17.00	
	11	1	0.00	0.00	60.64	0.00	0.00	11.00	
	18	1	0.00	1.93	27.79	6.94	0.00	34.00	
	19	1	0.00	84.42	18.71	451.21	0.00	240.00	
20	1	0.00	1.11	11.37	9.72	0.00	50.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
06:00-07:00	1	1	0.00	0.00	✓	4.17	0.27	3.97	1.00	0.00	28.95
	2	1	0.00	0.00	✓	4.16	0.16	4.16	1.00	0.00	29.01
		2	0.00	0.00	✓	2.57	0.03	2.57	1.00	0.00	16.77
	4	1	0.00	0.00	✓	2.04	0.04	2.04	1.00	0.00	18.44
		2	0.00	0.00	✓	17.63	2.78	10.54	1.00	0.00	119.11
		3	0.00	0.00	✓	1.32	0.03	1.32	1.00	0.00	7.03
	6	1	0.00	0.00	✓	5.18	0.06	5.16	1.00	0.00	26.30
		2	0.00	0.00	✓	3.05	0.05	3.05	1.00	0.00	16.78
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	1.93			1.00	0.00	2.45
	19	1	0.00	0.00	✓	106.76			1.00	0.00	553.32
20	1	0.00	0.00	✓	1.11			1.00	0.00	0.79	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
3	10/01/2022 15:39:36	10/01/2022 15:39:40	06:00	120	818.94	55.54	105.07	19/1	1	7	4/2	19/1	19/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
06:00-07:00	105	-14	4641	2211	43.09	788.70	30.24	818.94

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
06:00-07:00	4641	4598	85	✓	105	✓	-14	2211

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
06:00-07:00	18.91	43.09	55.54	788.70	53.30	2411.72	30.24

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)
06:00-07:00	839.78	0.00	544.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
06:00-07:00	0.00	0.00	✓	1.00	0.00	0.00	818.94

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	84.6	101.7	105.2
	2	113.7	0.0	112.5	112.4
	3	241.7	208.2	0.0	259.7
	4	83.2	68.4	85.5	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	19	113.72	19	113.72
6	2	4	44	112.35	44	112.35
10	1	4	175	105.22	175	105.22
11	2	3	56	112.46	56	112.46
12	4	1	135	83.20	135	83.20
16	1	2	8	84.57	8	84.57
17	1	3	103	101.67	103	101.67
18	4	2	6	68.40	6	68.40
19	4	3	184	85.51	184	85.51
20	3	1	157	241.68	157	241.68
21	3	4	609	259.73	609	259.73
22	3	2	119	208.21	119	208.21

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	w	m
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)		
1	1			1	G	119	2051	25	0.00	52	75	70.51	58.51	99.42	4.17		
2	1			1	E	175 <	1644	58	0.00	43	111	42.51	39.75	71.83	4.16 +		
	2			1	F	111	2010	58	6.00	22	307	38.85	36.09	69.41	2.57		
4	1			1	A	149 <	2019	74	0.00	23	285	31.43	29.99	40.88	2.04 +		
	2			1	A	580 <	2105	74	0.00	87	4	50.85	49.41	84.60	17.53 +		
	3			1	B	113	1416	84	0.00	22	303	16.33	14.89	26.87	1.32		
6	1			1	C	190 <	2069	74	0.00	29	210	35.22	32.82	71.26	5.18 +		
	2			1	D	135 <	1423	84	0.00	26	240	31.65	29.25	71.37	3.05 +		
8	1					127	Unrestricted	240	119.00	0	Unrestricted	24.85	0.00	0.00	0.00		
10	1					343	Unrestricted	240	17.00	0	Unrestricted	41.95	0.00	0.00	0.00		
11	1					799	Unrestricted	240	11.00	0	Unrestricted	41.84	0.00	0.00	0.00		
18	1					286	1800	240	34.00	18	387	20.87	1.69	14.89	1.93		
19	1					885 <	1800	240	240.00	105	-14	167.03	154.12	144.96	84.42 +		
20	1					325	1800	240	50.00	19	378	8.33	0.48	4.16	1.11		

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	731.27	79.92	9.15	55.54	788.70	30.24	0.00	818.94
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	731.27	79.92	9.15	55.54	788.70	30.24	0.00	818.94

- 1 < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- 1 * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- 1 ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- 1 + = average link/traffic stream excess queue is greater than 0
- 1 P.I. = PERFORMANCE INDEX

A4 - 2020 4-5 PM

D4 - 2020 4-5 PM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
4	10/01/2022 15:39:44	10/01/2022 15:39:48	16:00	120	231.06	15.12	74.91	6/1	0	0	6/1	20/1	6/1

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 4-5 PM		D4	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 4-5 PM				16:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2077	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2012	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2073	✓	✓	Normal	
8	1			✓	207.10						Normal	
9	1			✓	360.14						Normal	
10	1			✓	349.62						Normal	
11	1			✓	348.70						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connector turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	49	40.10		2077
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	89	62.68		2012
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	96.34		2073
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	240

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	86	86
2	1	66	66
	2	79	79
4	1	97	97
	2	298	298
	3	145	145
6	1	607	607
	2	160	160
8	1	195	195
9	1	301	301
10	1	649	649
11	1	393	393
18	1	145	145
19	1	540	540
20	1	767	767

