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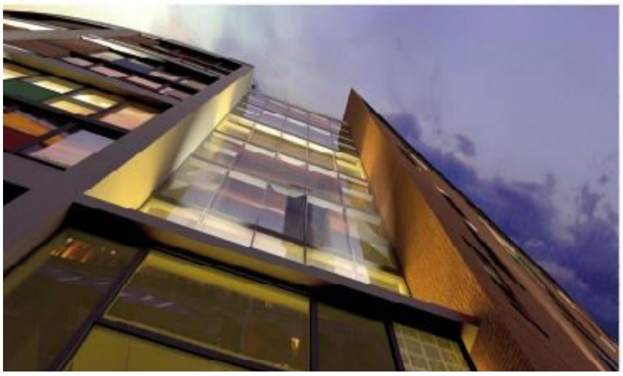 

Traffic and Transport Assessment

Proposed Strategic Housing Development at Belcamp, Dublin 17

April 2022

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Client Name:	Gerard Gannon Properties
Document Reference:	19-114r.016 Traffic and Transport Assessment
Project Number:	19-114

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015 and BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
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Comments

Disclaimer

Contents

Figures

Tables

Appendices

1. Introduction

1.1 Context

Waterman Moylan Consulting Engineers have been appointed by Gerard Gannon Properties to prepare this Traffic and Transport Assessment (TTA) as part of the planning documentation for a proposed Strategic Housing Development (SHD) planning submission in Belcamp, Dublin 17.

1.2 Scope

This TTA is a comprehensive review of all potential transport impacts of the overall Belcamp SHD development, including a detailed assessment of the transportation systems provided and the impact of the overall development on the surrounding environment and transportation network.

1.3 Standards

This Traffic and Transport Assessment has been prepared in accordance with the requirements of the Traffic and Transport Assessment Guidelines published by National Roads Authority in May 2014.

1.4 Threshold for Transport Assessment

Section 2.1 of the Traffic and Transport Assessment Guidelines (May 2014) requires submission of a Transport Assessment where a proposed development meets one or more of the following criteria:

1- Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road;

2- Traffic to and from the development exceeds 5% of the traffic flow on the adjoining road where congestion exists, or the location is sensitive;

3- Residential development in excess of 200 dwellings;

4- Retail and leisure development in excess of 1,000sqm;

5- Office, education and hospital development in excess of 2,500sqm;

6- Industrial development in excess of 5,000sqm;

7- Distribution and warehousing in excess of 10,000sqm.

1.5 Contents of the Transport Assessment

In accordance with Section 3.3 of the Traffic and Transport Assessment Guidelines (May 2014), the contents of this TTA include:

- Description of the existing and proposed traffic/transportation conditions including information on the current traffic, critical junctions, pedestrians, cycle and public transport facilities;
- A description of the proposed development;
- The traffic and transportation implications of the development including consideration of trip generation/attraction, mode choice and trip distribution;
- Description and analysis of under construction, permitted and future developments in the area;

- The time periods applicable to the TTA;
- The impact of the development on the surrounding road network including analysis of junction's capacity;
- Review of the historical data related to road safety;
- Description of car and cycle parking requirements and proposals.

1.6 Site Location and Description

The subject site is located in Belcamp. It is bounded to the west and north by agricultural lands, to the south by the R139 and to the east by the Malahide Road (R107). Mayne River runs west to east through the subject site and forms the boundary between Fingal County Council (FCC) and Dublin City Council (DCC). The subject site is located within the administrative areas of both FCC and DCC authorities. In the eastern portion of the Applicant's ownership lands to the north of Mayne River (FCC jurisdiction), Phase 1 of the Belcamp received a grant of planning permission under Planning Reference F15A/0609 and is currently under construction. The overall site location is shown in Figure 1.

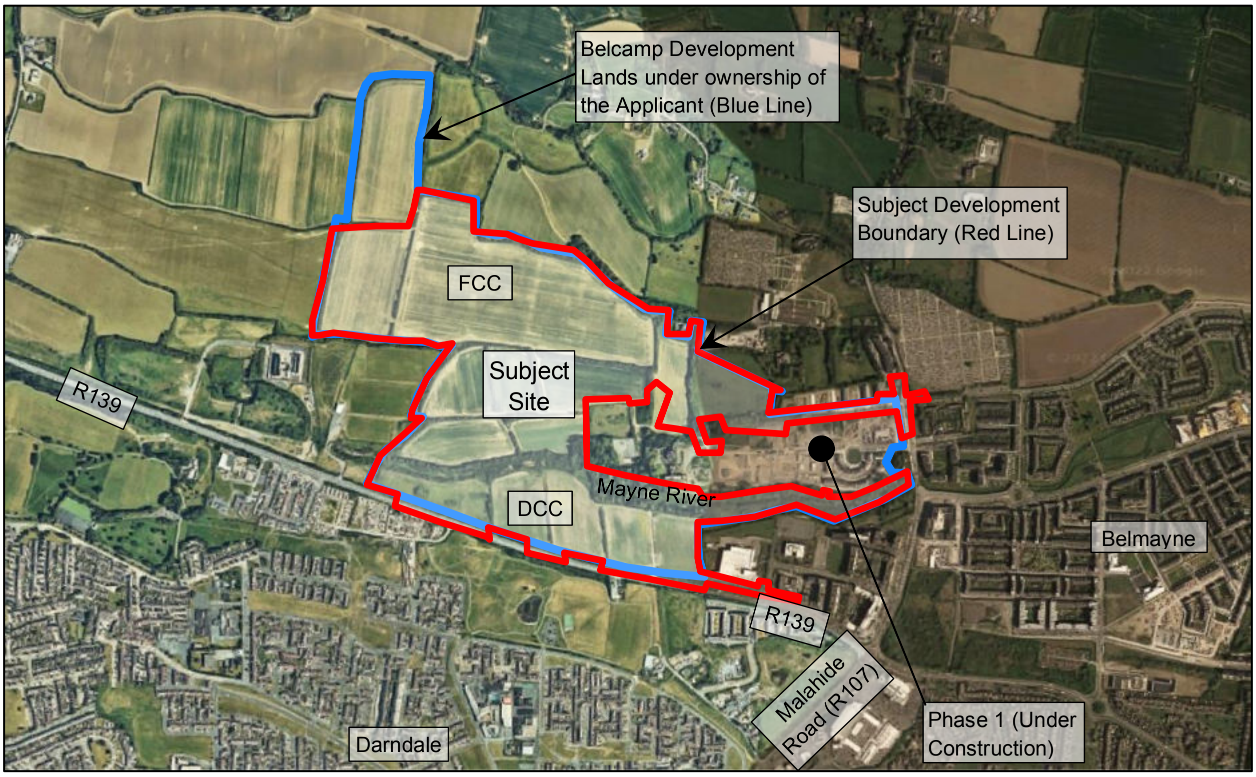


Figure 1 | *Site Location (Source: Google Maps)*

The subject site is proposed to be delivered in a phased manner, with the initial phases proposed on the eastern portion of the lands (within FCC jurisdiction), immediately adjacent to Malahide Road (R107), north of Mayne River. Phase 1 of Belcamp received grant permission by Fingal County Council in June 2017 under Reg. Ref. F15A/0609 and is currently under construction. Access to Phase 1 will be provided via College Avenue, a new east-west street accessed via a new junction with the Malahide Road (R107).

2. Review of Current Policies, Plans and Strategies

In this section, relevant national, regional and local policy, plans and strategies are reviewed to identify the documents considered to have relevance to the study.

2.1 National Policies and Strategies

2.1.1 Building on Recovery: Infrastructure and Capital Investment 2016 – 2021 (Department of Public Expenditure and Reform, last updated in June 2019)

The *Infrastructure and Capital Investment 2016 – 2021 Plan* presents the Government's €42 billion framework for infrastructure investment in Ireland over the period 2016 to 2021. The transport investment is largely shaped by the recommendations set out in the *Strategic Framework for Investment in Land Transport* which aim to maintain and renew important strategic infrastructure, address urban congestion and improve the efficiency and safety of existing transport networks. The plan identifies strategic infrastructure schemes to receive public funding including the following:

- The reopening of the Phoenix Park tunnel;
- Completion of the Dublin City Centre Re-signalling programme;
- The construction of a new Central Traffic Control centre for commuter and intercity rail;
- Further upgrading of Quality Bus Corridors;
- Metro North; and
- Completion of the Luas Cross City project.

In addition, the plan places a renewed focus on investing in key transport corridors including the upgrade of roads into Grange Castle Business Park to provide access for industry.

2.1.2 Towards a National Planning Framework: A Roadmap for the Delivery of the National Planning Framework (DECLG, 2015)

This roadmap outlines a new National Planning Framework (NPF) which will supersede the National Spatial Strategy 2002 (NSS). Spanning 20 years, the NPF will provide a long-term central planning policy strategy which will guide future development and investment decisions and inform future regional strategies and county development plans. The NPF will adopt a strategic approach which will promote sustainable land use and transport strategies in both urban and rural areas. The aim of this approach is to reduce emissions and address the necessity of adaptation to climate change protecting the environment and its amenities.

In February 2017 the government published 'Ireland 2040 Our Plan Issues and Choices', a paper setting out the key issues and challenges for the preparation of the NPF. As part of a comprehensive consultation process, the paper invited views on critical issues shaping the future of Ireland, such as spatial planning, infrastructure and global warming.

2.1.3 Investing in Our Transport Future: A Strategic Framework for Investment in Land Transport (Department of Transport, Tourism and Sport, 2015)

This framework outlines high level priorities for future investment in land transport and key principles, reflective of those priorities, to which transport investment proposals will be required to adhere to. The framework also identifies funding consistent with maintaining, renewing and improving an appropriate transport network that can efficiently support the economic and social needs of the country as a key challenge. The alignment of land use and transport planning is highlighted to be a key priority to ensure effective integration between land use and transport planning.

2.1.4 Smarter Travel: A Sustainable Transport Future 2009 – 2020 (Department of Transport, 2009)

Smarter Travel is a government policy which seeks to reduce the share of travel demand which is car dependant thus reducing reliance on fossils fuels and maximising the efficiency of the transport network. Its main objective is to promote a significant modal shift from private transport to public transport and sustainable transport modes over the period up to 2020. The policy sets out a target of 55% mode share for walking, cycling and public transport which it aims to achieve through several actions themed around the following:

- Encouraging Smarter Travel;
- Delivering Alternative Ways of Travelling;
- Improving the Efficiency of Motorised Transport; and
- Ensuring Integrated Delivery of the Policy.

Aligning spatial planning and transport to address urban sprawl and urban-generated one-off housing in peri-urban areas is identified as a key area to encourage smarter travel. Specifically, the policy encourages good public transport connections with safe routes for walking and cycling to access and the use of local area plans and Strategic Development Zones (SDZs) within major urban areas as a way of improving the land use-transport integration.

2.1.5 Healthy Ireland: A Framework for Improved Health and Wellbeing 2013 – 2025 (Department of Health, 2013)

Healthy Ireland sets out a Framework for action to improve the health and well-being of the population of Ireland. The framework recognizes the important role of transport and planning in terms of health and wellbeing with particular reference made to the Smarter Travel policy document.

2.2 Regional Plans and Strategies

2.2.1 Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022 (Regional Planning Guidelines Office, 2010)

The Regional Planning Guidelines for the Greater Dublin Area (RPG) aim to direct the future growth of the Greater Dublin Area (GDA) over the medium to long term to achieve an economically vibrant, active and sustainable international Gateway Region with strong connectivity and communities living in accessible places well supported by local infrastructure.

The Physical infrastructure policy (Strategic Policy PIP1) of the RPG notes that future investment in transport in the GDA should:

- Provide efficient, effective and sustainable means of moving people and goods for all purposes which minimises the environmental impact and the social and economic cost to users;
- Allow for the development of a land use strategy that supports sustainable development; and
- Support growth and efficiencies in economic activity for both the GDA and the State.

It should be noted that the Greater Dublin Area is now part of the larger Eastern and Midlands Regional Assembly (EMRA). The EMRA includes the four counties of Dublin (Fingal, Dublin City, South Dublin, Dún Laoghaire-Rathdown), the 'Eastern' counties of Louth, Kildare, Meath, Wicklow and the Midlands counties of Longford, Laois, Offaly, and Westmeath. The current RPGs for the GDA will be replaced by the 'Regional Spatial & Economic Strategy' for the EMRA. The purpose of these strategies is described as follows: -

"*The objective of regional spatial and economic strategies shall be to support the implementation of the National Spatial Strategy and the economic policies and objectives of the Government by providing a long-term strategic planning and economic framework for the development of the region for which the strategies are prepared which shall be consistent with the National Spatial Strategy and the economic policies or objectives of the Government*." (S.23 Planning and Development Act 2000).

2.2.2 Greater Dublin Area Transport Strategy 2016 – 2035 (NTA, 2016)

The *Greater Dublin Area Transport Strategy* (The Strategy) establishes the framework for the transport provision necessary to achieve the land use vision set out in the RPGs. The purpose of the Strategy is to contribute to the objectives set out in the RPG by providing for the efficient, effective and sustainable movement of people and goods. The strategy outlines the transport infrastructure required across all modes by 2035 within the GDA to achieve this objective.

In addition to the above core bus network the strategy outlines future improvements to the rail network including the opening of the Phoenix Park Tunnel, facilitating travel from the Kildare line through Connolly station, and the expansion of the Dart along the Kildare line as far as Hazelhatch.

The strategy recognises the importance of land use and transport planning in terms of influencing the how and why people travel and advocates the use of the following local land use planning principles:

- Planning at the local level should promote walking, cycling and public transport by maximising high density residential development near local amenities & schools and public transport services;
- New development areas should be fully permeable for walking and cycling and the retrospective implementation of walking and cycling facilities should be undertaken were practical; and
- Where possible, development should provide for filtered permeability to prioritise walking, cycling, public transport and discourage private car through trips; and
- Maximum parking standards should be set for all new developments, with the level of parking provision applied being based on the level of public transport accessibility.

The Strategy also supports the implementation of the cycle network proposed in the Greater Dublin Area Cycle Network Plan (GDACNP) in line with the principles set out in the National Cycle Manual.

2.2.3 New Dublin Area Bus Network (NTA, 2020)

Following three rounds of public consultation which began in 2017, the National Transport Authority (NTA) published, in September 2020, the new Dublin Area bus network. This new bus network plan is the final version resulting from previous redesign proposals and with consideration given to issues raised by 72,000 submissions. The implementation of the New Network will take place on a phased basis over a number of years starting in 2021, subject to Government funding.

The new Dublin Area bus network will provide a more coherently planned, higher capacity, more understandable network, delivering a better overall bus system for the Dublin region. It will consist of spines radiating from the city centre. Spines are very frequent routes made up of individual bus services timetabled to work together along a corridor. At the end of the corridor, the individual services branch off to serve different areas. The network will also include orbitals across the North, West and South areas of Dublin, additional local area services, peak only and express services.

The new network will see increased evening and weekend services, with most frequent routes operating every 15 minutes or better on weekdays and Saturdays, most on Sundays also. There will be a number of routes that will operate 24 hours a day. These services will operate throughout the night to support the night-time economy across Dublin. Overall, the level of bus services in the Dublin network will increase by 23% as a result of the new network. Other benefits of the New Network include:

- A 23% overall increase in bus services
- Increased capacity, particularly for all day services
- A more easily understood city network
- Better access to bus services for passengers
- New connections to schools, hospitals and other essential services

2.2.4 Greater Dublin Area Cycle Network Plan (NTA, 2013)

The *Greater Dublin Area Cycle Network Plan* sets out a 10-year strategy to expand the urban cycle network from 500km in length to 2,840km. The overarching ambition is for the cycle network in 2021 to carry as many commuters as currently take the bus representing a three-fold increase.

The network will consist of primary routes (serving the highest demand), secondary and feeder routes (Forecast to have lower demand) as well as Greenway routes (through parks, along waterways etc.)

To complement the investment in the cycle network, the cycle network plan also provides for:

- Sufficient on-street and off-street public cycle parking at key urban destinations such as bus and rail stations, schools and large workplaces;
- The expansion of the bike share scheme in Dublin City (Dublin Bikes) and the introduction of
- similar schemes across the GDA; and
- Implementation a comprehensive cycle route signage programme in conjunction with the development of the cycle network.

2.2.5 Planning and Development of Large-Scale, Rail Focused Residential Areas in Dublin (NTA, 2013)

The purpose of this study was to assess the future delivery of rail-based large and medium scale residential development areas in Dublin. The study, which does not have a statutory basis, had the following key challenges: -

- To examine current issues arising in relation to large and medium scale residential development areas due to the noted pressure to deliver development at densities lower than those set out in the planning frameworks, largely driven by perceived market trends and funding issues;
- To identify potential approaches that provide viable solutions to addressing these issues.

The approach to conducting the study broadly comprised 4 stages which were: -

1. Assessment of the current situation and trends in Dublin in relation to largescale residential development delivery;
2. Key principles of high-density schemes including case studies analysis;
3. Delivery & design considerations to achieving residential development in the current economic circumstances; and
4. Proof of Concept Analysis applied to one area.

The following are the key conclusions of the study: -

- Government policy in relation to sustainable residential density guidelines remains applicable;
- Government / public sector intervention is required to ‘show confidence’ in the delivery of strategic residential locations; and
- Flexibility in minimum densities should be considered subject to agreements being put in place to meet overall density targets.

2.2.6 Achieving Effective Workplace Travel Plans Guidance for Local Authorities (2013)

Achieving Effective Workplace Travel Plans Guidance for Local Authorities was prepared by the National Transport Authority (NTA) to assist local authorities with integrating the principles and practice of Workplace Travel Plans into the development plan and development management processes.

The guidance suggests a ‘Standard’ Workplace Travel Plan or a Workplace Travel Plan ‘Statement’ be assessed on an individual case basis taking account of location, scale of development, nature of the uses proposed and anticipated impact on the surrounding area, in terms of trip volume and congestion. As an indicative threshold, a ‘Standard’ Workplace Travel Plan should be required if an existing or proposed development has the potential to employ over 100 persons.

2.2.7 Spatial Planning and National Roads: Guidelines for Planning Authorities (Department of Environment, Community and Local Government, 2012)

Spatial Planning and National Roads: Guidelines for Planning Authorities set out planning policy considerations relating to development affecting national primary and secondary roads, including motorways and associated junctions, outside the 50-60 km/h speed limit zones for cities, towns and villages.

The guidelines aim to facilitate a well-informed, integrated and consistent approach that affords maximum support for the goal of achieving and maintaining a safe and network of national roads in the broader context of sustainable development strategies, thereby facilitating continued economic growth and development throughout the country.

The following Key Principles have informed these guidelines:

- Land-use and transportation policies are highly interdependent;
- Proper planning is central to ensuring road safety
- Development should be plan-led;
- Development Management is the key to Plan Implementation;
- Planning Authorities and National Roads Authority and other public transport bodies must work closely together

2.3 Local Plans and Strategies

2.3.1 Fingal County Council Development Plan 2017 - 2023

The Fingal Development Plan (2017 – 2023) sets out the authority's policies and objectives for the development of the County for the period of 2017 to 2023. The Plan seeks to develop and improve in a sustainable manner the social, economic, cultural and environments assets of the county. In the context of the subject development site and the proposed residential scheme a number of most relevant policies include:

<u>Strategic Policy</u>

"Seek the development of a high quality public transport system throughout the County and linking to adjoining counties, including the development of the indicative route for New Metro North and Light Rail Corridor, improvements to railway infrastructure including the DART Expansion Programme, Quality Bus Corridors (QBCs) and Bus Rapid Transit (BRT) systems, together with enhanced facilities for walking and cycling."

"Promote, improve and develop a well-connected national, regional and local road and public transport infrastructure system, geared to meet the needs of the County and the Region, and providing for all road users, prioritising walking, cycling and public transport."

<u>Integrated Land Use and Transportation</u>

"***Objective MT05***: *Integrate land use with transportation by allowing higher density development along higher capacity public transport corridors."*

Parking

*"**Objective MT08**: Control on-street parking in the interests of the viability, vitality and amenity of commercial centres by maximising the supply of short stay parking for shoppers, while providing appropriate levels of long-term parking within a reasonable distance for employees."*

Walking and Cycling

*"**Objective MT13**: Promote walking and cycling as efficient, health, and environmentally-friendly modes of transport by securing the development of a network of direct, comfortable, convenient and safe cycle routes and footpaths, particularly in urban areas."*

*"**Objective MT19**: Design roads and promote the design of roads, including cycle infrastructure, in line with the Principals of Sustainable Safety in a manner consistent with the National Cycle Manual and the Design Manual for Urban Roads and Streets."*

*"**Objective MT22**: Improve pedestrian and cycle connectivity to stations and other public transport interchanges."*

Traffic Calming

*"**Objective MT37**: Implement traffic calming on particular roads and in appropriate areas of the County, especially residential areas, to reduce vehicle speeds in the interests of road safety and residential amenity. Ensure that where appropriate, traffic calming is included as a pre-condition as part of the development of all new estates or extensions to existing estates."*

Road Construction and Improvement Measures

*"**Objective MT40**: Implement a programme of road construction and improvement works closely integrated with existing and planned land uses, taking into account both car and non-car modes of transport whilst promoting road safety as a high priority. Major road construction and improvement works will include an appraisal of environmental impacts."*

*"**Objective MT41**: Seek to implement the Road Improvement Schemes indicated in Table 7.1 within the Plan period, subject to assessment against the criteria set out in Section 5.8.3 of the NTA Transport Strategy for the GDA, where appropriate and where resources permit. Reserve the corridor of the proposed road improvements free of development".*

R107 Malahide Road Realignment, Balgriffin Bypass and East-West Distributor Road: Malahide Road to Stockhole Lane are included in the aforementioned Table 7.1 within the Plan.

Urban Fingal – Metropolitan Area – Balgriffin and Belcamp

In the Fingal Development Plan 2017 – 2023, the subject Belcamp lands falls within the Belcamp LAP lands and is zoned for "*Residential Area (RA): provide for new residential communities subject to the provision of the necessary social and physical infrastructure. Ensure the provision of high quality new residential environments with good layout and design, with adequate public transport and cycle links and within walking distance of community facilities. Provide an appropriate mix of house sizes, types and tenures in order to meet household needs and to promote balanced communities."*

The Fingal Development Plan sets out the Development Strategy and Objectives for the Balgriffin and Belcamp Lands as follows:

"***Development Strategy***: *Consolidate the new and existing areas of Balgriffin and Belcamp to create vibrant residential communities with appropriate local services and community facilities to serve the new population. Ensure that the necessary infrastructure is delivered in tandem with development and that the new built form respects the rich built and natural heritage of the surrounding environment and recognises the ecological sensitivity and hydrological connection with adjacent European Sites."*

*"**Objective Balgriffin/Belcamp 1**: Promote high quality residential development which meets the needs of all stages of the life cycle through an appropriate mix of house type and local amenities."*

*"**Objective Balgriffin/Belcamp 2**: Ensure that new communities are adequately served with accessible local services."*

*"**Objective Balgriffin/Belcamp 3**: Facilitate the protection of Belcamp House and ensure that new development respects the historic character and setting of Belcamp House, including both its natural and built heritage, and biodiversity assets."*

*"**Objective Balgriffin/Belcamp 4**: Promote green infrastructure linkages, in particular ensuring permeability between the lands at Belcamp, Balgriffin, Belmayne and the Regional Park at Racecourse Park, facilitating access to the Fingal Coastal Way."*

*"**Objective Balgriffin/Belcamp 5**: Consider a limited quantum of development on the Belcamp LAP lands to facilitate the rehabilitation and preservation of Belcamp House prior to the adoption of Belcamp LAP. A design brief including the quantum and location of any such development, which shall not prejudice any future road requirements, shall be agreed with the Planning Authority prior to a planning application being lodge. Not more than 50% of any residential units permitted shall be sold or occupied pending the full re-instatement of Belcamp House to the satisfaction of the Planning Authority."*

*"**Objective Balgriffin/Belcamp 6**: Prepare a Local Area Plan for lands at Belcamp to provide for a sustainable mixed use urban district including residential, community and recreational facilities subject to the delivery of necessary infrastructure and rehabilitation and restoration of Belcamp House."*

*"**Objective Balgriffin/Belcamp** 7: Promote improved pedestrian and cycle linkage between Balgriffin/Belcamp and Portmarnock Rail Station."*

<u>Green Infrastructure and Planning</u>

*"**Objective GI18**: Require all Local Area Plans to protect, enhance, provide and manage green infrastructure in an integrated and coherent manner addressing the five GI themes set out in the Development Plan – Biodiversity, Parks, Open Space and Recreation, Sustainable Water Management, Archaeological and Architectural Heritage, and Landscape."*

*"**Objective GI20**: Require all new development to contribute to the protection and enhancement of existing green infrastructure and the delivery of new green infrastructure, as appropriate."*

2.3.2 Dublin City Council Development Plan 2016 - 2022

The Dublin City Development Plan (2016 – 2022) sets out the authority's policies and objectives to guide how and where development will take place in the city over the lifetime of the Plan. It provides an integrated, coherent spatial framework to ensure the city is developed in an inclusive way which improves the quality of life for its citizens, whilst also being a more attractive place to visit and work. In the perspective of the subject residential development a number of key policies and objectives include:

Integrated Land-use and Transportation

*"**Objective MTO1**: To encourage intensification and mixed-use development along existing and planned public transport corridors and at transport nodes where sufficient public transport capacity and accessibility exists to meet the sustainable transport requirements of the development, having regard to conservation policies set out elsewhere in this plan and the need to make best use of urban land. Dublin City Council will seek to prepare SDZs, LAPs of other plans for areas surrounding key transport nodes, where appropriate, in order to guide future sustainable development."*

Promoting Modal Change and Active Travel

*"**Policy MT2**: Whilst having regard to the necessity for private car usage and the economic benefit to the city centre retail core as well as the city and national economy, to continue to promote modal shift from private car use towards increased use of more sustainable forms of transport such as cycling, walking and public transport, and to co-operate with the NTA, Transport Infrastructure Ireland (TII) and other transport agencies in progressing an integrated set of transport objectives. Initiatives contained in the government's 'Smarter Travel' document and in the NTA's draft transport strategy are key elements of this approach."*

Public Transport

*"**Policy MT4**: To promote and facilitate the provision of Metro, all heavy elements of the DART Expansion Programme including DART Underground (rail interconnector), the electrification of existing lines, the expansion of LUAS, and improvements to the bus network in order to achieve strategic transport objectives."*

*"**Policy MT5**: To work with the relevant transport providers, agencies and stakeholders to facilitate the integration of active travel (walking, cycling, etc.) with public transport, thereby making it easier for people to access and use the public transport system."*

*"**Objective MTO4**: To support improvements to the city's bus network and related services to encourage greater usage of public transport in accordance with the objectives of the NTA's strategy and the government's 'Smarter Travel' document."*

Promoting Active Travel: Cycling & Walking

*"**Objective MTO10**: To improve existing cycleways and bicycle priority measures throughout the city, and to create guarded cycle lanes, where appropriate and feasible."*

*"**Policy MT12**: To improve the pedestrian environment and promote the development of a network of pedestrian routes which link residential areas with recreational, educational and employment destinations to create a pedestrian environment that is safe and accessible to all".*

Mobility Management & Travel Planning

*"**Policy MT13**: To promote best practice mobility management and travel planning to balance car use to capacity and provide for necessary mobility via sustainable transport modes."*

*"**Objective MTO23**: To require Travel Plans and Transport Assessments for all relevant new developments and/or extensions or alterations to existing developments."*

*"**Objective MTO25**: To support the growth of Electric Vehicles and e-bikes, with support facilities as an alternative to the use of fossil-fuel-burning vehicles, through a roll-out of additional electric charging points in collaboration with relevant agencies at appropriate locations."*

Car Parking

*“**Policy MT14**: To minimise loss of on-street car parking, whilst recognizing that some loss of spaces is required for, or in relation to, sustainable transport provision, access to new development, or public realm improvements.”*

*“**Policy MT17**: To provide for sustainable levels of car parking and car storage in residential schemes in accordance with development plan car parking standards (section 16.38) so as to promote city centre living and reduce the requirement for car parking.”*

Road & Bridge Improvements

*“**Policy MT20**: To increase capacity of public transport, cycling and walking, where required, in order to achieve sustainable transportation policy objectives. Any works undertaken will include as an objective, enhanced provision for safety, public transportation, cyclists and pedestrians, and will be subject to environmental and conservation considerations.”*

*“**Policy MT20**: To increase capacity of public transport, cycling and walking, where required, in order to achieve sustainable transportation policy objectives. Any works undertaken will include as an objective, enhanced provision for safety, public transportation, cyclists and pedestrians, and will be subject to environmental and conservation considerations.”*

*“**Objective MTO31**: To initiate and/or implement the following road improvement schemes and bridge within the six-year period of the development plan, subject to availability of funding and environmental requirements and compliance with the ‘Principles of Road Development’ set out in the NTA Transport Strategy. “*

Environmental and Road Safety Impacts of Traffic

*“**Objective MTO45**: To implement best practice in road design as contained in statutory guidance and in the DMURS (the use of which is mandatory) with a focus on place-making and permeability (for example, by avoiding long walls alongside roads) in order to create street layouts that are suited to all users, including pedestrians and cyclists.”*

2.3.3 FCC South Fingal Transport Study (SFTS) - 2019

In September 2017 FCC commissioned SYSTRA to carry out the South Fingal Transport Study (SFTS) to update and refine the transport strategy for Dublin Airport, Swords and FCC/DCC fringe areas. This study was published/completed in February 2019 and will form the basis for the future transportation development to 2027 in both FCC and FCC/DCC fringe areas. The major changes proposed by SFTS to the current FCC/DCC fringe area transport strategy include:

1. Eliminate the road bridge on the Clarehall bypass over the R139.
2. Eliminate the extension of the Malahide Road bypass north of the East-West Distributor Road (now called East West Link Road).
3. Eliminate the extension of the East-West Distributor Road west of Stockhole Lane over the M1 (part of FCC orbital route) for the foreseeable future.
4. Apply Design manual for Urban Roads and Streets **(**DMURS) principles to the road design emphasising public transport, pedestrians and cyclist and urban style junctions.

The SFTS Recommendations which apply to the Fingal/Dublin Fringe area are SFTS Recommendations 21, 22, 23 and 24.

“***SFTS Recommendation 21****: Additional means of traffic distribution and around the areas adjacent to Clarehall Junction, particularly to its north is recommended through construction of a small-scale bypass in the context of the need to reconfigure the existing Clarehall Junction to rebalance capacity towards public transport and/or pedestrians and cyclists. It is recommended that future junctions be limited in scale as far as possible to avoid creating a car dominated environment, instead designing in favour of pedestrians and cyclists*.”

“***SFTS Recommendation 22****: The R107/Balgriffin Road junction should be upgraded to include additional left turning capacity for the southbound movement (e.g. adding a left turn flare), while also providing a safe and attractive environment for pedestrians and cyclists*.”

“***SFTS Recommendation 23****: Developing a new link between the Clarehall Junction Relief Road and Stockhole Lane to improve options for vehicular traffic entering/leaving the overall Fingal/Dublin Fringe area is recommended. This link would potentially cater for an orbital bus service linking the employment zoned lands north of the R139 with Dublin Airport and Swords. In the longer term this link would also cater for high quality walking and cycling trips via a more direct and safe route to Dublin Airport and for interchange with the future Swords CBC*.”

“***SFTS Recommendation 24****: To further consider the feasibility of a Fingal/Dublin Fringe – Dublin Airport – Swords Bus Route when Bus Connects and Metrolink are more advanced. The current phases of planning for these projects must give priority to those services already identified in the NTA GDA Strategy 2016-2035. However, a review of the NTA GDA Strategy is due to be undertaken by the end of 2022, at which point it would be timely to assess the potential inclusion of the proposed orbital bus service for delivery post 2027*.”

SFTS is considered in detail in Section 4.6 of this report.

2.3.4 Draft Belmayne and Belcamp Lane Masterplan (July 2020)

Dublin City Council has prepared a draft Masterplan for the lands at Belmayne and Belcamp Lane in Dublin 13 and 17. The majority portion of the Masterplan lands are in Council ownership. The purpose of the Masterplan is to demonstrate proposals for buildings, spaces, movements and land use for Belmayne and Belcamp Lane. This document is considered in more detail in Section 4.7 of this report.

2.4 Belcamp SHD – Sustainable Transport Strategy (2022)

To support this SHD application and the preparation of the subject Traffic and Transport Assessment, Gerard Gannon Properties (the Applicant) appointed SYSTRA to prepare a comprehensive Sustainable Transport Strategy (STS) for the subject Belcamp SHD. This document consists of a strategic transport modelling – which includes all modes of transport (e.g. private cars, public transport and active modes of travel), along with proposed sustainable transport strategies for subject Belcamp SHD.

The preparation of the Belcamp SHD – Sustainable Transport Strategy (STS) has been commissioned by the Applicant in order to demonstrate that the area can be properly integrated into the future transport network of Dublin, making best use of planned schemes such as BusConnects, DART+, MetroLink and the expanded GDA Cycle Network, and to demonstrate how the area can be sustainably developed without adversely impacting on the capacity of the local road network. This document, and its key findings and observations are considered in more detail in Section 7.2 of this report.

3. Receiving Environment

In this section, a review of the existing transport network was undertaken. The review focused on:

- Existing Road Network: main roads, primary junctions and accident data;
- Existing Public Transport provision: bus and rail; and
- Active Modes: cycling and walking facilities.

3.1 Existing Road Network

3.1.1 Main Roads

The subject Belcamp lands are situated immediately west of Malahide Road (R107) and north of R139. The existing main roads surrounding the subject Belcamp lands are illustrated in Figure 3 below.

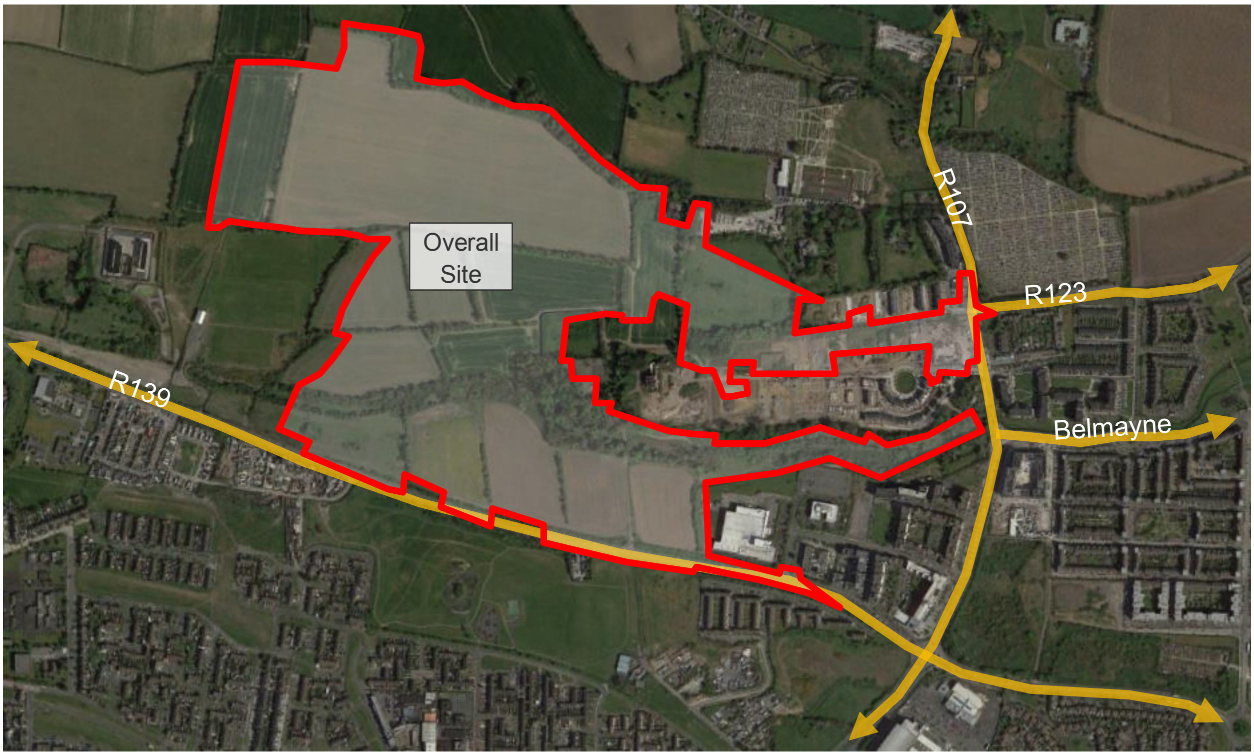


Figure 2 | *Existing Local Road Network (Source: Google Earth).*

Malahide Road (R107) is a regional road running south-north along the eastern boundary of the Belcamp site. This road is approximately 6.5km in length from the site to Fairview and 5.7km to Malahide. The carriageway of the Malahide Road between its intersections with Belmayne and R123 Balgriffin Road is approximately 9.0m wide with footpaths running along both sides and no cycle lanes provided. It is a dual carriageway road in front of the Northern Cross development and connects south to the city. From Northern Cross development, Malahide Road (R107) is a QBC.

R139 is a regional road running east west to the south of the subject Belcamp lands. Approximately 3.2km west of the junction with Malahide Road (R107), R139 provides connection to M1 and M50 motorways (M1 Exit 1 and M50 Exit 3). Along the development lands frontage, R139 has a carriageway of 15m with two lanes on both sides and dedicated right turning pocket lanes which currently facilitate access to some residential and non-residential developments, and also to the subject Belcamp lands. There is a right turning lane from the R139 into the development site and there is a signal-controlled pedestrian crossing at the existing access. Footpath is provided along both sides for the entirety of the road. Cycle lanes (shared with bus lane) are only provided to the east of Malahide Road (R107).

3.1.2 Primary Junctions

The primary existing junctions surrounding the subject Belcamp Lands are: -

- **Junction A (Existing Signalised T-junction)**: Malahide Road (R107) / Balgriffin Road (R123).
- **Junction B (Existing T-junction)**: Malahide Road (R107) with access to Belcamp Phase 1.
- **Junction C (Existing Signalised T-junction)**: Malahide Road (R107) / Belmayne.
- **Junction D (Existing Signalised Crossroads)**: Malahide Road (R107) / R139 (Clarehall Junction).
- **Junction E (Existing Signalised T-junction)**: R139 / Access Road to Bewley's Tea and Coffee.
- **Junction F (Existing T-junction with pedestrian signals)**: R139 / Access Road to Belcamp Lands.
- **Junction G (Existing T-junction)**: R139 / Priorswood.
- **Junction H (Existing T-junction)**: R139 with access to a residential estate.

Figure 3 | *Location of Nearby Primary Junctions (Source: Google Earth).*

Junction A is an existing signal-controlled T-junction located immediately east of the subject Belcamp lands as illustrated in Figure 4. This T-junction currently comprises an additional minor arm (western approach) which is not incorporated into the existing signal system and provides access to a single property only. The southern approach (Malahide Road) currently comprises a straight/left turning lane and a dedicated right turning lane with capacity to accommodate approximately 10 vehicles. This lane configuration provides easier access for those wishing to ingress the Balgriffin Road (R123) by segregating them from the straight/left turning movements. The Balgriffin Road (E) currently comprises a single typical lane which diverges into one straight/left turning lane and one dedicated right turning pocket lane just before approaching the junction. The northern approach (Malahide Road (R107)) comprises one typical lane with no provision of dedicated right turning or left slip lane. Dedicated pedestrian crossings are provided on the eastern and northern approaches of the junction. These pedestrian crossings are incorporated into the traffic system for the junction.

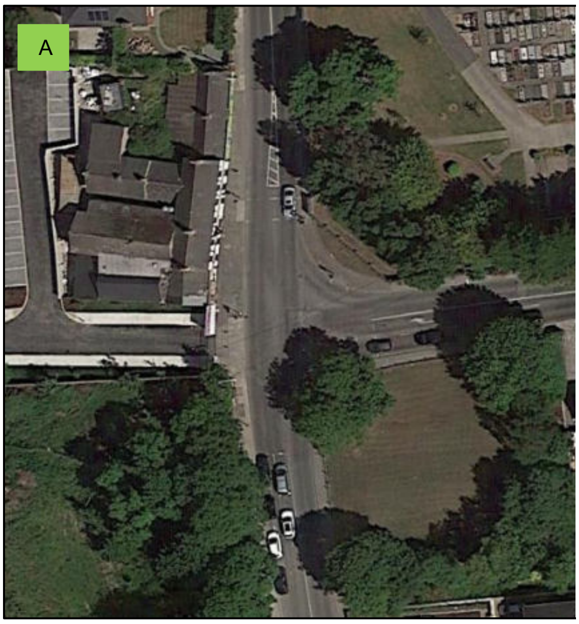


Figure 4 | *Existing Layout of Junction A.*

Figure 5 | *Existing Layout of Junction B.*

Junction B is an existing priority-controlled T-junction located to the east of subject Belcamp lands as illustrated in Figure 4. All approaches of the junction comprise one single lane with no dedicated turning lanes provided. The eastern approach is an access road to a residential development and comprises a dedicated pedestrian crossing (unsignalised) with dropped kerbs and tactile paving. An upgraded layout for Junction B was approved under Belcamp Phase 1 development (Reg. Ref. F15A/0609) and is now fully constructed. The new layout comprises the signalisation of the junction and the inclusion of the western approach (College Avenue). Details of the approved layout is provided later in this report in Section 4.9.

Junction C is an existing signal-controlled T-junction located to the east of the subject Belcamp lands as illustrated in Figure 4. The southern approach (Malahide Road) currently comprises a straight through lane and a dedicated right turning lane with capacity to accommodate approximately 7 vehicles. As for Junction A, this lane configuration on the southern approach of Junction C provides easier access for those wishing to ingress the Belmayne by segregating them from the heavier straight through movement. The eastern approach (Belmayne) currently comprises one lane dedicated for right turns and one lane dedicated for left turns. The northern approach (Malahide Road) comprises a single lane which diverges into a straight through lane and a left slip lane just before approaching the junction. Dedicated pedestrian crossings are provided on the eastern and southern approaches and are incorporated into the traffic system for the junction.

Figure 6 | *Existing Layout of Junction C.*

Figure 7 | *Existing Layout of Junction D.*

Junction D, Clarehall Junction is an existing signal-controlled crossroads, located southeast of the subject Belcamp lands as illustrated in Figure 4. The southern approach (Malahide Road) currently comprises two straight through lanes, one left turning slip lane and one dedicated right turning lane with capacity to accommodate approximately 10 vehicles. The northern approach (Malahide Road) currently comprises two straight through lanes, one left turning slip lane and one dedicated right turning lane with capacity to accommodate approximately 11 vehicles. The western approach (R139) currently comprises two straight through lanes, one left slip lane and one dedicated right turning lane with capacity to accommodate approximately 18 vehicles. The eastern approach (R139) currently comprises one straight through lane, one straight through/right turning lane and one left turning slip lane. Dedicated staggered pedestrian crossings are provided on the southern, eastern and western approaches. These pedestrian crossings are incorporated into the traffic signal system for the junction. Advanced stop lines for cyclists are provided on all approaches which currently provide a safe area for cyclists in front of vehicular queues and help them position themselves correctly for their turning movements. Road markings on this junction is relatively new and well-delineated.

Junction E is an existing signal-controlled T-junction located to the southeast of the subject Belcamp lands as illustrated in Figure 4. The eastern approach (R139) currently comprises two straight through lanes and a dedicated right turning lane with capacity to accommodate approximately 17 vehicles. This lane configuration on the eastern approach provides easier access for those wishing to ingress the commercial developments at Northern Cross by segregating them from the heavier straight through movement. The western approach (R139) currently comprises of two lanes, one for straight through/left turn movements and one dedicated for straight through. The northern approach comprises a single normal lane and an exit lane. A dedicated pedestrian crossing with dropped kerbs and tactile paving is provided on the northern approach.

Figure 9 | *Existing Layout of Junction E.*

Figure 8 | *Existing Layout of Junction F.*

Junction F is an existing priority-controlled T-junction located immediately south of the subject Belcamp lands and provides access to the development as illustrated in Figure 4. The eastern and western approaches of the junction (R139) comprise of two lanes on both direction with a dedicated right turning lane – with capacity to accommodate 9 vehicles, provided on the eastern approach for those wishing to access the subject Belcamp lands. The northern approach is gated for private access only. A dedicated staggered signalised pedestrian crossing is provided on the western approach to the junction.

Junction G is an existing priority-controlled T-junction located immediately south of the subject Belcamp lands as illustrated in Figure 4. The eastern and western approaches of the junction (R139) comprise of two lanes on both direction with a dedicated right turning lane – with capacity to accommodate 13 vehicles, provided on the western approach for those wishing to access the existing Tara Lawns halting site to the south. The southern approach comprises of a single normal lane and an exit lane.

Figure 10 | *Existing Layout of Junction G.*

Junction H is an existing priority-controlled T-junction located to the southwest of the subject Belcamp lands as illustrated in Figure 4. The eastern and western approaches of the junction (R139) comprise of two lanes on both direction with a dedicated right turning lane – with capacity to accommodate 7 vehicles, provided on the western approach for those wishing to access the road to the south. The southern approach comprises of a single normal lane and an exit lane.

Figure 11 | *Existing Layout of Junction H.*

3.1.3 Accident Data

Accident data was obtained for the area surrounding the subject Belcamp lands from the Road Safety Authority Collision Statistics database. Figure 13 below shows the location of all road traffic accidents recorded in the surrounding area in the period of 2005 – 2016. These accidents are categorised into class of severity, which includes minor (*black circles*), serious (*yellow circles*) and fatal (*red circles*). This review will assist to identify any potential safety concerns in relation to the existing road network.

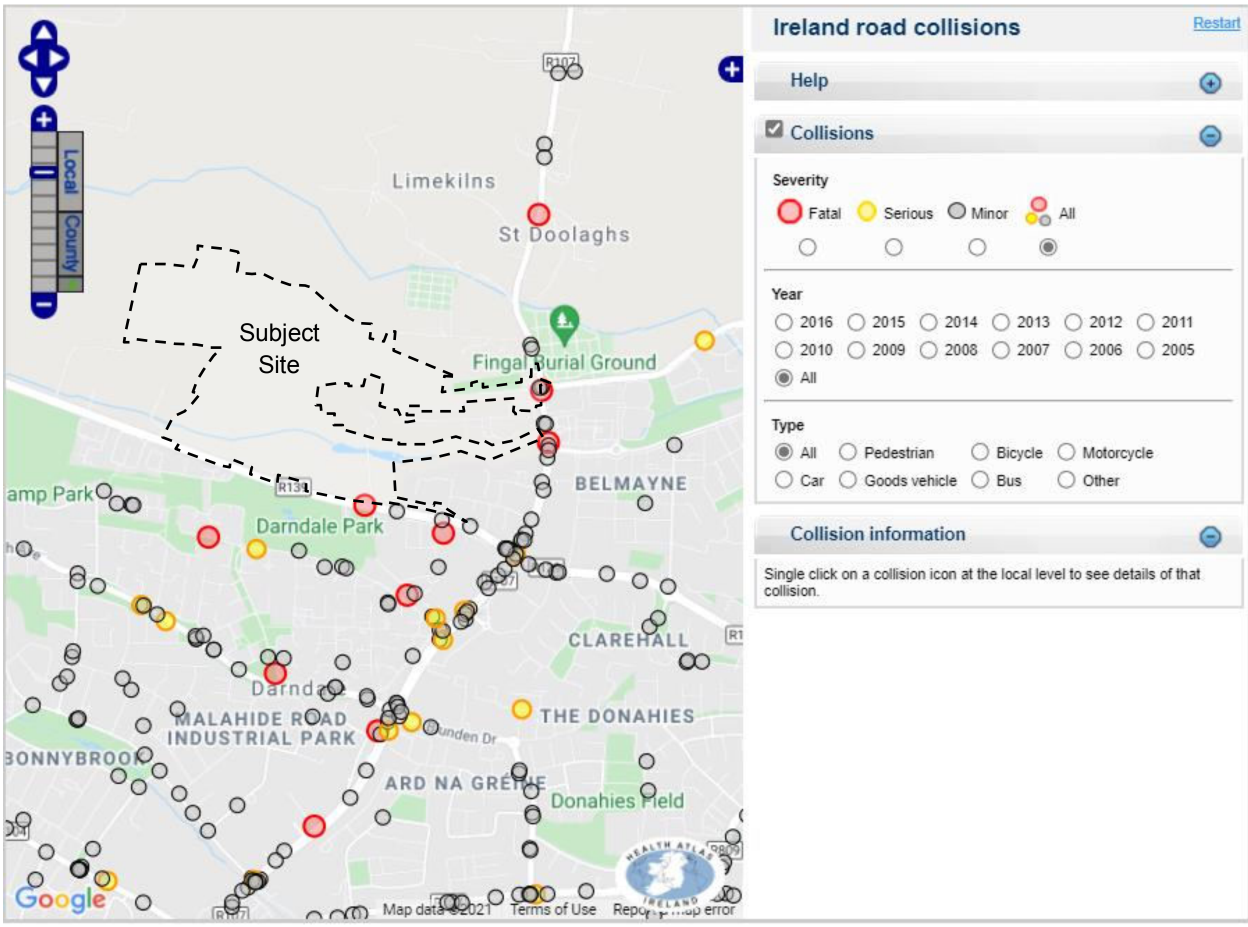


Figure 12 | *Map of Accident data for the period of 2005 – 2016 (Source: RSA Database).*

As can be seen from the map above, a cluster of accidents was recorded at the Clarehall junction with less dense clusters recorded to the south and north along Malahide Road (R107).

3.2 Existing Public Transport Provision

An assessment of the existing public transport service provision in the area has been carried out. This includes detailed analysis of the modes of transport, ease of access and frequency of service currently available. The existing QBC service along Malahide Road (R107) and the rail station in Clongriffin are key elements already serving the study area.

3.2.1 Existing Bus

The subject Belcamp lands are served by public bus services to the east of the site. The closest bus stops are located on Malahide Road (R107), being Bus Stops No. 1217 (southbound) and No. 1206 (northbound). The location of the subject bus stops in relation to subject Belcamp lands is illustrated in Figure 14. These bus stops are served by Dublin Bus Route 42 and Route 43. Section 6.4 of this TTA details the walking distances to the bus stops from the subject site.

- Route 42 operates between Talbot Street in Dublin city centre and Sand's Hotel in Portmarnock, via Malahide.
- Route 43 operates between Talbot Street in Dublin city centre and Swords Business Park.

The surrounding area is also served by Dublin Bus Route 15 and Route 27.

- Route 15 operates from Clongriffin Station (Stop 6317) and ends in Ballycullen Road (Stop 6282) travelling via the city centre.
- Route 27 operates from Fortunestown Road (Stop 2353) and ends in Templeview Avenue (Stop 4595) travelling via the city centre.

The closest bus stops served by these routes are located on R139 southeast of the subject Belcamp lands. A summary of the frequency of these routes is presented in Table 1.

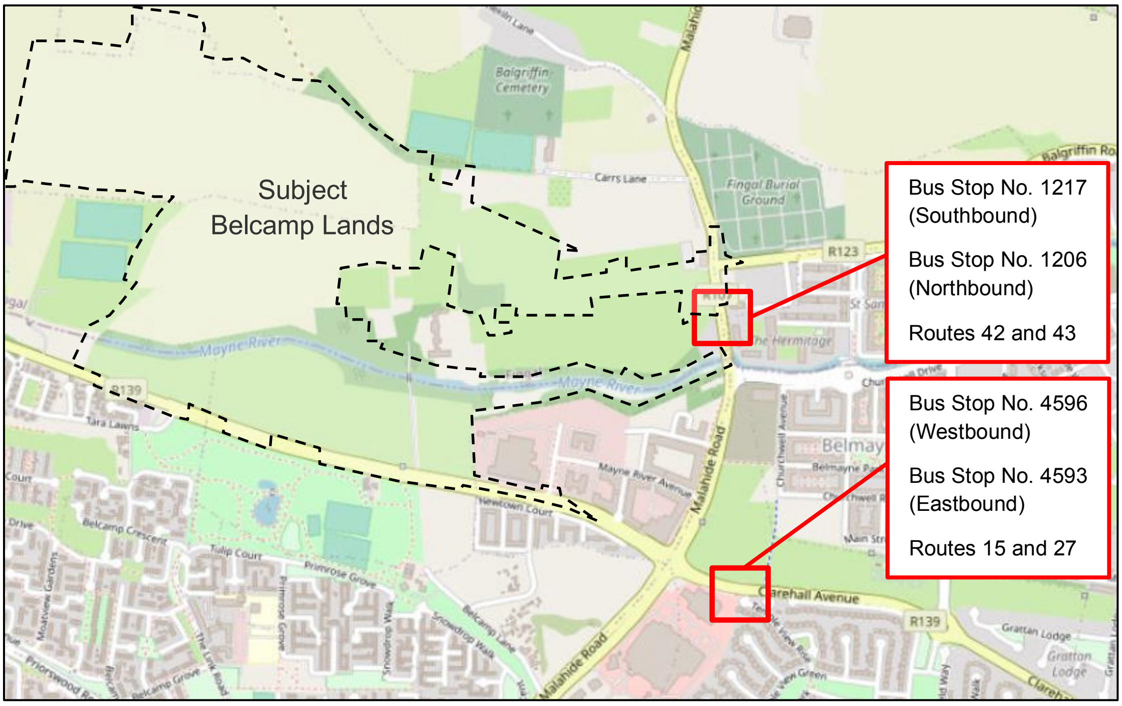


Figure 13 | *Location of Closest Bus Stops Served by Dublin Bus (Source: Openstreet Map).*

Travel time from the subject bus stop on Malahide Road (R107) to Talbot Street in Dublin city centre is approximately 16 minutes. On the opposite direction, the travel time from the subject bus stop on Malahide Road (R107) to Malahide is approximately 16 minutes, and to Swords Business Park is approx. 20 minutes.

It is worth mentioning that the bus frequency data presented in Table 1 below was based on the time that buses leave the first bus stop. The information was obtained by consultation of Dublin Bus website.

Weekday Frequency						
Route No.	Direction	00:00 to 07:00	07:00 to 09:00	09:00 to 17:00	17:00 to 19:00	19:00 to 00:00
42	From Dublin	1 service	6 services	17 services	6 services	9 services
	To Dublin	4 services	6 services	17 services	6 services	9 services
43	From Dublin	2 services	6 services	13 services	4 services	4 services
	To Dublin	3 services	7 services	13 services	4 services	4 services
15	From Dublin	18 services	17 services	Every 9-12min	13 services	20 services
	To Dublin	18 services	Every 8-12min	Every 8-12min	13 services	20 services
27	From Dublin	13 services	Every 10min	Every 10min	Every 10min	12 services
	To Dublin	11 services	Every 10min	Every 10min	Every 10min	15 services
Saturday Frequency						
Route No.	Direction	00:00 to 07:00	07:00 to 09:00	09:00 to 17:00	17:00 to 19:00	19:00 to 00:00
42	From Dublin	-	3 services	21 services	6 services	10 services
	To Dublin	1 service	4 services	21 services	5 services	10 services
43	From Dublin	1 service	2 services	10 services	3 services	4 services

	To Dublin	2 services	2 services	9 services	3 services	4 services
15	From Dublin	16 services	Every 15min	Every 15min	Every 15min	Every 15min
	To Dublin	16 services	Every 15min	Every 15min	Every 15min	Every 15min
27	From Dublin	4 services	5 services	Every 10min	Every 10min	13 services
	To Dublin	4 services	5 services	Every 10min	Every 10min	13 services
Sunday Frequency						
Route No.	Direction	00:00 to 07:00	07:00 to 09:00	09:00 to 17:00	17:00 to 19:00	19:00 to 00:00
42	From Dublin	-	-	13 services	5 services	6 services
	To Dublin	-	1 service	14 services	4 services	5 services
43	From Dublin	-	-	10 services	3 services	4 services
	To Dublin	-	1 service	10 services	3 services	4 services
15	From Dublin	14 services	4 services	Every 15min	Every 15min	Every 15min
	To Dublin	14 services	5 services	Every 15min	Every 15min	Every 15min
27	From Dublin	-	3 services	Every 15min	Every 15min	13 services
	To Dublin	-	3 services	Every 15min	Every 15min	13 services

Table 1 **|** *Dublin Bus Routes 15, 27, 42 and 43 – Weekday and Weekends Frequency.*

In addition to the routes above, Dublin Bus also operates Route 27x from Clarehall towards UCD Belfield. It is a Monday to Friday service, with one bus leaving Clarehall at 07:35 towards UCD Belfield in the morning and one bus leaving UCD Belfield at 17:05 in the evening towards Clarehall.

At the time of writing, it is expected that a new BusConnects Core Bus Corridor (CBC) service (D-route) will be commencing along the Malahide Road (R107) running from the City Centre to Clongriffin and is due to be in place for end of 2023. It is anticipated that the orbital N8 route will commence by the end of 2024 and will connect Clongriffin Dart Station to Blanchardstown via Belcamp and the Airport. These are further described in Sections 4.2 and 5.4 of this TTA.

Although not strictly public transport, a private shuttle bus is provided by Hilton Dublin Airport Hotel, 500m from the site at Clarehall junction, which provides a direct link from the Hotel to the Airport.

A public transport capacity assessment has been carried out to inform this Traffic and Transport Assessment. The results show the existing bus services currently have capacity to accommodate the Belcamp Site following the phasing programme. The assessment included bus capacity surveys at both bus stops listed above during peak rush hour times, the impact of the Belcamp site was then included to find the spare capacity of the existing public transport network. The findings of this assessment are reported in a stand-alone report, “Public Transport Capacity Assessment”, which is included at Appendix A.

The main conclusions of the Public Transport Capacity Assessment report are:

1. The Belcamp SHD site is well positioned to both the existing and the proposed, enhanced, Bus Connects and DART+ public transport network.

2. There are significant levels of spare capacity on the current bus network in the immediate area of the subject site, as shown by the bus stop surveys undertaken for this report.

3. The detailed layout of the SHD scheme contains key infrastructure of immense benefit to buses, both in the short and long term.

4. The NTA's BusConnects project proposals include attractive new orbital and radial routes of direct benefit to the development.

3.2.2 Existing Rail

The subject Belcamp lands are not directly served by rail service. The closest train station is Clongriffin, located approximately 2.5km (c. 37 – minutes walk) east of the subject site. See Figure 15. Clongriffin is served by Commuter Rail and DART services. The Commuter Rail service through Clongriffin Station serves all stations from Dundalk through Dublin City Centre to Gorey. The service operates at 3 – 4 services per hour in both direction on weekdays. The DART service through Clongriffin Station serves all station from Malahide through Dublin City Centre to Bray and Greystones. On weekdays, this service operates at a 20-minute frequency in both directions. Journey time from Clongriffin Station to Connolly Station is c. 20 minutes.

Dublin Bus Route 15 currently provides a connection between the subject Belcamp Lands and Clongriffin Station.

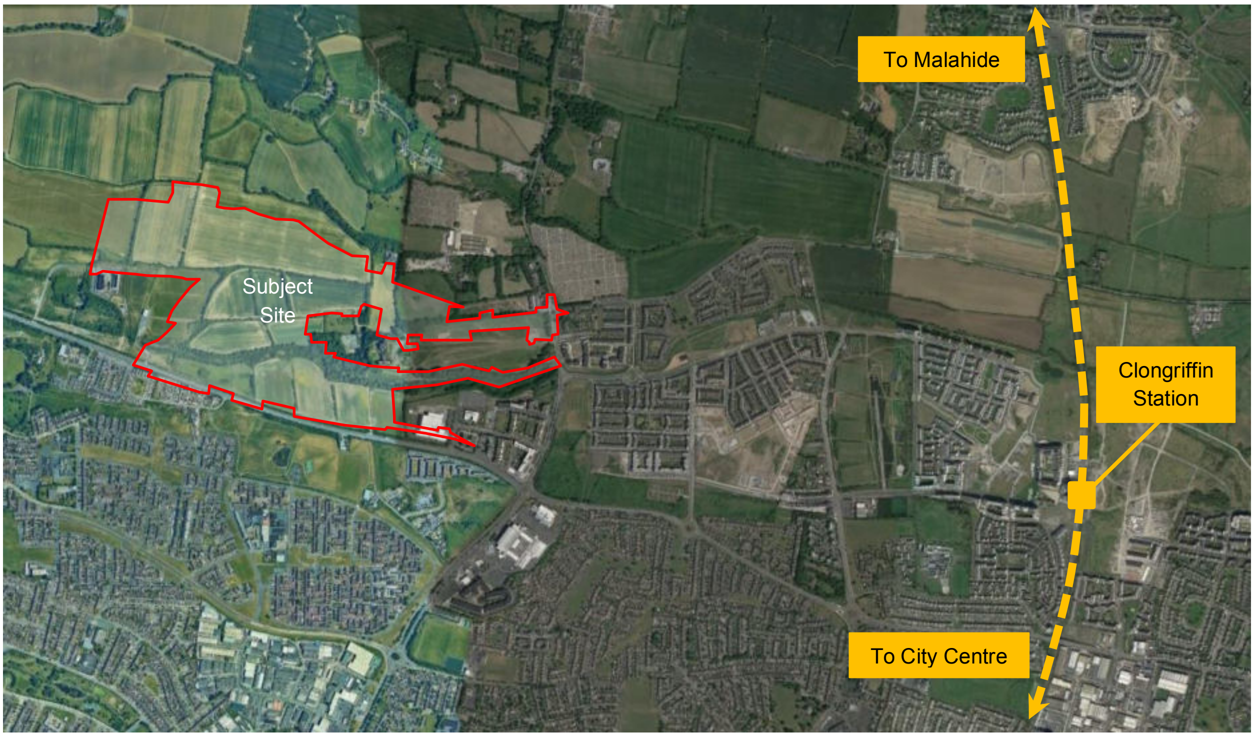


Figure 14 | *Location Map of Clongriffin Train Station (Source: Google Earth).*

3.3 Existing Cycle Facilities

3.3.1 Public Cycle Parking

Covered public cycle parking with 112 stands is provided in Clongriffin at Station Square which is 2.5km or a 37 minute walk, or a 10 minute bike trip from the subject site. This public cycle parking currently provides the opportunity for residents living in the surrounding area to commute to their final destination (place of work, school, college, etc.) by a cycle-train combined travel.

According to the Transport Assessment prepared by Waterman Moylan for a mixed-used development approved by DCC in March 2020 (Reg. Ref. 3894/19), 28 additional cycle parking stands will be provided at Station Square as part of the approved development to meet DCC requirements. This increase in the total number of parking stands at Station Square will facilitate and encourage existing and future residents in the local and surrounding area to shift towards cycle-train combined travels and away from private car usage.

31 cycle parking stands are also provided in the Clarehall complex, 26 in front of the entrance to Tesco supermarket and 5 stands serving the Mr. Price and Dealz retail stores. These are located less than 5-minutes walking from the subject site.

3.3.2 Cycle Infrastructure

Cyclists can benefit from the provision of dedicated cycle lanes along both sides of the carriageway on Belmayne, Malahide Road (R107), Hole In The Wall Road and Main Street (Clongriffin). These cycle lanes currently facilitate access to Clongriffin train station, Malahide Road Industrial Park and Dublin city centre.

Figure 16 is an extract of the Cycle Network Plan for the Greater Dublin Area which illustrates the existing cycling infrastructure within the surrounding area.

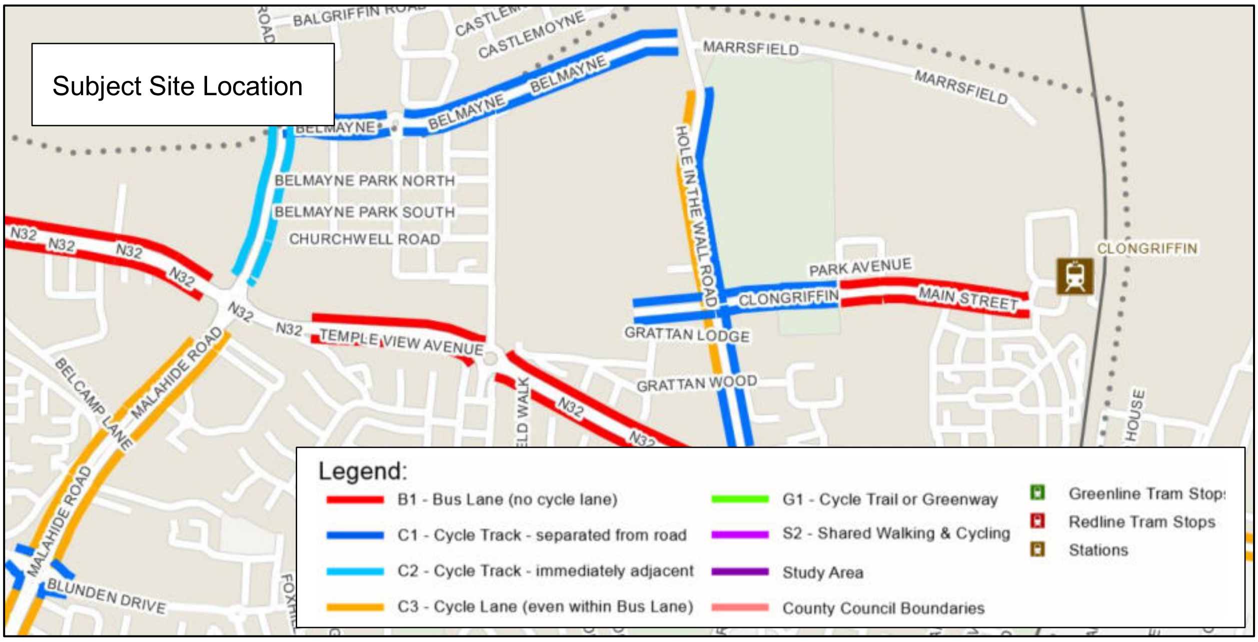


Figure 15 **|** *Existing Cycle Infrastructure.*

3.4 Existing GoCar Facility

To the east of the subject Belcamp lands, a number of GoCar stations are provided at Belmayne, Clarehall and Clongriffin. See Figure 17 below. Walking access to these stations is facilitated by the good-quality network of footpaths provided in the local area. The nearest GoCar stations are directly adjacent to the proposed development.

According to GoCar website, the key benefits associated with a GoCar include:

- Each GoCar replaces approximately 20 private cars.
- Carsharing reduces car ownership & car dependency, congestion, noise and air pollution.
- Planning Permission – the inclusion of a Car Club could increase the likelihood of gaining the most optimal planning permission for the project.
- Cut build costs and reduce construction time by reducing the parking requirements within a project.
- Helps increase walking, cycling and use of public transport.
- Allow individuals to have benefits of a private car without having the large costs and hassle associated with car ownership.

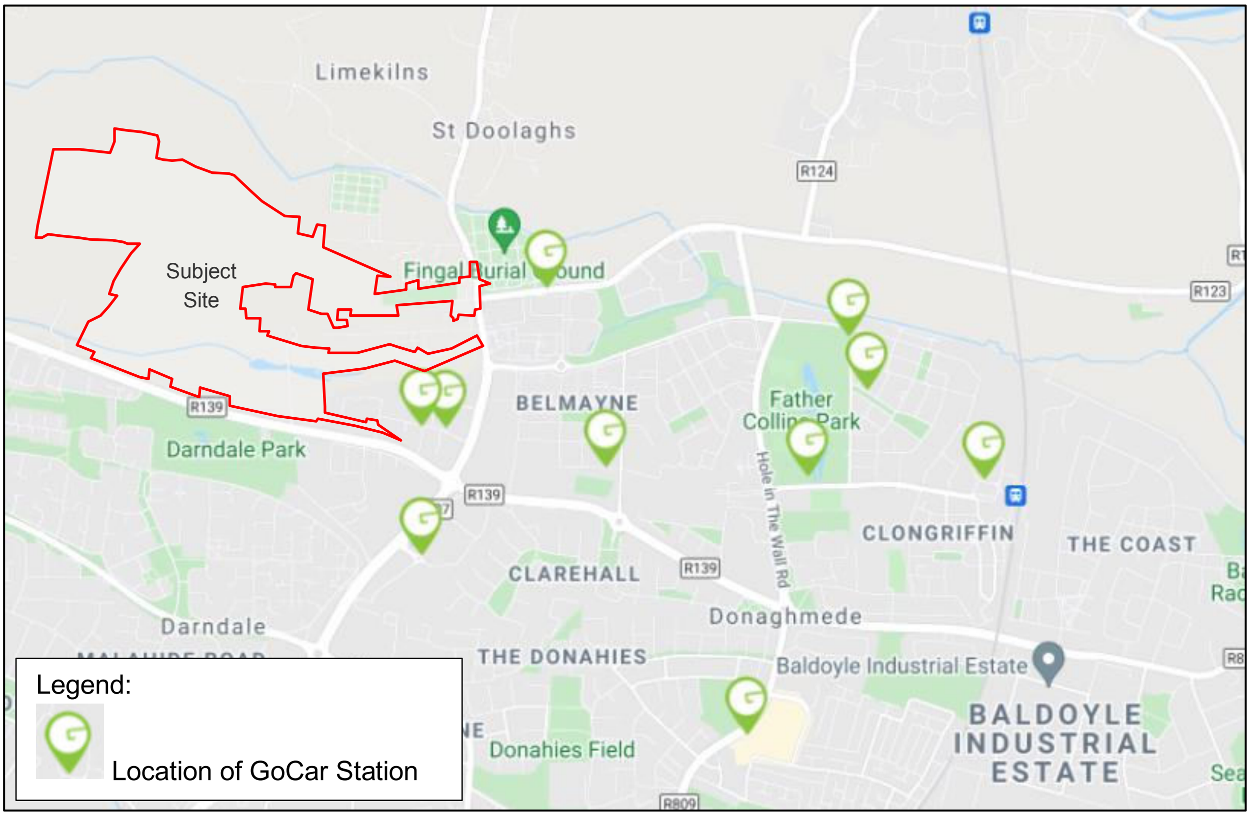


Figure 16 | *Location Map of Nearby GoCar Stations (Source: GoCar website).*

3.5 Existing Pedestrian Facilities

The Malahide Road (R107) located to the east of the subject Belcamp site and the R139 to the south, comprise footpaths along both sides of their carriageways. These footpaths, which join up at the Clarehall junction, are of good quality with consistent width throughout and offer walking connections to a number of facilities including bus stops, retail, educational and employment. Dedicated pedestrian crossings with dropped kerbs and tactile paving are provide at every road crossing point towards these facilities.

The existing pedestrian facilities in the surrounding area comprise an inter-connected network of footpaths linking the various neighbourhoods to each other, to the existing schools and commercial/retail, to the Clongriffin train station, to public parks and to the surrounding public network.

3.6 Mode Share – Census 2016, Small Areas

As part of the Belcamp SHD – Sustainable Transport Strategy (STS) prepared by SYSTRA to support the subject application, a review of the existing travel patterns (commuting to work and education) of the existing population of the locality was undertaken using the Small Area Population Statistics (SAPS) – Census 2016, which was considered relevant to predict the likely travel patterns of future residents at the subject Belcamp lands and identify existing constrains which may impact upon the sustainability of future development.

The subject Belcamp lands (proposed under the subject application) fall partially within the FCC and partially within the DCC jurisdictions. It was noted by SYSTRA that the corresponding Small Area in FCC lands covers predominantly rural lands, and it was therefore considered that the DCC Small Area would be more representative of the Site's future potential mode share. The Mode Share findings from the consultation of the DCC Small Area is outlined below.

- Car / Van / Motorcycle: representing 36% of the total trips.
- Public Transport: representing 24% of the total trips.
- Walk: representing 36% of the total trips.
- Cycle: representing 3% of the total trips.

In order to understand how the consulted Small Area in DCC compares with the commuting mode share for all Small Areas within DCC, a comparison chart was prepared by SYSTRA and is reproduced in Figure 18 below – extracted from *'Figure3. DCC & Local Commuting Mode Shares'* in Belcamp SHD – STS report.

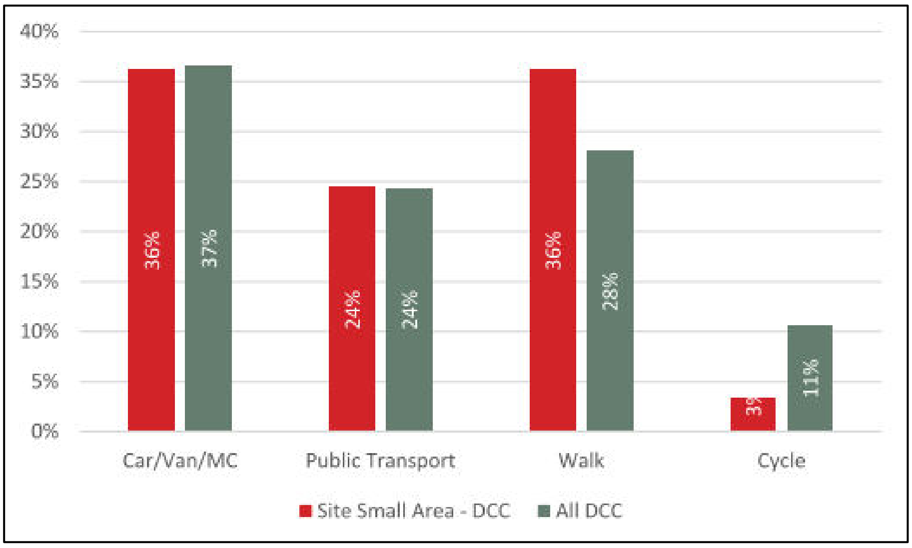


***Figure 17** | Mode Share Comparison (Belcamp SHD Small Area & All DCC).*

From the chart above, it can be seen that the car/van/motorcycle and public transport mode shares are similar when comparing the consulted Belcamp SHD Small Area with All DCC Small Areas. It was noted by SYSTRA however, that the public transport mode share in the Belcamp SHD Small Area *"is higher than expected for an outer suburban area, which can be explained by multiple bus routes serving the area and combining to provide a high frequency of services*". Cycling mode share for the consulted Belcamp SHD Small Area is relatively low when compared to All DCC Small Areas

4. Transportation & Infrastructure Improvements: Current Transport Projects, Plans and Strategies

4.1 DART+

Clongriffin Station, located approximately 2.5km east of the subject site, is part of the northern route of the DART railway network. The DART+ Programme aims to improve current rail services across Dublin City and Greater Dublin, by modernising and providing an electrified and more frequent and reliable rail service, enhancing capacity on the rail corridor. As part of the programme, the rail service between Drogheda and Dublin City Centre (via Clongriffin) is planned to be electrified with higher frequency. New rail frequency on Clongriffin has not been confirmed at the time of writing, however, significant increase in capacity is expected by purchase of new rolling stock. Improvements to the northern route are expected to be in place by 2028, with new rolling stock expected to come into service by late 2022.

4.2 Bus Connects

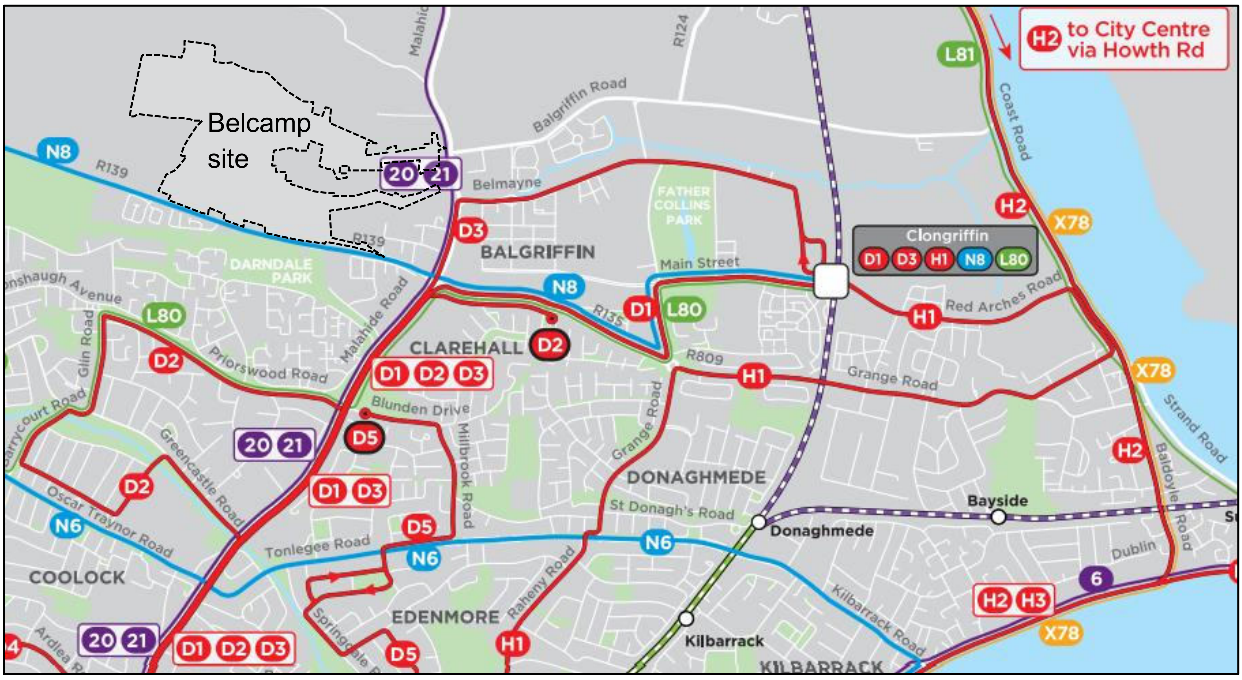
4.2.1 Context

The Bus Connects project currently being promoted by the National Transport Authority aims to deliver a much-enhanced bus service to the Greater Dublin Area. The bus services will be dominated by high frequency "Spine routes" that follow the main radial corridors in the city centre, and beyond. In tandem with these service re-designs, the bus route alignments will be upgraded to form Core Bus Corridors (CBC) which will radically enhance bus priority measures. As of April 2022, Phase 1 and 2 of the Bus Connects project have been launched. Phase 1 included the launch of the H Spine bus route which is located east of the Belcamp SHD site travelling through Donaghmede.

The subject site is located in close proximity to the proposed CBC Route 1 – Clongriffin to City Centre – See Section 4.2.1 below. Three "spine" routes and four "local/radial/orbital" routes are proposed to serve the subject Belcamp lands. These are: the **Spine Routes D1, D2 and D3**, the **Radial Routes 20 and 21**, the **Orbital Route N8** and the **Local Route L80** – See Figure 19 below. A summary of the frequency of these proposed routes is presented in Table 2.

The Spine Routes D1, D2 and D3 will become operational in the 4th quarter of 2023 and Orbital Route N8 4th quarter 2024.

The closest bus stops to be served by these proposed routes will be located on Malahide Road (R107) just east of the subject Belcamp lands, on R139 and on the extension of Belmayne Main Street (See Section 4.3 - Figure 21) to the southeast of the subject Belcamp lands.



Route No.	Description
20	Malahide - Kinsealy - City Centre
21	Swords Business Park - Kinsealy - City Centre
N8	Blanch SC - Dublin Airport - Clongriffin
D1	Clongriffin - City Centre - Grange Castle
D2	Clare Hall - City Centre - Citywest
D3	Clongriffin - City Centre - Clondalkin
L80	Clongriffin - Beaumont Hospital – DCU

Figure 18 **|** *Bus Connects Routes Map (Extracted from BusConnects Network Map).*

Weekday Frequency					
Route No.	Before 07:00	07:00 to 09:00	09:00 to 15:00	15:00 to 18:00	After 18:00
20	30 min	30 min	30 min	30 min	30 to 60 min
21	30 min	30 min	30 min	30 min	30 to 60 min
N8	30 to 60 min	30 min	30 min	30 min	30 to 60 min
D1	15 to 30 min	15 min	15 min	15 min	15 to 30 min
D2	15 to 30 min	15 min	15 min	15 min	15 to 30 min
D3	15 to 30 min	15 min	15 min	15 min	15 to 30 min
L80	40 min	20 min	40 min	20 min	40 to 60 min
Saturday Frequency					
Route No.	Before 07:00	07:00 to 09:00	09:00 to 15:00	15:00 to 18:00	After 18:00
20	60 min	60 min	30 min	30 min	30 to 60 min
21	60 min	60 min	30 min	30 min	30 to 60 min

N8	60 min	60 min	30 min	30 min	30 to 60 min
D1	20 min	20 min	15 min	15 min	15 to 30 min
D2	20 min	20 min	15 min	15 min	15 to 30 min
D3	20 min	20 min	15 min	15 min	15 to 30 min
L80	60 min	60 min	60 min	60 min	60 min
Sunday Frequency					
Route No.	Before 08:00	08:00 to 10:00	10:00 to 15:00	15:00 to 18:00	After 18:00
20	-	60 min	30 min	30 min	30 to 60 min
21	-	60 min	30 min	30 min	30 to 60 min
N8	-	60 min	30 min	30 min	30 to 60 min
D1	-	30 min	20 min	20 min	20 to 30 min
D2	-	30 min	20 min	20 min	20 to 30 min
D3	-	30 min	20 min	20 min	20 to 30 min
L80	60 min	60 min	60 min	60 min	60 min

Table 2 **|** *Frequency of Bus Connects Routes (Source: BusConnects).*

4.2.2 Core Bus Corridor (CBC) Route 1 – Clongriffin to City Centre

According to Bus Connects, "*a CBC is an existing road with bus priority so that buses can operate efficiently, reliably and punctually. This generally means full length dedicated bus lanes on both sides of the road from start to finish of each corridor or other measures to ensure that buses are not delayed in general traffic congestions. The bus lanes will be alongside general traffic and segregated cycle lanes/tracks where feasible*."

CBC Route 1 – Clongriffin to City Centre commences at Clongriffin DART Station and is routed via Clongriffin Main Street which will be extended to join the Malahide Road (R107) at a new junction to the north of Clarehall junction, to include a new bus, cycle and taxi only access (bus gate) with general traffic not permitted to use this access. The layout of the approved bus gate is as approved under the Dublin City Council's '*Belmayne Main Street and Belmayne Avenue PART VIII* Scheme', which is described in Section 4.3 and Figure 21 below.

From this bus gate, the CBC Route 1 is then routed via Malahide Road (R107) to the junction with Marino Mart/Fairview. From that point the CBC ties into a separate project, Clontarf to City Centre Cycle & Bus Priority Project which is currently being proposed by Dublin City Council and in summary aims to a) deliver a high quality, continuous and consistent cycling facilities to cater for existing and future demand; b) provide additional pedestrian crossings; c) improve bus journey times and reliability; d) reduce reliance on private car and e) provide for a reduction in transport emissions through encouraging a modal shift to active travel and public transport project.

Figure 19 | *Bus Connects CBC Routes Map.*

4.3 Go Car

It is expected that GoCar will provide 4 no. shared car club vehicles within the subject development site when fully constructed and occupied. A letter to confirm GoCar intentions to provide these new car club vehicles is included in Appendix D.

According to GoCar, *"Carsharing is a sustainable service. By allowing multiple people to use the same vehicle at different times, car sharing reduces car ownership, car dependency, congestion, noise and air pollution. It frees up land which would otherwise be used for additional parking spaces. Most GoCar users only use a car when necessary and walk and use public transport more often than car owners."*

4.4 Belmayne Main Street and Belmayne Avenue Scheme – Part VIII DCC

In accordance with the Clongriffin – Belmayne Local Area Plan requirements, Dublin City Council is proposing to complete the unfinished Belmayne Main Street – Belmayne Avenue roadway, which includes:

- Signalised junctions at Belmayne Avenue/Belmayne Main Street and at Belmayne Main Street/Malahide Road.
- Bus lane facilities along Belmayne Main Street, including a bus lane in both directions and a new bus-gate link to the Malahide Road (R107).
- Construction of carriageway with central median island, footpaths and cycleways along the Belmayne Main Street.

As set out in the '*Part VIII Report for Belmayne*', prepared by DBFL in October 2018, the overall proposed scheme is divided into four sections. Section 4, which will comprise the bus gate onto Malahide Road (R107) is illustrated in Figure 21 – extracted from the '*PART VIII Report for Belmayne*'.

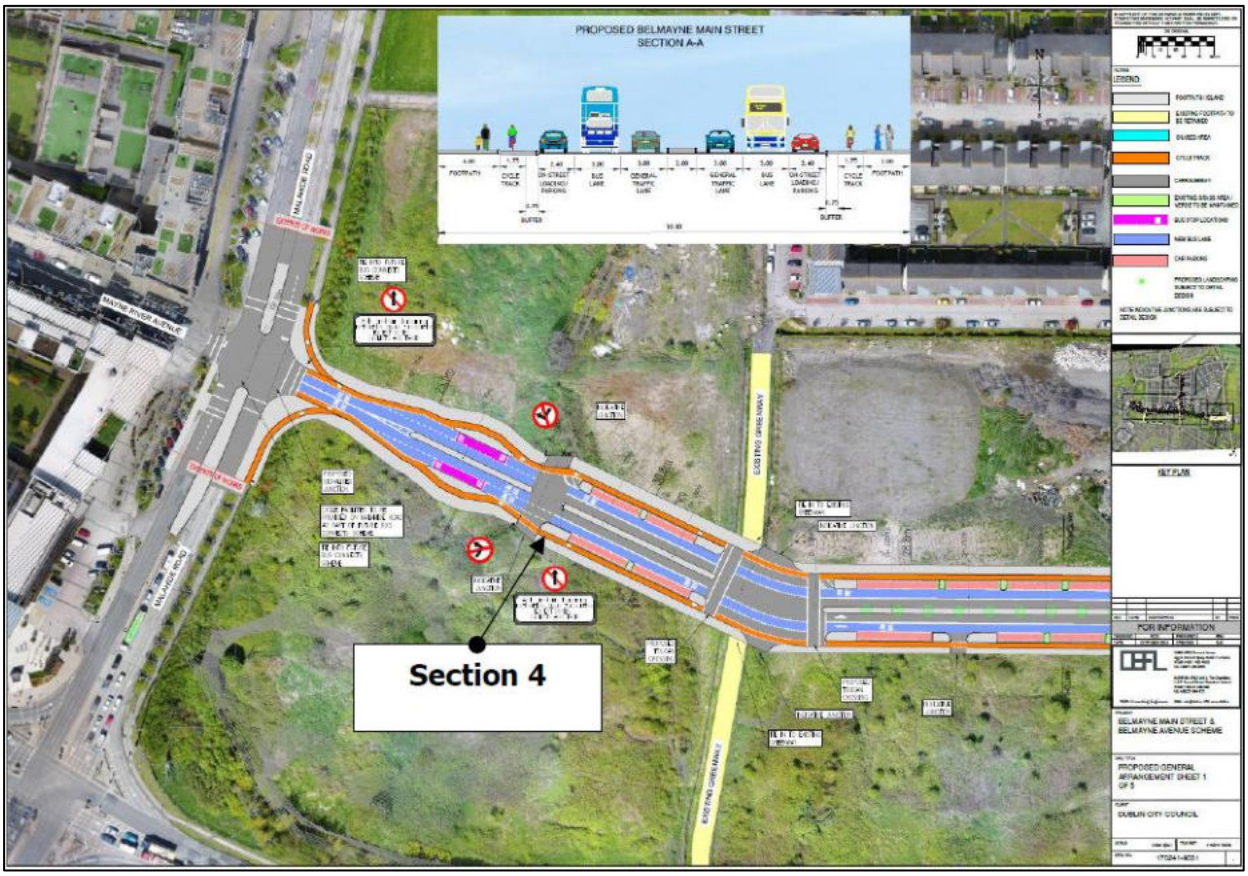


Figure 20 | *Approved Scheme for Belmayne Main Street and New Bus-gate Link.*

As can be seen from the above, the proposed bus gate requires the conversion of the existing three-armed priority-controlled junction between Malahide Road (R107)/Mayne River Street to a four-armed signal-controlled junction with the eastern arm forming the new bus gate.

