

Introduction

Ardent Consulting Engineers (ACE) is retained by Persimmon Homes Essex to advise on transport planning aspects of the redevelopment of the Dovers Corner Industrial Estate and Boomes Industrial Estate, Rainham.

Planning consent (ref. no. P0922.15) was granted in October 2017 for: *Demolition of existing structures and the phased redevelopment to provide 394 residential dwellings, car parking, bicycle parking, substation, public open space and pedestrian/cycle infrastructure, and other works and improvements (including deculverting of Pooles Sewer, relocation of gas main, minor alterations to access from New Road and closure of existing secondary accesses, formation of emergency access onto Lamson Road and other associated works).*

The planning application was supported by a Transport Assessment (TA) (report ref. no. S960-02, dated June 2015) and TA Addendum (TAA) (report ref. no. S960-17, dated May 2016), both prepared by ACE.

The site access junction design and modelling presented within the TA and TAA comprised a priority junction on New Road (the A1306), modified from its existing industrial standard form to serve the new residential use. The TA demonstrated that the priority junction would operate well within capacity with the predicted Development Case flows. Neither the London Borough of Havering (LBH) Highways nor Transport for London (TfL) raised objections to the proposed form of access.

The application was reported to committee in November 2016 with a recommendation for approval. At the Committee meeting, and notwithstanding officer views, Members resolved to seek provision for a scheme of traffic signal control at the site access junction. Persimmon Homes Essex subsequently amended the planning application in February 2017 to include a signalised junction arrangement in place of the priority junction. ACE prepared a technical note to support the amendment (dated February 2017, see **Appendix A**), which demonstrates that the signalised junction is forecast to operate over practical capacity but within theoretical capacity and that resultant queues on the westbound approach on New Road in the weekday peak hours should not affect the operation of the Dovers Corner roundabout. The application was approved on this basis, with Conditions 43 and 44 relating to access and the latter specifying a traffic light management system (see below extract from planning consent).

- 44** Unless alternative implementation programme is agreed in writing with the Local Planning Authority, no part of any phase of the development hereby permitted as specified in condition 4 above shall be occupied until a traffic light management system has been installed at the junction of the new access road with the A1306 in accordance with details that shall have been submitted to and approved in writing by the Local Planning Authority. The traffic light system shall be implemented in accordance with the approved details.

Reason:

Traffic light controls are considered necessary at the entrance and exit from the development prior to first occupation to ensure highway safety and that the development accords with the LDF Development Control Policies Development Plan Document Policy DC32.

Persimmon Homes Essex is now applying for a Section 73 amendment to vary Condition 44 of the planning consent to omit reference to the traffic light management system and revert to the original priority junction (non-signalised) form of site access.

This note supports the application and presents: the proposed improvements to New Road as part of its transformation into Beam Parkway; details of the technically approved site access priority junction; and revised capacity analysis for the technically approved priority junction and comparison with that for the currently conditioned signalised junction at the site access.

Beam Park Framework

At the time of the planning application (ref. no. P0922.15) LBH were finalising the Rainham and Beam Park Masterplan and Planning Framework ('Beam Park Framework'). The Beam Park Framework was adopted by LBH in February 2016.

The Beam Park Framework (2016) identifies as one of the challenges '*Over-engineered New Road with low quality uses fronting onto the street create a poor impression of the wider area*' (p5). The Vision (p5) includes; '*To transform New Road from a traffic dominated road into an attractive green corridor, the Beam Parkway, to provide a quality walking and cycling route, and a series of pocket parks, which will transform the image of the area; and • To create a network of green and blue walking and cycling routes that connect new local green spaces with the surrounding Marshes and Country Parks*'

The Beam Park Framework identifies how New Road will be transformed into Beam Parkway. This includes measures designed to reduce through traffic on New Road, reduce carriageway space and transforming it into an attractive street that is easier to cross (p47).

Prior to the publication of the Beam Park Framework (2016) the Council had commissioned consultants to prepare a concept design for the A1306 corridor to support a step one major scheme bid that was submitted to TfL in September 2015. LBH secured £4.5m of funding from the Mayor of London and £1.8m from TfL to progress plans to transform New Road (the A1306) in South Hornchurch.

LBH Beam Parkway consultation was undertaken in July 2018. Residents, businesses, communities and stakeholders were invited to have their say on the plans for the transformation of New Road, the A1306. An extract from the proposed scheme consulted upon is shown below.



In relation to the section of New Road to the front of Dovers Corner, the consultation proposed to:

- Retain the existing signalised pedestrian / cycle crossing on New Road located to the east of the access to Dovers Corner;
- Narrow the carriageway; and
- Form an uncontrolled crossing point in New Road located to the west of the site access / egress to Dovers Corner

The Consultation proposals for LBH Beam Parkway detail a priority junction (non-signalised) form of site access to / from the Dovers Corner site. It does not envisage a signalised junction.