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	24.85	30.00	✓	Nearside	33.17
9	1	1	4/1	9/1	43.22	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	41.95	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	24.85	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.22	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.95	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	24.85	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.22	30.00	✓	Offside	96.34
10	1	3	2/2	10/1	41.95	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2073	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	9	70	66
	2	44	0	13	29
	3	97	145	0	298
	4	160	41	566	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	44
	6		2	4	1/1, 11/1	Normal	29
	10		1	4	18/1, 2/1, 11/1	Normal	66
	11		2	3	1/1, 10/1	Normal	13
	12		4	1	20/1, 6/2, 9/1	Normal	160
	16		1	2	18/1, 2/2, 8/1	Normal	9
	17		1	3	18/1, 2/2, 10/1	Normal	70
	18		4	2	20/1, 6/1, 8/1	Normal	41
	19		4	3	20/1, 6/1, 10/1	Normal	566
	20		3	1	19/1, 4/1, 9/1	Normal	97
	21		3	4	19/1, 4/2, 11/1	Normal	298
	22		3	2	19/1, 4/3, 8/1	Normal	145

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	Manual	240

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown
	I	(untitled)	7	300	0	0	Cycle

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	H	1
	2	I	1
	3	A, C, I	1
	4	A, B, C, D	1
	5	B, D	1
	6	E, F	1
	7	G	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7	35, 51, 57, 97, 109, 128, 146, 154, 160, 200, 219, 5, 22

Intergreen Matrix for Controller Stream 1

		To								
		A	B	C	D	E	F	G	H	I
From	A					7	7	7	7	
	B						6	6	7	
	C						7	7	7	
	D					6	6	6	7	
	E	6			6			6	7	
	F	6	6	6	6			6	7	
	G	6	6	6	6	6	6		7	7
	H	15	15	15	15	15	15	15		15
	I							7	7	

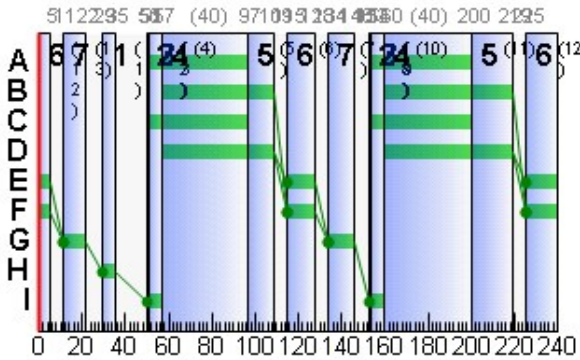
Banned Stage transitions for Controller Stream 1

		To						
		1	2	3	4	5	6	7
From	1							
	2							
	3							
	4							
	5							
	6							
	7							

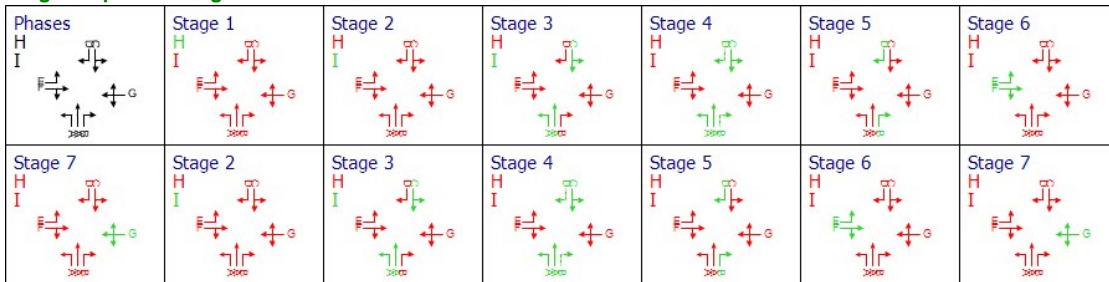
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	134	146	12	11	22	11
2	1		1	E	115	128	13	225	5	20
2	2		1	F	115	128	13	225	5	20
4	1		1	A	51	97	46	154	200	46
4	2		1	A	51	97	46	154	200	46
4	3		1	B	57	109	52	160	219	59
6	1		1	C	51	97	46	154	200	46
6	2		1	D	57	109	52	160	219	59

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
16:00-17:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)	
16:00-17:00	1	1	40	126	86	2077	23	55.75	2.88	16.54	18.91	1.04	19.95	
	2	1	28	227	66	1644	33	48.64	2.05	51.26	12.66	0.74	13.40	
		2	27	234	79	2012	33	48.01	2.52	63.09	14.96	0.88	15.84	
	4	1	12	634	97	2019	92	23.59	1.86	92.92	9.03	0.64	9.66	
		2	36	149	298	2105	92	26.15	6.24	298.76	30.74	2.11	32.85	
		3	22	318	145	1432	111	18.19	2.03	101.47	10.40	0.89	11.30	
	6	1	75	20	607	2069	92	39.01	22.51	647.21	93.40	6.81	100.21	
		2	24	281	160	1439	111	20.47	3.04	101.21	12.92	1.15	14.07	
	8	1	0	Unrestricted	195	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	301	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	649	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	393	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	8	1008	145	1800	240	0.10	0.04	0.16	0.06	0.01	0.01	0.07
	19	1	35	156	540	1800	240	3.30	6.39	34.18	7.04	1.28	8.31	
20	1	45	99	767	1800	240	1.50	5.09	44.72	4.55	0.84	5.39		