4.5 MetroLink

MetroLink is a proposed high-capacity, high-frequency rail line running from Swords through Dublin Airport and Dublin City Centre to Charlemont. MetroLink will carry up to 50 million passengers annually, cutting journey times from Swords to the city centre to 25 minutes. The preferred route for MetroLink is currently undergoing consultation and an application for planning approval for the MetroLink Scheme is expected to be made to An Bord Pleanala in 2022. Although initially forecast to be operational by 2027, the MetroLink scheme is currently assumed to be in place between 2030 and 2043.

4.6 GDA Cycle Network Plan

Proposals for the Greater Dublin Area Cycle Network Plan were published by the National Transport Authority in December 2013. The plan sets out a vision and a strategy for the construction and/or designation of a comprehensive network of cycling routes throughout the Greater Dublin Area (Counties Dublin, Meath, Kildare and Wicklow). An extract from Sheet N3 (Proposed Cycle Network for Dublin North Central), where the subject Belcamp lands are located, is reproduced in Figure 22 below.

Figure 21 **|** *GDA Cycle Network Plan - Proposed Cycle Network Upgrades.*

A draft version of the updated GDA Cycle Network Maps 2021 is currently available and shown in Figure 23 below. The plan includes an additional Greenway through the site and further development of the secondary cycle pathways surrounding the subject site. This Greenway connects Belcamp to Clongirffin Dart Station and the coastal roads.

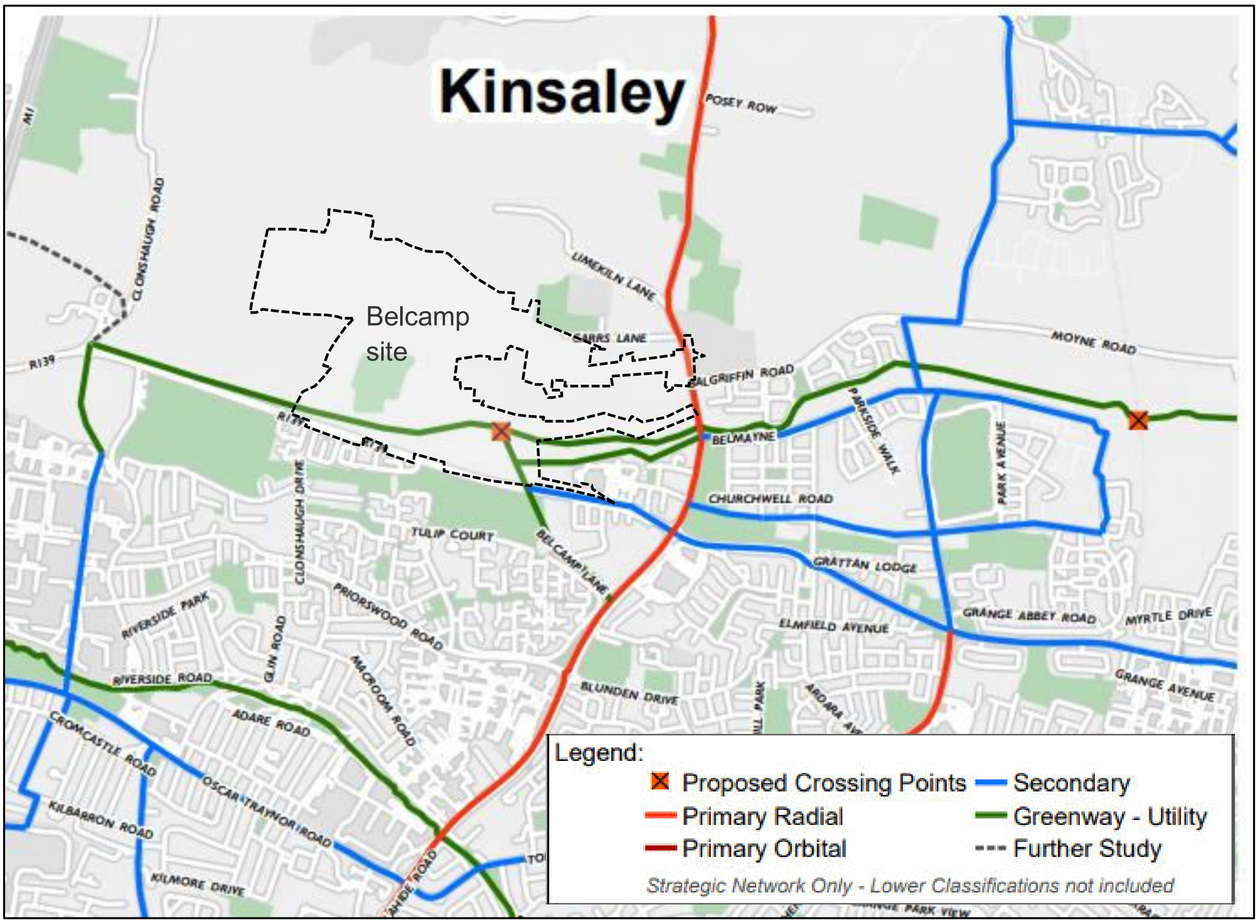


Figure 22 **|** *GDA Cycle Network Plan – 2021 Proposed Cycle Network Upgrades.*

4.7 South Fingal Transport Study (SFTS) - 2019

By way of background, in about 2006 FCC/Atkins prepared a transportation study of the FCC/DCC Fringe area which formed the basis of a proposed road infrastructure strategy for the area. This resulted in the Atkins Orange Route drawing which has been the basis of the transportation strategy in the area and of both FCC and DCC Development Plans (Figures 23 and 24, respectively). These plans include the East-West Distributor Road: Malahide Road (now called the East West Link Road) parallel to the R139 and the north south R107 Malahide Road Realignment, Balgriffin Bypass.

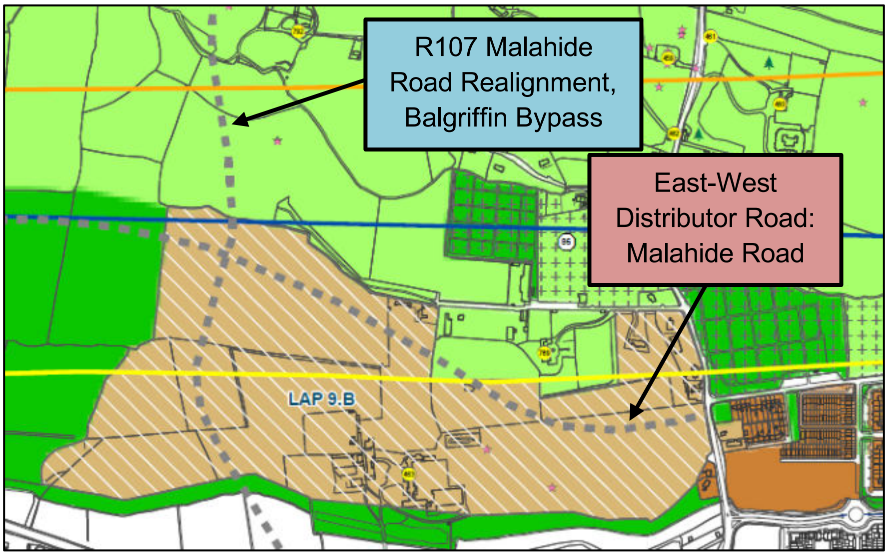


Figure 23 **|** *Proposed Road Alignment – Extracted from FCC Development Plan 2017 – 2023.*

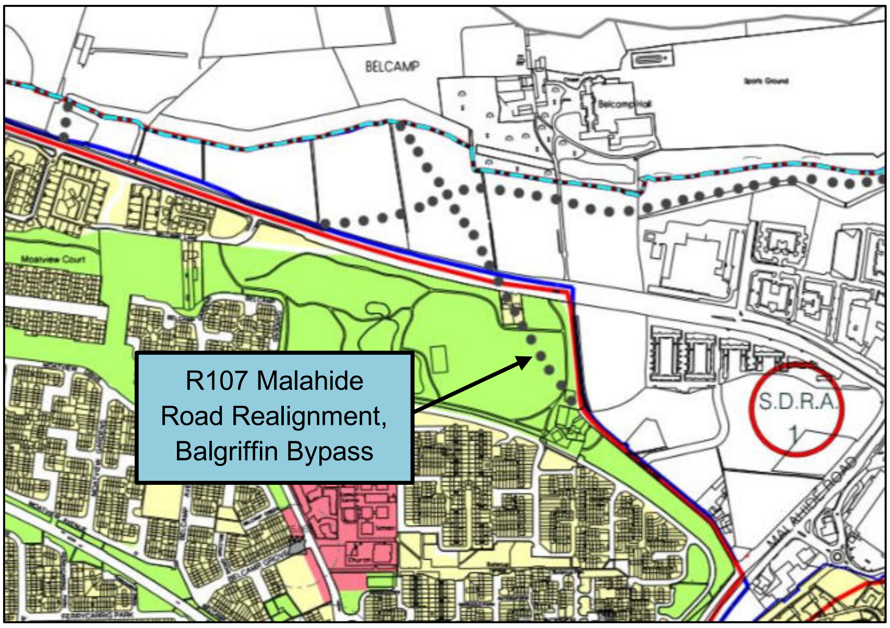


Figure 24 **|** *Proposed Road Alignment – Extracted from DCC Development Plan 2016 – 2022.*

DMURS was first published in 2013 and this has influenced significant changes in thinking in relation to the road infrastructure and transportation requirements. In addition, changes in densities, population data and public transport strategies, NTA Transport Strategy and transport modelling improvements have taken place since the Atkins study and these changes were required to be incorporated into future FCC/DCC strategy.

In this regard, in September 2017 FCC commissioned SYSTRA to carry out the South Fingal Transport Study (SFTS) to update the Atkins strategy. This study was published/completed in February 2019 and will form the basis for the future transportation development to 2027 in both FCC and DCC fringe areas. The

SFTS recommendations which apply to the Fingal/Dublin Fringe area are show in Figure 25 and summarised below.

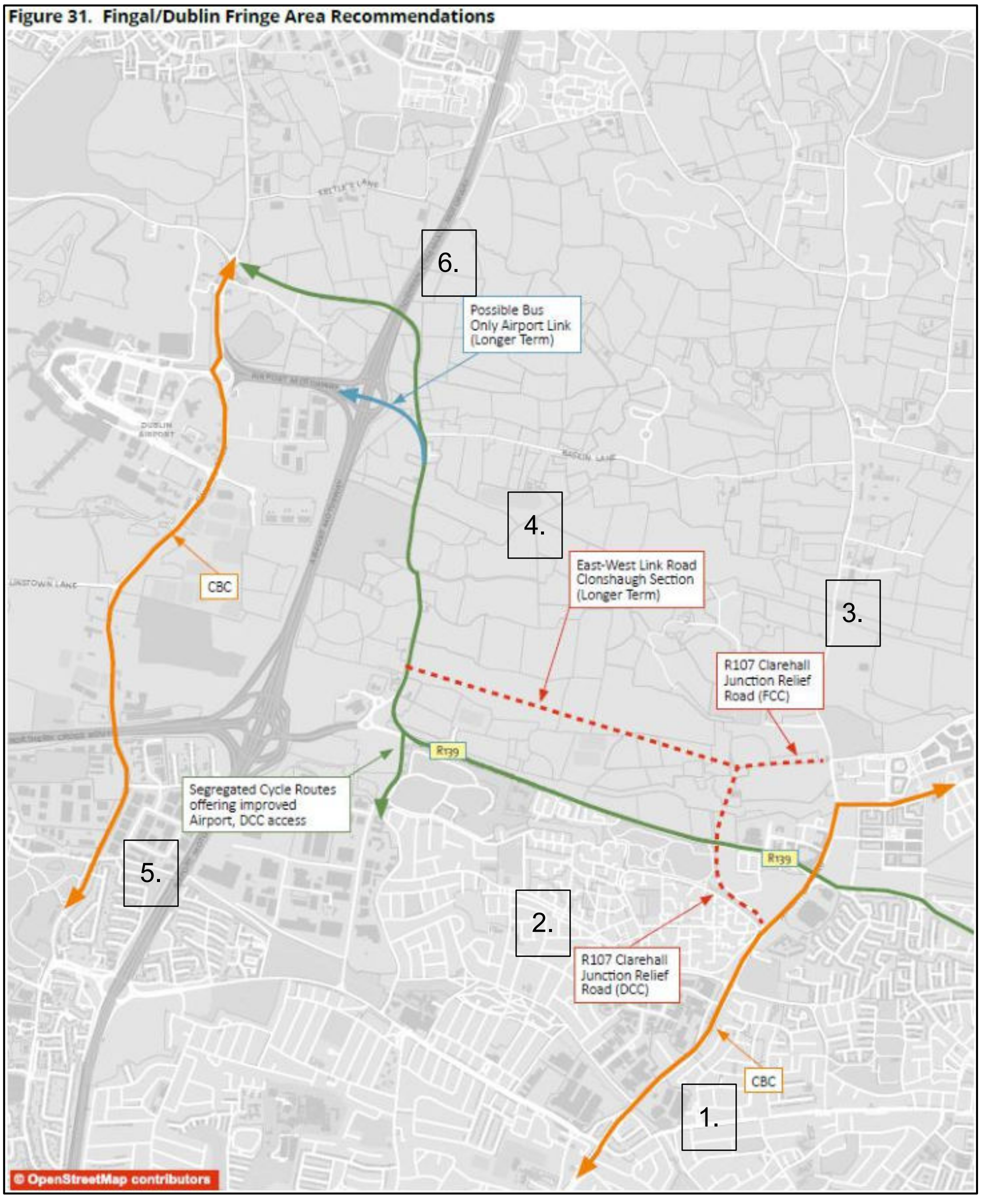


__Figure 25__ | SFTS Road Alignments Recommendations 2019.

The major changes proposed by SFTS to the Atkins strategy are:

1. Eliminate the road bridge on the Clarehall bypass over the R139.
2. Eliminate the extension of the Malahide Road bypass north of the East-West Distributor Road (now called East West Link Road).
3. Eliminate the extension of the East-West Distributor Road west of Stockhole Lane over the M1 (part of FCC orbital route) for the foreseeable future.

4. Apply DMURS principles to the road design emphasising public transport, pedestrians and cyclist and urban style junctions.

The SFTS Recommendations which apply to the Fingal/Dublin Fringe area are SFTS Recommendations 21, 22, 23 and 24. These recommendations are presented below.

> "***SFTS Recommendation 21****: Additional means of traffic distribution and around the areas adjacent to Clarehall Junction, particularly to its north is recommended through construction of a small-scale bypass in the context of the need to reconfigure the existing Clarehall Junction to rebalance capacity towards public transport and/or pedestrians and cyclists. It is recommended that future junctions be limited in scale as far as possible to avoid creating a car dominated environment, instead designing in favour of pedestrians and cyclists*."

According to SFTS Recommendation 21, the construction of the Clarehall Junction Relief Road (formerly identified as the R107 Malahide Road Realignment, Balgriffin Bypass) will provide additional traffic distribution at Clarehall Junction in a north south direction. In order to achieve this additional traffic distribution, this recommendation proposes the construction of a small-scale bypass of the Clarehall junction linking to the Malahide Road to the north via a section of the East West Link Road.

The recommended link consists of a new road within the DCC area from the Malahide Road (R107) opposite the Tesco shop, with an at grade junction with R139 (previous N32) connecting with the East West Link Road to divert traffic to the Malahide Road (R107) at the new junction with R123 Balgriffin Road. It should be noted that the road North of the R139 is now deemed a local road by Dublin City Council, therefore this is not undermining the SFTS.

The recommendation specifically suggests the junctions along the bypass to be scaled to a minimum to avoid a car dominated environment and to optimise pedestrian and cyclist links. The intention of this relief road is to divert traffic from the South to the R139 and not directly into the subject site.

The entire of this bypass is within the Gannon Properties Belcamp landholding (the Applicant) except for the section of this road within DCC lands to the south of the R139 and the crossing of the R139.

The construction of the bypass involves:

- The delivery of a new intersection (T-junction on the Malahide Road (R107)) opposite Tesco.
- A new link within DCC to the R139.
- A signal-controlled crossroads on the R139.
- A link north through Belcamp lands to the proposed East West Link Road (EWLR) – at which is to be a new signal-controlled T-junction.
- A section of the EWLR linking to the Malahide Road (R107) at a signal-controlled junction the with Balgriffin Road (R123).

To implement the works related to this SFTS Recommendation 21 required the agreement of:

1. DCC to complete the design of the road from the Malahide Road across the R139 and the Mayne River.
2. FCC Roads Department to agree the nature and details of the road linking to the EWLR and back to the Malahide Road at Balgriffin. In this regard the nature of the link roads and the junction

between the EWLR will need to be agreed. The extent of detail design and agreement with FCC should not be underestimated.

3. NTA to confirm that the facilities provided by this road infrastructure meets with public transport objectives for the region, in particular the bus routes between the DCC/FCC fringe area and Dublin Airport.
4. Agreement of the developer that the proposed road scheme optimises the development potential of the Belcamp lands to provide housing communities as required by FCC.

"***SFTS Recommendation 22****: The R107/Balgriffin Road junction should be upgraded to include additional left turning capacity for the southbound movement (e.g. adding a left turn flare), while also providing a safe and attractive environment for pedestrians and cyclists*."

According to SFTS Recommendation 22, the Malahide Road (R107)/Balgriffin Road junction should be upgraded to include additional left turning capacity for southbound movement.

This recommendation is outlined in the SFTS Fingal Dublin Fringe Sub Area Report Section 4.4.4.1 *Potential Local Network Issues* and is based on detail Studies 6, 7 and 12 as set out in that report. The extension of the Hole in The Wall to connect to Mayne Road (R123) and the R124 to the north will reduce the left turning movements predicted at the Malahide Road junction.

The provision of a left turn lane for southbound traffic is not considered feasible as the road reservation is restricted by the boundary to the Balgriffin cemetery.

It is therefore considered that SFTS Recommendation 22 cannot be implemented.

However, a right turning pocket lane for southbound traffic heading west towards the EWLR is feasible and would provide more capacity improvements at this junction when compared with a left turning lane. It is therefore suggested this right turning pocket lane to be provided. This junction has been designed in detail as part of Belcamp Phase 1B and has been discussed and agreed with FCC Transportation and has received a decision to grant from Fingal County Council under Reg. Ref. F15A/0609. However, as it has not received a final decision to grant at the time of issuing this SHD submission, this junction and section of the EWLR that has received a decision to grant by Fingal County Council under the Belcamp Phase 1B is included as part of this subject submission.

Details of the designed junction are shown in Figure 26 below.

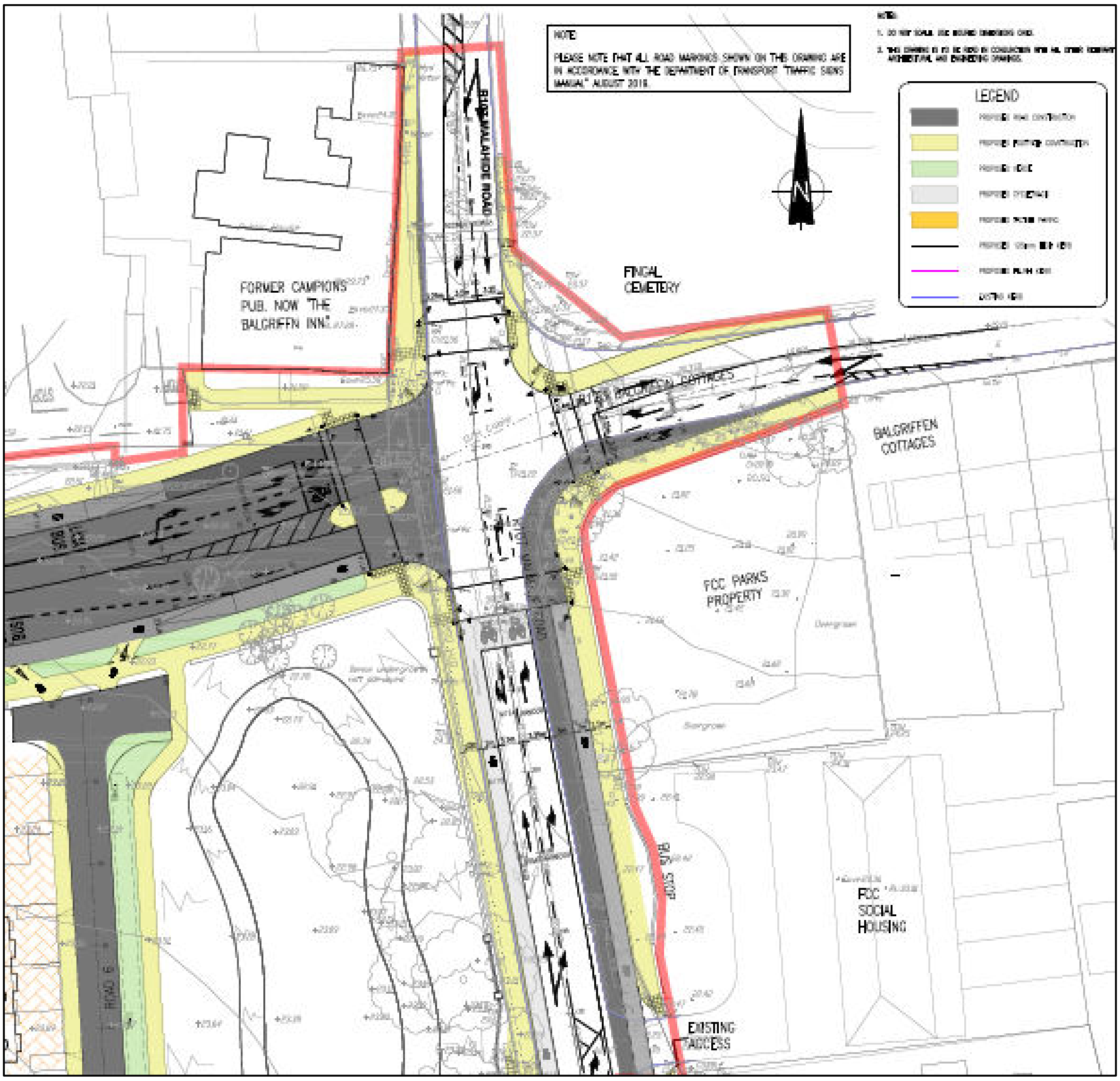


__Figure 26__ | Malahide Road (R107) / Balgriffin Road – New Layout

> "***SFTS Recommendation 23***: *Developing a new link between the Clarehall Junction Relief Road and Stockhole Lane to improve options for vehicular traffic entering/leaving the overall Fingal/Dublin Fringe area is recommended. This link would potentially cater for an orbital bus service linking the employment zoned lands north of the R139 with Dublin Airport and Swords. In the longer term this link would also cater for high quality walking and cycling trips via a more direct and safer route to Dublin Airport and for interchange with the future Swords CBC*."

This recommendation is to develop a connection between the Clarehall Junction Relief Road and the Stockhole Lane (Figure 25). A section of this road between the Clarehall Junction Relief Road and the western link to the Stockhole Lane as proposed in the FCC Development Plan is within the Belcamp Lands.

According to SFTS report, in summary:

1. *"Accessibility to Dublin Airport from the Fingal/Dublin Fringe is improved with the full EWLR.*

2. *Most of the traffic using the EWLR comes from Fingal/Dublin Fringe area.*
3. *With the full EWLR, trips from Dublin Airport may encounter congestion at the EWLR/R132 Swords Road Intersection, resulting in some increase in southbound flow on the M1.*
4. *The EWLR Clonshaugh section reduces traffic at Clarehall Junction significantly and similarly to the full route.*
5. *Journey time along the R107 is reduced with EWLR (Clonshaugh section) but not with Full EWLR, due to additional inducted traffic."*

> "***SFTS Recommendation 24***: *To further consider the feasibility of a Fingal/Dublin Fringe – Dublin Airport – Swords Bus Route when Bus Connects and Metrolink are more advanced. The current phases of planning for these projects must give priority to those services already identified in the NTA GDA Strategy 2016-2035. However, a review of the NTA GDA Strategy is due to be undertaken by the end of 2022, at which point it would be timely to assess the potential inclusion of the proposed orbital bus service for delivery post 2027*."

As part of the planning process, a meeting took place between Dublin City Council, Fingal County Council, National Transport Authority and the Applicant which reviewed the provision of the N8 Orbital Route through the proposed Belcamp development and any other possible bus routes. This is further discussed in section 5.4 of the TTA.

While the SFTS suggests that this orbital bus service is recommended in the future (post 2027) it is noted that a public transport licence has been granted to Dublin Coach (John O'Sullivan) for a bus linking Clongriffin via Clarehall Junction to Dublin Airport. This bus route is currently not operational, and the granted licence is to expire on 30th August 2021.

Currently the service is to utilise the R139 route to the M1. However, the construction of the EWLR to Stockhole Lane will provide an additional route and would be expected to reduce journey times.

The suggested possible bus link from Stockhole Lane to the M1 Airport Roundabout (illustrated in Figure 25 – extracted from SFTS study) would significantly enhance the level of service that the current bus route will provide to the DCC FCC Fringe area. However, this link is not within the scope of the Belcamp development.

<u>SFTS Requirements and Recommendation</u>

The SFTS recommends that the Clarehall Junction Relief Road (CJRR) and the East West Link Road to Stockhole Lane be constructed as a priority. It is suggested that the Clarehall Junction Relief Road combining the DCC and FCC sections (including the section of the EWLR to the east back to Malahide Road) is considered as a single priority project.

Section 6.4.6 of the SFTS states: "*The modelling undertaken indicates that there are clear benefits from the early implementation of the CJRR, and longer-term benefits from its implementation as a section of the East West Road…*

It is assumed that the EWLR would be aligned with, and essentially form a continuation of, the FCC section of the Clarehall Junction Relief Road, as described above. Traffic volumes are estimated at around 800 vehicle units in the peak hour, indicating a single traffic lane per direction is sufficient. The scheme should be developed to include additional continuous bus and segregated cycle priority."

In addition, the SFTS goes on to recommend that "*All new road schemes should be DMURS compliant and provide high quality cycle and pedestrian facilities between and through junctions*."

Detail transport modelling carried out by FCC/SYSTRA is considered in Section 7 of this report.

4.8 Draft Belmayne & Belcamp Lane Masterplan (July 2020)

In July 2020, Dublin City Council published the *'Draft Belmayne & Belcamp Lane Masterplan'* to guide the development of lands at Belmayne and Belcamp Lane with the objective to secure the delivery of a new Town Centre and residential area focused on the Clarehall Junction (signalised junction between Malahide Road (R107) and R139).

In section *'B3 Access and Movement'* of the *'Draft Belmayne & Belcamp Lane Masterplan'* a number of key access and movement infrastructures have been identified and integrated to the existing network to facilitate the development of the Key District Centre (at Clarehall Junction) and enable a permeable and more friendly network for pedestrians and cyclists. The major key road infrastructures identified are listed below and showed in Figure 27 below - extracted from *'Figure B3 Streets Layout'* within the *'Draft Belmayne & Belcamp Lane Masterplan'*.

Key Infrastructure 2 & 7 – Completion/Upgrade of Belmayne Main Street & Bus Priority Measures: These key infrastructures are related to the Bus Gate described in Section 4.3 of the subject TTA. As presented in that section, the proposed Bus Gate requires the conversion of the existing three-armed priority-controlled junction between Malahide Road (R107)/Mayne River Street to a four-armed signal-controlled junction with the eastern arm forming the new Bus Gate. Only bus, cycle and taxi will be permitted to use the bus gate. This Bus Gate is being developed in accordance with the Clongriffin – Belmayne LAP and is proposed to be constructed by Dublin City Council under a Part VIII Scheme.

Key Infrastructure 5 – Improved Crossings and Junction Access: This key infrastructure relates to a number of upgrades to the network to enable pedestrian/cyclists movements by improving crossings at existing junctions, construction of new junctions at the Malahide Road (R107) and the R139, and alterations to the existing Clarehall junction layout to prioritise sustainable modes of transport and reduce the number of crossings pedestrians are currently required to make.

Key Infrastructure 4 – Belcamp Parkway: This key infrastructure relates to a new link between Malahide Road (R107) – to the south of the Clarehall junction and R139 to the west of Clarehall junction. This new link street is included in the current Dublin City Development Plan as a new road to be provided in the area and is identified in the '*South Fingal Transport Study (2019)*' - under *'SFTS Recommendation 21',* as part of the Clarehall Junction Relief Road (formerly identified as the R107 Malahide Road Realignment, Balgriffin Bypass). Belcamp Parkway is envisaged to reduce the volume of traffic through the Clarehall junction, relieving existing stress and facilitate the redesign of Clarehall junction to cater more efficiently for cyclists, pedestrians and public transport as proposed under Key Infrastructure 5 described above.

Although the *'Draft Belmayne & Belcamp Lane Masterplan'* and the '*South Fingal Transport Study (2019)*' recommend the Clarehall junction to be redesigned to prioritise cyclists, pedestrians and public transport, none of these documents provides a new altered layout for the junction.

However, under the Clongriffin to City Centre CBC scheme of BusConnects, a new layout for Clarehall junction is currently under development. For ease of reference this layout is reproduced in Figure 28 below – '*Map 6: Preferred Route'* of the Clongriffin to City Centre CBC Brochure. Note that, Figure 28 is rotated by 90 degrees in relation to Figure 27.

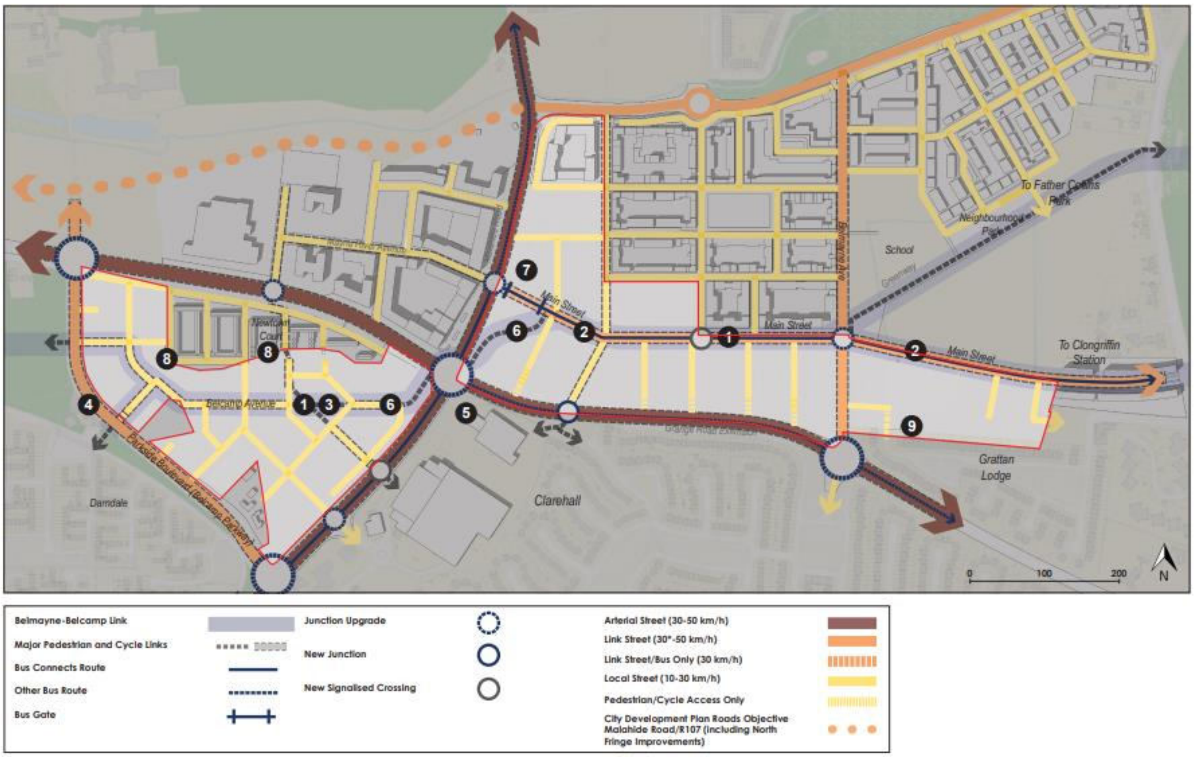


Figure 27* | *Belmayne and Belcamp Lane Masterplan Streets Layout.

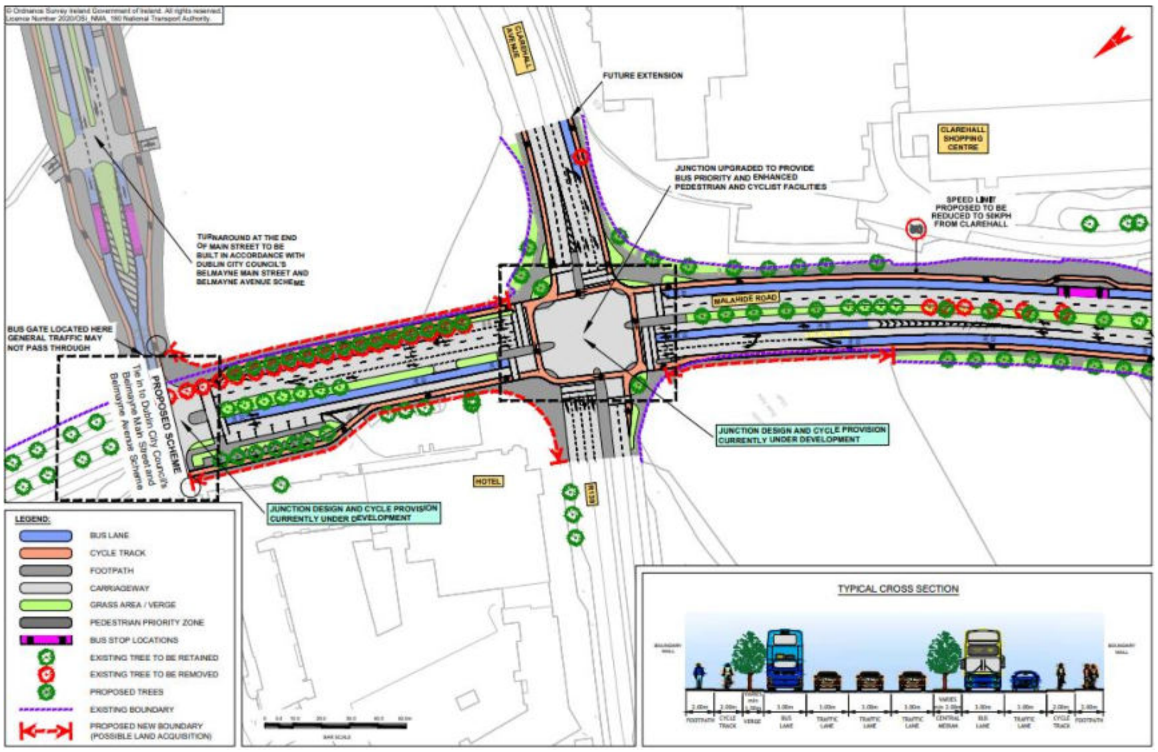


Figure 28* | *BusConnects – Proposed Clarehall Junction Layout

4.9 Malahide Road (R107) / College Avenue – Junction Upgrade

The overall proposal of the under-construction development of Belcamp Phase 1 (Reg. Ref. F15A/0609) includes the upgrade of the existing junction on Malahide Road (R107) to a signalised junction with the College Avenue forming the western arm of the junction. This junction is located between the Balgriffin Road (R123) to the north and the Belmayne Road to the south (see Junction B in section 3.1.2).

The approved scheme is constructed and comprises of:

- Installation of a new traffic signal infrastructure.
- Construction of the College Avenue (Western approach) with one all-movements lane and one exit lane.
- Provision of dedicated signalised pedestrian crossings with dropped kerbs and tactile paving on the approved College Avenue (Western approach)
- Provision of toucan crossings on the existing eastern approach and on R107 Malahide Road (Southern approach).
- Reconfiguration of the R107 Malahide Road (Northern approach) to include a dedicated right-turning pocket lane.
- Reconfiguration of the R107 Malahide Road (Southern approach) to include a dedicated right-turning pocket lane.
- Reconfiguration of the R107 Malahide Road (Southern approach) to include an advanced stop line for cyclists.
- Provision of advanced stop lines for cyclists on College Avenue (Western approach) and on the eastern approach
- Provision of cycle lanes along both sides of the R107 Malahide Road. This is in line with the GDA Cycle Network Plan.

The approved layout of this junction is provided in in the figure below.

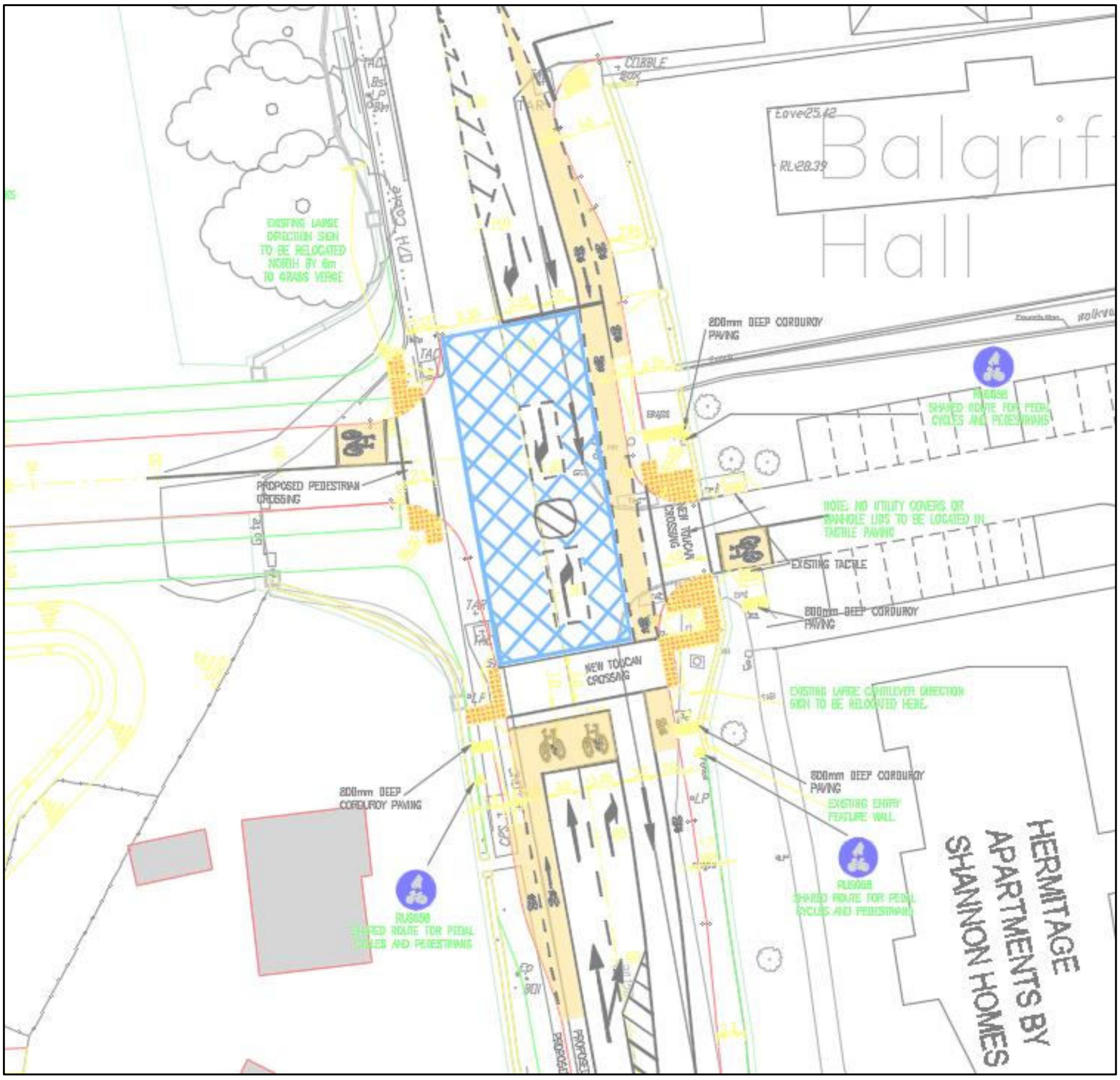


***Figure 29 |** Approved Junction - Malahide Road (R107) / College Avenue (Reg. Ref. F15A/0609)*

5. Proposed Belcamp SHD

5.1 Development Description

The proposed development comprises a total of 473 houses, 274 duplexes and 1,780 apartment units in 18 no. blocks, all on a c.67.2 Ha site. All of the proposed houses/duplexes are in the northern portion of the site, within Fingal County Council, and there are 550 apartment units proposed in this portion of the site, with 1,230 apartment units proposed in the southern portion of the site, within Dublin City Council.

The subject site is proposed to be delivered in a phased manner, with the initial phases proposed on the eastern portion of the lands (within FCC jurisdiction), immediately adjacent to Malahide Road (R107), north of Mayne River. Phase 1 of Belcamp received grant permission by Fingal County Council in June 2017 under Reg. Ref. F15A/0609 and is currently under construction. Access to Phase 1 will be provided via College Avenue, a new east-west street accessed via a new junction with the Malahide Road (R107).

It is proposed to include the main internal transportation infrastructure as part of the first phase of the SHD development, including Belcamp Parkway and the East–West Link Road, to ensure there is adequate transportation provision in place before the development is occupied. It is proposed to provide a transport hub at Belcamp Town Square with bus stops, E-bike charging stations, bicycle racks, E-car charging points and multiple designated car-share fleet parking spaces.

It is also proposed to include the main pedestrian and cycle links from Belcamp Town Square to Belmayne Commercial Area and bus gate, via the River Mayne 4.5m wide path and along the new 5.0m wide pedestrian/cycle link along the R139. It is proposed to provide open space within Phase 1 of the SHD, which will again attract active modes of transport internally and minimise the number of external car trips.

In addition to the transport infrastructure, it is proposed to provide commercial infrastructure within Phase 1 of the SHD, to contribute towards a self-sufficient development from an early stage. This will assist with minimising the number of external trips by car from an early stage in the Belcamp Development. The Figure below shows the proposed Phasing Plan. This Phasing Plan is also included as part of the accompanying A1 drawing package, for ease of reading at suitable scale.

The schedule of accommodation for each phase, along with the proposed construction schedule, is set out in the Table below:

Phase	Description	No. of Units
Phase SHD 1 36.565Ha *Q1 2023 - Q3 2028* *(Main Road infrastructure by Q1 2025)*	Houses	243
	Duplex Units	116
	Apartments	1,145
	Phase SHD 1 Total	***1,504***
Phase SHD 2 12.524Ha *Q3 2028 - Q3 2030*	Houses	142
	Duplex Units	68
	Apartments	420
	Phase SHD 2 Total	***630***
Phase SHD 3 18.491Ha *Q3 2030 - Q4 2032*	Houses	88
	Duplex Units	90
	Apartments	215

	Phase SHD 3 Total	***393***
TOTAL		**2,527**

Table 3 | *Schedule of Accommodation*

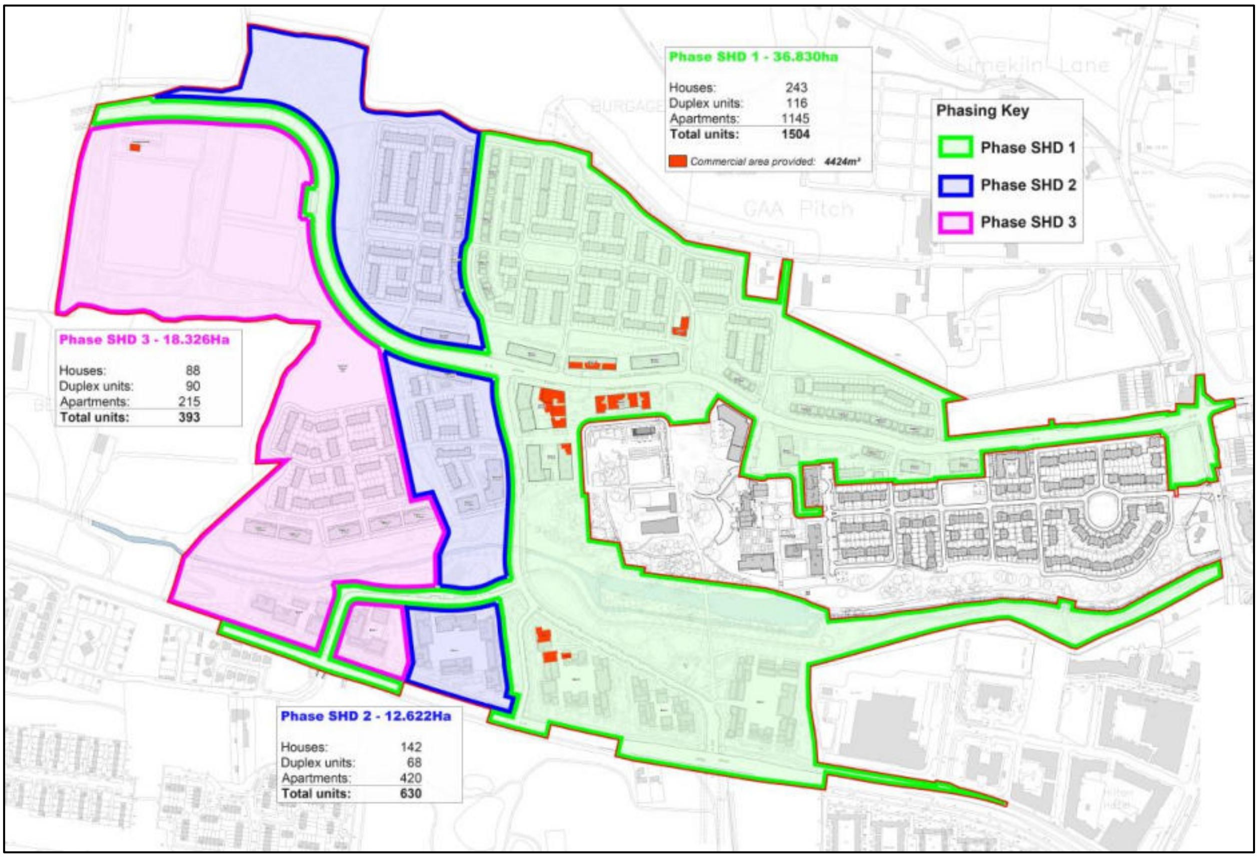


Figure 30 | *SHD Phasing Plan*

5.2 Proposed Roads Through Belcamp

The proposed road network provides a legible road hierarchy and has been designed to closely align with the Fingal County Council and Dublin City Council Development Plans, the South Fingal Transport Study (SFTS) and DCC Draft Belmayne Belcamp Masterplan, the NTA's requirements for bus routes, and to meet the emerging transportation demand.

The proposed road hierarchy within the subject Belcamp SHD will comprise of two new arterial roads (the East-West Link Road and the Belcamp Parkway), several new link streets, and a series of new local access roads, including shared surface/homezones.

The Belcamp Parkway is a north-south arterial road and will form a new junction with the R139, in DCC, where there is currently a private gated access. A new link road will form a second new junction along the R139, adjacent to the existing Tara Lawns halting site access. A new Bus Gate is also proposed as part of the Belcamp Parkway Road in order to accommodate the proposed Bus Connects routes shown in Section 5.5 of this TTA.

The East-West Link Road (EWLR) traverses the portion of the Belcamp lands within FCC's jurisdiction, extending from Malahide Road (R107) at the east as far as the western boundary of the Applicant's lands. The road is designed to facilitate continuation west beyond Belcamp, in accordance with the Fingal Development Plan 2017 – 2023. This street has been designed to incorporate high quality public transport facilities including a dedicated bus lane in both directions and high-quality bus stops strategically located to serve the proposed development.

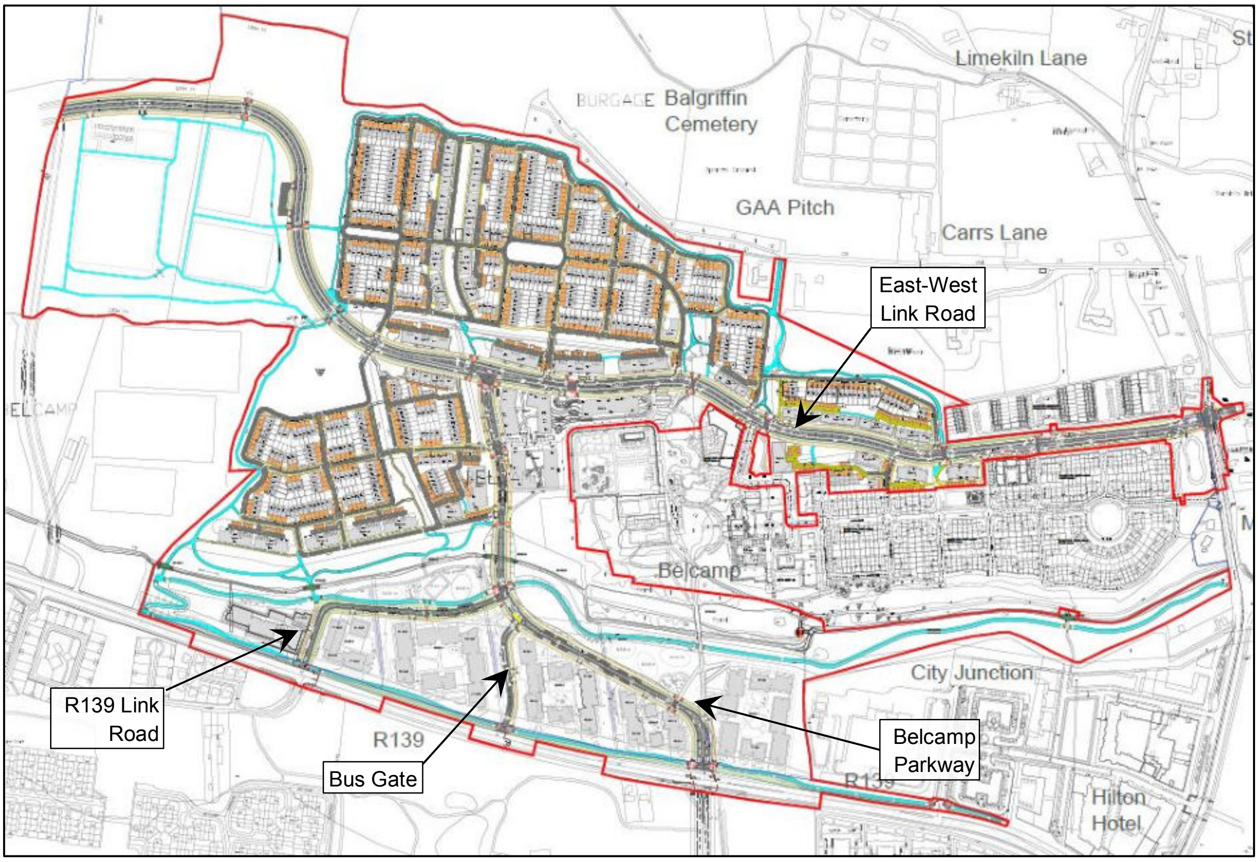


***Figure 31** | Belcamp SHD- Proposed Road Layout*

An emphasis has been placed on active modes of transport and links to the surrounding areas.

There is a high standard of pedestrian, cyclist and public transport facilities provided. This will give way to a clear, comprehensive and high-quality transport network for residents and visitors.

The design principles set out in the Design Manual for Urban Roads and Streets (DMURS) have been considered at the overall design stage and will be implemented during the detail design phase.

The four principles set out in DMURS have been considered in the design of the road network. These comprise:

- Design Principle 1: To support the creation of an integrated street networks which promote higher levels of permeability and legibility for all users, and in particular more sustainable forms of transport.

- Design Principle 2: The promotion of multi-functional. Place based streets that balance the needs of all users within a self-regulating environment.
- Design Principle 3: The quality of the street is measured by the quality of the pedestrian environment.
- Design Principle 4: Greater communication and co-operation between design professionals through the promotion of a plan-led, multidisciplinary approach to design.

5.2.1 Alternative EWLR Alignment– Option B

The previously proposed road alignment, at consultation stage, provided a straighter alignment for the proposed East West Link Road (EWLR). However, alternative design options have since been explored by the design team in consultation with key stakeholders, including the IDA, who are landowners of the strategic employment lands adjoining the western boundary of the application lands. Following this consultation, it was considered that the previous alignment did not represent the optimal design solution for the Belcamp lands and the surrounding context, including the adjoining IDA High Technology employed zoned lands to the west of the site. At a strategic and spatial level, the discussions took place with representatives of the IDA and it is the position of the IDA that the IDA have taken the Development Plan alignment as the default position of the road for their future proposals for their landholding. In order to facilitate the potential of a large single user on the site and maintain their landbank as a strategic whole, the IDA is not in a position to agree on the east-west alignment that divides their lands and thus there is a requirement for the EWLR to align as per the now preferred road design, i.e. to the north west of the Belcamp lands. In light of this, the applicant has brought forward this preferred route, which is submitted as part of this planning application and is the preferred route for the application.

At a site level, the previous consultation stage road layout segregated the proposed school reserved site from the playing pitches and meant that students would have to cross this EWLR to access the playing pitches, which represented a safety risk. The ‘S’ bend now proposed in the road will act as a speed reducing measure for vehicles travelling from the west as it approaches the Belcamp school site and Town Square at the heart of the scheme. It is important to note that the realignment of the road means that the open space and playing fields are now connected to the future reserved school site and ensures that the school can use these facilities without the need to directly cross the EWLR.

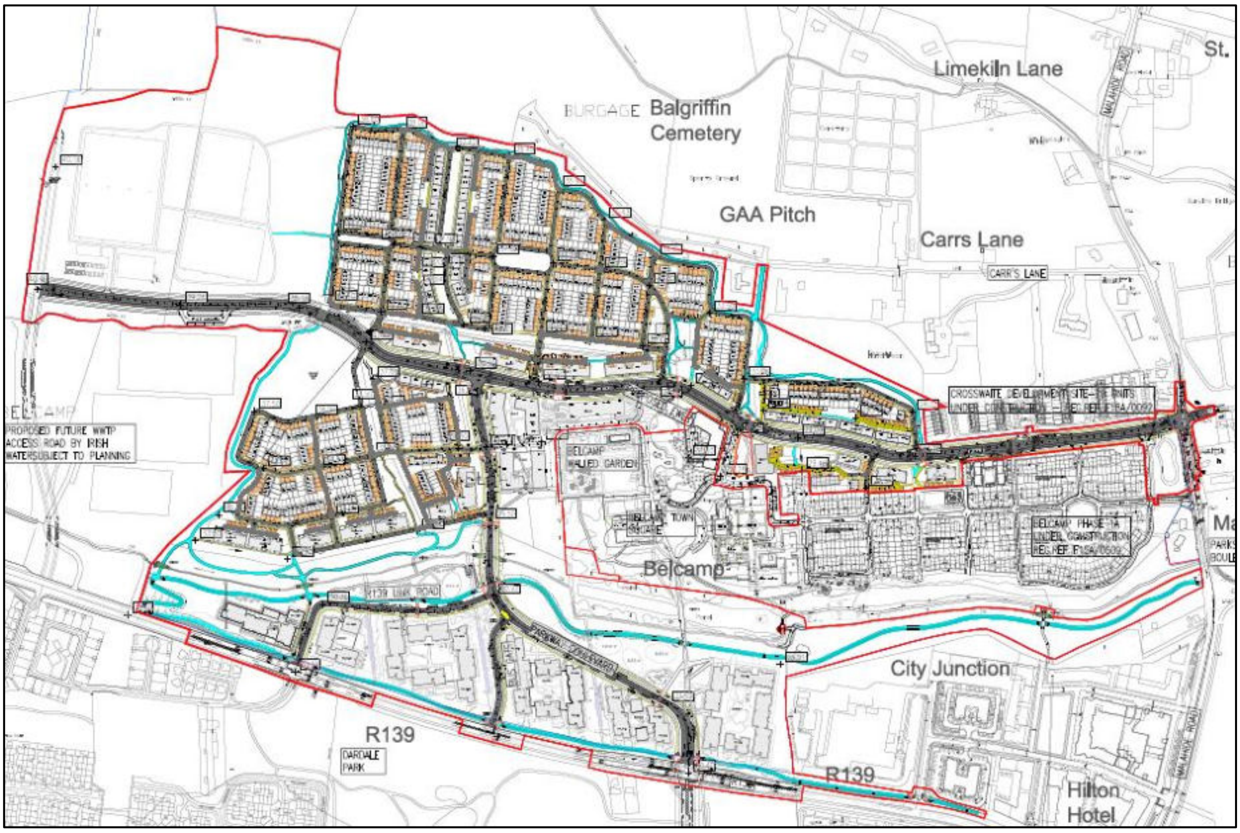


Figure 32 | *Alternative EWLR Alignment - Option B*

5.3 Access Junctions to Belcamp SHD

The overall Belcamp SHD development will benefit from five approved, proposed and potential future junctions located on both Malahide Road (R107) to the east and R139 to the south – See Figure 32. These junctions are outlined below:

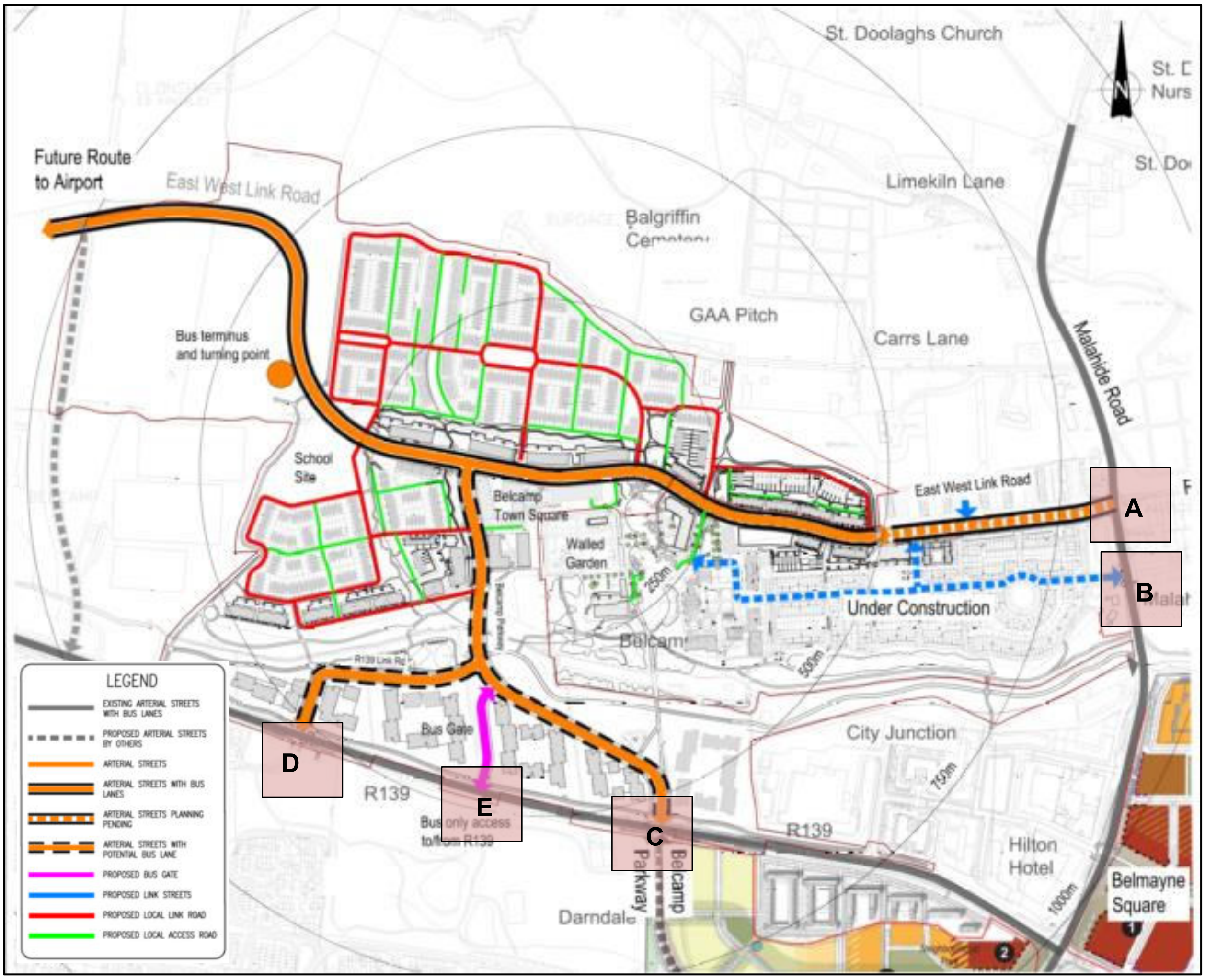


Figure 33 **|** *Proposed Development Roads and Junctions*

Junction A: is an existing signal-controlled T-junction which currently comprises an additional minor arm (western approach) that is not incorporated into the existing signal system and provides access to a single property only. The upgrade of this junction into a signalised crossroads is approved by FCC but is currently under appeal by a third party to An Bord Pleanála. The western approach will form the eastern section of the East-West Link Road and is also proposed under Phase 1B works. The upgraded layout is shown in Figure 33.

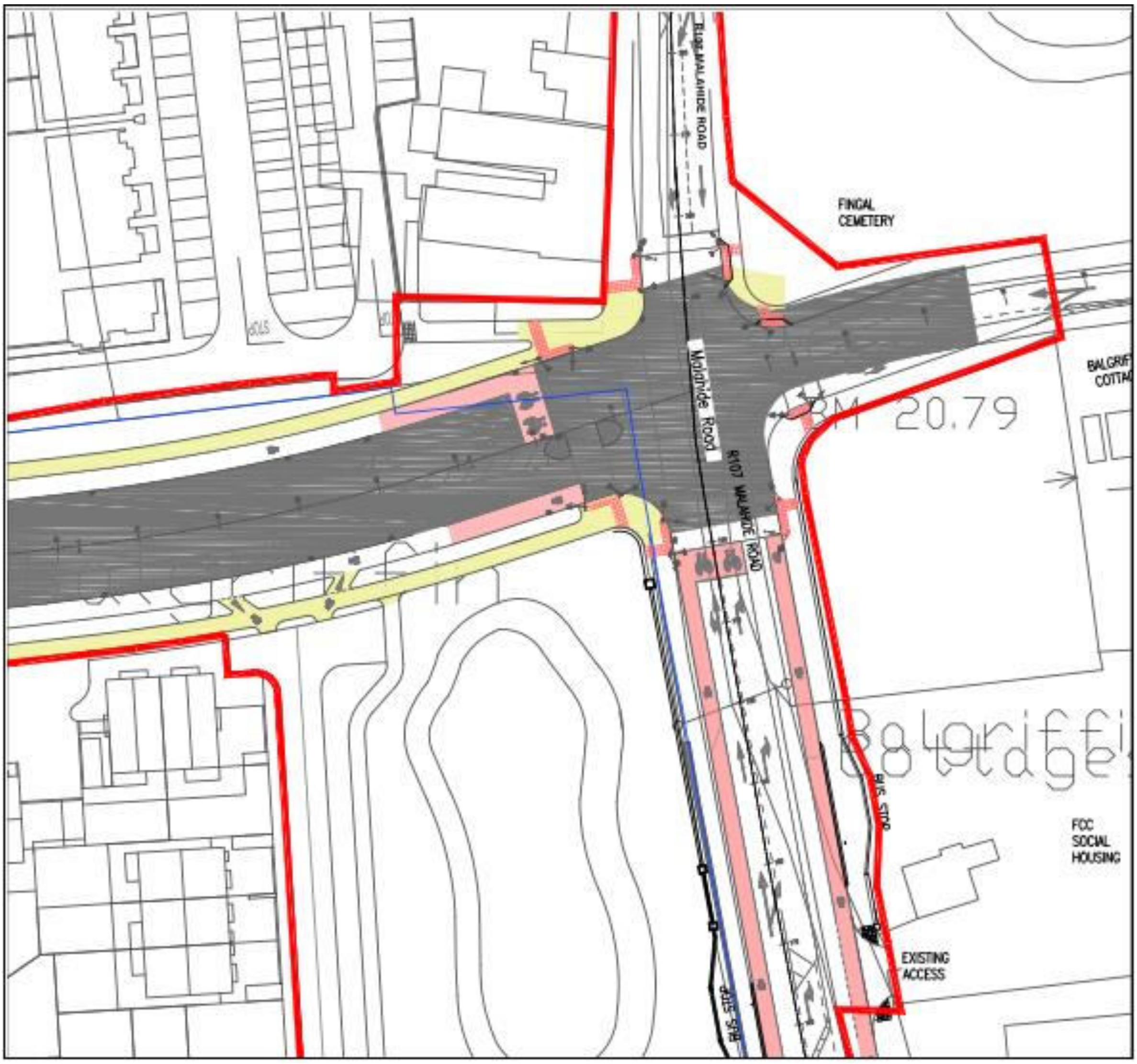


Figure 34 | *Junction A - Road Surfacing Layout*

Junction B: existing priority-controlled T-junction approved to be upgraded to a signalised crossroads with the western arm forming the new College Avenue approach approved under Belcamp Phase 1 (Reg. Ref. F15A/0609). This junction layout was also approved under Belcamp Phase 1 and is shown in Figure 34.

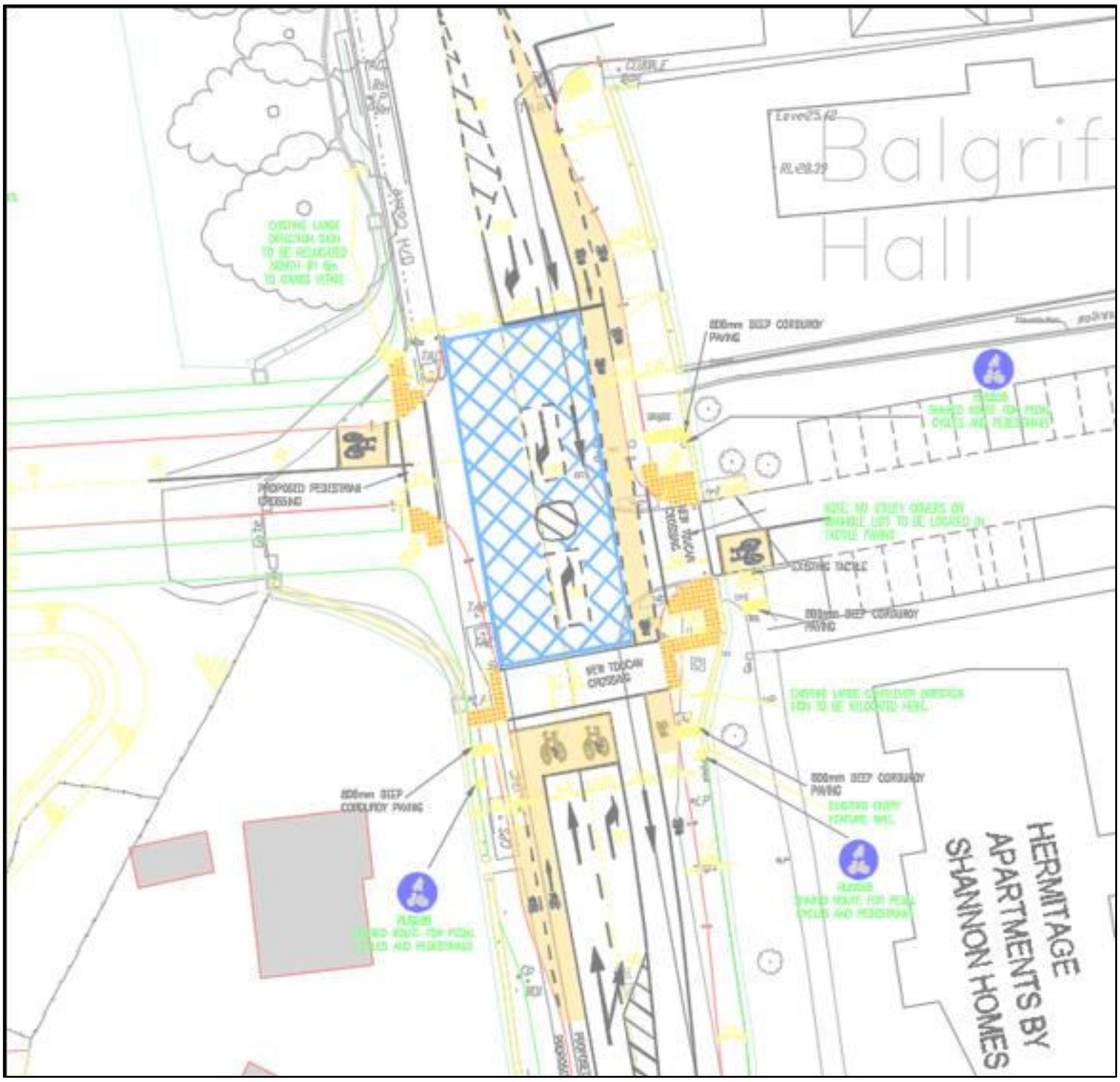


***Figure 35** | Approved junction B – Malahide Road (R107) / College Avenue (Reg. Ref. F15A/0609)*

Junction C: existing priority-controlled T-junction which currently provides access to the subject Belcamp lands via an existing gated entrance (northern approach). This junction is proposed to be upgraded to a signalised crossroads between the R139 (east-west) and the proposed Belcamp Parkway (north-south). The junction's proposed layout is shown in Figure 35.

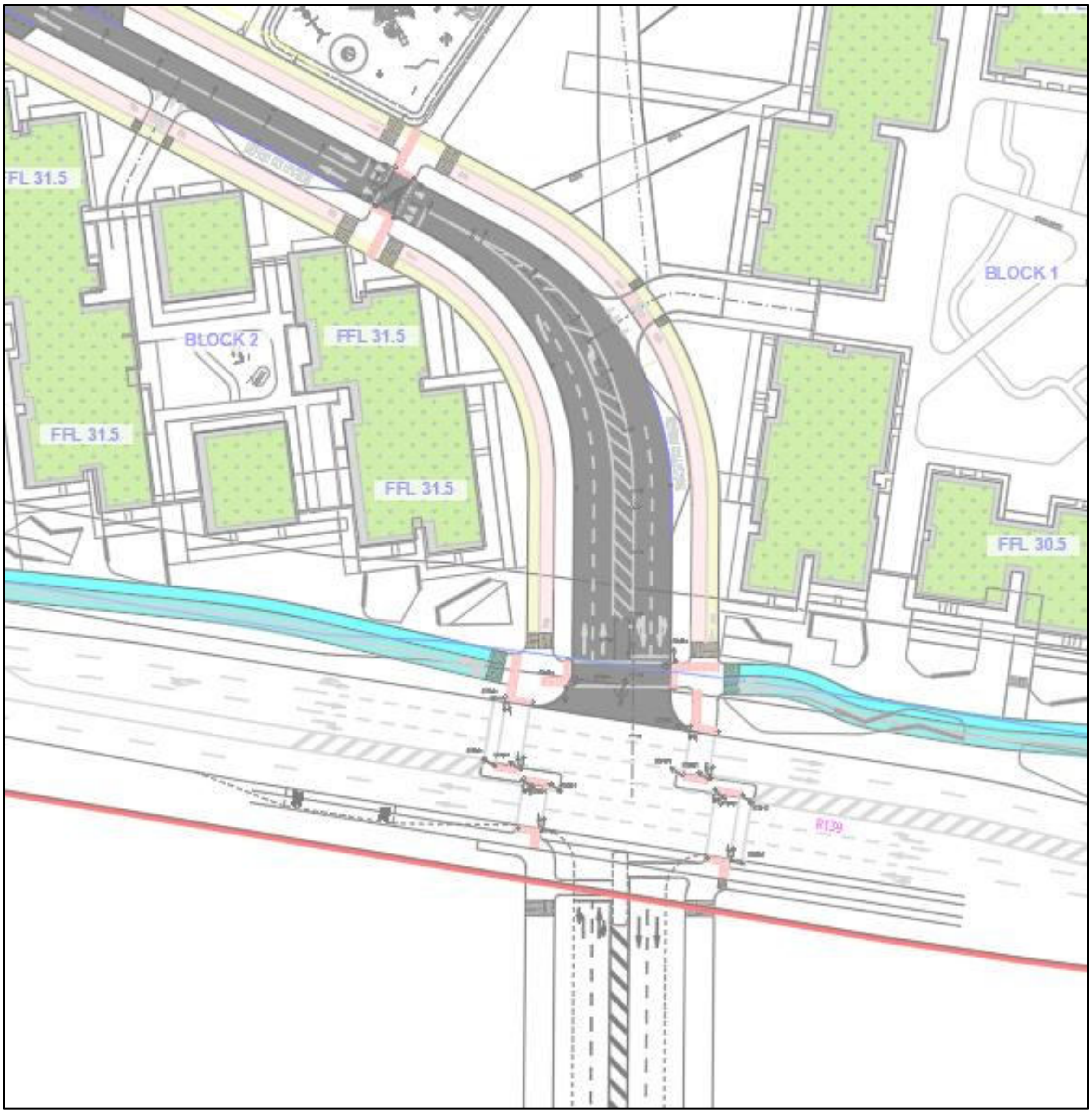


***Figure 36** | Junction C - Road Surfacing Layout*

Junction D existing priority-controlled T-junction which currently provides access to the existing Tara Lawns halting site to the south of R139. As part of the subject Belcamp SHD application, this junction is proposed to be upgraded to a signalised crossroads with the new northern approach forming a link road between Belcamp Parkway and R139. The junction's proposed layout is shown in Figure 36.

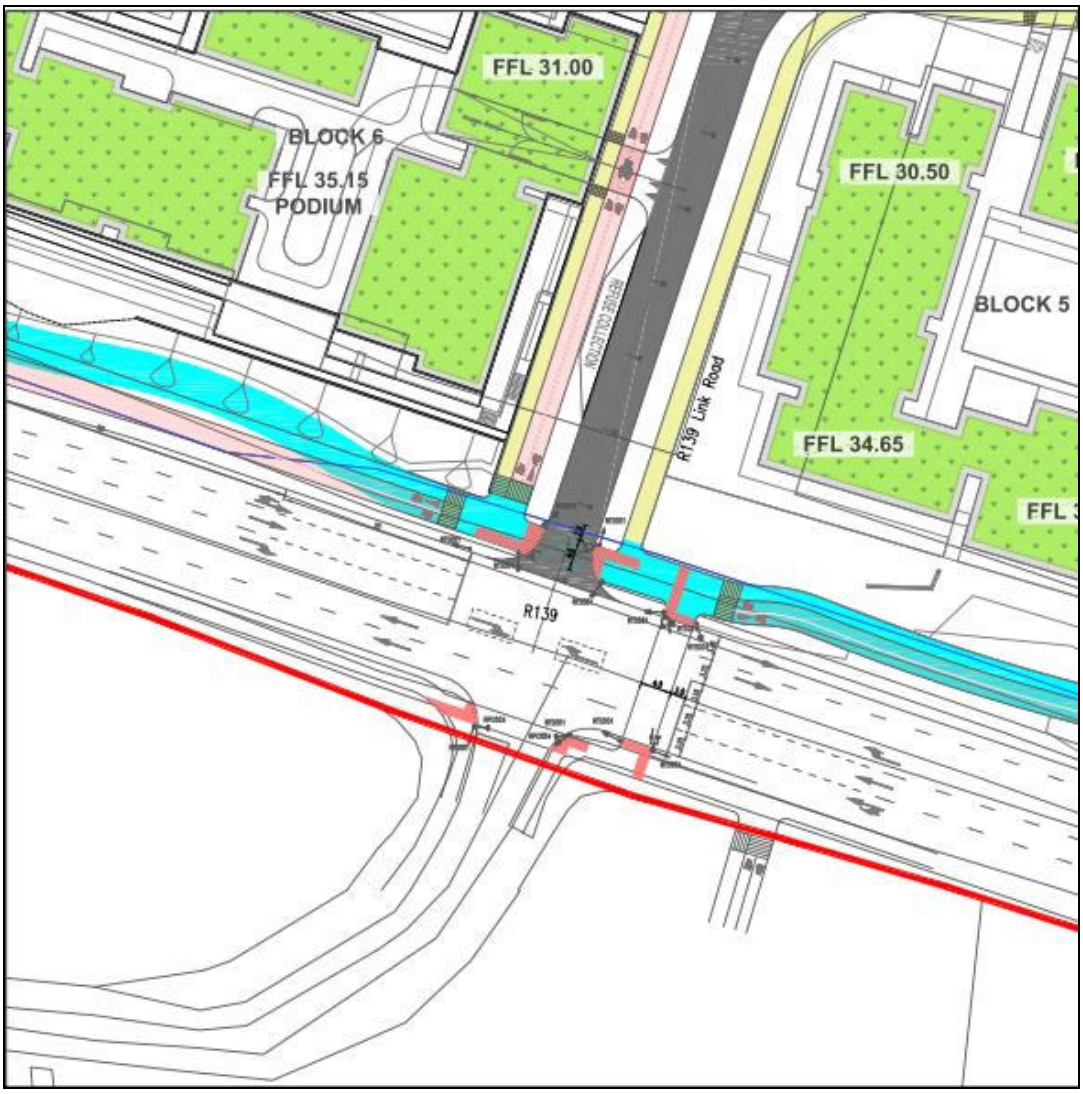


***Figure 37 |** Junction D - Road Surfacing Layout*

Junction E: is a proposed signal-controlled T-junction to operate as a bus-gate for the proposed N8 orbital route. Shown in Figure 37.

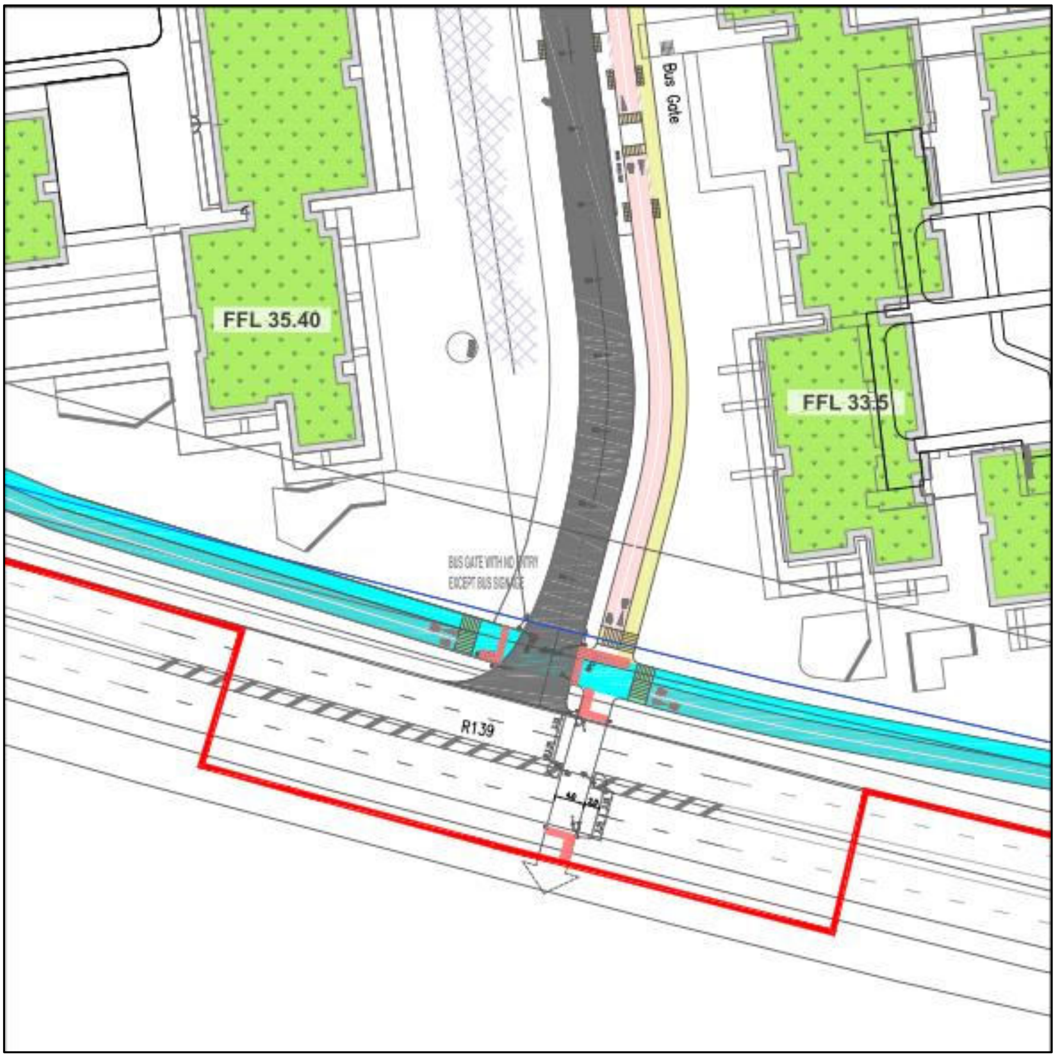


***Figure 38** | Junction E - Road Surfacing Layout*

5.4 Proposed BusConnects Routes

5.4.1 N8 Orbital Route

The EWLR is envisaged as a core bus route, providing east–west linkages to the fringe area and ultimately to the airport environs. Accordingly, this road is designed to comply with the principles of a Core Bus Corridor, including dedicated bus lanes and new bus stops, and to accommodate optimum cyclist and pedestrian facilities.

Waterman Moylan met with representatives from the NTA, FCC and DCC in March 2022 to discuss the transport requirements of the proposed Belcamp SHD development. The current N8 BusConnects route departs from Clongriffin train station, continuing along Main Street before turning south onto the Hole in the Wall Road and then continuing west along the R139. At the meeting, the NTA advised that they envisaged the N8 BusConnects Route being altered to run through the subject development along the East–West Link Road (EWLR) into Belcamp town square and then, preferably, directly south onto the R139.

The proposed road layout was amended following this meeting, to ensure that the requirements of the NTA are met. The amended proposal provides a bus gate linking directly southwards from the EWLR onto the R139. As noted above, the bus gate was introduced to give bus priority over cars and to provide a direct south link from the EWLR onto the R139, as discussed with the NTA in March 2022.

The revised N8 route will benefit from a newly proposed bus gate, indicated in the Figure below, providing a bus-only route onto the R139, with signal control on demand. During the meeting with the NTA, FCC and DCC, the NTA noted that they would welcome the use of bus gates to prioritise public transport ahead of cars and to ensure that buses do not get stuck in traffic.

Belcamp Parkway and the R139 Link Road have both also been designed to be bus capable and can accommodate bus routes with 3.25m wide lanes, locations for bus stops and signalised junctions that can provide bus priority. This provides a robust, flexible design with options for future bus routes. The removal of the bus gate and the use of the R139 link Road as N8 bus route can be accommodated without compromise to the proposed submission, if that is the NTA's preference for the N8 BusConnects route.

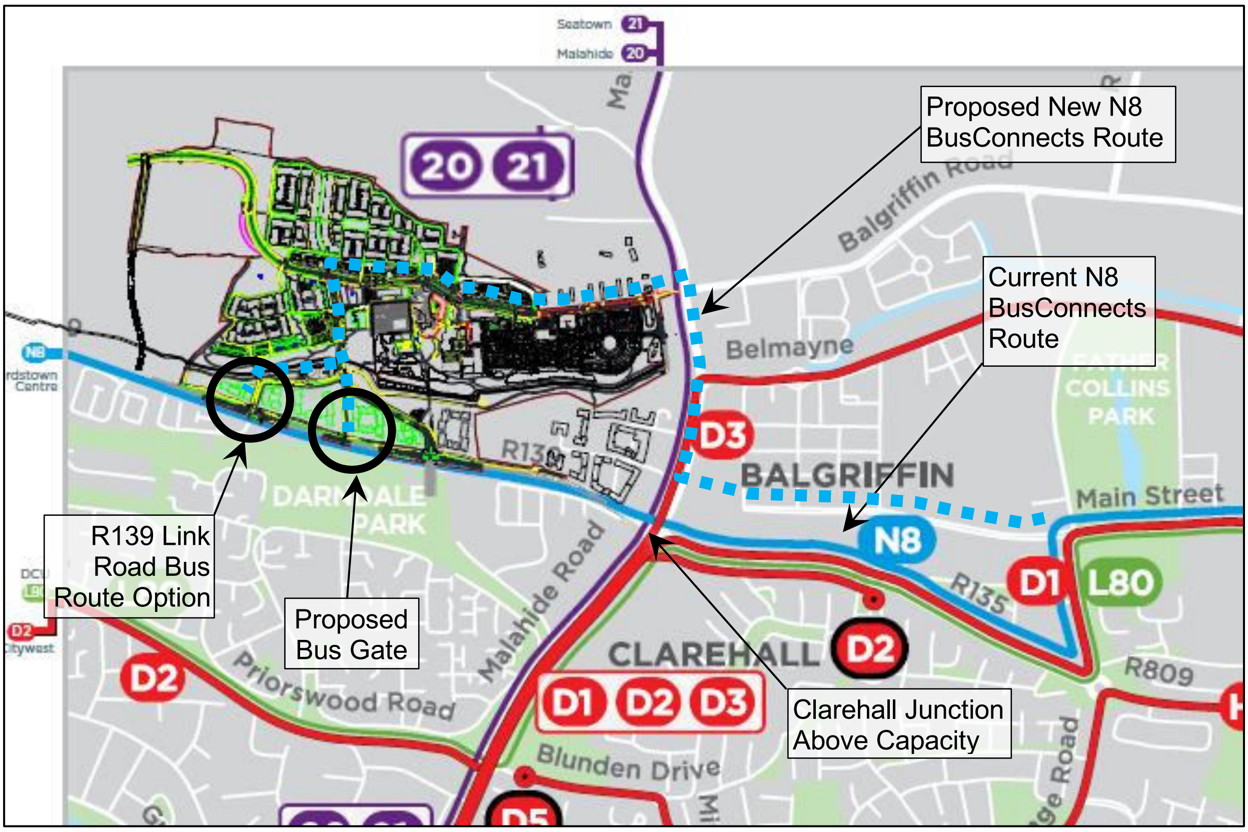


Figure 39 | *Bus Connects Proposed N8 Bus Route*

This proposed altered route would avoid the Clarehall junction between R107 and R139, which is currently above capacity and suffers from long queues and delays. The Bus Gate also avoids any traffic, given that it provides bus-only access, and on-demand signal controls will ensure efficient wait times before turning onto the R139. This proposed altered route provides several benefits:

- The new route would avoid the Clarehall junction between R107 and R139, which is currently above capacity and suffers from long queues and delays.
- The East–West Link Road is envisaged as a core bus route, and accordingly, this road is designed to comply with the principles of a Core Bus Corridor, including dedicated bus lanes, new bus stops, and segregated cycle lanes.
- The inclusion of a Bus Gate at the south of the site ensures that the bus route will follow a direct path and will avoid a meandering route through the site.
- The Bus Gate also avoids any traffic, given that it provides bus-only access, and on-demand signal controls will ensure efficient wait times before turning onto the R139.
- The new route will serve a large population in Belcamp.