The consultants advancing the project (Steer Group) advised that the scheme is at procurement stage. The Concept Design has been finalised, with works expected to commence in April 2021 (the latest relevant plans from Steer Group are included at **Appendix B**). The Concept Design contains the same features as the consultation

Persimmon's Development at Dovers Corner includes a £500,000 payment secured via the s106 agreement towards the New Road improvements (A1306 Pedestrian/Cycle Works Contribution).

S278 Technical Approval

Section 278 Technical Approval has been given by LBH for the priority junction arrangement shown on Withers Design Associates drawing no. 16-011/325 (see **Appendix C**). The details were worked up in consultation with LB Havering Highways, who have had regard to the integration of the junction within the wider New Road Improvements to create 'the Beam Parkway'.

As approved, the s278 details a priority junction (non-signalised) form of site access to / from the Dovers Corner site. The signalised crossing point to the east of the junction is to remain. This accords with the Council's proposals for Beam Parkway.

As identified above, Condition 44 reasons that traffic light controls are considered necessary to ensure highway safety. At the committee meeting in November 2016, members also cited the need for an improved pedestrian crossing towards the primary school opposite.

The existing toucan crossing located 50m west of the roundabout on New Road facilitates safe walk/cycle movement between Rainham Road and Bridge Road without significant deflection off the north-south desire line. The potential removal and replacement of this crossing further west would deflect the north-south desire line and could possibly lead to unsafe crossing movements between the site entrance and roundabout. As such, it is considered appropriate to retain the existing toucan crossing in its current form, supplemented by an uncontrolled pedestrian crossing with refuge as per the Beam Parkway works detailed at **Appendix B** (to which the development is making a financial contribution). In addition to the new crossing, the pedestrian and cycle environment in general will be greatly improved as part of the wider works. The proposed arrangement is considered suitable to ensure highway safety without the need for another signalised crossing close to the existing toucan crossing.

Junction Capacity Analysis

This part of the note presents revised capacity analysis undertaken by ACE for the technically approved priority junction arrangement and compares this against capacity analysis for the currently conditioned signalised junction at the site access.

Priority Junction Arrangement

The technically approved junction layout is illustrated on drawing no. 16-011/325. This differs slightly from the priority junction design submitted with the original planning application in that it relates to the pedestrian/cycle improvement works along New Road which the development has part funded by way of Section 106 contributions.

The results of the capacity analysis in the weekday am and pm peak hours for the original assessment flows are summarised below. This has been undertaken using the appropriate industry-standard PICADY software, which forms part of the Transport Research Laboratory's "Junctions 9" suite. We have selected the ONE HOUR option which adopts a synthesised peak flow profile over a 90-minute period (the peak hour itself plus 15 minutes either side). This is robust as it assumes a "peak within the peak" with the flow on each approach increasing to reach a simultaneous maximum halfway through the modelled period, when this occurs rarely in reality.

Table 1 summarises the results of the PICADY capacity analysis of the technically approved site access junction with the 2020 Development Case flows in the weekday peak hours. The table gives the maximum Ratio of Flow to Capacity (RFC) value predicted in association with each give way manoeuvre during each modelled period, together with the maximum average queue (in vehicles) and the average overall delay incurred by every vehicle passing through the junction. An RFC value of 0.85 is usually taken as indicating that the manoeuvre is operating at practical capacity, while a value of 1.0 indicates that it is operating at theoretical capacity. Full program outputs are included at **Appendix D**.

The junction model uses geometrical parameters taken from the technically approved arrangement illustrated on drawing no. 16-011/325. The capacity analysis is based on the 2020 Development Case flows (Flow Diagrams 21 and 22 appended to TA), which comprises predicted development traffic added to the predicted 2020 Background traffic and committed development traffic.

Table 1: PICADY Results for 2020 Development Case Flows

Stream and Manoeuvre		weekday am peak hour		weekday pm peak hour	
		<i>RFC</i>	<i>Q (vehicles)</i>	<i>RFC</i>	<i>Q (vehicles)</i>
B-AC	Site Access - left and right out	0.49	0.9	0.18	0.2
C-B	New Road - EB ahead & right	0.03	0.0	0.07	0.1
Overall junction delay (s)		2.18		0.72	

As shown above in **Table 1** and previously demonstrated in the TA, the priority junction is forecast to operate well within capacity with minimal queuing in the predicted 2020 Development Cases.

Signal-Controlled Junction Arrangement

The February 2017 technical note, included at **Appendix A**, sets out the preliminary design and capacity analysis work undertaken by ACE for a signalised junction at the site access. As identified in the note, the arrangement would require relocation of the existing westbound bus stop west of the site access as well as modifications to road markings at the New Road exit of the Dovers Corner roundabout to formalise two abreast queuing and maximise capacity to a 140m length between the site access and roundabout.

The results of the LINSIG capacity analysis are summarised in **Table 2**, with the predicted degree of saturation and mean maximum queue (MMQ) in PCUs for each link, together with the overall junction delay and Practical Reserve Capacity (PRC). A degree of saturation of 100% is normally considered to represent theoretical capacity and a value of 90% practical capacity, with a PRC of +10% typically sought.