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s per cycle)
16:00-17:00	1	1	86	86	0		2077	216	40		126	0.00	23
	2	1	66	66	0		1644	240	28		227	0.01	33
		2	79	79	0		2012	293	27		234	0.01	33
	4	1	97	97	0		2019	791	12		634	0.28	92
		2	298	298	0		2105	824	36		149	0.28	92
		3	145	145	0		1432	674	22		318	0.28	111
	6	1	607	607	0		2069	810	75		20	0.10	92
		2	160	160	0		1439	678	24		281	0.10	111
	8	1	195	195	0		Unrestricted	Unrestricted	0		Unrestricted	0.88	240
	9	1	301	301	0		Unrestricted	Unrestricted	0		Unrestricted	0.63	240
	10	1	649	649	0		Unrestricted	Unrestricted	0		Unrestricted	0.74	240
	11	1	393	393	0		Unrestricted	Unrestricted	0		Unrestricted	0.62	240
	18	1	145	145	0		1800	1785	8		1008	0.00	240
	19	1	540	540	0		1800	1539	35		156	0.00	240
20	1	767	767	0		1800	1698	45		99	0.00	240	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
16:00-17:00	1	1	12.00	55.75	1.33	18.91	96.42	82.92	1.04
	2	1	2.76	48.64	0.89	12.66	89.51	59.07	0.74
		2	2.76	48.01	1.05	14.96	88.99	70.30	0.88
	4	1	1.44	23.59	0.64	9.03	52.38	50.81	0.64
		2	1.44	26.15	2.16	30.74	56.47	168.28	2.11
		3	1.44	18.19	0.73	10.40	49.11	71.20	0.89
	6	1	2.40	39.01	6.58	93.40	89.51	543.32	6.81
		2	2.40	20.47	0.91	12.92	57.45	91.92	1.15
	8	1	24.85	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.22	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.95	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.10	0.00	0.06	0.53	0.77	0.01
19	1	12.91	3.30	0.50	7.04	18.89	102.00	1.28	
20	1	7.85	1.50	0.32	4.55	8.72	66.87	0.84	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s (per cycle))	Estimated blocking
16:00-17:00	1	1	0.00	2.88	17.39	16.54	0.00	0.00	
	2	1	0.00	2.05	4.00	51.26	0.00	0.00	
		2	0.00	2.52	4.00	63.09	0.00	0.00	
	4	1	0.00	1.86	2.00	92.92	0.00	7.00	
		2	0.00	6.24	2.09	298.76	0.00	0.00	
		3	0.00	2.03	2.00	101.47	0.00	0.00	
	6	1	0.00	22.51	3.48	647.21	0.00	0.00	
		2	0.00	3.04	3.00	101.21	0.00	0.00	
	8	1	0.00	0.00	36.02	0.00	0.00	92.00	
	9	1	0.00	0.00	62.63	0.00	0.00	38.00	
	10	1	0.00	0.00	60.80	0.00	0.00	22.00	
	11	1	0.00	0.00	60.64	0.00	0.00	19.00	
	18	1	0.00	0.04	27.79	0.16	0.00	2.00	
19	1	0.00	6.39	18.71	34.18	0.00	119.00		
20	1	0.00	5.09	11.37	44.72	0.00	178.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
16:00-17:00	1	1	0.00	0.00	✓	2.88	0.13	2.78	1.00	0.00	19.95
	2	1	0.00	0.00	✓	2.05	0.05	2.05	1.00	0.00	13.40
		2	0.00	0.00	✓	2.52	0.05	2.44	1.00	0.00	15.84
	4	1	0.00	0.00	✓	1.86	0.01	1.86	1.00	0.00	9.66
		2	0.00	0.00	✓	6.24	0.10	5.79	1.00	0.00	32.85
		3	0.00	0.00	✓	2.03	0.03	2.03	1.00	0.00	11.30
	6	1	0.00	0.00	✓	22.52	1.11	15.69	1.00	0.00	100.21
		2	0.00	0.00	✓	3.04	0.04	3.04	1.00	0.00	14.07
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.04			1.00	0.00	0.07
19	1	0.00	0.00	✓	6.39			1.00	0.00	8.31	
20	1	0.00	0.00	✓	5.09			1.00	0.00	5.39	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
4	10/01/2022 15:39:44	10/01/2022 15:39:48	16:00	120	231.06	15.12	74.91	6/1	0	0	6/1	20/1	6/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
16:00-17:00	75	20	4528	2267	12.02	214.67	16.39	231.06

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
16:00-17:00	4528	4528	0		75		20	2267

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
16:00-17:00	17.97	12.02	15.12	214.67	28.88	1307.47	16.39

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)
16:00-17:00	647.21	0.00	477.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
16:00-17:00	0.00	0.00	✓	1.00	0.00	0.00	231.06

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

	To				
	1	2	3	4	
From	1	0.0	94.9	112.0	112.5
	2	111.0	0.0	109.7	109.6
	3	84.5	60.7	0.0	85.7
	4	75.4	75.6	92.7	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	44	110.97	44	110.97
6	2	4	29	109.59	29	109.59
10	1	4	66	112.52	66	112.52
11	2	3	13	109.70	13	109.70
12	4	1	160	75.44	160	75.44
16	1	2	9	94.90	9	94.90
17	1	3	70	112.00	70	112.00
18	4	2	41	75.61	41	75.61
19	4	3	566	92.72	566	92.72
20	3	1	97	84.46	97	84.46
21	3	4	298	85.65	298	85.65
22	3	2	145	60.70	145	60.70

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	D wei mu
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	
1	1			1	G	86	2077	23	0.00	40	126	67.75	55.75	96.42	2.88	
2	1			1	E	66	1644	33	0.00	28	227	51.40	48.64	89.51	2.05	
	2			1	F	79	2012	33	0.00	27	234	50.77	48.01	88.99	2.52	
4	1			1	A	97	2019	92	7.00	12	634	25.03	23.59	52.38	1.86	
	2			1	A	298 <	2105	92	0.00	36	149	27.59	26.15	56.47	6.24 +	
	3			1	B	145 <	1432	111	0.00	22	318	19.63	18.19	49.11	2.03 +	
6	1			1	C	607 <	2069	92	0.00	75	20	41.41	39.01	89.51	22.51 +	
	2			1	D	160 <	1439	111	0.00	24	281	22.87	20.47	57.45	3.04 +	
8	1					195	Unrestricted	240	92.00	0	Unrestricted	24.85	0.00	0.00	0.00	
9	1					301	Unrestricted	240	38.00	0	Unrestricted	43.22	0.00	0.00	0.00	
10	1					649	Unrestricted	240	22.00	0	Unrestricted	41.95	0.00	0.00	0.00	
11	1					393	Unrestricted	240	19.00	0	Unrestricted	41.84	0.00	0.00	0.00	
18	1					145	1800	240	2.00	8	1008	19.27	0.10	0.53	0.04	
19	1					540	1800	240	119.00	35	156	16.21	3.30	18.89	6.39	
20	1					767	1800	240	178.00	45	99	9.35	1.50	8.72	5.09	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	677.91	37.71	17.97	15.12	214.67	16.39	0.00	231.06
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	677.91	37.71	17.97	15.12	214.67	16.39	0.00	231.06