5.4.2 D Spine Route

The NTA advised that there are currently no proposals to bring one of the D routes through the Belcamp development. However, BusConnects routes are subject to future change depending on demand and future development. As such, emphasis has been placed on providing a robust design that can facilitate various future bus routes through the site. Belcamp Parkway has therefore been designed to accommodate a possible future route for one of the D routes and has been designed with a 3.25m wide verge that can facilitate future bus lanes. This route would divert buses from the Malahide Road onto Belcamp Lane through the DCC Masterplan lands, south of the R139, through a signalised junction on the R139. This D route would not use the proposed Bus Gate, which is part of the N8 route. This will ensure a straight-through crossing of the R139, as shown in the Figure below.

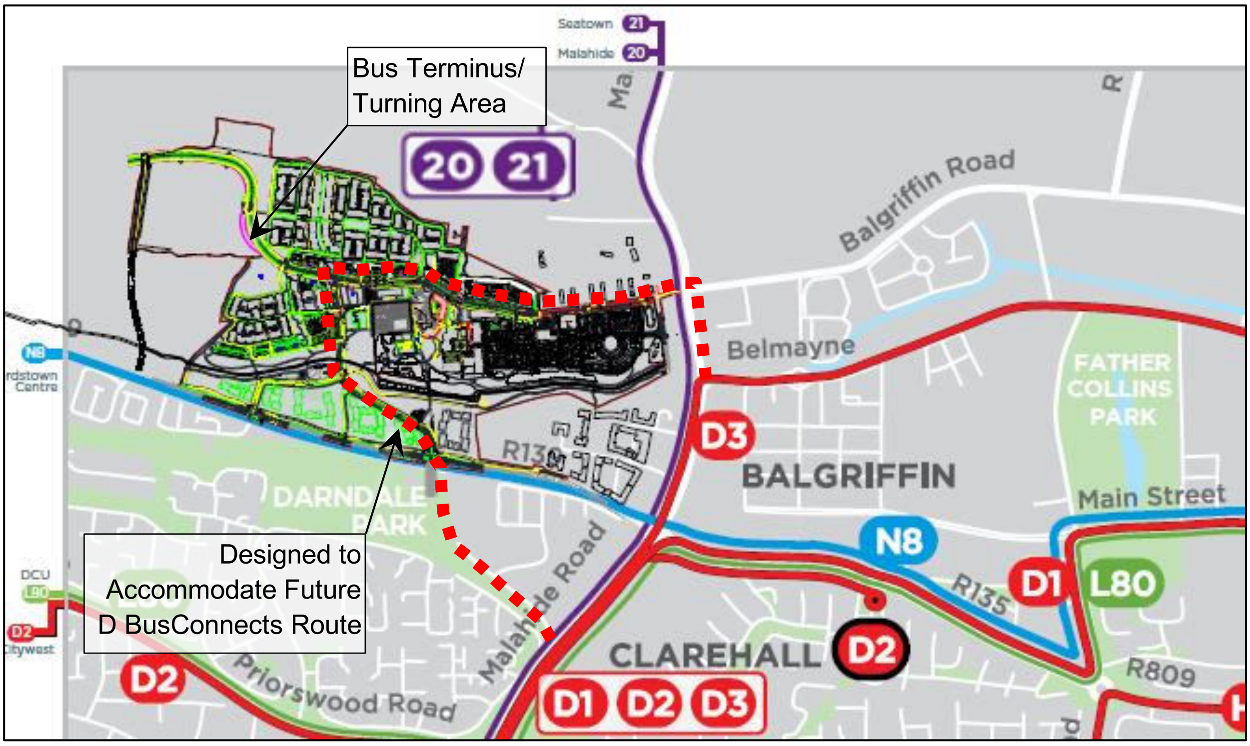


Figure 40 | *Possible Future D Route through Belcamp*

This proposed bus route through the subject lands can also facilitate possible future routes from DCC to the Airport, while avoiding the congested Clarehall junction. The Belcamp Parkway route from the R139 to the EWLR follows the alignment provided in FCC / DCC Development Plans, the Belcamp / Belmayne Masterplan and the South Fingal Transportation Study.

A bus terminus/turning area is provided along the EWLR, within the open space at the west of the proposed Belcamp Development. This again allows for a robust design of bus routes that can come into Belcamp, turn around and travel back along the same route alignment.

Proposed routes and associated junctions have been auto-tracked using the same bus type used for the N8 and D routes, as provided by the NTA – refer to drawing 19-114-P1135 for swept path analysis of each of these bus routes.

For further information on the proposed bus facilities, refer also to Section 2.2 of the DMURS Statement of Design consistency, which accompanies this submission under separate cover.

6. Site Accessibility

6.1 Permeability and Accessibility

A key component of the proposed development is the application of the design principles of DMURS to both roads and junctions, and to emphasise provision of high-quality cycle and pedestrian links throughout the site. The Belcamp Lands will be developed specifically to avoid a car dominated environment and to optimise pedestrian and cyclist links, in accordance with the design objectives set out in DMURS and the National Cycle Manual.

6.1.1 Walking Accessibility

The “Guidelines for Providing for Journeys on Foot” published by The Institution of Highways & Transportation in 2000 indicates that acceptable walking distances will vary between individuals and circumstances, such as an individual’s fitness, physical ability and personal motivation; the size of the city itself and the quality of the surrounding footpath network. This document also suggests walking distances and times based on an average walking speed of 1.4m/sec (approximately 400m in five minutes). Table 4 below summarises these suggested distances and times.

	Town Centres	Commuting/ School Sight-seeing	Elsewhere
Desirable	200m (2.5 minutes)	500m (6 minutes)	400m (5 minutes)
Acceptable	400m (5 minutes)	1,000m (12 minutes)	800m (10 minutes)
Preferred Maximum	800m (10 minutes)	2,000m (24 minutes)	1,200m (15 minutes)

Table 4 **|** *Suggested Walking Distances (Source: Guidelines for Providing for Journeys on Foot).*

6.1.2 Cycling Accessibility

As presented for walking, a similar catchment exercise has also been undertaken for the cycling mode of transport.

Data from the 2006 Census reveals that, for journeys within the Dublin Canal Ring, cyclists reached an average speed of 12km/h compared to just 15km/h for cars. For trips within the M50, the 2006 Census reveals an average speed for cyclists of 14km/h compared to 18km/h for cars. At 14km/h average a 15-minute bike journey would have a distance of approximately 3.5km.

6.2 Pedestrian Network

The existing pedestrian facilities in the surrounding area comprise an inter-connected network of footways linking the various neighbourhoods to each other, to the existing schools, to the Belmayne area, to the Clongriffin train station, to public parks and to the surrounding social infrastructure.

6.2.1 Proposed Pedestrian Infrastructure

The proposed development will include a network of footpaths throughout the site and connecting with the surrounding infrastructure providing efficient, high-quality routes along desire lines to destinations within and surrounding the development area.

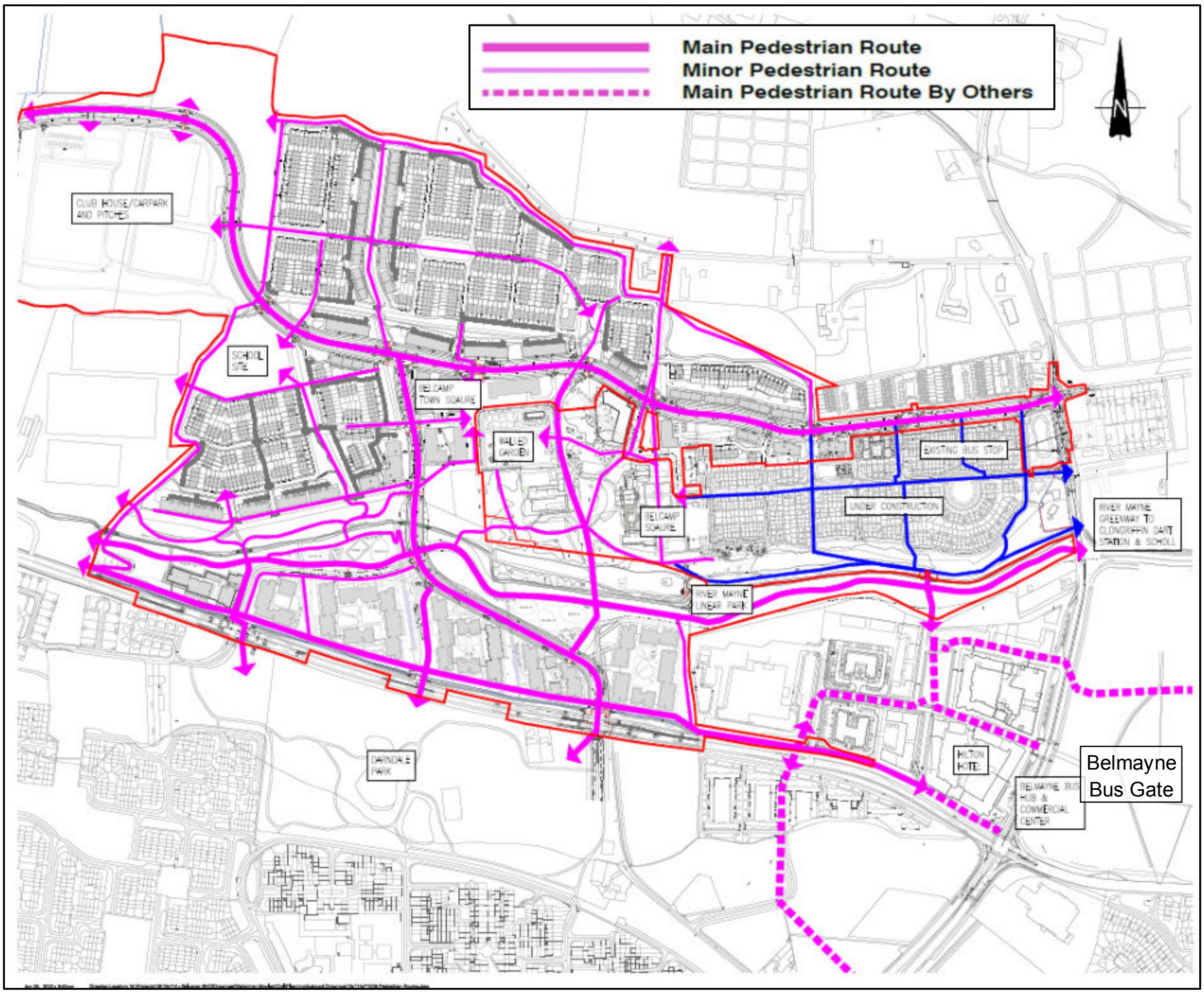


Figure 41 | *Main Pedestrian Routes Overview*

An active frontage along routes within the development is achieved with frequent entrances and openings that ensure the street is overlooked and that generate pedestrian activity as people come and go from buildings.

High quality pedestrian linkages will be provided to connect to Malahide Road (R107), the Mayne River, City Junction and to the R139, linking the development with the existing Clarehall Junction shopping and commercial area and to the future Belmayne Square.

Particular attention is paid to the quality of the pedestrian routes and to the facilities at pedestrian destinations. These destinations include the Belcamp Town Square, the Walled Garden, Belcamp Square, local school and crèche facilities, connections to the public bus network, the green route along the Mayne River and the route along the R139 to Clarehall Junction.

Junctions are designed with raised pedestrian tables/crossings at main pedestrian desire lines, allowing pedestrians to cross at grade. In addition to pedestrian and toucan facilities at signal-controlled junctions, on-call pedestrian signals are provided at key desire lines.

6.3 Cycle Network

Cyclists benefit from the provision of dedicated/shared cycle lanes along both sides of the carriageway on Belmayne, Hole in the Wall Road and Main Street (Clongriffin). Belmayne includes cycle lanes along both sides of the road up to Marrsfield Avenue. These cycle lanes are separated from the carriageway by a grass verge. As part of the improvements to the proposed site, cycle lanes are proposed along Marrsfield Avenue.

Although there isn't a continuous cycle lane on the Malahide Road, there are sporadic stretches with cycle lanes. Cycle lanes (shared with the bus lane) are only provided on the R139 to the east of the Malahide Road (R107), continuing along Temple View Avenue, with no cycle lanes along the R139 south of the subject site.

These cycle lanes facilitate access to Clongriffin train station, Malahide Road Industrial Park and Dublin City Centre.

Covered public cycle parking with 112 stands is provided in Clongriffin at Station Square. This public cycle parking currently provides the opportunity for residents living in the surrounding area to commute to their final destination (place of work, school, college, etc.) by cycle-train transfer.

6.3.1 Proposed Cycle Infrastructure

The proposed development will include dedicated cycle facilities, including an off-road cycle track along the East-West Link Road and along the R139, separated from the vehicular carriageway by a verge. The junction upgrade at the site entrance from Malahide Road includes new cycle stopping areas and new cycle lanes along the Malahide Road.

High quality cycle linkages will be provided to connect to Malahide Road (R107), the Mayne River, City Junction and to the R139 linking the development the existing Clarehall Junction shopping and commercial area and to the future Belmayne Square.

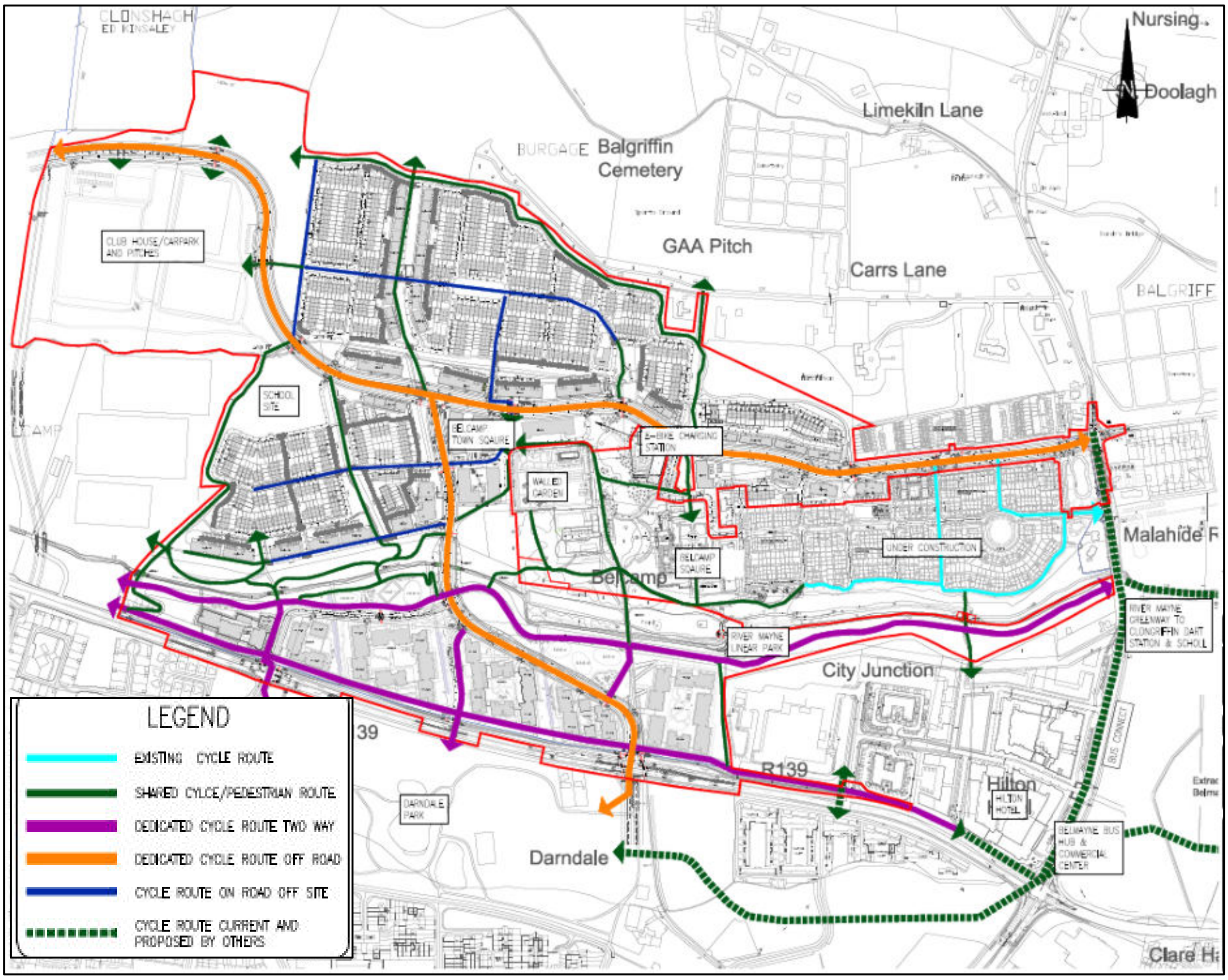


Figure 42 | *Main Bicycle Routes Overview*

It is proposed to provide a transport hub at Belcamp Town Square with bus stops, E-bike charging stations, bicycle racks, E-car charging points and multiple designated car-share fleet parking spaces. Typical E-bike charging stations, which are to be provided at Belcamp Town Square, are shown in the Figure below. As shown in Section 4.5 of this TTA, the proposed 2021 GDA Cycle network will also connect and travel through the site. This includes connectivity to the green route from Belcamp to the coast and Clongriffin Dart Station via River Mayne Linear Park

Figure 43 | *Typical E-bike Charging Stations*

6.4 Travel Times – Amenities in the Area.

6.4.1 Introduction

In order to show the subject site will not be a car dominated development, there must be reasonable access to key amenities within cycling or walking distance. The purpose of this is to show the proposed development will not rely on the car to access areas around Dublin.

The 1km, 2km and 3km zones show amenities in the area within walking and cycling distances including schools, places of employment, hospitals, supermarket, large retail developments and recreational activities. The places of special interest will reflect areas of Dublin which have high levels of employment, education or importance. Access to these areas will be though a combination of walking and public transport or cycling.

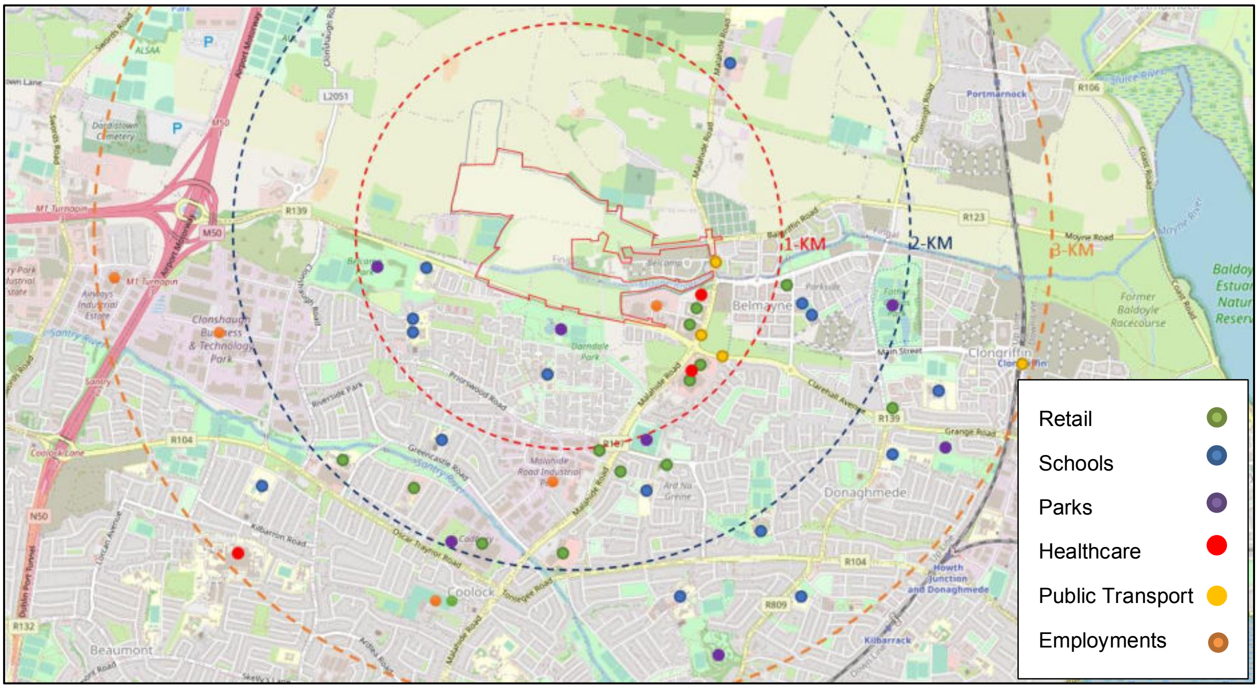


Figure 44 | *Site Accessibility – 1km, 2km and 3km catchments*

6.4.2 Walking and cycling – Site Accessibility and travel times

In order to show the accessibility of the Belcamp site for pedestrians and cyclists the travel times to key amenities in the area are shown in the figures below. These amenities include public transport, schools and places of employment. Specific routes, distances and walking and cycling times were recorded for each location in order to get a more robust assessment of the surrounding accessibility for the subject site.

Figure 45 | *Travel Times – 1Km Catchment*

Location	Distance
Clarehall Shopping Centre	1 km
Darndale Park	500 m
Belcamp Park	950 m
St. Michael's House Leisure Centre & Swimming Pool	600 m
Darndale Junior School	950 m
Exisiting Bus stops	750 m -1 km

Table 5 | *Distances to Local Amenities – 1km Catchment*

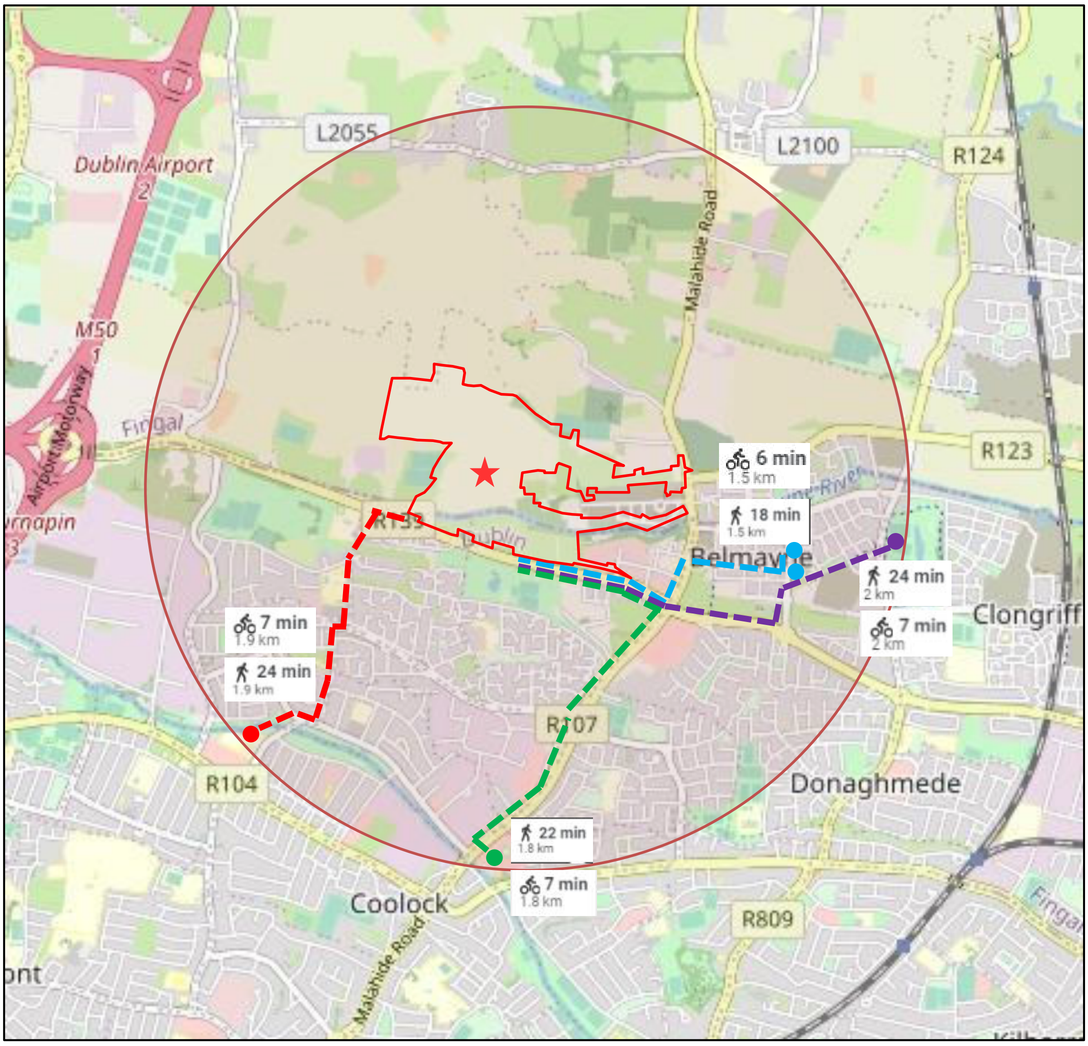


Figure 46 | *Travel Times – 2Km Catchment*

Location	Distance	Walking Time	Cycling Time
Northridge Shopping Centre	1.9 km	24 mins	7 mins
Father Collin Park	2.0 km	24 mins	7 mins
Leisureplex Coolock	1.8 km	22 mins	7 mins
Belmayne Educate Together National School	1.5 km	18 mins	6 mins
St. Francis of Assisi Primary School	1.4 km	16 mins	6 mins

Table 6 | *Distances to Local Amenities – 1km Catchment*

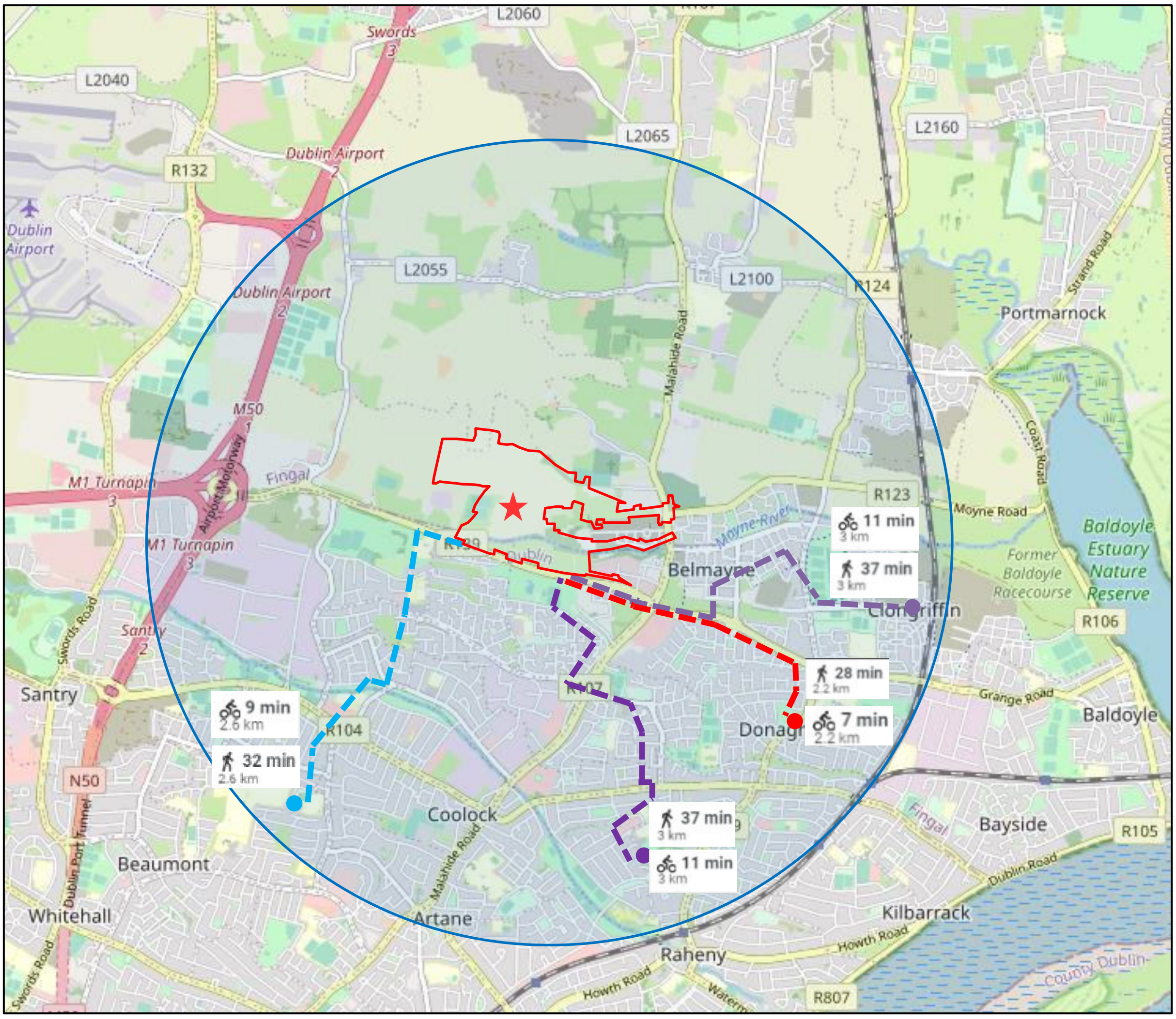


Figure 47 | *Travel Times – 3Km Catchment*

	Location	Distance	Walking Time	Cycling Time
	Donaghmede Shopping Centre	2.2 km	28 mins	7 mins
	Edenmore Park	3.0 km	37 mins	11 mins
	St John of God Girls National School	2.6 km	32 mins	9 mins
	Clongriffin Train Station	3.0 km	37 mins	11 mins

Table 7 | *Distances to Local Amenities – 3km Catchment*

7. Trip Generation and Distribution

7.1 Trip Rates

As mentioned previously, to guide and assess the design of the Belcamp lands for this SHD application and the preparation of the subject Traffic and Transport Assessment, Gerard Gannon Properties (the Applicant) commissioned SYSTRA to prepare a Sustainable Transport Strategy (STS) study for the subject Belcamp SHD. As part of this study, a detailed trip generation exercise - with two consultations of TRICS database and reference to approved trip rates for a nearby approved development (South Portmarnock Phase 1C), was carried out for the subject Belcamp SHD and the results are summarised below.

Three sets of trip rates were investigated by SYSTRA in order to conduct a comparison and identify the most suitable trip rates for the proposed development. These are showed below:

1. South Portmarnock Phase 1C: extracted from the Transport Assessment prepared for the site and approved in January 2020.
2. TRICS Consultation 1: using TRICS version 7.7.4 and the selection of the below criteria:
   - Sites located within the Republic of Ireland.
   - Sites categorised as Suburban or Edge of Town.
   - Maximum Parking ratio of 1.5 spaces per dwelling.

This TRICS consultation returned two sites, located within the urban areas of Dublin and Galway.

3. TRICS Consultation 2: using TRICS version 7.7.4 with the same selection criteria as TRICS Consultation 1, except the maximum parking ratio.

This consultation of TRICS returned four sites – the two sites returned in Consultation 1 plus two additional sites in South Dublin located within walking distance to stations on the DART line serving the coastal suburbs.

Source	Trip Rate Type	AM Peak Hour		PM Peak Hour	
		Arrivals	Departures	Arrivals	Departures
South Portmarnock Phase 1C	*Person*	0.124	0.359	0.314	0.170
	Vehicle	0.081	0.234	0.204	0.110
TRICS Consultation 1	*Person*	0.040	0.667	0.477	0.293
	Vehicle	0.029	0.305	0.282	0.092
TRICS Consultation 2	*Person*	0.091	0.606	0.415	0.241
	Vehicle	0.033	0.261	0.245	0.083

Table 8 | *Summary of Trip Rates' Sets Investigated by SYSTRA.*

SYSTRA considered that the trip rates from TRICS Consultation 2 would be the ones to most reflect the situation of the Belcamp SHD - which is located in relatively close proximity to Clongriffin Railway Station served by DART services to Dublin city centre and also located close to the frequent Malahide Road Bus Corridor.

In comparison with TRICS Consultation 1 (trip rates for sites with restricted parking ratio), it was noted by SYSTRA that, for sites of Belcamp SHD's nature, proximity to public transport services may have a greater influence on the overall vehicle trip rates than the number of parking spaces provided, and therefore, enhancing public transport connections to and from the site, by improving walking and cycling facilities and direct bus links, could potentially assist in this regard. Walking, cycling and public transport strategies for the subject Belcamp SHD have been set out in this TTA; Section 9 explains them in detail.

7.2 Trip Generation

Potential trip generation for the subject Belcamp SHD is presented in Table 9 below. It has been based on:

a) Trip rates from TRICS Consultation 2 as presented in Table 4 above.

b) Belcamp SHD - Phase 1 with 1,504 residential units, expected to be fully in place by 2028.

c) Belcamp SHD – Phase 2 with 630 residential units, expected to be fully in place by 2030.

d) Belcamp SHD – Phase 3 with 393 residential units, expected to be fully in place by 2032.

Year	Belcamp SHD	Trip Type	AM Peak Hour		PM Peak Hour	
			Arrivals	Departures	Arrivals	Departures
2028	Phase 1	*Person*	137	911	624	363
		Vehicle	50	393	369	125
2030	Phase 2	*Person*	57	382	262	152
		Vehicle	21	164	154	52
2032	Phase 3	*Person*	36	238	163	95
		Vehicle	13	103	96	33

Table 9 | *Belcamp SHD – Potential Trip Generation for Belcamp SHD Phases 1, 2 & 3.*

It can be seen from the calculations above that, in 2028, the labelled Phase 1 of Belcamp SHD is estimated to generate a total of 443 vehicle trips in the AM peak hour (50 arrivals and 392 departures) and a total of 494 vehicle trips in the PM peak hour (369 arrivals and 125 departures). For the Belcamp SHD full build out, in 2032, 744 vehicle trips were estimated for the AM peak hour (84 arrivals and 660 departures) and 829 vehicle trips for the PM peak hour (619 arrivals and 210 departures).

7.3 Trip Length and Mode Share – SYSTRA's Analysis

In order to understand the trip patterns expected to arise from the subject development when it is in place - such as trip lengths and mode choices, SYSTRA carried out two ERM model runs for the Belcamp SHD; the 2028 "with development" as a representation of Phase 1 and the 2040 "with development" with the overall Belcamp SHD in place. The trip rates from TRICS Consultation 2 were used to inform the preparation of the models and a summary of the results is provided below.

The 2028 "with development" ERM model prepared is a customised version of a 2028 "do minimum" ERM model, which was prepared to support and develop the Bus Connects scheme and its associated elements.

The 2040 “with development” ERM model includes further transportation improvements for the area such as DART+ Programme and MetroLink.

SYSTRA’s analysis of trip patterns was focused on the “dominant trips” in each peak hour. For the AM Peak Hour, dominant trips are those leaving the subject Belcamp SHD to external destinations (outbound trips), whilst for the PM Peak Hour, the dominant trips are those made from outside locations to the subject Belcamp SHD site (inbound trips).

AM Peak Hour findings from ERM models

The results of the AM Peak Hour of the 2028 “with development” model indicated that the vast majority of trips leaving the Belcamp SHD have their destinations within the range of 10km from the site, with a particular high proportion of trips made by car - see Figure 47 below extracted from SYSTRA’s study. For trips within the 5 to 20km range, a fairly high proportion of public transport trips from the site is noted. This is generally representative of travels into Dublin City Centre and its immediate surroundings. For longer trips (more than 20km), the proportion made by car is above 80%.

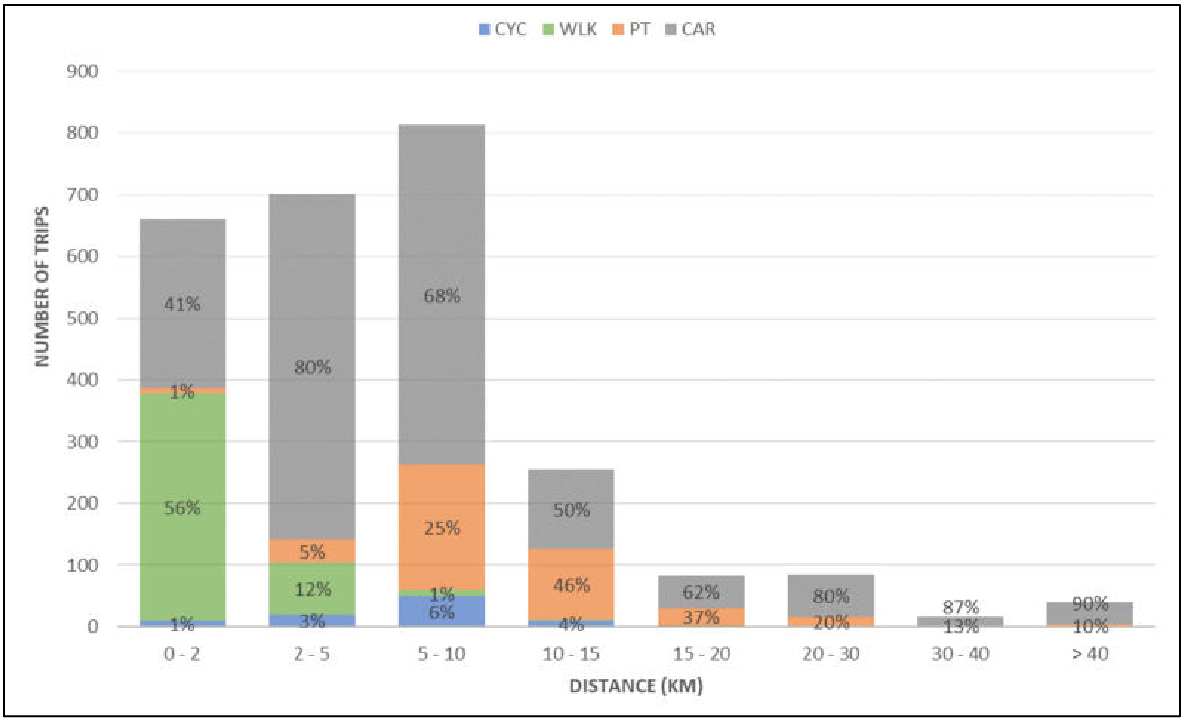


***Figure 48** | AM Peak Outbound Trips – Trip Length and Mode (2028 with development).*

In general, considering all trip length categories set out in Figure 47 above, the following modal split was identified for Belcamp SHD outbound trips in the AM peak hour.

- Car: 63%
- Public Transport: 16%
- Walking: 18%
- Cycling: 3%

However, as can be noted, this does not relate specifically to any “km bands” set out in the chart above, where a higher proportion of trips are made on foot within the 0-2 km band, a higher proportion of trips are made by public transport in the 5 to 30km bands, and a higher proportion of trips are made by car for longer trips (more than 20 km).

By 2040, with the full Belcamp SHD in place, the overall proportion of car trips reduces from 63% to 55%.

PM Peak Hour findings from the ERM models

The results of the PM Peak Hour of the 2028 “with development” model also indicated that the vast majority of trips to Belcamp SHD originates within the range of 10km from the site, with also a high proportion of trips made by car, specially from the 2-5km and 5-10km bands (at 74% and 75%, respectively). As observed in the AM peak data above, the high proportion of public transport modes in the 5-10km and 10-15km bands corresponds with the City Centre (and immediate surroundings) trips. For the longer trips (more than 20km), as in the AM peak, car trips are also prevalent in the PM.

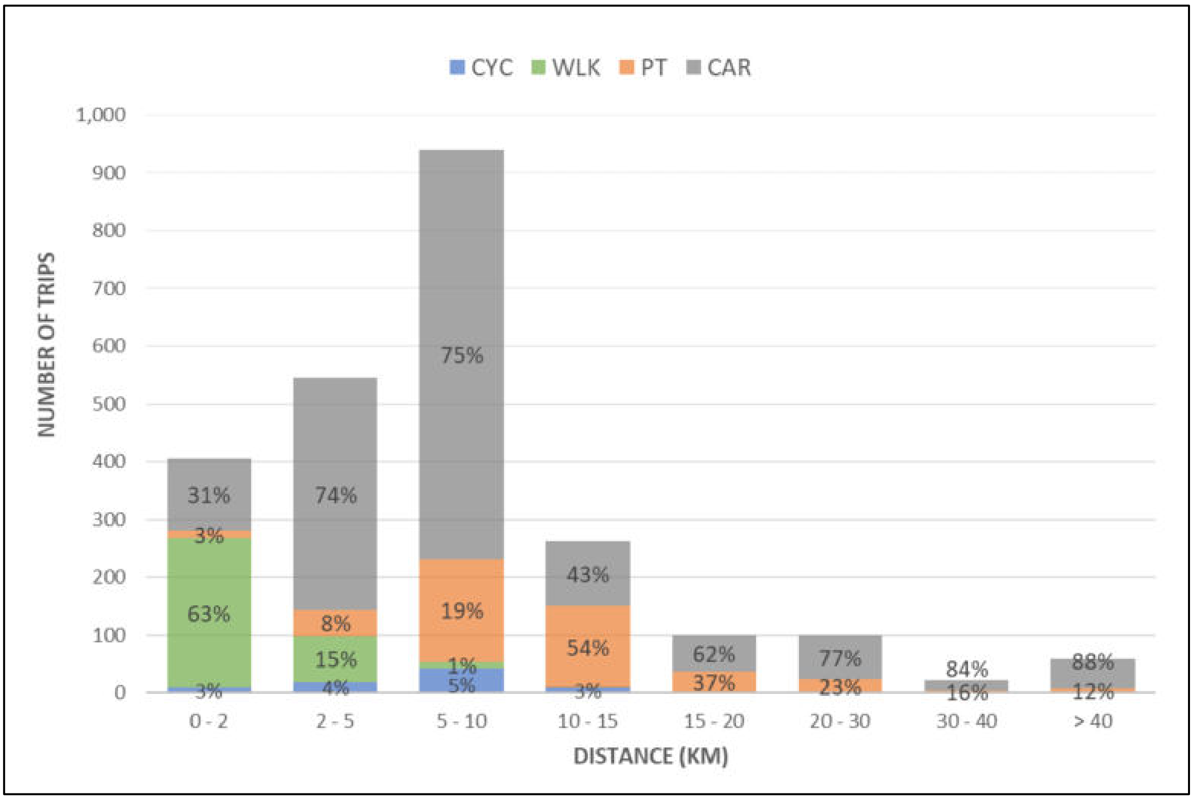


Figure 49 | *PM Peak Inbound Trips – Trip Length and Mode (2028 with development).*

For the Belcamp SHD inbound trips in the PM, the following modal split was identified.

- Car: 64%
- Public Transport: 19%
- Walking: 14%
- Cycling: 3%

In comparison with the AM outbound trips as outlined previously, the percentage of car and cycle trips are very consistent between both peak hours. Public transport proportion is slightly higher in the PM when compared to the AM (at 19% vs. 16% in the AM) while walking trips are slightly lower (at 14% in the PM vs. 16% in the AM).

By 2040, with the full Belcamp SHD in place, the overall proportion of car trips in the PM reduces from 64% to 62%.

7.4 South Fingal Transport Study (SFTS) - Transportation Modelling

As previously noted, in order to update and refine the development strategy in South Fingal in terms of transportation, FCC commissioned SYSTRA to prepare the South Fingal Transportation Study. As part of this study SYSTRA prepared a regional transportation model of the Fingal Dublin Fringe Area (South Fingal area with a part of north Dublin City).

This model includes the strategic transportation demand and infrastructure in the vicinity of the subject application site and as such provides the strategic traffic and transport assessments for the area in the medium and long terms. The SFTS model therefore forms basis of the local road infrastructure proposed as part of this application including the nature of the part of the East West Link Road proposed.

The regional transportation modelling was carried out by SYSTRA using the NTA Eastern Regional Model (ERM).

This is a sophisticated strategic model which includes all modes of transport (including active modes) and provides for extensive predictive modelling based on demand forecasting and supply changes in terms of new road and public transport infrastructure.

The model has been calibrated and used for predictive analysis of trip distributions by mode, network analysis to identify journey times, junction volumes, public transport line flows etc. for various scenarios of development and infrastructure provision.

In addition, local area modelling was also carried out by SYSTRA to assess the impacts of various scenarios of road infrastructure within the three study areas.

Section 4.2 of the *South Fingal Transport Study – Fingal Dublin Fringe Sub Area Report* sets out details of the Local Area Model (LAM) which was developed based on the ERM. The LAM was used for a detailed assessment of route choices based on the ERM demand and modal choice.

As set out in Section 4.3 of the that document, various infrastructure scenarios were tested using a combination of the ERM and the LAM. The tested scenarios are presented in Table 10 – extracted from *Figure 4.1 Matrix of Model Scenarios* within the *South Fingal Transport Study – Fingal Dublin Fringe Sub Area Report*.

A description of the tested scenarios, as detailed in the *Fingal Dublin Fringe Sub Area Report*, are presented below:

> *"**DoMin** assumes no changes are made to the transport to the transport network; this scenario, therefore, represents what could happen on the transport network due to population and employment growth if no improvements were made to accommodate the increased travel.*

__GDA Strategy__ assumes the NTA GDA Strategy is implemented with respect to its bus network improvement programme, MetroLink and increased DART frequencies as part of DART expansion.

__FDP Roads__ includes all potential future road schemes in the main strategic model run, on top of the GDA Strategy scenario."

The road scheme tested includes the East West Link Road (Clonshaugh section), East West Link Road (Airport section), Clarehall Junction Relief Road and the R107 Kinsealy bypass.

Scenario Name	Growth	Bus Connects / DART Expansion etc.	Additional Roads
DoMin 2016	No Growth (2016)		
DoMin 2027	Recognised Development		
GDA Strategy	Recognised Development	☑	
FDP Roads	Recognised Development	☑	☑

***Table 10** | Tested Scenarios – Extracted from Figure 4.1 of Fingal Dublin Fringe Sub Area Report.*

As indicated by the name of the document, the '*Fingal Dublin Fringe Sub Area Report'* assess the impact on the road network of the Fingal/Dublin Fringe area as whole. This assessment was undertaken by comparing the above tested scenarios against each other in order to identify network changings in terms of future traffic volumes, junction's Volume/Capacity (V/C), junction's delays, amongst others. This section of the TTA provides an overview of the changes on the local road network, which are expected to occur with the reconfiguration of the overall transportation network of the Fingal/Dublin Fringe area.

Section 4.4.4 of the '*South Fingal Transport Study – Fingal Dublin Fringe Sub Area Report*' sets out that, *"the high-level trip generation modelling indicates that private vehicular demand will rise substantially over the 2016 modelled levels, almost doubling in the general Fingal/Dublin Fringe areas as the population grows to its full potential. There is a high demand for public transport within this population growth, but the capacity of the system and the fact that many trips are not city-centre bound, place a limit on the share of future travel demand that public transport is capable of accommodating. Therefore, it is prudent to begin planning now for significant upgrades to the road network, incorporating public transport priority, in order to provide relief of the impacts associated with the full build-out of both the Fingal and Dublin City lands comprising this growth area."*

As part of the GDA Strategy to accommodate the BusConnects Core Bus Corridor scheme and to provide a more pedestrian-friendly environment and favour active modes, the downsizing of the Clarehall Junction is required. The downsized scheme has been modelled within the SFTS report and the results indicated that, while creating a more active friendly environment, this measure would elevate the level of congestion on this junction.

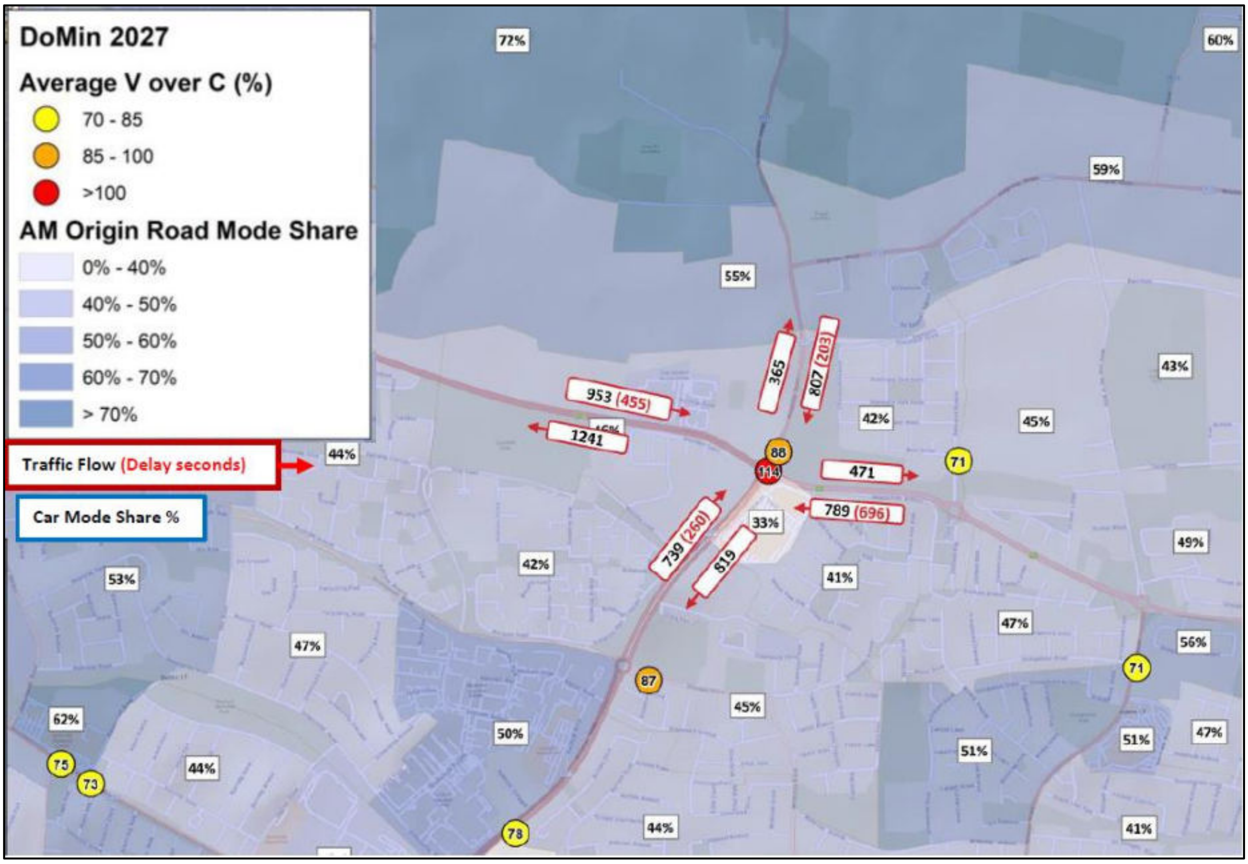


Figure 50 | *Do Minimum – Extracted from Figure 4.18 of the SFTS.*

In order to identify measures to alleviate this elevated level of congestion due to the downsized scheme, Section 4.5 of the '*SFTS – Fingal Dublin Fringe Sub Area Report*' sets out a wide range of additional road scenarios to investigate alternatives to the R107 Malahide Road Bypass and the East West Link Road. The investigate alternatives are as follows:

1) DCC Relief Road (e.g. partial Clarehall Junction Relief Road)
2) DCC and FCC Relief Road (full Clarehall Junction Relief Road)
3) Clarehall Junction Relief Road with East West Link Road to Stockhole Lane.

The analysis results on V/C for each alternative road network is reproduce in Figures 50 and 51 below – all extracted from South Fingal Transport Study.

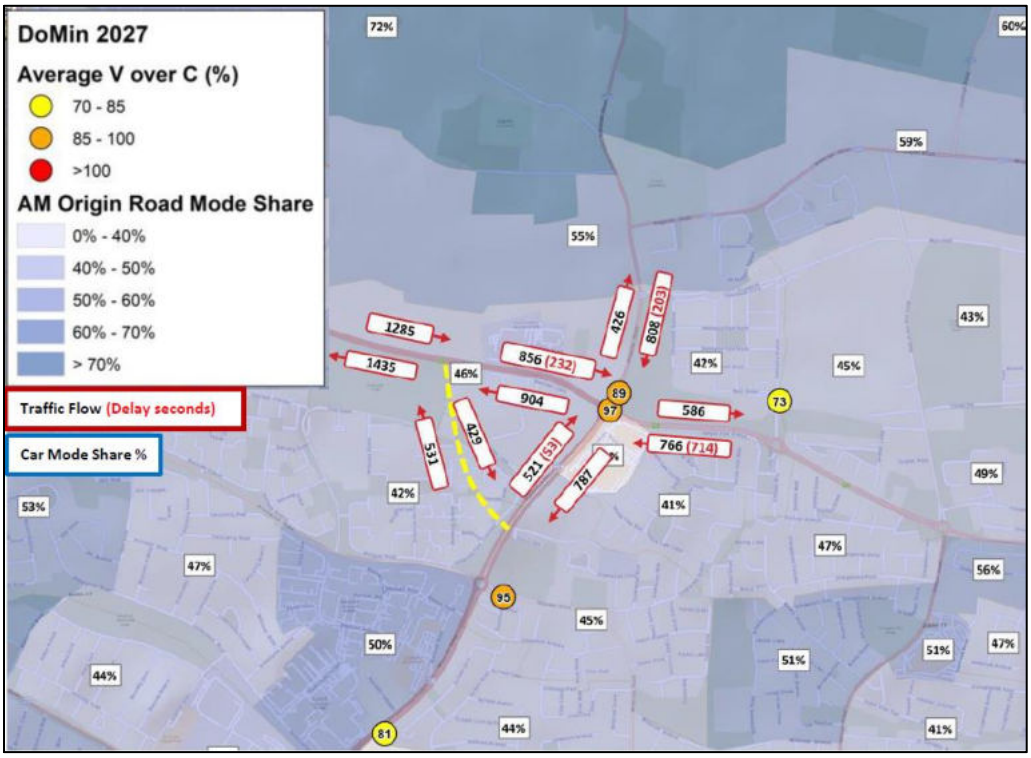


Figure 51 | *Alternative No. (1) – Extracted from Figure 4.19 of the SFTS.*

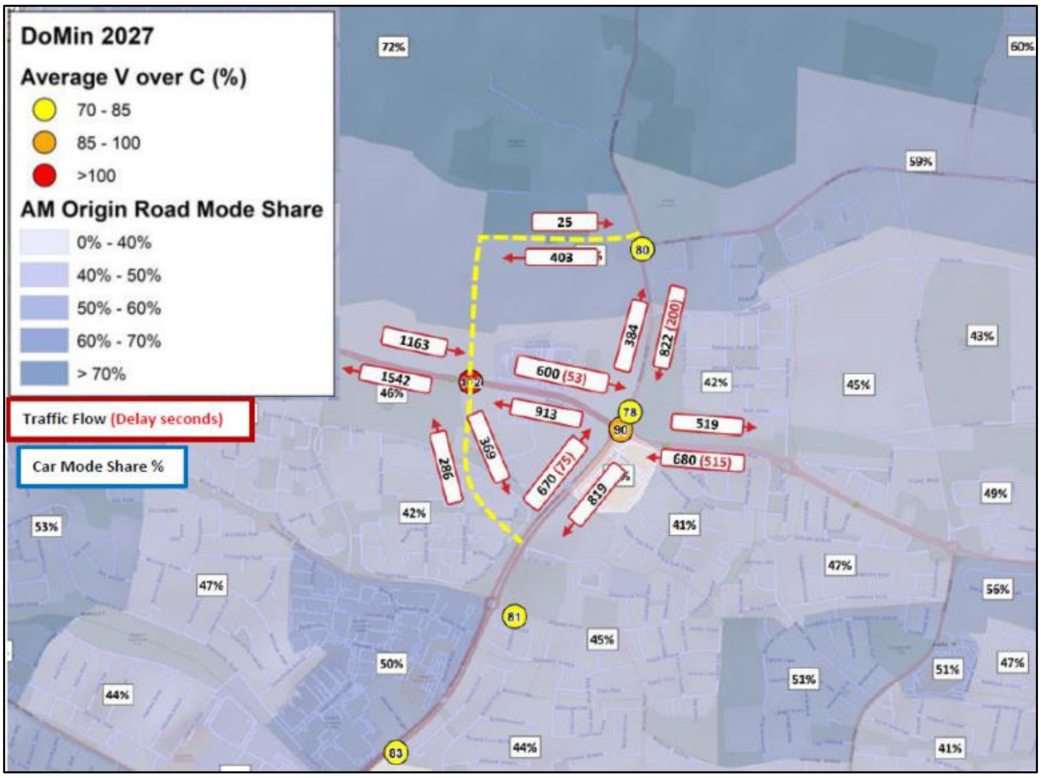


Figure 52 | *Alternative No. (2) – Extracted from Figure 4.20 of the SFTS.*

As can be seen from above, with the construction of the DCC and FCC sections of the relief road, the average V/C of Clarehall junction is reduced to 90, however, the new crossroads to the west of the Clarehall junction is predicted to operate above capacity.

With the construction of the Alternative No. (3) - Clarehall Junction Relief Road with East West Link Road to Stockhole Lane, the modelling results as shown in Figure 52 below – extracted from *Figure 4.21 of the SFTS*, indicate that the average V/C on the Clarehall junction and the new junction on R139 would be reduced to satisfactory values, however the junction between the EWLR and the Malahide Road (R107) would suffer an increase in the average V/C to above 100%.

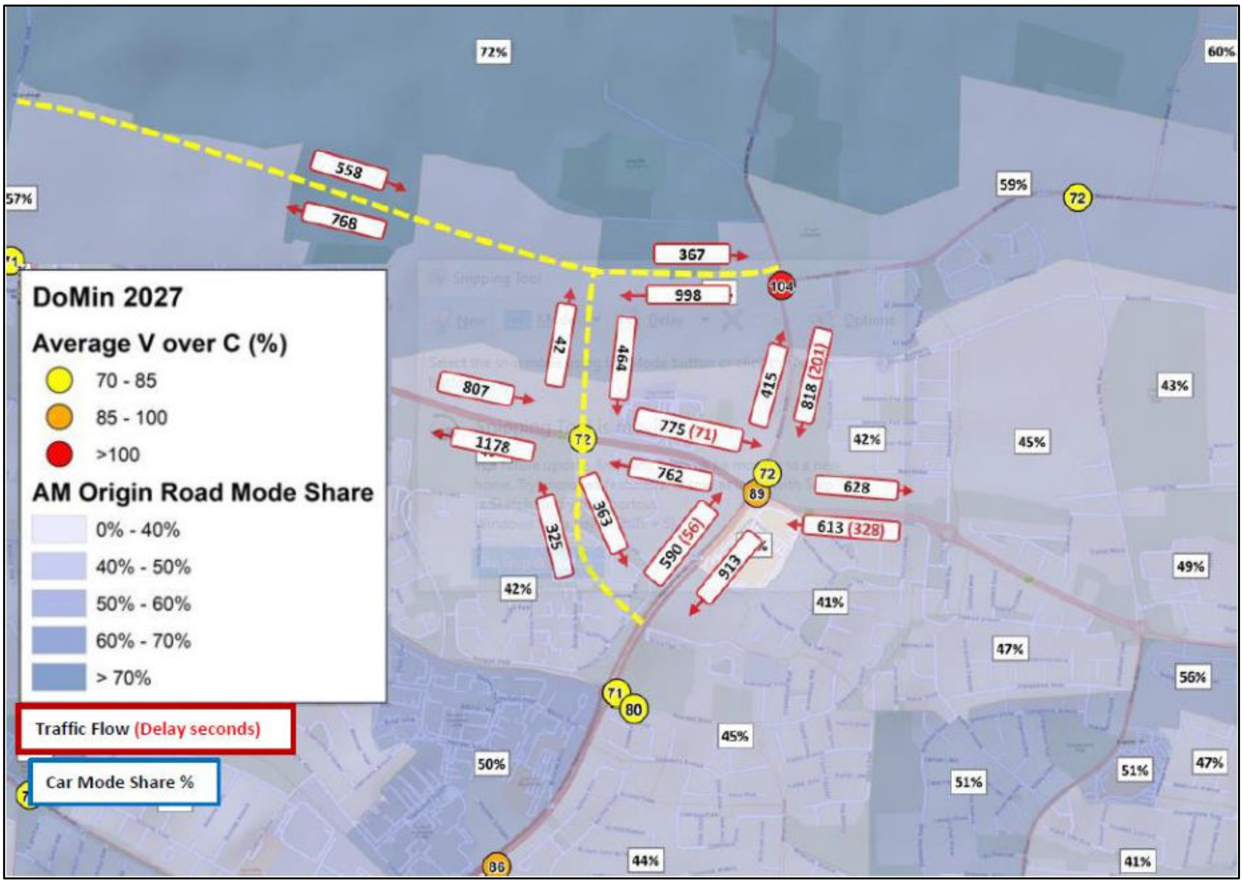


Figure 53 **|** *Alternative No. (3) – Extracted from Figure 4.21 of the SFTS.*

This increase in the V/C is a result of the construction of the EWLR up until Stockhole Lane, which, while providing a higher capacity for traffic leaving the Fingal Dublin Fringe area with a more direct and attractive route towards the Airport, M50 and Swords, will oversaturate its intersection with the R107 Malahide Road.

High Technology Business Parks – Bus Route Assessment

Section 4.6 of the '*SFTS – Fingal Dublin Fringe Sub Area Report'* addresses a portion of land on the western end of R139, just before the M1/M50 junction (See Figure 53 below), which is zoned for High Technology in the FCC Development Plan 2017 - 2023 with potential to create a high number of new jobs. It is likely that these HT Zoned Lands, when developed, will create additional traffic demand in the area.

As per national and regional policies, all major development must be highly accessible by public transport and active modes and not car dependant. It is recognised that Fingal Dublin Fringe area is not currently served by any orbital bus route which could potentially facilitate access to this HT Zoned Lands by public transport.

In this regard, an additional test was undertaken by SYSTRA in their study using the ERM to simulate whether a new orbital bus service on R139 could help shifting new potential car trips to the HT Zoned Lands towards public transport. The route that was tested links employment and population nodes in Clongriffin, R139 HT Zoned Lands, the Airport and Swords with provision of a high frequency and high priority service.

For the purpose of assessment, the test of the new bus route was compared with the following scenarios:

a. DoMin 2027

b. GDA Strategy 2027

c. Fingal Orbital Bus

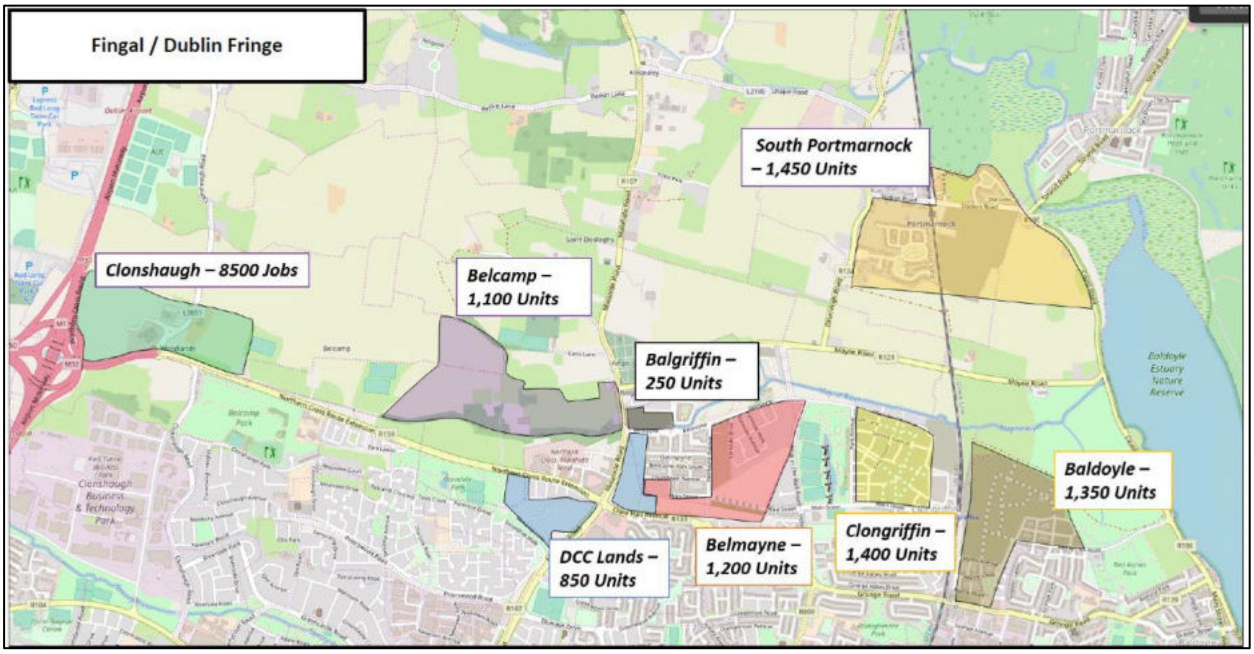


Figure 54 | *HT Zoned Land Location and Modal Split by Employees.*

The modal split breakdown with the inclusion of this orbital bus service is illustrated in Figure 54 below – extracted from Figure 4.29 of the '*SFTS – Fingal Dublin Fringe Sub Area Report'.*

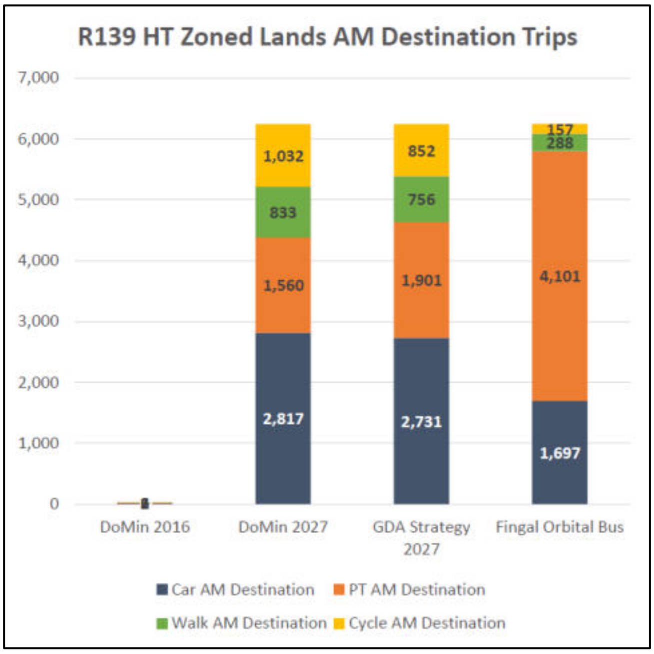


Figure 55 | *HT Zoned Land Location and Modal Split by Employees.*

As can be seen from the above, the orbital bus route shows significant potential to eliminate car trips destinated to the HT Zoned Lands with a reduction from 2,731 in the GDA Strategy scenario to 1,697 in the Fingal Orbital Route scenario. Public Transport use more than doubles from 1,901 in the GDA Strategy to 4,101 with Fingal Orbital Route in place.

In summary, the SFTS report states that, with the future land uses assessed in the report, "*there is a strong demand for an orbital public transport route running between Clongriffin, Dublin Airport and Swords"* and this route would "*help reduce car dependency trips to major employment areas potentially along the R139 and will also serve Dublin Airport and Swords*".

In addition, the SFTS report recommends this bus service to be routed via the new East West Link Road rather than the R139, to provide the most directly service possible.

With this route in place providing a high frequent (every five to ten minutes to meet peak period demand) and high prioritised service, it is expected that some vehicles leaving the Fingal Dublin Fringe area towards the Airport/Swords will opt to commute to their served destination by bus instead of driving, which would help reduce the level of car-based trips in the area.

Possible Bus Corridor along EWLR

The East West Link Road (EWLR) is included in the Fingal County Council Development Plan 2017 – 2023 and is a significant key recommendation from the South Fingal Transport Study.

The EWLR proposed as part of the subject application comprises dedicated bus lanes in both directions and, as addressed in the SFTS, would offer the potential to be part of a new orbital bus corridor which would allow for a connection between the Clongriffin to City Centre Core Bus Corridor, Dublin Airport and Swords and would be a significant gain for the entire Northern Fringe area by providing enhanced public transport service between residential areas and major employments.

7.5 Belcamp SHD – Sustainable Transport Strategy (2021)

Introduction and Assessed Models

As previously introduced, to support this planning application, the Applicant commissioned SYSTRA to prepare a comprehensive Sustainable Transport Strategy (STS) for the subject Belcamp SHD. This document consists of a strategic transport modelling – which include all modes of transport, along with sustainable transport strategies for the subject Belcamp SHD.

With the aim of assessing the expected all mode transport demands associated with the proposed Belcamp SHD and develop a Sustainable Transport Strategy for the site, SYSTRA has made use of the existing NTA Eastern Regional Model (ERM) as basis to identify potential travel patterns associated with the site.

The following three models have been developed by SYSTRA:

- *"2028 "do minimum": the 2028 ERM prepared to support and develop the Bus Connects scheme, with the relevant elements of those works present in the model."*

The subject Belcamp SHD site is located in close proximity to the well-advanced Bus Connects network and was therefore considered by SYSTRA that including the elements of Bus Connects in the 2028 "do minimum" model would be a good starting point for the modelling exercise.

- *"2028 "with development": a customised version of the 2028 "do minimum" model, which includes representation of 1,000 new dwellings at the Belcamp site, an upgraded version of the existing access to the Malahide Road and a new access on to the R139"*

This model was developed to assess the Belcamp SHD Phase 1 (first 1,000 residential units) in advance of the full build out of the site to understand the initial travel demands expected to arise in this Phase of development and explore the feasibility of sustainable transport measures.

- *"2040 "with development": a model which includes the full Bus Connects scheme, DART+ and Metro schemes, the full East-West Link Road, all main Belcamp SHD internal roads, and the additional "riverside" access point to the Malahide Road with corresponding new connection to the R139."*

The 2040 ERM model (2040 "with development") provides a representation of how the future surrounding transportation network is expected to operate in the long-term scenario with the overall proposed Belcamp SHD in place.

Growth Areas and Existing Planning Permissions

In the preparation of the 2028 "with development" and 2040 "with development" models, in order to provide a robust and complete assessment of the study area, SYSTRA has reviewed the South Fingal/North Dublin Fringe area with regards to growth areas and relevant committed developments in the locality, which are expected to be developed by the assessed years. A number of Growth Areas were identified by consulting the FCC South Fingal Transport Study as well as three nearby sites which received grant permission between July 2019 and December 2020. See Figure 55 below – extracted from Figure 4 of the *"Belcamp SHD – Sustainable Transport Strategy (2021)",* where *"red"* means Belcamp SHD (including under-construction Phase 1 and approved planning application Phase 1B), *"green"* means Growth Areas and *"blue"* means nearby approved sites.

For modelling purposes, it was assumed by SYSTRA that by the 2028 “with development” scenario, the three nearby sites and 30% of the Growth Areas will be in place, with the remaining 70% of the Growth Areas being included in the 2040 “with development” model.

Taken as a whole, the identified Growth Areas sums up to 6,500 new dwellings and 500 new jobs, of which 1,950 dwellings and 500 jobs are assumed to be in place by 2028 and the remaining 4,550 dwellings by 2040. The three nearby approved sites amount to 645 new dwellings.

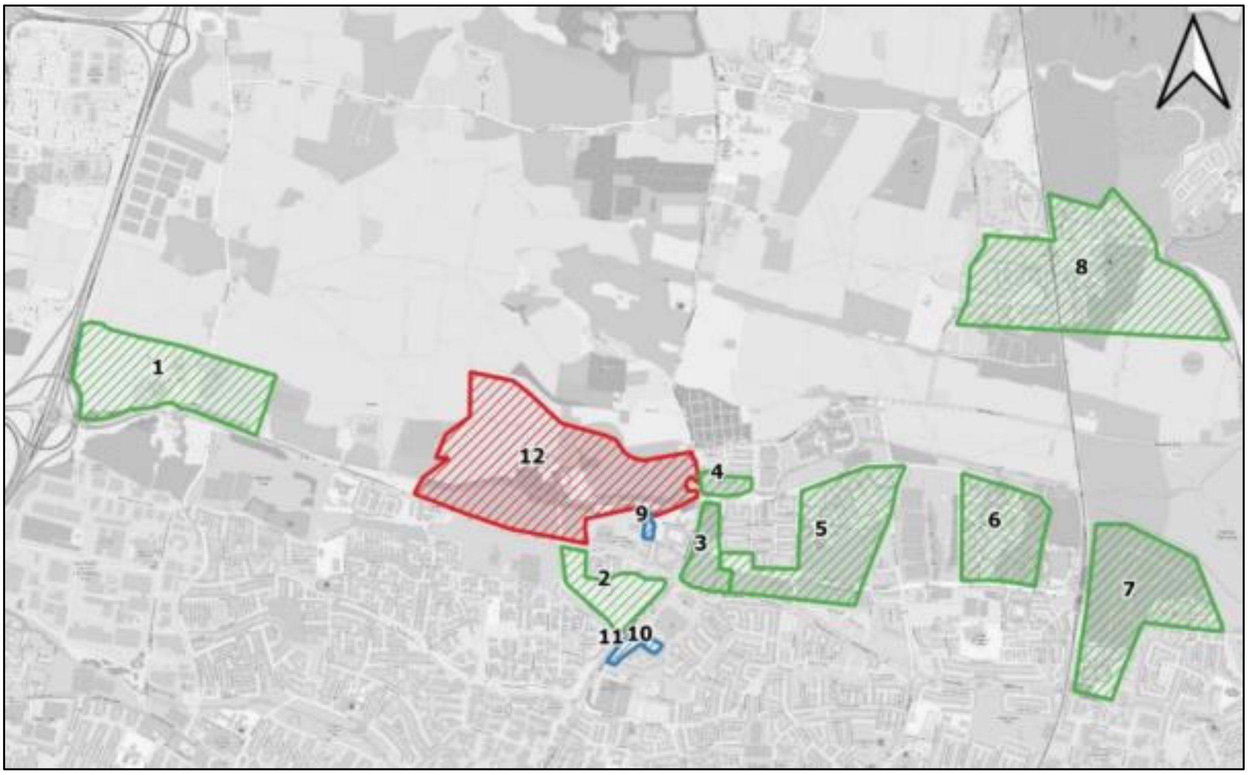


Figure 56 | *Location Map for Belcamp SHD, Growth Areas and Existing Permissions.*

Assessed Junctions

Eleven junctions were assessed as part of the models carried out by SYSTRA. However, for the purpose of the subject TTA, only analysis results for the below junctions are described.

- Malahide Road (R107) / R139 (known as Clarehall Junction) – existing signalised crossroads.
- Malahide Road (R107) / Belmayne – existing signalised T-junction.
- Malahide Road (R107) / Balgriffin Cottages – existing signalised T-junction with additional unsignalised western arm.
- R139 / Belcamp Parkway – new signalised crossroads.

Summary of 2028 “do minimum” model – Junctions Results

The 2028 “do minimum” model (with Bus Connects system) indicated that all approaches of the Clarehall junction (Malahide Road (R107) / R139) would operate at or above capacity during the AM and PM peak hours, with the eastern approach being the most congested in the AM recording a V/C ratio of 1.23 and with the highest V/C value at 1.17 at the western (R139) and southern (Malahide Road R107) approaches in the PM.

For the Malahide Road (R107) / Belmayne junction, the results indicated that the junction would operate well within capacity during both peak hours with the highest V/C below 0.90.

The results for the Malahide Road (R107) / Balgriffin Cottages junction indicated that the junction would operate above capacity during both peak hours with the highest V/C at 1.01 in the AM and at 1.01 in the PM, both recorded at the eastern approach (Balgriffin Cottages).

As the new junctions on R139 is proposed to be developed as part of the subject application, the analysis results for it are only available from the 2028 and 2040 "with development" models.

In summary, SYSTRA noted that, for the 2028 "do minimum" *"with Bus Connects scheme in place, there will be significant congestion at a number of junctions within the vicinity of the site, most significantly at the Malahide Road / Clarehall junction. These locations are understood to presently suffer from regular congestion at peak times, and from the junction data it can be seen that the introduction of Bus Connects will lead to some improvement for those routes used by buses, but in some cases this comes at the expense of general traffic capacity."*

Summary of 2028 "with development" model – Junctions Results

The 2028 "with development" model (with the initial 1,000 residential units in place at the subject Belcamp SHD) indicated that all approaches of the Clarehall junction would operate above capacity during the AM and PM peak hours, except the western approach (R139) in the AM which a V/C below 1.00 was recorded.

For the Malahide Road (R107) / Belmayne junction, the results indicated that it would continue to operate within capacity during both peak hours with V/C below 0.90 recorded on all approaches.

The results for the Malahide Road (R107) / Balgriffin Cottages junction indicated that it would operate above capacity during the AM peak hour with the highest V/C at 1.02 recorded at the eastern approach (Balgriffin Cottages R123). The same approach is also recorded as the most congested in the PM peak hour, however the recorded V/C is 0.92. For the 2028 "with development" model, this junction was considered by SYSTRA's to be upgraded to a signalised crossroads with the western arm forming the East West Link Road (which is included in both FCC Development Plan and FCC South Fingal Transport Study). Note that the upgraded layout for this junction (including a portion of the EWLR) is was approved by the Applicant under a separate planning application labelled as Phase 1B.

For the R139 / Belcamp Parkway junction (new signalised crossroads proposed as part of the subject application and included in both DCC Development Plan and FCC South Fingal Transport Study), the SYSTRA analysis results indicated that this junction would operate within capacity during both peak hours across all approaches.

Summary of 2040 "with development" model – Junctions Results

The 2040 "with development" model (with the EWLR, the Clarehall Junction bypass and the Belcamp SHD fully developed) indicated that this junction would operate above capacity during both peak hours with V/Cs above 1.00 on the Northern, Eastern and Southern approaches in the AM and with V/Cs above 1.00 recorded on the Eastern and Southern approaches in the PM.

For the Malahide Road (R107) / Belmayne junction, the results indicated that it would operate above capacity in the AM peak hour with the highest V/C recorded at 1.09 on the eastern approach (Belmayne) and within capacity in the PM peak hour with the highest V/C at 0.95 also recorded at the eastern approach.

The analysis results for the Malahide Road (R107) / Balgriffin Cottages junction indicated that it would operate above capacity during both peak hours with a V/C above 1.00 recorded on the eastern (Balgriffin Cottages) approach in the AM and with V/C above 1.00 also recorded on the same approach in the PM.

For the new R139 / Belcamp Parkway junction the modelling results indicated that this junction would continue to operate within capacity during both peak hours across all approaches.

Detailed junction modelling for 2028 "with development" and 2040 "with development" scenarios have been carried out as part of this TTA and is provided in the following Section 8.

Strategic Model – Relevant Findings from 2028 "with development" model

From the assessment of the 2028 "with development" model, SYSTRA identified some AM and PM trip patterns (trip distribution, length and modes) which were examined and used to identify opportunities to be incorporated in the Sustainable Transport Strategy (STS) to encourage a modal shift away from private car and target a modal shift to sustainable transport modes. These are listed below.

- *"A large majority of trips associated with Phase 1 of the development are less than 15km and therefore in principle could be made by modes other than private car. This is expected to be consistent across all Phases.*
- *Education trips play a significant role in AM peak trip patterns. Whilst there are a substantial number of trips made by sustainable modes, a similar number are made by car.*
- *PM Peak travel patterns are dominated by commuting but show similar concentrations around particular zones to the AM peak excluding known education areas.*
- *A large majority of trips into the City Centre which will be made by residents of the proposed development are predicted by the models to be made by public transport with relatively few made by car.*
- *Furthermore, as public transport capacity is improved so is the potential for those living in the development to choose employment and non-work activities at locations served by the routes. The corollary of this effect is a potential reduction in proportion of local residents who choose employment and other activities that required a car to get to.*
- *The "potential" of walking and cycling provision within the site could be supported through external improvements, particularly to the immediate networks to the east and south of the site; it is recognised that the delivery of these elements would rest with the local Highway Authority.*
- *The sustainable transport strategy should include a focus on making short trips easy and convenient for walking and cycling.*
- *Providing a direct and attractive link to Clongriffin Station has potential to reduce trips by car, as evidenced by the model origins and destination analysis.*
- *Whilst recognising local congestion issues, outside of specific destinations it is unlikely that more car use can be significantly discouraged without direct action to manage parking provision within the site."*

Based on the key findings, a number of measures for inclusion in the Sustainable Transport Strategy have been proposed by SYSTRA and are set out below.

IDENTIFIED ISSUE / OPPORTUNITY	PROPOSED MEASURE OR ACTION	NOTES
High proportion of trips made are of relatively short length (i.e. AM peak 82% 10km or less, PM peak 78% 10km or less)	Identification of key origins and destinations with concentration of trips within these distances, and subsequent development of proposals for improvements to access by sustainable modes.	Examination of any potentially complementary strategies or aspirations within relevant local transport plans.
Relatively high proportion of very short trips (under 2km) are made by car (i.e. 41% of trips are made by car in the AM peak, and 30% in the PM peak)	As above, plus consideration of factors such as parking availability and role of facilities within the development area.	
High proportion of short trips (2 to 5km) are made by car (i.e. 80% of trips are made by car in the AM peak, and 73% in the PM peak)	As above, plus consideration of factors such as parking availability.	
Concentration of car trips in the AM peak corresponding to zone with primary school provision	Improvement to walking and cycling infrastructure on off-site parts of routes to identified zone to be supported (subject to implementation by LHA).	Earlier implementation of a primary school development within the Belcamp SHD area (understood to also be recommended by Fingal CC with regard to Education comments)
Concentration of car trips in the AM and PM peaks associated with Airport (commuting)	Examination of potential PT improvements (either short term using existing road networks, or longer term using new east-west link road)	Examination of on-site parking provision
Concentration of car trips in the AM and PM peaks associated with hospital / healthcare (based on zone trip numbers)	Examination of improvements to access to Bus Connects corridor, and to off-site cycling infrastructure provision (where feasible).	Examination of on-site parking provision
Concentration of car trips in the AM and PM peaks associated with "park and ride / kiss and ride" activity at Clongriffin Station	Test introduction of dedicated bus service linking site directly with station; longer term potential to integrate with direct service to Airport.	Examination of on-site parking provision

***Table 11** | Key Findings and Observations – extracted from Table 75 of Belcamp SHD - STS.*

8. Junction Modelling

8.1 Introduction

The junction modelling exercise described in this section was carried out by Waterman Moylan using the industry standard software package TRANSYT.

TRANSYT is a computer program for studying everything from isolated road junctions to large signal-coordinated networks. It is capable of developing optimum signal settings for representative traffic conditions of a system. Priority intersections (non-signalised junctions) and roundabouts can also be modelled using TRANSYT, however this is only appropriate where these junctions form part of a larger network comprised of signalised junctions.

TRANSYT contains two main components – a traffic model and a signal optimiser. The traffic model predicts a Performance Index (PI) for a network based on a fixed signal timing plan and set of average traffic flows. The PI is a measure of the overall cost associated with congestion and is a weighted combination of total vehicle delay and stops experienced by traffic within the modelled network. The signal optimisation component within TRANSYT modifies signal timings and assesses whether those adjustments have reduced the PI.

The output report of a TRANSYT model also includes a number of other results to evaluate the modelled system, such as Degree of Saturation percentage (DOS%) figure, Mean Maximum Queue (MMQ) and Mean Delay per pcu for each link on the road network.

Degree of Saturation (DOS):

DOS, also referred to as Volume to Capacity Ratio (v/c), is a measure of performance which represents the capacity of a junction/traffic lane/link to accommodate the vehicular demand and indicates how near the network is to the maximum capacity available. A DOS less than 85% generally indicates that adequate capacity is available, and vehicles are not expected to experience significant queues and delays. As the DOS approaches 100%, traffic flow may become unstable, and delay and queuing conditions may occur.

Mean Maximum Queue (MMQ):

MMQ is the highest estimated mean number of Passenger Car Units (pcu) queued in any lane of a junction approach link, averaged over the entire analysis period.

Mean Delay per Vehicle (seconds):

Mean Delay per vehicle is the average delay experienced by a vehicle on a junction approach link or traffic stream as a result of having to queue at signals or having to give way at a priority junction.

8.2 Modelled Junctions

The junctions modelled in this TTA are the following:

- Junction 1 (existing signalised crossroads): Malahide Road (R107) / Balgriffin Road / EWLR.
- Junction 2 (existing signalised crossroads): Malahide Road (R107) / R139.
- Junction 3 (proposed signalised crossroads): R139 / Belcamp Parkway.
- Junction 4 (proposed signalised T-junction): R139 / R139 Link Road

Figure 57 **|** *Location of Assessed Junctions (Source: Google Earth).*

Junction 1 is an existing signalised T-junction which is proposed to be upgraded to a new signalised crossroads with the western arm forming the East West Link Road (EWLR). This junction upgrade is approved by the Applicant under a separate planning application (Belcamp Phase 1B) and its new layout was showed earlier in Figure 29 of this report. For the modelling exercise, Junction 1 has been assessed based on its approved configuration.

Junction 2 is the Clarehall junction. Several studies in the area recommend this junction to be the upgraded to a more pedestrian, cyclist and public transport friendly intersection. An emerging future layout (illustrated earlier in Figure 28 of this report) for this junction has been designed by BusConnets under their Clongriffin to City Centre CBC scheme and was used in this assessment for modelling purposes.

Junction 3 is a non-existing (proposed) signalised crossroads identified and tested in a number of studies for the area. As part of the subject development works, this junction is proposed to be constructed. The modelling for Junction 3 was carried out based on the proposed layout, which was showed earlier in Figure 35 of this report.

Junction 4 is a non-existing (proposed) signalised crossroads identified and tested in a number of studies for the area. As part of the subject development works, this junction is proposed to be constructed. The modelling for Junction 4 was carried out based on the proposed layout, which was showed earlier in Figure 36 of this report.

8.3 Assessed Scenarios

The performance of the assessed junctions has been analysed for the critical AM Peak Hour and PM Peak Hour for the below scenarios (Table 12), where green means "*in place*", orange means *"partially in place*" and white "*not in place*". Note that these assessment scenarios and associated transportation improvements/road network upgrades are in line with detailed model runs carried out by SYSTRA as part of their Sustainable Transport Strategy study. Some of the below road network upgrades, such as the East West Link Road (EWLR) and the Belcamp Parkway (FCC) are proposed by the Applicant as part of the subject application.

Note that when carrying out the analysis, SYSTRA considered that in 2028, 1,000 residential units would in place in Belcamp, whilst in the subject TTA the phasing programme proposal indicates 1,504 units by this year. Similar situation occurs in the 2040 scenario, where SYSTRA conservatively assumed 3,700 residential units in Belcamp (fully developed) whilst the subject proposal is for a total of 2,527 residential units. In that case, for the 2028 scenario, 504 new units have been included in the model and for the 2040 scenario 1,173 units have been removed.