The junction model uses geometrical parameters (including lane widths and turning radii) taken from the arrangement illustrated on drawing no. S960-015 (included at **Appendix A**), with the existing toucan crossing included in the model. Again, the capacity analysis is based on the 2020 Development Case flows (Flow Diagrams 21 and 22 appended to TA).

Table 2: LINSIG Results for 2020 Development Case Flows

Link and Manoeuvre		weekday am peak hour		weekday pm peak hour	
		Sat'n	MMQ (PCUs)	Sat'n	MMQ (PCUs)
1/1	New Road - WB left & ahead	83.7%	11.0	82.1%	11.6
2/1	Site Access - left & right	82.9%	5.3	25.5%	1.1
3/1	New Road - EB ahead & right	38.8%	4.3	73.4%	7.3
4/1	New Road - EB to crossing ahead	34.7%	1.3	46.6%	1.8
7/1	New Road - WB to crossing ahead	60.9%	12.4	49.2%	6.8
Modelled time period (seconds)		108		73	
Stage Sequence modelled		1,2,1,3		1,2,1,3	
Practical Reserve Capacity		+ 7.5%		+ 9.7%	
Delay for Signalised Lanes (pcu/ hr)		10.72		10.43	

As shown in **Table 2**, the junction is forecast to operate over practical capacity but within theoretical capacity in the predicted 2020 Development Cases, with a worst-case PRC of + 7.5% in the weekday am peak hour. The cumulative MMQ on the westbound approach to the site entrance is 23.4 PCUs. On the basis of a PCU length of 5.5m, the resultant total MMQ length is 128.7m. This is just within the 140m available queue length between the site access junction and the roundabout circulatory carriageway, and so queues in the 'worst case' am peak hour should not affect operation of the Dovers Corner roundabout, albeit this is marginal.

Summary

It has been demonstrated that the technically approved priority junction arrangement is forecast to operate well within capacity with minimal queuing in the predicted Development Cases and neither LBH Highways nor TfL has raised objections to this form of access.

A scheme of traffic signal control at the site access junction was sought by members and the application was approved on this basis. It has been demonstrated that a signalised junction is forecast to operate over practical capacity but within theoretical capacity in the predicted Development Cases, and that predicted queuing at peak times should not affect the operation of the Dovers Corner roundabout, albeit this is marginal and relies on drivers queuing two abreast on the roundabout exit.

Persimmon Homes Essex has applied for a Section 73 amendment to vary Condition 44 of the planning consent to omit reference to the traffic light management system and revert to the original priority junction (non-signalised) form of site access on the basis that modelling work clearly demonstrates that this form of junction will operate more efficiently and will remove the risk of queuing traffic affecting the operation of the Dovers Corner roundabout.

Conclusion

Persimmon Homes Essex is applying for a Section 73 amendment to vary Condition 44 of the planning consent to omit reference to the traffic light management system and revert to the original priority junction (non-signalised) form of site access on the basis that:

- (a) A priority junction accords with the Council's proposal for Beam Parkway, whereas a traffic light management system is not.
- (b) Improvements to Beam Parkway, to which the development makes a financial contribution, will give rise to significant improvements to New Road and enhance the ability for pedestrians to cross.
- (c) There is an existing convenient traffic-controlled crossing point facilitating pedestrian movement across New Road.
- (d) Traffic light management system is not needed.
- (e) Modelling work clearly demonstrates that a non-signalised form of junction will operate more efficiently and will remove the risk of queues affecting the operation of the Dovers Corner roundabout.
- (f) The proposed junction is acceptable to the Highway Authority.

Appendix A

Signal Controlled Site Access Junction Note (February 2017)

Introduction

Ardent Consulting Engineers (ACE) is retained by Persimmon Homes Essex to advise on transport and infrastructure aspects of the proposed redevelopment of the Dovers Corner Industrial Estate and Boomes Industrial Estate, Rainham.

At the meeting of the Regulatory Services Committee, held on 17th November 2016, members resolved to: *delegate to the Assistant Director of Regulatory Services to negotiate provision for a scheme of traffic light control at the site entrance plus a signal controlled, improved pedestrian crossing towards the primary school opposite and subject to this provision being agreed to grant planning permission subject to prior completion of a legal agreement subject to no contrary direction on referral to the Mayor of London.*

This note presents preliminary design and capacity analysis work undertaken by ACE for a signal controlled junction at the site entrance for the purpose of seeking agreement in principle over the design and layout with the London Borough of Havering (LBH) Highways.

Design Approach

There is already a toucan crossing on New Road located 50m west of Dovers Corner roundabout. This facilitates safe walk/cycle movement between Rainham Road and Bridge Road without significant deflection off the north-south desire line. This provision is replicated on the east side of the roundabout, again offset 50m from the roundabout. The potential removal and replacement of the existing crossing further west within the signal controlled site access junction would further deflect the north-south desire line and could possibly lead to unsafe crossing movements between the site entrance and roundabout. Given this, it is considered appropriate to retain the existing crossing in its current form. It is however considered appropriate to incorporate a controlled crossing on the west side of the junction. LBH Highways have agreed with this approach in initial discussions.