- 1 < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- 1 * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- 1 ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- 1 + = average link/traffic stream excess queue is greater than 0
- 1 P.I. = PERFORMANCE INDEX

A5 - 2020 8-9 AM

D5 - 2020 8-9 AM*

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
5	10/01/2022 15:39:40	10/01/2022 15:39:44	08:00	120	275.61	18.01	72.72	19/1	0	0	4/2	19/1	19/1

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
2020 8-9 AM		D5	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2020 8-9 AM				08:00	

Network Options

Network timings

Network cycle time (s)	Restrict to SCOOT cycle times	Time segment length (min)	Number of time segments	Modelled time period (min)
120		60	1	60

Signals options

Start displacement (s)	End displacement (s)
2	3

Advanced

Phase minimum broken penalty (£)	Phase maximum broken penalty (£)	Intergreen broken penalty (£)	Starting Red-with-Amber (s)
10000.00	10000.00	10000.00	2

Traffic options

Traffic model	Vehicle flow scaling factor (%)	Pedestrian flow scaling factor (%)	Cruise times or speeds
Platoon Dispersion (PDM)	100	100	Cruise Speeds

Advanced

Resolution	DOS Threshold (%)	Cruise scaling factor (%)	Use link stop weightings	Use link delay weightings	Exclude pedestrians from results calculation	Random delay mode	Type of Vehicle-in-Service	Type of random parameter	PCU Length (m)	Calculate results for Path Segments	Generate PDM Profile Data
1	90	100	✓	✓		Complex	Uniform (TRANSYT)	Uniform (TRANSYT)	5.75		✓

Normal Traffic parameters

Dispersion type	Dispersion coefficient	Travel time coefficient
Default	35	80

Normal Traffic Types

Name	PCU Factor
Normal	1.00

Bus parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Bus	1.00	Default	0.94	30	85

Tram parameters

Name	PCU Factor	Dispersion type	Acceleration (ms ^{^-2})	Stationary time coefficient	Cruise time coefficient
Tram	1.00	Default	0.94	100	100

Pedestrian parameters

Dispersion type
Default

Optimisation options

Enable optimisation	Auto redistribute	Optimisation level	Enable OUT Profile accuracy
✓	✓	Offsets And Green Splits	✓

Advanced

Optimisation type	Hill climb increments	OUTProfile accuracy	Use enhanced optimisation	Auto optimisation order	Optimisation order	Master controller	Offsets relative to master controller	Master controller offset after each run
Hill Climb (Fast)	15, 40, -1, 15, 40, 1, -1, 1	50, 50, 5, 5, 0.5, 0.5, 0.05, 0.05		✓	1			Do nothing

Economics

Vehicle Monetary Value Of Delay (£ per PCU-hr)	Vehicle Monetary Value Of Stops (£ per 100 stops)	Pedestrian monetary value of delay (£ per Ped-hr)
14.20	2.60	14.20

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
(ALL)			

Traffic Streams

Arm	Traffic Stream	Name	Description	Auto length	Length (m)	Has Saturation Flow	Saturation flow source	Saturation flow (PCU/hr)	Is signal controlled	Is give way	Traffic type	Allow Nearside Turn On Red
1	1			✓	100.00	✓	Sum of lanes	2051	✓		Normal	
2	1				23.00	✓	Sum of lanes	1644	✓		Normal	
	2				23.00	✓	Sum of lanes	2010	✓		Normal	
4	1				12.00	✓	Sum of lanes	2019	✓		Normal	
	2				12.00	✓	Sum of lanes	2105	✓		Normal	
	3				12.00	✓	Sum of lanes	2044	✓	✓	Normal	
6	1				20.00	✓	Sum of lanes	2069	✓		Normal	
	2				20.00	✓	Sum of lanes	2073	✓	✓	Normal	
8	1			✓	207.10						Normal	
9	1			✓	360.14						Normal	
10	1			✓	349.62						Normal	
11	1			✓	348.70						Normal	
18	1			✓	159.81	✓	Sum of lanes	1800			Normal	
19	1			✓	107.58	✓	Sum of lanes	1800			Normal	
20	1			✓	65.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Surface condition	Site quality factor	Gradient (%)	Width (m)	Use connector turning radius	Proportion that turn (%)	Turning radius (m)	Nearside lane	Saturation flow (PCU/hr)
1	1	1	(untitled)		✓	N/A	N/A	0	3.60	✓	83	40.10		2051
2	1	2	(untitled)		✓	N/A	N/A	0	3.00		100	6.00		1644
	2	1	(untitled)		✓	N/A	N/A	0	3.00	✓	93	62.68		2010
4	1	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	35.42		2019
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	0	99999.00		2105
	3	1	(untitled)		✓	N/A	N/A	0	3.50		24	12.00		2044
6	1	1	(untitled)		✓	N/A	N/A	0	3.50		7	6.00		2069
	2	2	(untitled)		✓	N/A	N/A	0	3.50	✓	100	96.34		2073
8	1	1	(untitled)											
9	1	1	(untitled)											
10	1	1	(untitled)											
11	1	1	(untitled)											
18	1	1	(untitled)											1800
19	1	1	(untitled)											1800
20	1	1	(untitled)											1800