Year	Scenario	Bus Connects	DART+	MetroLink	Clarehall Junction Upgraded	EWLR	Belcamp Parkway (DCC)	Belcamp Parkway (FCC)
2028	**With Belcamp Phase 1** **(1,504 units)**							
2040	**With Belcamp Full Build Out** **(2,527 units)**							

Table 12 | *Summary of Assessed Scenarios and Associated Transportation Network.*

8.4 TRANSYT Set Up

Typical input data to set up a junction model in TRANSYT include traffic flows (vehicles or pcu per time segment), traffic signal controller phases and stages, intergreen times, saturations flows and lane lengths.

Traffic Flows

As part of the subject application, no traffic survey was commissioned. Instead, output traffic flows for each assessed junction supplied by SYSTRA (extracted from their models) have been used. As mentioned above, SYSTRA assumed that 1,000 residential units would in place in Belcamp in 2028, whilst in the subject TTA, the phasing programme proposal indicates 1,504 units by this year. Similar situation occurs in the 2040 scenario, where SYSTRA conservatively assumed 3,700 residential units in Belcamp (fully developed) whilst the subject proposal is for a total of 2,527 residential units. In that case, for the 2028 scenario, 504 new units have been included in the model and for the 2040 scenario 1,173 units have been removed. The traffic flows supplied by SYSTRA are provided in Appendix B. Traffic flows used in the modelling are showed on TRANSYT Output Reports in Appendix B.

Pedestrian Movements

No pedestrian movement survey was not carried out for this application. Instead, a very conservative assumption of 300 pedestrian movements on each pedestrian crossing of each assessed junction has been applied. This would equate to c. 5 people crossing a given pedestrian crossing per minute per way.

Phases and Stages

Details of the phases and stages set for each assessed junction is summarised later in this report and provided in full in Appendix C – TRANSYT Output reports. The TRANSYT Output reports include information on pedestrian and normal traffic phases, and the sequence and times of which they have been modelled/optimised.

It is worth mentioning that all assessed junctions are new junctions (proposed/approved by the Applicant or by others) to be constructed or upgraded and therefore, for the purpose of this TTA, stage sequencies for these junctions were optimised by TRANSYT.

Intergreens

An intergreen period refers to the period of time between the end of the green signal giving right of way for one phase and the beginning of the green signal for the next phase. The normal minimum value of an intergreen period is 5 seconds (3 seconds amber and 2 seconds all red), but this is very often longer for larger junctions. The '*Traffic Management Guidelines'* published by the Stationery Office states the following with regards to intergreen times:

"The intergreen times can vary between 5 seconds for compact junctions and 10 seconds or more for junctions with a long distance between entries and exits. Particular care is needed when pedestrian phase follows a traffic phase."

Intergreen values for each stage of each signalised junction have been set automatically by TRANSYT, which uses as reference for calculations the determination of intergreen times set out in the *"Department of Transport – Traffic Advisory Leaflet 1/06".*

Saturation Flows

Saturation flow is a common concept in Traffic Engineering and largely used in junction modelling. For a signalised intersection, a Base (or unadjusted) Saturation Flow can be defined as the maximum amount of flow crossing a stop line if the signals were permanently on green, and is given by the following relationship:

$$S = 3600 / h$$

Where: S = Saturation Flow (pcu/hour or Vehicle/hour); h = Saturation headway (sec/pcu or sec/veh); 3600 = number of seconds in one hour.

When developing a model with TRANSYT, the software initially adopts all signalised lanes of the network as having a Base Saturation Flow of 1,800 pcu/hour based on a saturation headway value of 2 seconds per pcu (or vehicle). This value represents a base or unadjusted saturation flow, however, for the purpose of this assessment, saturation flows for each lane on the modelled junctions have been defined as 1,800 pcu/hr

Details of the model set up are provided in full within the TRANSYT output reports in Appendix C.

8.5 Assessment Results

8.5.1 Junction 1: Malahide Road (R107) / Balgriffin Road / EWLR

As mentioned previously, under a separate planning application (Belcamp Phase 1B), the Applicant received grant permission to upgrade Junction 1 to a signalised crossroads. A section of the EWLR was also approved under that application and is projected to form the western approach of the junction.

Modelling for Junction 1 was carried out for the 2028 and 2040 "with development" scenarios and the analysis results are summarised in Table 13. The modelled junction is illustrated in Figure 57.

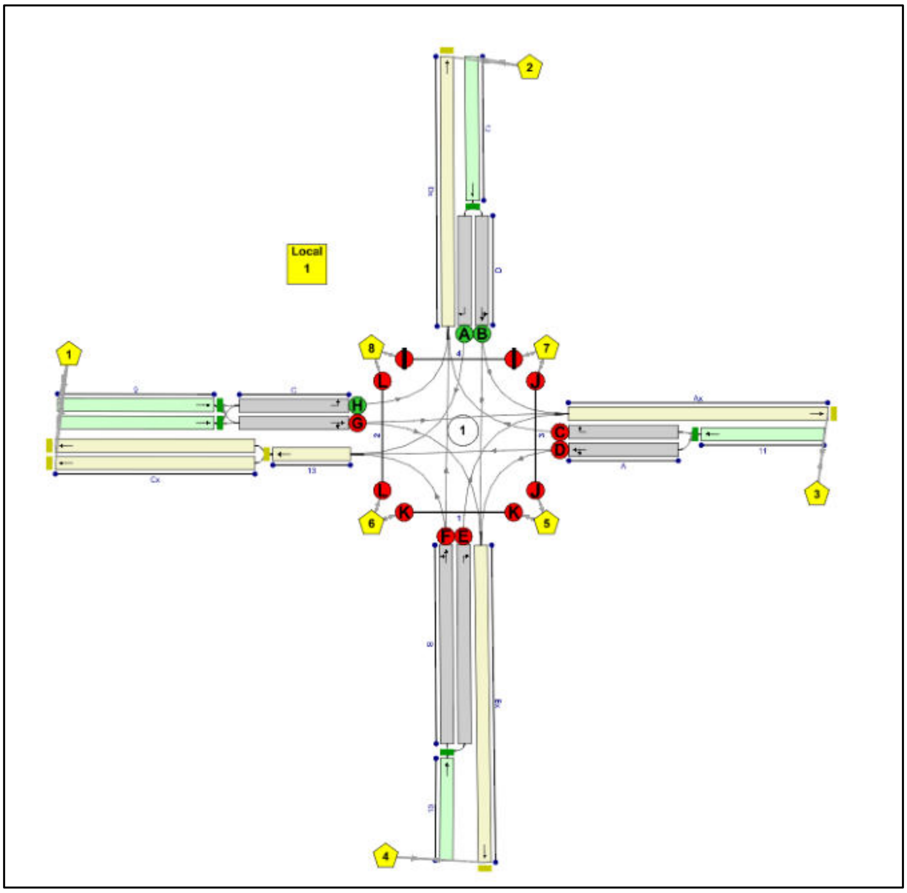


Figure 58 | *Junction 1 – Upgraded Layout.*

TRANSYT analysis was undertaken applying a 5-stage signal cycle (4 for normal traffic and one for pedestrian) over a selected 120-second cycle. The optimised stage sequence is illustrated in Figure 58.

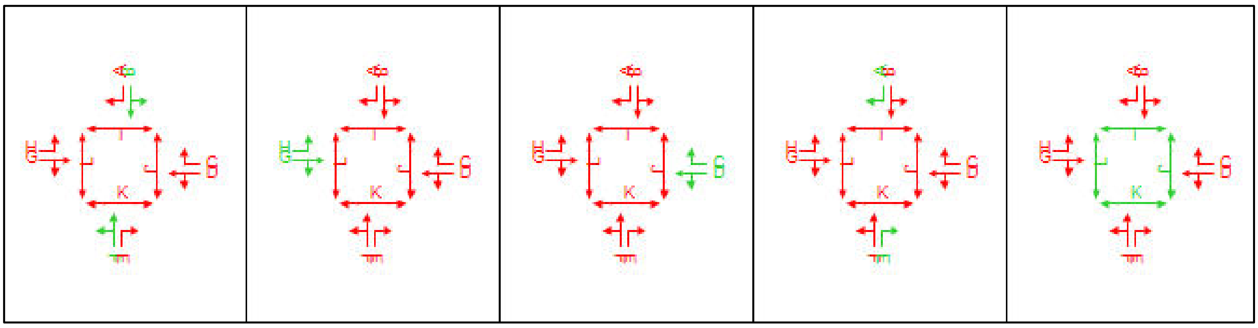


Figure 59 | *Junction 1 – Stage Sequence.*

The arms of the junction were labelled as follows within the model:

- Arm A: Balgriffin Road (E).
- Arm B: Malahide Road R107 (S).
- Arm C: EWLR (W).

- Arm D: Malahide Road R107 (N).

Arm	Mov.	AM Peak Hour		PM Peak Hour	
		Queue (pcu)	DOS (%)	Queue (pcu)	DOS (%)
2028 “with development”					
A	R	15.71	105	9.00	86
	S/L	8.02	89	11.03	94
B	R	9.25	82	10.12	81
	S/L	11.32	66	11.41	69
C	L	0.86	16	0.32	10
	S/R	6.42	77	4.37	76
D	R	0.00	0	0.17	2
	S/L	15.10	79	13.43	77
2040 “with development”					
A	R	0.26	4	0.55	7
	S/L	18.94	105	12.27	94
B	R	4.51	73	7.37	78
	S/L	17.09	82	10.93	65
C	L	0.67	11	0.12	3
	S/R	12.58	97	4.90	74
D	R	0.32	10	0.00	0
	S/L	12.92	69	15.62	82

Table 13 **|** *Junction 1 – TRANSYT Analysis Results.*

From the TRANSYT analysis as summarised above, the eastern approach of Junction 1 (Balgriffin Road) would operate above capacity for the assessment years of 2028 and 2040 “with development” during the AM peak hour and at capacity during the PM peak hour.

8.5.2 Junction 2: Malahide Road (R107) / R139

Junction 2 is the existing signalised crossroads known as Clarehall Junction. As described previously in this report, several studies in the FCC/DCC Fringe area recommend Clarehall junction to be the upgraded to a more pedestrian, cyclist and public transport friendly intersection, by reducing the number of pedestrian crossings and prioritising public transport and active modes.

BusConnects, under their Clongriffin to City Centre CBC scheme, provides an emerging/potential future layout for this junction which was previously shown in Figure 28 of this report. It has been assumed in this modelling exercise that, by the year of 2028 with the Clongriffin to City Centre CBC in place and fully operational, Junction 2 will be upgraded as per the BusConnects proposal and, for the 2028 “with development” and 2040 “with development” scenarios, was modelled as such.

The modelled junction is illustrated in Figure 59 below.

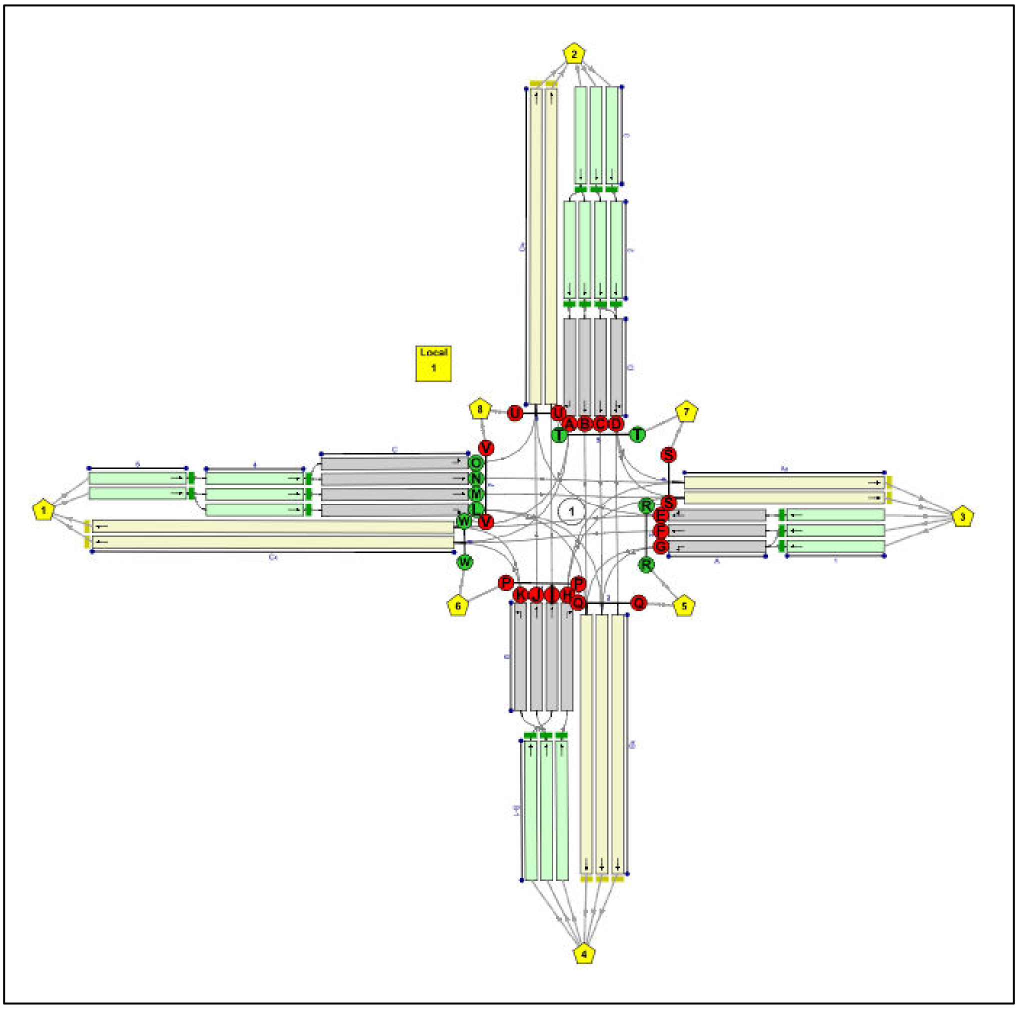


***Figure 60** | Junction 2 (Clarehall Junction) – Upgraded Layout.*

TRANSYT analysis was undertaken applying a 4-stage signal cycle over a selected 120-second cycle. The optimised stage sequence is illustrated in Figure 60.

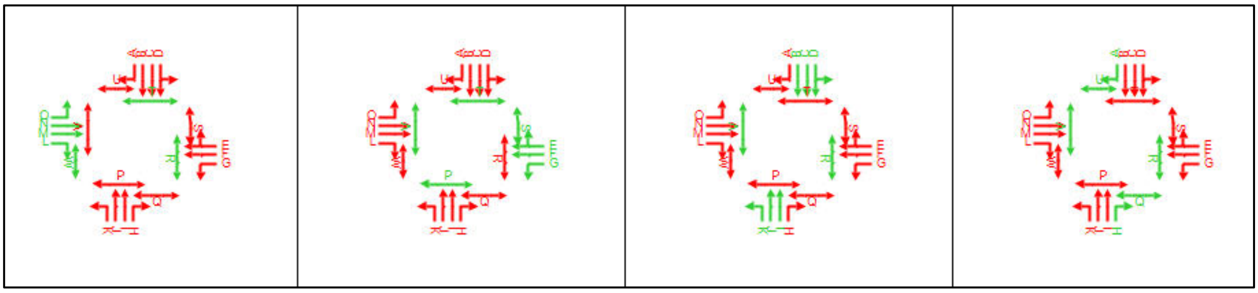


***Figure 61** | Junction 2 – Stage Sequence.*

The TRANSYT analysis results for the 2028 “with development” and 2040 “with development” scenarios are summarised in Table 14 below. The arms of the junction were labelled as follows within the model:

- Arm A: R139 (E).

- Arm B: Malahide Road R107 (S).
- Arm C: R139 (W).
- Arm D: Malahide Road R107 (N).

Arm	Mov.	AM Peak Hour		PM Peak Hour	
		Queue (pcu)	DOS (%)	Queue (pcu)	DOS (%)
2028 “with development”					
A	S	11.07	80	7.74	76
	L	0.00	0	0.00	0
	R	11.07	80	7.74	76
B	S	8.48	59	11.50	72
	L	12.66	82	12.72	80
	R	3.65	61	5.00	69
	Bus Lane	1.37	12	1.34	11
C	S	13.16	79	13.97	78
	L	5.33	37	5.44	36
	R	8.38	62	5.48	41
D	S	8.78	58	8.04	52
	L/Bus Lane	1.33	11	5.39	37
	R	4.77	73	5.88	76
2040 “with development”					
A	S	9.87	69	6.96	65
	L	0.00	0	0.00	0
	R	9.87	69	6.96	65
B	S	8.65	71	9.77	75
	L	0.17	2	1.70	18
	R	3.68	58	5.08	67
	Bus Lane	1.48	15	1.47	14
C	S	11.45	70	12.58	70
	L	3.58	25	3.97	26
	R	4.12	32	3.95	29
D	S	7.85	61	6.31	50
	L/Bus Lane	1.44	13	5.75	46
	R	4.47	67	5.32	69

Table 14 | *Junction 2 - TRANSYT Analysis Results.*

From the TRANSYT analysis as summarised above, Junction 2 with the BusConnects upgraded layout would operate within capacity for the assessment years of 2028 and 2040 “with development” across all approaches during both peak hours.

8.5.3 Junction 3: R139 / Belcamp Parkway

Junction 3 is a signalised crossroads proposed as part of the subject application. This junction is proposed on R139 just south of the proposed Belcamp SHD site and approximately 600 metres west of Clarehall junction. The modelled junction is illustrated in Figure 61. It has been modelled based on its proposed layout and the TRANSYT analysis results for both 2028 and 2040 “with development” scenarios are summarised in Table 15.

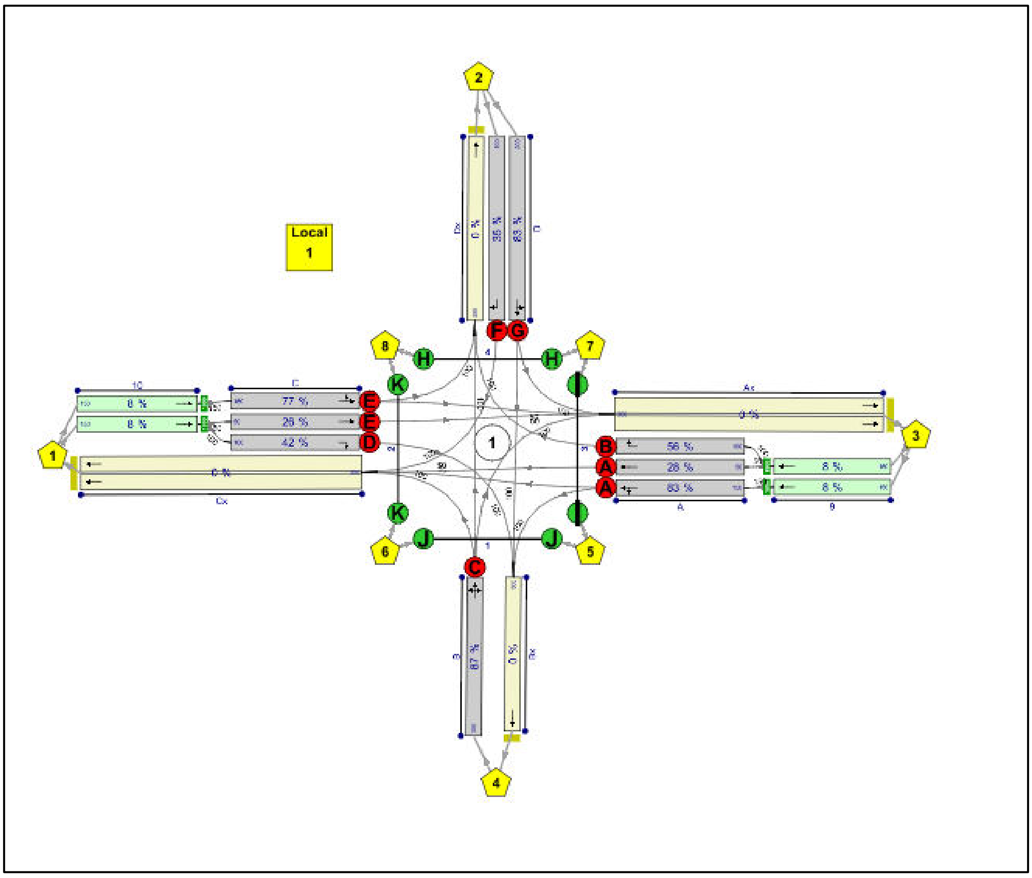


Figure 62 | *Junction 3 – Proposed Layout.*

TRANSYT analysis was undertaken applying a 6-stage signal cycle (5 for normal traffic and one for pedestrian) over a selected 120-second cycle. The optimised stage sequence is illustrated in Figure 62.

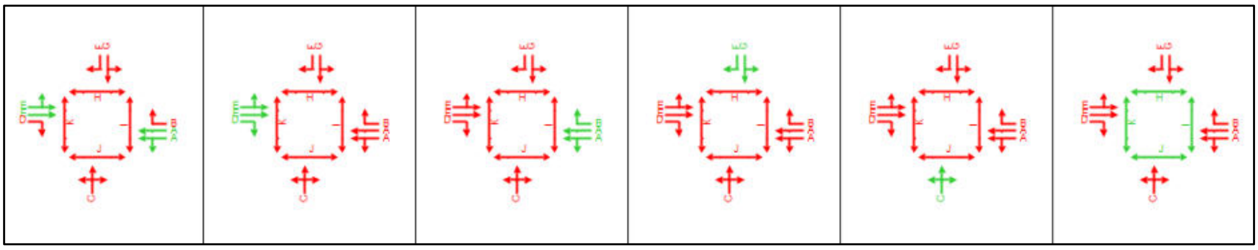


Figure 63 | *Junction 3 – Stage Sequence.*

The arms of the proposed junction were labelled as follows within the model:

- Arm A: R139 (E).
- Arm B: Belcamp Parkway (S).
- Arm C: R139 (W).

- Arm D: Belcamp Parkway (N).

Arm	Mov.	AM Peak Hour		PM Peak Hour	
		Queue (pcu)	DOS (%)	Queue (pcu)	DOS (%)
2028 “with development”					
A	S	13.38	80	12.31	73
	S/L	13.38	80	12.31	73
	R	0.00	0	0.00	2
B	S/R	0.85	28	3.25	71
	L	0.29	10	0.32	10
C	S	23.27	90	27.31	90
	S/L	24.43	90	13.13	60
	R	2.13	39	0.48	9
D	S/L	2.11	45	0.50	12
	S/R	0.29	10	0.13	4
2040 “with development”					
A	S	11.38	81	8.19	62
	S/L	11.38	81	8.19	62
	R	0.12	3	0.74	19
B	S/R	4.51	49	2.19	29
	L	5.79	61	6.99	76
C	S	17.21	81	23.61	88
	S/L	17.21	81	11.94	58
	R	2.05	41	0.78	15
D	S/L	2.61	41	2.64	54
	S/R	0.12	3	0.00	1

Table 15 | *Junction 3 – TRANSYT Analysis Results.*

From the TRANSYT analysis as summarised above, Junction 3 with its proposed layout would operate within satisfactory capacity for the assessment years of 2028 and 2040 “with development” across all approaches during both peak hours.

8.5.4 Junction 4: R139 / R139 Link Road

Junction 4 is a signalised crossroad proposed as part of the subject application. This junction is proposed on R139 just south of the proposed Belcamp SHD site and approximately 1km west of Clarehall junction. It has been modelled based on its proposed layout and the TRANSYT analysis results for both 2028 and 2040 “with development” scenarios are summarised in Table 16.

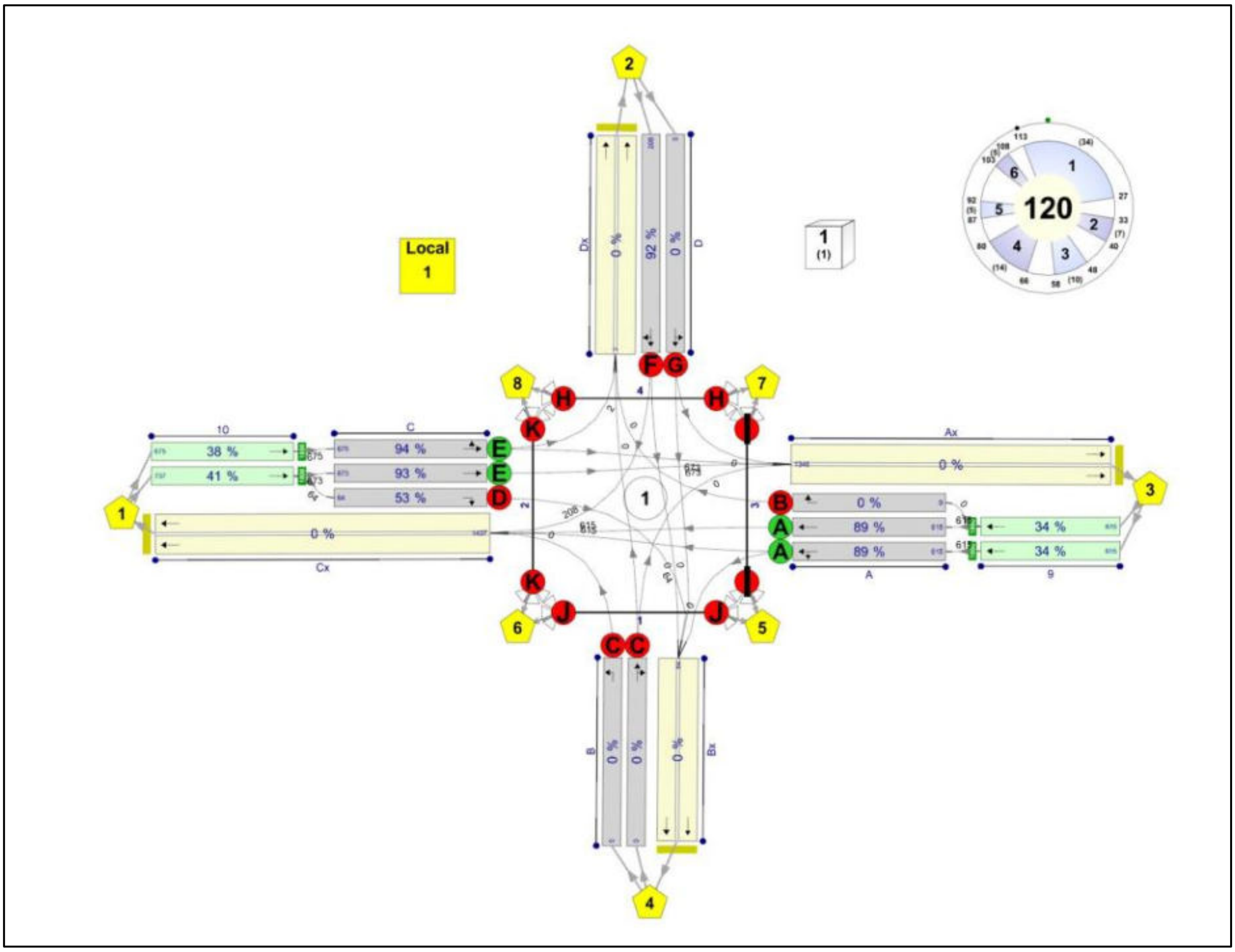


Figure 64 | *Junction 4 – Proposed Layout.*

TRANSYT analysis was undertaken applying a 3-stage signal cycle (1 for normal traffic, one for the bus gate and one for pedestrian) over a selected 90-second cycle. The optimised stage sequence is illustrated in Figure 64.

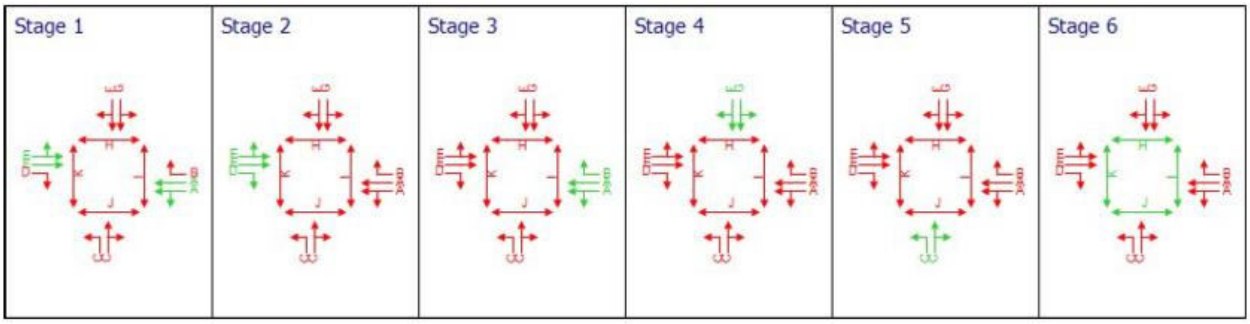


Figure 65 | *Junction 4 – Stage Sequence.*

The arms of the proposed junction were labelled as follows within the model:

- Arm A: R139 (W).

- Arm B: Tara Lawns
- Arm C: R139 (E).
- Arm D: R139 Link Road (N).

Arm	Mov.	AM Peak Hour		PM Peak Hour	
		Queue (pcu)	DOS (%)	Queue (pcu)	DOS (%)
2028 "with development"					
A	S	40.24	89	24.76	72
	S/L	40.24	89	24.76	72
	R	0.00	0	51.12	2
B	S/R/L	0.00	0	0.00	0
C	S	63.75	94	24.38	60
	S/L	63.75	93	40.32	88
	R	70.86	53	0.00	0
D	S/L	0.00	0	0.00	0
	S/R	115.54	92	77.64	53
2040 "with development"					
A	S	69.36	94	31.65	70
	S/L	69.36	94	31.65	70
	R	52.21	3	0.00	0
B	S/R/L	0.00	0	0.00	0
C	S	89.68	96	54.02	87
	S/L	89.68	96	92.66	99
	R	77.84	58	0.00	0
D	S/L	0.00	0	0.00	0
	S/R	120.89	97	140.67	94

***Table 16** | Junction 4 – TRANSYT Analysis Results.*

From the TRANSYT analysis as summarised above, Junction 4 with its proposed layout and within capacity for the assessment years of 2028 and 2040 "with development" across all approaches during both peak hours.

9. Belcamp Transport Strategy

9.1 General Design Strategy

A key component of the proposed development is the application of the design principles of DMURS to both roads and junctions, and to emphasise provision of high-quality cycle and pedestrian links throughout the site and to destinations in the area, including major shopping and business centre at Clarehall Junction, local GAA clubs and the strategic Mayne River green route. The Belcamp Lands will be developed specifically to avoid a car dominated environment and to optimise pedestrian and cyclist links.

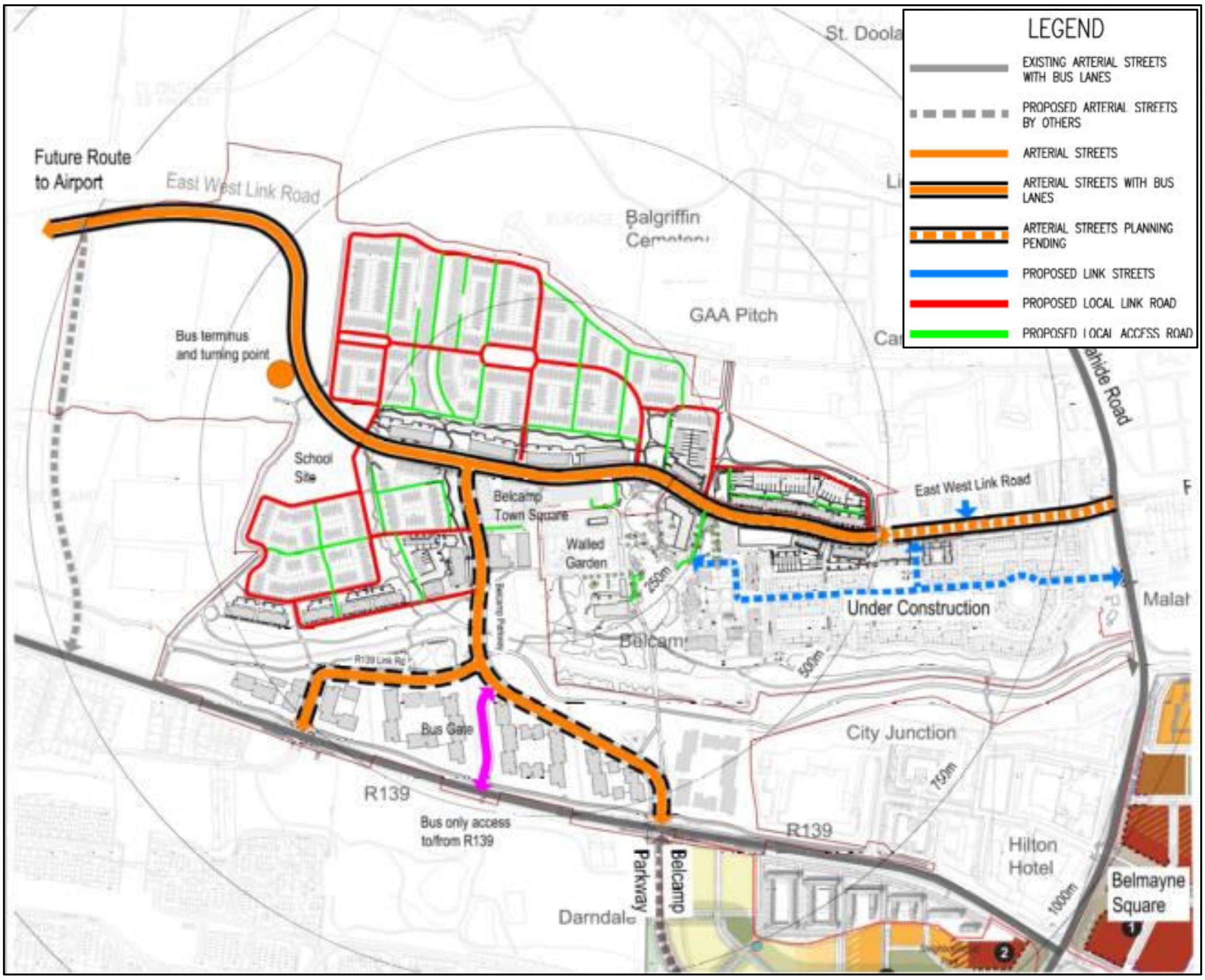


Figure 66 | Proposed Transport Network General Arrangement

9.2 Proposed Transport Links

The proposed transport network provides a legible road hierarchy and has been designed to closely align with the Fingal County Council and Dublin City Council Development Plans, the South Fingal Transportation Study (SFTS) and DCC Draft Belmayne Belcamp Masterplan, to meet the emerging transportation demand.

The proposed road hierarchy will comprise of two new arterial roads (the East-West Link Road and the Belcamp Parkway), several new link streets, and a series of new local access roads, including shared surface/home-zones.

9.2.1 East–West Link Road

The East–West Link Road (EWLR) traverses the portion of the Belcamp lands within FCC's jurisdiction, extending from the Malahide Road (R107) at the east as far as the western boundary of the Applicant's lands. The road is designed to facilitate continuation west beyond Belcamp, through the IDA zoned lands, in accordance with the Fingal Development Plan. This street has been designed to incorporate high quality public transport facilities including a dedicated bus lane in both directions and high-quality bus stops strategically located to serve the proposed development. The road also includes provision for active forms of transport, with separated cycle tracks on both sides of the carriageway and continuous footpaths with pedestrian crossings provided at anticipated desire lines.

Figure 67 | *View of the Proposed East–West Link Road*

It is proposed to provide a transport hub at Belcamp Town Square with bus stops, E-bike charging stations, bicycle racks, E-car charging points and multiple designated car-share fleet parking spaces. This transport hub will be accessible from the EWLR.

Figure 68 **|** *Typical Proposed Cycle Infrastructure: E-bike Charging Station and Bicycle Racks*

9.2.2 Belcamp Parkway

Belcamp Parkway is an extension of the DCC Belcamp/Belmayne Masterplan, which includes a link from the R107 Malahide Road to the R139 and forms a Boulevard style street through the DCC Master Plan area linking to the Belcamp SHD development. It is a north-south arterial street and includes a new junction with the R139, where there is currently a signalised pedestrian crossing and access road to the Belcamp lands. From the R139 the Belcamp Parkway will cross the Mayne River and connect with the East West Link Road.

An emphasis has been placed on active modes of transport and links to the surrounding areas. There is a high standard of pedestrian, cyclist and public transport facilities provided. This will provide a clear, comprehensive, and high-quality transport network for residents and visitors. All of the proposed junctions have been designed in accordance with DMURS, incorporating high quality pedestrian and cyclist facilities.

Figure 69 **|** *View of the Proposed Belcamp Parkway*

9.2.3 R139 – Adjacent to the Belcamp Site

A new footpath and cycle track is to be introduced along the R139, south of the Belcamp Site, for the full frontage of the site, linking the development to Clarehall Junction.

At the west of the proposed development a new 4-way junction at the existing Tara Lawns access is proposed on the R139. This junction will connect the Belcamp Parkway and the R139.

Heading east along the R139 approximately 265m to the east of this new junction it is proposed to introduce a new toucan crossing. This crossing is positioned on a north south desire line to facilitate active transport from Belcamp Town Centre to the R139 and to Darndale Park.

To the east of this crossing the proposed Belcamp Parkway will cross the R139 at a signal-controlled junction, complete with pedestrian and toucan facilities.

It is proposed to include pedestrian and cycle links from Belcamp Town Square to Belmayne Commercial Area and bus gate via a new 5.0m wide pedestrian/cycle link along the R139.

Figure 70 **|** *View of Proposed Pedestrian/Cycle Path Along the R139*

9.2.4 Mayne River Road to Malahide Road

It was previously proposed to provide a new vehicular route linking from the Malahide Road, south of the Mayne River and adjacent to Belmayne, as far as Belcamp Parkway. However, at the meeting held on 4 February 2022, DCC Transportation Department advised that this inner relief road is no longer part of the strategic road network in the area, and as it is not included in the South Fingal Transportation Study recommendations, this link does not from part of the proposed development.

A new access link for pedestrians and cyclists is proposed along this route in accordance with the NTA 2021 Cycle Network Plan for the Greater Dublin Area.

It is proposed to include pedestrian and cycle links from Belcamp Town Square to Belmayne Commercial Area and bus gate via a River Mayne 4.5m wide path.

9.3 SYSTRA Public Transport Strategy

SYSTRA have prepared a public transport strategy, which includes traffic modelling of the surrounding area and recommendations on how to mitigate the development’s impact on the transport network.

9.3.1 Modelling & Findings

SYSTRA's analysis found that the vast majority of trips are less than 15km in length, with 82% less than 10km.

There is a significant morning peak concentration in the 2km to 5km radius. These morning peak destination "hotspots" for car trips are believed to be associated with primary school education escort trips, "park and ride" activity at Clongriffin Train Station, and a notable number of trips to the zone containing a major city hospital. Evening peak destination "hotspots" include Clongriffin Station and the Hospital zone, but with less concentration overall than the morning peak.

The data provides support for bus link between the development and Clongriffin Station. Providing an active transport and bus links for those accessing primary and secondary education may also be beneficial.

9.3.2 Proposed Measures to be Implemented

In accordance with the recommendations of SYSTRA's report, several measures are proposed to minimise the impact that the development will have on the surrounding transport network.

It is proposed to include the main road infrastructure as recommended by the SFTS part of the first phase of development. This includes the East West Link Road and Belcamp Parkway.

The social infrastructure proposed, including the reserved school site, commercial and retail areas at the Town Centre and the apartment complexes south of the Mayne, and the recreational facilities to be provided within the development and the existing GAA clubs adjoining the development, together with links to surrounding social infrastructure, retail, schools etc, will ensure that all facilities are available within high quality active transport routes, and maximise the modal shift away from private car to sustainable transport options.

The East-West Link Road is designed as a bus route to Core Bus Corridor standards, with dedicated bus lanes on both sides of the carriageway. The road reservation for Belcamp Parkway has been designed to facilitate future 3.25m bus lanes if required in the future. The development has been designed based on extensive quality active transport links within the development and to adjoining facilities.

10. Car Parking

10.1 Fingal Development Plan 2017 - 2023

Table 17 below highlights the Standards for car parking in new developments are set out in Table 12.8 of the Fingal Development Plan 2017 - 2023.

Description	Car Parking Norm	Norm or Max
House – Urban / Suburban (1 or 2 bedrooms)	1-2 spaces within the curtilage	Norm
House – Urban / Suburban (3 or more bedrooms)	2 spaces within the curtilage	Norm
Apartment / Townhouse (1 bedroom)	1 Space per unit plus 1 visitor space per 5 units	Norm
Apartment / Townhouse (2 bedrooms)	1.5 spaces per unit plus 1 visitor space per 5 units	Norm
Apartment / Townhouse (3 bedrooms)	2 spaces per unit plus 1 visitor space per 5 units	Norm
Pre-school facilities/crèche	0.5 per classroom	Max
Restaurant/Pub/Café	1 per 15m²	Norm
Takeaway	1 per 30m²	Norm
Convenience Store (<200m²)	1 per 30m²	Max
Retail	1 per 20m²	Max

Table 17* | *Fingal Development Plan 2017–2023 - Car Parking Requirement.

Table 18 below highlights the Standards for car parking in new developments are set out in the Draft Fingal Development Plan 2023 – 2029.

Description	Car Parking Norm	Norm or Max
Residential (1–2 Bedrooms)	0.5 per unit	Max
Residential (3+ Bedrooms)	1.0 per unit	Max
Pre-school facilities/crèche	0.5 per classroom	Max
Restaurant/Pub	Not Specified	-
Takeaway	None	Norm
Convenience Store	1 per 60m²	Max
Retail	1 per 20m²	Max

Table 18* | *Draft Fingal Development Plan 2023 - 2029 - Car Parking Requirement.

10.2 Dublin City Development Plan 2016 - 2022

Standards for car parking in new developments are shown on Map J of the Dublin City Development Plan 2016-2022. The DCC area is divided into three areas for the purpose of parking control:

1) Parking Zone 1: is generally within an inner-city location where transport corridors intersect, or that has significant interchange potential.
2) Parking Zone 2: occurs alongside transport corridors
3) Parking Zone 3. Remainder of the city

Car parking provision in Zones 1 and 2 is restricted on account of the proximity of these locations to public transport. An increased density of development will be promoted in Zone 1 and those parts of Zone 2 where the development is in close proximity to good public transport links

Table 19 below are extracts related to new developments from Table 16.1 of the DCC Plan 2016 – 2022:

Description	Zone	Car Spaces
Residential (Houses, Apartments and Duplexes)	1 and 2	1 per dwelling
	3	1.5 per dwelling
Pre-school facilities/crèche	1	None
	2 and 3	1 per classroom
Restaurants, Cafés and Take-aways	1	None
	2 and 3	1 per 150 m² seating area
Retail	1	1 per 75 m² GFA
	2 and 3	

Table 19 **|** *Dublin City Development Plan 2016–2022 - Car Parking Requirement.*

<u>Residential Car Parking In Apartments:</u>

Car parking standards are maximum in nature and may be reduced in specific, mainly inner-city locations where it is demonstrated that other modes of transport are sufficient for the needs of residents. In other locations, it is considered desirable that one car parking space (or as required by Table 16.1) be provided off-street within the curtilage of the development per residential unit, as car storage requirements cannot be met on-street for all residents. Each space shall be permanently assigned to and sold with each apartment and shall not be sublet or leased to non-residential owners or occupiers. Where sites are constrained, or provision of on-site car storage is not possible, alternative solutions will be considered such as residential car clubs or off-site storage. Apartment parking spaces are mainly to provide for car storage to support family-friendly living policies in the city and make apartments more attractive for all residents. It is not intended to promote the use of the car within the city. If the car space is not required in the short-term, it should be given over to other residential storage or utility uses

10.3 Design Standards for New Apartments – December 2020

In December 2020, a revised version of the document "Sustainable Urban Housing: Design Standard for New Apartments" was released. The parking standards set out in this document are considerably lower than those contained in the Fingal Development Plan 2017 – 2023 and Dublin City Development Plan 2016-2022 in respect to apartment developments.

Chapter 2 of the Design Standard for New Apartments sets out the following "types of location" which are defined by site's accessibility and proximity to public transport and town/city centres:

"Central and/or Accessible Urban Locations

- *Sites within walking distance (i.e up to 15 minutes or 1,000-1,500m), of principal city centres, or significant employment locations, that may include hospitals and third level institutions;*
- *Sites within reasonable walking distance (i.e. up to 10 minutes or 800-1,000m) to/from high capacity urban public transport stops (such as DART or Luas); and*
- *Sites within easy walking distance (i.e. up to 5 minutes or 400-500m) to/from high frequency (i.e. min 10 minute peak hour frequency) urban bus service.*

Intermediate Urban Locations

- *Sites within or close to i.e. within reasonable walking distance (i.e. up to 10 minutes or 800-1,000m), of principal town or suburban centres or employment locations, that may include hospitals and third level institutions;*
- *Sites within walking distance (i.e. between 10-15 minutes or 1,000-1,500m) of high capacity urban public transport stops (such as DART, commuter rail or Luas) or within reasonable walking distance (i.e. between 5-10 minutes or up to 1,000m) of high frequency (i.e. min 10 minutes peak hour frequency) urban bus services or where such services can be provided;*
- *Sites within easy walking distance (i.e. up to 5 minutes or 400-500m) of reasonably frequent (min 15 minute peak hour frequency) urban bus services.*

Peripheral and/or Less Accessible Urban Locations

- *Sites in suburban development areas that do not meet proximity or accessibility criteria;*
- *Sites in small towns or villages."*

The document also states that the range of locations is not exhaustive and will require further local assessment.

As per the Design Standards for New Apartments – Guidelines for Planning Authorities – December 2020 standards set out above and the location of the proposed development in relation to current and proposed public transport provision, subject development meets criteria for reasonable grounds to minimise car parking provisions.

10.4 Proposed Car Parking

The proposed car parking at the development is set out in the Table below:

Description			No. of Units	No. of Spaces	Location	Ratio
Dublin City Council	Apartments	Block 1	273	128	Under Podium	0.5
		Block 2	160	48	On-Street/Under Podiu	0.3
		Block 3	297	76	On-Street/Under Podium	0.3
		Block 4	285	163	On-Street/Under Podium	0.6
		Block 5	96	52	Under Podium/Basement	0.5
		Block 6	119	23	Under Podium	0.2
		Visitor Spaces	N/A	25	On-Street	-
	Commercial	Crèche	6 Classrooms	3	On-Street	-
		Block 3 Café/Retail	393.4m²	13	Under Podium	-
	DCC Subtotal		***1,230***	***531***	**-**	***0.4***
Fingal County Council	Houses	2-Bed	16	16	On-curtilage	1.0
		3-Bed	385	770	On-curtilage	2.0
		4-Bed	72	144	On-curtilage	2.0
	Duplexes	Block 1.1	18	18	Curtilage/Under-Croft	1.0
		Block 1.2	18	18	Curtilage/Under-Croft	1.0
		Block 1.3	18	18	Curtilage/Under-Croft	1.0
		Block 1.4	18	18	Curtilage/Under-Croft	1.0
		Block 1.5	18	18	Curtilage/Under-Croft	1.0
		Block 2.1	8	8	On-Street/Curtilage	1.0
		Block 2.2	16	16	On-curtilage	1.0
		Block 2.3	16	16	On-curtilage	1.0
		Block 2.4	8	8	On-curtilage	1.0
		Block 2.5	12	12	On-curtilage	1.0
		Block 2.6	16	16	On-Street/Curtilage	1.0
		Block 3.1	12	12	On-curtilage	1.0
		Block 3.2	12	12	On-curtilage	1.0
		Block 3.3	12	12	On-curtilage	1.0
		Block 3.4	12	12	On-curtilage	1.0
		Block 3.5	12	12	On-curtilage	1.0
		Block 3.6	16	16	On-curtilage	1.0
		Block 3.7	16	16	On-curtilage	1.0
		Block 3.8	8	8	On-curtilage	1.0
		Block 3.9	8	8	On-curtilage	1.0

	Apartments	Block A	23	16	On-Street/Curtilage	0.7
		Block B	23	16	On-Street/Curtilage	0.7
		Block C	27	18	On-Street/Curtilage	0.7
		Block D	42	12	On-Street	0.3
		Block F	103	91	Under Podium/Basement	0.9
		Block G	65	40	Under Podium	0.6
		Block H	46	32	On-Street/Curtilage/Under-Croft	0.7
		Block J	40	28	Curtilage/Under-Croft	0.7
		Block L	46	32	On-Street/Curtilage/Under-Croft	0.7
		Block M	56	39	Curtilage/Under-Croft	0.7
		Blocks N & P	79	58	On-Street/Curtilage	0.7
	Comm-ercial	Crèche	6 Classrooms	7	On-Street	-
		Block F	1,162m²	26	Under Podium	-
		Town Square Environs	1,633m²	35	On-Street	-
		Clubhouse	97m²	40	On-Street	-
	FCC Subtotal		***1,297***	***1,694***	***-***	***1.2***
Total			**2,527**	**2,225**	**-**	**0.88**

Table 20 | *Proposed Residential Car Parking*

All of the private residential parking spaces throughout the development are to be provided with Electric Vehicle (EV) charging points, with a minimum of 10% of the public/visitor parking spaces to be fitted with charging points from completion of the proposed development and with all ducting and services provided as part of the proposed development to facilitate non-disruptive retrofitting of EV charging points for all of the remaining parking spaces.

The draft Development Plan, 2022 to 2030, has an ambitious target of 100% electric or hybrid cars and vans by 2030. The recommendations for EV points in the current development plan is non-specific and what has been provided represents a future proofing of EV provision for private car parking.

11. Cycle Parking

11.1 Fingal Development Plan 2017 – 2023

Standards for bicycle parking in new developments are set out in Table 12.9 of the Fingal Development Plan 2017 – 2023. Based on that, Table 21 below sets out the cycle parking requirements applicable to the subject proposed development of Belcamp

Land Use	FDP Standard	Norm or Max
Apartment	1 per unit + 1 visitor space per 5 units	Norm
Creche	0.5 space per classroom	Norm

Table 21 **|** *Fingal Development Plan 2017 – 2023 – Cycle Parking Standards.*

11.2 Dublin City Development Plan 2016 – 2022

Standards for bicycle parking in new developments are set out in Table 16.2 of the Dublin City Development Plan 2016 – 2022. Based on that, Table 22 below sets out the cycle parking requirements applicable to the subject proposed development of Belcamp.

Description	Zone	Cycle Spaces
Residential (House and apartments)	All zones	1 per unit (Additional requirements for larger units and visitor parking will be decided on a case-by-case basis)
Public Houses	1 and 2	1 per 150 sq.m
	3	1 per 200 sq.m

Table 22 **|** *Dublin City Development Plan 2016 – 2022 – Cycle Parking Standards.*

11.3 Design Standard for New Apartments – March 2018

The following extracts from the “Design Standards for New Apartments – March 2018” summarise the guidelines for cycle parking:

“*A general minimum standard of 1 cycle storage space per bedroom shall be applied. For studio units, at least 1 cycle storage space shall be provided. Visitor cycle parking shall also be provided at a standard of 1 space per 2 residential units. Any deviation from these standards shall be at the discretion of the planning authority and shall be justified with respect to factors such as location, quality of facilities proposed, flexibility for future enhancement/enlargement, etc.”*

11.4 Proposed Cycle Parking

The proposed development will include dedicated cycle facilities, including an off-road cycle track along the East-West Link Road and along the R139, separated from the vehicular carriageway by a verge. The proposed junction upgrade at the site entrance from Malahide Road includes new cycle stopping areas and new cycle lanes along the Malahide Road.

High quality cycle linkages will be provided to connect to Malahide Road (R107), the Mayne River, City Junction and to the R139 linking the development the existing Clarehall Junction shopping and commercial area and to the future Belmayne Square.

Particular attention will be paid at detail design stage to the quality of the cycle routes and to the facilities at cycle destinations. These destinations include the Belcamp Town Square, the Walled Garden, Belcamp Square, local school and crèche facilities, connections to the public bus network, the green route along the Mayne River and the route along the R139 to Clarehall Junction. E-Bike charging stations and bicycle racks are to be provided at the transport hub, to encourage active travel to the town square.

The Department of Housing, Local Government and Heritage document "*Sustainable Urban Housing: Design Standards for New Apartments*" states that in order to apply and justify the use of a reduced car parking ratio, new developments must be comprehensively equipped with high quality cycle parking and storage facilities for residents and visitors. This document recommends a general minimum standard of 1 cycle storage space per bedroom with a visitor parking standard of 1 space per 2 residential units – refer also to the accompanying Car Parking Strategy report.

The required bicycle parking and the proposed bicycle parking are set out in the Table below:

Description			No. of Units	No. of Bedspaces	Total Requirement	No. of Bicycle Spaces Proposed		
						Residential	*Visitor*	*Total*
Dublin City Council	Apartments	Block 1	273	492	629	618	26	644
		Block 2	160	265	345	345	14	359
		Block 3	297	523	672	640	42	682
		Block 4	285	537	680	752	46	798
		Block 5	96	163	211	240	24	264
		Block 6	119	239	299	290	20	310
		Additional Visitor	-	-	-	-	5	5
		Crèche	6 Classrooms	-	-	-	3	3
		Block 3 Café/Retail	418m²	-	-	-	19	19
	DCC Subtotal		***1,230***	***2,219***	***2,834***	***2,885***	***199***	***3,084***

Fingal County Council	Duplexes	Block 1.1	18	38	47	38	10	48
		Block 1.2	18	38	47	38	10	48
		Block 1.3	18	38	47	38	10	48
		Block 1.4	18	38	47	38	10	48
		Block 1.5	18	38	47	38	10	48
		Block 2.1	8	24	28	24	8	32
		Block 2.2	16	48	56	48	16	64
		Block 2.3	16	48	56	48	16	64
		Block 2.4	8	24	28	24	8	32
		Block 2.5	12	36	42	36	12	48
		Block 2.6	16	48	56	48	16	64
		Block 3.1	12	36	42	36	12	48
		Block 3.2	12	36	42	36	12	48
		Block 3.3	12	32	38	40	12	52
		Block 3.4	12	32	38	32	12	44
		Block 3.5	12	36	42	36	12	48
		Block 3.6	16	48	56	48	16	64
		Block 3.7	16	48	56	48	16	64
		Block 3.8	8	24	28	24	8	32
		Block 3.9	8	24	28	24	8	32
	Apartments	Block A	23	38	50	38	12	50
		Block B	23	38	50	38	12	50
		Block C	27	47	61	47	14	61
		Block D	42	67	88	71	22	93
		Block F	103	165	217	165	52	217
		Block G	65	101	134	102	36	138
		Block H	46	72	95	88	24	112
		Block J	40	64	84	84	24	108
		Block L	46	72	95	88	24	112
		Block M	56	88	116	88	28	116
		Block N	56	91	119	96	34	130
		Block P	23	41	53	41	12	53
	Town Square Environs		-	-	-	-	24	24
	Public Racks at Block F/G		-	-	-	-	20	20
	Clubhouse		-	-	-	-	50	50
	FCC Subtotal		***824***	***1,618***	***2,030***	***1,688***	***622***	***2,310***
Total			**2,054**	**3,837**	**4,864**	**4,573**	**821**	**5,394**

Table 23 | *Cycle Parking Standards & Proposed Cycle Parking*

At Blocks 1 to 6, visitor parking is provided under podium/basement as well as on the street. At each block entrance, it is proposed to introduce 10 no. visitor cycle parking spaces in the form of Sheffield-style stands. These will provide convenient parking for short-stay visitors.

As set out in the Table above, it is proposed to provide ample cycle parking over and above the requirements set out in the Design Standards for New Apartments.

12. Conclusion

12.1 Overview

Waterman Moylan Consulting Engineers have been appointed by Gerard Gannon Properties to prepare this Traffic and Transport Assessment (TTA) for a residential led, mixed-use development at Belcamp, Dublin 17.

The subject site is bounded to the west and north by agricultural lands, to the south by the R139 and to the east by the Malahide Road (R107). Mayne River runs west to east through the subject site and forms the boundary between FCC and DCC. The subject site is located within the administrative areas of both FCC and DCC authorities.

Access to the subject Belcamp SHD is proposed from east and south via Malahide Road (R107) and R139.

12.2 Systra report

To support the subject application and the preparation of this TTA, the Applicant commissioned Systra to prepare a Sustainable Transport Strategy (STS) which is included in the documentation package under a separate cover.

The study for this strategy includes transportation modelling utilising the Eastern Region Model which is a multi-modal model. The report prepared by Systra has provided guidance to the Design Team in the development of the transport infrastructure and to assess the impacts of these design.

The core strategy is based on a very heavy emphasis on public transport and the provision of active transport routes connecting to existing and proposed residential neighbourhoods as well as social, education, retail and commercial facilities in the area.

The Clongriffin Rail station is located c.2.5 km to the east of the subject site, which is served by Commuter Rail and DART services. The Commuter Rail service through Clongriffin Station serves all stations from Dundalk through Dublin City Centre to Gorey. The service operates at 3 – 4 services per hour in both direction on weekdays. The DART service through Clongriffin Station serves all station from Malahide through Dublin City Centre to Bray and Greystones. On weekdays, this service operates at a 20-minute frequency in both directions.

The proposed development is also located in close proximity to the Malahide Bus Corridor which currently provides a high frequent bus service for the area. In addition, a number of facilities such as Commercial, Leisure and Retail Centres, Office and Business/Industrial Parks and Primary and Post-primary schools are reached within the range of 15-minute cycle time.

12.3 Liaison with NTA and Local Authorities

Waterman Moylan met with representatives from the NTA, FCC and DCC in March 2022 to discuss the transport requirements of the proposed Belcamp SHD development. The current N8 BusConnects route departs from Clongriffin train station, continuing along Main Street before turning south onto the Hole in the Wall Road and then continuing west along the R139. At the meeting, the NTA advised that they envisaged the N8 BusConnects Route being altered to run through the subject development along the East–West Link Road (EWLR) into Belcamp town square and then, preferably, directly south onto the R139.

The NTA advised that there are currently no proposals to bring one of the D routes through the Belcamp development. However, BusConnects routes are subject to future change depending on demand and future development. As such, emphasis has been placed on providing a robust design that can facilitate various future bus routes through the site. Belcamp Parkway has therefore been designed to accommodate a possible future route for one of the D routes and has been designed with a 3.25m wide verge that can facilitate future bus lanes. This route would divert buses from the Malahide Road onto Belcamp Lane through the DCC Masterplan lands, south of the R139, through a signalised junction on the R139. This D route would not use the proposed Bus Gate, which is part of the N8 route.

DART+ Programme and BusConnects programmes will play an important role in encouraging residents in the area to shift away from private car usage and commute using more sustainable modes of transport.

12.4 Traffic Modelling

The traffic expected to be generated by the Belcamp SHD has been calculated by Systra as part of their STS study and reproduced in this TTA. It is estimated that, in 2028, the labelled Phase 1 of Belcamp SHD is estimated to generate a total of 443 vehicle trips in the AM peak hour (50 arrivals and 392 departures) and a total of 494 vehicle trips in the PM peak hour (369 arrivals and 125 departures). For the Belcamp SHD full build out, in 2032, 744 vehicle trips were estimated for the AM peak hour (84 arrivals and 660 departures) and 829 vehicle trips for the PM peak hour (619 arrivals and 210 departures).

The strategic modelling carried out by Systra under their STS study provided traffic forecast figures for the future model scenarios of 2028 “with development” and 2040 “with development” for a number of existing and potential future junctions in the locality. As part of this TTA, turning flows for the following four junctions were investigated and used in the modelling exercise.

- Junction 1 (existing signalised crossroads): Malahide Road (R107) / Balgriffin Road / EWLR.
- Junction 2 (existing signalised crossroads): Malahide Road (R107) / R139.
- Junction 3 (proposed signalised crossroads): R139 / Belcamp Parkway.
- Junction 4 (proposed signalised T-junction): R139 / Belcamp Bus gate

Junctions 1 to 3 are existing junctions which are expected to be upgraded by the Applicant or by others. Junction 4 is a new junction proposed as part of the subject application. In this TTA, all junctions were modelled based on their potential future/proposed layouts and the TRANSYT analysis results indicated that all junctions would operate below the 100% DOS threshold during both peak hours.

The East West Link Road (EWLR) is included in the Fingal County Council Development Plan 2017 – 2023 and is a significant key recommendation from the South Fingal Transport Study. The design for this road is compatible to Bus Corridor parameters. A new bus route along EWLR would represent a very significant gain for the Fingal Dublin fringe area.

12.5 Public Transport & Permeability Provision

The public transport strategy proposed under the subject application consists of four elements:

1. Provision of bus facilities within the development, including bus stops for a high frequency bus route, and bus terminus facilities to facilitate flexible bus routes.
2. Provision by the Developer of a subsidised east west bus service at occupation of the first phase of the development to link the centre of the development to the QBC, Clarehall shopping area and east to Clongriffin and the Dart station at Clongriffin Square.

3. Provision of walking and cycling routes and facilities to serve access to bus stops by residents and visitors to the area.
4. Provision of CBC standard through route for a future link to the IDA lands adjacent to and west of the development and ultimately on to Dublin Airport and Swords.

The Applicant will support the services, such as shuttle bus routes, during part of the build-out period as necessary, to ensure that there is a sufficiently attractive service from "day one" to begin building patronage and establishing sustainable travel patterns. However, it is fully intended that the services will, with time, become self-sustaining from a commercial perspective and that the Bus Connects services, N8 and D routes, will provide long term sustainable public transport to the Belcamp neighbourhood.

Appendices

A. Appendix A – Public Transport Capacity Assessment

Public Transport Capacity Assessment

Belcamp Site, Malahide Road, Co Dublin.

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1. Introduction.

Gerard Gannon Properties intend to apply to An Bord Pleanala for planning permission for a strategic housing development (SHD) at Belcamp, Malahide Road, Dublin 17. This report, by Derry O'Leary, Transport Consultant, has been commissioned by Gerard Gannon Properties to provide an overview of the adjacent existing bus network, assess the available spare capacity in the current public transport network and review the implications for the proposed National Transport Authority's BusConnects network in the area. The author, a Civil Engineer, qualified as a Traffic Engineer and has over 40 years experience in both the public and private sectors. He has spent nearly 30 years in both planning and operations in Dublin Bus. This report supplements the Traffic and Transport Assessment (TTA) undertaken by Waterman-Moylan (WM) and the Sustainable Transport Strategy (STS) prepared by SYSTRA on the subject site.

Site Description

The Belcamp lands are located centrally in the Dublin Fringe area, north of the Northern Cross Route, R139, to the east of the IDA lands, and to the west of the Malahide Road (R107). The IDA lands are zoned "High Technology" (HT), to provide for office, research and development and high technology/high technology manufacturing type employment in a high quality built and landscaped environment. The total site area of the subject lands is c.67.2 hectares.

The subject site is bounded to the north and west by agricultural lands, to the south by the R139 Regional Road and to the east by an existing mixed-use development, by Phase 1 of the Belcamp development, which is currently under construction by the Applicant, and by the Malahide Road (R107).

The Mayne River flows from west to east through the site. The northern portion of the subject site is within Fingal County Council's jurisdiction, while the southern portion of the site is within Dublin City Council's jurisdiction, with the Mayne River forming the border between the two Local Authorities.

The proposed development comprises a total of 473 houses, 274 duplexes and 1,780 apartment units in 18 no. blocks, all on a c.67.2 Ha site. All of the proposed houses/duplexes are in the northern portion of the site, within Fingal County Council, and there are 550 apartment units proposed in this portion of the site, with 1,230 apartment units proposed in the southern portion of the site, within the administrative area of Dublin City Council.

Figure 1. Site Location Map (Source: Google Maps).

2. Background to Dublin’s Public Transport Network

2.1 While the customer-facing bus network serving the Greater Dublin Area has been relatively stable in recent years, the organisation of these operations has undergone significant structural change in the last decade or so. The National Transport Authority (NTA), established in 2009, has a wide number of roles in the transport sector. One of these remits is its role as public transport Regulator. Under this relatively new regime, the overall planning of bus and rail services nationwide has moved from the CIE Group of companies to the NTA. Responsibility for the network and individual route designs, frequencies, fares and timetable details, etc. now lies solely with the Regulator. All operators providing services under Public Service Obligation (PSO) or State subvention do so under contract to the NTA. Under this new arrangement even the smallest modification to any bus route or timetable must be agreed with the NTA in advance of implementation. The NTA also approves and allocates licences to commercial bus operators, subject to agreed routes, timetables and conditions. Irish Rail services, including the DART in this instance, also come within the ambit of the NTA.

2.2 In 2015, the NTA commenced a comprehensive review of the efficiency and effectiveness of the Greater Dublin Area’s (GDA) bus network, branded as Bus Connects. In parallel, it also began a Bus Market Opening (BMO) process to open up much of the Irish bus market to competition. These are now briefly outlined below.

3. Bus Market Opening (BMO)

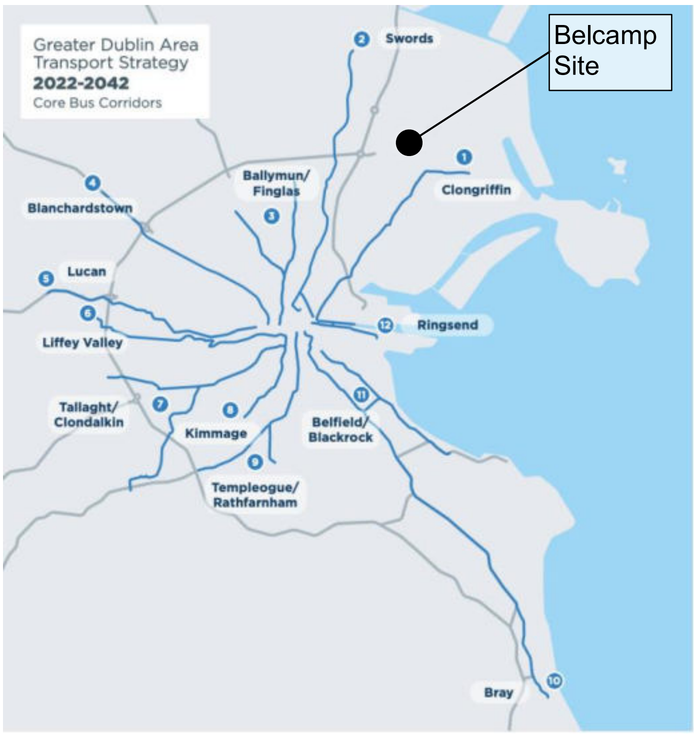
3.1 In order to open the Irish bus market to private sector rivals to the incumbent State-owned operators (Dublin Bus and Bus Eireann) the NTA first tendered a package of orbital bus routes previously operated by Dublin Bus in 2016. The group of 24 orbital routes, and total fleet of 125 buses, represented roughly 10% of the bus market in the Greater Dublin Area (GDA). Following the competitive tendering process, the Go-Ahead Group (a largely UK-based bus and rail operator with large overseas businesses) was selected to operate these routes. The seamless transfer of routes, in stages, from Dublin Bus to Go-Ahead Ireland (GAI) took place over a 12-month period in 2018/2019. The switch was barely noticed by the general public and passengers alike, as the new operations were introduced under the NTA's Transport for Ireland (TFI) brand. At this point in time all of the key PSO routes operating on the Malahide Road near the subject site are radial in nature and therefore are still operated by Dublin Bus.

3.2 All PSO operators, whether commercially or State-owned, operate bus services under contract to the NTA and must meet a set of key performance indicators (KPIs) covering reliability, timekeeping and vehicle maintenance. Similar standards are expected of all contracted operators and failure to meet the targets will result in fines or contract cessation. Both the performance standards expected of contractors and the level of fines exacted for not meeting those standards are in the public domain.

3.3 The NTA entirely owns the current fleet deployed by GAI to operate its routes in the GDA. It appears that, over time, the entire publicly-owned public transport fleet will be owned by the NTA as the fleet is renewed and the Authority obtains the capital funding to buy and replace buses for use in the PSO networks across Ireland. The next batch of buses ordered by the NTA for the Dublin urban market are fully-electric traction. The delivery of the first of these EV buses is expected in 2024, commencing operation in 2025.

4. <u>Bus Connects Project Overview.</u>

4.1 This comprehensive re-design of the urban bus network in the Greater Dublin Area (GDA) was commenced by the NTA in 2015. In tandem with the service re-designs, the bus route alignments, including the successful Malahide QBC, under the NTA proposals, will be upgraded to radically enhance bus priority measures. This capital investment on the QBC alignment is required to further protect the enhanced operation from the adverse impacts on reliability caused by traffic congestion and improve average bus speeds significantly. These Core Bus Corridors (CBCs), along which the high-frequent "Spine routes" will run, and the revised routes themselves have been through a series of extensive consultation phases with the general public and key stakeholders. Local Authorities have been directly involved in both the bus route and CBC design process. The route network consultation process, which concluded in 2020, modified the proposals following the review of thousands of submissions by members of the public and key stakeholders. The final network has now been agreed.



1.	Clongriffin to City Centre
2.	Swords to City Centre
3.	Ballymun/Finglas to City Centre
4.	Blanchardstown to City Centre
5.	Lucan to City Centre
6.	Liffey Valley to City Centre
7.	Tallaght/Clondalkin to City Centre
8.	Kimmage to City Centre
9.	Templeogue/Rathfarnham to City Centre
10.	Bray to City Centre
11.	Belfield/Blackrock to City Centre
12.	Ringsend to City Centre

Figure 2. NTA's Core Bus Corridors (CBCs). The Malahide Road is on corridor 1 (Clongriffin to City Centre).

4.2 Phased implementation of new Spine routes has already started. To date, only two of the phases required to modify the bus network in the Greater Dublin Area have been introduced. The C-Spine and H-Spine changes have been introduced in parts of the west and north suburbs of Dublin. While new route H1 of H-Spine routes now operates relatively close to the Gerard Gannon Properties site under review here it is still too far away to have a significant impact. All the existing routes in the Belcamp area are discussed in detail in section 5.

4.3 Further Bus Connects phases, including routes of more direct relevance here, have been designed and planned but will take a number of years to implement. The whole network of services, though somewhat delayed to date, is expected to be implemented in phases by 2024. The future BusConnects bus network serving the wider Belcamp area is addressed in section 7. The Core Bus Corridors, effectively QBC upgrades, will shortly be the subject of a formal planning application.

5. <u>Existing Public Transport Network Serving the Belcamp Site.</u>

5.1 The Belcamp site is well-located immediately adjacent to the very successful Malahide Road Quality Bus Corridor (QBC) to the east. The key bus routes in the area are identified in Table 1 below, together with their advertised timetabled frequencies.

Route	Origin	Destination	Peak Frequency (mins)
15	Clongriffin	Ballycullen	10
27	Clare Hall	Jobstown	10
42	Portmarnock	City Centre	20
43	Bray Station	Ballymun (IKEA)	20
27X	Clare Hall	UCD Belfield	2 trips only

Table 1. Routes on Malahide Road, Clare Hall. Southbound AM Peak.

The Malahide Road QBC is one of the original Quality Bus Corridors in Dublin. It is a major axis for a wide variety of bus routes that serve the north eastern suburbs of Dublin. It has a combination of high bus flows, strong bus patronage and significant peak traffic congestion, even if the level of each has diminished somewhat post Covid-19. Two high frequency cross-city routes, 15 and 27, dominate bus flows here as Table 1 above and survey data in section 5 below show. They both join the Malahide Road at Clare Hall. Route 15 commences at Clongriffin Station and offers an existing link to the DART service. Route 15 is one of the few routes to operate a 24-hour bus service. The two other routes with significant bus patronage, routes 42 and 43, pass immediately to the east of the site, on the Malahide Road (R107). The combined strength of these four routes is reflected in the surveys. They are the backbone of the bus service along the entire length of this QBC. The peak bus service from the area is supplemented, according to the timetable, by two peak buses on express route 27X which terminates in UCD, Belfield.

5.2 The future occupants of the Belcamp site, as of now, would have the attractive option of boarding routes 42 and 43 at stop 1217 (Malahide Road, Balgriffin Road) close to their residences adjacent to the subject site. But many, if not most, will likely board buses at stop 4563 (Malahide Road, Clare Hall) with the existing route configuration. The latter stop opens up significantly more options for commuters. The basis for this assertion is addressed in section 5.3 below. Both stops 1217 and 4563 are within acceptable walking distance of the site. Stop 1217, the closest southbound to the development, is only 75m from the planned site entrance.

The Clare Hall stop, while almost 740m away from the site entrance, has roughly three times the number of current bus services available to future residents at this location which shortens the perceived walking distance.

5.3 In modelling the behaviour of travellers, whether by car, bus or rail, traffic engineers and transport economists use the concept of “generalised cost” which uses the “value of time” in broadly determining modal split (or between competing routes). The modellers break down the components of alternative possible trips into their constituent parts. Simplistically, in this example, it breaks down the bus trip into four basic time components. In this instance,

- Firstly, the walk time to the target bus stop(s).
- Secondly, the wait time for the bus.
- Thirdly, the duration of the bus journey itself and,
- Finally, the walk time to the work or school destination.

The impacts of fares, etc. are ignored in this brief outline. Each element of the bus trip is assigned different weightings, depending on their relative attractiveness.

While there is some debate over the values of these weightings, extensive research has shown that travellers generally dislike both the walking and waiting elements of the journey more than the in-vehicle journey time. On this basis, the walk element is usually assigned a value greater than 1. The weighting assigned to waiting for buses typically has a higher value, normally 2 or greater. This reflects the degree of relative discomfort or uncertainty associated with the unknown arrival time of the bus. The weighting value of the actual bus trip itself is closer to 1 if it has a very predictable and repetitive journey time. The value of any equivalent rail weightings for both the waiting component and journey time are typically somewhat lower due to their greater general predictability, though not directly relevant here.

5.4 One outcome of this modelling based on behavioural research conducted over decades is that the trade-offs that travellers use in determining what mode they use can be assessed. In practice this suggests that the likelihood of city-bound commuters from the Belcamp area walking to the key Clare Hall stop is extremely high for one outstanding reason. Much higher bus frequencies are available at this stop towards Dublin city centre. The strong frequency results in a much lower weighting for the “wait element” of the journey. At the same time, the good bus speeds lower the “journey time” weightings. Collectively they reduce or overcome any possible negatives associated with longer walks at the start of the journey. The outcome here is a “generalised cost” of travel that is much reduced by a combination of high bus frequency and fast, predictable QBC bus speeds. If a future bus route were to commence within the new development, the “best case scenario”, then generalised cost would be materially reduced still further. The relative benefits of bus travel on QBC corridors is also enhanced if high levels of congestion are present, making travel by car less attractive, and increasing public transports’ modal share. In the long term, the planned NTA upgrade to the QBC to CBC standard (see 4.1 above) would further enhance average bus speeds, thereby again lowering the “cost” of travel by bus.

6. Public Transport Capacity Assessment.

6.1 The purpose of this analysis is to determine whether or not the demand for public transport generated by further developing the Belcamp site will put the existing bus services under undue pressure. Surveys of bus patronage have been undertaken to demonstrate that the additional demand will not burden the existing levels of public transport services.

6.2 The demand profile for public transport services, like road traffic, is quite seasonal in nature.

- Demand for bus and rail services, in general, is materially lower in the Summer and school holiday periods.

- Demand tends to be somewhat higher in the late Autumn and in the run up to the busy Christmas holiday. Surveying in the none-holiday weeks in the opening four months of the year, and early Autumn, represent a reliable indication of base-level pre-development expressed demand for transport.

- Demand also varies by day of the week, with traffic demand generally lower on Mondays and Fridays, with some exceptions. Public transport usage on Saturdays and Sundays (in particular) are materially lower than mid-week demand.

- Demand for travel varies throughout the standard weekday but morning peak- hour levels are shorter but higher than the corresponding evening peak flows.

6.3 In determining whether spare capacity is available to meet increasing demand from any development site it is best to undertake surveys and test the midweek morning peaks prior to the Summer period when schools are open. This advice was strictly followed in the surveys undertaken for this report.

Bus Survey on Malahide QBC

6.4 As we have seen above in section 5.2, the walk distance to the closest city bound bus stop (1217) is 75m or only a 1 minute walk from the site entrance on the Malahide Road. However, only current routes 42 and 43 pass this point in the bus network. While stop 4563 at Clare Hall is somewhat further away, roughly 740m or 9 minutes walk, it made sense to survey the latter as one captures a wide variety of city-bound buses at this point, including the routes cited above.

Surveys of existing bus usage were undertaken on Thursday, 7th April, 2022 between 06.45 and 08.45 am to establish the current level of bus patronage at stop 4563. These have been undertaken at a suitably representative time of the year, as identified in 6.2 above. Details of the survey are now outlined.

6.5 Bus capacity for the purposes of this analysis is taken, conservatively, as the seated capacity only, which, at 67 seats, understates the ultimate true capacity of buses by roughly 20%. Table 2 below shows the passenger demand profile by time band of the survey data for the morning peak in question.

Timeband	Bus Numbers	Passengers	Passengers/Bus
06.45 - 07.00	4	83	21
07.01 - 07.15	5	75	15
07.16 - 07.30	5	125	25
07.31 - 07.45	4	70	18
07.46 - 08.00	7	201	29
08.01 - 08.15	6	181	30
08.16 - 08.30	4	160	40
08.31 - 08.45	6	165	28
Total	**41**	**1,060**	**26**

Table 2. Malahide Road at Clare Hall (STOP 4563).

This summary in Table 2 of bus passengers per 15 minute time band indicates that the busiest period at stop 4563 (Clare Hall), occurs between 07.45 and 08.15. but the peak is not very pronounced. Note the increase in buses during these time bands.

Demand remains relatively strong up to the end of the survey period at 08.45. After this time scheduled bus numbers fall away appreciably. In summary, the survey showed that

- In excess of 1,000 passengers in total were on buses at this point over the survey period. The demand was well spread over the survey period.
- A total of 41 buses scheduled to stop at this stop were recorded.

- The bus appeared, in their pattern of arrival, to operate largely to schedule throughout the survey period
- The average number of passengers per bus was quite low at 26 over the entire period, peaking at just 40 in the 08.16 - 08.30 time band. It must be noted that route 27 just starts, literally, around the corner from stop 4563, two stops earlier, on Clare Hall Avenue (R135) at stop 4595 (Clare Hall Avenue, Clare Hall) and low passenger loading in the initial stops served to bring down the overall bus average.
- The regularity of the service was good, with buses evenly spread over the survey period and passengers were comfortably carried to their destinations.
- Standing customers on the buses were observed on only two buses at the survey location.
- On a number of occasions buses passed the stop, when not hailed, when another bus was loading. The routes are nearly identical in nature from this stop to the city centre, except for an early deviation into Darndale on route 27.
- Schoolchildren boarding at this stop was a feature of the survey at this stop location.

6.6 The busiest period, in terms of passengers loadings on departing buses from this stop, only exceeded 200 passengers and occurred between 07.46 and 08.00. Buses leaving this stop in this time band still have plenty of spare capacity with 29 passengers per bus (see table 2) and will have delivered their customers to city centre destinations well in advance of any 09.00 start. Table 3 below presents the same survey data, but on a route basis. On the assumption of 67 seats per double deck bus, this table identifies the actual spare capacity by route.

Route Number	Bus Numbers	Passengers	Passengers/Bus	Spare Capacity %
15	14	584	42	37
27	12	98	8	88
42	6	159	27	60
43	6	205	34	49
27X	3	14	5	93
Total	**41**	**1,060**	**26**	**61**

Table 3. Passenger Numbers and Spare Capacity by Route (STOP 4563, Clare Hall)

There are a total of 5 routes that passengers can board at this stop, as indicated earlier in Table 1, and seen in Table 3 immediately above. In addition to routes 42 and 43 passing immediately adjacent to the Belcamp site, passengers from here that choose to walk to this stop at Clare Hall benefit additionally from two major Dublin Bus routes, services 15 and 27. The latter route is supplemented by the express route 27X that operates to UCD. The two large routes each have a daytime frequency of a bus every 10 minutes. Route 15 is one of the few city bus routes to operate on a 24-hour basis. It has a bus every 30 minutes between midnight and 06.00 hours. Passengers on route 27 (and 27X) would be expected to be low at this point as the route has only just commenced two stops earlier on Clare Hall Avenue. The data bear this out.

6.7 The impact of Covid-19 is very visible to anyone familiar with this part of the bus network with volumes below “normal” levels experienced before March 2020. This is generally true of the whole Dublin bus network. The Malahide Road QBC is one of the primary bus axes in the city. It has continued to perform well since its introductory launch as the original QBC in the late 1990’s. The near-continuity of southbound bus lanes from beyond the Clare Hall junction to Amien Street and across the Liffey insulates bus operations against normally high levels of congestion. From Table 3 it is obvious that there are abnormal levels of spare capacity currently here and elsewhere along the Malahide Road QBC. The average spare capacity of routes serving the city over the survey period from Table 3 above exceeds 60%. This is admittedly driven higher by the very low patronage (in single figures) on route 27 at this point. Route 15, the other key route, has materially fewer seats available to passengers at this point with an average 42 passengers per bus and spare (seated) capacity of 37% from Table 3. A few route 15 buses were full at the Clare Hall stop during the busiest periods. Passenger volumes on this route are quite high, given that the route has only commenced at Clongriffin Station. Routes 15 and 27 (together with the 27X to UCD) operate cross-city and draw extra patronage on this basis as they open up additional destinations for their customers. While only two route 27X peak buses are advertised (as indicated in Table 1), three were surveyed at this stop. From a bus operator’s perspective many of these buses would be viewed as under-utilised at this point in the peak but it must be recognised that they still have to operate over the bulk of the QBC. While route 15 is more direct in its alignment, route 27 operates along the entire QBC after the Greencastle Road junction having diverted off the QBC to serve the Darndale area.

6.8 There was little evidence of any bus passenger failing to board a bus because it was full. While some passengers were observed leaving specific buses pass by in order to board other buses following behind, this practice more likely relates to their ultimate final destination (not all routes suit them) than any lack of capacity. Routes 42 and 43 do not operate cross-city while the remainder of the services do. The level of information now available to potential bus passengers, due to travel Apps and the increasingly reliable real-time passenger information (RTPI) units at the surveyed stop, facilitate active trip management by commuters and increases satisfaction and customer confidence in the services generally. Some passengers were seen alighting one bus and then boarding another shortly afterwards. Interchange of this nature shows a high degree of confidence in the bus service.

The latest ticketing options available to Leap card holders do facilitate and encourage inter-bus and intermodal interchange.

6.9 Prior to Covid-19, a certain level of overcrowding along the busiest sections of the Malahide Road QBC was commonplace in peak periods. But the high frequency nature of the service here meant that few regular bus passengers either anticipated or experienced material delays. This was because any short-term overcrowding in the form of queues at stops, lasting a minute or two, were quickly eliminated by the frequency of the buses. Regular bus users on most QBCs are not overly concerned given that more buses follow on relatively quickly, and are "visible" on the RTPI screens. The significantly higher levels of spare capacity on route 27 at this point offers additional certainty of securing a seat for potential passengers from the subject site. The average spare capacity of route 27 is 88%. It is even higher for its sister route 27X but both, it must be noted again, have only just commenced operation prior to the survey stop. Additional bus surveys undertaken by Waterman Moylan, at stops 1217, closest to the subject site (on the R107), and 4596 on Clare Hall Avenue, served, as expected, to confirm the data from Clare Hall stop 4563 in terms of the high levels of spare capacity.

6.10 Buses in the opposite, northbound, direction also have solid frequencies (such as on the key routes identified here). The equivalent northbound bus services have much lower patronage levels, except in the evening peak. The evening peak around Dublin is relatively well spread as most returning schoolchildren head home well ahead of the commuter peak. The morning peak operations are where loading problems will first manifest themselves.

<u>Spare Capacity after Generated Trips</u>

6.11 In assessing the impact of estimated generated trips from the proposed Belcamp SHD development on the public transport network this report has drawn on the work done by both Waterman-Moylan in their Transport and Travel Assessment (TTA) and by Systra in their modelling work for the South Fingal Transport Study (SFTS) and the Sustainable Transport Strategy (STS) for the Belcamp site. The detailed TRICS assessment and modal share analysis, when combined, suggests that

- An AM Peak trip rate of 0.606 per unit from TRICS represents a reasonable expectation
- 16% of Belcamp residents will likely use public transport (buses) to journey to work, school and college in the AM peak hour (see section 6.2, Table 5 and 6.3 of the Belcamp TTA for details)
- This modal split for buses is in respect of all distance bands but that a higher figure would apply for Dublin City bound commuters.

6.12 For the purpose of this broad bus capacity analysis it is assumed that Phase 1, which includes the first 1,504 units are to be completed and occupied by 2028 and that Belcamp's full build out of 2,527 units, is completed by 2032. Table 4 below summarises the impact on current bus patronage of the modal split assumptions when combined with the timelines above. In the April 2022 survey the peak hour in terms of bus patronage was between 07.45 and 08.45, as seen in Table 2 above. In this hour a total of 707 passengers boarded at the Clare Hall stop (4563).

Year	**Additional Units**	**Generated Trips (TRICS of 0.606)**	**Generated Bus Trips (16%)**	**Peak Hour BusTrips**	**Increase in Peak Hour Trips %**
2022	**-**	-		707	-
2028	**1504**	911	146	853	20.7
2032	**1023**	620	99	952	34.7

Table 4. Impact of generated trips on current peak volumes.

In Table 4 the surveyed AM peak hour passenger numbers on buses at Clare Hall are increased incrementally with the anticipated generated trips using modal split assumptions based on Systra's modelling work. The generated AM peak hour trips for Phase 1 of Belcamp up to 2028 results in 146 additional bus passengers. While this represents a 20.7% increase on current peak hour surveyed passengers of 707, the existing average level of spare capacity at 61% (from Table 3) is not challenged. Even in the busiest 15-minute period (the peak within the peak) the average passengers per bus did not exceed 40. This equates to spare seated capacity of 40% for a 67-seater bus. With the full build out of the Belcamp SHD scheme by 2032 the level of generated trips attributed to buses increases by nearly 35% with an additional 99 passengers. The current level of spare seated capacity would cater for this increase even during the busiest period in the AM peak hour. While other scheme build-outs will occur over this period, the 20% extra capacity associated with a full bus, including standees, is also available to commuters. The NTA, under its Measure Bus5 process, will also continue to monitor and enhance bus services as required to meet demand (see 7.4 below).

6.13 The analysis above demonstrates that there are significant levels of spare capacity on the current bus network in the immediate area of the subject site as shown by the bus stop survey undertaken for this report. It should be noted that the public transport modal split volumes in Table 4 above are based on the current network of bus services. As can be seen in section 7 below a whole series of new opportunities will soon arise for public transport users to access many other areas of the city network. The BusConnects project, as it directly applies to the Belcamp area, is now described.

7. Bus Connects Network in Belcamp area

7.1 Figure 2 below shows the proposed Bus Connects network for the subject area. It is extracted from the NTA's most recently revised "Big Picture Network" following rounds of public consultation and revision. The NTA proposals, in summary, are for the "D-Spine" with an upgraded QBC to Core Bus Corridor (CBC) status with even higher levels of bus priority.