In respect of east-west walk/cycle movement along New Road, across the site entrance, LBH Highways has identified a preference for this to take the form of a direct-line crossing rather than with staggered central island. Therefore, an 'all-red' pedestrian stage is required.

Proposed Junction Arrangement

The proposed preliminary junction layout is illustrated at **drawing no. S960-015** and follows the design approach described above. The proposed arrangement requires the removal of the existing westbound bus stop. This would be relocated west of the site access, at a position to be agreed with Transport for London (TfL) and LBH.

It is also proposed to modify road markings downstream of the site access junction at the New Road exit on the roundabout to formalise two abreast queuing and therefore maximise queueing capacity between the site access and roundabout. There is a 140m long stacking length available between the site access junction stop-line and the roundabout circulatory carriageway, including an allowance for two abreast queuing and with keeping the toucan crossing clear.

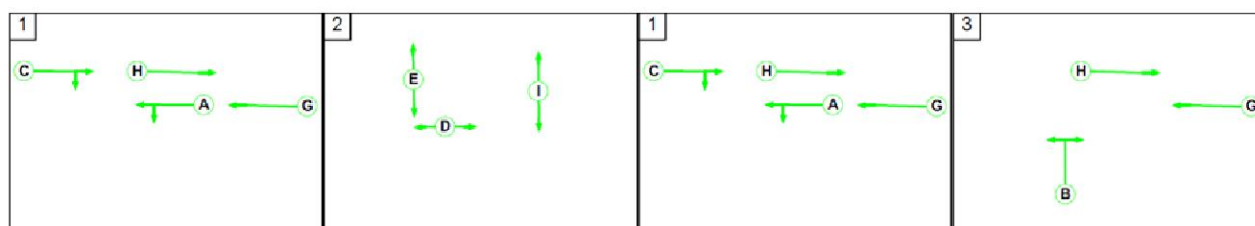
Junction Assessment

As agreed with LBH, we have used the appropriate industry-standard LINSIG program to undertake preliminary capacity analysis for the following scenario presented within the submitted Transport Assessment (TA) prepared by ACE report (ref. S960-02): -

- 2020 Development Case flows (Flow Diagrams 21 and 22 appended to TA), which comprises predicted development traffic added to the predicted 2020 Background traffic and committed development traffic.

The model uses geometrical parameters (including lane widths and turning radii) taken from the arrangement illustrated on **drawing no. S960-015**. The existing toucan crossing is included in the model.

The following stage sequence has been used for both the AM and PM flow groups:



- A. New Road West Bound (West of Existing Crossing)
- B. Site Access

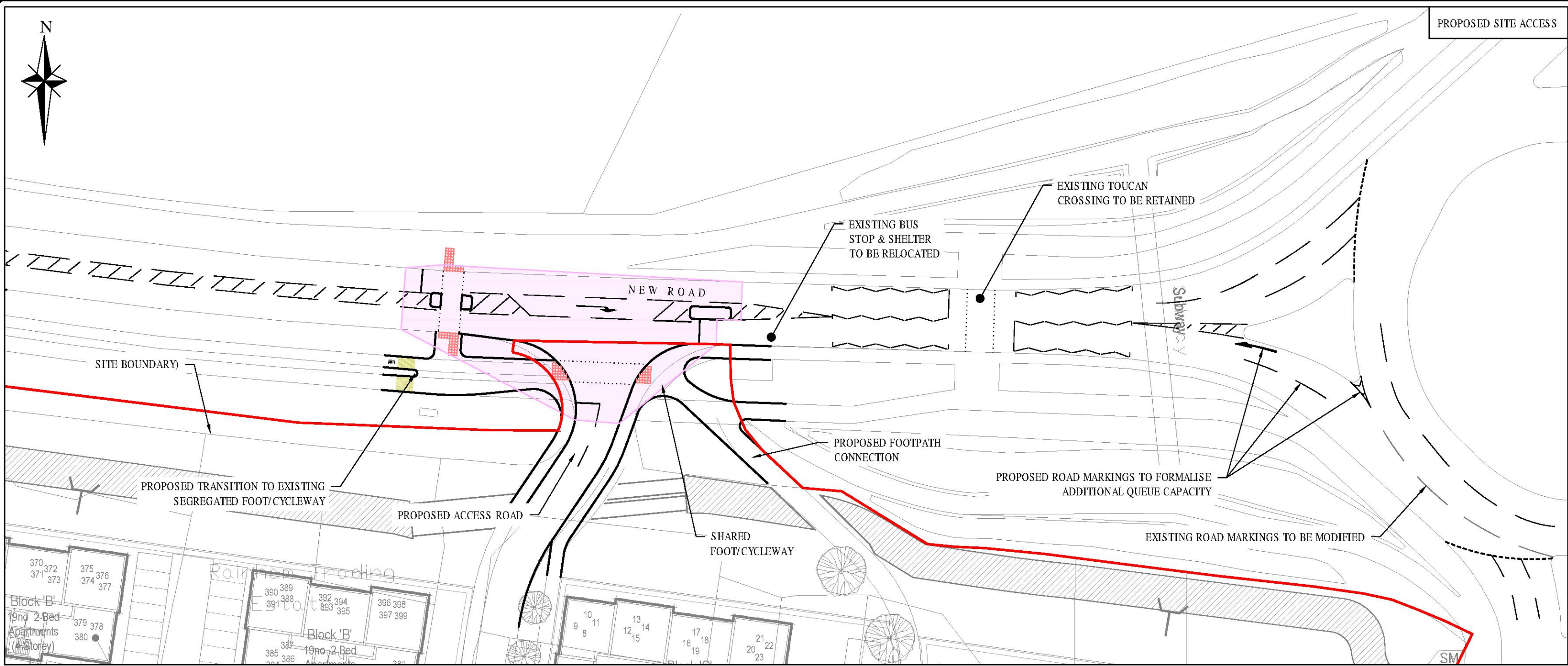
- C. New Road East Bound (West of Proposed Crossing)
- D. Pedestrian Movement Across Site Access
- E. Pedestrian Movement Across New Road (New Crossing)
- F. Indicative Arrow (not used in model)
- G. New Road West Bound (East of Existing Crossing)
- H. New Road East Bound (West of Existing Crossing)
- I. Pedestrian Movement Across New Road (Existing Crossing)