Modelling

Arm	Traffic Stream	Traffic model	Stop weighting multiplier (%)	Delay weighting multiplier (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (PCU)	Has queue limit	Has degree of saturation limit
1	1	NetworkDefault	100	100	100		0.00		
2	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
4	1	Flare	100	100	100		0.00		
	2	NetworkDefault	100	100	100		0.00		
	3	Flare	100	100	100		0.00		
6	1	NetworkDefault	100	100	100		0.00		
	2	Flare	100	100	100		0.00		
8	1	NetworkDefault	100	100	100		0.00		
9	1	NetworkDefault	100	100	100		0.00		
10	1	NetworkDefault	100	100	100		0.00		
11	1	NetworkDefault	100	100	100		0.00		
18	1	NetworkDefault	100	100	100		0.00		
19	1	NetworkDefault	100	100	100		0.00		
20	1	NetworkDefault	100	100	100		0.00		

Modelling - Advanced

Arm	Traffic Stream	Initial queue (PCU)	Type of Vehicle-in-Service	Vehicle-in-Service	Type of random parameter	Random parameter	Auto cycle time	Cycle time
(ALL)	(ALL)	0.00	NetworkDefault	Not-Included	NetworkDefault	0.50	✓	240

Normal traffic - Modelling

Arm	Traffic Stream	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	100	100

Normal traffic - Advanced

Arm	Traffic Stream	Dispersion type for Normal Traffic
(ALL)	(ALL)	NetworkDefault

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)
1	1	103	103
2	1	119	119
	2	75	75
4	1	142	142
	2	551	551
	3	194	194
6	1	253	253
	2	115	115
8	1	207	207
9	1	274	274
10	1	363	363
11	1	708	708
18	1	194	194
19	1	887	887
20	1	368	368

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
1	1	1	G	
2	1	1	E	
	2	1	F	
4	1	1	A	
	2	1	A	
	3	1	B	
6	1	1	C	
	2	1	D	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
1	1	12.00	30.00
18	1	19.18	30.00
19	1	12.91	30.00
20	1	7.85	30.00

Sources

Arm	Traffic Stream	Source	Source traffic stream	Destination traffic stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
2	1	1	18/1	2/1	2.76	30.00	✓	Straight	Straight Movement
	2	1	18/1	2/2	2.76	30.00	✓	Straight	Straight Movement
4	1	1	19/1	4/1	1.44	30.00	✓	Straight	Straight Movement
	2	1	19/1	4/2	1.44	30.00	✓	Straight	Straight Movement
	3	1	19/1	4/3	1.44	30.00	✓	Straight	Straight Movement
6	1	1	20/1	6/1	2.40	30.00	✓	Straight	Straight Movement
	2	1	20/1	6/2	2.40	30.00	✓	Straight	Straight Movement
8	1	1	6/1	8/1	24.85	30.00	✓	Nearside	33.17
9	1	1	4/1	9/1	43.22	30.00	✓	Nearside	35.42
10	1	1	1/1	10/1	41.95	30.00	✓	Nearside	40.10
11	1	1	1/1	11/1	41.84	30.00	✓	Offside	91.65
8	1	2	2/2	8/1	24.85	30.00	✓	Straight	Straight Movement
9	1	2	1/1	9/1	43.22	30.00	✓	Straight	Straight Movement
10	1	2	6/1	10/1	41.95	30.00	✓	Straight	Straight Movement
11	1	2	2/1	11/1	41.84	30.00	✓	Nearside	47.20
8	1	3	4/3	8/1	24.85	30.00	✓	Offside	62.46
9	1	3	6/2	9/1	43.22	30.00	✓	Offside	96.34
10	1	3	2/2	10/1	41.95	30.00	✓	Offside	62.68
11	1	3	4/2	11/1	41.84	30.00	✓	Straight	Straight Movement

Give Way Data

Arm	Traffic Stream	Opposed traffic	Use Step-wise Opposed Turn Model	Visibility restricted
(ALL)	(ALL)	Movement		

Give Way Data - Movements

Arm	Traffic Stream	Movement	Destination traffic stream	Max Flow (Opposed) (PCU/hr)	Max Flow (Unopposed) (PCU/hr)	Percentage opposed (%)
4	3	1	8/1	1200	2044	100
6	2	1	9/1	1200	2073	100

Give Way Data - Movements - Conflicts

Arm	Traffic Stream	Movement	Destination traffic stream	Description	Controlling type	Controlling traffic stream	Percentage opposing (%)	Slope coefficient	Upstream signals visible	Conflict shift	Conflict duration
4	3	1	8/1		TrafficStream	6/1	100	0.00		0	0
6	2	1	9/1		TrafficStream	4/1	100	0.00		0	0

Local OD Matrix - Local Matrix: 1

Local Matrix Options

OD Matrix	Name	Use for point to point table	Auto calculate	Allocation mode	Allow paths past exit locations	Allow looped paths on arms	Allow looped paths on traffic nodes	Copy flows	Matrix to copy flows from	Limit paths by length	Path length limit multiplier	Limit paths by number	Path number limit
1	(untitled)	✓	✓	Path Equalisation			✓			✓	1.25		

Normal Input Flows (PCU/hr)

		To			
		1	2	3	4
From	1	0	5	70	119
	2	17	0	48	38
	3	142	194	0	551
	4	115	8	245	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows not shown as they are blank.