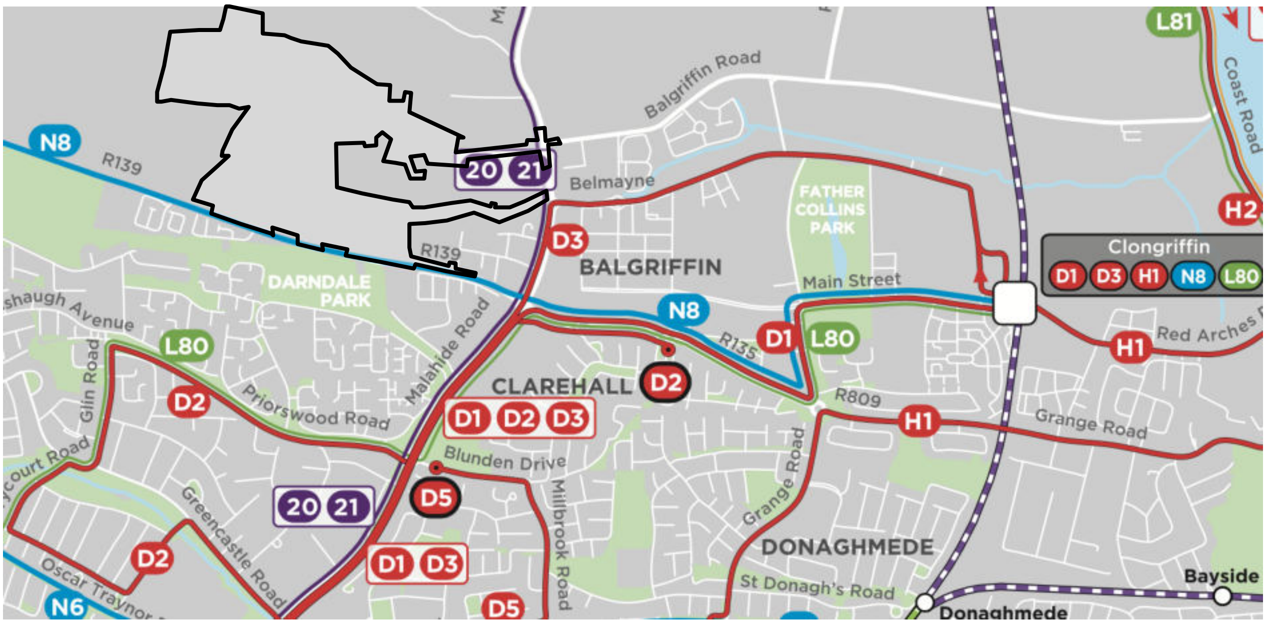


Figure 3. Extract from the NTA's Big Picture Network (latest version).

7.2 The NTA proposals for this area are for some of the key "D-Spine" routes running on an upgraded QBC to Core Bus Corridor (CBC) status, with even higher levels of bus priority and significantly faster average bus speeds. The route proposals together with the latest NTA Bus Connects Frequency Table that accompany the route network shows three major routes forming the backbone of this key cross-city spine of services supplemented by a series of other radial, orbital and local routes.

The comparison of existing versus proposed routes is best summarised in Table 5 below.

Existing Route	Current Frequency (mins)	Bus Connects Replacement	Frequency (mins)
15	10	D1	15
27	10	D2	15
-		D3	15
42	20	20	30
43	20	21	30
27X	2/3 trips only	-	-
-		**N8**	30
-		L80	20

Table 5. Comparison of existing and proposed Bus Connects routes for Belcamp/Clare Hall area.

The highlights in Table 5 are the addition of two new routes into the bus network. Route N8, an entirely new north city orbital that is currently planned to operate westwards from Clongriffin Station, along the adjacent R139 via Dublin Airport to Blanchardstown Shopping Centre, will plug a significant existing gap in the northern orbital bus network. Route L80, a local route also providing orbital connections, via Beaumont Hospital, to DCU is also a welcome development and opens up novel network connections for this area. However, in keeping with the Bus Connects masterplan elsewhere in Dublin, the “Spine routes" dominate the level of service here.

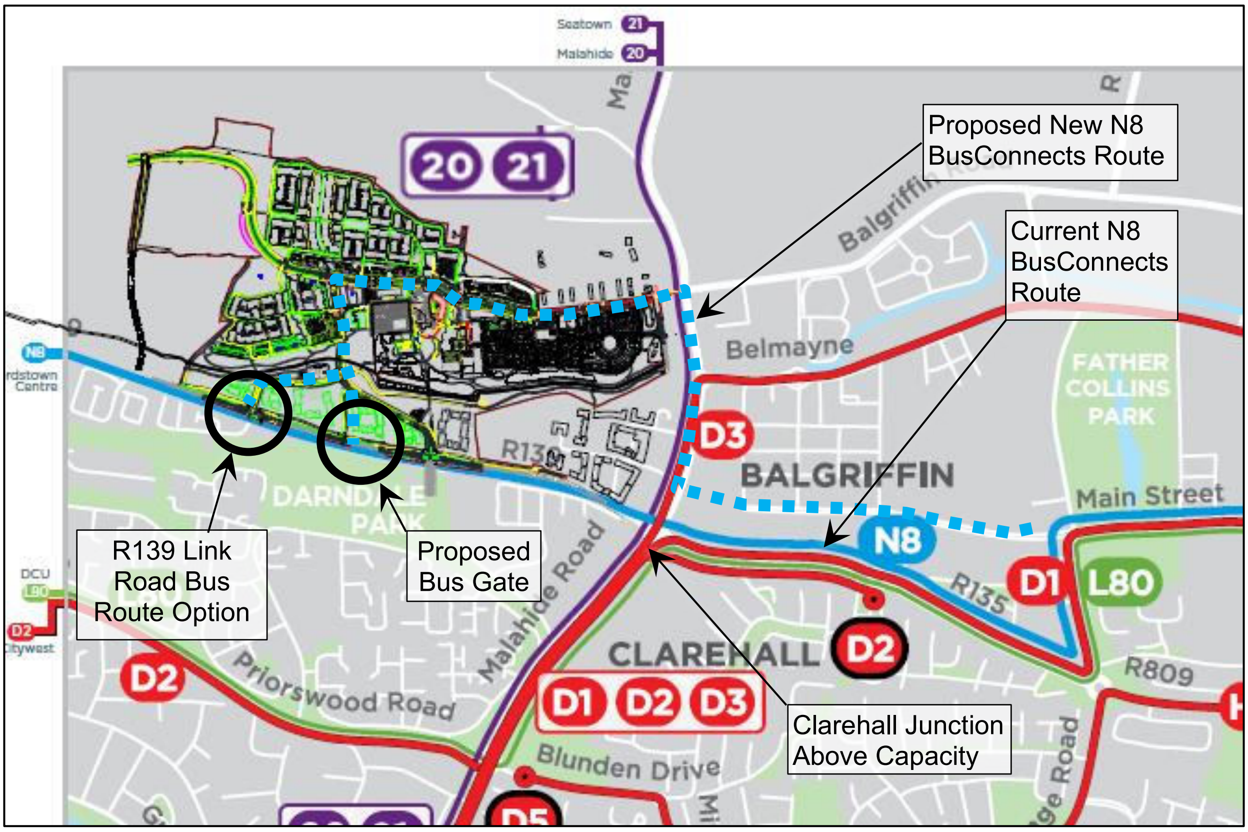
- **The D1 Spine route,** from Clongriffin Station, via the Malahide Road to the City Centre and west along the Crumlin Road to Grange Castle, effectively replicates the northern section of existing route 15.
- **The D2 Spine route,** from the Clare Hall Avenue (adjacent to Clare Hall) via the Malahide Road to the City Centre and Citywest mirrors virtually all of the existing 27 route.
- **The D3 Spine route,** also operates from Clongriffin Station (but on a different alignment to D1 in the Clongriffin SDZ area), via the Malahide Road to the City Centre and west along the Crumlin Road to Clondalkin and again overlaps much of the northern section of existing route 15.
- **Route 20,** from Malahide via Kinsealy to the City Centre, is a radial route and essentially a direct replacement for existing route 42
- **Route 21,** also a radial service, from Swords Business Park via Kinsealy to the City Centre replicates the routing of existing route 43.

- The proposed **N8 is a northern orbital route** and represents, arguably, BusConnects' most significant addition to the public transport network. It is the most northern of the northern orbital group N2, N4, N6 and N8. It is unusual in being a completely new route, operating along much of the northern boundary of the city. It will run from the DART station in Clongriffin, via Dublin Airport, to Blanchardstown Shopping Centre. It is of particular interest to future residents of the subject site. The precise alignment of route N8 in the area of the Belcamp is discussed further below.
- **Local route L80** also represents a departure from the existing bus network and operates diagonally in a south western direction across much of the city's northern suburbs with valuable links to Beaumont Hospital and DCU.

7.3 The key design feature of "Spine routes" in the Bus Connects project is that they generally begin in specific, discreet, suburban areas but quickly merge to form groups along each CBC. The combined frequency of these routes is very strong, post merging. Unusually, in this instance there is a degree of overlap between routes D1 and D2 prior to merging on the QBC/CBC. The former is essentially a longer version of the latter, in the same way that route 27 starts partly along route 15. The planned frequency for each of these three "D-Spine" routes is a bus every 15 minutes each weekday, going to every 20 minutes for much of the weekend. The combined, 5-minute, frequency of routes D1, D2 and D3 from the Clare Hall stop surveyed mirrors the combined frequencies of current routes 15 and 27. (These routes, in turn, merge with the other two "D-Spine" routes D4 and D5 at the Artane roundabout but the impact of D4 and D5 on this review can be set aside.) While the replacement for routes 42 and 43 in BusConnects show a reduced peak frequency this must be seen in the light of the proposed alignment for route D3. In the stretch of Malahide Road immediately east of the site the proposed presence of route D3, when combined with new routes 20 and 21, will represent a small increase on the observed frequency of buses passing bus stop 1217.

7.4 In many respects, the resultant Bus Connects network for the Belcamp site can be viewed as almost a direct replacement of the existing **radial** bus network. The design permits an easy ramp up of services, if required, through increased D-Spine frequencies in the first instance. The modal split objectives of the NTA envisage such changes in time as demand increases. Any examination of the annual cordon count in Dublin - the annual traffic survey last undertaken in 2019 by the key transport agencies - reveals that public transport's share of peak traffic passing the 32 cordon points has trended upwards significantly in the last two decades while the private car share has fallen correspondingly. A combination of both transport and climate policy will continue to drive public transport's share higher. The NTA's Greater Dublin Area Strategy 2022-2042 clearly indicates that "demand for bus services in 2042 would require routes additional to those set out in the network review" (Bus Connects). It proposes that "periodic reviews will be undertaken during the period of the Transport Strategy to evaluate the impacts of changing development and transport patterns, and to implement appropriate additions or adjustments to the overall bus system to accommodate the changing arrangements". This forms the basis for what is termed "Measure Bus5" to continually monitor the bus network and enhance or amend it accordingly. The BusConnects project, now underway, together with the assurances of Measure Bus5, when combined with the enhanced QBCs or CBCs as they will now be called represent as good a guarantee of high quality radial bus services to Dublin as anyone could expect.

7.5 The future **orbital** bus network in the Belcamp area is potentially even more exciting. This derives from a variety of sources. Firstly, the new routes themselves. While the N8 route will, rightly, grab many of the orbital headlines when introduced, the proposed L80 (or Local) service is essentially an orbital route in all but name. It will serve key markets like Beaumont Hospital and DCU and create strong linkage to other areas. Secondly, the N8 route offers the prospect of <u>direct access to and through the subject site</u>. While the current planned east/west alignment of this route envisages the N8 running along Clare Hall Avenue and then R139 south of the Belcamp site, discussions are already underway with the NTA with a view to diverting this route directly along much of the East West Link Road, through the subject site, before exiting via a proposed bus gate back to the R139 (in the absence of the completion of the full East West Link Road envisaged in the Systra SFTS). See Figure 3 below.



<u>Figure 4</u>. Scheme layout on BusConnects plans. Linkage to R139 includes a bus gate for the N8 route.

The interim arrangement to aid access to the scheme, with an exit to/from the R139 via a dedicated bus-gate, for route N8 is valuable to residents of Belcamp, in the medium term it is not unreasonable to assume that the entire length of route N8 westwards from its Clongriffin terminus to Stockhole Lane will follow via Clongriffin Main St, Belmayne Main St and the bus gate proposed by Dublin City Council for the junction with the R107 to the East West Link Road in the Belcamp SHD scheme. In this way the route will directly serve high density residential areas, have high levels of bus priority throughout, in both directions, and be protected from local traffic congestion. Thirdly, the attraction that such a strong, efficient bus link to the enhanced DART+ frequencies at Clongriffin Station would represent are clear for all to see. Clongriffin, in the BusConnects project, becomes a major transport hub of significance to the entire area. Finally, it is easy to envisage the need for materially higher frequencies on the N8 than the 30 minute frequency currently proposed. Most BusConnects orbital routes of significance have better frequencies, with buses every 10 or 15 minutes throughout the day the norm for most northern (e.g N4, N6) and southern (S2, S4, S6) orbital routes (as outlined in the NTA's BusConnects Frequency Tables). While route N8 will likely attain that type of frequency in time, in the interim it is conceivable that the Belcamp development (and other interested parties in the area) could financially support enhanced frequencies on the N8 from its commencement between the subject site and Clongriffin, if a mechanism for such an arrangement could be agreed with the NTA. The basis for financial contributions need not be unduly complicated.

The strong case for the N8 argued above has been done without even taking into account the enormous employment opportunities that direct linkage with Dublin Airport and beyond open up on route N8 for future residents of the Belcamp area, nor the employment opportunities within the IDA lands, to the west of the subject site, which are zoned "High Technology" (HT), "to provide for office, research and development and high technology/high technology manufacturing type employment in a high quality built and landscaped environment". The combined impact of both radial route upgrades and the new orbital routes suggest that the modal split estimates for public transport departing the Belcamp site in the AM peak will, in practice, be revised upwards in the course of time.

7.6 As identified earlier in 7.2 and 7.4, the introduction of the D-Spine routes largely replicate the current network of routes. Equally, we have also seen from Table 3 above the current very low level of patronage on routes 27 and 27X. The NTA current proposal is to commence route D2 from stop 4595, precisely where route 27 now operates from, a short distance east of the Clare Hall junction on the R135. Looking at the detailed design of the Belcamp SHD scheme with its bus priority measures, quality bus stop infrastructure and industry standard turning facilities for buses there is a very strong case to be made to the NTA seeking an alteration to route D2 that sees it commencing its radial journey south from the heart of the Belcamp SHD development. If the proposed development proceeds as planned the NTA would likely agree to the proposal to amend future route D2, given the potential demand from the scheme and the presence of route D1 already on the R135.

The marginally longer D2 would be more than compensated for with the anticipated increase in patronage.

This will encourage early usage of buses by future residents of the development (reducing car ownership in the process) and make for a better allocation of bus resources for the area as a whole. As with the new N8, every effort should be made to improve direct access to the BusConnects network thereby reducing key elements of the “generalised cost” equation, increasing public transport’s modal share and further achieving key climate goals.

8. Conclusions and Recommendations

This assessment of the existing bus network, the spare capacity currently on the network and the review of the proposed BusConnects routings leads to the following key conclusions and recommendations.

Conclusions

1. The Belcamp SHD site is well positioned to both the existing and the proposed, enhanced, Bus Connects and DART+ public transport network.
2. There are significant levels of spare capacity on the current bus network in the immediate area of the subject site, as shown by the bus stop surveys undertaken for this report.
3. The detailed layout of the SHD scheme contains key infrastructure of immense benefit to buses, both in the short and long term.
4. The NTA's BusConnects project proposals include attractive new orbital and radial routes of direct benefit to the development.

Recommendations

1. To increase the public transport mode share of the scheme the Developer should continue the efforts to re-route the new orbital N8 service through the site to the maximum extent possible from inception.
2. There is a case to be made for supporting enhanced frequencies on the new N8 to/from the subject site and Clongriffin Station in its early years.
3. The various parties, public and private, controlling the east/west alignment north of the R139/R135 axis of route N8 must come together to expedite use of this alignment to their mutual benefit.
4. The NTA should be approached with a view to commencing the D2-Spine route from within the development at the earliest opportunity to enhance the route's attractiveness and increase buses' modal share.

B. Appendix B – Systra Traffic Flows

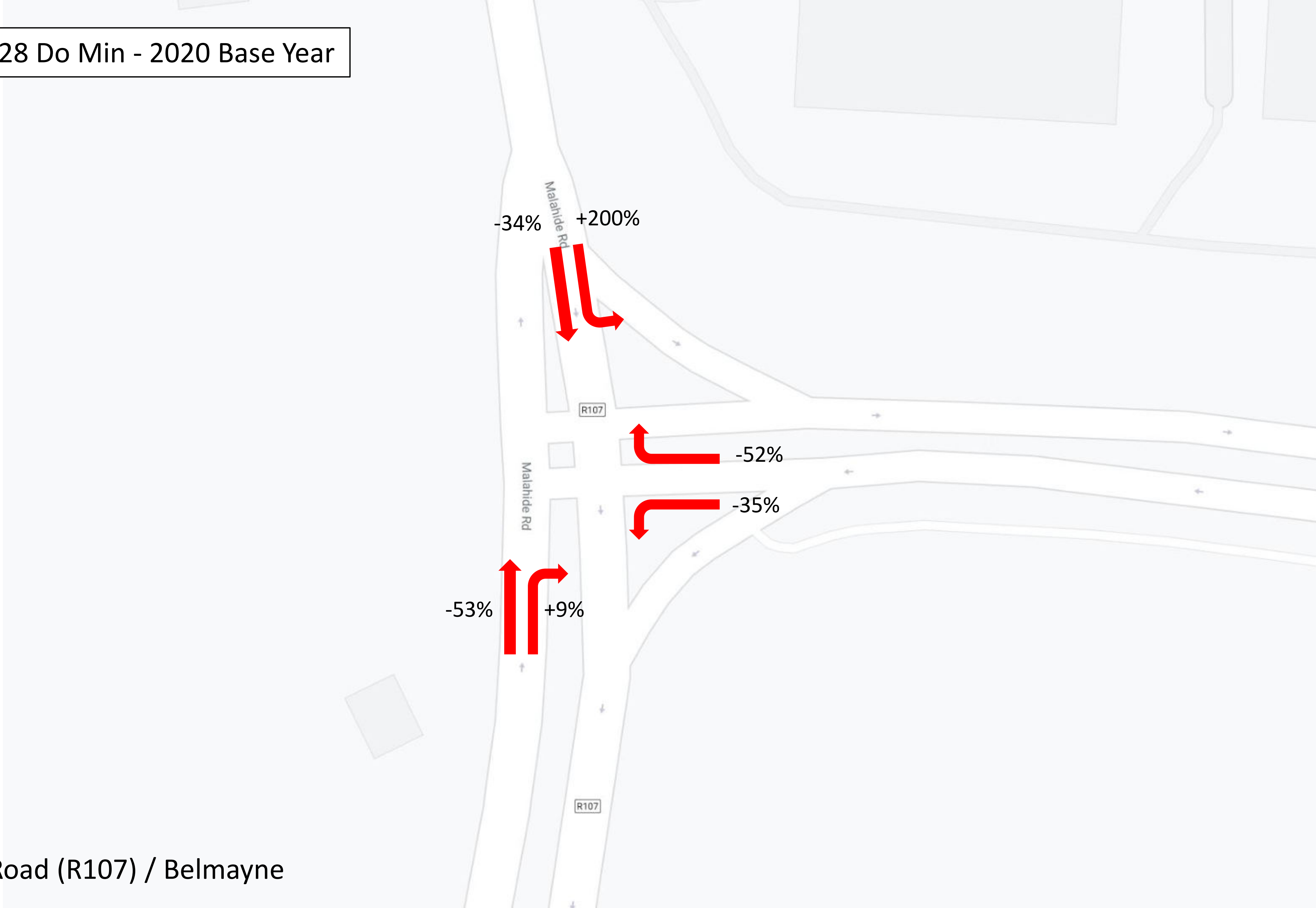
2028 Do Min - 2020 Base Year

AM

Malahide Road (R107) / Balgriffin Cottages

2028 Do Min - 2020 Base Year

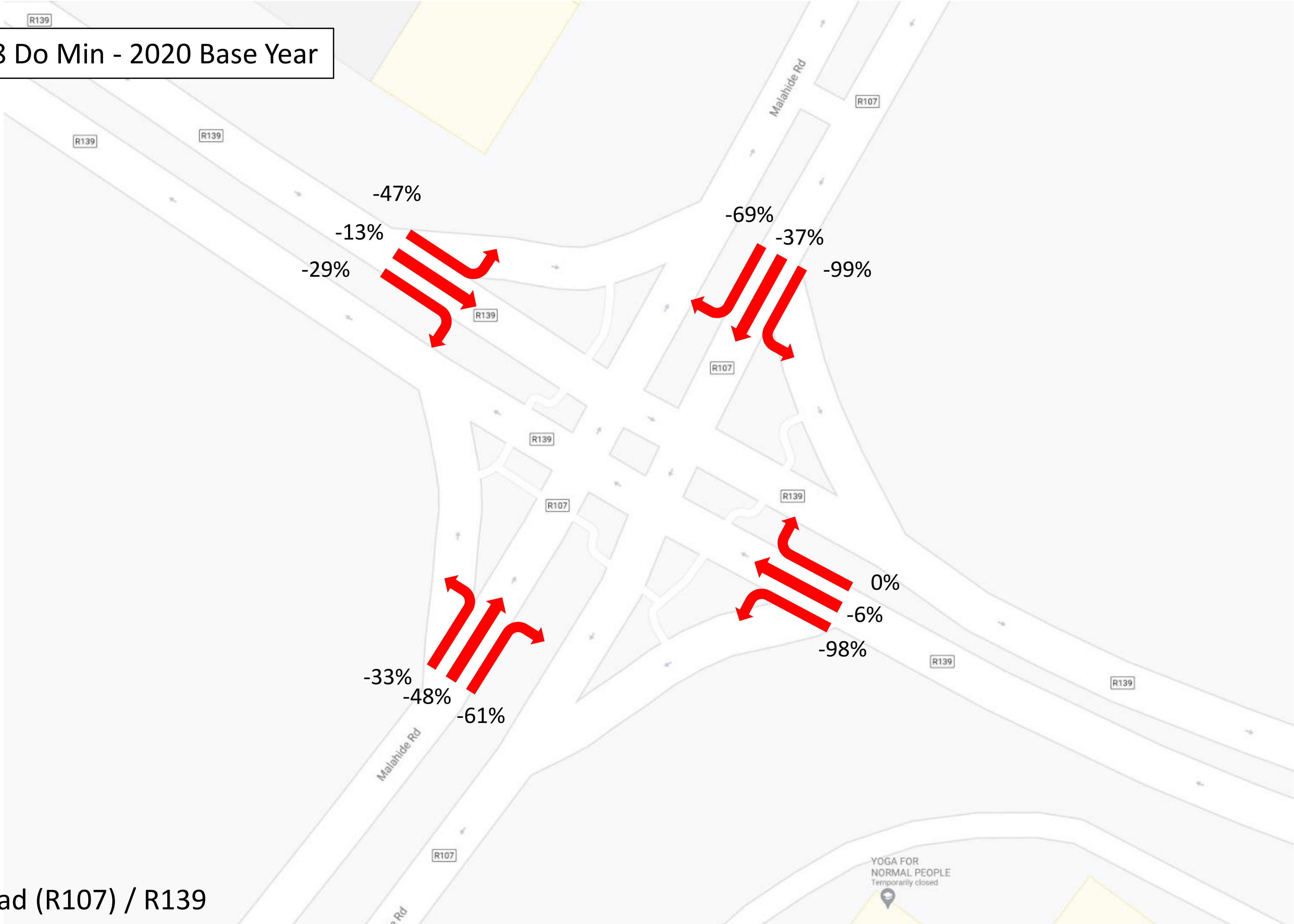
AM



Malahide Road (R107) / Belmayne

2028 Do Min - 2020 Base Year

AM



Malahide Road (R107) / R139

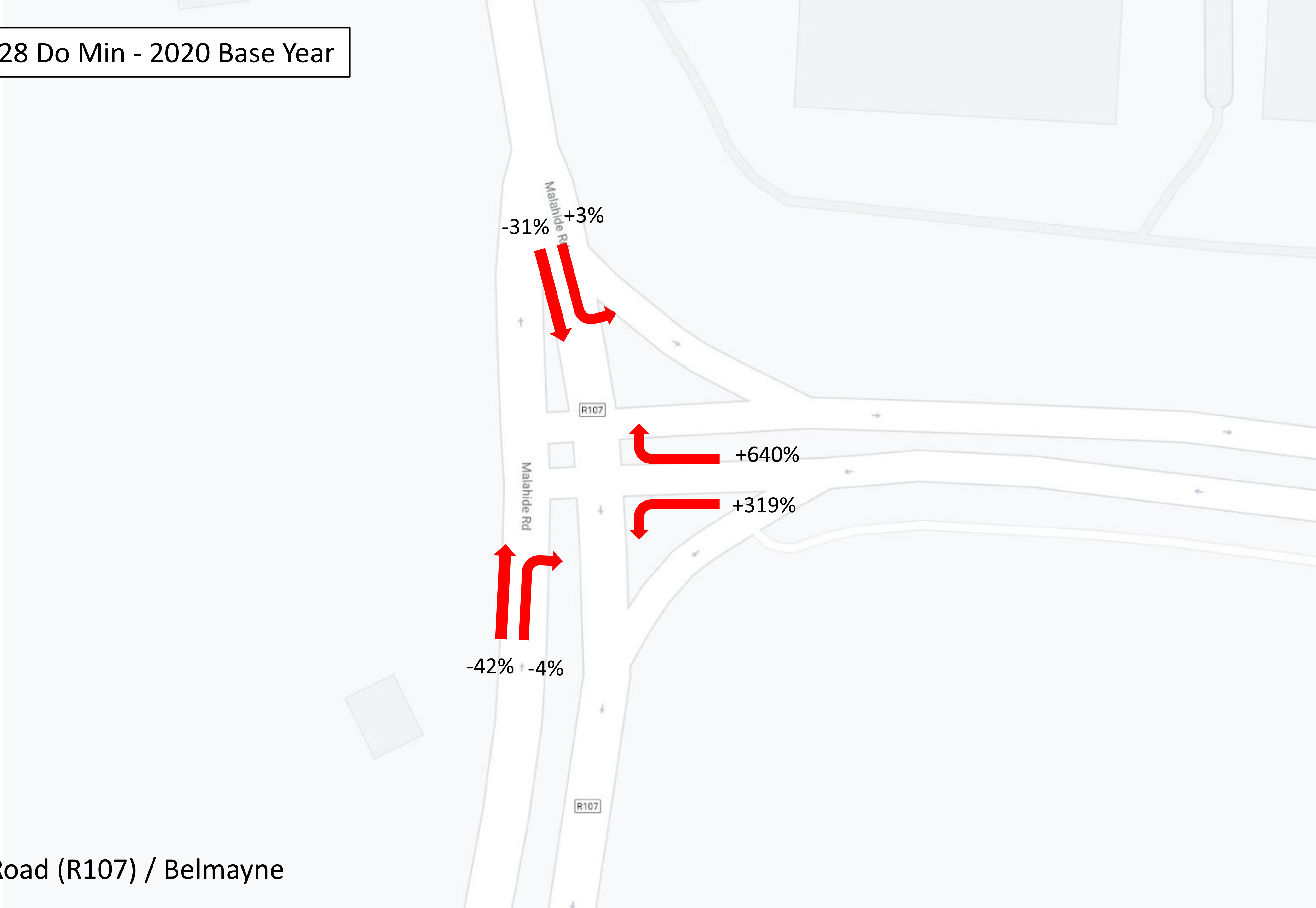
2028 Do Min - 2020 Base Year

PM

Malahide Road (R107) / Balgriffin Cottages

2028 Do Min - 2020 Base Year

PM



Malahide Road (R107) / Belmayne

2028 Do Min - 2020 Base Year

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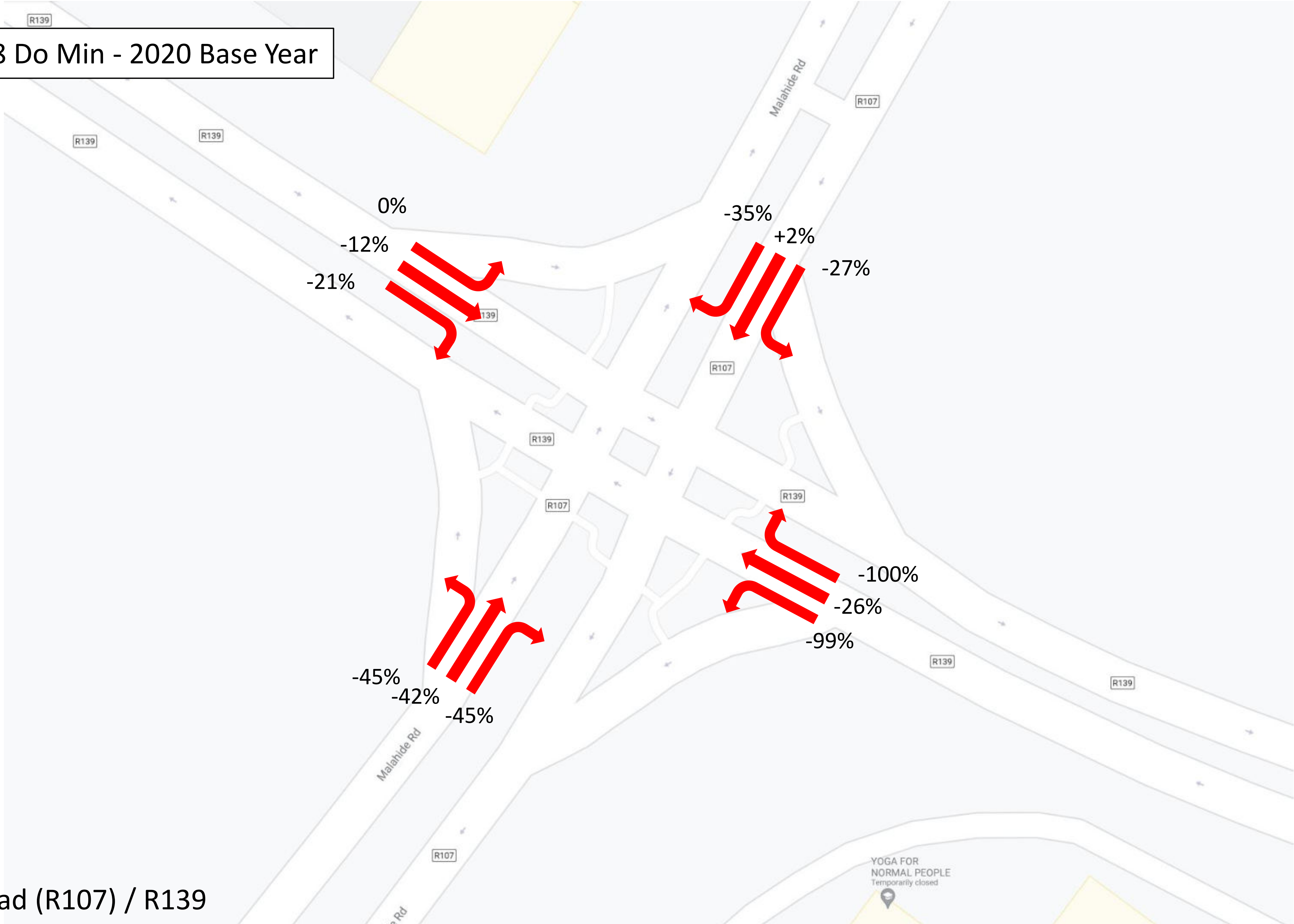
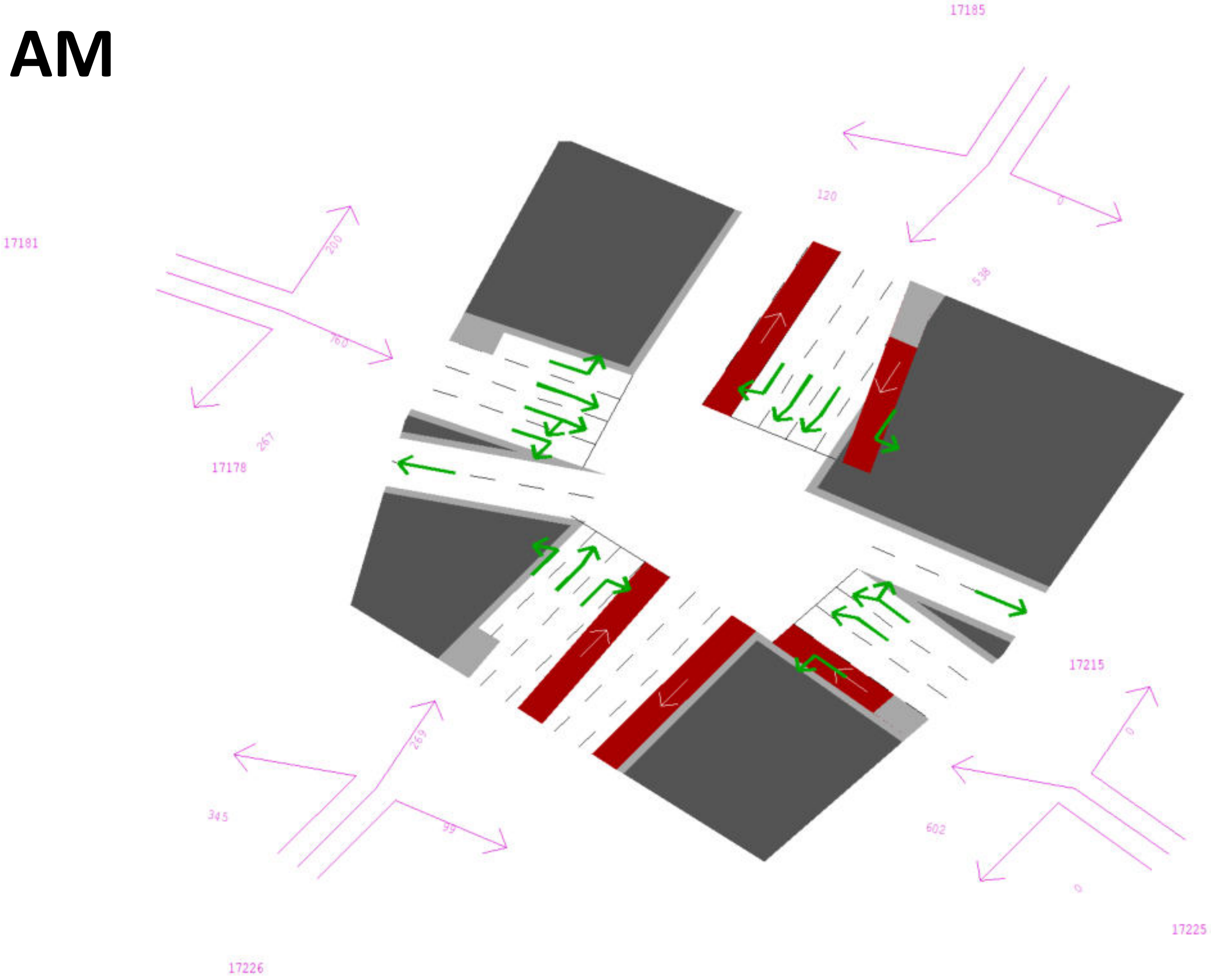


Malahide Road (R107) / R139

AM



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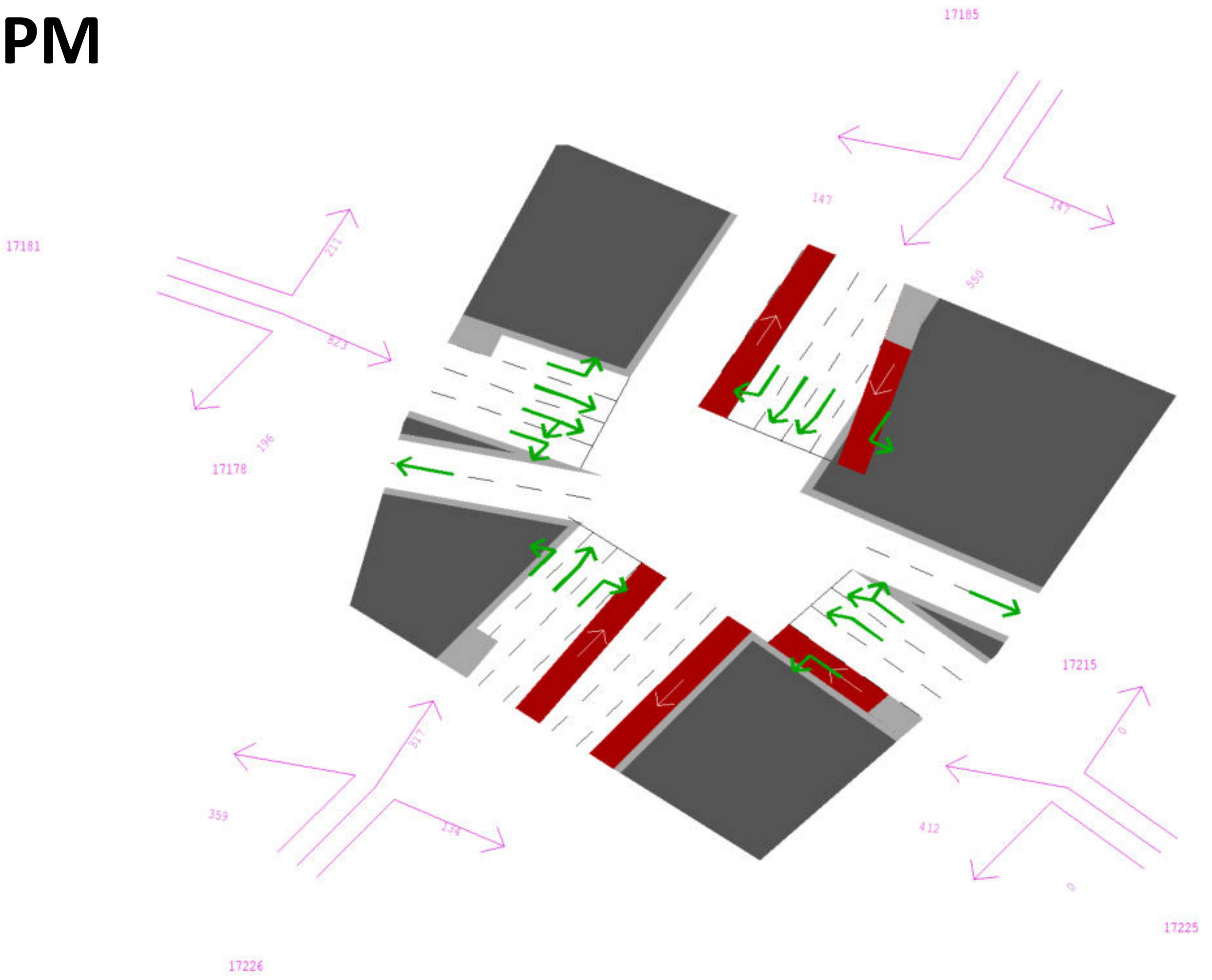
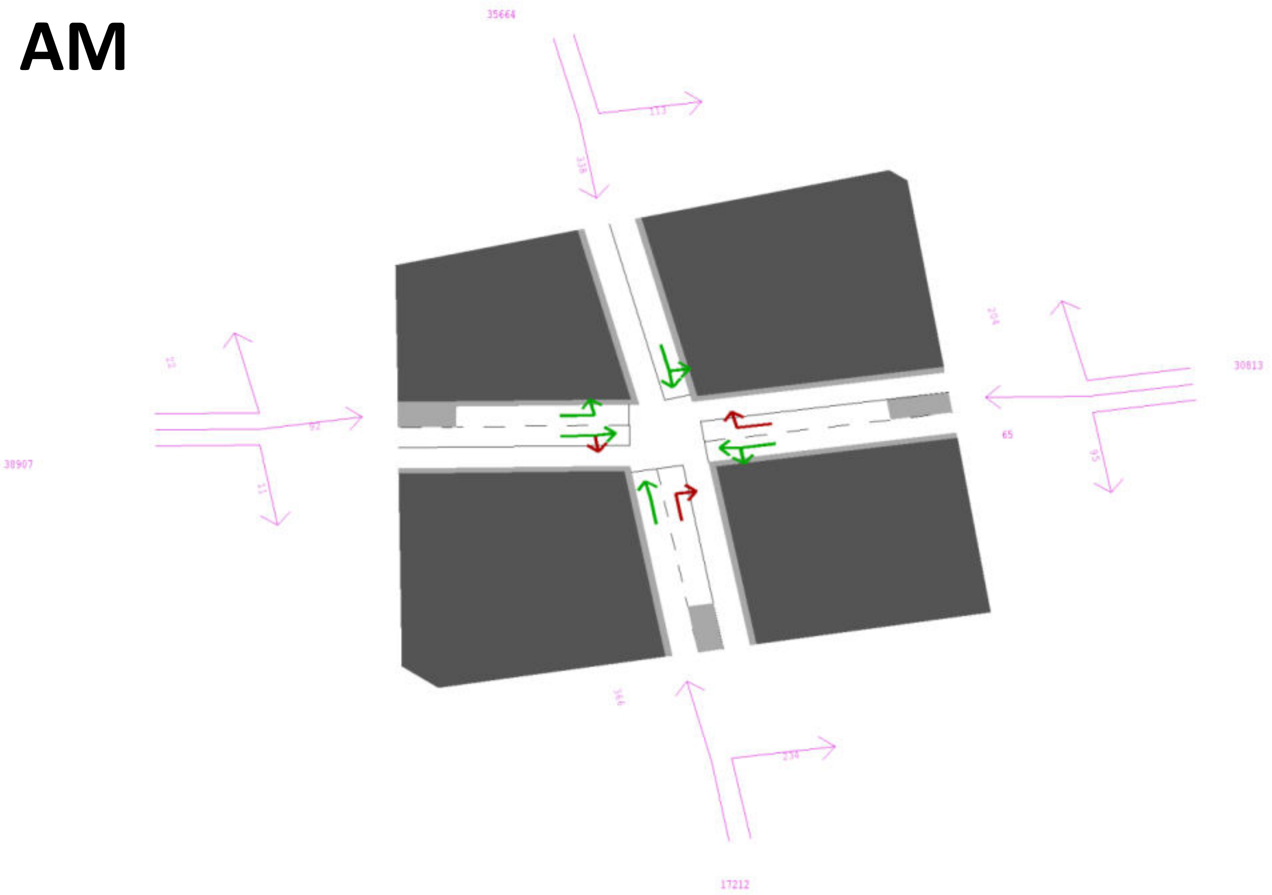


Junction 1 - Malahide Road (R107) / R139

AM



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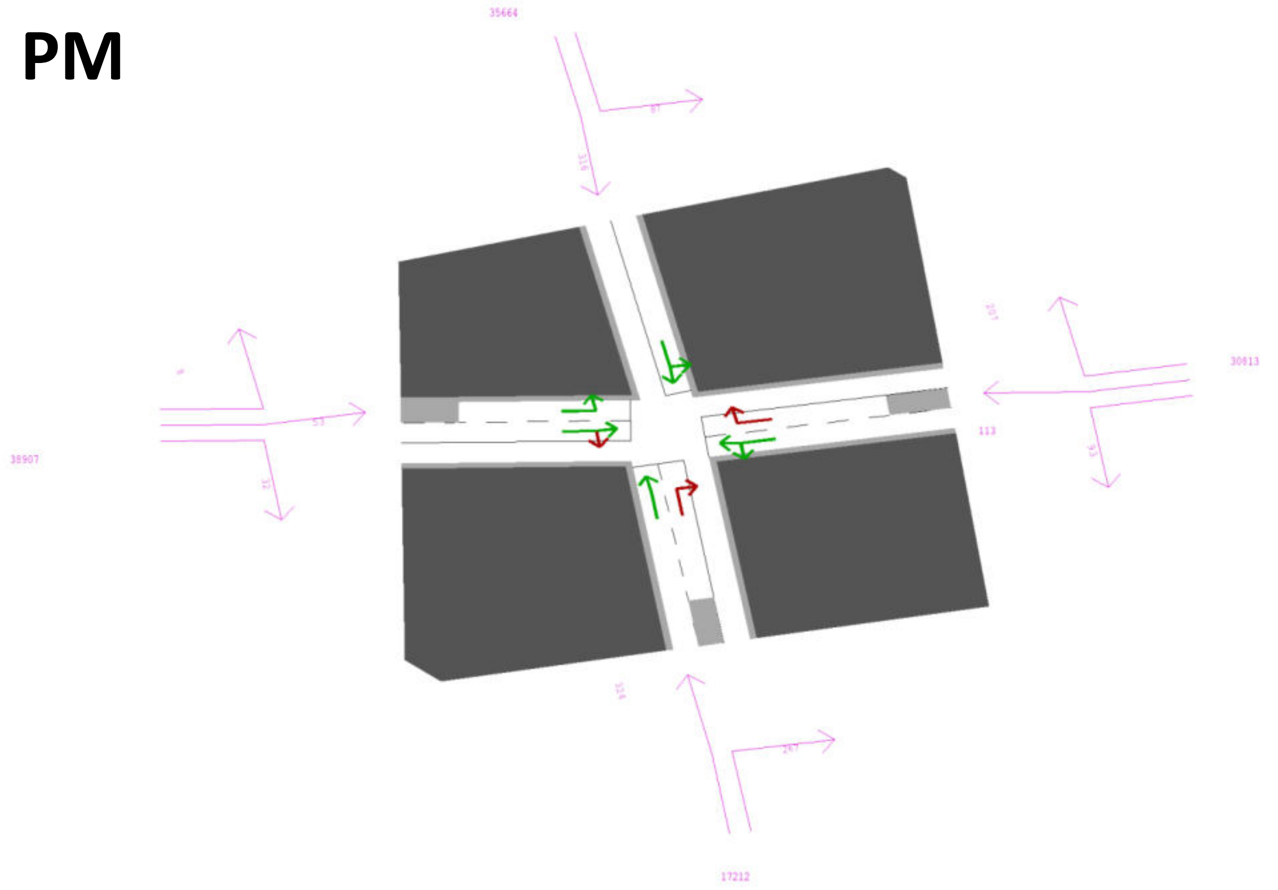
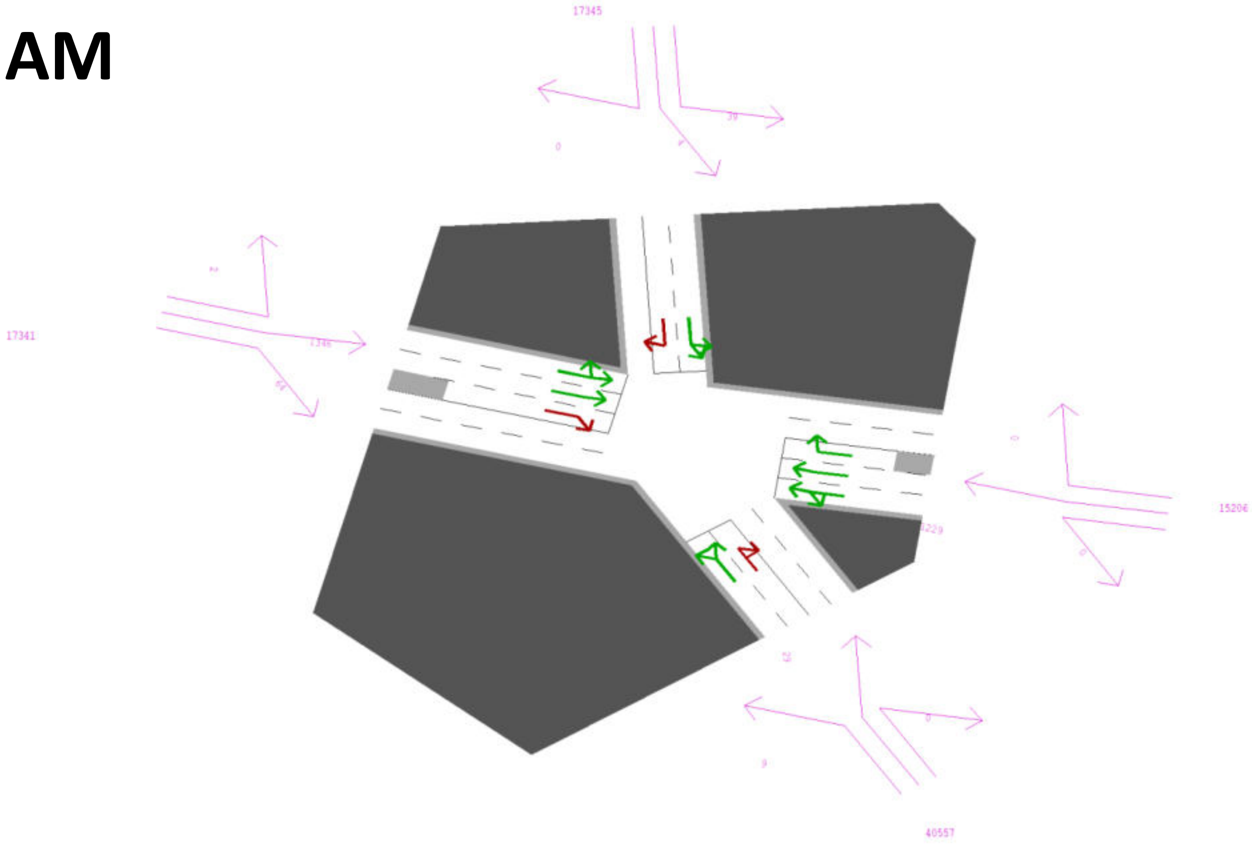


Junction 5 - Malahide Road (R107) / Balgriffin Cottages

AM



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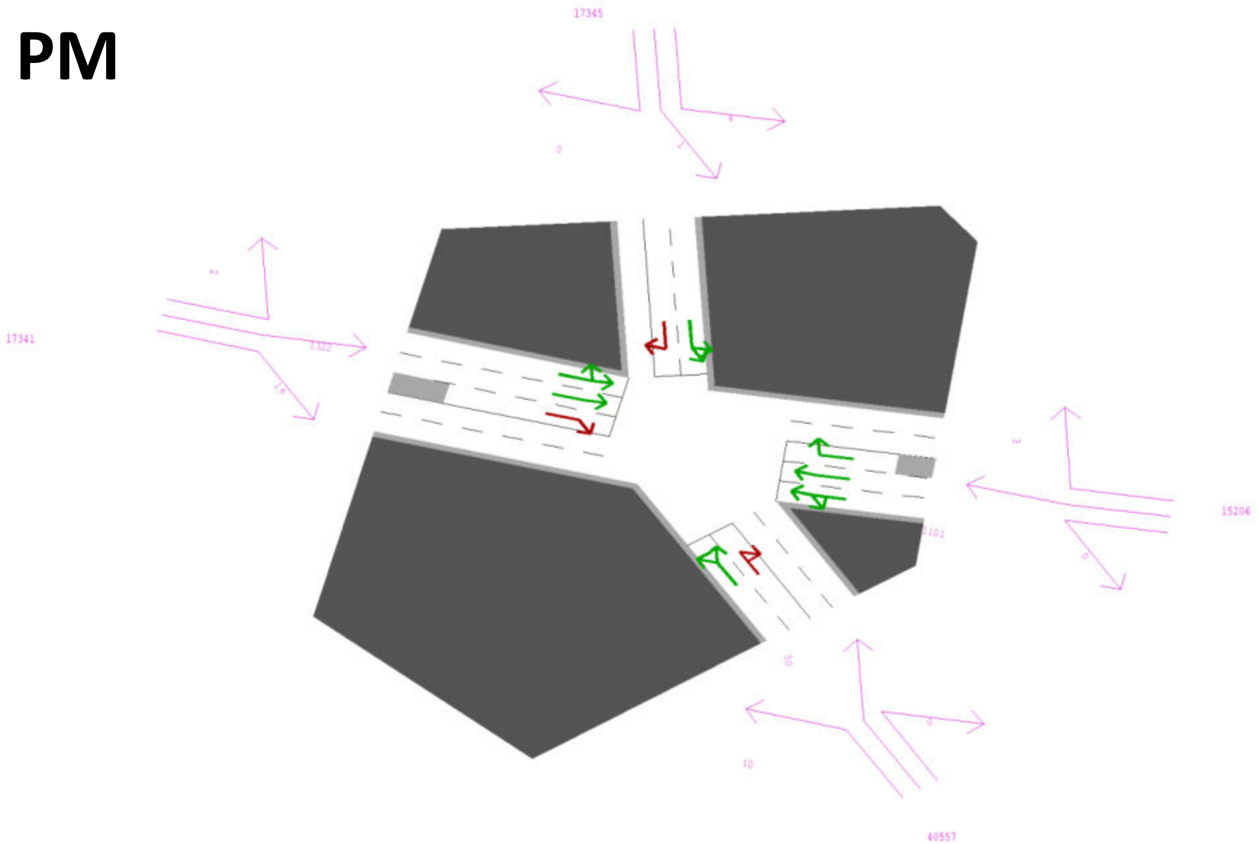
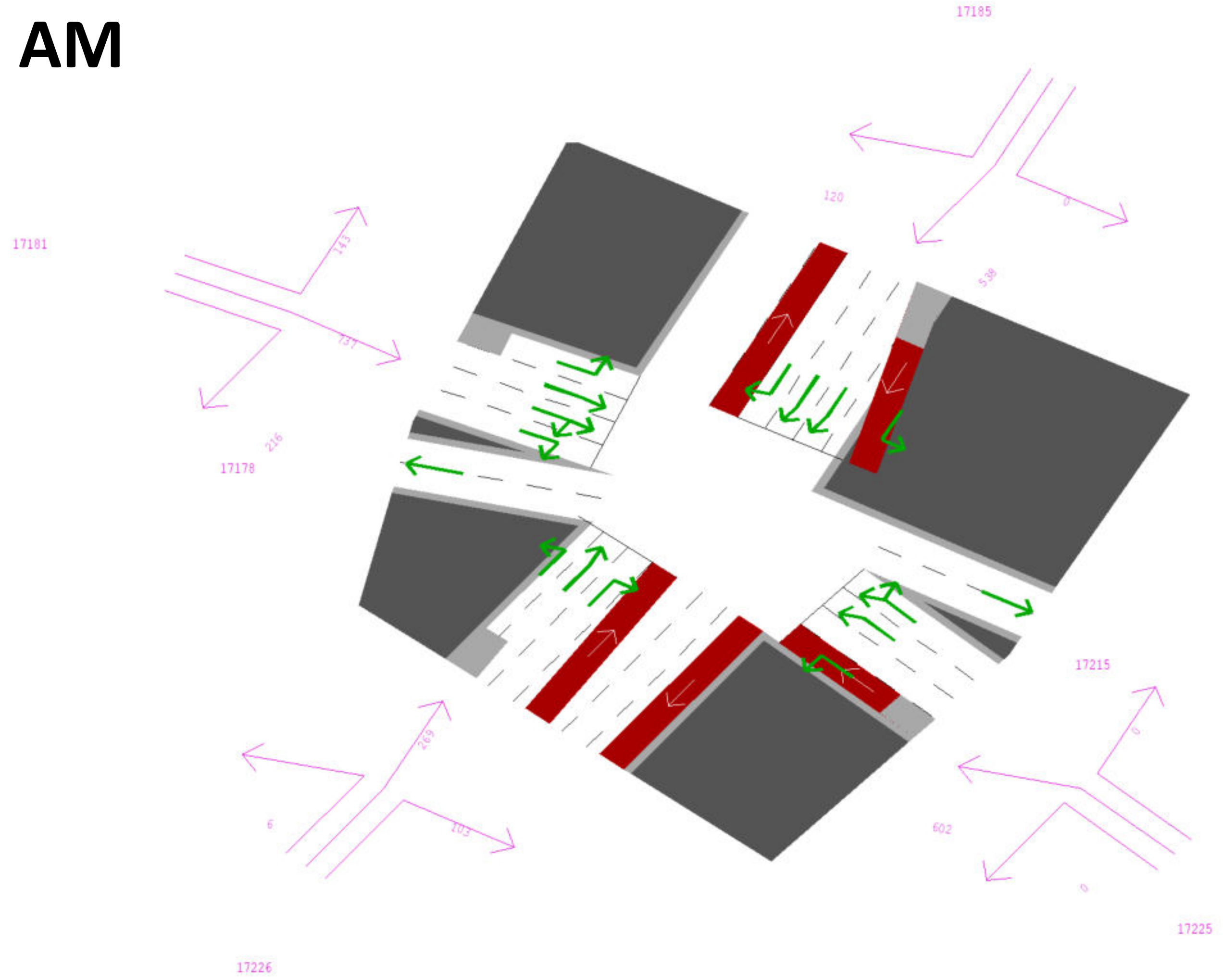


Junction 10 – Belcamp Parkway and R139

AM



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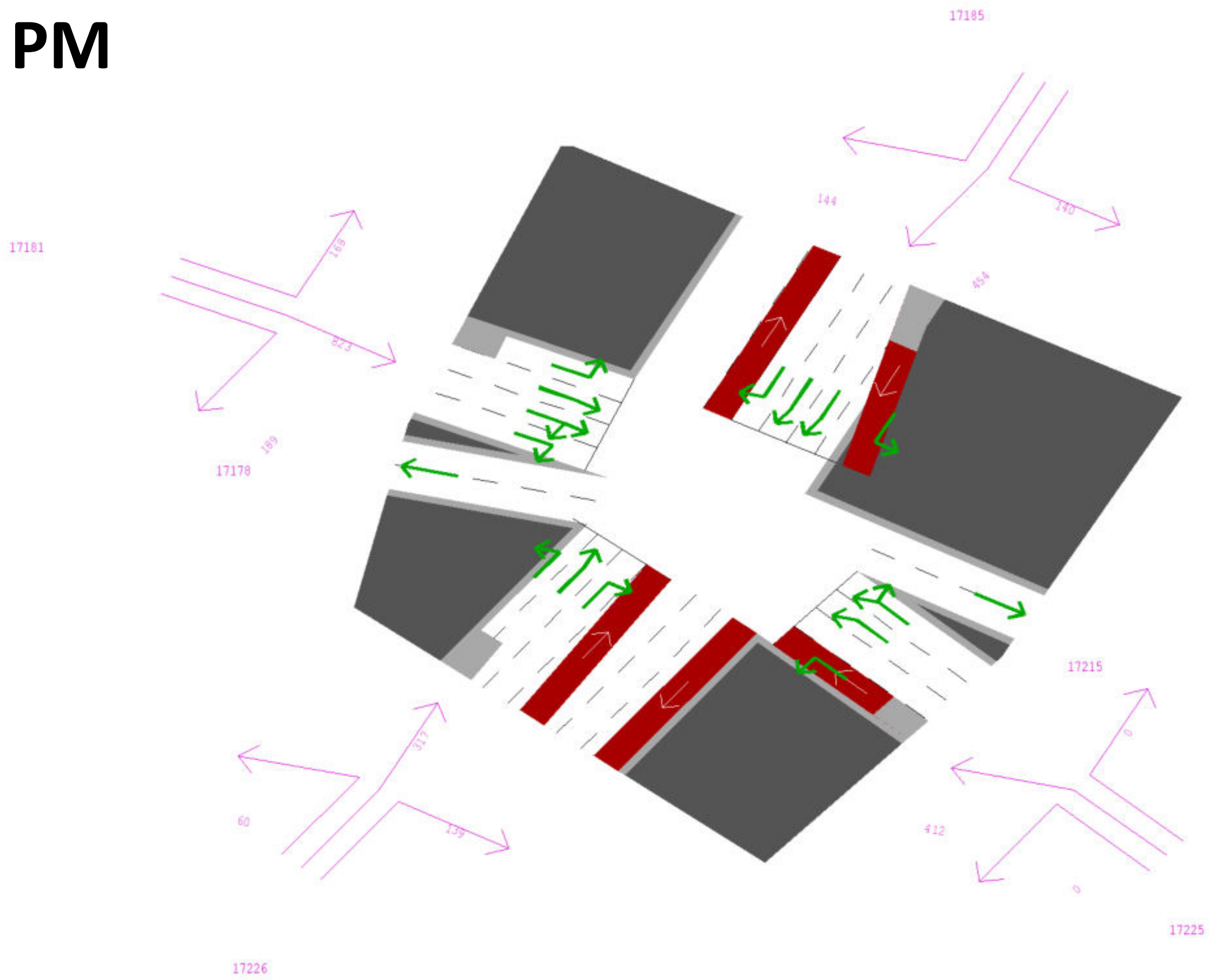
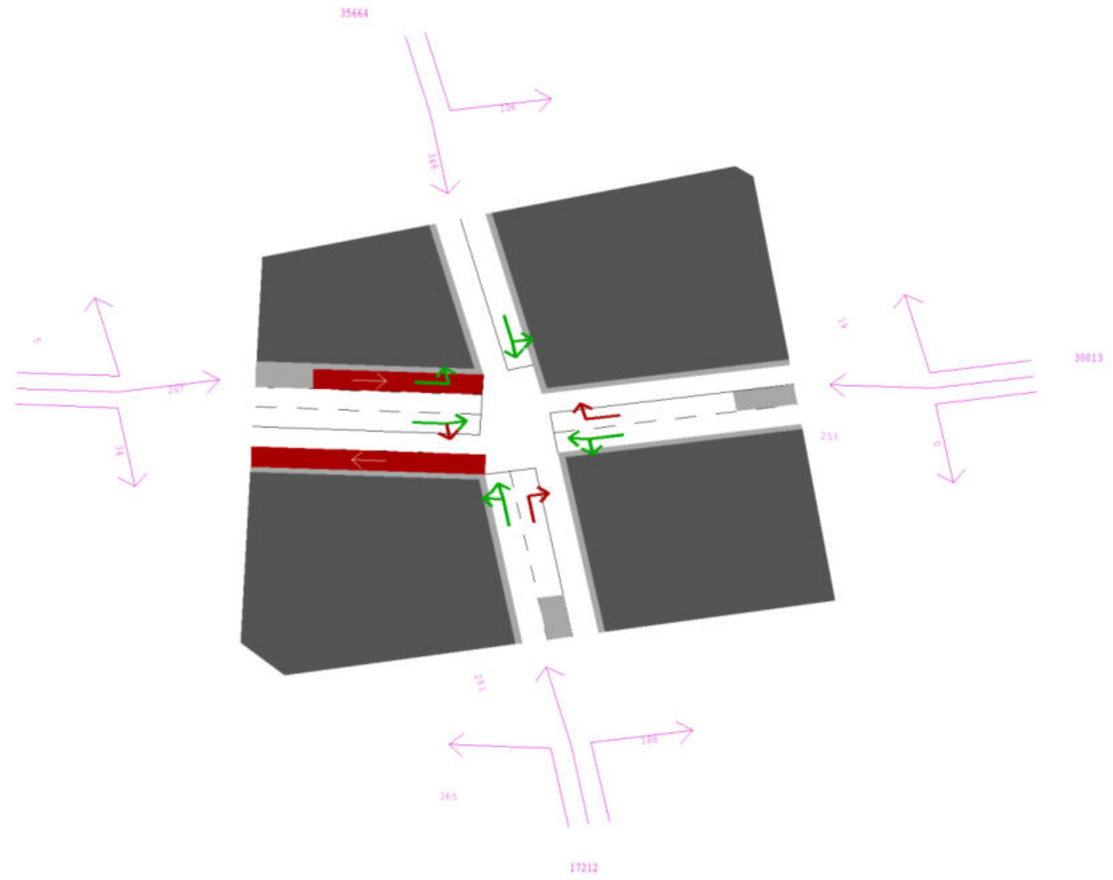


Junction 1 - Malahide Road (R107) / R139

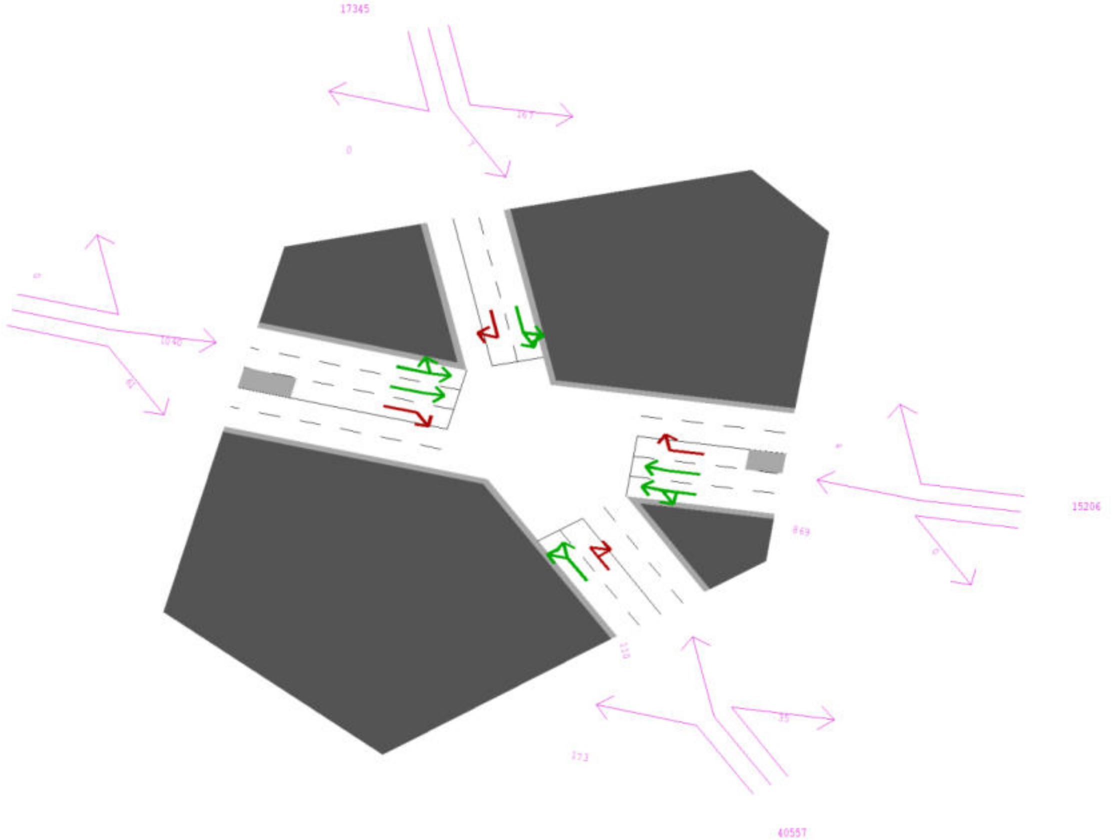
AM

PM



Junction 5 - Malahide Road (R107) / Balgriffin Cottages

AM



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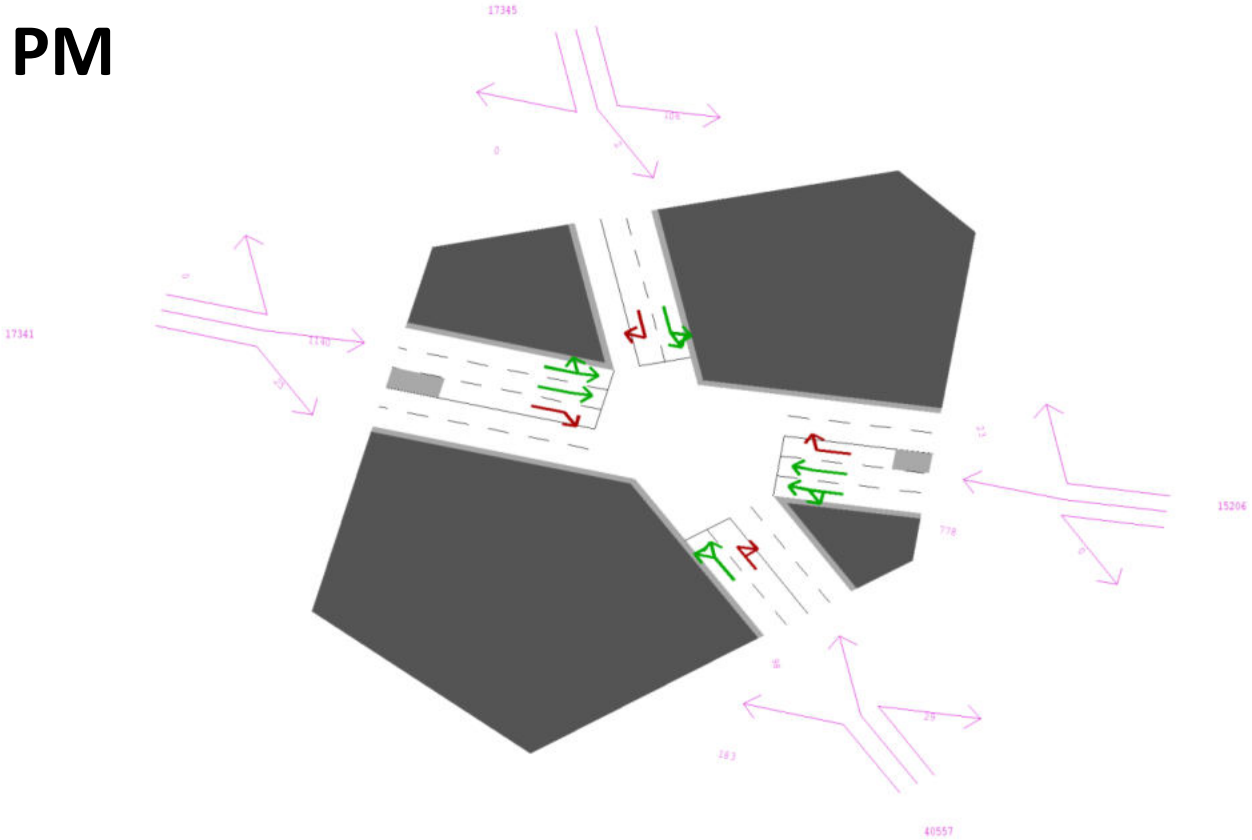

Junction 10 – Belcamp Parkway and R139

C. Appendix C- Junction Analysis Results

TRANSYT 16

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Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 1\Upgraded Layout
Report generation date: 28/04/2022 02:15:18

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 1 - 2028 "with development",			
Network	1000.60	68.79	105% (TS A/2)	1 (4%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

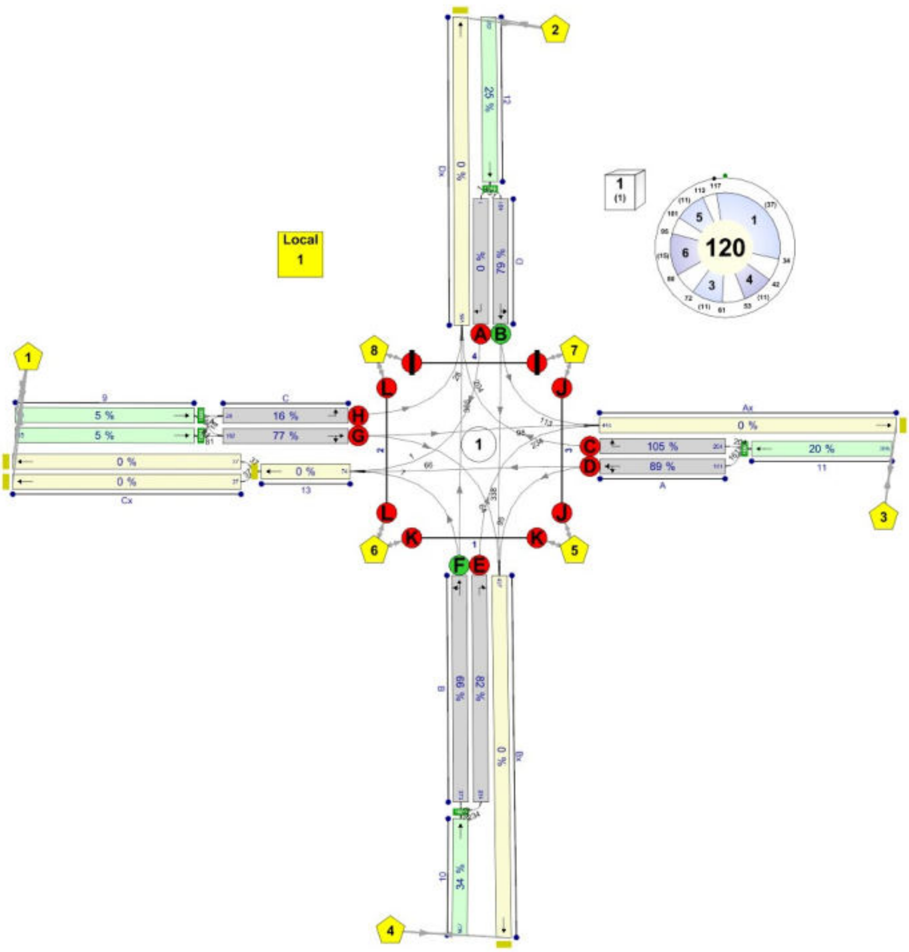
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	3.00	999	200	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 1
D1 - 2028 "with development",, AM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Arm Data	Arm 13	No traffic node specified for arm(s): 13

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 02:15:05	28/04/2022 02:15:10	5.24	08:00	120	1000.60	68.79	104.62	A/2	1	4	A/2	10/1

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 1			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development",	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1
11			1
12			1
13			

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
A	1	(untitled)		✓	63.49	✓	Sum of lanes	1800	✓		Normal	
	2			✓	60.67	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	203.69						Normal	
B	1	(untitled)		✓	97.37	✓	Sum of lanes	1800	✓		Normal	
	2			✓	102.39	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	233.18						Normal	
C	1	(untitled)		✓	63.36	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.22	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	100.70						Normal	
	2			✓	100.58						Normal	
D	1	(untitled)		✓	58.52	✓	Sum of lanes	1800	✓		Normal	
	2			✓	58.16	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	207.29						Normal	
9	1			✓	71.45	✓	Sum of lanes	1800			Normal	
	2			✓	71.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.60	✓	Sum of lanes	1800			Normal	
11	1			✓	56.09	✓	Sum of lanes	1800			Normal	
12	1			✓	65.81	✓	Sum of lanes	1800			Normal	
13	1			✓	122.47						Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
Ax	1	1	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
Cx	1	1	(untitled)			
	2	1	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
11	1	1	(untitled)			1800
12	1	1	(untitled)			1800
13	1	1	(untitled)			

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
(ALL)	(ALL)	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)
A	1	161	161
	2	204	204
Ax	1	445	445
B	1	373	373
	2	234	234
Bx	1	497	497
C	1	28	28
	2	162	162
Cx	1	37	37
	2	37	37
D	1	451	451
	2	1	1
Dx	1	598	598
9	1	95	95
	2	95	95
10	1	607	607
11	1	365	365
12	1	452	452
13	1	74	74

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
9	1	8.57	30.00
	2	8.57	30.00
10	1	5.59	30.00
11	1	6.73	30.00
12	1	7.90	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)
A	1	1	11/1	A/1	7.62	30.00	✓	Straight	Straight Movement
	2	1	11/1	A/2	7.28	30.00	✓	Straight	Straight Movement
Ax	1	1	B/2	Ax/1	24.44	30.00	✓	Offside	47.99
B	1	1	10/1	B/1	11.68	30.00	✓	Straight	Straight Movement
	2	1	10/1	B/2	12.29	30.00	✓	Straight	Straight Movement
Bx	1	1	C/2	Bx/1	27.98	30.00	✓	Offside	56.60
C	1	1	9/2	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	1	9/2	C/2	7.59	30.00	✓	Straight	Straight Movement
Cx	1	1	13/1	Cx/1	12.08	30.00	✓	Straight	Straight Movement
	2	1	13/1	Cx/2	12.07	30.00	✓	Straight	Straight Movement
D	1	1	12/1	D/1	7.02	30.00	✓	Straight	Straight Movement
	2	1	12/1	D/2	6.98	30.00	✓	Straight	Straight Movement
Dx	1	1	B/1	Dx/1	24.88	30.00	✓	Straight	Straight Movement
13	1	1	B/1	13/1	14.70	30.00	✓	Nearside	41.84
Ax	1	2	D/1	Ax/1	24.44	30.00	✓	Nearside	39.46
Bx	1	2	D/1	Bx/1	27.98	30.00	✓	Straight	Straight Movement
C	1	2	9/1	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	2	9/1	C/2	7.59	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	24.88	30.00	✓	Nearside	36.02
13	1	2	D/2	13/1	14.70	30.00	✓	Offside	52.19
Ax	1	3	C/2	Ax/1	24.44	30.00	✓	Straight	Straight Movement
Bx	1	3	A/1	Bx/1	27.98	30.00	✓	Nearside	40.20
Dx	1	3	A/2	Dx/1	24.88	30.00	✓	Offside	48.68
13	1	3	A/1	13/1	14.70	30.00	✓	Straight	Straight Movement

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	K	
2	1	L	
3	1	J	
4	1	I	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	28	98	64	0	0	0	0
	2	1	0	113	338	0	0	0	0
	3	66	204	0	95	0	0	0	0
	4	7	366	234	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	9/2, 9/1	Cx/2, Cx/1	#0000FF
	2	(untitled)	12/1	Dx/1	#FF0000
	3	(untitled)	11/1	Ax/1	#00FF00
	4	(untitled)	10/1	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		4	3	10/1, B/2, Ax/1	Normal	234
	10		4	2	10/1, B/1, Dx/1	Normal	366
	11		4	1	10/1, B/1, 13/1, Cx/1	Normal	4
	12		4	1	10/1, B/1, 13/1, Cx/2	Normal	4
	13		1	2	9/2, C/1, Dx/1	Normal	14
	14		1	2	9/1, C/1, Dx/1	Normal	14
	16		1	4	9/2, C/2, Bx/1	Normal	32
	19		2	1	12/1, D/2, 13/1, Cx/1	Normal	1
	20		2	1	12/1, D/2, 13/1, Cx/2	Normal	1
	21		2	4	12/1, D/1, Bx/1	Normal	338
	24		3	1	11/1, A/1, 13/1, Cx/1	Normal	33
	25		3	1	11/1, A/1, 13/1, Cx/2	Normal	33
	26		3	4	11/1, A/1, Bx/1	Normal	95
	44		1	4	9/1, C/2, Bx/1	Normal	32
	45		2	3	12/1, D/1, Ax/1	Normal	113
	46		3	2	11/1, A/2, Dx/1	Normal	204
	47		1	3	9/2, C/2, Ax/1	Normal	49
	48		1	3	9/1, C/2, Ax/1	Normal	49

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		8	NetworkDefault	120	60

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	5	300	0	0	Unknown	
	B	(untitled)	5	300	0	0	Unknown	
	C	(untitled)	5	12	0	0	Unknown	
	D	(untitled)	5	12	0	0	Unknown	
	E	(untitled)	5	300	0	0	Unknown	
	F	(untitled)	5	300	0	0	Unknown	
	G	(untitled)	5	300	0	0	Unknown	
	H	(untitled)	5	300	0	0	Unknown	
	I	(untitled)	5	300	0	0	Pedestrian	0
	J	(untitled)	5	300	0	0	Pedestrian	0
	K	(untitled)	5	300	0	0	Pedestrian	0
	L	(untitled)	5	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	B, F	1	0	0
	2	F, E	1	0	0
	3	C, D	1	0	0
	4	H, G	1	0	0
	5	I, L, J, K	1	0	0
	6	E, A	1	0	0

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 3, 4, 5, 6	17, 43, 66, 92, 113	63	
	2	(untitled)	Single	1, 3, 4, 6, 5	17, 43, 67, 93, 115	61	
	3	(untitled)	Single	1, 3, 5, 4, 6	16, 41, 69, 89, 113	67	
	4	(untitled)	Single	1, 3, 5, 6, 4	16, 41, 69, 90, 112	66	
	5	(untitled)	Single	1, 3, 6, 4, 5	17, 42, 66, 89, 115	64	
	6	(untitled)	Single	1, 3, 6, 5, 4	17, 43, 68, 91, 112	61	
	7	(untitled)	Single	1, 4, 3, 5, 6	16, 40, 64, 92, 113	65	
	8	(untitled)	Single	1, 4, 3, 6, 5	34, 53, 72, 95, 112	60	
	9	(untitled)	Single	1, 4, 5, 3, 6	17, 42, 68, 89, 113	63	
	10	(untitled)	Single	1, 4, 5, 6, 3	17, 41, 67, 88, 112	64	

Intergreen Matrix for Controller Stream 1

		To											
		A	B	C	D	E	F	G	H	I	J	K	L
From	A			5	5		7	7		6			0
	B			5	9	6		5		6	10	0	
	C	8	5			5	5	5	7	12	6		
	D	5	5			5	8	5			6	10	0
	E		7	8	5			5			0	6	
	F	7		7	5			6	8	0		6	11
	G	5	8	7	8	9	5				0	0	6
	H			5			5			10			6
	I	4	4	4			4		4				
	J		5	5	5	5		5					
	K		4		4	4	4	4					
	L	5			5		5	5	5				

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	9	8	11	7
	2	7	0	8	8	11	7
	3	8	8	0	7	12	8
	4	8	9	8	0	10	9
	5	5	5	5	5	0	5
	6	7	7	8	7	6	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	B,F	117	34	37	1	5
	2	✓	4	H,G	42	53	11	1	5
	3	✓	3	C,D	61	72	11	1	5
	4	✓	6	E,A	80	95	15	1	5
	5	✓	5	I,L,J,K	101	112	11	1	5

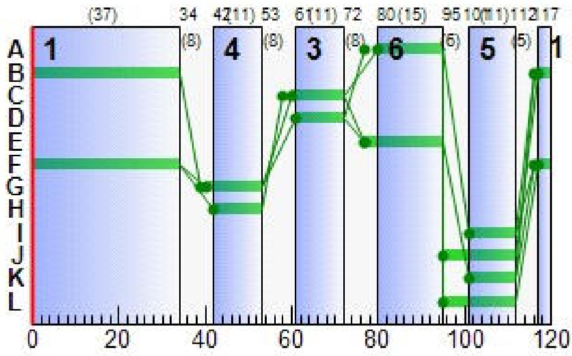
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	80	95	15
	B	1	✓	117	34	37
	C	1	✓	60	72	12
	D	1	✓	61	72	11
	E	1	✓	77	95	18
	F	1	✓	117	34	37
	G	1	✓	40	53	13
	H	1	✓	42	53	11
	I	1	✓	101	112	11
	J	1	✓	95	112	17
	K	1	✓	101	112	11
	L	1	✓	95	112	17

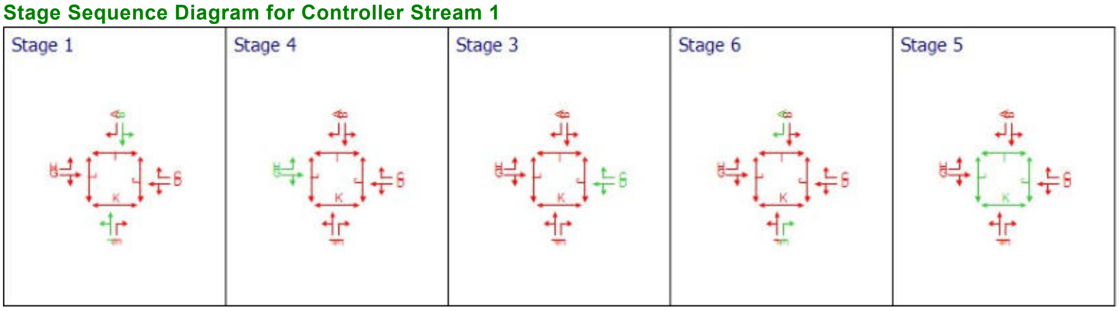
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	**1**	1	1	D	61	72	11
A	**2**	1	1	C	60	72	12
B	**1**	1	1	F	117	34	37
B	**2**	1	1	E	77	95	18
C	**1**	1	1	H	42	53	11
C	**2**	1	1	G	40	53	13
D	**1**	1	1	B	117	34	37
D	**2**	1	1	A	80	95	15

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

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)**	**JourneyTime (s)**	**Mean Delay per Veh (s)**	**Mean stops per Veh (%)**	**Mean max queue (PCU)**
A	**1**	(untitled)	1	1	D	161	1800	11	0.00	89	12	122.35	114.73	142.43	8.02
	2		1	1	C	204 <	1800	12	0.00	105	-4	221.87	214.59	203.24	15.71 +
Ax	**1**	(untitled)				445	Unrestricted	120	8.00	0	Unrestricted	24.44	0.00	0.00	0.00
B	**1**	(untitled)	1	1	F	374	1800	37	0.00	66	52	53.00	41.32	89.45	11.32
	2		1	1	E	234	1800	18	0.00	82	22	87.51	75.22	115.92	9.25
Bx	**1**	(untitled)				497	Unrestricted	120	24.00	0	Unrestricted	27.98	0.00	0.00	0.00
C	**1**	(untitled)	1	1	H	28	1800	11	10.00	16	543	58.86	51.26	91.37	0.86
	2		1	1	G	162	1800	13	0.00	77	30	85.78	78.19	116.70	6.42
Cx	**1**	(untitled)				37	Unrestricted	120	99.00	0	Unrestricted	12.08	0.00	0.00	0.00
	2					37	Unrestricted	120	99.00	0	Unrestricted	12.07	0.00	0.00	0.00
D	**1**	(untitled)	1	1	B	451 <	1800	37	0.00	79	26	55.94	48.92	98.79	15.10 +
	2		1	1	A	0	1800	15	16.00	0	Unrestricted	0.00	0.00	0.00	0.00
Dx	**1**	(untitled)				589	Unrestricted	120	21.00	0	Unrestricted	24.88	0.00	0.00	0.00
9	**1**		1			95	1800	120	0.00	5	1795	8.63	0.06	0.00	0.00
	2		1			95	1800	120	0.00	5	1795	8.63	0.06	0.00	0.00
10	**1**		1			608	1800	120	0.00	34	196	6.10	0.51	0.00	0.09
11	**1**		1			365	1800	120	96.00	20	393	6.99	0.25	0.00	0.03
12	**1**		1			451	1800	120	40.00	25	299	8.23	0.33	0.00	0.04
13	**1**					74	Unrestricted	120	99.00	0	Unrestricted	14.70	0.00	0.00	0.00

Network Results

	Distance travelled (PCU-km/hr)	**Time spent (PCU-hr/hr)**	**Mean journey speed (kph)**	**Uniform delay (PCU-hr/hr)**	**Random plus oversat 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	558.58	55.29	10.10	19.52	17.16	520.79	23.72	0.00	544.51
Bus									
Tram									
Pedestrians	20.40	36.12	0.56	32.12	0.00	456.10	0.00	0.00	456.10
TOTAL	578.98	91.41	6.33	51.64	17.16	976.89	23.72	0.00	1000.60

- *< = 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***

TRANSYT 16

Filename: Junction 1 - 2028 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 1\Upgraded Layout
Report generation date: 28/04/2022 02:19:06

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 1 - 2028 "with development"			
Network	894.63	61.46	94% (TS A/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