The results of the preliminary capacity analysis are summarised in **Table 1**. This sets out the predicted degree of saturation and mean maximum queue (MMQ) in PCUs for each link, together with the overall junction delay and Practical Reserve Capacity (PRC). A degree of saturation of 100% is normally considered to represent theoretical capacity and a value of 90% practical capacity, with a PRC of +10% typically sought. A full program output listing is appended to this note.

Table 1: LINSIG Results for 2020 Development Case Flows

Link and Manoeuvre		weekday am peak hour		weekday pm peak hour	
		Sat'n	MMQ (PCUs)	Sat'n	MMQ (PCUs)
1/1	New Road WB Left & Ahead	83.7%	11.0	82.1%	11.6
2/1	Site Access Left & Right	82.9%	5.3	25.5%	1.1
3/1	New Road EB Ahead & Right	38.8%	4.3	73.4%	7.3
4/1	New Road EB to crossing Ahead	34.7%	1.3	46.6%	1.8
7/1	New Road WB to crossing Ahead	60.9%	12.4	49.2%	6.8
Modelled time period (seconds)		108		73	
Stage Sequence modelled		1,2,1,3		1,2,1,3	
Practical Reserve Capacity		+ 7.5 %		+ 9.7 %	
Delay for Signalised Lanes (pcuHr)		10.72		10.43	

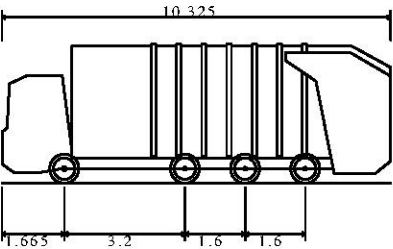
In summary, the junction is forecast to operate within theoretical capacity in the 2020 Development Cases, with a worst case PRC of +7.5% in the weekday am peak hour. There is a forecast MMQ of 11.0 PCUs on the westbound approach to the site entrance in the am peak hour, in addition to a predicted MMQ of 12.4 PCUs of the westbound approach to the toucan crossing. The cumulative MMQ on the westbound approach to the site entrance is therefore 23.4 PCUs. On the basis of a PCU length of 5.5m, the resultant total MMQ length is 128.7m. This is within the 140m available queue length between the site access junction and the roundabout circulatory carriageway, and so queues in the 'worst case' am peak hour should not affect the operation of the roundabout.



PROPOSED SITE ACCESS

NOTES:

VEHICLE USED:

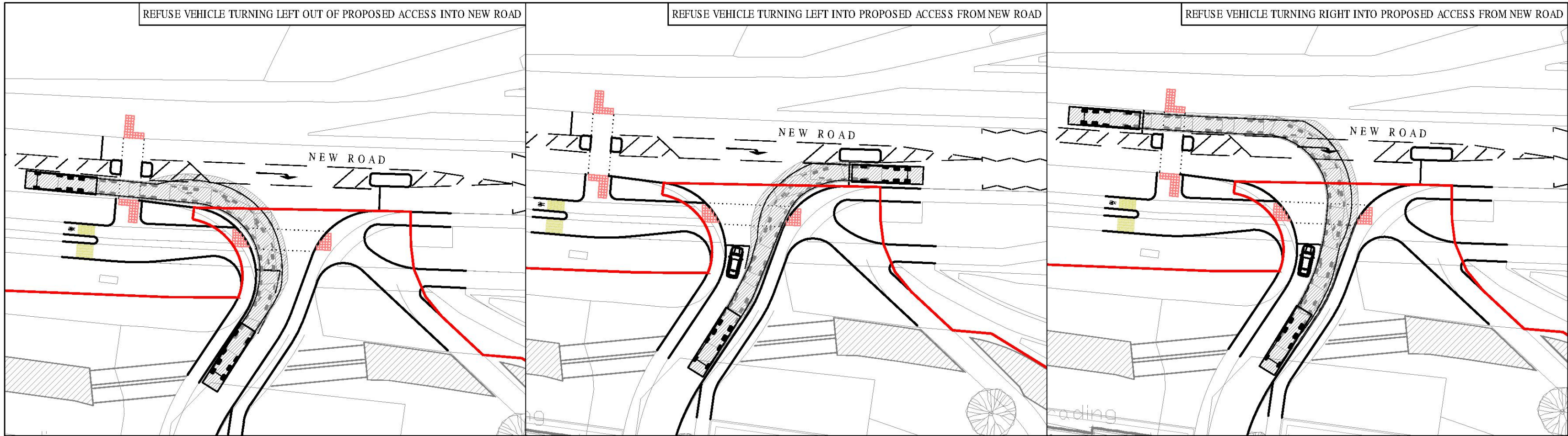


Dennis Eagle Olympus 8x4MS Refuse Vehicle
Overall Length 10.325m
Overall Width 2.550m
Overall Body Height 3.690m
Min Body Ground Clearance 0.251m
Track Width 2.200m
Lock to Lock Time 4.00s
Wall to Wall Turning Radius 11.200m

KEY:

- INTERVISIBILITY ZONE
- SITE BOUNDARY

PRELIMINARY



A	SITE BOUNDARY UPDATED	DV	DV	SAF	06.02.17
REV	AMENDMENTS	DRN	CHK	APP	DATE

ARDENT CONSULTING ENGINEERS

Suite 207
One Alie Street
London
E1 8DE
t 020 7680 4088
f 020 7488 3736
w www.ardent-ce.co.uk
e enquiries@ardent-ce.co.uk

CLIENT: PERSIMMON HOMES ESSEX

PROJECT TITLE: DOVERS CORNER RAINHAM

DRAWING TITLE: PROPOSED SIGNAL JUNCTION ARRANGEMENT

SCALE: 1:500 @ A2	DATE: 25.01.17	DESIGNED: DV
DRAWN: DV	CHECKED: DV	APPROVED: SAF
DRAWING NO. S960-015	REV: A	

Full Input Data And Results

Project:	Dovers Corner
Title:	Signalised Junction
Location:	Dovers Corner, Rainham (LB Havering)
File name:	Draft Model - Proposed Signalised Junction.lsg3x
Author:	KFM
Company:	Ardent Consulting Engineers Ltd
Address:	Suite 207, One Alie Street, London E1 8DE
Notes:	

Proposed New Road/Site Access Signal Junction

Diagram illustrating a proposed new road/site access signal junction. The junction is shown with various arms and traffic signals.

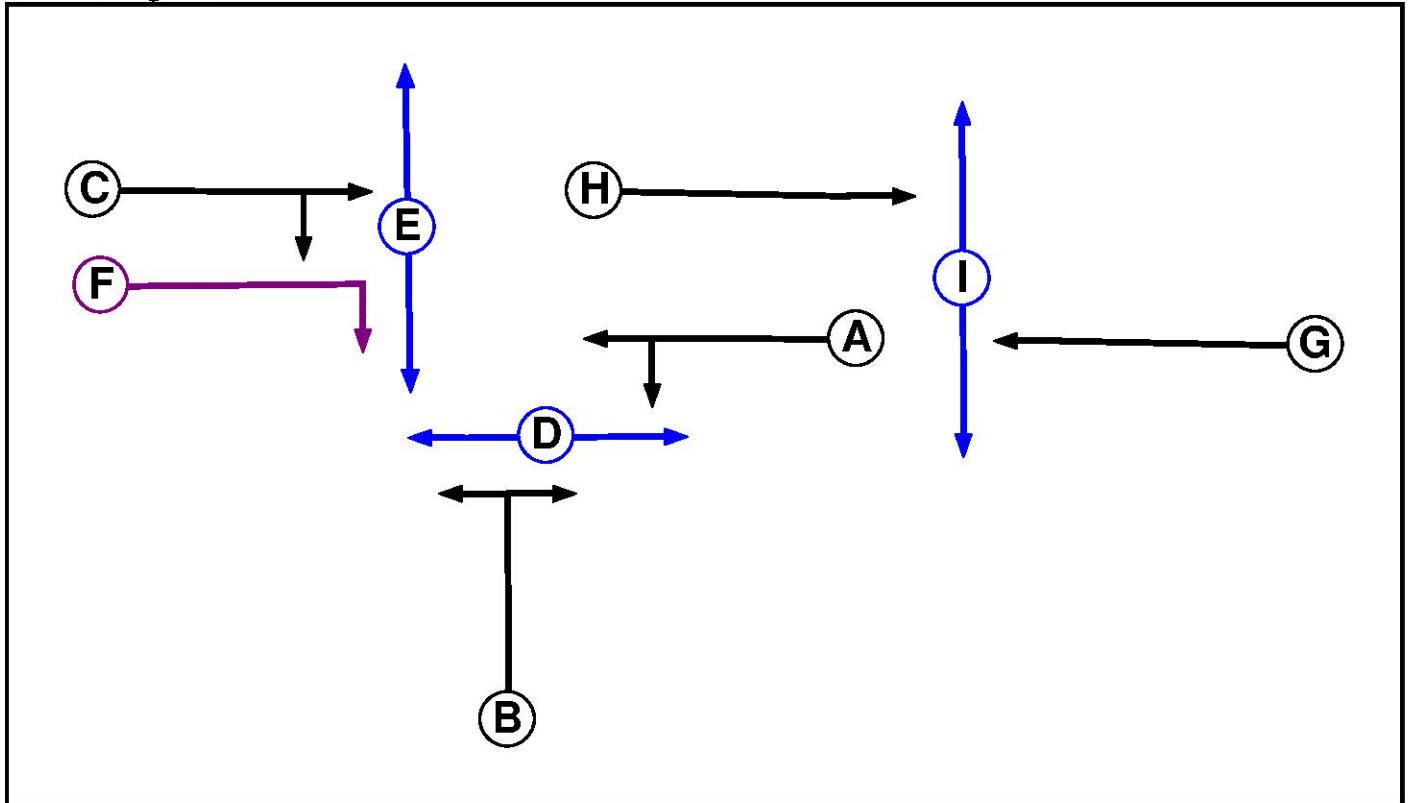
Arms and Traffic Signals:

- Arm 1 - New Rd WB (west of crossing):** Signal 1/1 (purple box).
- Arm 2 - Site Access:** Signal 2/1 (vertical bar).
- Arm 3 - New Road (West) EB:** Signal 3/1 (horizontal bar).
- Arm 4 - New Road EB to crossing:** Signal 4/1 (horizontal bar).
- Arm 5 - New Rd WB (west of crossing):** Signal 1/1 (purple box).
- Arm 6 - New Rd WB (East of Crossing):** Signal 7/1 (horizontal bar).
- Arm 7 - New Rd WB (East of Crossing):** Signal 7/1 (horizontal bar).
- Arm 8 - New Rd (E) - EB from crossing (coil):** Signal 8/1 (horizontal bar).

Other Features:

- P1:** Pedestrian crossing on the left side.
- P2:** Pedestrian crossing at the bottom.
- Signal Phases:** Various signal phases are indicated, including 3/1, 4/1, 8/1, 6/1, 1/1, 7/1, 2/1, and 1/9.
- Arrows:** Arrows indicate the direction of traffic flow for each arm.

Phase Diagram



Phase Input Data

Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Pedestrian		6	6
E	Pedestrian		6	6
F	Ind. Arrow	C	4	4
G	Traffic		7	7
H	Traffic		7	7
I	Pedestrian		6	6

Full Input Data And Results

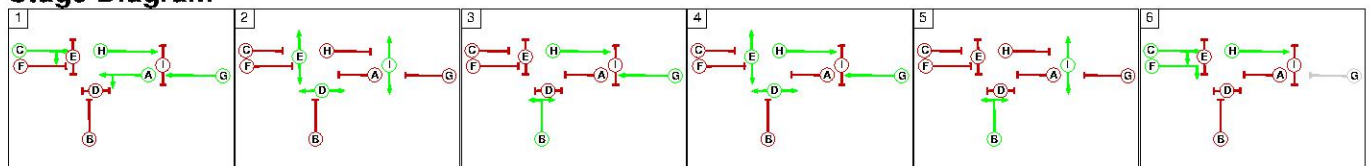
Phase Intergreens Matrix

	Starting Phase									
		A	B	C	D	E	F	G	H	I
	A		5	-	5	8	5	-	-	-
	B	5		6	5	6	6	-	-	-
	C	-	6		7	5	-	-	-	-
	D	11	11	11		-	11	-	-	-
	E	11	11	11	-		11	-	-	-
	F	5	6	-	7	5		-	-	-
	G	-	-	-	-	-	-		-	5
	H	-	-	-	-	-	-	-		5
	I	-	-	-	-	-	-	11	11	

Phases in Stage

Stage No.	Phases in Stage
1	A C G H
2	D E I
3	B G H
4	D E G H
5	B I
6	C F H

Stage Diagram



Phase Delays

Term. Stage	Start Stage	Phase	Type	Value	Cont value
1	5	G	Losing	4	4
1	5	H	Losing	4	4

Prohibited Stage Change

	To Stage						
		1	2	3	4	5	6
	1		8	6	8	9	5
	2	11		11	11	11	11
	3	6	6		6	5	6
	4	11	5	11		11	11
	5	11	6	11	11		11
	6	5	7	6	7	6	