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	18/1	9/1	#0000FF
	2	(untitled)	1/1	8/1	#FF0000
	3	(untitled)	19/1	10/1	#00FF00
	4	(untitled)	20/1	11/1	#FFFF00

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	2		2	1	1/1, 9/1	Normal	17
	6		2	4	1/1, 11/1	Normal	38
	10		1	4	18/1, 2/1, 11/1	Normal	119
	11		2	3	1/1, 10/1	Normal	48
	12		4	1	20/1, 6/2, 9/1	Normal	115
	16		1	2	18/1, 2/2, 8/1	Normal	5
	17		1	3	18/1, 2/2, 10/1	Normal	70
	18		4	2	20/1, 6/1, 8/1	Normal	8
	19		4	3	20/1, 6/1, 10/1	Normal	245
	20		3	1	19/1, 4/1, 9/1	Normal	142
	21		3	4	19/1, 4/2, 11/1	Normal	551
	22		3	2	19/1, 4/3, 8/1	Normal	194

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)
1	(untitled)		1	Manual	240

Controller Stream 1 - Properties

Controller Stream	Manufacturer name	Type	Model number	(Telephone) Line Number	Site number	Grid reference	Gaining delay type
1	Unspecified						Absolute

Controller Stream 1 - Optimisation

Controller Stream	Allow offset optimisation	Allow green split optimisation	Optimisation level	Auto redistribute	Enable stage constraint
1	✓	✓	Offsets And Green Splits	✓	

Phases

Controller Stream	Phase	Name	Minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	7	300	0	0	Unknown
	B	(untitled)	7	300	0	0	Unknown
	C	(untitled)	7	300	0	0	Unknown
	D	(untitled)	7	300	0	0	Unknown
	E	(untitled)	7	300	0	0	Unknown
	F	(untitled)	7	300	0	0	Unknown
	G	(untitled)	7	300	0	0	Unknown
	H	(untitled)	6	300	0	0	Unknown
	I	(untitled)	7	300	0	0	Cycle

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)
1	1	H	1
	2	I	1
	3	A, C, I	1
	4	A, B, C, D	1
	5	B, D	1
	6	E, F	1
	7	G	1

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7	35, 51, 57, 91, 106, 130, 146, 154, 160, 200, 214, 3, 22

Intergreen Matrix for Controller Stream 1

		To								
		A	B	C	D	E	F	G	H	I
From	A					7	7	7	7	
	B						6	6	7	
	C						7	7	7	
	D					6	6	6	7	
	E	6			6			6	7	
	F	6	6	6	6			6	7	
	G	6	6	6	6	6	6		7	7
	H	15	15	15	15	15	15	15		15
	I							7	7	

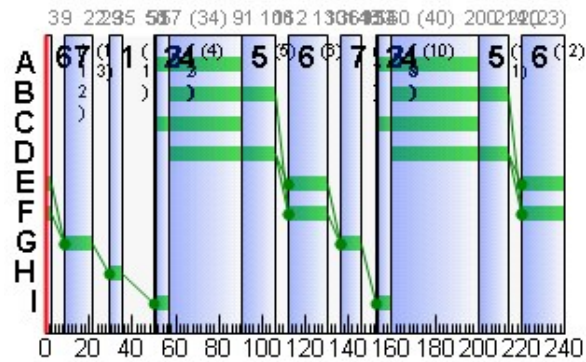
Banned Stage transitions for Controller Stream 1

		To						
		1	2	3	4	5	6	7
From	1							
	2							
	3							
	4							
	5							
	6							
	7							

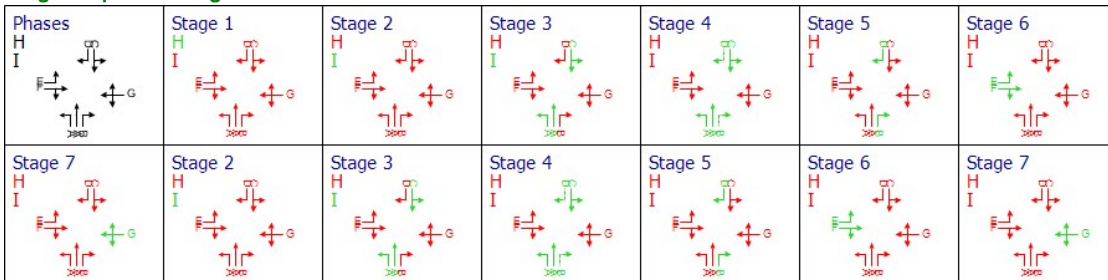
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
1	1		1	G	136	146	10	9	22	13
2	1		1	E	112	130	18	220	3	23
2	2		1	F	112	130	18	220	3	23
4	1		1	A	51	91	40	154	200	46
4	2		1	A	51	91	40	154	200	46
4	3		1	B	57	106	49	160	214	54
6	1		1	C	51	91	40	154	200	46
6	2		1	D	57	106	49	160	214	54

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Resultant penalties

Time Segment	Controller stream	Phase min max penalty (£ per hr)	Intergreen broken penalty (£ per hr)	Stage constraint broken penalty (£ per hr)	Cost of controller stream penalties (£ per hr)
08:00-09:00	1	0.00	0.00	0.00	0.00