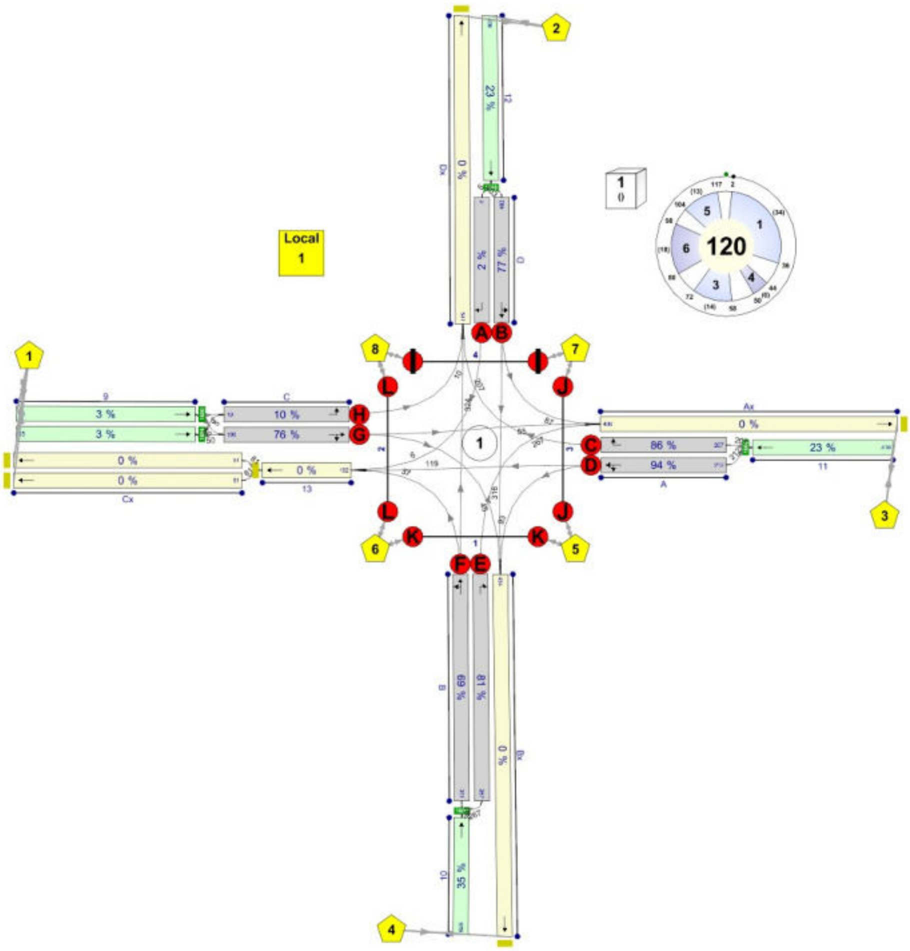
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 1
D1 - 2028 "with development", PM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Arm Data	Arm 13	No traffic node specified for arm(s): 13

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 02:16:21	28/04/2022 02:16:27	6.43	17:00	120	894.63	61.46	93.78	A/1	0	0	A/1	10/1

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 1			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1
11			1
12			1
13			

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
A	1	(untitled)		✓	63.49	✓	Sum of lanes	1800	✓		Normal	
	2			✓	60.67	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	203.69						Normal	
B	1	(untitled)		✓	97.37	✓	Sum of lanes	1800	✓		Normal	
	2			✓	102.39	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	233.18						Normal	
C	1	(untitled)		✓	63.36	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.22	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	100.70						Normal	
	2			✓	100.58						Normal	
D	1	(untitled)		✓	58.52	✓	Sum of lanes	1800	✓		Normal	
	2			✓	58.16	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	207.29						Normal	
9	1			✓	71.45	✓	Sum of lanes	1800			Normal	
	2			✓	71.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.60	✓	Sum of lanes	1800			Normal	
11	1			✓	56.09	✓	Sum of lanes	1800			Normal	
12	1			✓	65.81	✓	Sum of lanes	1800			Normal	
13	1			✓	122.47						Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
Ax	1	1	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
Cx	1	1	(untitled)			
	2	1	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
11	1	1	(untitled)			1800
12	1	1	(untitled)			1800
13	1	1	(untitled)			

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
(ALL)	(ALL)	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)
A	1	212	212
	2	207	207
Ax	1	409	409
B	1	361	361
	2	267	267
Bx	1	454	454
C	1	10	10
	2	100	100
Cx	1	81	81
	2	81	81
D	1	403	403
	2	6	6
Dx	1	541	541
9	1	55	55
	2	55	55
10	1	628	628
11	1	419	419
12	1	409	409
13	1	162	162

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
9	1	8.57	30.00
	2	8.57	30.00
10	1	5.59	30.00
11	1	6.73	30.00
12	1	7.90	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)
A	1	1	11/1	A/1	7.62	30.00	✓	Straight	Straight Movement
	2	1	11/1	A/2	7.28	30.00	✓	Straight	Straight Movement
Ax	1	1	B/2	Ax/1	24.44	30.00	✓	Offside	47.99
B	1	1	10/1	B/1	11.68	30.00	✓	Straight	Straight Movement
	2	1	10/1	B/2	12.29	30.00	✓	Straight	Straight Movement
Bx	1	1	C/2	Bx/1	27.98	30.00	✓	Offside	56.60
C	1	1	9/2	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	1	9/2	C/2	7.59	30.00	✓	Straight	Straight Movement
Cx	1	1	13/1	Cx/1	12.08	30.00	✓	Straight	Straight Movement
	2	1	13/1	Cx/2	12.07	30.00	✓	Straight	Straight Movement
D	1	1	12/1	D/1	7.02	30.00	✓	Straight	Straight Movement
	2	1	12/1	D/2	6.98	30.00	✓	Straight	Straight Movement
Dx	1	1	B/1	Dx/1	24.88	30.00	✓	Straight	Straight Movement
13	1	1	B/1	13/1	14.70	30.00	✓	Nearside	41.84
Ax	1	2	D/1	Ax/1	24.44	30.00	✓	Nearside	39.46
Bx	1	2	D/1	Bx/1	27.98	30.00	✓	Straight	Straight Movement
C	1	2	9/1	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	2	9/1	C/2	7.59	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	24.88	30.00	✓	Nearside	36.02
13	1	2	D/2	13/1	14.70	30.00	✓	Offside	52.19
Ax	1	3	C/2	Ax/1	24.44	30.00	✓	Straight	Straight Movement
Bx	1	3	A/1	Bx/1	27.98	30.00	✓	Nearside	40.20
Dx	1	3	A/2	Dx/1	24.88	30.00	✓	Offside	48.68
13	1	3	A/1	13/1	14.70	30.00	✓	Straight	Straight Movement

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	K	
2	1	L	
3	1	J	
4	1	I	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	10	55	45	0	0	0	0
	2	6	0	87	316	0	0	0	0
	3	119	207	0	93	0	0	0	0
	4	37	324	267	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	9/2, 9/1	Cx/2, Cx/1	#0000FF
	2	(untitled)	12/1	Dx/1	#FF0000
	3	(untitled)	11/1	Ax/1	#00FF00
	4	(untitled)	10/1	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		4	3	10/1, B/2, Ax/1	Normal	267
	10		4	2	10/1, B/1, Dx/1	Normal	324
	11		4	1	10/1, B/1, 13/1, Cx/1	Normal	19
	12		4	1	10/1, B/1, 13/1, Cx/2	Normal	19
	13		1	2	9/2, C/1, Dx/1	Normal	5
	14		1	2	9/1, C/1, Dx/1	Normal	5
	16		1	4	9/2, C/2, Bx/1	Normal	23
	19		2	1	12/1, D/2, 13/1, Cx/1	Normal	3
	20		2	1	12/1, D/2, 13/1, Cx/2	Normal	3
	21		2	4	12/1, D/1, Bx/1	Normal	316
	24		3	1	11/1, A/1, 13/1, Cx/1	Normal	60
	25		3	1	11/1, A/1, 13/1, Cx/2	Normal	60
	26		3	4	11/1, A/1, Bx/1	Normal	93
	44		1	4	9/1, C/2, Bx/1	Normal	23
	45		2	3	12/1, D/1, Ax/1	Normal	87
	46		3	2	11/1, A/2, Dx/1	Normal	207
	47		1	3	9/2, C/2, Ax/1	Normal	28
	48		1	3	9/1, C/2, Ax/1	Normal	28

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		8	NetworkDefault	120	60

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	5	300	0	0	Unknown	
	B	(untitled)	5	300	0	0	Unknown	
	C	(untitled)	5	15	0	0	Unknown	
	D	(untitled)	5	15	0	0	Unknown	
	E	(untitled)	5	300	0	0	Unknown	
	F	(untitled)	5	300	0	0	Unknown	
	G	(untitled)	5	300	0	0	Unknown	
	H	(untitled)	5	300	0	0	Unknown	
	I	(untitled)	5	300	0	0	Pedestrian	0
	J	(untitled)	5	300	0	0	Pedestrian	0
	K	(untitled)	5	300	0	0	Pedestrian	0
	L	(untitled)	5	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	B, F	1	1	100
	2	F, E	1	1	100
	3	C, D	1	1	100
	4	H, G	1	1	100
	5	I, L, J, K	1	1	100
	6	E, A	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 3, 4, 5, 6	17, 43, 66, 92, 113	63	
	2	(untitled)	Single	1, 3, 4, 6, 5	17, 43, 67, 93, 115	61	
	3	(untitled)	Single	1, 3, 5, 4, 6	16, 41, 69, 89, 113	67	
	4	(untitled)	Single	1, 3, 5, 6, 4	16, 41, 69, 90, 112	66	
	5	(untitled)	Single	1, 3, 6, 4, 5	17, 42, 66, 89, 115	64	
	6	(untitled)	Single	1, 3, 6, 5, 4	17, 43, 68, 91, 112	61	
	7	(untitled)	Single	1, 4, 3, 5, 6	16, 40, 64, 92, 113	65	
	8	(untitled)	Single	1, 4, 3, 6, 5	36, 50, 72, 98, 117	60	
	9	(untitled)	Single	1, 4, 5, 3, 6	17, 42, 68, 89, 113	63	
	10	(untitled)	Single	1, 4, 5, 6, 3	17, 41, 67, 88, 112	64	

Intergreen Matrix for Controller Stream 1

		To											
		A	B	C	D	E	F	G	H	I	J	K	L
From	A			5	5		7	7		6			0
	B			5	9	6		5		6	10	0	
	C	8	5			5	5	5	7	12	6		
	D	5	5			5	8	5			6	10	0
	E		7	8	5			5			0	6	
	F	7		7	5			6	8	0		6	11
	G	5	8	7	8	9	5				0	0	6
	H			5			5			10			6
	I	4	4	4			4		4				
	J		5	5	5	5		5					
	K		4		4	4	4	4					
	L	5			5		5	5	5				

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	9	8	11	7
	2	7	0	8	8	11	7
	3	8	8	0	7	12	8
	4	8	9	8	0	10	9
	5	5	5	5	5	0	5
	6	7	7	8	7	6	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	B,F	2	36	34	1	5
	2	✓	4	H,G	44	50	6	1	5
	3	✓	3	C,D	58	72	14	1	5
	4	✓	6	E,A	80	98	18	1	5
	5	✓	5	I,L,J,K	104	117	13	1	5

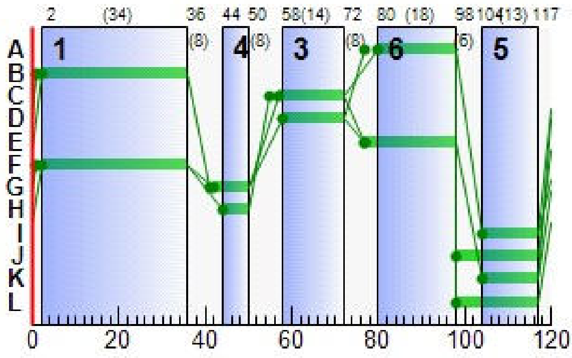
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	80	98	18
	B	1	✓	2	36	34
	C	1	✓	57	72	15
	D	1	✓	58	72	14
	E	1	✓	77	98	21
	F	1	✓	2	36	34
	G	1	✓	42	50	8
	H	1	✓	44	50	6
	I	1	✓	104	117	13
	J	1	✓	98	117	19
	K	1	✓	104	117	13
	L	1	✓	98	117	19

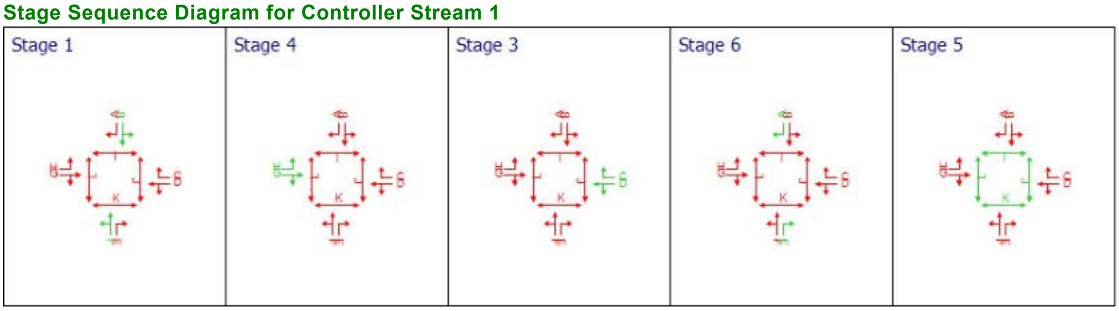
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	D	58	72	14
A	2	1	1	C	57	72	15
B	1	1	1	F	2	36	34
B	2	1	1	E	77	98	21
C	1	1	1	H	44	50	6
C	2	1	1	G	42	50	8
D	1	1	1	B	2	36	34
D	2	1	1	A	80	98	18

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	D	211	1800	14	0.00	94	7	129.81	122.19	148.02	11.03
	2		1	1	C	207	1800	15	0.00	86	16	97.76	90.48	126.80	9.00
Ax	1	(untitled)				410	Unrestricted	120	14.00	0	Unrestricted	24.44	0.00	0.00	0.00
B	1	(untitled)	1	1	F	362	1800	34	0.00	69	45	56.85	45.17	93.14	11.41
	2		1	1	E	267	1800	21	0.00	81	24	80.76	68.47	111.29	10.12
Bx	1	(untitled)				455	Unrestricted	120	30.00	0	Unrestricted	27.98	0.00	0.00	0.00
C	1	(untitled)	1	1	H	10	1800	6	6.00	10	950	63.08	55.48	94.68	0.32
	2		1	1	G	102	1800	8	0.00	76	32	99.18	91.59	125.20	4.37
Cx	1	(untitled)				81	Unrestricted	120	73.00	0	Unrestricted	12.08	0.00	0.00	0.00
	2					81	Unrestricted	120	73.00	0	Unrestricted	12.07	0.00	0.00	0.00
D	1	(untitled)	1	1	B	403 <	1800	34	0.00	77	30	56.78	49.76	98.46	13.43 +
	2		1	1	A	6	1800	18	18.00	2	4650	50.04	43.06	83.29	0.17
Dx	1	(untitled)				541	Unrestricted	120	27.00	0	Unrestricted	24.88	0.00	0.00	0.00
9	1		1			56	1800	120	120.00	3	3114	8.61	0.03	0.00	0.00
	2		1			56	1800	120	120.00	3	3114	8.61	0.03	0.00	0.00
10	1		1			629	1800	120	0.00	35	186	6.13	0.54	0.00	0.09
11	1		1			418	1800	120	0.00	23	331	7.03	0.30	0.00	0.04
12	1		1			409	1800	120	30.00	23	340	8.19	0.29	0.00	0.03
13	1					162	Unrestricted	120	61.00	0	Unrestricted	14.70	0.00	0.00	0.00

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	545.13	48.71	11.19	19.36	11.18	433.65	21.92	0.00	455.57
Bus									
Tram									
Pedestrians	20.40	34.92	0.58	30.92	0.00	439.06	0.00	0.00	439.06
TOTAL	565.53	83.63	6.76	50.28	11.18	872.71	21.92	0.00	894.63

- *< = 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***

TRANSYT 16

Filename: Junction 1 - 2040 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 1\Upgraded Layout
Report generation date: 28/04/2022 02:24:05

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 1 [A2] - 2040 "with development",			
Network	1010.08	69.47	105% (TS A/1)	1 (4%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

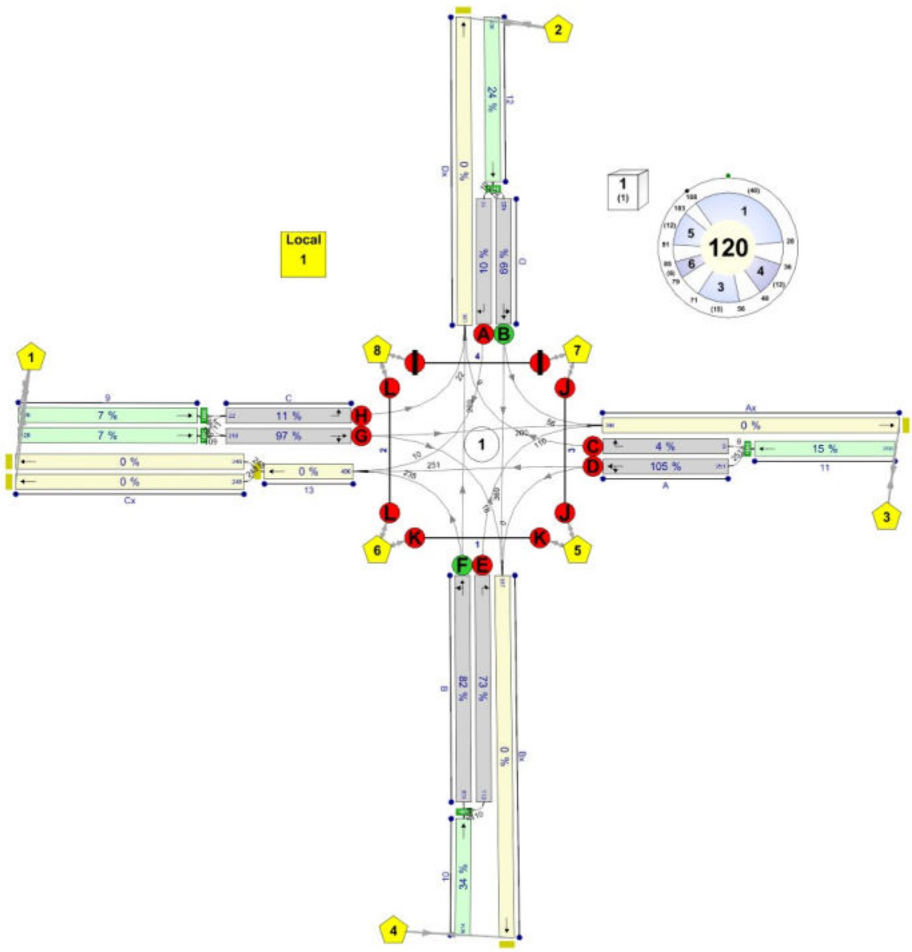
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	3.00	999	200	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 1 [A2]
D1 - 2040 "with development",, AM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Arm Data	Arm 13	No traffic node specified for arm(s): 13

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 02:23:47	28/04/2022 02:23:52	5.87	08:00	120	1010.08	69.47	105.00	A/1	1	4	A/1	10/1

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set (s)	Specific Demand Set (s)	Optimise specific Demand Set (s)	Include in report	Locked
Junction 1 [A2]			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development",	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1
11			1
12			1
13			

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
A	1	(untitled)		✓	63.49	✓	Sum of lanes	1800	✓		Normal	
	2			✓	60.67	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	203.69						Normal	
B	1	(untitled)		✓	97.37	✓	Sum of lanes	1800	✓		Normal	
	2			✓	102.39	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	233.18						Normal	
C	1	(untitled)		✓	63.36	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.22	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	100.70						Normal	
	2			✓	100.58						Normal	
D	1	(untitled)		✓	58.52	✓	Sum of lanes	1800	✓		Normal	
	2			✓	58.16	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	207.29						Normal	
9	1			✓	71.45	✓	Sum of lanes	1800			Normal	
	2			✓	71.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.60	✓	Sum of lanes	1800			Normal	
11	1			✓	56.09	✓	Sum of lanes	1800			Normal	
12	1			✓	65.81	✓	Sum of lanes	1800			Normal	
13	1			✓	122.47						Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
Ax	1	1	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
Cx	1	1	(untitled)			
	2	1	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
11	1	1	(untitled)			1800
12	1	1	(untitled)			1800
13	1	1	(untitled)			

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
(ALL)	(ALL)	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)
A	1	251	251
	2	9	9
Ax	1	366	366
B	1	504	504
	2	110	110
Bx	1	387	387
C	1	22	22
	2	218	218
Cx	1	248	248
	2	248	248
D	1	425	425
	2	10	10
Dx	1	300	300
9	1	120	120
	2	120	120
10	1	614	614
11	1	260	260
12	1	435	435
13	1	496	496

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
9	1	8.57	30.00
	2	8.57	30.00
10	1	5.59	30.00
11	1	6.73	30.00
12	1	7.90	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)
A	1	1	11/1	A/1	7.62	30.00	✓	Straight	Straight Movement
	2	1	11/1	A/2	7.28	30.00	✓	Straight	Straight Movement
Ax	1	1	B/2	Ax/1	24.44	30.00	✓	Offside	47.99
B	1	1	10/1	B/1	11.68	30.00	✓	Straight	Straight Movement
	2	1	10/1	B/2	12.29	30.00	✓	Straight	Straight Movement
Bx	1	1	C/2	Bx/1	27.98	30.00	✓	Offside	56.60
C	1	1	9/2	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	1	9/2	C/2	7.59	30.00	✓	Straight	Straight Movement
Cx	1	1	13/1	Cx/1	12.08	30.00	✓	Straight	Straight Movement
	2	1	13/1	Cx/2	12.07	30.00	✓	Straight	Straight Movement
D	1	1	12/1	D/1	7.02	30.00	✓	Straight	Straight Movement
	2	1	12/1	D/2	6.98	30.00	✓	Straight	Straight Movement
Dx	1	1	B/1	Dx/1	24.88	30.00	✓	Straight	Straight Movement
13	1	1	B/1	13/1	14.70	30.00	✓	Nearside	41.84
Ax	1	2	D/1	Ax/1	24.44	30.00	✓	Nearside	39.46
Bx	1	2	D/1	Bx/1	27.98	30.00	✓	Straight	Straight Movement
C	1	2	9/1	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	2	9/1	C/2	7.59	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	24.88	30.00	✓	Nearside	36.02
13	1	2	D/2	13/1	14.70	30.00	✓	Offside	52.19
Ax	1	3	C/2	Ax/1	24.44	30.00	✓	Straight	Straight Movement
Bx	1	3	A/1	Bx/1	27.98	30.00	✓	Nearside	40.20
Dx	1	3	A/2	Dx/1	24.88	30.00	✓	Offside	48.68
13	1	3	A/1	13/1	14.70	30.00	✓	Straight	Straight Movement

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	K	
2	1	L	
3	1	J	
4	1	I	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	22	200	18	0	0	0	0
	2	10	0	56	369	0	0	0	0
	3	251	9	0	0	0	0	0	0
	4	235	269	110	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	9/2, 9/1	Cx/2, Cx/1	#0000FF
	2	(untitled)	12/1	Dx/1	#FF0000
	3	(untitled)	11/1	Ax/1	#00FF00
	4	(untitled)	10/1	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		4	3	10/1, B/2, Ax/1	Normal	110
	10		4	2	10/1, B/1, Dx/1	Normal	269
	11		4	1	10/1, B/1, 13/1, Cx/1	Normal	118
	12		4	1	10/1, B/1, 13/1, Cx/2	Normal	118
	13		1	2	9/2, C/1, Dx/1	Normal	11
	14		1	2	9/1, C/1, Dx/1	Normal	11
	16		1	4	9/2, C/2, Bx/1	Normal	9
	19		2	1	12/1, D/2, 13/1, Cx/1	Normal	5
	20		2	1	12/1, D/2, 13/1, Cx/2	Normal	5
	21		2	4	12/1, D/1, Bx/1	Normal	369
	24		3	1	11/1, A/1, 13/1, Cx/1	Normal	126
	25		3	1	11/1, A/1, 13/1, Cx/2	Normal	126
	26		3	4	11/1, A/1, Bx/1	Normal	0
	44		1	4	9/1, C/2, Bx/1	Normal	9
	45		2	3	12/1, D/1, Ax/1	Normal	56
	46		3	2	11/1, A/2, Dx/1	Normal	9
	47		1	3	9/2, C/2, Ax/1	Normal	100
	48		1	3	9/1, C/2, Ax/1	Normal	100

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		8	NetworkDefault	120	60

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	5	300	0	0	Unknown	
	B	(untitled)	5	300	0	0	Unknown	
	C	(untitled)	5	16	0	0	Unknown	
	D	(untitled)	5	16	0	0	Unknown	
	E	(untitled)	5	300	0	0	Unknown	
	F	(untitled)	5	300	0	0	Unknown	
	G	(untitled)	5	14	0	0	Unknown	
	H	(untitled)	5	14	0	0	Unknown	
	I	(untitled)	5	300	0	0	Pedestrian	0
	J	(untitled)	5	300	0	0	Pedestrian	0
	K	(untitled)	5	300	0	0	Pedestrian	0
	L	(untitled)	5	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	B, F	1	1	100
	2	F, E	1	1	100
	3	C, D	1	1	100
	4	H, G	1	1	100
	5	I, L, J, K	1	1	100
	6	E, A	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 3, 4, 5, 6	17, 43, 66, 92, 113	63	
	2	(untitled)	Single	1, 3, 4, 6, 5	17, 43, 67, 93, 115	61	
	3	(untitled)	Single	1, 3, 5, 4, 6	16, 41, 69, 89, 113	67	
	4	(untitled)	Single	1, 3, 5, 6, 4	16, 41, 69, 90, 112	66	
	5	(untitled)	Single	1, 3, 6, 4, 5	17, 42, 66, 89, 115	64	
	6	(untitled)	Single	1, 3, 6, 5, 4	17, 43, 68, 91, 112	61	
	7	(untitled)	Single	1, 4, 3, 5, 6	16, 40, 64, 92, 113	65	
	8	(untitled)	Single	1, 4, 3, 6, 5	28, 48, 71, 85, 103	60	
	9	(untitled)	Single	1, 4, 5, 3, 6	17, 42, 68, 89, 113	63	
	10	(untitled)	Single	1, 4, 5, 6, 3	17, 41, 67, 88, 112	64	

Intergreen Matrix for Controller Stream 1

		To											
		A	B	C	D	E	F	G	H	I	J	K	L
From	A			5	5		7	7		6			0
	B			5	9	6		5		6	10	0	
	C	8	5			5	5	5	7	12	6		
	D	5	5			5	8	5			6	10	0
	E		7	8	5			5			0	6	
	F	7		7	5			6	8	0		6	11
	G	5	8	7	8	9	5				0	0	6
	H			5			5			10			6
	I	4	4	4			4		4				
	J		5	5	5	5		5					
	K		4		4	4	4	4					
	L	5			5		5	5	5				

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	9	8	11	7
	2	7	0	8	8	11	7
	3	8	8	0	7	12	8
	4	8	9	8	0	10	9
	5	5	5	5	5	0	5
	6	7	7	8	7	6	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	B,F	108	28	40	1	5
	2	✓	4	H,G	36	48	12	1	5
	3	✓	3	C,D	56	71	15	1	5
	4	✓	6	E,A	79	85	6	1	5
	5	✓	5	I,L,J,K	91	103	12	1	5

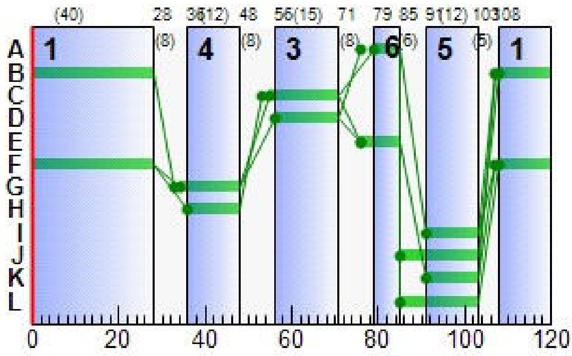
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	79	85	6
	B	1	✓	108	28	40
	C	1	✓	55	71	16
	D	1	✓	56	71	15
	E	1	✓	76	85	9
	F	1	✓	108	28	40
	G	1	✓	34	48	14
	H	1	✓	36	48	12
	I	1	✓	91	103	12
	J	1	✓	85	103	18
	K	1	✓	91	103	12
	L	1	✓	85	103	18

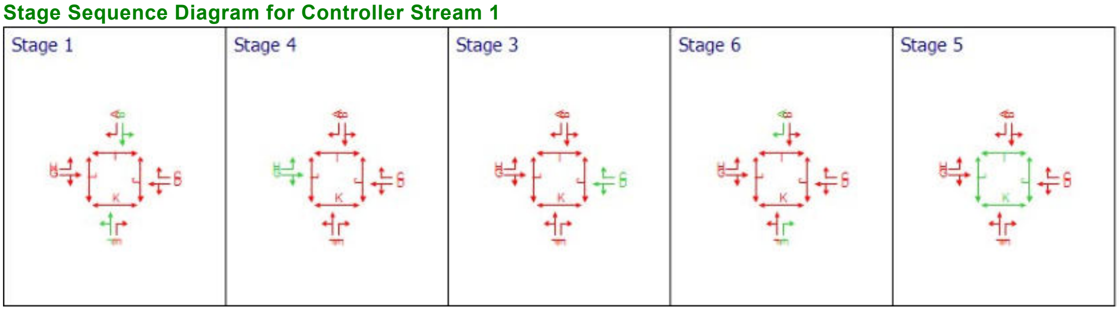
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	D	56	71	15
A	2	1	1	C	55	71	16
B	1	1	1	F	108	28	40
B	2	1	1	E	76	85	9
C	1	1	1	H	36	48	12
C	2	1	1	G	34	48	14
D	1	1	1	B	108	28	40
D	2	1	1	A	79	85	6

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

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	D	252 <	1800	15	0.00	105	-5	214.37	206.75	200.86	18.94 +
	2		1	1	C	9	1800	16	16.00	4	2733	52.17	44.89	85.06	0.26
Ax	1	(untitled)				366	Unrestricted	120	12.00	0	Unrestricted	24.44	0.00	0.00	0.00
B	1	(untitled)	1	1	F	505 <	1800	40	0.00	82	22	60.66	48.97	99.93	17.09 +
	2		1	1	E	110	1800	9	0.00	73	36	96.47	84.18	120.16	4.51
Bx	1	(untitled)				387	Unrestricted	120	51.00	0	Unrestricted	27.98	0.00	0.00	0.00
C	1	(untitled)	1	1	H	22	1800	12	11.00	11	786	57.14	49.54	89.99	0.67
	2		1	1	G	218 <	1800	14	0.00	97	3	148.65	141.06	159.89	12.58 +
Cx	1	(untitled)				243	Unrestricted	120	38.00	0	Unrestricted	12.08	0.00	0.00	0.00
	2					243	Unrestricted	120	38.00	0	Unrestricted	12.07	0.00	0.00	0.00
D	1	(untitled)	1	1	B	425 <	1800	40	0.00	69	45	47.52	40.49	89.74	12.92 +
	2		1	1	A	10	1800	6	6.00	10	950	62.46	55.48	94.68	0.32
Dx	1	(untitled)				300	Unrestricted	120	46.00	0	Unrestricted	24.88	0.00	0.00	0.00
9	1		1			120	1800	120	27.00	7	1400	8.65	0.07	0.00	0.00
	2		1			120	1800	120	27.00	7	1400	8.65	0.07	0.00	0.00
10	1		1			615	1800	120	2.00	34	193	6.11	0.52	0.00	0.09
11	1		1			261	1800	120	119.00	15	590	6.90	0.17	0.00	0.01
12	1		1			435	1800	120	24.00	24	314	8.22	0.32	0.00	0.04
13	1					486	Unrestricted	120	38.00	0	Unrestricted	14.70	0.00	0.00	0.00

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	542.09	56.02	9.68	17.92	20.03	538.90	23.64	0.00	562.54
Bus									
Tram									
Pedestrians	20.40	35.52	0.57	31.52	0.00	447.54	0.00	0.00	447.54
TOTAL	562.49	91.54	6.14	49.44	20.03	986.43	23.64	0.00	1010.08

- *< = 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***

TRANSYT 16

Filename: Junction 1 - 2040 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 1\Upgraded Layout
Report generation date: 28/04/2022 02:27:15

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 1 [A2] - 2040 "with development"			
Network	823.24	56.64	94% (TS A/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

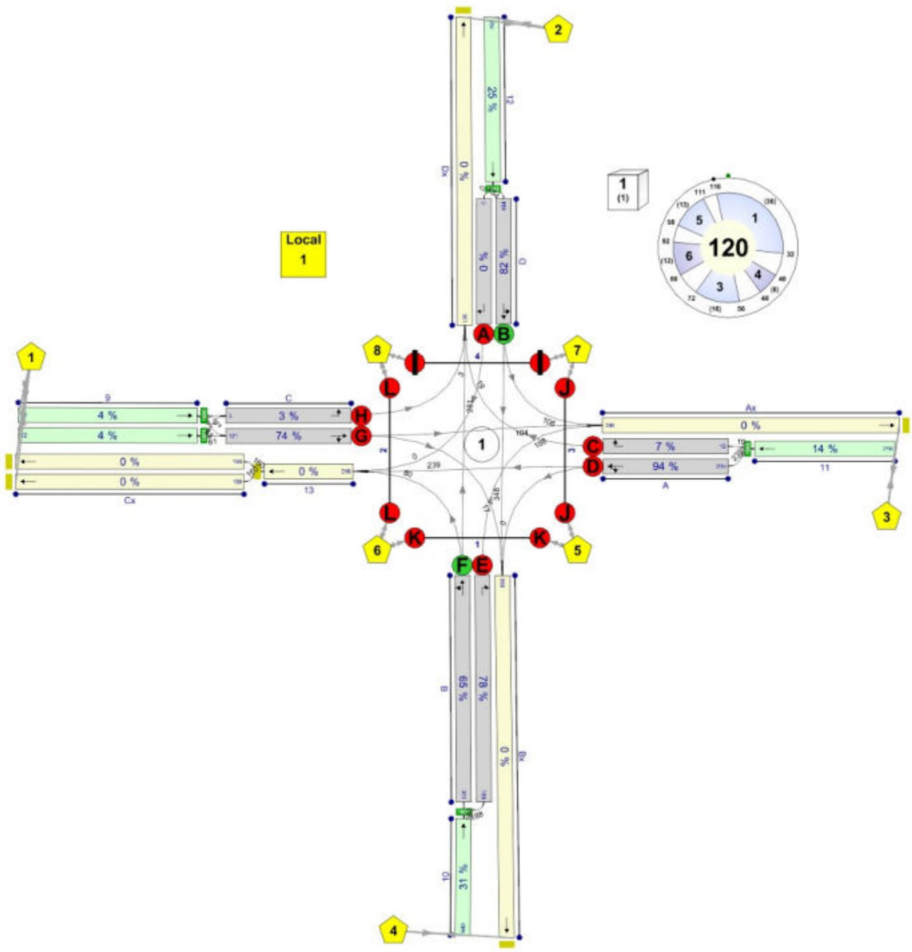
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 1 [A2]
D1 - 2040 "with development", PM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Arm Data	Arm 13	No traffic node specified for arm(s): 13

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 02:24:59	28/04/2022 02:25:04	5.57	17:00	120	823.24	56.64	94.12	A/1	0	0	A/1	10/1

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set (s)	Specific Demand Set (s)	Optimise specific Demand Set (s)	Include in report	Locked
Junction 1 [A2]			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1
11			1
12			1
13			

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
A	1	(untitled)		✓	63.49	✓	Sum of lanes	1800	✓		Normal	
	2			✓	60.67	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	203.69						Normal	
B	1	(untitled)		✓	97.37	✓	Sum of lanes	1800	✓		Normal	
	2			✓	102.39	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	233.18						Normal	
C	1	(untitled)		✓	63.36	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.22	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	100.70						Normal	
	2			✓	100.58						Normal	
D	1	(untitled)		✓	58.52	✓	Sum of lanes	1800	✓		Normal	
	2			✓	58.16	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	207.29						Normal	
9	1			✓	71.45	✓	Sum of lanes	1800			Normal	
	2			✓	71.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.60	✓	Sum of lanes	1800			Normal	
11	1			✓	56.09	✓	Sum of lanes	1800			Normal	
12	1			✓	65.81	✓	Sum of lanes	1800			Normal	
13	1			✓	122.47						Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
Ax	1	1	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
Cx	1	1	(untitled)			
	2	1	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
11	1	1	(untitled)			1800
12	1	1	(untitled)			1800
13	1	1	(untitled)			

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
(ALL)	(ALL)	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)
A	1	239	239
	2	19	19
Ax	1	398	398
B	1	361	361
	2	188	188
Bx	1	365	365
C	1	3	3
	2	121	121
Cx	1	160	160
	2	160	160
D	1	454	454
	2	0	0
Dx	1	303	303
9	1	62	62
	2	62	62
10	1	549	549
11	1	258	258
12	1	454	454
13	1	319	319

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
9	1	8.57	30.00
	2	8.57	30.00
10	1	5.59	30.00
11	1	6.73	30.00
12	1	7.90	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)
A	1	1	11/1	A/1	7.62	30.00	✓	Straight	Straight Movement
	2	1	11/1	A/2	7.28	30.00	✓	Straight	Straight Movement
Ax	1	1	B/2	Ax/1	24.44	30.00	✓	Offside	47.99
B	1	1	10/1	B/1	11.68	30.00	✓	Straight	Straight Movement
	2	1	10/1	B/2	12.29	30.00	✓	Straight	Straight Movement
Bx	1	1	C/2	Bx/1	27.98	30.00	✓	Offside	56.60
C	1	1	9/2	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	1	9/2	C/2	7.59	30.00	✓	Straight	Straight Movement
Cx	1	1	13/1	Cx/1	12.08	30.00	✓	Straight	Straight Movement
	2	1	13/1	Cx/2	12.07	30.00	✓	Straight	Straight Movement
D	1	1	12/1	D/1	7.02	30.00	✓	Straight	Straight Movement
	2	1	12/1	D/2	6.98	30.00	✓	Straight	Straight Movement
Dx	1	1	B/1	Dx/1	24.88	30.00	✓	Straight	Straight Movement
13	1	1	B/1	13/1	14.70	30.00	✓	Nearside	41.84
Ax	1	2	D/1	Ax/1	24.44	30.00	✓	Nearside	39.46
Bx	1	2	D/1	Bx/1	27.98	30.00	✓	Straight	Straight Movement
C	1	2	9/1	C/1	7.60	30.00	✓	Straight	Straight Movement
	2	2	9/1	C/2	7.59	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	24.88	30.00	✓	Nearside	36.02
13	1	2	D/2	13/1	14.70	30.00	✓	Offside	52.19
Ax	1	3	C/2	Ax/1	24.44	30.00	✓	Straight	Straight Movement
Bx	1	3	A/1	Bx/1	27.98	30.00	✓	Nearside	40.20
Dx	1	3	A/2	Dx/1	24.88	30.00	✓	Offside	48.68
13	1	3	A/1	13/1	14.70	30.00	✓	Straight	Straight Movement

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	K	
2	1	L	
3	1	J	
4	1	I	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	3	104	17	0	0	0	0
	2	0	0	106	348	0	0	0	0
	3	239	19	0	0	0	0	0	0
	4	80	281	188	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	9/2, 9/1	Cx/2, Cx/1	#0000FF
	2	(untitled)	12/1	Dx/1	#FF0000
	3	(untitled)	11/1	Ax/1	#00FF00
	4	(untitled)	10/1	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		4	3	10/1, B/2, Ax/1	Normal	188
	10		4	2	10/1, B/1, Dx/1	Normal	281
	11		4	1	10/1, B/1, 13/1, Cx/1	Normal	40
	12		4	1	10/1, B/1, 13/1, Cx/2	Normal	40
	13		1	2	9/2, C/1, Dx/1	Normal	2
	14		1	2	9/1, C/1, Dx/1	Normal	2
	16		1	4	9/2, C/2, Bx/1	Normal	9
	19		2	1	12/1, D/2, 13/1, Cx/1	Normal	0
	20		2	1	12/1, D/2, 13/1, Cx/2	Normal	0
	21		2	4	12/1, D/1, Bx/1	Normal	348
	24		3	1	11/1, A/1, 13/1, Cx/1	Normal	120
	25		3	1	11/1, A/1, 13/1, Cx/2	Normal	120
	26		3	4	11/1, A/1, Bx/1	Normal	0
	44		1	4	9/1, C/2, Bx/1	Normal	9
	45		2	3	12/1, D/1, Ax/1	Normal	106
	46		3	2	11/1, A/2, Dx/1	Normal	19
	47		1	3	9/2, C/2, Ax/1	Normal	52
	48		1	3	9/1, C/2, Ax/1	Normal	52

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		8	NetworkDefault	120	60

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
1	A	(untitled)	5	300	0	0	Unknown	
	B	(untitled)	5	300	0	0	Unknown	
	C	(untitled)	5	17	0	0	Unknown	
	D	(untitled)	5	17	0	0	Unknown	
	E	(untitled)	5	300	0	0	Unknown	
	F	(untitled)	5	300	0	0	Unknown	
	G	(untitled)	5	300	0	0	Unknown	
	H	(untitled)	5	300	0	0	Unknown	
	I	(untitled)	5	300	0	0	Pedestrian	0
	J	(untitled)	5	300	0	0	Pedestrian	0
	K	(untitled)	5	300	0	0	Pedestrian	0
	L	(untitled)	5	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	B, F	1	1	100
	2	F, E	1	1	100
	3	C, D	1	1	100
	4	H, G	1	1	100
	5	I, L, J, K	1	1	100
	6	E, A	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 3, 4, 5, 6	17, 43, 66, 92, 113	63	
	2	(untitled)	Single	1, 3, 4, 6, 5	17, 43, 67, 93, 115	61	
	3	(untitled)	Single	1, 3, 5, 4, 6	16, 41, 69, 89, 113	67	
	4	(untitled)	Single	1, 3, 5, 6, 4	16, 41, 69, 90, 112	66	
	5	(untitled)	Single	1, 3, 6, 4, 5	17, 42, 66, 89, 115	64	
	6	(untitled)	Single	1, 3, 6, 5, 4	17, 43, 68, 91, 112	61	
	7	(untitled)	Single	1, 4, 3, 5, 6	16, 40, 64, 92, 113	65	
	8	(untitled)	Single	1, 4, 3, 6, 5	32, 48, 72, 92, 111	60	
	9	(untitled)	Single	1, 4, 5, 3, 6	17, 42, 68, 89, 113	63	
	10	(untitled)	Single	1, 4, 5, 6, 3	17, 41, 67, 88, 112	64	

Intergreen Matrix for Controller Stream 1

		To											
		A	B	C	D	E	F	G	H	I	J	K	L
From	A			5	5		7	7		6			0
	B			5	9	6		5		6	10	0	
	C	8	5			5	5	5	7	12	6		
	D	5	5			5	8	5			6	10	0
	E		7	8	5			5			0	6	
	F	7		7	5			6	8	0		6	11
	G	5	8	7	8	9	5				0	0	6
	H			5			5			10			6
	I	4	4	4			4		4				
	J		5	5	5	5		5					
	K		4		4	4	4	4					
	L	5			5		5	5	5				

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	9	8	11	7
	2	7	0	8	8	11	7
	3	8	8	0	7	12	8
	4	8	9	8	0	10	9
	5	5	5	5	5	0	5
	6	7	7	8	7	6	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	B,F	116	32	36	1	5
	2	✓	4	H,G	40	48	8	1	5
	3	✓	3	C,D	56	72	16	1	5
	4	✓	6	E,A	80	92	12	1	5
	5	✓	5	I,L,J,K	98	111	13	1	5

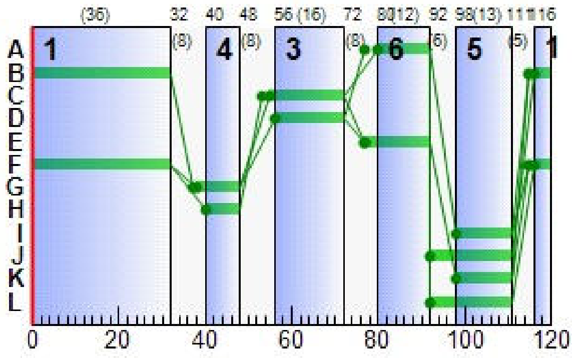
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	80	92	12
	B	1	✓	116	32	36
	C	1	✓	55	72	17
	D	1	✓	56	72	16
	E	1	✓	77	92	15
	F	1	✓	116	32	36
	G	1	✓	38	48	10
	H	1	✓	40	48	8
	I	1	✓	98	111	13
	J	1	✓	92	111	19
	K	1	✓	98	111	13
	L	1	✓	92	111	19

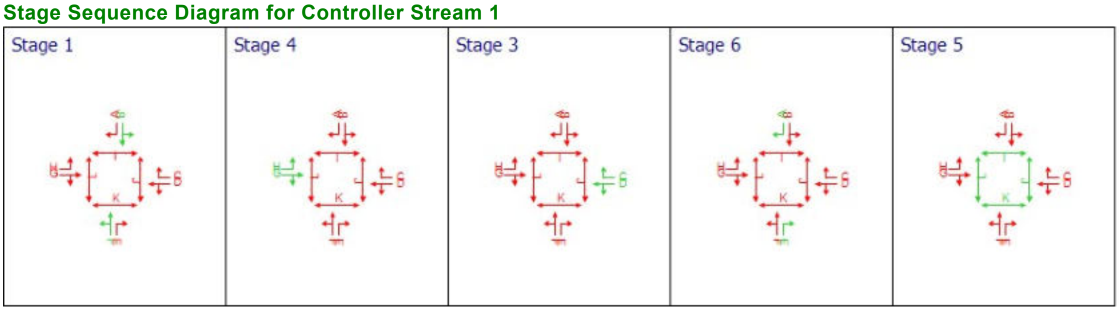
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	D	56	72	16
A	2	1	1	C	55	72	17
B	1	1	1	F	116	32	36
B	2	1	1	E	77	92	15
C	1	1	1	H	40	48	8
C	2	1	1	G	38	48	10
D	1	1	1	B	116	32	36
D	2	1	1	A	80	92	12

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	D	240 <	1800	16	0.00	94	6	124.67	117.05	145.41	12.27 +
	2		1	1	C	19	1800	17	16.00	7	1321	51.63	44.35	85.26	0.55
Ax	1	(untitled)				398	Unrestricted	120	13.00	0	Unrestricted	24.44	0.00	0.00	0.00
B	1	(untitled)	1	1	F	361	1800	36	0.00	65	54	53.55	41.87	89.60	10.93
	2		1	1	E	188	1800	15	0.00	78	28	87.71	75.43	115.18	7.37
Bx	1	(untitled)				366	Unrestricted	120	57.00	0	Unrestricted	27.98	0.00	0.00	0.00
C	1	(untitled)	1	1	H	4	1800	8	8.00	3	3275	59.81	52.21	91.85	0.12
	2		1	1	G	122	1800	10	0.00	74	35	89.37	81.78	118.21	4.90
Cx	1	(untitled)				160	Unrestricted	120	57.00	0	Unrestricted	12.08	0.00	0.00	0.00
	2					160	Unrestricted	120	57.00	0	Unrestricted	12.07	0.00	0.00	0.00
D	1	(untitled)	1	1	B	454 <	1800	36	0.00	82	22	59.28	52.26	101.72	15.62 +
	2		1	1	A	0	1800	12	13.00	0	Unrestricted	0.00	0.00	0.00	0.00
Dx	1	(untitled)				304	Unrestricted	120	53.00	0	Unrestricted	24.88	0.00	0.00	0.00
9	1		1			63	1800	120	0.00	4	2757	8.61	0.04	0.00	0.00
	2		1			63	1800	120	0.00	4	2757	8.61	0.04	0.00	0.00
10	1		1			549	1800	120	0.00	31	228	6.03	0.44	0.00	0.07
11	1		1			259	1800	120	19.00	14	595	6.90	0.17	0.00	0.01
12	1		1			454	1800	120	44.00	25	296	8.23	0.34	0.00	0.04
13	1					320	Unrestricted	120	51.00	0	Unrestricted	14.70	0.00	0.00	0.00

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	485.14	41.89	11.58	16.56	9.16	365.19	18.99	0.00	384.18
Bus									
Tram									
Pedestrians	20.40	34.92	0.58	30.92	0.00	439.06	0.00	0.00	439.06
TOTAL	505.54	76.81	6.58	47.48	9.16	804.24	18.99	0.00	823.24

- *< = 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***

TRANSYT 16

Filename: Junction 2 - 2028 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 2\Upgraded Layout
Report generation date: 28/04/2022 03:22:15

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 2 - 2028 "with development"			
Network	1435.67	98.24	82% (TS B/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

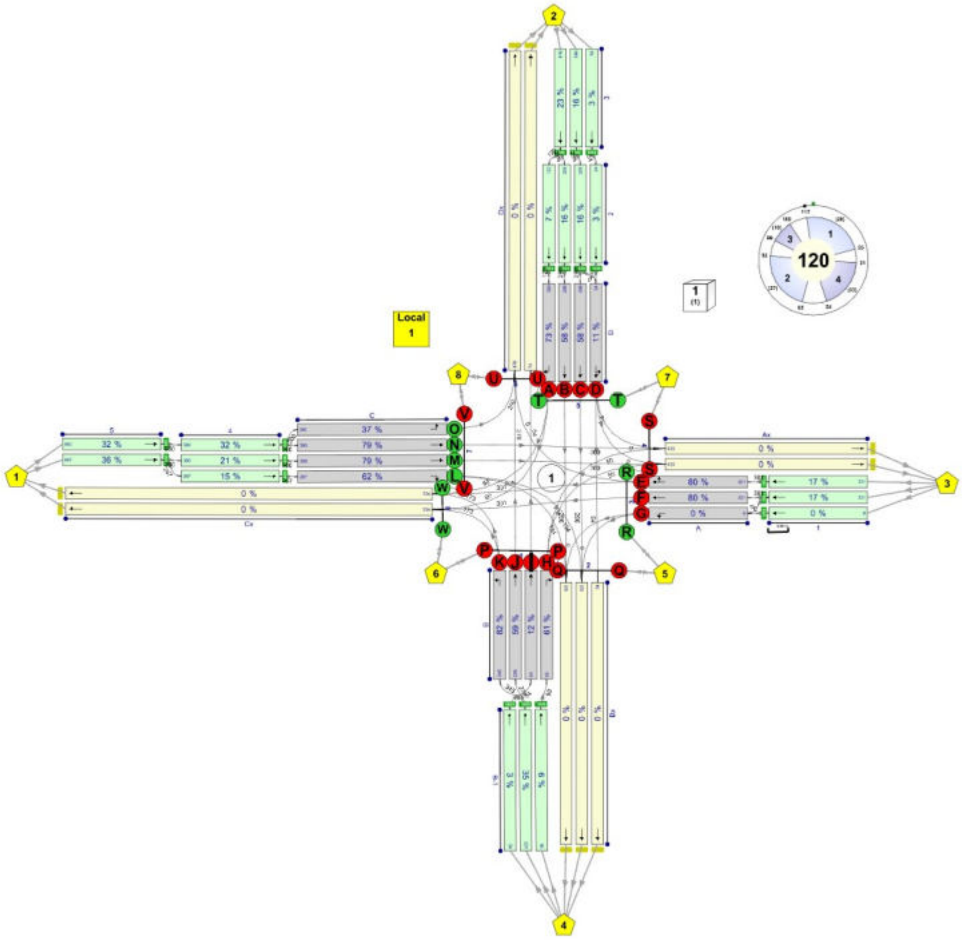
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 2
D1 - 2028 "with development", AM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Traffic Stream Flows	Arm 1 - Traffic Stream 4 (Bus) - Flows (08:00-09:00)	Traffic Stream 1/4 has no paths passing through it, so will not be assigned any flows.

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi worst unsignal PRC
1	28/04/2022 03:21:57	28/04/2022 03:22:06	9.74	08:00	120	1435.67	98.24	82.38	B/1	0	0	B/1	5/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 2			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development"	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
1	(untitled)		1
B-1	(untitled)		1
2	(untitled)		1
3	(untitled)		1
4	(untitled)		1
5	(untitled)		1

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
A	1	(untitled)		✓	30.67	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	93.88						Normal	
	2	(untitled)		✓	93.94						Normal	
B	1	(untitled)		✓	37.78	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	35.22	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	36.96	✓	Sum of lanes	1800	✓		Bus	
	4	(untitled)		✓	34.84	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	115.03						Bus	
	2	(untitled)		✓	107.54						Normal	
	3	(untitled)		✓	107.49						Normal	
C	1	(untitled)		✓	43.30	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	41.51	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	41.53	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	41.55	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	134.35						Normal	
	2	(untitled)		✓	134.34						Normal	
D	1	(untitled)		✓	30.45	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	121.45						Normal	
	2	(untitled)		✓	129.15						Bus	
1	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Bus	
B-1	2			✓	35.10	✓	Sum of lanes	1800			Bus	
	3			✓	35.10	✓	Sum of lanes	1800			Normal	
	4			✓	35.10	✓	Sum of lanes	1800			Normal	
2	2			✓	29.00	✓	Sum of lanes	1800			Normal	
	3			✓	29.00	✓	Sum of lanes	1800			Normal	
	4			✓	30.01	✓	Sum of lanes	1800			Normal	
	5			✓	29.00	✓	Sum of lanes	1800			Bus	
3	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	6			✓	24.40	✓	Sum of lanes	1800			Bus	
4	2			✓	29.47	✓	Sum of lanes	1800			Normal	
	3			✓	31.40	✓	Sum of lanes	1800			Normal	
	5			✓	29.47	✓	Sum of lanes	1800			Normal	
5	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	2	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
Ax	1	2	(untitled)			
	2	1	(untitled)			
B	1	2	(untitled)			1800
	2	4	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
Bx	1	3	(untitled)			
	2	1	(untitled)			
	3	2	(untitled)			
C	1	4	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
	4	2	(untitled)			1800
Cx	1	1	(untitled)			
	2	2	(untitled)			
D	1	5	(untitled)			1800
	2	2	(untitled)			1800
	3	4	(untitled)			1800
	4	3	(untitled)			1800
Dx	1	1	(untitled)			
	2	2	(untitled)			
1	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
B-1	2	2	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
2	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
	5	1	(untitled)			1800
3	2	1	(untitled)			1800
	3	1	(untitled)			1800
	6	1	(untitled)			1800
4	2	1	(untitled)			1800
	3	1	(untitled)			1800
	5	1	(untitled)			1800
5	2	1	(untitled)			1800
	4	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
(ALL)	(ALL)	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

Bus - Modelling

Arm	Traffic Stream	Stationary time (seconds)	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	0.00	100	100

Bus - Advanced

Arm	Traffic Stream	Dispersion type	Use network default acceleration
(ALL)	(ALL)	NetworkDefault	✓

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)	Bus Flow (PCU/hr)
A	1	0	0	0
	2	301	301	
	3	301	301	
Ax	1	430	430	
	2	430	430	
B	1	345	345	
	2	276	276	
	3	54		54
	4	99	99	
Bx	1	54		54
	2	429	429	
	3	429	429	
C	1	200	200	
	2	380	380	
	3	380	380	
	4	267	267	
Cx	1	534	534	
	2	534	534	
D	1	54	0	54
	2	296	296	
	3	296	296	
	4	120	120	
Dx	1	476	476	
	2	54		54
1	2	301	301	
	3	301	301	
	4	0		0
B-1	2	54		54
	3	621	621	
	4	99	99	
2	2	296	296	
	3	296	296	
	4	120	120	
	5	54		54
3	2	296	296	
	3	416	416	
	6	54		54
4	2	380	380	
	3	267	267	
	5	580	580	
5	2	647	647	
	4	580	580	

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
A	1	1	G	
	2	1	F	
	3	1	E	
B	1	1	K	
	2	1	J	
	3	1	I	
	4	1	H	
C	1	1	O	
	2	1	N	
	3	1	M	
	4	1	L	
D	1	1	D	
	2	1	C	
	3	1	B	
	4	1	A	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Bus Free Running Speed (kph)
1	2	2.93	30.00	
	3	2.93	30.00	
	4			15.00
B-1	2			15.00
	3	4.21	30.00	
	4	4.21	30.00	
3	2	2.93	30.00	
	3	2.93	30.00	
	6			15.00
5	2	2.93	30.00	
	4	2.93	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)	Bus Free Running Speed (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
A	1	1	1/4	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
	2	1	1/2	A/2	3.58	30.00		✓	Straight	Straight Movement
	3	1	1/3	A/3	3.58	30.00		✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	11.27	30.00		✓	Nearside	16.65
	2	1	D/1	Ax/2	11.27	30.00		✓	Nearside	17.23
B	1	1	B-1/3	B/1	4.53	30.00		✓	Straight	Straight Movement
	2	1	B-1/3	B/2	4.23	30.00		✓	Straight	Straight Movement
	3	1	B-1/2	B/3			15.00	✓	Straight	Straight Movement
	4	1	B-1/4	B/4	4.18	30.00		✓	Straight	Straight Movement
Bx	1	1	D/1	Bx/1			15.00	✓	Straight	Straight Movement
	2	1	C/4	Bx/2	12.91	30.00		✓	Offside	26.45
	3	1	C/4	Bx/3	12.90	30.00		✓	Offside	26.45
	1	1	4/5	C/1	5.20	30.00		✓	Straight	Straight Movement

C	2	1	4/5	C/2	4.98	30.00		✓	Straight	Straight Movement
	3	1	4/2	C/3	4.98	30.00		✓	Straight	Straight Movement
	4	1	4/3	C/4	4.99	30.00		✓	Straight	Straight Movement
Cx	1	1	A/2	Cx/1	16.12	30.00		✓	Straight	Straight Movement
	2	1	A/3	Cx/2	16.12	30.00		✓	Straight	Straight Movement
D	1	1	2/5	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
	2	1	2/2	D/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	2/3	D/3	3.54	30.00		✓	Straight	Straight Movement
	4	1	2/4	D/4	3.54	30.00		✓	Straight	Straight Movement
Dx	1	1	B/2	Dx/1	14.57	30.00		✓	Straight	Straight Movement
	2	1	B/3	Dx/2			15.00	✓	Straight	Straight Movement
2	2	1	3/2	2/2	3.48	30.00		✓	Straight	Straight Movement
	3	1	3/3	2/3	3.48	30.00		✓	Straight	Straight Movement
	4	1	3/3	2/4	3.60	30.00		✓	Straight	Straight Movement
	5	1	3/6	2/5			15.00	✓	Straight	Straight Movement
4	2	1	5/2	4/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	5/2	4/3	3.77	30.00		✓	Straight	Straight Movement
	5	1	5/4	4/5	3.54	30.00		✓	Straight	Straight Movement
A	1	2	1/2	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
Ax	1	2	C/2	Ax/1	11.27	30.00		✓	Straight	Straight Movement
	2	2	C/3	Ax/2	11.27	30.00		✓	Straight	Straight Movement
Bx	2	2	D/2	Bx/2	12.91	30.00		✓	Straight	Straight Movement
	3	2	D/3	Bx/3	12.90	30.00		✓	Straight	Straight Movement
Cx	1	2	B/1	Cx/1	16.12	30.00		✓	Nearside	15.08
	2	2	B/1	Cx/2	16.12	30.00		✓	Nearside	16.75
D	1	2	2/2	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	14.57	30.00		✓	Nearside	14.66
Ax	1	3	B/4	Ax/1	11.27	30.00		✓	Offside	29.45
	2	3	B/4	Ax/2	11.27	30.00		✓	Offside	26.33
Bx	2	3	A/1	Bx/2	12.91	30.00		✓	Nearside	16.74
	3	3	A/1	Bx/3	12.90	30.00		✓	Nearside	17.18
Cx	1	3	D/4	Cx/1	16.12	30.00		✓	Offside	28.88
	2	3	D/4	Cx/2	16.12	30.00		✓	Offside	27.91
Dx	1	3	A/3	Dx/1	14.57	30.00		✓	Offside	27.77

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40
5	(untitled)				Farside	3.00	2.00	5.40
6	(untitled)				Farside	3.00	2.00	5.40
7	(untitled)				Farside	3.00	2.00	5.40
8	(untitled)				Farside	3.00	2.00	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	P	
2	1	Q	
3	1	R	
4	1	S	
5	1	T	
6	1	U	
7	1	V	
8	1	W	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Pedestrian Crossing Connectors

Pedestrian Crossing Connectors

Pedestrian crossing connector	Pedestrian crossing1	Pedestrian crossing2	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	2:1	1:1	3.00	2.00	5.40
2	4:1	3:1	3.00	2.00	5.40
3	6:1	5:2	3.00	2.00	5.40
4	8:1	7:2	3.00	2.00	5.40

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	200	760	267	0	0	0	0
	2	120	0	0	591	0	0	0	0
	3	602	0	0	0	0	0	0	0
	4	345	276	99	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	54	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	54	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	5/4, 5/2	Cx/1, Cx/2	#0000FF
	2	(untitled)	3/6, 3/2, 3/3	Dx/2, Dx/1	#FF0000
	3	(untitled)	1/4, 1/2, 1/3	Ax/1, Ax/2	#00FF00
	4	(untitled)	B-1/4, B-1/3, B-1/2	Bx/3, Bx/2, Bx/1	#FFFF00
	5	(untitled)	2:2E, 3:2E	2:2X, 3:2X	#FF00FF
	6	(untitled)	1:2E, 8:2E	1:2X, 8:2X	#008000
	7	(untitled)	4:2E, 5:1E	4:2X, 5:1X	#FFA500
	8	(untitled)	6:2E, 7:1E	6:2X, 7:1X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	4		1	4	5/2, 4/3, C/4, Bx/3	Normal	134
	6		1	4	5/2, 4/3, C/4, Bx/2	Normal	134
	8		1	2	5/4, 4/5, C/1, Dx/1	Normal	200
	10		2	4	3/3, 2/3, D/3, Bx/3	Normal	296
	11		2	4	3/2, 2/2, D/2, Bx/2	Normal	296
	14		3	2	1/3, A/3, Dx/1	Normal	0
	26		2	3	3/2, 2/2, D/1, Ax/1	Normal	0
	27		2	3	3/2, 2/2, D/1, Ax/2	Normal	0
	28		1	3	5/4, 4/5, C/2, Ax/1	Normal	380
	29		1	3	5/2, 4/2, C/3, Ax/2	Normal	380
	30		4	3	B-1/4, B/4, Ax/2	Normal	50
	31		4	3	B-1/4, B/4, Ax/1	Normal	50
	33		3	1	1/3, A/3, Cx/2	Normal	301
	34		3	1	1/2, A/2, Cx/1	Normal	301
	35		4	1	B-1/3, B/1, Cx/1	Normal	173
	36		4	1	B-1/3, B/1, Cx/2	Normal	173
	37		2	1	3/3, 2/4, D/4, Cx/2	Normal	60
	38		2	1	3/3, 2/4, D/4, Cx/1	Normal	60
	40		3	4	1/2, A/1, Bx/2	Normal	0
	41		3	4	1/2, A/1, Bx/3	Normal	0
	42		4	2	B-1/3, B/2, Dx/1	Normal	276

Bus Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Bus Calculated Flow (PCU/hr)
1	12		2	4	3/6, 2/5, D/1, Bx/1	Normal	54
	39		4	2	B-1/2, B/3, Dx/2	Normal	54

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	18		5	6	2:2E, 2:1X, 1:1E, 1:2X	Normal	300
	19		6	5	1:2E, 1:1X, 2:1E, 2:2X	Normal	300
	20		5	7	3:2E, 3:1X, 4:1E, 4:2X	Normal	300
	21		7	5	4:2E, 4:1X, 3:1E, 3:2X	Normal	300
	22		8	7	6:2E, 6:1X, 5:2E, 5:1X	Normal	300
	23		7	8	5:1E, 5:2X, 6:1E, 6:2X	Normal	300
	24		8	6	7:1E, 7:2X, 8:1E, 8:2X	Normal	300
	25		6	8	8:2E, 8:1X, 7:2E, 7:1X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		5	NetworkDefault	120	59

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
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)	7	300	0	0	Unknown	
	I	(untitled)	7	300	0	0	Unknown	
	J	(untitled)	7	300	0	0	Unknown	
	K	(untitled)	7	300	0	0	Unknown	
	L	(untitled)	7	300	0	0	Unknown	
	M	(untitled)	7	300	0	0	Unknown	
	N	(untitled)	7	300	0	0	Unknown	
	O	(untitled)	7	300	0	0	Unknown	
	P	(untitled)	7	300	0	0	Pedestrian	0
	Q	(untitled)	7	300	0	0	Pedestrian	0
	R	(untitled)	7	300	0	0	Pedestrian	0
	S	(untitled)	7	300	0	0	Pedestrian	0
	T	(untitled)	7	300	0	0	Pedestrian	0
	U	(untitled)	7	300	0	0	Pedestrian	0
	V	(untitled)	7	300	0	0	Pedestrian	0
	W	(untitled)	7	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	O, N, M, L, W, T, R	1	1	100
	2	I, J, K, B, C, D, V, R	1	1	100
	3	A, H, Q, U, R, V	1	1	100
	4	E, F, G, P, V, T, S	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4	16, 44, 66, 89	66	
	2	(untitled)	Single	1, 2, 4, 3	15, 42, 68, 92	68	
	3	(untitled)	Single	1, 3, 2, 4	15, 40, 64, 89	70	
	4	(untitled)	Single	1, 3, 4, 2	15, 40, 63, 89	68	
	5	(untitled)	Single	1, 4, 2, 3	25, 54, 92, 109	59	
	6	(untitled)	Single	1, 4, 3, 2	16, 38, 63, 89	63	

Intergreen Matrix for Controller Stream 1

		To																						
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**
From	**A**					5	5			5	6	10	8	5	5						6			0
	B					6	7		7				5	5	5			0			6			
	C					6	7		5				5	5	5			0			6			
	D					7	8	11	5					5	5			0		11	6			
	E	8	5	5	5				5	7	8	11	7	5	6	11			6			0		0
	F	6	5	5	5				6	8	8	11	5						6					0
	G				5													9	6					
	H		5	5	10	8	5						5	5	5		6			0				
	I	7				5	5						5	6	7		6					0		
	J	5				5	5						6	7	8	11	6					0		
	K	5				5	5										6							10
	L	5	5	5		5	5		9	5	5							0					5	
	M	5	7	7	11	5			6	5	5									0			5	
	N	6	7	8	12	5			6	5	5									0			6	
	O					5					5											10	6	
	P								4	4	4	4												
	Q		5	5	5			5					5											
	R					5	5	5																
	S				4				4					4	4									
	T	1	1	1	1																			
	U					1				1	1					1								
	V												1	1	1	1								
	W	1				1	1					1												

Banned Stage transitions for Controller Stream 1

		To			
		1	**2**	**3**	**4**
From	**1**				
	2				
	3				
	4				

Interstage Matrix for Controller Stream 1

		To			
		1	**2**	**3**	**4**
From	**1**	0	12	10	6
	2	11	0	7	11
	3	8	10	0	8
	4	11	11	9	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	**1**	✓	1	O,N,M,L,W,T,R	117	25	28	1	7
	2	✓	4	E,F,G,P,V,T,S	31	54	23	1	6
	3	✓	2	I,J,K,B,C,D,V,R	65	92	27	1	7
	4	✓	3	A,H,Q,U,R,V	99	109	10	1	7

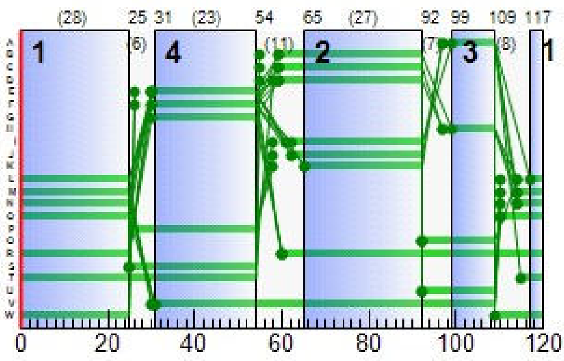
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	99	109	10
	B	1	✓	59	92	33
	C	1	✓	59	92	33
	D	1	✓	59	92	33
	E	1	✓	30	54	24
	F	1	✓	30	54	24
	G	1	✓	30	54	24
	H	1	✓	99	109	10
	I	1	✓	62	92	30
	J	1	✓	62	92	30
	K	1	✓	65	92	27
	L	1	✓	117	25	28
	M	1	✓	114	25	31
	N	1	✓	114	25	31
	O	1	✓	110	25	35
	P	1	✓	25	54	29
	Q	1	✓	92	109	17
	R	1	✓	60	25	85
	S	1	✓	25	54	29
	T	1	✓	115	54	59
	U	1	✓	92	109	17
	V	1	✓	31	109	78
	W	1	✓	109	25	36

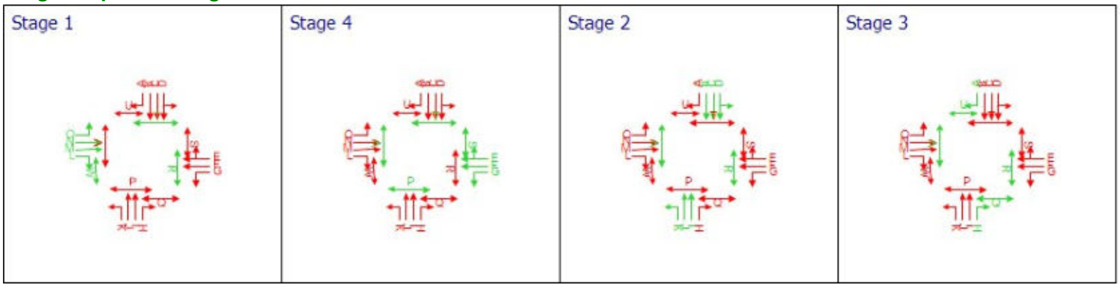
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	G	30	54	24
A	2	1	1	F	30	54	24
A	3	1	1	E	30	54	24
B	1	1	1	K	65	92	27
B	2	1	1	J	62	92	30
B	3	1	1	I	62	92	30
B	4	1	1	H	99	109	10
C	1	1	1	O	110	25	35
C	2	1	1	N	114	25	31
C	3	1	1	M	114	25	31
C	4	1	1	L	117	25	28
D	1	1	1	D	59	92	33
D	2	1	1	C	59	92	33
D	3	1	1	B	59	92	33
D	4	1	1	A	99	109	10

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

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1 NB	(untitled)	1	1	G	0	1800	24	25.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	F	301 <	1800	24	0.00	80	12	67.10	63.52	108.04	11.07 +
	3	(untitled)	1	1	E	301 <	1800	24	0.00	80	12	67.10	63.52	108.04	11.07 +
Ax	1	(untitled)				430	Unrestricted	120	66.00	0	Unrestricted	11.27	0.00	0.00	0.00
	2	(untitled)				430	Unrestricted	120	66.00	0	Unrestricted	11.27	0.00	0.00	0.00
B	1	(untitled)	1	1	K	346 <	1800	27	0.00	82	9	66.91	62.37	108.07	12.66 +
	2	(untitled)	1	1	J	276 <	1800	30	0.00	59	52	48.80	44.58	90.56	8.48 +
	3 B	(untitled)	1	1	I	54	1800	30	28.00	12	675	43.43	34.56	75.82	1.37
	4	(untitled)	1	1	H	100	1800	10	0.00	61	49	72.87	68.69	107.93	3.65
Bx	1 B	(untitled)				54	Unrestricted	120	96.00	0	Unrestricted	27.61	0.00	0.00	0.00
	2	(untitled)				430	Unrestricted	120	47.00	0	Unrestricted	12.91	0.00	0.00	0.00
	3	(untitled)				430	Unrestricted	120	47.00	0	Unrestricted	12.90	0.00	0.00	0.00
C	1	(untitled)	1	1	O	200	1800	35	0.00	37	143	40.23	35.04	78.87	5.33
	2	(untitled)	1	1	N	380 <	1800	31	0.00	79	14	59.53	54.55	102.29	13.16 +
	3	(untitled)	1	1	M	380 <	1800	31	0.00	79	14	59.53	54.55	102.29	13.16 +
	4	(untitled)	1	1	L	268 <	1800	28	0.00	62	46	52.08	47.10	92.68	8.38 +
Cx	1	(untitled)				534	Unrestricted	120	31.00	0	Unrestricted	16.12	0.00	0.00	0.00
	2	(untitled)				534	Unrestricted	120	31.00	0	Unrestricted	16.12	0.00	0.00	0.00
D	1 NB	(untitled)	1	1	D	54	1800	33	31.00	11	750	39.53	32.22	73.24	1.33
	2	(untitled)	1	1	C	296 <	1800	33	0.00	58	55	45.26	41.72	87.93	8.78 +
	3	(untitled)	1	1	B	296 <	1800	33	0.00	58	55	45.26	41.72	87.93	8.78 +
	4	(untitled)	1	1	A	120	1800	10	0.00	73	24	83.72	80.18	117.06	4.77
Dx	1	(untitled)				476	Unrestricted	120	41.00	0	Unrestricted	14.57	0.00	0.00	0.00
	2 B	(untitled)				54	Unrestricted	120	93.00	0	Unrestricted	31.00	0.00	0.00	0.00
1	2		1			301	1800	120	71.00	17	438	3.13	0.20	0.00	0.02
	3		1			301	1800	120	71.00	17	438	3.13	0.20	0.00	0.02
	4 B		1			0	1800	120	120.00	0	Unrestricted	0.00	0.00	0.00	0.00
B-1	2 B		1			54	1800	120	120.00	3	2900	8.45	0.03	0.00	0.00
	3		1			622	1800	120	64.00	35	160	4.74	0.53	0.00	0.09
	4		1			100	1800	120	0.00	6	1520	4.27	0.06	0.00	0.00
2	2		1			296	1800	120	45.00	16	447	3.68	0.20	0.00	0.02
	3		1			296	1800	120	45.00	16	447	3.68	0.20	0.00	0.02
	4		1			120	1800	120	0.00	7	1250	3.67	0.07	0.00	0.00
	5 B		1			54	1800	120	120.00	3	2900	6.99	0.03	0.00	0.00
3	2		1			296	1800	120	0.00	16	447	3.12	0.20	0.00	0.02
	3		1			416	1800	120	0.00	23	289	3.23	0.30	0.00	0.03
	6 B		1			54	1800	120	120.00	3	2900	5.89	0.03	0.00	0.00
4	2		1			380	1800	120	57.00	21	326	3.80	0.27	0.00	0.03
	3		1			268	1800	120	16.00	15	504	3.94	0.17	0.00	0.01
	5		1			580	1800	120	57.00	32	179	4.01	0.48	0.00	0.08
5	2		1			648	1800	120	0.00	36	150	3.49	0.56	0.00	0.10
	4		1			580	1800	120	0.00	32	179	3.40	0.48	0.00	0.08

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	635.92	70.15	9.07	37.52	11.43	695.12	40.46	0.00	735.57
Bus	21.60	2.44	8.84	0.99	0.02	14.24	0.25	0.00	14.50
Tram									
Pedestrians	34.80	54.95	0.63	48.28	0.00	685.60	0.00	0.00	685.60
TOTAL	692.32	127.54	5.43	86.79	11.45	1394.96	40.71	0.00	1435.67

- *N = at least one source for this link/traffic stream carries normal traffic*
- *B = at least one source for this link/traffic stream carries Bus traffic*
- *< = 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***

TRANSYT 16

Filename: Junction 2 - 2028 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 2\Upgraded Layout
Report generation date: 28/04/2022 03:27:26

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 2 - 2028 "with development"			
Network	1431.74	97.96	80% (TS B/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

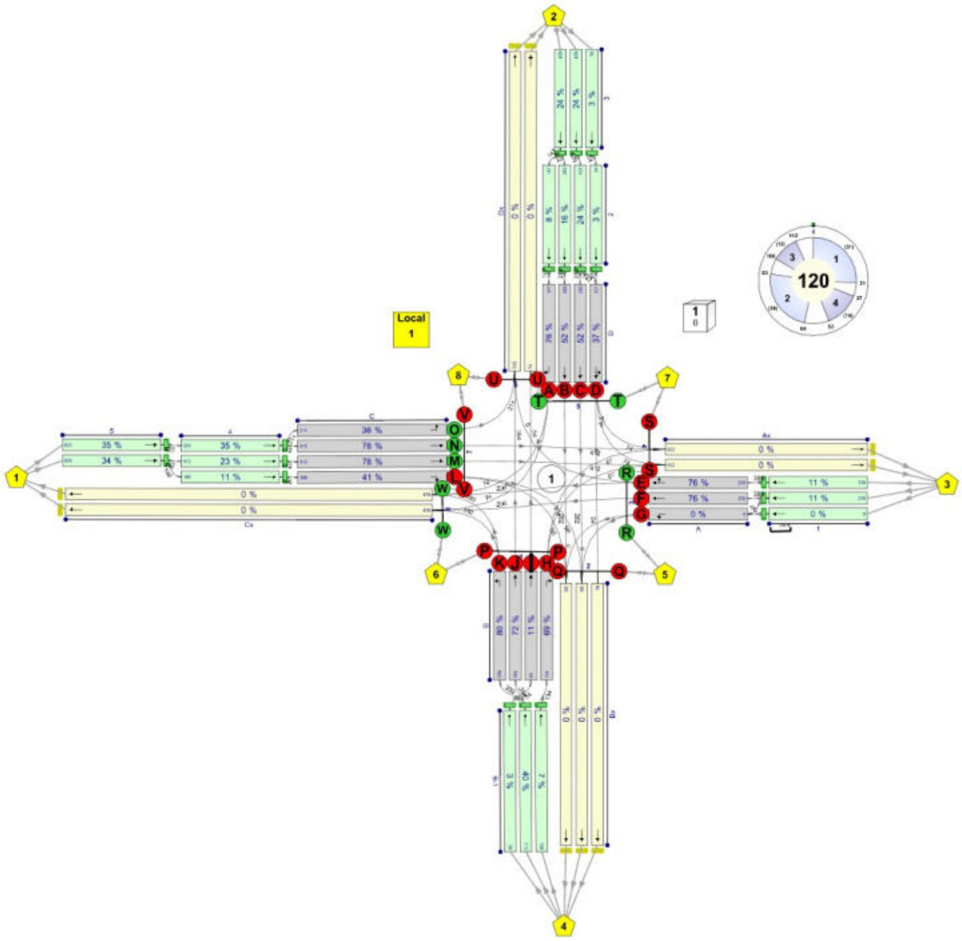
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 2
D1 - 2028 "with development", PM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Traffic Stream Flows	Arm 1 - Traffic Stream 4 (Bus) - Flows (17:00-18:00)	Traffic Stream 1/4 has no paths passing through it, so will not be assigned any flows.