Traffic Stream Results

Traffic Stream Results: Vehicle summary

Time Segment	Arm	Traffic Stream	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Mean max queue (PCU)	Utilised storage (%)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	48	87	103	2051	23	58.58	3.60	20.69	23.80	1.28	25.08
	2	1	40	123	119	1644	41	48.03	3.71	92.65	22.55	1.33	23.87
		2	21	332	75	2010	41	43.71	2.33	58.30	12.93	0.80	13.73
	4	1	19	369	142	2019	86	24.87	2.02	101.14	13.93	0.76	14.69
		2	71	26	551	2105	86	33.02	14.41	690.70	71.76	4.58	76.33
		3	31	191	194	1433	103	15.75	2.07	103.37	12.05	0.80	12.85
	6	1	33	170	253	2069	86	29.54	7.25	208.48	29.48	2.27	31.75
		2	18	393	115	1441	103	22.61	2.64	87.99	10.26	0.88	11.14
	8	1	0	Unrestricted	207	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	0	Unrestricted	274	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	0	Unrestricted	363	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	0	Unrestricted	708	Unrestricted	240	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	11	707	194	1800	240	0.22	0.28	0.99	0.17	0.06	0.23
	19	1	73	24	887	1800	240	16.72	23.87	127.60	58.48	7.08	65.56
20	1	20	340	368	1800	240	0.26	0.03	0.23	0.37	0.00	0.37	

Traffic Stream Results: Flows and signals

Time Segment	Arm	Traffic Stream	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Calculated sat flow (PCU/hr)	Calculated capacity (PCU/hr)	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Mean modulus of error	Actual green (s per cycle)
08:00-09:00	1	1	103	103	0		2051	214	48		87	0.00	23
	2	1	119	119	0		1644	295	40		123	0.05	41
		2	75	75	0		2010	360	21		332	0.05	41
	4	1	142	142	0		2019	740	19		369	0.63	86
		2	551	551	0		2105	772	71		26	0.63	86
		3	194	194	0		1433	627	31		191	0.63	103
	6	1	253	253	0		2069	759	33		170	0.00	86
		2	115	115	0		1441	630	18		393	0.00	103
	8	1	207	207	0		Unrestricted	Unrestricted	0		Unrestricted	0.92	240
	9	1	274	274	0		Unrestricted	Unrestricted	0		Unrestricted	0.80	240
	10	1	363	363	0		Unrestricted	Unrestricted	0		Unrestricted	0.56	240
	11	1	708	708	0		Unrestricted	Unrestricted	0		Unrestricted	0.62	240
	18	1	194	194	0		1800	1740	11		707	0.00	240
	19	1	887	887	0		1800	1220	73		24	0.00	240
20	1	368	368	0		1800	1800	20		340	0.00	240	

Traffic Stream Results: Stops and delays

Time Segment	Arm	Traffic Stream	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	1	1	12.00	58.58	1.68	23.80	99.11	102.08	1.28
	2	1	2.76	48.03	1.59	22.55	88.90	105.79	1.33
		2	2.76	43.71	0.91	12.93	84.59	63.44	0.80
	4	1	1.44	24.87	0.98	13.93	42.73	60.68	0.76
		2	1.44	33.02	5.05	71.76	66.23	364.92	4.58
		3	1.44	15.75	0.85	12.05	32.85	63.73	0.80
	6	1	2.40	29.54	2.08	29.48	71.57	181.08	2.27
		2	2.40	22.61	0.72	10.26	61.18	70.36	0.88
	8	1	24.85	0.00	0.00	0.00	0.00	0.00	0.00
	9	1	43.22	0.00	0.00	0.00	0.00	0.00	0.00
	10	1	41.95	0.00	0.00	0.00	0.00	0.00	0.00
	11	1	41.84	0.00	0.00	0.00	0.00	0.00	0.00
	18	1	19.18	0.22	0.01	0.17	2.59	5.02	0.06
19	1	12.91	16.72	4.12	58.48	63.66	564.65	7.08	
20	1	7.85	0.26	0.03	0.37	0.00	0.00	0.00	

Traffic Stream Results: Queues and blocking

Time Segment	Arm	Traffic Stream	Initial queue (PCU)	Mean max queue (PCU)	Max queue storage (PCU)	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)	Estimated blocking
08:00-09:00	1	1	0.00	3.60	17.39	20.69	0.00	0.00	
	2	1	0.00	3.71	4.00	92.65	0.00	0.00	
		2	0.00	2.33	4.00	58.30	0.00	3.00	
	4	1	0.00	2.02	2.00	101.14	0.00	4.00	
		2	0.00	14.41	2.09	690.70	0.00	0.00	
		3	0.00	2.07	2.00	103.37	0.00	0.00	
	6	1	0.00	7.25	3.48	208.48	0.00	0.00	
		2	0.00	2.64	3.00	87.99	0.00	0.00	
	8	1	0.00	0.00	36.02	0.00	0.00	105.00	
	9	1	0.00	0.00	62.63	0.00	0.00	62.00	
	10	1	0.00	0.00	60.80	0.00	0.00	13.00	
	11	1	0.00	0.00	60.64	0.00	0.00	13.00	
	18	1	0.00	0.28	27.79	0.99	0.00	8.00	
19	1	0.00	23.87	18.71	127.60	0.00	183.00		
20	1	0.00	0.03	11.37	0.23	0.00	76.00		

Traffic Stream Results: Advanced

Time Segment	Arm	Traffic Stream	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	Mean Max Queue EoTS (PCU)	Max End of Green Queue EoTS (PCU)	Max End of Red Queue EoTS (PCU)	PCU Factor	Cost of traffic penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	1	1	0.00	0.00	✓	3.60	0.22	3.46	1.00	0.00	25.08
	2	1	0.00	0.00	✓	3.71	0.14	3.71	1.00	0.00	23.87
		2	0.00	0.00	✓	2.33	0.03	2.28	1.00	0.00	13.73
	4	1	0.00	0.00	✓	2.02	0.02	2.02	1.00	0.00	14.69
		2	0.00	0.00	✓	14.42	0.88	8.64	1.00	0.00	76.33
		3	0.00	0.00	✓	2.07	0.07	2.07	1.00	0.00	12.85
	6	1	0.00	0.00	✓	7.25	0.08	6.41	1.00	0.00	31.75
		2	0.00	0.00	✓	2.64	0.02	2.64	1.00	0.00	11.14
	8	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	9	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	10	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	11	1	0.00	0.00	✓	0.00			1.00	0.00	0.00
	18	1	0.00	0.00	✓	0.28			1.00	0.00	0.23
19	1	0.00	0.00	✓	23.88			1.00	0.00	65.56	
20	1	0.00	0.00	✓	0.03			1.00	0.00	0.37	