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 03:27:09	28/04/2022 03:27:18	9.28	17:00	120	1431.74	97.96	80.00	B/1	0	0	B/1	B-1/3

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 2			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
1	(untitled)		1
B-1	(untitled)		1
2	(untitled)		1
3	(untitled)		1
4	(untitled)		1
5	(untitled)		1

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
A	1	(untitled)		✓	30.67	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	93.88						Normal	
	2	(untitled)		✓	93.94						Normal	
B	1	(untitled)		✓	37.78	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	35.22	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	36.96	✓	Sum of lanes	1800	✓		Bus	
	4	(untitled)		✓	34.84	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	115.03						Bus	
	2	(untitled)		✓	107.54						Normal	
	3	(untitled)		✓	107.49						Normal	
C	1	(untitled)		✓	43.30	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	41.51	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	41.53	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	41.55	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	134.35						Normal	
	2	(untitled)		✓	134.34						Normal	
D	1	(untitled)		✓	30.45	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	121.45						Normal	
	2	(untitled)		✓	129.15						Bus	
1	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Bus	
B-1	2			✓	35.10	✓	Sum of lanes	1800			Bus	
	3			✓	35.10	✓	Sum of lanes	1800			Normal	
	4			✓	35.10	✓	Sum of lanes	1800			Normal	
2	2			✓	29.00	✓	Sum of lanes	1800			Normal	
	3			✓	29.00	✓	Sum of lanes	1800			Normal	
	4			✓	30.01	✓	Sum of lanes	1800			Normal	
	5			✓	29.00	✓	Sum of lanes	1800			Bus	
3	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	6			✓	24.40	✓	Sum of lanes	1800			Bus	
4	2			✓	29.47	✓	Sum of lanes	1800			Normal	
	3			✓	31.40	✓	Sum of lanes	1800			Normal	
	5			✓	29.47	✓	Sum of lanes	1800			Normal	
5	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	2	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
Ax	1	2	(untitled)			
	2	1	(untitled)			
B	1	2	(untitled)			1800
	2	4	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
Bx	1	3	(untitled)			
	2	1	(untitled)			
	3	2	(untitled)			
C	1	4	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
	4	2	(untitled)			1800
Cx	1	1	(untitled)			
	2	2	(untitled)			
D	1	5	(untitled)			1800
	2	2	(untitled)			1800
	3	4	(untitled)			1800
	4	3	(untitled)			1800
Dx	1	1	(untitled)			
	2	2	(untitled)			
1	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
B-1	2	2	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
2	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
	5	1	(untitled)			1800
3	2	1	(untitled)			1800
	3	1	(untitled)			1800
	6	1	(untitled)			1800
4	2	1	(untitled)			1800
	3	1	(untitled)			1800
	5	1	(untitled)			1800
5	2	1	(untitled)			1800
	4	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
(ALL)	(ALL)	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

Bus - Modelling

Arm	Traffic Stream	Stationary time (seconds)	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	0.00	100	100

Bus - Advanced

Arm	Traffic Stream	Dispersion type	Use network default acceleration
(ALL)	(ALL)	NetworkDefault	✓

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)	Bus Flow (PCU/hr)
A	1	0	0	0
	2	206	206	
	3	206	206	
Ax	1	552	552	
	2	552	552	
B	1	359	359	
	2	354	354	
	3	54		54
	4	134	134	
Bx	1	54		54
	2	380	380	
	3	380	380	
C	1	211	211	
	2	412	412	
	3	412	412	
	4	196	196	
Cx	1	459	459	
	2	459	459	
D	1	201	147	54
	2	282	282	
	3	282	282	
	4	147	147	
Dx	1	565	565	
	2	54		54
1	2	206	206	
	3	206	206	
	4	0		0
B-1	2	54		54
	3	713	713	
	4	134	134	
2	2	429	429	
	3	282	282	
	4	147	147	
	5	54		54
3	2	429	429	
	3	429	429	
	6	54		54
4	2	412	412	
	3	196	196	
	5	623	623	
5	2	608	608	
	4	623	623	

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
A	1	1	G	
	2	1	F	
	3	1	E	
B	1	1	K	
	2	1	J	
	3	1	I	
	4	1	H	
C	1	1	O	
	2	1	N	
	3	1	M	
	4	1	L	
D	1	1	D	
	2	1	C	
	3	1	B	
	4	1	A	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Bus Free Running Speed (kph)
1	2	2.93	30.00	
	3	2.93	30.00	
	4			15.00
B-1	2			15.00
	3	4.21	30.00	
	4	4.21	30.00	
3	2	2.93	30.00	
	3	2.93	30.00	
	6			15.00
5	2	2.93	30.00	
	4	2.93	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)	Bus Free Running Speed (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
A	1	1	1/4	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
	2	1	1/2	A/2	3.58	30.00		✓	Straight	Straight Movement
	3	1	1/3	A/3	3.58	30.00		✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	11.27	30.00		✓	Nearside	16.65
	2	1	D/1	Ax/2	11.27	30.00		✓	Nearside	17.23
B	1	1	B-1/3	B/1	4.53	30.00		✓	Straight	Straight Movement
	2	1	B-1/3	B/2	4.23	30.00		✓	Straight	Straight Movement
	3	1	B-1/2	B/3			15.00	✓	Straight	Straight Movement
	4	1	B-1/4	B/4	4.18	30.00		✓	Straight	Straight Movement
Bx	1	1	D/1	Bx/1			15.00	✓	Straight	Straight Movement
	2	1	C/4	Bx/2	12.91	30.00		✓	Offside	26.45
	3	1	C/4	Bx/3	12.90	30.00		✓	Offside	26.45
	1	1	4/5	C/1	5.20	30.00		✓	Straight	Straight Movement

C	2	1	4/5	C/2	4.98	30.00		✓	Straight	Straight Movement
	3	1	4/2	C/3	4.98	30.00		✓	Straight	Straight Movement
	4	1	4/3	C/4	4.99	30.00		✓	Straight	Straight Movement
Cx	1	1	A/2	Cx/1	16.12	30.00		✓	Straight	Straight Movement
	2	1	A/3	Cx/2	16.12	30.00		✓	Straight	Straight Movement
D	1	1	2/5	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
	2	1	2/2	D/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	2/3	D/3	3.54	30.00		✓	Straight	Straight Movement
	4	1	2/4	D/4	3.54	30.00		✓	Straight	Straight Movement
Dx	1	1	B/2	Dx/1	14.57	30.00		✓	Straight	Straight Movement
	2	1	B/3	Dx/2			15.00	✓	Straight	Straight Movement
2	2	1	3/2	2/2	3.48	30.00		✓	Straight	Straight Movement
	3	1	3/3	2/3	3.48	30.00		✓	Straight	Straight Movement
	4	1	3/3	2/4	3.60	30.00		✓	Straight	Straight Movement
	5	1	3/6	2/5			15.00	✓	Straight	Straight Movement
4	2	1	5/2	4/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	5/2	4/3	3.77	30.00		✓	Straight	Straight Movement
	5	1	5/4	4/5	3.54	30.00		✓	Straight	Straight Movement
A	1	2	1/2	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
Ax	1	2	C/2	Ax/1	11.27	30.00		✓	Straight	Straight Movement
	2	2	C/3	Ax/2	11.27	30.00		✓	Straight	Straight Movement
Bx	2	2	D/2	Bx/2	12.91	30.00		✓	Straight	Straight Movement
	3	2	D/3	Bx/3	12.90	30.00		✓	Straight	Straight Movement
Cx	1	2	B/1	Cx/1	16.12	30.00		✓	Nearside	15.08
	2	2	B/1	Cx/2	16.12	30.00		✓	Nearside	16.75
D	1	2	2/2	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	14.57	30.00		✓	Nearside	14.66
Ax	1	3	B/4	Ax/1	11.27	30.00		✓	Offside	29.45
	2	3	B/4	Ax/2	11.27	30.00		✓	Offside	26.33
Bx	2	3	A/1	Bx/2	12.91	30.00		✓	Nearside	16.74
	3	3	A/1	Bx/3	12.90	30.00		✓	Nearside	17.18
Cx	1	3	D/4	Cx/1	16.12	30.00		✓	Offside	28.88
	2	3	D/4	Cx/2	16.12	30.00		✓	Offside	27.91
Dx	1	3	A/3	Dx/1	14.57	30.00		✓	Offside	27.77

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40
5	(untitled)				Farside	3.00	2.00	5.40
6	(untitled)				Farside	3.00	2.00	5.40
7	(untitled)				Farside	3.00	2.00	5.40
8	(untitled)				Farside	3.00	2.00	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	P	
2	1	Q	
3	1	R	
4	1	S	
5	1	T	
6	1	U	
7	1	V	
8	1	W	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Pedestrian Crossing Connectors

Pedestrian Crossing Connectors

Pedestrian crossing connector	Pedestrian crossing1	Pedestrian crossing2	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	2:1	1:1	3.00	2.00	5.40
2	4:1	3:1	3.00	2.00	5.40
3	6:1	5:2	3.00	2.00	5.40
4	8:1	7:2	3.00	2.00	5.40

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	211	823	196	0	0	0	0
	2	147	0	147	563	0	0	0	0
	3	412	0	0	0	0	0	0	0
	4	359	354	134	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	54	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	54	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	5/4, 5/2	Cx/1, Cx/2	#0000FF
	2	(untitled)	3/6, 3/2, 3/3	Dx/2, Dx/1	#FF0000
	3	(untitled)	1/4, 1/2, 1/3	Ax/1, Ax/2	#00FF00
	4	(untitled)	B-1/4, B-1/3, B-1/2	Bx/3, Bx/2, Bx/1	#FFFF00
	5	(untitled)	2:2E, 3:2E	2:2X, 3:2X	#FF00FF
	6	(untitled)	1:2E, 8:2E	1:2X, 8:2X	#008000
	7	(untitled)	4:2E, 5:1E	4:2X, 5:1X	#FFA500
	8	(untitled)	6:2E, 7:1E	6:2X, 7:1X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	4		1	4	5/2, 4/3, C/4, Bx/3	Normal	98
	6		1	4	5/2, 4/3, C/4, Bx/2	Normal	98
	8		1	2	5/4, 4/5, C/1, Dx/1	Normal	211
	10		2	4	3/3, 2/3, D/3, Bx/3	Normal	282
	11		2	4	3/2, 2/2, D/2, Bx/2	Normal	282
	14		3	2	1/3, A/3, Dx/1	Normal	0
	26		2	3	3/2, 2/2, D/1, Ax/1	Normal	74
	27		2	3	3/2, 2/2, D/1, Ax/2	Normal	74
	28		1	3	5/4, 4/5, C/2, Ax/1	Normal	412
	29		1	3	5/2, 4/2, C/3, Ax/2	Normal	412
	30		4	3	B-1/4, B/4, Ax/2	Normal	67
	31		4	3	B-1/4, B/4, Ax/1	Normal	67
	33		3	1	1/3, A/3, Cx/2	Normal	206
	34		3	1	1/2, A/2, Cx/1	Normal	206
	35		4	1	B-1/3, B/1, Cx/1	Normal	180
	36		4	1	B-1/3, B/1, Cx/2	Normal	180
	37		2	1	3/3, 2/4, D/4, Cx/2	Normal	74
	38		2	1	3/3, 2/4, D/4, Cx/1	Normal	74
	40		3	4	1/2, A/1, Bx/2	Normal	0
	41		3	4	1/2, A/1, Bx/3	Normal	0
	42		4	2	B-1/3, B/2, Dx/1	Normal	354

Bus Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Bus Calculated Flow (PCU/hr)
1	12		2	4	3/6, 2/5, D/1, Bx/1	Normal	54
	39		4	2	B-1/2, B/3, Dx/2	Normal	54

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	18		5	6	2:2E, 2:1X, 1:1E, 1:2X	Normal	300
	19		6	5	1:2E, 1:1X, 2:1E, 2:2X	Normal	300
	20		5	7	3:2E, 3:1X, 4:1E, 4:2X	Normal	300
	21		7	5	4:2E, 4:1X, 3:1E, 3:2X	Normal	300
	22		8	7	6:2E, 6:1X, 5:2E, 5:1X	Normal	300
	23		7	8	5:1E, 5:2X, 6:1E, 6:2X	Normal	300
	24		8	6	7:1E, 7:2X, 8:1E, 8:2X	Normal	300
	25		6	8	8:2E, 8:1X, 7:2E, 7:1X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		5	NetworkDefault	120	59

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
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)	7	300	0	0	Unknown	
	I	(untitled)	7	300	0	0	Unknown	
	J	(untitled)	7	300	0	0	Unknown	
	K	(untitled)	7	300	0	0	Unknown	
	L	(untitled)	7	300	0	0	Unknown	
	M	(untitled)	7	300	0	0	Unknown	
	N	(untitled)	7	300	0	0	Unknown	
	O	(untitled)	7	300	0	0	Unknown	
	P	(untitled)	7	300	0	0	Pedestrian	0
	Q	(untitled)	7	300	0	0	Pedestrian	0
	R	(untitled)	7	300	0	0	Pedestrian	0
	S	(untitled)	7	300	0	0	Pedestrian	0
	T	(untitled)	7	300	0	0	Pedestrian	0
	U	(untitled)	7	300	0	0	Pedestrian	0
	V	(untitled)	7	300	0	0	Pedestrian	0
	W	(untitled)	7	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	O, N, M, L, W, T, R	1	1	100
	2	I, J, K, B, C, D, V, R	1	1	100
	3	A, H, Q, U, R, V	1	1	100
	4	E, F, G, P, V, T, S	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4	16, 44, 66, 89	66	
	2	(untitled)	Single	1, 2, 4, 3	15, 42, 68, 92	68	
	3	(untitled)	Single	1, 3, 2, 4	15, 40, 64, 89	70	
	4	(untitled)	Single	1, 3, 4, 2	15, 40, 63, 89	68	
	5	(untitled)	Single	1, 4, 2, 3	31, 53, 93, 112	59	
	6	(untitled)	Single	1, 4, 3, 2	16, 38, 63, 89	63	

Intergreen Matrix for Controller Stream 1

		To																						
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
From	A					5	5			5	6	10	8	5	5						6			0
	B					6	7		7				5	5	5			0			6			
	C					6	7		5				5	5	5			0			6			
	D					7	8	11	5					5	5			0		11	6			
	E	8	5	5	5				5	7	8	11	7	5	6	11			6			0		0
	F	6	5	5	5				6	8	8	11	5						6					0
	G				5													9	6					
	H		5	5	10	8	5						5	5	5		6			0				
	I	7				5	5						5	6	7		6					0		
	J	5				5	5						6	7	8	11	6					0		
	K	5				5	5										6							10
	L	5	5	5		5	5		9	5	5							0					5	
	M	5	7	7	11	5			6	5	5									0			5	
	N	6	7	8	12	5			6	5	5									0			6	
	O					5					5											10	6	
	P								4	4	4	4												
	Q		5	5	5			5					5											
	R					5	5	5																
	S				4				4					4	4									
	T	1	1	1	1																			
	U					1				1	1					1								
	V												1	1	1	1								
	W	1				1	1					1												

Banned Stage transitions for Controller Stream 1

		To			
		1	2	3	4
From	1				
	2				
	3				
	4				

Interstage Matrix for Controller Stream 1

		To			
		1	2	3	4
From	1	0	12	10	6
	2	11	0	7	11
	3	8	10	0	8
	4	11	11	9	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	O,N,M,L,W,T,R	0	31	31	1	7
	2	✓	4	E,F,G,P,V,T,S	37	53	16	1	6
	3	✓	2	I,J,K,B,C,D,V,R	64	93	29	1	7
	4	✓	3	A,H,Q,U,R,V	100	112	12	1	7

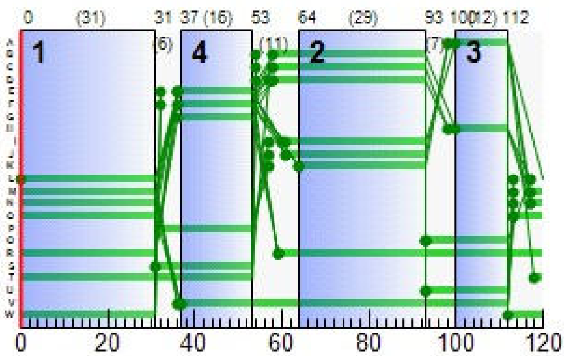
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	100	112	12
	B	1	✓	58	93	35
	C	1	✓	58	93	35
	D	1	✓	58	93	35
	E	1	✓	36	53	17
	F	1	✓	36	53	17
	G	1	✓	36	53	17
	H	1	✓	100	112	12
	I	1	✓	61	93	32
	J	1	✓	61	93	32
	K	1	✓	64	93	29
	L	1	✓	0	31	31
	M	1	✓	117	31	34
	N	1	✓	117	31	34
	O	1	✓	113	31	38
	P	1	✓	31	53	22
	Q	1	✓	93	112	19
	R	1	✓	59	31	92
	S	1	✓	31	53	22
	T	1	✓	118	53	55
	U	1	✓	93	112	19
	V	1	✓	37	112	75
	W	1	✓	112	31	39

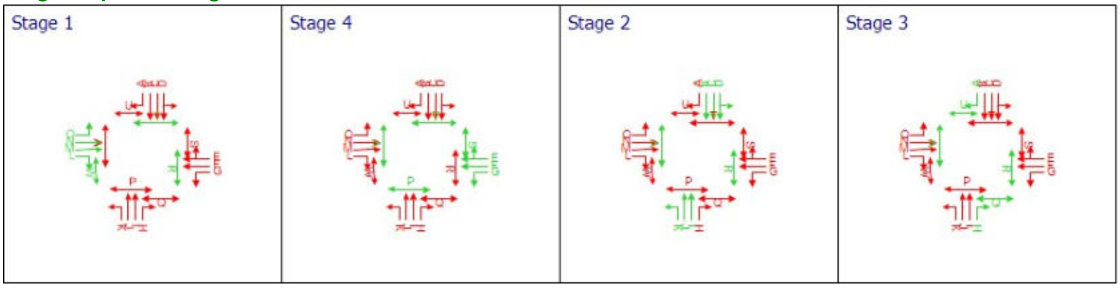
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	G	36	53	17
A	2	1	1	F	36	53	17
A	3	1	1	E	36	53	17
B	1	1	1	K	64	93	29
B	2	1	1	J	61	93	32
B	3	1	1	I	61	93	32
B	4	1	1	H	100	112	12
C	1	1	1	O	113	31	38
C	2	1	1	N	117	31	34
C	3	1	1	M	117	31	34
C	4	1	1	L	0	31	31
D	1	1	1	D	58	93	35
D	2	1	1	C	58	93	35
D	3	1	1	B	58	93	35
D	4	1	1	A	100	112	12

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1 NB	(untitled)	1	1	G	0	1800	17	18.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	F	206 <	1800	17	0.00	76	18	72.78	69.20	110.71	7.74 +
	3	(untitled)	1	1	E	206 <	1800	17	0.00	76	18	72.78	69.20	110.71	7.74 +
Ax	1	(untitled)				553	Unrestricted	120	25.00	0	Unrestricted	11.27	0.00	0.00	0.00
	2	(untitled)				553	Unrestricted	120	25.00	0	Unrestricted	11.27	0.00	0.00	0.00
B	1	(untitled)	1	1	K	360 <	1800	29	0.00	80	13	61.94	57.41	104.36	12.72 +
	2	(untitled)	1	1	J	354 <	1800	32	0.00	72	26	52.42	48.19	95.92	11.50 +
	3 B	(untitled)	1	1	I	54	1800	32	30.00	11	725	41.86	32.99	74.10	1.34
	4	(untitled)	1	1	H	134	1800	12	0.00	69	31	75.12	70.94	110.36	5.00
Bx	1 B	(untitled)				54	Unrestricted	120	91.00	0	Unrestricted	27.61	0.00	0.00	0.00
	2	(untitled)				380	Unrestricted	120	44.00	0	Unrestricted	12.91	0.00	0.00	0.00
	3	(untitled)				380	Unrestricted	120	44.00	0	Unrestricted	12.90	0.00	0.00	0.00
C	1	(untitled)	1	1	O	211	1800	38	0.00	36	150	37.90	32.71	76.24	5.44
	2	(untitled)	1	1	N	412 <	1800	34	0.00	78	15	56.06	51.08	99.88	13.97 +
	3	(untitled)	1	1	M	412 <	1800	34	0.00	78	15	56.07	51.08	99.88	13.97 +
	4	(untitled)	1	1	L	196	1800	31	0.00	41	120	43.78	38.79	82.79	5.48
Cx	1	(untitled)				460	Unrestricted	120	34.00	0	Unrestricted	16.12	0.00	0.00	0.00
	2	(untitled)				460	Unrestricted	120	34.00	0	Unrestricted	16.12	0.00	0.00	0.00
D	1 NB	(untitled)	1	1	D	202 <	1800	35	0.00	37	141	39.74	35.11	79.09	5.39 +
	2	(untitled)	1	1	C	282 <	1800	35	0.00	52	72	42.03	38.49	84.37	8.04 +
	3	(untitled)	1	1	B	282 <	1800	35	0.00	52	72	42.03	38.49	84.37	8.04 +
	4	(untitled)	1	1	A	148 <	1800	12	0.00	76	19	82.46	78.92	116.89	5.88 +
Dx	1	(untitled)				565	Unrestricted	120	34.00	0	Unrestricted	14.57	0.00	0.00	0.00
	2 B	(untitled)				54	Unrestricted	120	93.00	0	Unrestricted	31.00	0.00	0.00	0.00
1	2		1			206	1800	120	45.00	11	686	3.06	0.13	0.00	0.01
	3		1			206	1800	120	45.00	11	686	3.06	0.13	0.00	0.01
	4 B		1			0	1800	120	120.00	0	Unrestricted	0.00	0.00	0.00	0.00
B-1	2 B		1			54	1800	120	120.00	3	2900	8.45	0.03	0.00	0.00
	3		1			714	1800	120	62.00	40	127	4.87	0.66	0.00	0.13
	4		1			134	1800	120	0.00	7	1109	4.29	0.08	0.00	0.00
2	2		1			430	1800	120	38.00	24	277	3.79	0.31	0.00	0.04
	3		1			282	1800	120	38.00	16	474	3.67	0.19	0.00	0.01
	4		1			148	1800	120	19.00	8	995	3.69	0.09	0.00	0.00
	5 B		1			54	1800	120	120.00	3	2900	6.99	0.03	0.00	0.00
3	2		1			430	1800	120	0.00	24	277	3.24	0.31	0.00	0.04
	3		1			430	1800	120	0.00	24	277	3.24	0.31	0.00	0.04
	6 B		1			54	1800	120	120.00	3	2900	5.89	0.03	0.00	0.00
4	2		1			412	1800	120	59.00	23	293	3.83	0.30	0.00	0.03
	3		1			196	1800	120	0.00	11	727	3.89	0.12	0.00	0.01
	5		1			623	1800	120	59.00	35	160	4.07	0.53	0.00	0.09
5	2		1			608	1800	120	0.00	34	166	3.44	0.51	0.00	0.09
	4		1			623	1800	120	0.00	35	160	3.46	0.53	0.00	0.09

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	650.38	69.75	9.32	37.29	10.78	682.56	40.51	0.00	723.07
Bus	21.60	2.46	8.77	0.98	0.04	14.52	0.26	0.00	14.78
Tram									
Pedestrians	34.80	55.53	0.63	48.87	0.00	693.89	0.00	0.00	693.89
TOTAL	706.79	127.74	5.53	87.14	10.82	1390.97	40.77	0.00	1431.74

- *N = at least one source for this link/traffic stream carries normal traffic*
- *B = at least one source for this link/traffic stream carries Bus traffic*
- *< = 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***

TRANSYT 16

Filename: Junction 2 - 2040 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 2\Upgraded Layout
Report generation date: 28/04/2022 03:32:33

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 2 [A2] - 2040 "with development"			
Network	1228.39	84.32	71% (TS B/2)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

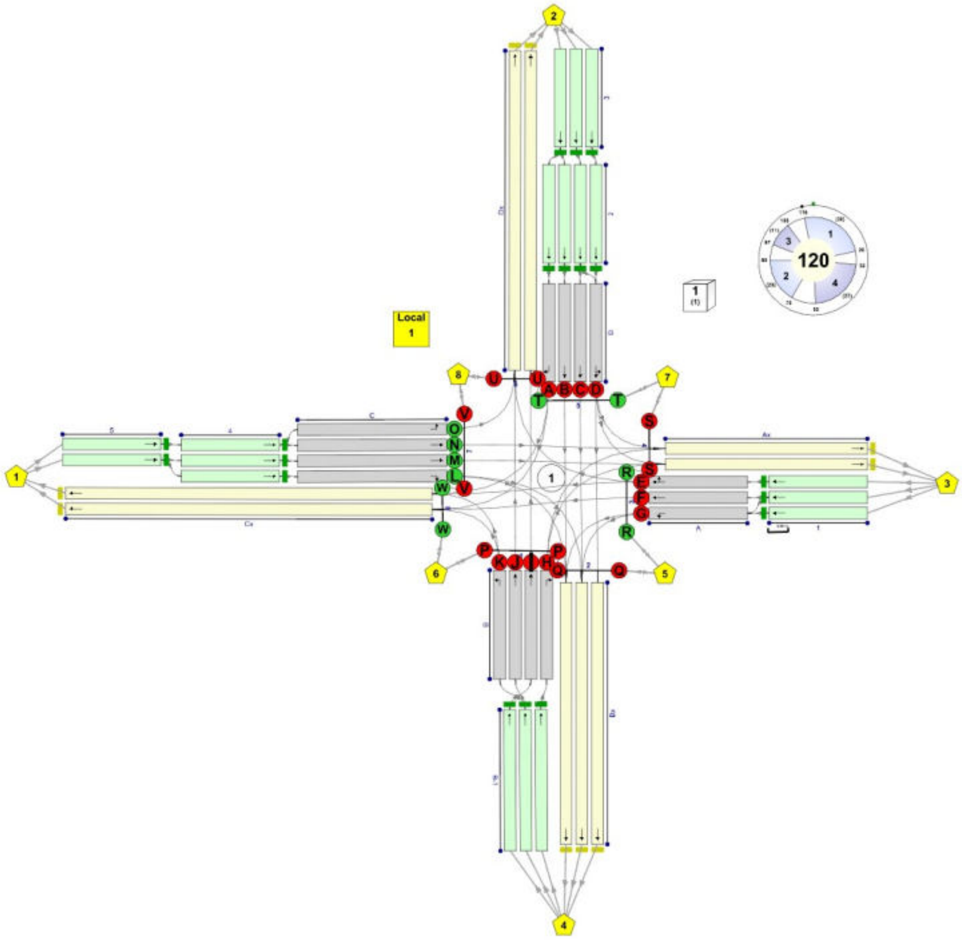
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 2 [A2]
D1 - 2040 "with development", AM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Traffic Stream Flows	Arm 1 - Traffic Stream 4 (Bus) - Flows (08:00-09:00)	Traffic Stream 1/4 has no paths passing through it, so will not be assigned any flows.

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 03:32:17	28/04/2022 03:32:25	8.65	08:00	120	1228.39	84.32	70.56	B/2	0	0	B/2	5/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set (s)	Specific Demand Set (s)	Optimise specific Demand Set (s)	Include in report	Locked
Junction 2 [A2]			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development"	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
1	(untitled)		1
B-1	(untitled)		1
2	(untitled)		1
3	(untitled)		1
4	(untitled)		1
5	(untitled)		1

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
A	1	(untitled)		✓	30.67	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	93.88						Normal	
	2	(untitled)		✓	93.94						Normal	
B	1	(untitled)		✓	37.78	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	35.22	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	36.96	✓	Sum of lanes	1800	✓		Bus	
	4	(untitled)		✓	34.84	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	115.03						Bus	
	2	(untitled)		✓	107.54						Normal	
	3	(untitled)		✓	107.49						Normal	
C	1	(untitled)		✓	43.30	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	41.51	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	41.53	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	41.55	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	134.35						Normal	
	2	(untitled)		✓	134.34						Normal	
D	1	(untitled)		✓	30.45	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	121.45						Normal	
	2	(untitled)		✓	129.15						Bus	
1	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Bus	
B-1	2			✓	35.10	✓	Sum of lanes	1800			Bus	
	3			✓	35.10	✓	Sum of lanes	1800			Normal	
	4			✓	35.10	✓	Sum of lanes	1800			Normal	
2	2			✓	29.00	✓	Sum of lanes	1800			Normal	
	3			✓	29.00	✓	Sum of lanes	1800			Normal	
	4			✓	30.01	✓	Sum of lanes	1800			Normal	
	5			✓	29.00	✓	Sum of lanes	1800			Bus	
3	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	6			✓	24.40	✓	Sum of lanes	1800			Bus	
4	2			✓	29.47	✓	Sum of lanes	1800			Normal	
	3			✓	31.40	✓	Sum of lanes	1800			Normal	
	5			✓	29.47	✓	Sum of lanes	1800			Normal	
5	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	2	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
Ax	1	2	(untitled)			
	2	1	(untitled)			
B	1	2	(untitled)			1800
	2	4	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
Bx	1	3	(untitled)			
	2	1	(untitled)			
	3	2	(untitled)			
C	1	4	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
	4	2	(untitled)			1800
Cx	1	1	(untitled)			
	2	2	(untitled)			
D	1	5	(untitled)			1800
	2	2	(untitled)			1800
	3	4	(untitled)			1800
	4	3	(untitled)			1800
Dx	1	1	(untitled)			
	2	2	(untitled)			
1	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
B-1	2	2	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
2	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
	5	1	(untitled)			1800
3	2	1	(untitled)			1800
	3	1	(untitled)			1800
	6	1	(untitled)			1800
4	2	1	(untitled)			1800
	3	1	(untitled)			1800
	5	1	(untitled)			1800
5	2	1	(untitled)			1800
	4	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
(ALL)	(ALL)	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

Bus - Modelling

Arm	Traffic Stream	Stationary time (seconds)	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	0.00	100	100

Bus - Advanced

Arm	Traffic Stream	Dispersion type	Use network default acceleration
(ALL)	(ALL)	NetworkDefault	✓

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)	Bus Flow (PCU/hr)
A	1	0	0	0
	2	301	301	
	3	301	301	
Ax	1	410	410	
	2	410	410	
B	1	6	6	
	2	254	254	
	3	54		54
	4	103	103	
Bx	1	54		54
	2	323	323	
	3	323	323	
C	1	143	143	
	2	358	358	
	3	358	358	
	4	150	150	
Cx	1	364	364	
	2	364	364	
D	1	54	0	54
	2	248	248	
	3	248	248	
	4	120	120	
Dx	1	397	397	
	2	54		54
1	2	301	301	
	3	301	301	
	4	0		0
B-1	2	54		54
	3	260	260	
	4	103	103	
2	2	248	248	
	3	248	248	
	4	120	120	
	5	54		54
3	2	248	248	
	3	368	368	
	6	54		54
4	2	358	358	
	3	150	150	
	5	501	501	
5	2	508	508	
	4	501	501	

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
A	1	1	G	
	2	1	F	
	3	1	E	
B	1	1	K	
	2	1	J	
	3	1	I	
	4	1	H	
C	1	1	O	
	2	1	N	
	3	1	M	
	4	1	L	
D	1	1	D	
	2	1	C	
	3	1	B	
	4	1	A	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Bus Free Running Speed (kph)
1	2	2.93	30.00	
	3	2.93	30.00	
	4			15.00
B-1	2			15.00
	3	4.21	30.00	
	4	4.21	30.00	
3	2	2.93	30.00	
	3	2.93	30.00	
	6			15.00
5	2	2.93	30.00	
	4	2.93	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)	Bus Free Running Speed (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
A	1	1	1/4	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
	2	1	1/2	A/2	3.58	30.00		✓	Straight	Straight Movement
	3	1	1/3	A/3	3.58	30.00		✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	11.27	30.00		✓	Nearside	16.65
	2	1	D/1	Ax/2	11.27	30.00		✓	Nearside	17.23
B	1	1	B-1/3	B/1	4.53	30.00		✓	Straight	Straight Movement
	2	1	B-1/3	B/2	4.23	30.00		✓	Straight	Straight Movement
	3	1	B-1/2	B/3			15.00	✓	Straight	Straight Movement
	4	1	B-1/4	B/4	4.18	30.00		✓	Straight	Straight Movement
Bx	1	1	D/1	Bx/1			15.00	✓	Straight	Straight Movement
	2	1	C/4	Bx/2	12.91	30.00		✓	Offside	26.45
	3	1	C/4	Bx/3	12.90	30.00		✓	Offside	26.45
	1	1	4/5	C/1	5.20	30.00		✓	Straight	Straight Movement

C	2	1	4/5	C/2	4.98	30.00		✓	Straight	Straight Movement
	3	1	4/2	C/3	4.98	30.00		✓	Straight	Straight Movement
	4	1	4/3	C/4	4.99	30.00		✓	Straight	Straight Movement
Cx	1	1	A/2	Cx/1	16.12	30.00		✓	Straight	Straight Movement
	2	1	A/3	Cx/2	16.12	30.00		✓	Straight	Straight Movement
D	1	1	2/5	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
	2	1	2/2	D/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	2/3	D/3	3.54	30.00		✓	Straight	Straight Movement
	4	1	2/4	D/4	3.54	30.00		✓	Straight	Straight Movement
Dx	1	1	B/2	Dx/1	14.57	30.00		✓	Straight	Straight Movement
	2	1	B/3	Dx/2			15.00	✓	Straight	Straight Movement
2	2	1	3/2	2/2	3.48	30.00		✓	Straight	Straight Movement
	3	1	3/3	2/3	3.48	30.00		✓	Straight	Straight Movement
	4	1	3/3	2/4	3.60	30.00		✓	Straight	Straight Movement
	5	1	3/6	2/5			15.00	✓	Straight	Straight Movement
4	2	1	5/2	4/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	5/2	4/3	3.77	30.00		✓	Straight	Straight Movement
	5	1	5/4	4/5	3.54	30.00		✓	Straight	Straight Movement
A	1	2	1/2	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
Ax	1	2	C/2	Ax/1	11.27	30.00		✓	Straight	Straight Movement
	2	2	C/3	Ax/2	11.27	30.00		✓	Straight	Straight Movement
Bx	2	2	D/2	Bx/2	12.91	30.00		✓	Straight	Straight Movement
	3	2	D/3	Bx/3	12.90	30.00		✓	Straight	Straight Movement
Cx	1	2	B/1	Cx/1	16.12	30.00		✓	Nearside	15.08
	2	2	B/1	Cx/2	16.12	30.00		✓	Nearside	16.75
D	1	2	2/2	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	14.57	30.00		✓	Nearside	14.66
Ax	1	3	B/4	Ax/1	11.27	30.00		✓	Offside	29.45
	2	3	B/4	Ax/2	11.27	30.00		✓	Offside	26.33
Bx	2	3	A/1	Bx/2	12.91	30.00		✓	Nearside	16.74
	3	3	A/1	Bx/3	12.90	30.00		✓	Nearside	17.18
Cx	1	3	D/4	Cx/1	16.12	30.00		✓	Offside	28.88
	2	3	D/4	Cx/2	16.12	30.00		✓	Offside	27.91
Dx	1	3	A/3	Dx/1	14.57	30.00		✓	Offside	27.77

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40
5	(untitled)				Farside	3.00	2.00	5.40
6	(untitled)				Farside	3.00	2.00	5.40
7	(untitled)				Farside	3.00	2.00	5.40
8	(untitled)				Farside	3.00	2.00	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	P	
2	1	Q	
3	1	R	
4	1	S	
5	1	T	
6	1	U	
7	1	V	
8	1	W	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Pedestrian Crossing Connectors

Pedestrian Crossing Connectors

Pedestrian crossing connector	Pedestrian crossing1	Pedestrian crossing2	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	2:1	1:1	3.00	2.00	5.40
2	4:1	3:1	3.00	2.00	5.40
3	6:1	5:2	3.00	2.00	5.40
4	8:1	7:2	3.00	2.00	5.40

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	143	716	150	0	0	0	0
	2	120	0	0	495	0	0	0	0
	3	602	0	0	0	0	0	0	0
	4	6	254	103	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	54	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	54	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	5/4, 5/2	Cx/1, Cx/2	#0000FF
	2	(untitled)	3/6, 3/2, 3/3	Dx/2, Dx/1	#FF0000
	3	(untitled)	1/4, 1/2, 1/3	Ax/1, Ax/2	#00FF00
	4	(untitled)	B-1/4, B-1/3, B-1/2	Bx/3, Bx/2, Bx/1	#FFFF00
	5	(untitled)	2:2E, 3:2E	2:2X, 3:2X	#FF00FF
	6	(untitled)	1:2E, 8:2E	1:2X, 8:2X	#008000
	7	(untitled)	4:2E, 5:1E	4:2X, 5:1X	#FFA500
	8	(untitled)	6:2E, 7:1E	6:2X, 7:1X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	4		1	4	5/2, 4/3, C/4, Bx/3	Normal	75
	6		1	4	5/2, 4/3, C/4, Bx/2	Normal	75
	8		1	2	5/4, 4/5, C/1, Dx/1	Normal	143
	10		2	4	3/3, 2/3, D/3, Bx/3	Normal	248
	11		2	4	3/2, 2/2, D/2, Bx/2	Normal	248
	14		3	2	1/3, A/3, Dx/1	Normal	0
	26		2	3	3/2, 2/2, D/1, Ax/1	Normal	0
	27		2	3	3/2, 2/2, D/1, Ax/2	Normal	0
	28		1	3	5/4, 4/5, C/2, Ax/1	Normal	358
	29		1	3	5/2, 4/2, C/3, Ax/2	Normal	358
	30		4	3	B-1/4, B/4, Ax/2	Normal	52
	31		4	3	B-1/4, B/4, Ax/1	Normal	52
	33		3	1	1/3, A/3, Cx/2	Normal	301
	34		3	1	1/2, A/2, Cx/1	Normal	301
	35		4	1	B-1/3, B/1, Cx/1	Normal	3
	36		4	1	B-1/3, B/1, Cx/2	Normal	3
	37		2	1	3/3, 2/4, D/4, Cx/2	Normal	60
	38		2	1	3/3, 2/4, D/4, Cx/1	Normal	60
	40		3	4	1/2, A/1, Bx/2	Normal	0
	41		3	4	1/2, A/1, Bx/3	Normal	0
	42		4	2	B-1/3, B/2, Dx/1	Normal	254

Bus Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Bus Calculated Flow (PCU/hr)
1	12		2	4	3/6, 2/5, D/1, Bx/1	Normal	54
	39		4	2	B-1/2, B/3, Dx/2	Normal	54

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	18		5	6	2:2E, 2:1X, 1:1E, 1:2X	Normal	300
	19		6	5	1:2E, 1:1X, 2:1E, 2:2X	Normal	300
	20		5	7	3:2E, 3:1X, 4:1E, 4:2X	Normal	300
	21		7	5	4:2E, 4:1X, 3:1E, 3:2X	Normal	300
	22		8	7	6:2E, 6:1X, 5:2E, 5:1X	Normal	300
	23		7	8	5:1E, 5:2X, 6:1E, 6:2X	Normal	300
	24		8	6	7:1E, 7:2X, 8:1E, 8:2X	Normal	300
	25		6	8	8:2E, 8:1X, 7:2E, 7:1X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		5	NetworkDefault	120	59

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
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)	7	300	0	0	Unknown	
	I	(untitled)	7	300	0	0	Unknown	
	J	(untitled)	7	300	0	0	Unknown	
	K	(untitled)	7	300	0	0	Unknown	
	L	(untitled)	7	300	0	0	Unknown	
	M	(untitled)	7	300	0	0	Unknown	
	N	(untitled)	7	300	0	0	Unknown	
	O	(untitled)	7	300	0	0	Unknown	
	P	(untitled)	7	300	0	0	Pedestrian	0
	Q	(untitled)	7	300	0	0	Pedestrian	0
	R	(untitled)	7	300	0	0	Pedestrian	0
	S	(untitled)	7	300	0	0	Pedestrian	0
	T	(untitled)	7	300	0	0	Pedestrian	0
	U	(untitled)	7	300	0	0	Pedestrian	0
	V	(untitled)	7	300	0	0	Pedestrian	0
	W	(untitled)	7	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	O, N, M, L, W, T, R	1	1	100
	2	I, J, K, B, C, D, V, R	1	1	100
	3	A, H, Q, U, R, V	1	1	100
	4	E, F, G, P, V, T, S	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4	16, 44, 66, 89	66	
	2	(untitled)	Single	1, 2, 4, 3	15, 42, 68, 92	68	
	3	(untitled)	Single	1, 3, 2, 4	15, 40, 64, 89	70	
	4	(untitled)	Single	1, 3, 4, 2	15, 40, 63, 89	68	
	5	(untitled)	Single	1, 4, 2, 3	26, 59, 90, 108	59	
	6	(untitled)	Single	1, 4, 3, 2	16, 38, 63, 89	63	

Intergreen Matrix for Controller Stream 1

From \ To	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
A					5	5			5	6	10	8	5	5						6			0
B					6	7		7				5	5	5			0			6			
C					6	7		5				5	5	5			0			6			
D					7	8	11	5					5	5			0		11	6			
E	8	5	5	5				5	7	8	11	7	5	6	11			6			0		0
F	6	5	5	5				6	8	8	11	5						6					0
G				5													9	6					
H		5	5	10	8	5						5	5	5		6			0				
I	7				5	5						5	6	7		6					0		
J	5				5	5						6	7	8	11	6					0		
K	5				5	5										6							10
L	5	5	5		5	5		9	5	5							0					5	
M	5	7	7	11	5			6	5	5									0			5	
N	6	7	8	12	5			6	5	5									0			6	
O					5					5											10	6	
P								4	4	4	4												
Q		5	5	5			5					5											
R					5	5	5																
S				4				4					4	4									
T	1	1	1	1																			
U					1				1	1					1								
V												1	1	1	1								
W	1				1	1					1												

Banned Stage transitions for Controller Stream 1

From \ To	1	2	3	4
1				
2				
3				
4				

Interstage Matrix for Controller Stream 1

From \ To	1	2	3	4
1	0	12	10	6
2	11	0	7	11
3	8	10	0	8
4	11	11	9	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	O,N,M,L,W,T,R	116	26	30	1	7
	2	✓	4	E,F,G,P,V,T,S	32	59	27	1	6
	3	✓	2	I,J,K,B,C,D,V,R	70	90	20	1	7
	4	✓	3	A,H,Q,U,R,V	97	108	11	1	7

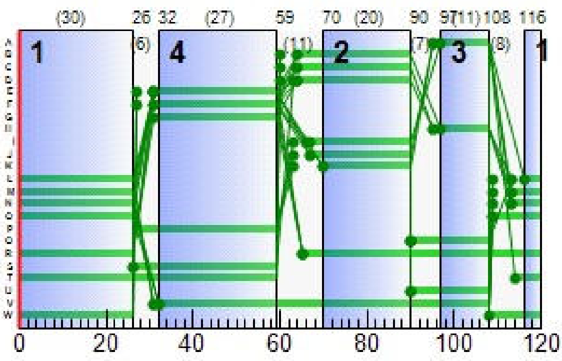
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	108	11
	B	1	✓	64	90	26
	C	1	✓	64	90	26
	D	1	✓	64	90	26
	E	1	✓	31	59	28
	F	1	✓	31	59	28
	G	1	✓	31	59	28
	H	1	✓	97	108	11
	I	1	✓	67	90	23
	J	1	✓	67	90	23
	K	1	✓	70	90	20
	L	1	✓	116	26	30
	M	1	✓	113	26	33
	N	1	✓	113	26	33
	O	1	✓	109	26	37
	P	1	✓	26	59	33
	Q	1	✓	90	108	18
	R	1	✓	65	26	81
	S	1	✓	26	59	33
	T	1	✓	114	59	65
	U	1	✓	90	108	18
	V	1	✓	32	108	76
	W	1	✓	108	26	38

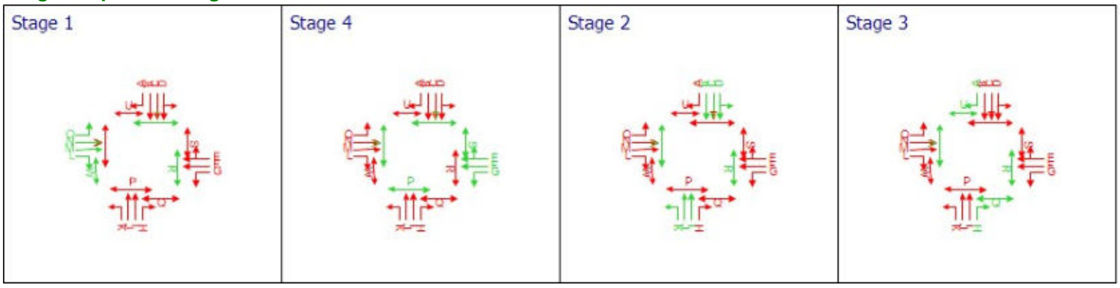
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	G	31	59	28
A	2	1	1	F	31	59	28
A	3	1	1	E	31	59	28
B	1	1	1	K	70	90	20
B	2	1	1	J	67	90	23
B	3	1	1	I	67	90	23
B	4	1	1	H	97	108	11
C	1	1	1	O	109	26	37
C	2	1	1	N	113	26	33
C	3	1	1	M	113	26	33
C	4	1	1	L	116	26	30
D	1	1	1	D	64	90	26
D	2	1	1	C	64	90	26
D	3	1	1	B	64	90	26
D	4	1	1	A	97	108	11

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

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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**	**JourneyTime (s)**	**Mean Delay per Veh (s)**	**Mean stops per Veh (%)**	**Mean max queue (PCU)**
A	**1 NB**	(untitled)	1	1	G	0	1800	28	29.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	F	301 <	1800	28	0.00	69	30	54.11	50.53	96.93	9.87 +
	3	(untitled)	1	1	E	301 <	1800	28	0.00	69	30	54.11	50.53	96.93	9.87 +
Ax	**1**	(untitled)				410	Unrestricted	120	64.00	0	Unrestricted	11.27	0.00	0.00	0.00
	2	(untitled)				410	Unrestricted	120	64.00	0	Unrestricted	11.27	0.00	0.00	0.00
B	**1**	(untitled)	1	1	K	6	1800	20	20.00	2	4625	45.89	41.36	81.61	0.17
	2	(untitled)	1	1	J	254 <	1800	23	0.00	71	28	60.59	56.36	100.92	8.65 +
	3 B	(untitled)	1	1	I	54	1800	23	21.00	15	500	49.34	40.47	81.96	1.48
	4	(untitled)	1	1	H	104	1800	11	0.00	58	56	69.12	64.94	104.83	3.68
Bx	**1 B**	(untitled)				54	Unrestricted	120	95.00	0	Unrestricted	27.61	0.00	0.00	0.00
	2	(untitled)				323	Unrestricted	120	55.00	0	Unrestricted	12.91	0.00	0.00	0.00
	3	(untitled)				323	Unrestricted	120	55.00	0	Unrestricted	12.90	0.00	0.00	0.00
C	**1**	(untitled)	1	1	O	143	1800	37	0.00	25	259	36.69	31.49	73.63	3.58
	2	(untitled)	1	1	N	358 <	1800	33	0.00	70	28	51.60	46.62	94.49	11.45 +
	3	(untitled)	1	1	M	358 <	1800	33	0.00	70	28	51.61	46.62	94.49	11.45 +
	4	(untitled)	1	1	L	150	1800	30	0.00	32	179	42.83	37.85	81.00	4.12
Cx	**1**	(untitled)				364	Unrestricted	120	58.00	0	Unrestricted	16.12	0.00	0.00	0.00
	2	(untitled)				364	Unrestricted	120	58.00	0	Unrestricted	16.12	0.00	0.00	0.00
D	**1 NB**	(untitled)	1	1	D	54	1800	26	24.00	13	575	45.16	37.85	79.30	1.44
	2	(untitled)	1	1	C	248 <	1800	26	0.00	61	47	52.26	48.72	93.82	7.85 +
	3	(untitled)	1	1	B	248 <	1800	26	0.00	61	47	52.26	48.72	93.82	7.85 +
	4	(untitled)	1	1	A	120	1800	11	0.00	67	35	74.79	71.25	110.20	4.47
Dx	**1**	(untitled)				397	Unrestricted	120	45.00	0	Unrestricted	14.57	0.00	0.00	0.00
	2 B	(untitled)				54	Unrestricted	120	96.00	0	Unrestricted	31.00	0.00	0.00	0.00
1	**2**		1			301	1800	120	57.00	17	438	3.13	0.20	0.00	0.02
	3		1			301	1800	120	57.00	17	438	3.13	0.20	0.00	0.02
	4 B		1			0	1800	120	120.00	0	Unrestricted	0.00	0.00	0.00	0.00
B-1	**2 B**		1			54	1800	120	120.00	3	2900	8.45	0.03	0.00	0.00
	3		1			260	1800	120	36.00	14	523	4.38	0.17	0.00	0.01
	4		1			104	1800	120	0.00	6	1458	4.27	0.06	0.00	0.00
2	**2**		1			248	1800	120	40.00	14	553	3.64	0.16	0.00	0.01
	3		1			248	1800	120	40.00	14	553	3.64	0.16	0.00	0.01
	4		1			120	1800	120	0.00	7	1250	3.67	0.07	0.00	0.00
	5 B		1			54	1800	120	120.00	3	2900	6.99	0.03	0.00	0.00
3	**2**		1			248	1800	120	0.00	14	553	3.09	0.16	0.00	0.01
	3		1			368	1800	120	0.00	20	340	3.18	0.26	0.00	0.03
	6 B		1			54	1800	120	120.00	3	2900	5.89	0.03	0.00	0.00
4	**2**		1			358	1800	120	43.00	20	353	3.78	0.25	0.00	0.02
	3		1			150	1800	120	0.00	8	980	3.86	0.09	0.00	0.00
	5		1			501	1800	120	43.00	28	223	3.92	0.39	0.00	0.05
5	**2**		1			508	1800	120	0.00	28	219	3.32	0.39	0.00	0.06
	4		1			501	1800	120	0.00	28	223	3.31	0.39	0.00	0.05

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	498.66	52.48	9.50	29.50	6.36	509.23	30.78	0.00	540.01
Bus	21.60	2.62	8.26	1.15	0.02	16.70	0.27	0.00	16.98
Tram									
Pedestrians	34.80	53.95	0.65	47.28	0.00	671.40	0.00	0.00	671.40
TOTAL	555.06	109.05	5.09	77.93	6.39	1197.33	31.05	0.00	1228.39

- *N = at least one source for this link/traffic stream carries normal traffic*
- *B = at least one source for this link/traffic stream carries Bus traffic*
- *< = 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***

TRANSYT 16

Version: 16.0.1.8473

Filename: Junction 2 - 2040 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 2\Upgraded Layout
Report generation date: 28/04/2022 03:37:09

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 2 [A2] - 2040 "with development"			
Network	1249.82	85.76	75% (TS B/2)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

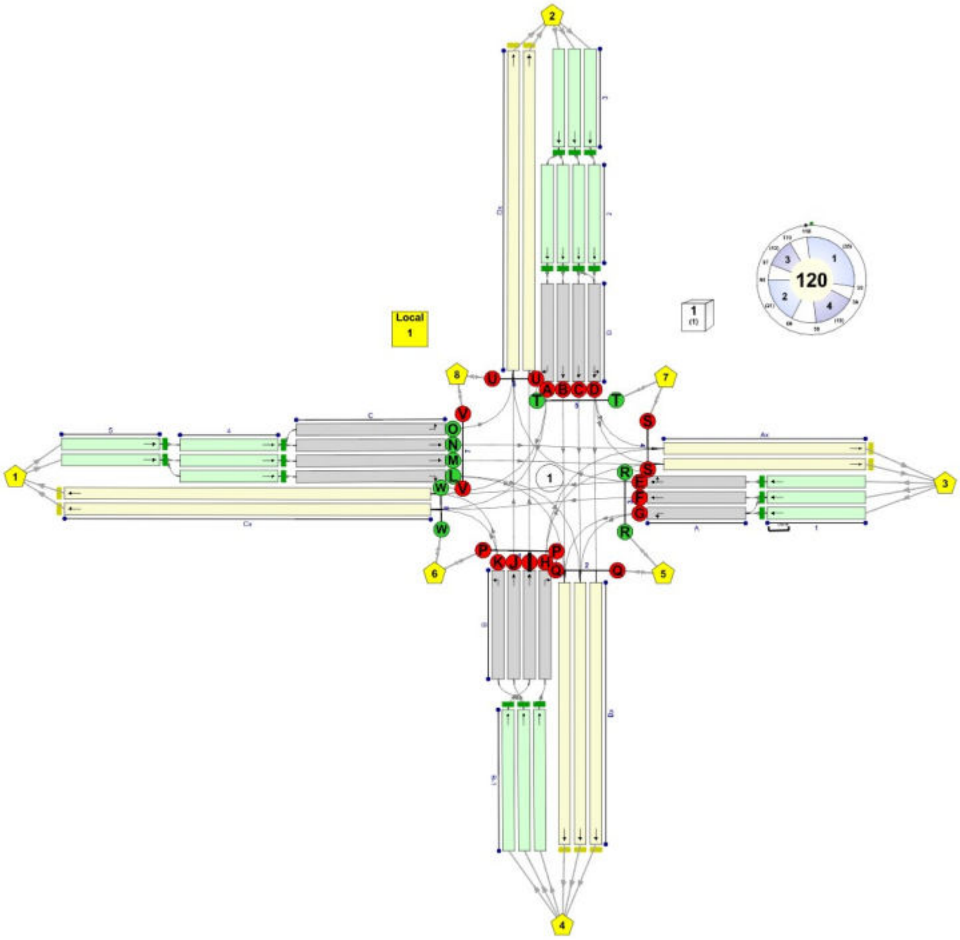
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 2 [A2]
D1 - 2040 "with development", PM

Summary

Data Errors and Warnings

Severity	Area	Item	Description
Info	Traffic Stream Flows	Arm 1 - Traffic Stream 4 (Bus) - Flows (17:00-18:00)	Traffic Stream 1/4 has no paths passing through it, so will not be assigned any flows.

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 03:36:52	28/04/2022 03:37:00	8.25	17:00	120	1249.82	85.76	74.67	B/2	0	0	B/2	4/5

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set (s)	Specific Demand Set (s)	Optimise specific Demand Set (s)	Include in report	Locked
Junction 2 [A2]			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
1	(untitled)		1
B-1	(untitled)		1
2	(untitled)		1
3	(untitled)		1
4	(untitled)		1
5	(untitled)		1

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
A	1	(untitled)		✓	30.67	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.80	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	93.88						Normal	
	2	(untitled)		✓	93.94						Normal	
B	1	(untitled)		✓	37.78	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	35.22	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	36.96	✓	Sum of lanes	1800	✓		Bus	
	4	(untitled)		✓	34.84	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	115.03						Bus	
	2	(untitled)		✓	107.54						Normal	
	3	(untitled)		✓	107.49						Normal	
C	1	(untitled)		✓	43.30	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	41.51	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	41.53	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	41.55	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	134.35						Normal	
	2	(untitled)		✓	134.34						Normal	
D	1	(untitled)		✓	30.45	✓	Sum of lanes	1800	✓		Normal, Bus	
	2	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	3	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
	4	(untitled)		✓	29.50	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	121.45						Normal	
	2	(untitled)		✓	129.15						Bus	
1	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Bus	
B-1	2			✓	35.10	✓	Sum of lanes	1800			Bus	
	3			✓	35.10	✓	Sum of lanes	1800			Normal	
	4			✓	35.10	✓	Sum of lanes	1800			Normal	
2	2			✓	29.00	✓	Sum of lanes	1800			Normal	
	3			✓	29.00	✓	Sum of lanes	1800			Normal	
	4			✓	30.01	✓	Sum of lanes	1800			Normal	
	5			✓	29.00	✓	Sum of lanes	1800			Bus	
3	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	3			✓	24.40	✓	Sum of lanes	1800			Normal	
	6			✓	24.40	✓	Sum of lanes	1800			Bus	
4	2			✓	29.47	✓	Sum of lanes	1800			Normal	
	3			✓	31.40	✓	Sum of lanes	1800			Normal	
	5			✓	29.47	✓	Sum of lanes	1800			Normal	
5	2			✓	24.40	✓	Sum of lanes	1800			Normal	
	4			✓	24.40	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	2	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
Ax	1	2	(untitled)			
	2	1	(untitled)			
B	1	2	(untitled)			1800
	2	4	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
Bx	1	3	(untitled)			
	2	1	(untitled)			
	3	2	(untitled)			
C	1	4	(untitled)			1800
	2	1	(untitled)			1800
	3	3	(untitled)			1800
	4	2	(untitled)			1800
Cx	1	1	(untitled)			
	2	2	(untitled)			
D	1	5	(untitled)			1800
	2	2	(untitled)			1800
	3	4	(untitled)			1800
	4	3	(untitled)			1800
Dx	1	1	(untitled)			
	2	2	(untitled)			
1	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
B-1	2	2	(untitled)			1800
	3	3	(untitled)			1800
	4	1	(untitled)			1800
2	2	1	(untitled)			1800
	3	1	(untitled)			1800
	4	1	(untitled)			1800
	5	1	(untitled)			1800
3	2	1	(untitled)			1800
	3	1	(untitled)			1800
	6	1	(untitled)			1800
4	2	1	(untitled)			1800
	3	1	(untitled)			1800
	5	1	(untitled)			1800
5	2	1	(untitled)			1800
	4	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
(ALL)	(ALL)	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

Bus - Modelling

Arm	Traffic Stream	Stationary time (seconds)	Stop weighting (%)	Delay weighting (%)
(ALL)	(ALL)	0.00	100	100

Bus - Advanced

Arm	Traffic Stream	Dispersion type	Use network default acceleration
(ALL)	(ALL)	NetworkDefault	✓

Flows

Arm	Traffic Stream	Total Flow (PCU/hr)	Normal Flow (PCU/hr)	Bus Flow (PCU/hr)
A	1	0	0	0
	2	206	206	
	3	206	206	
Ax	1	548	548	
	2	548	548	
B	1	60	60	
	2	280	280	
	3	54		54
	4	139	139	
Bx	1	54		54
	2	287	287	
	3	287	287	
C	1	168	168	
	2	408	408	
	3	408	408	
	4	153	153	
Cx	1	308	308	
	2	308	308	
D	1	194	140	54
	2	210	210	
	3	210	210	
	4	144	144	
Dx	1	448	448	
	2	54		54
1	2	206	206	
	3	206	206	
	4	0		0
B-1	2	54		54
	3	340	340	
	4	139	139	
2	2	350	350	
	3	210	210	
	4	144	144	
	5	54		54
3	2	350	350	
	3	354	354	
	6	54		54
4	2	408	408	
	3	153	153	
	5	576	576	
5	2	561	561	
	4	576	576	

Signals

Arm	Traffic Stream	Controller stream	Phase	Second phase enabled
A	1	1	G	
	2	1	F	
	3	1	E	
B	1	1	K	
	2	1	J	
	3	1	I	
	4	1	H	
C	1	1	O	
	2	1	N	
	3	1	M	
	4	1	L	
D	1	1	D	
	2	1	C	
	3	1	B	
	4	1	A	

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)	Bus Free Running Speed (kph)
1	2	2.93	30.00	
	3	2.93	30.00	
	4			15.00
B-1	2			15.00
	3	4.21	30.00	
	4	4.21	30.00	
3	2	2.93	30.00	
	3	2.93	30.00	
	6			15.00
5	2	2.93	30.00	
	4	2.93	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)	Bus Free Running Speed (kph)	Auto turning radius	Traffic turn style	Turning radius (m)
A	1	1	1/4	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
	2	1	1/2	A/2	3.58	30.00		✓	Straight	Straight Movement
	3	1	1/3	A/3	3.58	30.00		✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	11.27	30.00		✓	Nearside	16.65
	2	1	D/1	Ax/2	11.27	30.00		✓	Nearside	17.23
B	1	1	B-1/3	B/1	4.53	30.00		✓	Straight	Straight Movement
	2	1	B-1/3	B/2	4.23	30.00		✓	Straight	Straight Movement
	3	1	B-1/2	B/3			15.00	✓	Straight	Straight Movement
	4	1	B-1/4	B/4	4.18	30.00		✓	Straight	Straight Movement
Bx	1	1	D/1	Bx/1			15.00	✓	Straight	Straight Movement
	2	1	C/4	Bx/2	12.91	30.00		✓	Offside	26.45
	3	1	C/4	Bx/3	12.90	30.00		✓	Offside	26.45
	1	1	4/5	C/1	5.20	30.00		✓	Straight	Straight Movement

C	2	1	4/5	C/2	4.98	30.00		✓	Straight	Straight Movement
	3	1	4/2	C/3	4.98	30.00		✓	Straight	Straight Movement
	4	1	4/3	C/4	4.99	30.00		✓	Straight	Straight Movement
Cx	1	1	A/2	Cx/1	16.12	30.00		✓	Straight	Straight Movement
	2	1	A/3	Cx/2	16.12	30.00		✓	Straight	Straight Movement
D	1	1	2/5	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
	2	1	2/2	D/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	2/3	D/3	3.54	30.00		✓	Straight	Straight Movement
	4	1	2/4	D/4	3.54	30.00		✓	Straight	Straight Movement
Dx	1	1	B/2	Dx/1	14.57	30.00		✓	Straight	Straight Movement
	2	1	B/3	Dx/2			15.00	✓	Straight	Straight Movement
2	2	1	3/2	2/2	3.48	30.00		✓	Straight	Straight Movement
	3	1	3/3	2/3	3.48	30.00		✓	Straight	Straight Movement
	4	1	3/3	2/4	3.60	30.00		✓	Straight	Straight Movement
	5	1	3/6	2/5			15.00	✓	Straight	Straight Movement
4	2	1	5/2	4/2	3.54	30.00		✓	Straight	Straight Movement
	3	1	5/2	4/3	3.77	30.00		✓	Straight	Straight Movement
	5	1	5/4	4/5	3.54	30.00		✓	Straight	Straight Movement
A	1	2	1/2	A/1	3.68	30.00	15.00	✓	Straight	Straight Movement
Ax	1	2	C/2	Ax/1	11.27	30.00		✓	Straight	Straight Movement
	2	2	C/3	Ax/2	11.27	30.00		✓	Straight	Straight Movement
Bx	2	2	D/2	Bx/2	12.91	30.00		✓	Straight	Straight Movement
	3	2	D/3	Bx/3	12.90	30.00		✓	Straight	Straight Movement
Cx	1	2	B/1	Cx/1	16.12	30.00		✓	Nearside	15.08
	2	2	B/1	Cx/2	16.12	30.00		✓	Nearside	16.75
D	1	2	2/2	D/1	3.65	30.00	15.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	14.57	30.00		✓	Nearside	14.66
Ax	1	3	B/4	Ax/1	11.27	30.00		✓	Offside	29.45
	2	3	B/4	Ax/2	11.27	30.00		✓	Offside	26.33
Bx	2	3	A/1	Bx/2	12.91	30.00		✓	Nearside	16.74
	3	3	A/1	Bx/3	12.90	30.00		✓	Nearside	17.18
Cx	1	3	D/4	Cx/1	16.12	30.00		✓	Offside	28.88
	2	3	D/4	Cx/2	16.12	30.00		✓	Offside	27.91
Dx	1	3	A/3	Dx/1	14.57	30.00		✓	Offside	27.77

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40
5	(untitled)				Farside	3.00	2.00	5.40
6	(untitled)				Farside	3.00	2.00	5.40
7	(untitled)				Farside	3.00	2.00	5.40
8	(untitled)				Farside	3.00	2.00	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	P	
2	1	Q	
3	1	R	
4	1	S	
5	1	T	
6	1	U	
7	1	V	
8	1	W	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

Pedestrian Crossing Connectors

Pedestrian Crossing Connectors

Pedestrian crossing connector	Pedestrian crossing1	Pedestrian crossing2	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	2:1	1:1	3.00	2.00	5.40
2	4:1	3:1	3.00	2.00	5.40
3	6:1	5:2	3.00	2.00	5.40
4	8:1	7:2	3.00	2.00	5.40

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	168	816	153	0	0	0	0
	2	144	0	140	420	0	0	0	0
	3	412	0	0	0	0	0	0	0
	4	60	280	139	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	54	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	54	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	5/4, 5/2	Cx/1, Cx/2	#0000FF
	2	(untitled)	3/6, 3/2, 3/3	Dx/2, Dx/1	#FF0000
	3	(untitled)	1/4, 1/2, 1/3	Ax/1, Ax/2	#00FF00
	4	(untitled)	B-1/4, B-1/3, B-1/2	Bx/3, Bx/2, Bx/1	#FFFF00
	5	(untitled)	2:2E, 3:2E	2:2X, 3:2X	#FF00FF
	6	(untitled)	1:2E, 8:2E	1:2X, 8:2X	#008000
	7	(untitled)	4:2E, 5:1E	4:2X, 5:1X	#FFA500
	8	(untitled)	6:2E, 7:1E	6:2X, 7:1X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	4		1	4	5/2, 4/3, C/4, Bx/3	Normal	77
	6		1	4	5/2, 4/3, C/4, Bx/2	Normal	77
	8		1	2	5/4, 4/5, C/1, Dx/1	Normal	168
	10		2	4	3/3, 2/3, D/3, Bx/3	Normal	210
	11		2	4	3/2, 2/2, D/2, Bx/2	Normal	210
	14		3	2	1/3, A/3, Dx/1	Normal	0
	26		2	3	3/2, 2/2, D/1, Ax/1	Normal	70
	27		2	3	3/2, 2/2, D/1, Ax/2	Normal	70
	28		1	3	5/4, 4/5, C/2, Ax/1	Normal	408
	29		1	3	5/2, 4/2, C/3, Ax/2	Normal	408
	30		4	3	B-1/4, B/4, Ax/2	Normal	70
	31		4	3	B-1/4, B/4, Ax/1	Normal	70
	33		3	1	1/3, A/3, Cx/2	Normal	206
	34		3	1	1/2, A/2, Cx/1	Normal	206
	35		4	1	B-1/3, B/1, Cx/1	Normal	30
	36		4	1	B-1/3, B/1, Cx/2	Normal	30
	37		2	1	3/3, 2/4, D/4, Cx/2	Normal	72
	38		2	1	3/3, 2/4, D/4, Cx/1	Normal	72
	40		3	4	1/2, A/1, Bx/2	Normal	0
	41		3	4	1/2, A/1, Bx/3	Normal	0
	42		4	2	B-1/3, B/2, Dx/1	Normal	280

Bus Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Bus Calculated Flow (PCU/hr)
1	12		2	4	3/6, 2/5, D/1, Bx/1	Normal	54
	39		4	2	B-1/2, B/3, Dx/2	Normal	54

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	18		5	6	2:2E, 2:1X, 1:1E, 1:2X	Normal	300
	19		6	5	1:2E, 1:1X, 2:1E, 2:2X	Normal	300
	20		5	7	3:2E, 3:1X, 4:1E, 4:2X	Normal	300
	21		7	5	4:2E, 4:1X, 3:1E, 3:2X	Normal	300
	22		8	7	6:2E, 6:1X, 5:2E, 5:1X	Normal	300
	23		7	8	5:1E, 5:2X, 6:1E, 6:2X	Normal	300
	24		8	6	7:1E, 7:2X, 8:1E, 8:2X	Normal	300
	25		6	8	8:2E, 8:1X, 7:2E, 7:1X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		5	NetworkDefault	120	59

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type	Blackout Time (s)
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)	7	300	0	0	Unknown	
	I	(untitled)	7	300	0	0	Unknown	
	J	(untitled)	7	300	0	0	Unknown	
	K	(untitled)	7	300	0	0	Unknown	
	L	(untitled)	7	300	0	0	Unknown	
	M	(untitled)	7	300	0	0	Unknown	
	N	(untitled)	7	300	0	0	Unknown	
	O	(untitled)	7	300	0	0	Unknown	
	P	(untitled)	7	300	0	0	Pedestrian	0
	Q	(untitled)	7	300	0	0	Pedestrian	0
	R	(untitled)	7	300	0	0	Pedestrian	0
	S	(untitled)	7	300	0	0	Pedestrian	0
	T	(untitled)	7	300	0	0	Pedestrian	0
	U	(untitled)	7	300	0	0	Pedestrian	0
	V	(untitled)	7	300	0	0	Pedestrian	0
	W	(untitled)	7	300	0	0	Pedestrian	0

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	O, N, M, L, W, T, R	1	1	100
	2	I, J, K, B, C, D, V, R	1	1	100
	3	A, H, Q, U, R, V	1	1	100
	4	E, F, G, P, V, T, S	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4	16, 44, 66, 89	66	
	2	(untitled)	Single	1, 2, 4, 3	15, 42, 68, 92	68	
	3	(untitled)	Single	1, 3, 2, 4	15, 40, 64, 89	70	
	4	(untitled)	Single	1, 3, 4, 2	15, 40, 63, 89	68	
	5	(untitled)	Single	1, 4, 2, 3	33, 58, 90, 110	59	
	6	(untitled)	Single	1, 4, 3, 2	16, 38, 63, 89	63	

Intergreen Matrix for Controller Stream 1

		To																						
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
	A					5	5			5	6	10	8	5	5						6			0
	B					6	7		7				5	5	5			0			6			
	C					6	7		5				5	5	5			0			6			
	D					7	8	11	5					5	5			0		11	6			
	E	8	5	5	5				5	7	8	11	7	5	6	11			6			0		0
	F	6	5	5	5				6	8	8	11	5						6					0
	G				5													9	6					
	H		5	5	10	8	5						5	5	5		6			0				
	I	7				5	5						5	6	7		6					0		
	J	5				5	5						6	7	8	11	6					0		
From	K	5				5	5										6							10
	L	5	5	5		5	5		9	5	5							0					5	
	M	5	7	7	11	5			6	5	5									0			5	
	N	6	7	8	12	5			6	5	5									0			6	
	O					5					5											10	6	
	P								4	4	4	4												
	Q		5	5	5			5					5											
	R					5	5	5																
	S				4				4					4	4									
	T	1	1	1	1																			
	U					1				1	1					1								
	V												1	1	1	1								
	W	1				1	1					1												

Banned Stage transitions for Controller Stream 1

		To			
		1	2	3	4
	1				
From	2				
	3				
	4				

Interstage Matrix for Controller Stream 1

		To			
		1	2	3	4
	1	0	12	10	6
From	2	11	0	7	11
	3	8	10	0	8
	4	11	11	9	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	O,N,M,L,W,T,R	118	33	35	1	7
	2	✓	4	E,F,G,P,V,T,S	39	58	19	1	6
	3	✓	2	I,J,K,B,C,D,V,R	69	90	21	1	7
	4	✓	3	A,H,Q,U,R,V	97	110	13	1	7

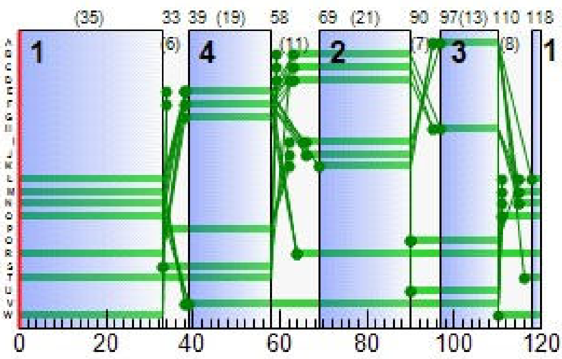
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	97	110	13
	B	1	✓	63	90	27
	C	1	✓	63	90	27
	D	1	✓	63	90	27
	E	1	✓	38	58	20
	F	1	✓	38	58	20
	G	1	✓	38	58	20
	H	1	✓	97	110	13
	I	1	✓	66	90	24
	J	1	✓	66	90	24
	K	1	✓	69	90	21
	L	1	✓	118	33	35
	M	1	✓	115	33	38
	N	1	✓	115	33	38
	O	1	✓	111	33	42
	P	1	✓	33	58	25
	Q	1	✓	90	110	20
	R	1	✓	64	33	89
	S	1	✓	33	58	25
	T	1	✓	116	58	62
	U	1	✓	90	110	20
	V	1	✓	39	110	71
	W	1	✓	110	33	43

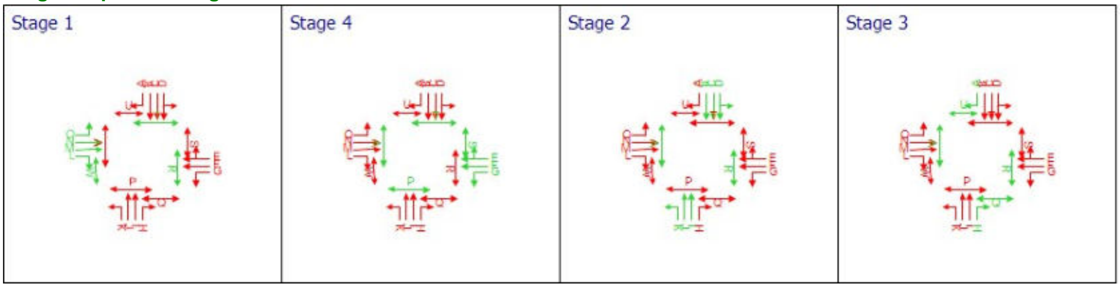
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
A	1	1	1	G	38	58	20
A	2	1	1	F	38	58	20
A	3	1	1	E	38	58	20
B	1	1	1	K	69	90	21
B	2	1	1	J	66	90	24
B	3	1	1	I	66	90	24
B	4	1	1	H	97	110	13
C	1	1	1	O	111	33	42
C	2	1	1	N	115	33	38
C	3	1	1	M	115	33	38
C	4	1	1	L	118	33	35
D	1	1	1	D	63	90	27
D	2	1	1	C	63	90	27
D	3	1	1	B	63	90	27
D	4	1	1	A	97	110	13

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)
17:00-18:00	**1**	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1 NB	(untitled)	1	1	G	0	1800	20	21.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	F	206 <	1800	20	0.00	65	38	60.25	56.68	100.09	6.96 +
	3	(untitled)	1	1	E	206 <	1800	20	0.00	65	38	60.25	56.68	100.09	6.96 +
Ax	1	(untitled)				548	Unrestricted	120	28.00	0	Unrestricted	11.27	0.00	0.00	0.00
	2	(untitled)				548	Unrestricted	120	28.00	0	Unrestricted	11.27	0.00	0.00	0.00
B	1	(untitled)	1	1	K	60	1800	21	18.00	18	395	47.17	42.64	84.19	1.70
	2	(untitled)	1	1	J	280 <	1800	24	0.00	75	21	62.39	58.17	103.21	9.77 +
	3 B	(untitled)	1	1	I	54	1800	24	22.00	14	525	48.45	39.58	81.06	1.47
	4	(untitled)	1	1	H	140	1800	13	0.00	67	35	71.47	67.29	107.32	5.08
Bx	1 B	(untitled)				54	Unrestricted	120	92.00	0	Unrestricted	27.61	0.00	0.00	0.00
	2	(untitled)				287	Unrestricted	120	50.00	0	Unrestricted	12.91	0.00	0.00	0.00
	3	(untitled)				287	Unrestricted	120	50.00	0	Unrestricted	12.90	0.00	0.00	0.00
C	1	(untitled)	1	1	O	168	1800	42	0.00	26	246	33.43	28.23	69.83	3.97
	2	(untitled)	1	1	N	408 <	1800	38	0.00	70	29	47.31	42.33	91.18	12.58 +
	3	(untitled)	1	1	M	408 <	1800	38	0.00	70	29	47.31	42.33	91.18	12.58 +
	4	(untitled)	1	1	L	154	1800	35	0.00	29	216	38.47	33.48	75.95	3.95
Cx	1	(untitled)				308	Unrestricted	120	51.00	0	Unrestricted	16.12	0.00	0.00	0.00
	2	(untitled)				308	Unrestricted	120	51.00	0	Unrestricted	16.12	0.00	0.00	0.00
D	1 NB	(untitled)	1	1	D	194 <	1800	27	0.00	46	95	47.86	43.19	87.65	5.75 +
	2	(untitled)	1	1	C	210 <	1800	27	0.00	50	80	47.72	44.18	88.84	6.31 +
	3	(untitled)	1	1	B	210 <	1800	27	0.00	50	80	47.72	44.18	88.84	6.31 +
	4	(untitled)	1	1	A	144 <	1800	13	0.00	69	31	72.38	68.84	109.05	5.32 +
Dx	1	(untitled)				448	Unrestricted	120	38.00	0	Unrestricted	14.57	0.00	0.00	0.00
	2 B	(untitled)				54	Unrestricted	120	95.00	0	Unrestricted	31.00	0.00	0.00	0.00
1	2		1			206	1800	120	31.00	11	686	3.06	0.13	0.00	0.01
	3		1			206	1800	120	31.00	11	686	3.06	0.13	0.00	0.01
	4 B		1			0	1800	120	120.00	0	Unrestricted	0.00	0.00	0.00	0.00
B-1	2 B		1			54	1800	120	120.00	3	2900	8.45	0.03	0.00	0.00
	3		1			340	1800	120	47.00	19	376	4.44	0.23	0.00	0.02
	4		1			140	1800	120	0.00	8	1057	4.30	0.08	0.00	0.00
2	2		1			350	1800	120	21.00	19	363	3.72	0.24	0.00	0.02
	3		1			210	1800	120	21.00	12	671	3.61	0.13	0.00	0.01
	4		1			144	1800	120	5.00	8	1025	3.69	0.09	0.00	0.00
	5 B		1			54	1800	120	120.00	3	2900	6.99	0.03	0.00	0.00
3	2		1			350	1800	120	0.00	19	363	3.17	0.24	0.00	0.02
	3		1			354	1800	120	0.00	20	358	3.17	0.24	0.00	0.02
	6 B		1			54	1800	120	120.00	3	2900	5.89	0.03	0.00	0.00
4	2		1			408	1800	120	48.00	23	297	3.83	0.29	0.00	0.03
	3		1			154	1800	120	0.00	9	952	3.86	0.09	0.00	0.00
	5		1			576	1800	120	48.00	32	181	4.01	0.47	0.00	0.08
5	2		1			562	1800	120	0.00	31	188	3.38	0.45	0.00	0.07
	4		1			576	1800	120	0.00	32	181	3.40	0.47	0.00	0.08

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	525.77	54.18	9.70	30.30	6.35	520.44	31.76	0.00	552.20
Bus	21.60	2.68	8.05	1.17	0.07	17.65	0.29	0.00	17.94
Tram									
Pedestrians	34.80	54.53	0.64	47.87	0.00	679.69	0.00	0.00	679.69
TOTAL	582.18	111.39	5.23	79.34	6.42	1217.78	32.05	0.00	1249.82

- *N = at least one source for this link/traffic stream carries normal traffic*
- *B = at least one source for this link/traffic stream carries Bus traffic*
- *< = 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***

TRANSYT 16

Version: 16.0.1.8473

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

Filename: Junction 3 - 2028 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 3
Report generation date: 28/04/2022 04:36:26

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 3 - 2028 "with development"			
Network	941.77	63.85	90% (TS C/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

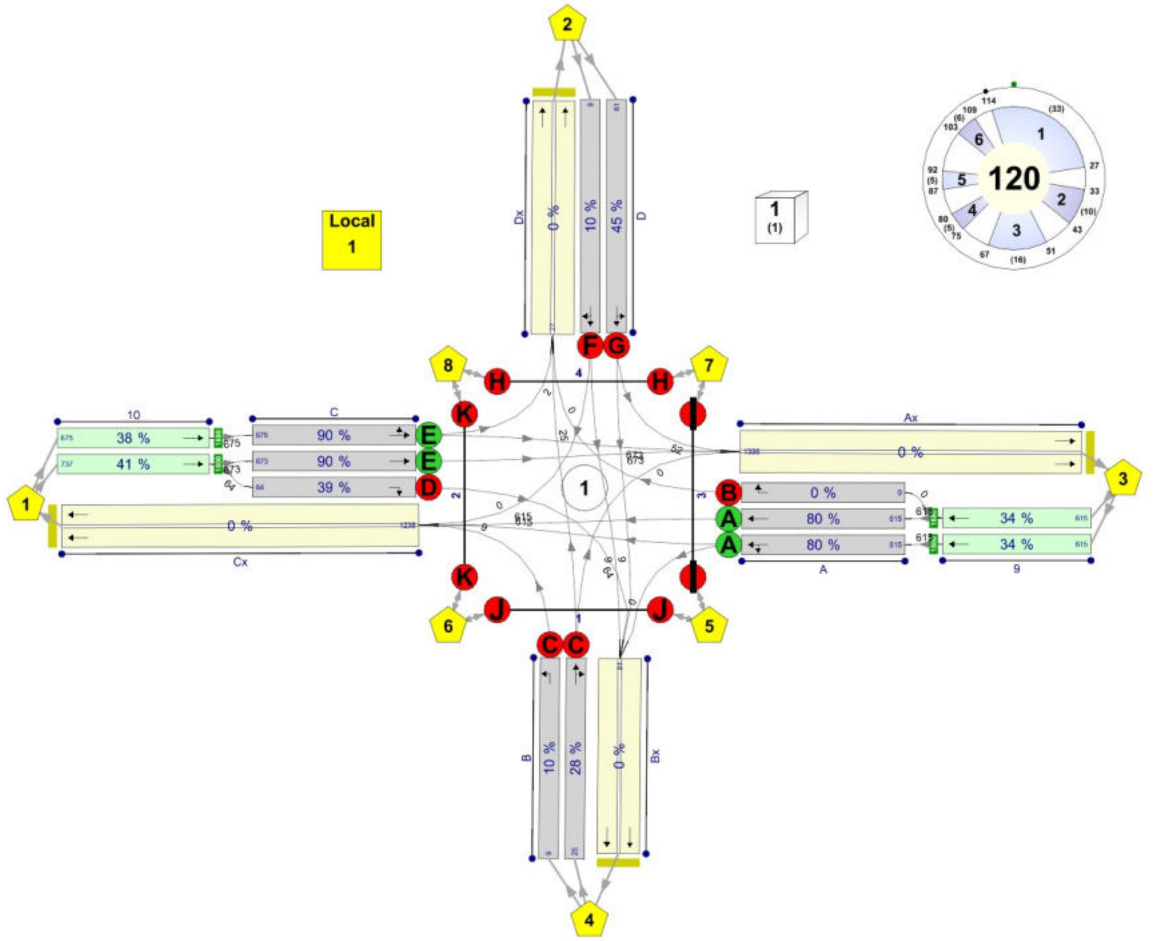
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 3
D1 - 2028 "with development", AM

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 04:34:05	28/04/2022 04:34:09	4.56	08:00	120	941.77	63.85	90.00	C/1	0	0	C/1	10/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 3			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development"	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	193.07						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.92						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.61						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.11						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	615	615
	2	615	615
	3	0	0
Ax	1	1398	1398
B	1	9	9
	2	25	25
Bx	1	81	81
C	1	675	675
	2	673	673
	3	64	64
Cx	1	1238	1238
D	1	61	61
	2	9	9
Dx	1	27	27
9	1	615	615
	2	615	615
10	1	675	675
	2	737	737

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.17	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.87	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.83	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.49	30.00	✓	Offside	48.18
Ax	1	2	C/2	Ax/1	23.17	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.87	30.00	✓	Nearside	35.15
Cx	1	2	A/2	Cx/1	23.83	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.49	30.00	✓	Nearside	31.19
Ax	1	3	C/1	Ax/1	23.17	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.87	30.00	✓	Offside	52.02
Cx	1	3	A/1	Cx/1	23.83	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.49	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.17	30.00	✓	Offside	50.08
Bx	1	4	D/2	Bx/1	17.87	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.83	30.00	✓	Nearside	40.07

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	2	1346	64	0	0	0	0
	2	0	0	52	17	0	0	0	0
	3	1229	0	0	0	0	0	0	0
	4	9	25	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	9
	10		2	3	D/1, Ax/1	Normal	52
	11		3	2	9/2, A/3, Dx/1	Normal	0
	12		3	1	9/2, A/2, Cx/1	Normal	615
	13		3	1	9/1, A/1, Cx/1	Normal	615
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Normal	673
	20		1	4	10/2, C/3, Bx/1	Normal	64
	21		1	3	10/1, C/1, Ax/1	Normal	673
	43		4	1	B/1, Cx/1	Normal	9
	44		1	2	10/1, C/1, Dx/1	Normal	2
	45		2	1	D/2, Cx/1	Normal	0
	46		4	2	B/2, Dx/1	Normal	25
	47		4	3	B/2, Ax/1	Normal	0
	48		2	4	D/2, Bx/1	Normal	9

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		1	NetworkDefault	120	75

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	(ALL)	(untitled)	5	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	E, A	1	1	100
	2	E, D	1	1	100
	3	A, B	1	1	100
	4	F, G	1	1	100
	5	C	1	1	100
	6	H, I, J, K	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	27, 43, 67, 80, 92, 109	75	

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	9	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	10	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	10	8	10
	2	8	0	8	10	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	9	9	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	114	27	33	1	5
	2	✓	2	E,D	33	43	10	1	5
	3	✓	3	A,B	51	67	16	1	5
	4	✓	4	F,G	75	80	5	1	5
	5	✓	5	C	87	92	5	1	5
	6	✓	6	H,I,J,K	103	109	6	1	5

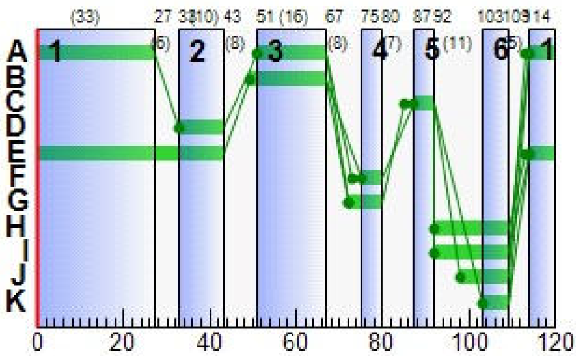
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	51	67	16
		2	✓	114	27	33
	B	1	✓	49	67	18
	C	1	✓	87	92	5
	D	1	✓	33	43	10
	E	1	✓	114	43	49
	F	1	✓	75	80	5
	G	1	✓	72	80	8
	H	1	✓	92	109	17
	I	1	✓	92	109	17
	J	1	✓	98	109	11
	K	1	✓	103	109	6

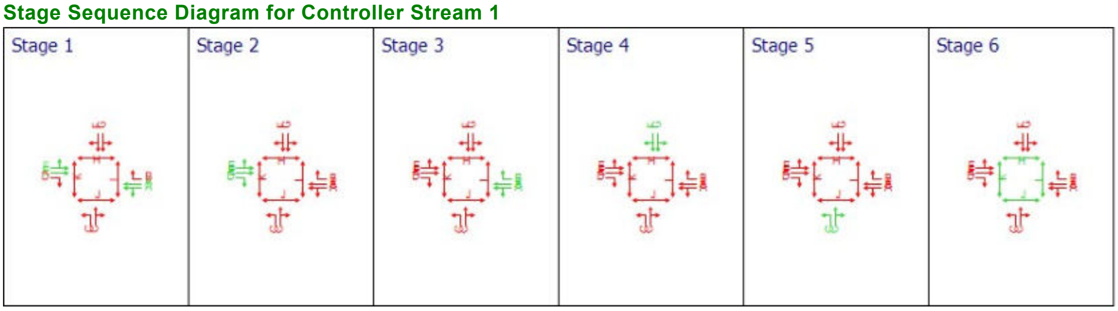
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	51	67	16	114	27	33
A	2	1	1	A	51	67	16	114	27	33
A	3	1	1	B	49	67	18			
B	1	1	1	C	87	92	5			
B	2	1	1	C	87	92	5			
C	1	1	1	E	114	43	49			
C	2	1	1	E	114	43	49			
C	3	1	1	D	33	43	10			
D	1	1	1	G	72	80	8			
D	2	1	1	F	75	80	5			

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

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	615 <	1800	49	0.00	80	24	33.48	26.09	97.96	13.38 +
	2		1	1	A	615 <	1800	49	0.00	80	24	33.48	26.09	97.96	13.38 +
	3		1	1	B	0	1800	18	19.00	0	Unrestricted	0.00	0.00	0.00	0.00
Ax	1	(untitled)				1398	Unrestricted	120	25.00	0	Unrestricted	23.17	0.00	0.00	0.00
B	1	(untitled)	1	1	C	9	1800	5	5.00	10	900	64.24	56.84	95.85	0.29
	2	(untitled)	1	1	C	25	1800	5	4.00	28	260	69.99	62.60	101.09	0.85
Bx	1	(untitled)				82	Unrestricted	120	89.00	0	Unrestricted	17.87	0.00	0.00	0.00
C	1	(untitled)	1	1	E	675 <	1800	49	0.00	90	11	59.54	51.95	106.45	24.43 +
	2		1	1	E	673 <	1800	49	0.00	90	11	59.02	51.43	106.01	24.27 +
	3		1	1	D	64	1800	10	0.00	39	158	66.06	58.17	98.20	2.13
Cx	1	(untitled)				1239	Unrestricted	120	16.00	0	Unrestricted	23.83	0.00	0.00	0.00
D	1	(untitled)	1	1	G	61	1800	8	0.00	45	121	72.53	63.96	102.82	2.11
	2		1	1	F	9	1800	5	5.00	10	900	65.41	56.84	95.85	0.29
Dx	1	(untitled)				27	Unrestricted	120	107.00	0	Unrestricted	18.49	0.00	0.00	0.00
9	1		1			615	1800	120	16.00	34	193	5.97	0.52	0.00	0.09
	2		1			615	1800	120	16.00	34	193	5.97	0.52	0.00	0.09
10	1		1			675	1800	120	72.00	38	167	6.19	0.60	0.00	0.11
	2		1			737	1800	120	71.00	41	144	6.28	0.69	0.00	0.14

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	826.32	59.08	13.99	20.41	11.13	447.83	35.17	0.00	483.00
Bus									
Tram									
Pedestrians	20.40	36.31	0.56	32.31	0.00	458.78	0.00	0.00	458.78
TOTAL	846.72	95.39	8.88	52.72	11.13	906.60	35.17	0.00	941.77

- *< = 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***

TRANSYT 16

Version: 16.0.1.8473

Filename: Junction 3 - 2028 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 3
Report generation date: 28/04/2022 04:39:55

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 3 - 2028 "with development"			
Network	841.60	57.24	90% (TS C/2)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

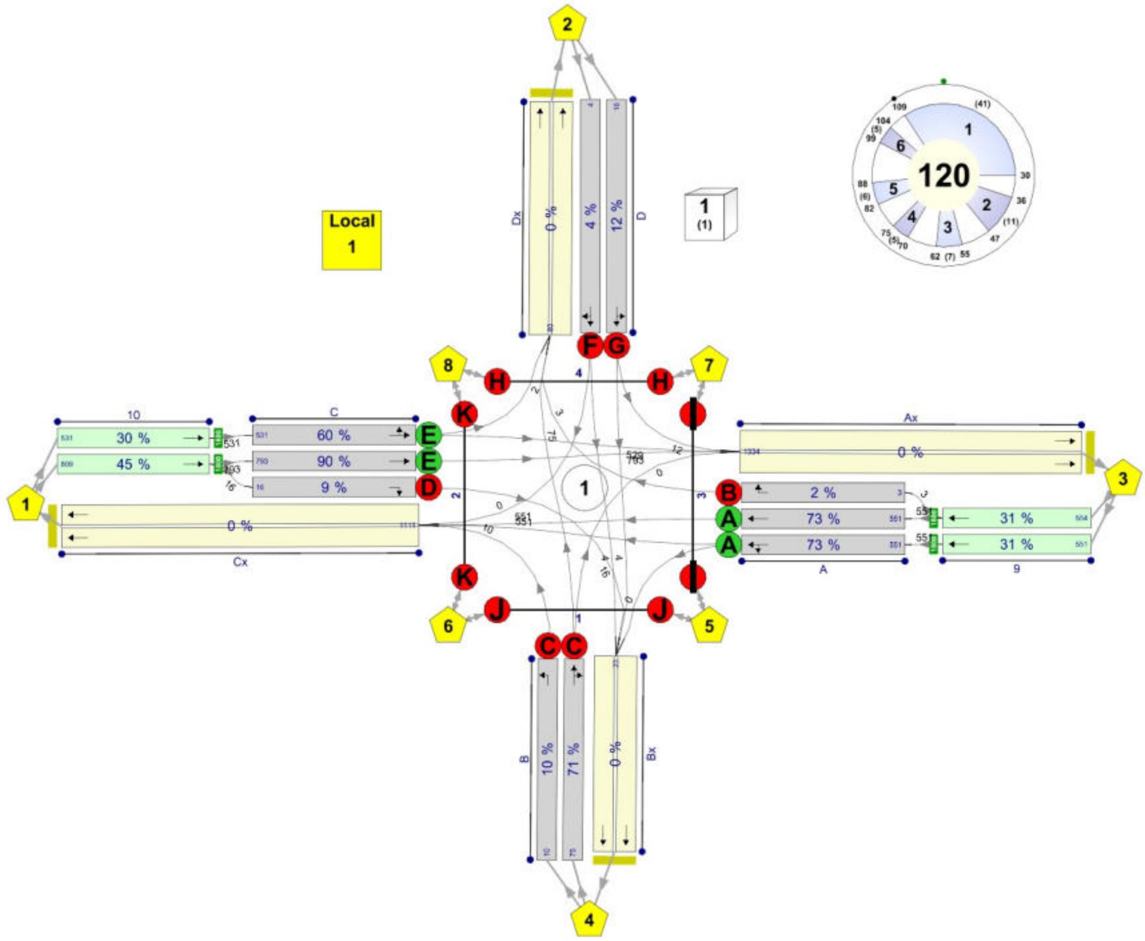
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 3
D1 - 2028 "with development", PM

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 04:37:37	28/04/2022 04:37:42	5.51	17:00	120	841.60	57.24	89.60	C/2	0	0	C/2	10/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 3			✓	D1		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2028 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	193.26						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.24						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.73						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.63						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	551	551
	2	551	551
	3	3	3
Ax	1	1334	1334
B	1	10	10
	2	75	75
Bx	1	23	23
C	1	531	531
	2	793	793
	3	16	16
Cx	1	1111	1111
D	1	16	16
	2	4	4
Dx	1	80	80
9	1	551	551
	2	554	554
10	1	531	531
	2	809	809

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.19	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.79	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.85	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.56	30.00	✓	Offside	47.95
Ax	1	2	C/2	Ax/1	23.19	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.79	30.00	✓	Nearside	34.47
Cx	1	2	A/2	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.56	30.00	✓	Nearside	30.96
Ax	1	3	C/1	Ax/1	23.19	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.79	30.00	✓	Offside	51.34
Cx	1	3	A/1	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.56	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.19	30.00	✓	Offside	50.69
Bx	1	4	D/2	Bx/1	17.79	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.85	30.00	✓	Nearside	39.46

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	2	1322	16	0	0	0	0
	2	0	0	12	7	0	0	0	0
	3	1101	3	0	0	0	0	0	0
	4	10	75	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	4
	10		2	3	D/1, Ax/1	Normal	12
	11		3	2	9/2, A/3, Dx/1	Normal	3
	12		3	1	9/2, A/2, Cx/1	Normal	551
	13		3	1	9/1, A/1, Cx/1	Normal	551
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Percentage	793
	20		1	4	10/2, C/3, Bx/1	Normal	16
	21		1	3	10/1, C/1, Ax/1	Percentage	529
	43		4	1	B/1, Cx/1	Normal	10
	44		1	2	10/1, C/1, Dx/1	Normal	2
	45		2	1	D/2, Cx/1	Normal	0
	46		2	4	D/2, Bx/1	Normal	4
	47		4	2	B/2, Dx/1	Normal	75
	48		4	3	B/2, Ax/1	Normal	0

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		1	NetworkDefault	120	75

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	(ALL)	(untitled)	5	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	E, A	1	1	100
	2	E, D	1	1	100
	3	A, B	1	1	100
	4	F, G	1	1	100
	5	C	1	1	100
	6	H, I, J, K	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	30, 47, 62, 75, 88, 104	75	

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	8	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	9	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	9	8	10
	2	8	0	8	9	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	8	8	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	109	30	41	1	5
	2	✓	2	E,D	36	47	11	1	5
	3	✓	3	A,B	55	62	7	1	5
	4	✓	4	F,G	70	75	5	1	5
	5	✓	5	C	82	88	6	1	5
	6	✓	6	H,I,J,K	99	104	5	1	5

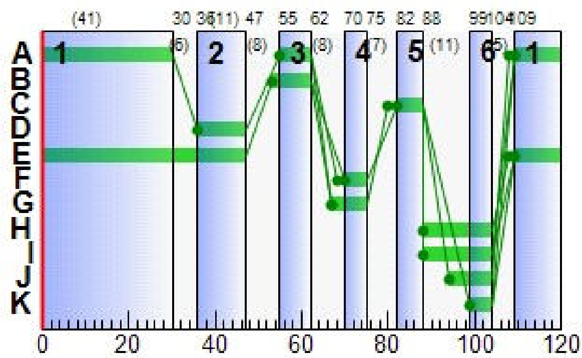
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	55	62	7
		2	✓	109	30	41
	B	1	✓	53	62	9
	C	1	✓	82	88	6
	D	1	✓	36	47	11
	E	1	✓	109	47	58
	F	1	✓	70	75	5
	G	1	✓	67	75	8
	H	1	✓	88	104	16
	I	1	✓	88	104	16
	J	1	✓	94	104	10
	K	1	✓	99	104	5

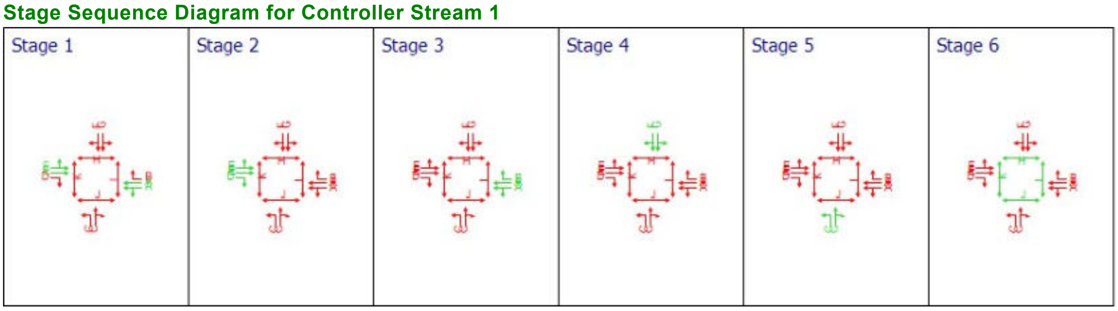
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	55	62	7	109	30	41
A	2	1	1	A	55	62	7	109	30	41
A	3	1	1	B	53	62	9			
B	1	1	1	C	82	88	6			
B	2	1	1	C	82	88	6			
C	1	1	1	E	109	47	58			
C	2	1	1	E	109	47	58			
C	3	1	1	D	36	47	11			
D	1	1	1	G	67	75	8			
D	2	1	1	F	70	75	5			

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	551 <	1800	48	0.00	73	23	33.32	25.94	87.30	12.31 +
	2		1	1	A	551 <	1800	48	0.00	73	23	33.32	25.94	87.30	12.31 +
	3		1	1	B	3	1800	9	9.00	2	4400	58.89	51.12	90.68	0.00
Ax	1	(untitled)				1334	Unrestricted	120	30.00	0	Unrestricted	23.19	0.00	0.00	0.00
B	1	(untitled)	1	1	C	10	1800	6	6.00	10	845	62.87	55.48	94.68	0.32
	2	(untitled)	1	1	C	75	1800	6	0.00	71	26	101.84	94.45	126.45	3.25
Bx	1	(untitled)				24	Unrestricted	120	102.00	0	Unrestricted	17.79	0.00	0.00	0.00
C	1	(untitled)	1	1	E	531 <	1800	58	0.00	60	50	32.62	25.03	72.70	13.13 +
	2		1	1	E	793 <	1800	58	0.00	90	0	51.30	43.71	101.21	27.31 +
	3		1	1	D	16	1800	11	11.00	9	913	57.91	50.02	89.82	0.48
Cx	1	(untitled)				1112	Unrestricted	120	18.00	0	Unrestricted	23.85	0.00	0.00	0.00
D	1	(untitled)	1	1	G	16	1800	8	8.00	12	659	62.16	53.59	93.00	0.50
	2		1	1	F	4	1800	5	5.00	4	1925	64.13	55.55	94.79	0.13
Dx	1	(untitled)				80	Unrestricted	120	99.00	0	Unrestricted	18.56	0.00	0.00	0.00
9	1		1			551	1800	120	11.00	31	194	5.90	0.44	0.00	0.07
	2		1			554	1800	120	11.00	31	192	5.90	0.44	0.00	0.07
10	1		1			531	1800	120	15.00	30	205	6.00	0.42	0.00	0.06
	2		1			809	1800	120	75.00	45	100	6.40	0.82	0.00	0.18

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	766.87	49.89	15.37	17.15	7.18	345.44	28.72	0.00	374.16
Bus									
Tram									
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	787.27	86.81	9.07	50.06	7.18	812.88	28.72	0.00	841.60

- *< = 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***

TRANSYT 16

Filename: Junction 3 - 2040 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 3
Report generation date: 28/04/2022 04:42:59

Summary of network performance

	AM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 3 - 2040 "with development"			
Network	917.63	62.49	81% (TS C/1)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

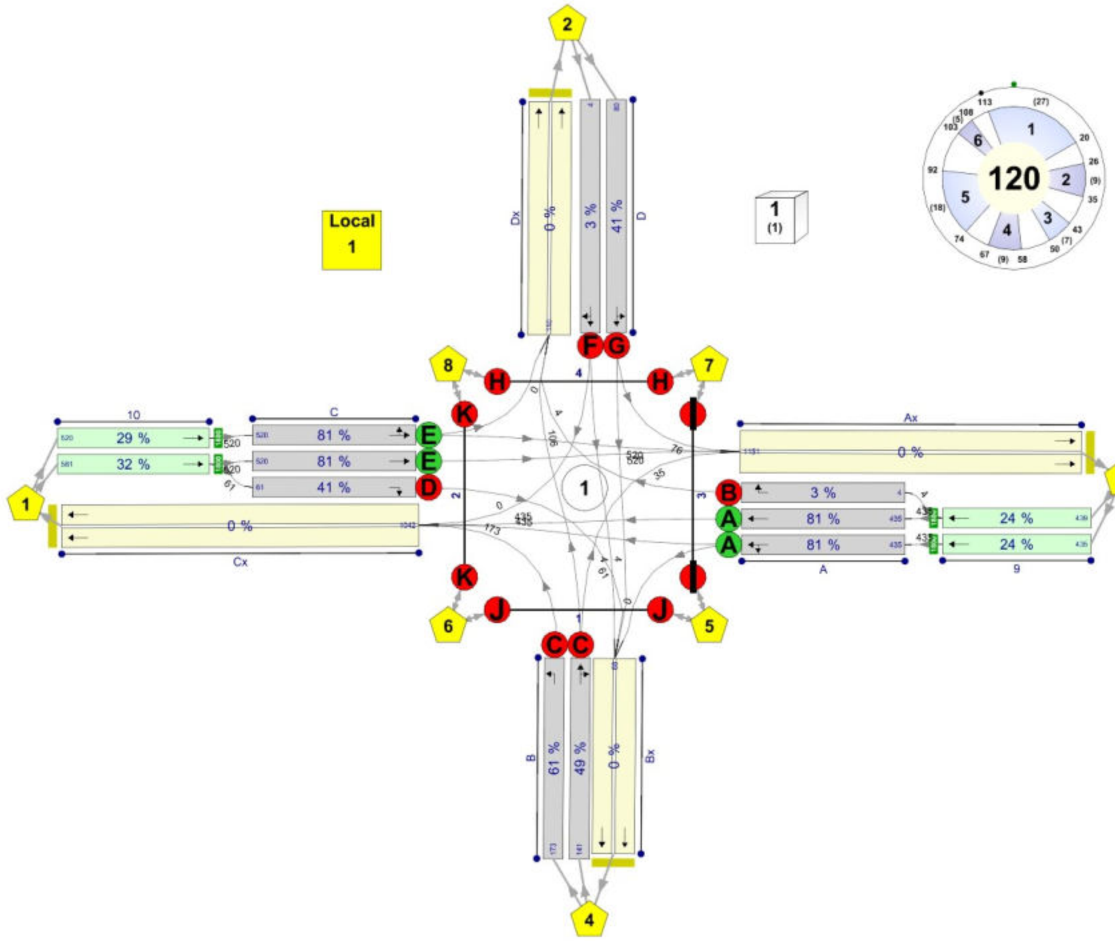
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 3
D2 - 2040 "with development", AM

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 04:40:58	28/04/2022 04:41:01	3.75	08:00	120	917.63	62.49	80.62	C/1	0	0	C/1	10/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 3			✓	D2		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development"	AM	(untitled)			08:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	192.83						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.83						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	199.09						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.64						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	435	435
	2	435	435
	3	4	4
Ax	1	1151	1151
B	1	173	173
	2	141	141
Bx	1	68	68
C	1	520	520
	2	520	520
	3	61	61
Cx	1	1042	1042
D	1	80	80
	2	4	4
Dx	1	110	110
9	1	435	435
	2	439	439
10	1	520	520
	2	581	581

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.14	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.86	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.89	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.56	30.00	✓	Offside	47.95
Ax	1	2	C/2	Ax/1	23.14	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.86	30.00	✓	Nearside	35.16
Cx	1	2	A/2	Cx/1	23.89	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.56	30.00	✓	Nearside	30.95
Ax	1	3	C/1	Ax/1	23.14	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.86	30.00	✓	Offside	52.04
Cx	1	3	A/1	Cx/1	23.89	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.56	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.14	30.00	✓	Offside	48.69
Bx	1	4	D/2	Bx/1	17.86	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.89	30.00	✓	Nearside	40.34

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	1040	61	0	0	0	0
	2	0	0	76	7	0	0	0	0
	3	869	4	0	0	0	0	0	0
	4	173	106	35	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	4
	10		2	3	D/1, Ax/1	Normal	76
	11		3	2	9/2, A/3, Dx/1	Normal	4
	12		3	1	9/2, A/2, Cx/1	Normal	435
	13		3	1	9/1, A/1, Cx/1	Normal	435
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Normal	520
	20		1	4	10/2, C/3, Bx/1	Normal	61
	21		1	3	10/1, C/1, Ax/1	Normal	520
	24		4	2	B/2, Dx/1	Normal	106
	43		4	1	B/1, Cx/1	Normal	173
	44		1	2	10/1, C/1, Dx/1	Normal	0
	45		2	1	D/2, Cx/1	Normal	0
	46		4	3	B/2, Ax/1	Normal	35
	47		2	4	D/2, Bx/1	Normal	4

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		1	NetworkDefault	120	92

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	**A**	(untitled)	5	300	0	0	Unknown
	B	(untitled)	5	300	0	0	Unknown
	C	(untitled)	18	300	0	0	Unknown
	D	(untitled)	5	300	0	0	Unknown
	E	(untitled)	5	300	0	0	Unknown
	F	(untitled)	9	300	0	0	Unknown
	G	(untitled)	9	300	0	0	Unknown
	H	(untitled)	5	300	0	0	Unknown
	I	(untitled)	5	300	0	0	Unknown
	J	(untitled)	5	300	0	0	Unknown
	K	(untitled)	5	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	**1**	E, A	1	1	100
	2	E, D	1	1	100
	3	A, B	1	1	100
	4	F, G	1	1	100
	5	C	1	1	100
	6	H, I, J, K	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	20, 35, 50, 67, 92, 108	92	

Intergreen Matrix for Controller Stream 1

		To										
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
From	**A**			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	9	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	10	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	10	8	10
	2	8	0	8	10	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	9	9	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	113	20	27	1	5
	2	✓	2	E,D	26	35	9	1	5
	3	✓	3	A,B	43	50	7	1	5
	4	✓	4	F,G	58	67	9	1	9
	5	✓	5	C	74	92	18	1	18
	6	✓	6	H,I,J,K	103	108	5	1	5

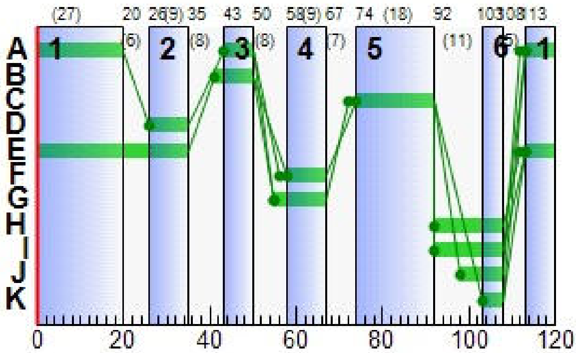
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	43	50	7
		2	✓	113	20	27
	B	1	✓	41	50	9
	C	1	✓	74	92	18
	D	1	✓	26	35	9
	E	1	✓	113	35	42
	F	1	✓	58	67	9
	G	1	✓	55	67	12
	H	1	✓	92	108	16
	I	1	✓	92	108	16
	J	1	✓	98	108	10
	K	1	✓	103	108	5

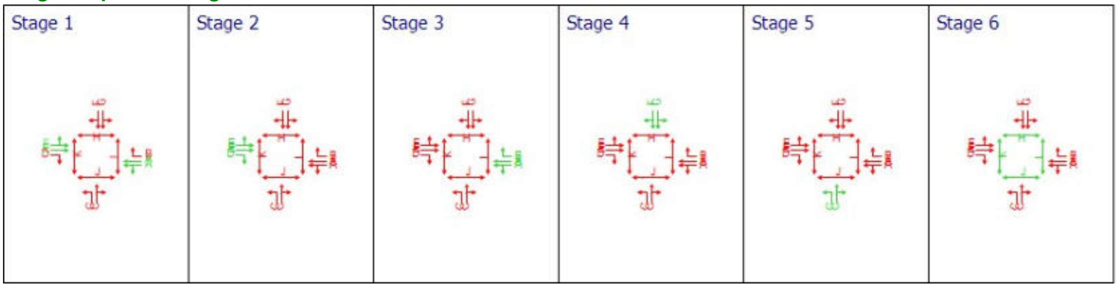
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	**1**	1	1	A	43	50	7	113	20	27
A	**2**	1	1	A	43	50	7	113	20	27
A	**3**	1	1	B	41	50	9			
B	**1**	1	1	C	74	92	18			
B	**2**	1	1	C	74	92	18			
C	**1**	1	1	E	113	35	42			
C	**2**	1	1	E	113	35	42			
C	**3**	1	1	D	26	35	9			
D	**1**	1	1	G	55	67	12			
D	**2**	1	1	F	58	67	9			

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

Final Prediction Table

Traffic Stream Results

			SIGNALS			FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	435 <	1800	34	0.00	81	24	44.38	36.99	109.29	11.38 +
	2		1	1	A	435 <	1800	34	0.00	81	24	44.38	36.99	109.29	11.38 +
	3		1	1	B	4	1800	9	9.00	3	3650	58.98	51.20	90.95	0.12
Ax	1	(untitled)				1151	Unrestricted	120	16.00	0	Unrestricted	23.14	0.00	0.00	0.00
B	1	(untitled)	1	1	C	173	1800	18	0.00	61	65	64.00	56.60	99.32	5.79
	2	(untitled)	1	1	C	141	1800	18	0.00	49	102	59.65	52.25	94.87	4.51
Bx	1	(untitled)				69	Unrestricted	120	95.00	0	Unrestricted	17.86	0.00	0.00	0.00
C	1	(untitled)	1	1	E	520 <	1800	42	0.00	81	24	53.51	45.92	97.40	17.21 +
	2		1	1	E	520 <	1800	42	0.00	81	24	53.51	45.92	97.40	17.21 +
	3		1	1	D	61	1800	9	0.00	41	146	68.21	60.33	99.84	2.05
Cx	1	(untitled)				1043	Unrestricted	120	4.00	0	Unrestricted	23.89	0.00	0.00	0.00
D	1	(untitled)	1	1	G	80	1800	12	0.00	41	144	64.86	56.29	96.75	2.61
	2		1	1	F	4	1800	9	9.00	3	3650	59.78	51.20	90.95	0.12
Dx	1	(untitled)				110	Unrestricted	120	91.00	0	Unrestricted	18.56	0.00	0.00	0.00
9	1		1			435	1800	120	6.00	24	314	5.77	0.32	0.00	0.04
	2		1			439	1800	120	6.00	24	310	5.78	0.32	0.00	0.04
10	1		1			520	1800	120	43.00	29	246	5.99	0.41	0.00	0.06
	2		1			581	1800	120	43.00	32	210	6.06	0.48	0.00	0.08

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	696.84	52.80	13.20	21.96	7.61	419.91	30.28	0.00	450.19
Bus									
Tram									
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	717.24	89.72	7.99	54.88	7.61	887.35	30.28	0.00	917.63

- *< = 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***

TRANSYT 16

Filename: Junction 3 - 2040 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 3
Report generation date: 28/04/2022 04:45:56

Summary of network performance

	PM			
	PI (£ per hr)	Total delay (PCU-hr/hr)	Highest DOS	Number oversaturated
	Junction 3 - 2040 "with development"			
Network	845.04	57.66	88% (TS C/2)	0 (0%)

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
Description	

Model and Results

Enable controller offsets	Enable fuel consumption	Enable quick flares	Display journey time results	Display OD matrix distances	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	c m
			✓			✓		✓	✓						

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

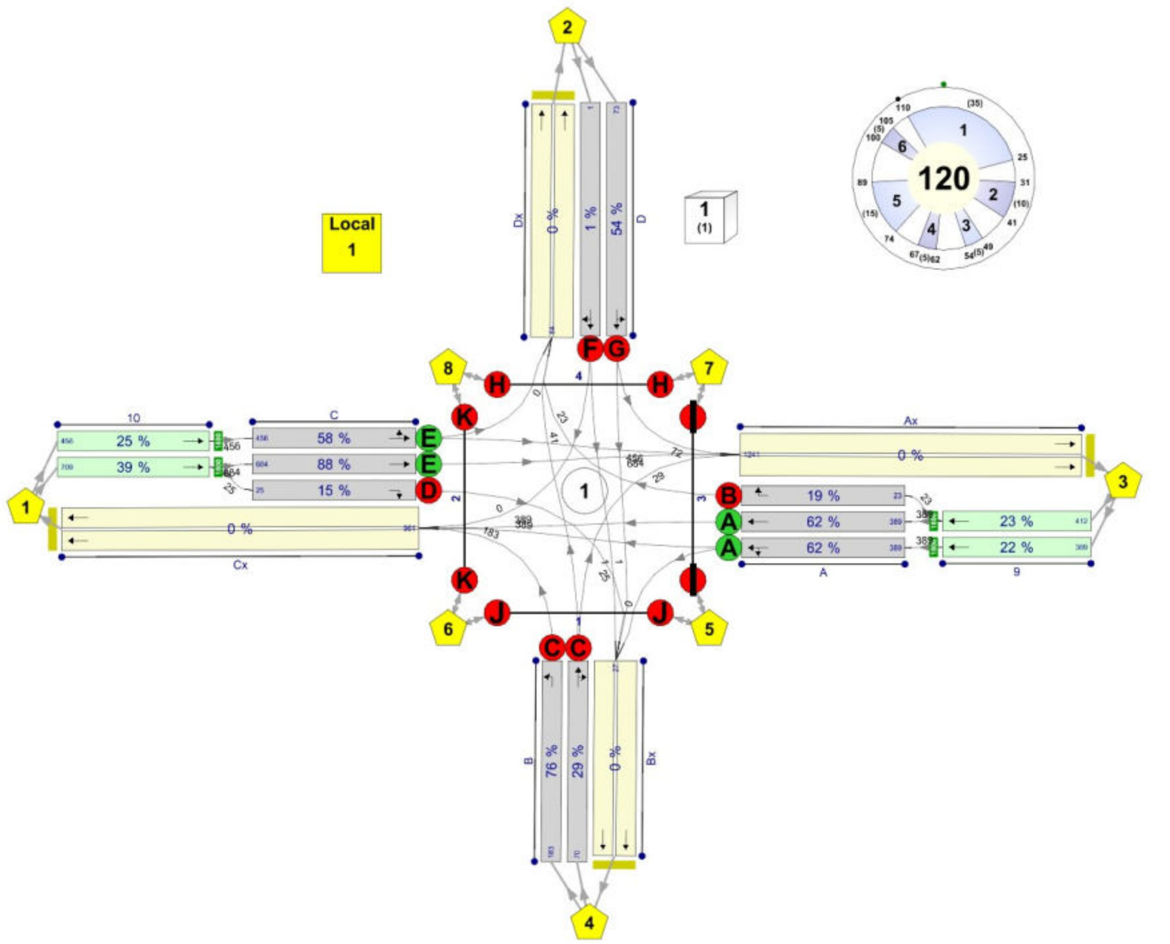
Sorting

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	✓

Simulation options

Criteria type	Stop criteria (%)	Stop criteria time (s)	Stop criteria number of trials	Random seed	Results refresh speed (s)	Average animation capture interval (s)	Use quick response	Do flow sampling	Uniform vehicle generation	Last run random seed	Last run number of trials	Last run time taken (s)
Delay	1.00	10000	10000	-1	3	60	✓			0	0	0.00

Network Diagrams



(untitled)
Diagram produced using TRANSYT 16.0.1.8473

A1 - Junction 3
D2 - 2040 "with development", PM

Summary

Data Errors and Warnings

No errors or warnings

Run Summary

Analysis set used	Run start time	Run finish time	Run duration (s)	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 wi wors unsignal PRC
1	28/04/2022 04:43:56	28/04/2022 04:44:00	4.33	17:00	120	845.04	57.66	87.69	C/2	0	0	C/2	10/2

Analysis Set Details

Name	Use Simulation	Description	Use specific Demand Set(s)	Specific Demand Set(s)	Optimise specific Demand Set(s)	Include in report	Locked
Junction 3			✓	D2		✓	

Demand Set Details

Scenario name	Time Period name	Description	Composite	Demand sets	Start time (HH:mm)	Locked	Run automatically
2040 "with development"	PM	(untitled)			17:00		✓

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	192.95						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.63						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.79						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.72						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	389	389
	2	389	389
	3	23	23
Ax	1	1241	1241
B	1	183	183
	2	70	70
Bx	1	27	27
C	1	456	456
	2	684	684
	3	25	25
Cx	1	961	961
D	1	73	73
	2	1	1
Dx	1	64	64
9	1	389	389
	2	412	412
10	1	456	456
	2	709	709

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.15	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.84	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.85	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.57	30.00	✓	Offside	48.16
Ax	1	2	C/2	Ax/1	23.15	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.84	30.00	✓	Nearside	34.92
Cx	1	2	A/2	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.57	30.00	✓	Nearside	31.17
Ax	1	3	C/1	Ax/1	23.15	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.84	30.00	✓	Offside	51.79
Cx	1	3	A/1	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.57	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.15	30.00	✓	Offside	49.38
Bx	1	4	D/2	Bx/1	17.84	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.85	30.00	✓	Nearside	40.34

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	Limit paths by flow	Low path flow threshold
1	(untitled)	✓	✓	Path Equalisation	✓		✓			✓	1.25				

Normal Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	1140	25	0	0	0	0
	2	0	0	72	2	0	0	0	0
	3	778	23	0	0	0	0	0	0
	4	183	41	29	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	1
	10		2	3	D/1, Ax/1	Normal	72
	11		3	2	9/2, A/3, Dx/1	Normal	23
	12		3	1	9/2, A/2, Cx/1	Normal	389
	13		3	1	9/1, A/1, Cx/1	Normal	389
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Percentage	684
	20		1	4	10/2, C/3, Bx/1	Normal	25
	21		1	3	10/1, C/1, Ax/1	Percentage	456
	24		4	2	B/2, Dx/1	Normal	41
	43		4	1	B/1, Cx/1	Normal	183
	44		1	2	10/1, C/1, Dx/1	Normal	0
	45		2	1	D/2, Cx/1	Normal	0
	46		4	3	B/2, Ax/1	Normal	29
	47		2	4	D/2, Bx/1	Normal	1

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

Signal Timings

Network Default: 120s cycle time; 120 steps

Controller Stream 1

Controller Stream	Name	Description	Use sequence	Cycle time source	Cycle time (s)	Minimum possible cycle time (s)
1	(untitled)		1	NetworkDefault	120	85

Controller Stream 1 - Properties

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

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	Street minimum green (s)	Maximum green (s)	Relative start displacement (s)	Relative end displacement (s)	Type
1	A	(untitled)	5	300	0	0	Unknown
	B	(untitled)	5	300	0	0	Unknown
	C	(untitled)	15	300	0	0	Unknown
	D	(untitled)	5	300	0	0	Unknown
	E	(untitled)	5	300	0	0	Unknown
	F	(untitled)	5	300	0	0	Unknown
	G	(untitled)	5	300	0	0	Unknown
	H	(untitled)	5	300	0	0	Unknown
	I	(untitled)	5	300	0	0	Unknown
	J	(untitled)	5	300	0	0	Unknown
	K	(untitled)	5	300	0	0	Unknown

Library Stages

Controller Stream	Library Stage	Phases in stage	User stage minimum (s)	Run every N cycles	Probability of running (%)
1	1	E, A	1	1	100
	2	E, D	1	1	100
	3	A, B	1	1	100
	4	F, G	1	1	100
	5	C	1	1	100
	6	H, I, J, K	1	1	100

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends	Minimum possible cycle time (s)	Exclude from analysis
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	25, 41, 54, 67, 89, 105	85	

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	8	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	9	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	9	8	10
	2	8	0	8	9	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	8	8	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	110	25	35	1	5
	2	✓	2	E,D	31	41	10	1	5
	3	✓	3	A,B	49	54	5	1	5
	4	✓	4	F,G	62	67	5	1	5
	5	✓	5	C	74	89	15	1	15
	6	✓	6	H,I,J,K	100	105	5	1	5

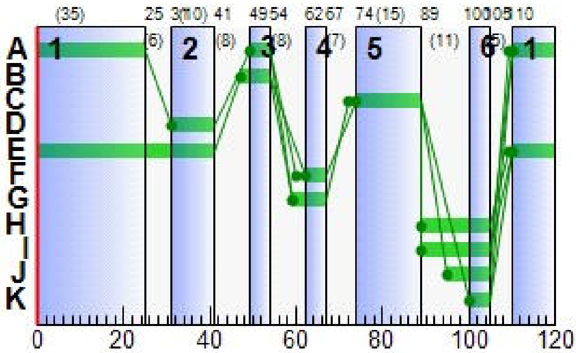
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	49	54	5
		2	✓	110	25	35
	B	1	✓	47	54	7
	C	1	✓	74	89	15
	D	1	✓	31	41	10
	E	1	✓	110	41	51
	F	1	✓	62	67	5
	G	1	✓	59	67	8
	H	1	✓	89	105	16
	I	1	✓	89	105	16
	J	1	✓	95	105	10
	K	1	✓	100	105	5

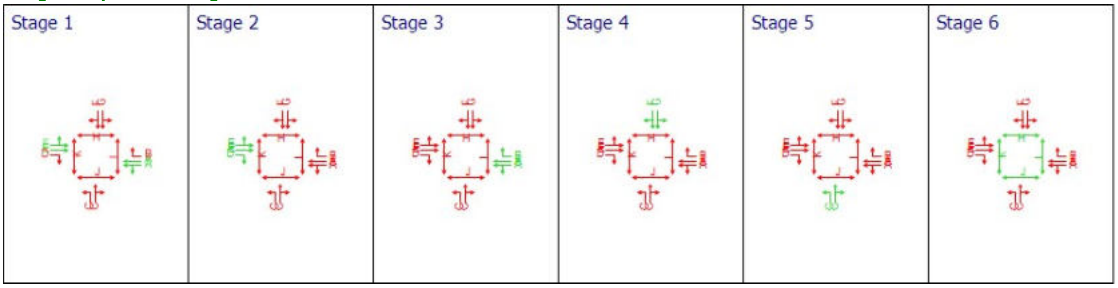
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	49	54	5	110	25	35
A	2	1	1	A	49	54	5	110	25	35
A	3	1	1	B	47	54	7			
B	1	1	1	C	74	89	15			
B	2	1	1	C	74	89	15			
C	1	1	1	E	110	41	51			
C	2	1	1	E	110	41	51			
C	3	1	1	D	31	41	10			
D	1	1	1	G	59	67	8			
D	2	1	1	F	62	67	5			

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	389	1800	40	0.00	62	62	31.57	24.19	84.01	8.19
	2		1	1	A	389	1800	40	0.00	62	62	31.57	24.19	84.01	8.19
	3		1	1	B	23	1800	7	6.00	19	422	64.34	56.56	96.11	0.74
Ax	1	(untitled)				1241	Unrestricted	120	16.00	0	Unrestricted	23.15	0.00	0.00	0.00
B	1	(untitled)	1	1	C	183	1800	15	0.00	76	31	80.14	72.74	112.78	6.99
	2	(untitled)	1	1	C	70	1800	15	0.00	29	243	57.38	49.98	91.51	2.16
Bx	1	(untitled)				27	Unrestricted	120	107.00	0	Unrestricted	17.84	0.00	0.00	0.00
C	1	(untitled)	1	1	E	456 <	1800	51	0.00	58	71	36.63	29.03	76.60	11.94 +
	2		1	1	E	684 <	1800	51	0.00	88	14	53.92	46.32	101.49	23.61 +
	3		1	1	D	25	1800	10	9.00	15	560	60.10	52.22	92.29	0.78
Cx	1	(untitled)				961	Unrestricted	120	5.00	0	Unrestricted	23.85	0.00	0.00	0.00
D	1	(untitled)	1	1	G	73	1800	8	0.00	54	85	77.38	68.81	107.18	2.64
	2		1	1	F	1	1800	5	5.00	1	8900	63.42	54.85	94.01	0.00
Dx	1	(untitled)				64	Unrestricted	120	88.00	0	Unrestricted	18.57	0.00	0.00	0.00
9	1		1			389	1800	120	0.00	22	363	5.73	0.28	0.00	0.03
	2		1			412	1800	120	0.00	23	337	5.75	0.30	0.00	0.03
10	1		1			456	1800	120	8.00	25	295	5.93	0.34	0.00	0.04
	2		1			709	1800	120	67.00	39	154	6.24	0.65	0.00	0.13

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	679.08	47.38	14.33	18.66	6.08	351.37	26.23	0.00	377.60
Bus									
Tram									
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	699.48	84.30	8.30	51.58	6.08	818.81	26.23	0.00	845.04

- *< = 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***

TRANSYT 15

Version: 15.5.2.7994

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

Filename: Junction 4 - 2028 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 4.1
Report generation date: 29/04/2022 14:53:29

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
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
			✓		✓		✓	✓					

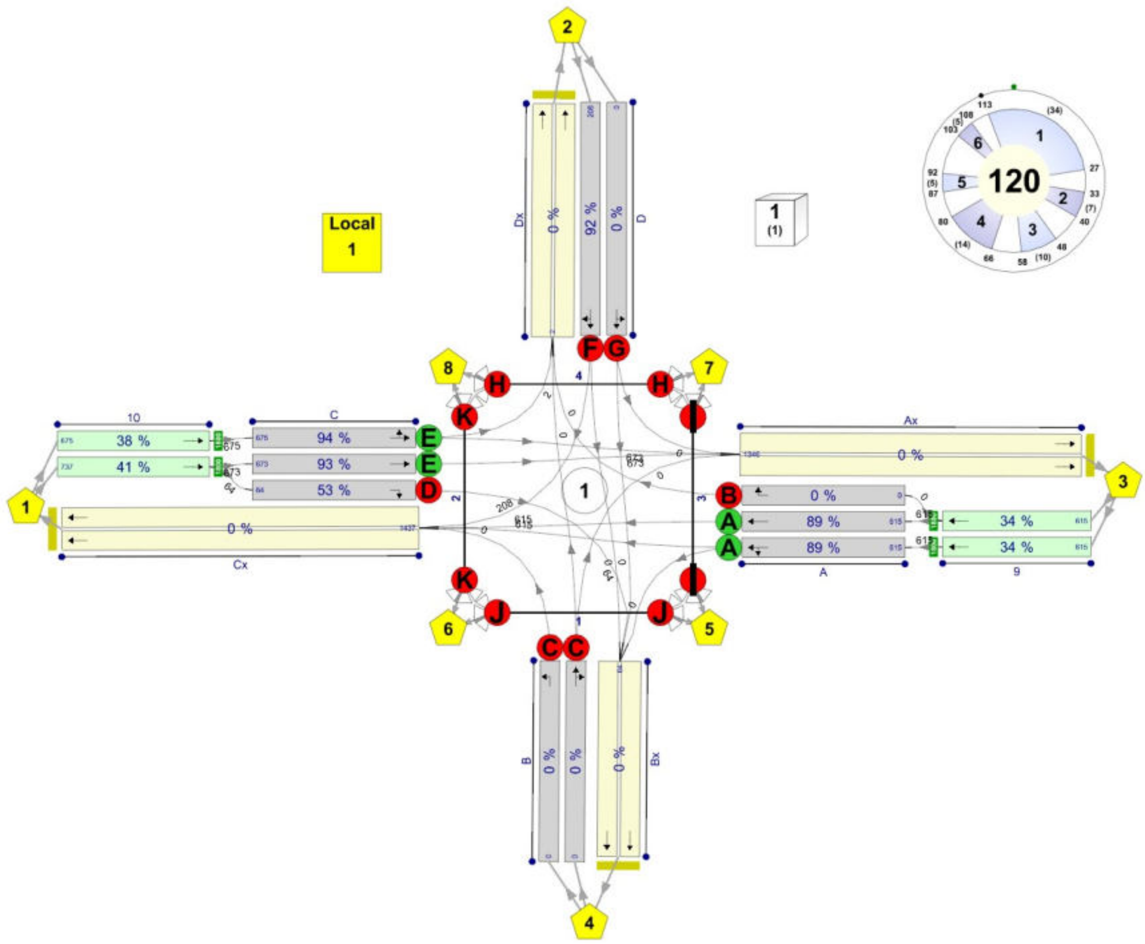
Units

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



(untitled)
Diagram produced using TRANSYT 15.5.2.7994

A1 - Junction 4
D1 - 2028 "with development", 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	Ite wit wor over PR
1	29/04/2022 14:51:38	29/04/2022 14:51:39	08:00	120	1160.55	78.73	93.75	C/1	0	0	C/1	10/2	C/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
Junction 4		D1	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2028 "with development", AM	(untitled)			08:00	

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	193.07						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.92						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.61						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.11						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	615	615
	2	615	615
	3	0	0
Ax	1	1346	1346
B	1	0	0
	2	0	0
Bx	1	64	64
C	1	675	675
	2	673	673
	3	64	64
Cx	1	1437	1437
D	1	0	0
	2	208	208
Dx	1	2	2
9	1	615	615
	2	615	615
10	1	675	675
	2	737	737

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.17	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.87	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.83	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.49	30.00	✓	Offside	48.18
Ax	1	2	C/2	Ax/1	23.17	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.87	30.00	✓	Nearside	35.15
Cx	1	2	A/2	Cx/1	23.83	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.49	30.00	✓	Nearside	31.19
Ax	1	3	C/1	Ax/1	23.17	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.87	30.00	✓	Offside	52.02
Cx	1	3	A/1	Cx/1	23.83	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.49	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.17	30.00	✓	Offside	50.08
Bx	1	4	D/2	Bx/1	17.87	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.83	30.00	✓	Nearside	40.07

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	5	6	7	8
From	1	0	2	1346	64	0	0	0	0
	2	208	0	0	0	0	0	0	0
	3	1229	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	0
	10		2	3	D/1, Ax/1	Normal	0
	11		3	2	9/2, A/3, Dx/1	Normal	0
	12		3	1	9/2, A/2, Cx/1	Normal	615
	13		3	1	9/1, A/1, Cx/1	Normal	615
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Normal	673
	20		1	4	10/2, C/3, Bx/1	Normal	64
	21		1	3	10/1, C/1, Ax/1	Normal	673
	43		4	1	B/1, Cx/1	Normal	0
	44		1	2	10/1, C/1, Dx/1	Normal	2
	45		2	1	D/2, Cx/1	Normal	208
	46		4	2	B/2, Dx/1	Normal	0
	47		4	3	B/2, Ax/1	Normal	0
	48		2	4	D/2, Bx/1	Normal	0

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

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						Relative

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	(ALL)	(untitled)	5	300	0	0	Unknown

Library Stages

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

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	27, 40, 58, 80, 92, 108

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	9	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	10	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	10	8	10
	2	8	0	8	10	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	9	9	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	113	27	34	1	5
	2	✓	2	E,D	33	40	7	1	5
	3	✓	3	A,B	48	58	10	1	5
	4	✓	4	F,G	66	80	14	1	5
	5	✓	5	C	87	92	5	1	5
	6	✓	6	H,I,J,K	103	108	5	1	5

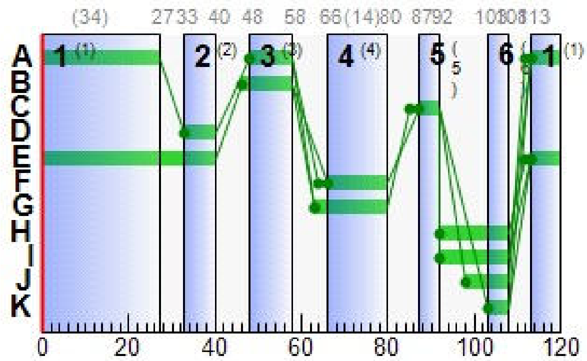
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	48	58	10
		2	✓	113	27	34
	B	1	✓	46	58	12
	C	1	✓	87	92	5
	D	1	✓	33	40	7
	E	1	✓	113	40	47
	F	1	✓	66	80	14
	G	1	✓	63	80	17
	H	1	✓	92	108	16
	I	1	✓	92	108	16
	J	1	✓	98	108	10
	K	1	✓	103	108	5

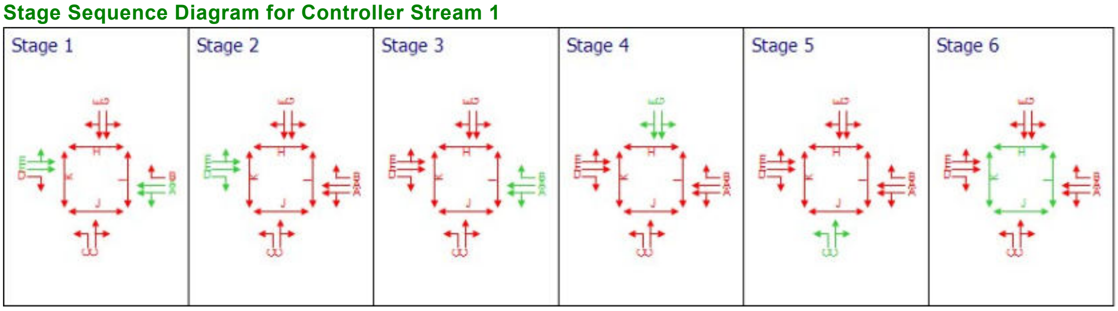
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	48	58	10	113	27	34
A	2	1	1	A	48	58	10	113	27	34
A	3	1	1	B	46	58	12			
B	1	1	1	C	87	92	5			
B	2	1	1	C	87	92	5			
C	1	1	1	E	113	40	47			
C	2	1	1	E	113	40	47			
C	3	1	1	D	33	40	7			
D	1	1	1	G	63	80	17			
D	2	1	1	F	66	80	14			

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

Final Prediction Table

Traffic Stream Results

			SIGNALS			FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	615 <	1800	44	0.00	89	12	47.62	40.24	119.01	17.13 +
	2		1	1	A	615 <	1800	44	0.00	89	12	47.62	40.24	119.01	17.13 +
	3		1	1	B	0	1800	12	13.00	0	Unrestricted	0.00	0.00	0.00	0.00
Ax	1	(untitled)				1346	Unrestricted	120	47.00	0	Unrestricted	23.17	0.00	0.00	0.00
B	1	(untitled)	1	1	C	0	1800	5	6.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	C	0	1800	5	6.00	0	Unrestricted	0.00	0.00	0.00	0.00
Bx	1	(untitled)				64	Unrestricted	120	101.00	0	Unrestricted	17.87	0.00	0.00	0.00
C	1	(untitled)	1	1	E	675 <	1800	47	0.00	94	7	71.35	63.75	116.65	27.04 +
	2		1	1	E	673 <	1800	47	0.00	93	7	70.40	62.81	115.76	26.60 +
	3		1	1	D	64	1800	7	0.00	53	88	78.74	70.86	108.96	2.36
Cx	1	(untitled)				1438	Unrestricted	120	10.00	0	Unrestricted	23.83	0.00	0.00	0.00
D	1	(untitled)	1	1	G	0	1800	17	18.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2		1	1	F	208	1800	14	0.00	92	8	124.12	115.54	143.86	10.49
Dx	1	(untitled)				2	Unrestricted	120	120.00	0	Unrestricted	18.49	0.00	0.00	0.00
9	1		1			615	1800	120	38.00	34	193	5.97	0.52	0.00	0.09
	2		1			615	1800	120	38.00	34	193	5.97	0.52	0.00	0.09
10	1		1			675	1800	120	86.00	38	167	6.19	0.60	0.00	0.11
	2		1			737	1800	120	84.00	41	144	6.28	0.69	0.00	0.14

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	857.03	74.38	11.52	24.07	21.74	650.50	42.62	0.00	693.12
Bus	0.00	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	0.00
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	877.43	111.30	7.88	56.98	21.74	1117.93	42.62	0.00	1160.55

- *< = 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***

TRANSYT 15

Version: 15.5.2.7994

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

Filename: Junction 4 - 2028 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 4.1
Report generation date: 29/04/2022 14:48:05

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
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
			✓		✓		✓	✓					

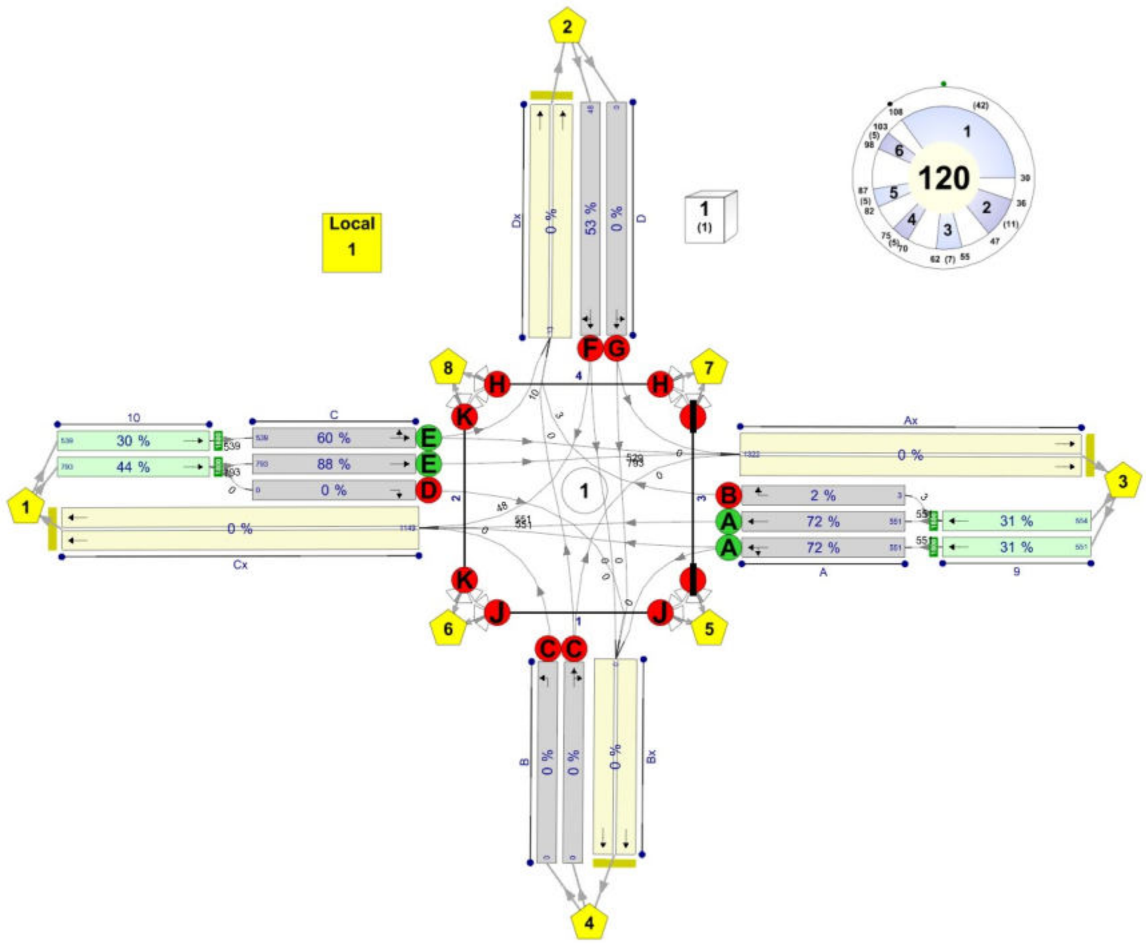
Units

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



(untitled)
Diagram produced using TRANSYT 15.5.2.7994

A1 - Junction 4
D1 - 2028 "with development", 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	Ite wit wor over PR
1	29/04/2022 14:47:56	29/04/2022 14:47:57	17:00	120	801.74	54.55	88.11	C/2	0	0	C/2	10/2	C/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
Junction 4		D1	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2028 "with development", PM	(untitled)			17:00	

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	193.26						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.24						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.73						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Sum of lanes	1800	✓		Normal	
Dx	1	(untitled)		✓	154.63						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			1800
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	551	551
	2	551	551
	3	3	3
Ax	1	1322	1322
B	1	0	0
	2	0	0
Bx	1	0	0
C	1	539	539
	2	793	793
	3	0	0
Cx	1	1149	1149
D	1	0	0
	2	48	48
Dx	1	13	13
9	1	551	551
	2	554	554
10	1	539	539
	2	793	793

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.19	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.79	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.85	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.56	30.00	✓	Offside	47.95
Ax	1	2	C/2	Ax/1	23.19	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.79	30.00	✓	Nearside	34.47
Cx	1	2	A/2	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.56	30.00	✓	Nearside	30.96
Ax	1	3	C/1	Ax/1	23.19	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.79	30.00	✓	Offside	51.34
Cx	1	3	A/1	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.56	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.19	30.00	✓	Offside	50.69
Bx	1	4	D/2	Bx/1	17.79	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.85	30.00	✓	Nearside	39.46

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	5	6	7	8
From	1	0	10	1322	0	0	0	0	0
	2	48	0	0	0	0	0	0	0
	3	1101	3	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	0
	10		2	3	D/1, Ax/1	Normal	0
	11		3	2	9/2, A/3, Dx/1	Normal	3
	12		3	1	9/2, A/2, Cx/1	Normal	551
	13		3	1	9/1, A/1, Cx/1	Normal	551
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Percentage	793
	20		1	4	10/2, C/3, Bx/1	Normal	0
	21		1	3	10/1, C/1, Ax/1	Percentage	529
	43		4	1	B/1, Cx/1	Normal	0
	44		1	2	10/1, C/1, Dx/1	Normal	10
	45		2	1	D/2, Cx/1	Normal	48
	46		2	4	D/2, Bx/1	Normal	0
	47		4	2	B/2, Dx/1	Normal	0
	48		4	3	B/2, Ax/1	Normal	0

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

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						Relative

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	(ALL)	(untitled)	5	300	0	0	Unknown

Library Stages

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

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	30, 47, 62, 75, 87, 103

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	8	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	9	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	9	8	10
	2	8	0	8	9	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	8	8	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	108	30	42	1	5
	2	✓	2	E,D	36	47	11	1	5
	3	✓	3	A,B	55	62	7	1	5
	4	✓	4	F,G	70	75	5	1	5
	5	✓	5	C	82	87	5	1	5
	6	✓	6	H,I,J,K	98	103	5	1	5

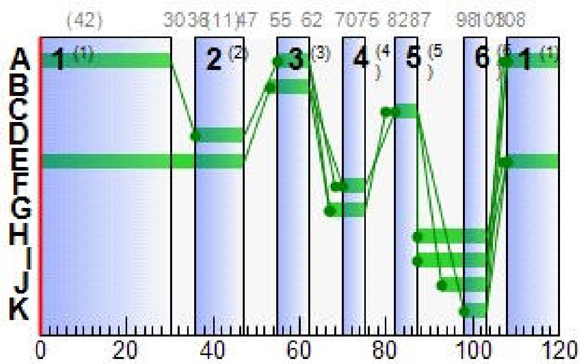
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	55	62	7
		2	✓	108	30	42
	B	1	✓	53	62	9
	C	1	✓	82	87	5
	D	1	✓	36	47	11
	E	1	✓	108	47	59
	F	1	✓	70	75	5
	G	1	✓	67	75	8
	H	1	✓	87	103	16
	I	1	✓	87	103	16
	J	1	✓	93	103	10
	K	1	✓	98	103	5

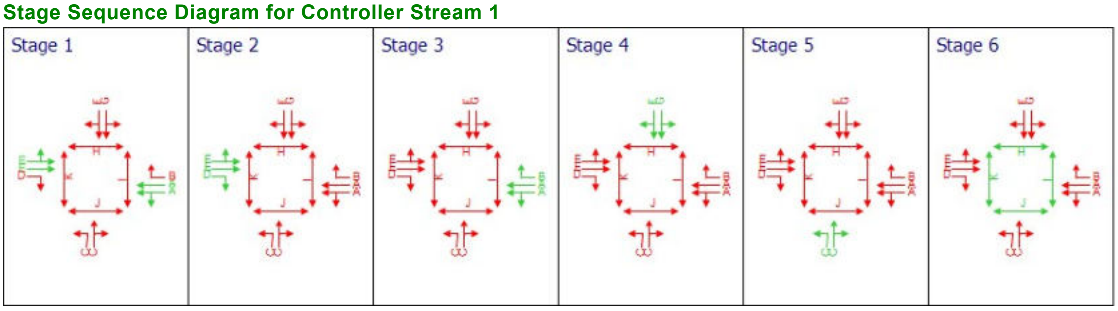
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	55	62	7	108	30	42
A	2	1	1	A	55	62	7	108	30	42
A	3	1	1	B	53	62	9			
B	1	1	1	C	82	87	5			
B	2	1	1	C	82	87	5			
C	1	1	1	E	108	47	59			
C	2	1	1	E	108	47	59			
C	3	1	1	D	36	47	11			
D	1	1	1	G	67	75	8			
D	2	1	1	F	70	75	5			

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

			SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	551 <	1800	49	0.00	72	25	32.14	24.76	85.79	12.07 +
	2		1	1	A	551 <	1800	49	0.00	72	25	32.14	24.76	85.79	12.07 +
	3		1	1	B	3	1800	9	9.00	2	4400	58.89	51.12	90.68	0.00
Ax	1	(untitled)				1322	Unrestricted	120	38.00	0	Unrestricted	23.19	0.00	0.00	0.00
B	1	(untitled)	1	1	C	0	1800	5	6.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	C	0	1800	5	6.00	0	Unrestricted	0.00	0.00	0.00	0.00
Bx	1	(untitled)				0	Unrestricted	120	120.00	0	Unrestricted	0.00	0.00	0.00	0.00
C	1	(untitled)	1	1	E	539 <	1800	59	0.00	60	50	31.98	24.38	71.86	13.17 +
	2		1	1	E	793 <	1800	59	0.00	88	2	48.22	40.62	98.04	26.61 +
	3		1	1	D	0	1800	11	12.00	0	Unrestricted	0.00	0.00	0.00	0.00
Cx	1	(untitled)				1150	Unrestricted	120	17.00	0	Unrestricted	23.85	0.00	0.00	0.00
D	1	(untitled)	1	1	G	0	1800	8	9.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2		1	1	F	48	1800	5	2.00	53	69	86.22	77.64	113.95	1.85
Dx	1	(untitled)				13	Unrestricted	120	120.00	0	Unrestricted	18.56	0.00	0.00	0.00
9	1		1			551	1800	120	9.00	31	194	5.90	0.44	0.00	0.07
	2		1			554	1800	120	9.00	31	192	5.90	0.44	0.00	0.07
10	1		1			539	1800	120	15.00	30	201	6.01	0.43	0.00	0.06
	2		1			793	1800	120	71.00	44	104	6.37	0.79	0.00	0.17

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	754.03	46.76	16.12	15.65	5.98	307.13	27.18	0.00	334.31
Bus	0.00	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	0.00
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	774.43	83.68	9.25	48.57	5.98	774.57	27.18	0.00	801.74

- *< = 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***

TRANSYT 15

Version: 15.5.2.7994

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

Filename: Junction 4 - 2040 AM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 4.1
Report generation date: 29/04/2022 14:56:14

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
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
			✓		✓		✓	✓					

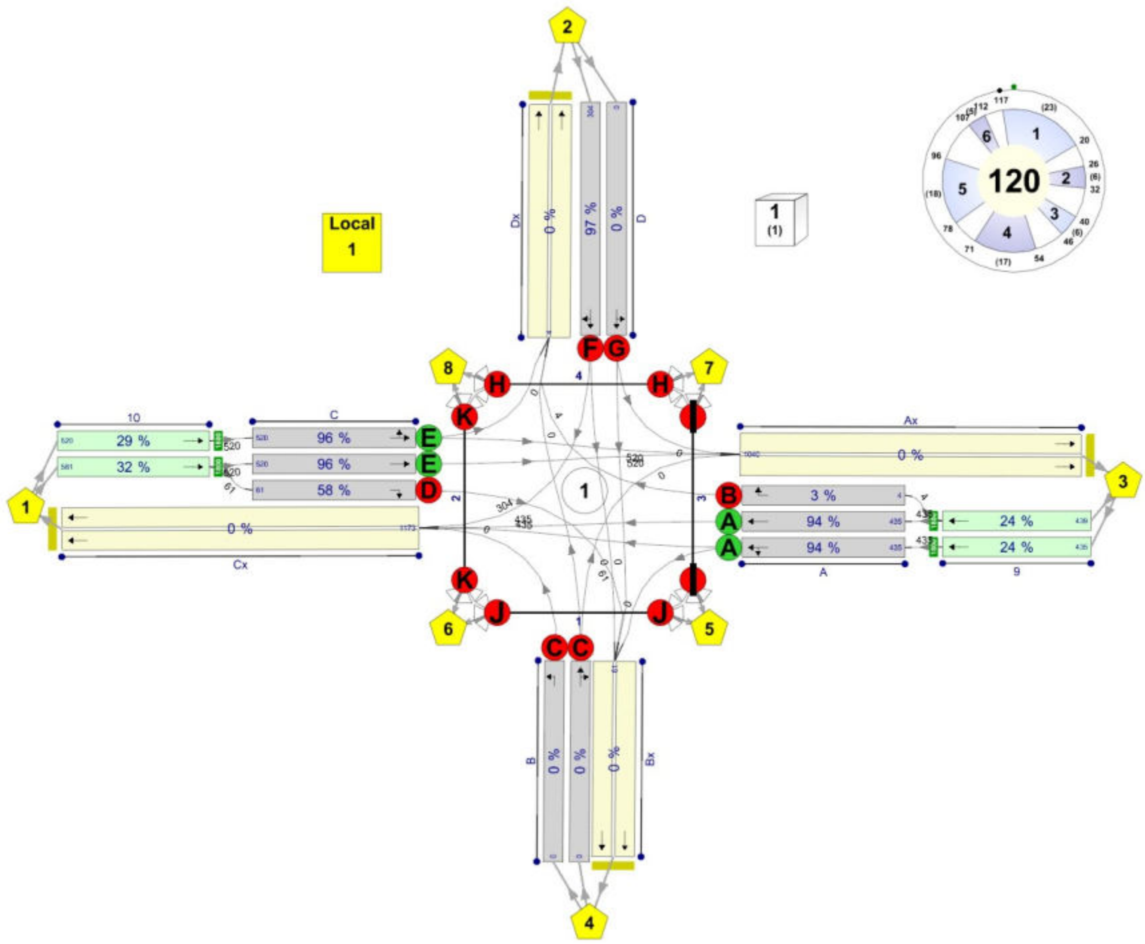
Units

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



(untitled)
Diagram produced using TRANSYT 15.5.2.7994

A1 - Junction 4
D2 - 2040 "with development", 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	Ite wit wor over PR
1	29/04/2022 14:56:07	29/04/2022 14:56:08	08:00	120	1281.30	87.39	96.51	D/2	0	0	D/2	10/2	D/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
Junction 4		D2	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2040 "with development", AM	(untitled)			08:00	

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	192.83						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.83						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	199.09						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Directly entered	2100	✓		Normal	
Dx	1	(untitled)		✓	154.64						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	435	435
	2	435	435
	3	4	4
Ax	1	1040	1040
B	1	0	0
	2	0	0
Bx	1	61	61
C	1	520	520
	2	520	520
	3	61	61
Cx	1	1173	1173
D	1	0	0
	2	304	304
Dx	1	4	4
9	1	435	435
	2	439	439
10	1	520	520
	2	581	581

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.14	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.86	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.89	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.56	30.00	✓	Offside	47.95
Ax	1	2	C/2	Ax/1	23.14	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.86	30.00	✓	Nearside	35.16
Cx	1	2	A/2	Cx/1	23.89	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.56	30.00	✓	Nearside	30.95
Ax	1	3	C/1	Ax/1	23.14	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.86	30.00	✓	Offside	52.04
Cx	1	3	A/1	Cx/1	23.89	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.56	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.14	30.00	✓	Offside	48.69
Bx	1	4	D/2	Bx/1	17.86	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.89	30.00	✓	Nearside	40.34

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	5	6	7	8
From	1	0	0	1040	61	0	0	0	0
	2	304	0	0	0	0	0	0	0
	3	869	4	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	0
	10		2	3	D/1, Ax/1	Normal	0
	11		3	2	9/2, A/3, Dx/1	Normal	4
	12		3	1	9/2, A/2, Cx/1	Normal	435
	13		3	1	9/1, A/1, Cx/1	Normal	435
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Normal	520
	20		1	4	10/2, C/3, Bx/1	Normal	61
	21		1	3	10/1, C/1, Ax/1	Normal	520
	24		4	2	B/2, Dx/1	Normal	0
	43		4	1	B/1, Cx/1	Normal	0
	44		1	2	10/1, C/1, Dx/1	Normal	0
	45		2	1	D/2, Cx/1	Normal	304
	46		4	3	B/2, Ax/1	Normal	0
	47		2	4	D/2, Bx/1	Normal	0

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

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						Relative

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)	5	300	0	0	Unknown
	B	(untitled)	5	300	0	0	Unknown
	C	(untitled)	18	300	0	0	Unknown
	D	(untitled)	5	300	0	0	Unknown
	E	(untitled)	5	300	0	0	Unknown
	F	(untitled)	9	300	0	0	Unknown
	G	(untitled)	9	300	0	0	Unknown
	H	(untitled)	5	300	0	0	Unknown
	I	(untitled)	5	300	0	0	Unknown
	J	(untitled)	5	300	0	0	Unknown
	K	(untitled)	5	300	0	0	Unknown

Library Stages

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

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	20, 32, 46, 71, 96, 112

Intergreen Matrix for Controller Stream 1

		To										
		A	B	C	D	E	F	G	H	I	J	K
From	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	9	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	10	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	10	8	10
	2	8	0	8	10	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	9	9	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	117	20	23	1	5
	2	✓	2	E,D	26	32	6	1	5
	3	✓	3	A,B	40	46	6	1	5
	4	✓	4	F,G	54	71	17	1	9
	5	✓	5	C	78	96	18	1	18
	6	✓	6	H,I,J,K	107	112	5	1	5

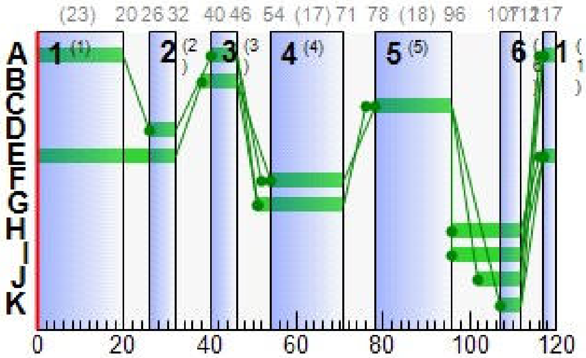
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	40	46	6
		2	✓	117	20	23
	B	1	✓	38	46	8
	C	1	✓	78	96	18
	D	1	✓	26	32	6
	E	1	✓	117	32	35
	F	1	✓	54	71	17
	G	1	✓	51	71	20
	H	1	✓	96	112	16
	I	1	✓	96	112	16
	J	1	✓	102	112	10
	K	1	✓	107	112	5

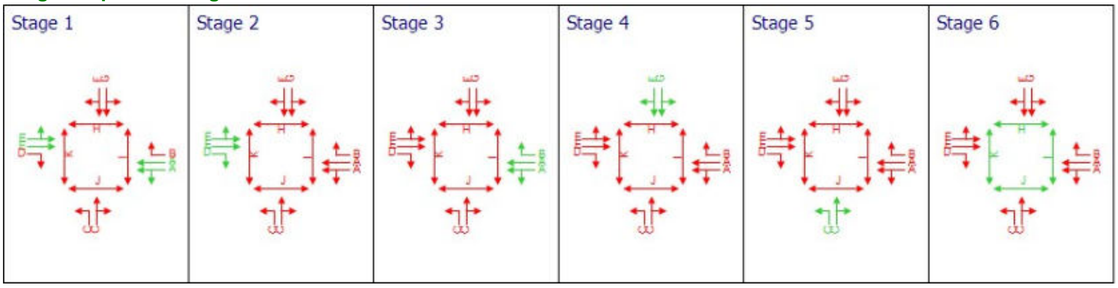
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	40	46	6	117	20	23
A	2	1	1	A	40	46	6	117	20	23
A	3	1	1	B	38	46	8			
B	1	1	1	C	78	96	18			
B	2	1	1	C	78	96	18			
C	1	1	1	E	117	32	35			
C	2	1	1	E	117	32	35			
C	3	1	1	D	26	32	6			
D	1	1	1	G	51	71	20			
D	2	1	1	F	54	71	17			

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

Final Prediction Table

Traffic Stream Results

			SIGNALS			FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	435 <	1800	29	0.00	94	7	76.75	69.36	151.34	16.00 +
	2		1	1	A	435 <	1800	29	0.00	94	7	76.75	69.36	151.34	16.00 +
	3		1	1	B	4	1800	8	8.00	3	3275	59.98	52.21	91.85	0.12
Ax	1	(untitled)				1040	Unrestricted	120	57.00	0	Unrestricted	23.14	0.00	0.00	0.00
B	1	(untitled)	1	1	C	0	1800	18	19.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	C	0	1800	18	19.00	0	Unrestricted	0.00	0.00	0.00	0.00
Bx	1	(untitled)				61	Unrestricted	120	101.00	0	Unrestricted	17.86	0.00	0.00	0.00
C	1	(untitled)	1	1	E	520 <	1800	35	0.00	96	4	97.27	89.68	132.90	24.03 +
	2		1	1	E	520 <	1800	35	0.00	96	4	97.27	89.68	132.90	24.03 +
	3		1	1	D	61	1800	6	0.00	58	72	85.73	77.84	113.78	2.35
Cx	1	(untitled)				1174	Unrestricted	120	21.00	0	Unrestricted	23.89	0.00	0.00	0.00
D	1	(untitled)	1	1	G	0	1800	20	21.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2		1	1	F	304 <	2100	17	0.00	97	4	129.46	120.89	148.59	15.98 +
Dx	1	(untitled)				4	Unrestricted	120	118.00	0	Unrestricted	18.56	0.00	0.00	0.00
9	1		1			435	1800	120	44.00	24	314	5.77	0.32	0.00	0.04
	2		1			439	1800	120	44.00	24	310	5.78	0.32	0.00	0.04
10	1		1			520	1800	120	91.00	29	246	5.99	0.41	0.00	0.06
	2		1			581	1800	120	91.00	32	210	6.06	0.48	0.00	0.08

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	680.30	77.14	8.82	24.20	30.27	773.44	40.42	0.00	813.86
Bus	0.00	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	0.00
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	700.70	114.06	6.14	57.12	30.27	1240.88	40.42	0.00	1281.30

- *< = 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***

TRANSYT 15

Version: 15.5.2.7994

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

Filename: Junction 4 - 2040 PM.t16
Path: M:\Projects\19\19-114 - Belcamp SHD\Design\Traffic\Junction Analysis\MODELLING APRIL 2022\Junction 4.1
Report generation date: 29/04/2022 15:00:07

File summary

File description

File title	(untitled)
Location	
Site number	
UTCRegion	
Driving side	Left
Date	06/12/2011
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	DOMAIN\f.silva
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
			✓		✓		✓	✓					

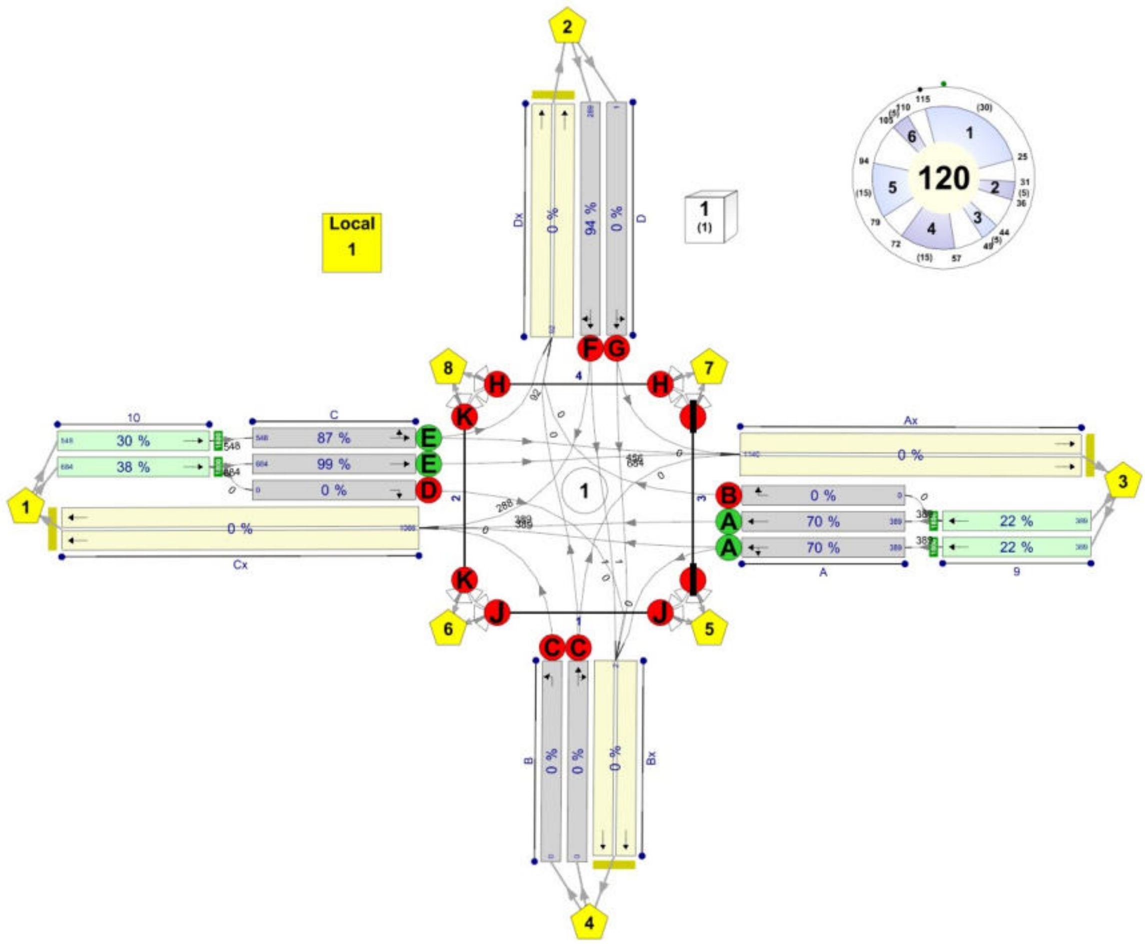
Units

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



(untitled)
Diagram produced using TRANSYT 15.5.2.7994

A1 - Junction 4
D2 - 2040 "with development", 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	Ite wit wor over PR
1	29/04/2022 15:00:00	29/04/2022 15:00:00	17:00	120	1094.07	74.69	98.50	C/2	0	0	C/2	10/2	C/

Analysis Set Details

Name	Description	Demand set	Include in report	Locked
Junction 4		D2	✓	

Demand Set Details

Name	Description	Composite	Demand sets	Start time (HH:mm)	Locked
2040 "with development", PM	(untitled)			17:00	

Traffic Nodes

Traffic Nodes

Traffic node	Name	Description
1	(untitled)	

Arms and Traffic Streams

Arms

Arm	Name	Description	Traffic node
A	(untitled)		1
Ax	(untitled)		
B	(untitled)		1
Bx	(untitled)		
C	(untitled)		1
Cx	(untitled)		
D	(untitled)		1
Dx	(untitled)		
9			1
10			1

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
A	1	(untitled)		✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	2			✓	61.56	✓	Sum of lanes	1800	✓		Normal	
	3			✓	64.79	✓	Sum of lanes	1800	✓		Normal	
Ax	1	(untitled)		✓	192.95						Normal	
B	1	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
	2	(untitled)		✓	61.63	✓	Sum of lanes	1800	✓		Normal	
Bx	1	(untitled)		✓	148.63						Normal	
C	1	(untitled)		✓	63.28	✓	Sum of lanes	1800	✓		Normal	
	2			✓	63.28	✓	Directly entered	1984	✓		Normal	
	3			✓	65.68	✓	Sum of lanes	1800	✓		Normal	
Cx	1	(untitled)		✓	198.79						Normal	
D	1	(untitled)		✓	71.44	✓	Sum of lanes	1800	✓		Normal	
	2			✓	71.44	✓	Directly entered	2300	✓		Normal	
Dx	1	(untitled)		✓	154.72						Normal	
9	1			✓	45.45	✓	Sum of lanes	1800			Normal	
	2			✓	45.45	✓	Sum of lanes	1800			Normal	
10	1			✓	46.55	✓	Sum of lanes	1800			Normal	
	2			✓	46.55	✓	Sum of lanes	1800			Normal	

Lanes

Arm	Traffic Stream	Lane	Name	Description	Use RR67	Saturation flow (PCU/hr)
A	1	1	(untitled)			1800
	2	1	(untitled)			1800
	3	1	(untitled)			1800
Ax	1	1	(untitled)			
		2	(untitled)			
B	1	1	(untitled)			1800
	2	1	(untitled)			1800
Bx	1	1	(untitled)			
		2	(untitled)			
C	1	1	(untitled)			1800
	2	1	(untitled)			
	3	1	(untitled)			1800
Cx	1	1	(untitled)			
		2	(untitled)			
D	1	1	(untitled)			1800
	2	1	(untitled)			
Dx	1	1	(untitled)			
		2	(untitled)			
9	1	1	(untitled)			1800
	2	1	(untitled)			1800
10	1	1	(untitled)			1800
	2	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
(ALL)	(ALL)	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)
A	1	389	389
	2	389	389
	3	0	0
Ax	1	1140	1140
B	1	0	0
	2	0	0
Bx	1	2	2
C	1	548	548
	2	684	684
	3	0	0
Cx	1	1066	1066
D	1	1	1
	2	289	289
Dx	1	92	92
9	1	389	389
	2	389	389
10	1	548	548
	2	684	684

Signals

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

Entry Sources

Arm	Traffic Stream	Cruise time for Normal Traffic (s)	Cruise speed for Normal Traffic (kph)
B	1	7.40	30.00
	2	7.40	30.00
D	1	8.57	30.00
	2	8.57	30.00
9	1	5.45	30.00
	2	5.45	30.00
10	1	5.59	30.00
	2	5.59	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)
A	1	1	9/1	A/1	7.39	30.00	✓	Straight	Straight Movement
	2	1	9/2	A/2	7.39	30.00	✓	Straight	Straight Movement
	3	1	9/2	A/3	7.78	30.00	✓	Straight	Straight Movement
Ax	1	1	D/1	Ax/1	23.15	30.00	✓	Nearside	36.46
Bx	1	1	D/1	Bx/1	17.84	30.00	✓	Straight	Straight Movement
C	1	1	10/1	C/1	7.59	30.00	✓	Straight	Straight Movement
	2	1	10/2	C/2	7.59	30.00	✓	Straight	Straight Movement
	3	1	10/2	C/3	7.88	30.00	✓	Straight	Straight Movement
Cx	1	1	D/2	Cx/1	23.85	30.00	✓	Offside	52.80
Dx	1	1	A/3	Dx/1	18.57	30.00	✓	Offside	48.16
Ax	1	2	C/2	Ax/1	23.15	30.00	✓	Straight	Straight Movement
Bx	1	2	A/1	Bx/1	17.84	30.00	✓	Nearside	34.92
Cx	1	2	A/2	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	2	C/1	Dx/1	18.57	30.00	✓	Nearside	31.17
Ax	1	3	C/1	Ax/1	23.15	30.00	✓	Straight	Straight Movement
Bx	1	3	C/3	Bx/1	17.84	30.00	✓	Offside	51.79
Cx	1	3	A/1	Cx/1	23.85	30.00	✓	Straight	Straight Movement
Dx	1	3	B/2	Dx/1	18.57	30.00	✓	Straight	Straight Movement
Ax	1	4	B/2	Ax/1	23.15	30.00	✓	Offside	49.38
Bx	1	4	D/2	Bx/1	17.84	30.00	✓	Straight	Straight Movement
Cx	1	4	B/1	Cx/1	23.85	30.00	✓	Nearside	40.34

Pedestrian Crossings

Pedestrian Crossings

Crossing	Name	Description	Traffic node	Allow walk on red	Crossing type	Length (m)	Cruise time (seconds)	Cruise speed (kph)
1	(untitled)		1		Farside	7.00	4.67	5.40
2	(untitled)		1		Farside	8.00	5.33	5.40
3	(untitled)		1		Farside	8.00	5.33	5.40
4	(untitled)		1		Farside	7.00	4.67	5.40

Pedestrian Crossings - Signals

Crossing	Controller stream	Phase	Second phase enabled
1	1	J	
2	1	K	
3	1	I	
4	1	H	

Pedestrian Crossings - Sides

Crossing	Side	Saturation flow (Ped/hr)
(ALL)	(ALL)	11000

Pedestrian Crossings - Modelling

Crossing	Side	Delay weighting (%)	Assignment Cost Weighting (%)	Exclude from results calculation	Max queue storage (Ped)	Has queue limit	Has degree of saturation limit
(ALL)	(ALL)	100	100		0.00		

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	5	6	7	8
From	1	0	92	1140	0	0	0	0	0
	2	288	0	0	2	0	0	0	0
	3	778	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0

Bus Input Flows not shown as they are blank.

Tram Input Flows not shown as they are blank.

Pedestrian Input Flows (PCU/hr)

		To							
		1	2	3	4	5	6	7	8
From	1	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	300	300	0
	6	0	0	0	0	300	0	0	300
	7	0	0	0	0	300	0	0	300
	8	0	0	0	0	0	300	300	0

Locations

OD Matrix	Location	Name	Entries	Exits	Colour
1	1	(untitled)	10/1, 10/2	Cx/1	#0000FF
	2	(untitled)	D/1, D/2	Dx/1	#FF0000
	3	(untitled)	9/1, 9/2	Ax/1	#00FF00
	4	(untitled)	B/1, B/2	Bx/1	#FFFF00
	5	(untitled)	3:2E, 1:1E	3:2X, 1:1X	#FF00FF
	6	(untitled)	2:1E, 1:2E	2:1X, 1:2X	#008000
	7	(untitled)	4:2E, 3:1E	4:2X, 3:1X	#FFA500
	8	(untitled)	4:1E, 2:2E	4:1X, 2:2X	#00FFFF

Normal Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Normal Calculated Flow (PCU/hr)
1	9		2	4	D/1, Bx/1	Normal	1
	10		2	3	D/1, Ax/1	Normal	0
	11		3	2	9/2, A/3, Dx/1	Normal	0
	12		3	1	9/2, A/2, Cx/1	Normal	389
	13		3	1	9/1, A/1, Cx/1	Normal	389
	14		3	4	9/1, A/1, Bx/1	Normal	0
	19		1	3	10/2, C/2, Ax/1	Percentage	684
	20		1	4	10/2, C/3, Bx/1	Normal	0
	21		1	3	10/1, C/1, Ax/1	Percentage	456
	24		4	2	B/2, Dx/1	Normal	0
	43		4	1	B/1, Cx/1	Normal	0
	44		1	2	10/1, C/1, Dx/1	Normal	92
	45		2	1	D/2, Cx/1	Normal	288
	46		4	3	B/2, Ax/1	Normal	0
	47		2	4	D/2, Bx/1	Normal	1

Pedestrian Paths and Flows

OD Matrix	Path	Description	From location	To location	Path items	Allocation type	Pedestrian calculated flow (Ped/hr)
1	17		8	7	4:1E, 4:2X	Normal	300
	18		8	6	2:2E, 2:1X	Normal	300
	22		5	7	3:2E, 3:1X	Normal	300
	23		5	6	1:1E, 1:2X	Normal	300
	34		6	8	2:1E, 2:2X	Normal	300
	35		6	5	1:2E, 1:1X	Normal	300
	41		7	8	4:2E, 4:1X	Normal	300
	42		7	5	3:1E, 3:2X	Normal	300

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						Relative

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)	5	300	0	0	Unknown
	B	(untitled)	5	300	0	0	Unknown
	C	(untitled)	15	300	0	0	Unknown
	D	(untitled)	5	300	0	0	Unknown
	E	(untitled)	5	300	0	0	Unknown
	F	(untitled)	5	300	0	0	Unknown
	G	(untitled)	5	300	0	0	Unknown
	H	(untitled)	5	300	0	0	Unknown
	I	(untitled)	5	300	0	0	Unknown
	J	(untitled)	5	300	0	0	Unknown
	K	(untitled)	5	300	0	0	Unknown

Library Stages

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

Stage Sequences

Controller Stream	Sequence	Name	Multiple cycling	Stage IDs	Stage ends
1	1	(untitled)	Single	1, 2, 3, 4, 5, 6	25, 36, 49, 72, 94, 110

Intergreen Matrix for Controller Stream 1

		To										
From		A	B	C	D	E	F	G	H	I	J	K
	A			8	6		6	5		6	10	0
	B			5		7	8	5	12	6		
	C	5	8		5	8	7	9	0	0	6	11
	D	8		7			5	5			0	6
	E		6	5			6	9	10	0		6
	F	5	5	7	7	5			6			0
	G	9	5	5	6	5			6	10	0	
	H		4	4		4	4	4				
	I	5	5	5		5		5				
	J	4		4	4			4				
	K	5		5	5	5	5					

Banned Stage transitions for Controller Stream 1

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

Interstage Matrix for Controller Stream 1

		To					
		1	2	3	4	5	6
From	1	0	6	6	9	8	10
	2	8	0	8	9	7	10
	3	7	7	0	8	8	12
	4	9	7	9	0	7	10
	5	8	8	8	9	0	11
	6	5	5	5	5	5	0

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	✓	1	E,A	115	25	30	1	5
	2	✓	2	E,D	31	36	5	1	5
	3	✓	3	A,B	44	49	5	1	5
	4	✓	4	F,G	57	72	15	1	5
	5	✓	5	C	79	94	15	1	15
	6	✓	6	H,I,J,K	105	110	5	1	5

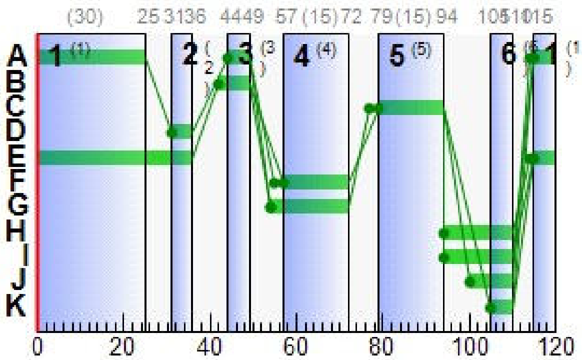
Resultant Phase Green Periods

Controller Stream	Phase	Green period	Is base green period	Start time (s)	End time (s)	Duration (s)
1	A	1	✓	44	49	5
		2	✓	115	25	30
	B	1	✓	42	49	7
	C	1	✓	79	94	15
	D	1	✓	31	36	5
	E	1	✓	115	36	41
	F	1	✓	57	72	15
	G	1	✓	54	72	18
	H	1	✓	94	110	16
	I	1	✓	94	110	16
	J	1	✓	100	110	10
	K	1	✓	105	110	5

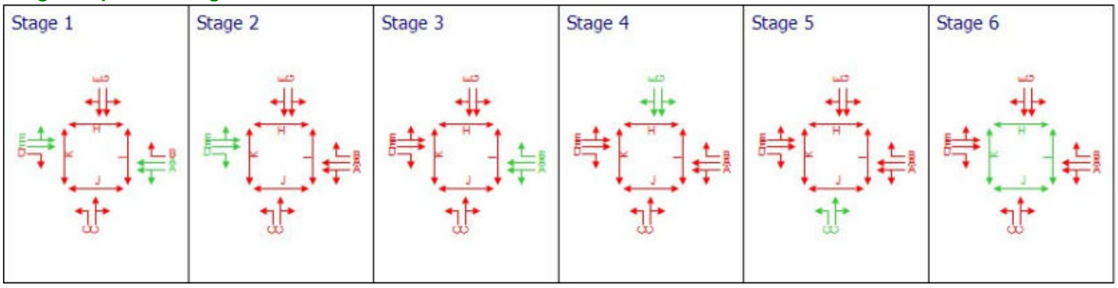
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1			Green Period 2		
					Start	End	Duration	Start	End	Duration
A	1	1	1	A	44	49	5	115	25	30
A	2	1	1	A	44	49	5	115	25	30
A	3	1	1	B	42	49	7			
B	1	1	1	C	79	94	15			
B	2	1	1	C	79	94	15			
C	1	1	1	E	115	36	41			
C	2	1	1	E	115	36	41			
C	3	1	1	D	31	36	5			
D	1	1	1	G	54	72	18			
D	2	1	1	F	57	72	15			

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)
17:00-18:00	1	0.00	0.00	0.00	0.00

Final Prediction Table

Traffic Stream Results

			SIGNALS			FLOWS		PERFORMANCE				PER PCU			QUEUES
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 (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)
A	1	(untitled)	1	1	A	389	1800	35	0.00	70	43	39.03	31.65	96.46	9.67
	2		1	1	A	389	1800	35	0.00	70	43	39.03	31.65	96.46	9.67
	3		1	1	B	0	1800	7	8.00	0	Unrestricted	0.00	0.00	0.00	0.00
Ax	1	(untitled)				1140	Unrestricted	120	52.00	0	Unrestricted	23.15	0.00	0.00	0.00
B	1	(untitled)	1	1	C	0	1800	15	16.00	0	Unrestricted	0.00	0.00	0.00	0.00
	2	(untitled)	1	1	C	0	1800	15	16.00	0	Unrestricted	0.00	0.00	0.00	0.00
Bx	1	(untitled)				2	Unrestricted	120	120.00	0	Unrestricted	17.84	0.00	0.00	0.00
C	1	(untitled)	1	1	E	548 <	1800	41	0.00	87	15	61.62	54.02	105.52	19.72 +
	2		1	1	E	684 <	1984	41	0.00	99	2	100.26	92.66	137.26	32.67 +
	3		1	1	D	0	1800	5	6.00	0	Unrestricted	0.00	0.00	0.00	0.00
Cx	1	(untitled)				1066	Unrestricted	120	18.00	0	Unrestricted	23.85	0.00	0.00	0.00
D	1	(untitled)	1	1	G	1	1800	18	18.00	0	28400	51.52	42.95	83.18	0.00
	2		1	1	F	289 <	2300	15	0.00	94	6	118.75	110.17	140.67	14.18 +
Dx	1	(untitled)				92	Unrestricted	120	74.00	0	Unrestricted	18.57	0.00	0.00	0.00
9	1		1			389	1800	120	0.00	22	363	5.73	0.28	0.00	0.03
	2		1			389	1800	120	0.00	22	363	5.73	0.28	0.00	0.03
10	1		1			548	1800	120	58.00	30	228	6.02	0.44	0.00	0.07
	2		1			684	1800	120	115.00	38	163	6.20	0.61	0.00	0.12

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Uniform delay (PCU-hr/hr)	Random plus oversat 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	685.68	64.62	10.61	22.27	19.49	593.09	33.54	0.00	626.63
Bus	0.00	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	0.00
Pedestrians	20.40	36.92	0.55	32.92	0.00	467.44	0.00	0.00	467.44
TOTAL	706.08	101.54	6.95	55.19	19.49	1060.53	33.54	0.00	1094.07

- *< = 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***

D. Appendix D – Go Car Letter of Intent

Gerard Gannon Properties
Kinvara House
52 Northumberland House
Ballsbridge
Dublin 4

07/04/2022

To Whom It May Concern,

This is a letter to confirm that GoCar intends to provide a car sharing service in the proposed Strategic Housing Development (SHD) at Belcamp, Dublin 7. GoCar representatives have discussed the project with representatives of Waterman Moylan, who are the developers for this project and are excited to provide a car sharing service at this location. In the initial phase GoCar would provide four (4) car sharing vehicles but as usage increases GoCar would add vehicles where and when required. While it is the intention for these vehicles to be used primarily by the residents of the development, the vehicles will be open for access to other GoCar members nearby.

GoCar is Ireland's leading car sharing service with over 60,000 members and over 860 cars and vans on fleet.
Car sharing is a sustainable community service. Each GoCar which is placed in a community has the potential to replace the journeys of up to 15 private vehicles. With the addition of Electric Vehicles and vans to the GoCar fleet it gives members the ability to choose from different vehicles depending on their journey needs.

The Department of Housing's Design Standards for New Apartments - Guidelines for Planning Authorities 2020 outline: "For all types of location, where it is sought to eliminate or reduce car parking provision, it is necessary to ensure... provision is also to be made for alternative mobility solutions including facilities for car sharing club vehicles."

By allowing multiple people to use the same vehicle at different times, car sharing reduces car ownership, car dependency, congestion, noise, and air pollution. It frees up land which would otherwise be used for additional parking spaces. Most GoCar users only use a car when necessary and walk and use public transport more often than car owners.

By having GoCar car sharing vehicles in a development such as this, the residents therein will have access to pay-as-you-go driving, in close proximity to their homes, which will increase usership of the service.

I trust that this information is satisfactory. For any queries, please do not hesitate to contact me.

Rob Montgomery
Revenue and Growth Manager
GoCar Carsharing Ltd
Mobile: 086 609 7096
E: robert.montgomery@gocar.ie

UK and Ireland Office Locations