Network Results

Run Summary

Analysis set used	Run start time	Run finish time	Modelling start time (HH:mm)	Network Cycle Time (s)	Performance Index (£ per hr)	Total network delay (PCU-hr/hr)	Highest DOS (%)	Item with highest DOS	Number of oversaturated items	Percentage of oversaturated items (%)	Item with worst signalised PRC	Item with worst unsignalised PRC	Item with worst over PR
5	10/01/2022 15:39:40	10/01/2022 15:39:44	08:00	120	275.61	18.01	72.72	19/1	0	0	4/2	19/1	19/

Network Results: Vehicle summary

Time Segment	Degree of saturation (%)	Practical reserve capacity (%)	Calculated flow entering (PCU/hr)	Actual green (s per cycle)	Mean Delay per Veh (s)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Performance Index (£ per hr)
08:00-09:00	73	24	4553	2249	14.24	255.78	19.83	275.61

Network Results: Flows and signals

Time Segment	Calculated flow entering (PCU/hr)	Calculated flow out (PCU/hr)	Flow discrepancy (PCU/hr)	Adjusted flow warning	Degree of saturation (%)	DOS Threshold exceeded	Practical reserve capacity (%)	Actual green (s per cycle)
08:00-09:00	4553	4553	0		73		24	2249

Network Results: Stops and delays

Time Segment	Mean Cruise Time per Veh (s)	Mean Delay per Veh (s)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Mean stops per Veh (%)	Total stops (Stops per hr)	Weighted cost of stops (£ per hr)
08:00-09:00	18.41	14.24	18.01	255.78	34.74	1581.77	19.83

Network Results: Queues and blocking

Time Segment	Utilised storage (%)	Excess queue penalty (£ per hr)	Wasted time total (s per cycle)
08:00-09:00	690.70	0.00	467.00

Network Results: Advanced

Time Segment	Degree of saturation penalty (£ per hr)	Ped gap accepting penalty (£ per hr)	Warmed up	PCU Factor	Cost of traffic penalties (£ per hr)	Controller stream penalties (£ per hr)	Performance Index (£ per hr)
08:00-09:00	0.00	0.00	✓	1.00	0.00	0.00	275.61

Point to Point Journey Time

Average Journey Time (s) for Local Matrix: 1

		To			
		1	2	3	4
From	1	0.0	90.7	107.8	112.0
	2	113.8	0.0	112.5	112.4
	3	99.1	71.7	0.0	105.9
	4	76.3	64.9	82.0	0.0

Path Journey Time

Path	From Location	To Location	Normal Calculated Flow (PCU/hr)	Normal journey time (s)	Calculated Total Flow (PCU/hr)	Avg journey time (s)
2	2	1	17	113.80	17	113.80
6	2	4	38	112.43	38	112.43
10	1	4	119	112.03	119	112.03
11	2	3	48	112.54	48	112.54
12	4	1	115	76.33	115	76.33
16	1	2	5	90.71	5	90.71
17	1	3	70	107.82	70	107.82
18	4	2	8	64.90	8	64.90
19	4	3	245	82.00	245	82.00
20	3	1	142	99.15	142	99.15
21	3	4	551	105.93	551	105.93
22	3	2	194	71.67	194	71.67

Final Prediction Table

Traffic Stream Results

Arm	Traffic Stream	Name	Traffic node	SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	D wei mu
				Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	
1	1			1	G	103	2051	23	0.00	48	87	70.58	58.58	99.11	3.60	
2	1			1	E	119	1644	41	0.00	40	123	50.79	48.03	88.90	3.71	
	2			1	F	75	2010	41	3.00	21	332	46.47	43.71	84.59	2.33	
4	1			1	A	142 <	2019	86	4.00	19	369	26.31	24.87	42.73	2.02 +	
	2			1	A	551 <	2105	86	0.00	71	26	34.46	33.02	66.23	14.41 +	
	3			1	B	194 <	1433	103	0.00	31	191	17.19	15.75	32.85	2.07 +	
6	1			1	C	253 <	2069	86	0.00	33	170	31.94	29.54	71.57	7.25 +	
	2			1	D	115	1441	103	0.00	18	393	25.01	22.61	61.18	2.64	
8	1					207	Unrestricted	240	105.00	0	Unrestricted	24.85	0.00	0.00	0.00	
9	1					274	Unrestricted	240	62.00	0	Unrestricted	43.22	0.00	0.00	0.00	
10	1					363	Unrestricted	240	13.00	0	Unrestricted	41.95	0.00	0.00	0.00	
11	1					708	Unrestricted	240	13.00	0	Unrestricted	41.84	0.00	0.00	0.00	
18	1					194	1800	240	8.00	11	707	19.39	0.22	2.59	0.28	
19	1					887 <	1800	240	183.00	73	24	29.63	16.72	63.66	23.87 +	
20	1					368	1800	240	76.00	20	340	8.10	0.26	0.00	0.03	

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	698.60	41.30	16.92	18.01	255.78	19.83	0.00	275.61
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians								
TOTAL	698.60	41.30	16.92	18.01	255.78	19.83	0.00	275.61

- 1 < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- 1 * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- 1 ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- 1 + = average link/traffic stream excess queue is greater than 0
- 1 P.I. = PERFORMANCE INDEX