Full Input Data And Results

Give-Way Lane Input Data

Junction: Proposed New Road/Site Access Signal Junction											
Lane	Movement	Max Flow when Giving Way (PCU/Hr)	Min Flow when Giving Way (PCU/Hr)	Opposing Lane	Opp. Lane Coeff.	Opp. Mvmnts.	Right Turn Storage (PCU)	Non-Blocking Storage (PCU)	RTF	Right Turn Move up (s)	Max Turns in Intergreen (PCU)
3/1 (New Road (West) EB)	5/1 (Right)	1439	0	1/1	1.09	All	3.00	3.00	0.50	3	3.00

Lane Input Data

Junction: Proposed New Road/Site Access Signal Junction												
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (New Rd WB (west of crossing))	U	A	2	3	7.3	Geom	-	3.50	0.00	Y	Arm 5 Left	Inf
											Arm 6 Ahead	15.00
2/1 (Site Access)	U	B	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 4 Right	17.00
											Arm 6 Left	13.00
3/1 (New Road (West) EB)	O	C F	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 4 Ahead	Inf
											Arm 5 Right	15.00
4/1 (New Road EB to crossing)	U	H	2	3	11.7	Geom	-	3.50	0.00	Y	Arm 8 Ahead	Inf
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1 (New Rd W WB (exit))	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1 (New Rd WB (East of Crossing))	U	G	2	3	60.0	Geom	-	3.50	0.00	Y	Arm 1 Ahead	Inf
8/1 (New Rd (E) - EB from crossing (exit))	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2020 Weekday AM Development Case'	07:30	08:30	01:00	
2: '2020 Weekday PM Development Case'	16:30	17:30	01:00	

Scenario 1: 'AM Post Dev' (FG1: '2020 Weekday AM Development Case', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired**Desired Flow :**

	Destination			
	A	B	C	Tot.
Origin	A	0	27	903
	B	77	0	33
	C	453	12	0
	Tot.	530	39	936
				1505

Traffic Lane Flows

Lane	Scenario 1: AM Post Dev
Junction: Proposed New Road/Site Access Signal Junction	
1/1	930
2/1	110
3/1	465
4/1	530
5/1	39
6/1	936
7/1	930
8/1	530

Lane Saturation Flows

Junction: Proposed New Road/Site Access Signal Junction								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (New Rd WB (west of crossing))	3.50	0.00	Y	Arm 5 Left	Inf	2.9 %	1791	1791
				Arm 6 Ahead	15.00	97.1 %		
2/1 (Site Access)	3.50	0.00	Y	Arm 4 Right	17.00	70.0 %	1792	1792
				Arm 6 Left	13.00	30.0 %		
3/1 (New Road (West) EB)	3.50	0.00	Y	Arm 4 Ahead	Inf	97.4 %	1960	1960
				Arm 5 Right	15.00	2.6 %		
4/1 (New Road EB to crossing)	3.50	0.00	Y	Arm 8 Ahead	Inf	100.0 %	1965	1965
5/1	Infinite Saturation Flow						Inf	Inf
6/1 (New Rd W WB (exit) Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (New Rd WB (East of Crossing))	3.50	0.00	Y	Arm 1 Ahead	Inf	100.0 %	1965	1965
8/1 (New Rd (E) - EB from crossing (exit) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 2: 'PM Post Dev' (FG2: '2020 Weekday PM Development Case', Plan 1: 'Network Control Plan 1')

Traffic Flows, Desired

Desired Flow :

Origin	Destination				
		A	B	C	Tot.
	A	0	69	580	649
	B	35	0	15	50
	C	579	30	0	609
Tot.	614	99	595	1308	

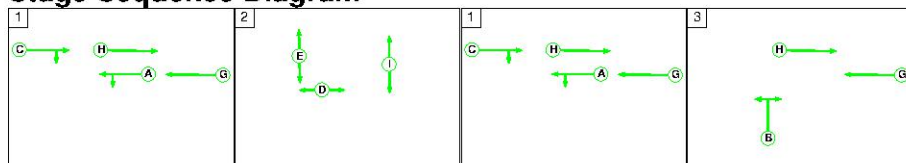
Traffic Lane Flows

Lane	Scenario 2: PM Post Dev
Junction: Proposed New Road/Site Access Signal Junction	
1/1	649
2/1	50
3/1	609
4/1	614
5/1	99
6/1	595
7/1	649
8/1	614

Lane Saturation Flows

Junction: Proposed New Road/Site Access Signal Junction								
Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat Flow (PCU/Hr)	Flared Sat Flow (PCU/Hr)
1/1 (New Rd WB (west of crossing))	3.50	0.00	Y	Arm 5 Left	Inf	10.6 %	1804	1804
				Arm 6 Ahead	15.00	89.4 %		
2/1 (Site Access)	3.50	0.00	Y	Arm 4 Right	17.00	70.0 %	1792	1792
				Arm 6 Left	13.00	30.0 %		
3/1 (New Road (West) EB)	3.50	0.00	Y	Arm 4 Ahead	Inf	95.1 %	1955	1955
				Arm 5 Right	15.00	4.9 %		
4/1 (New Road EB to crossing)	3.50	0.00	Y	Arm 8 Ahead	Inf	100.0 %	1965	1965
5/1	Infinite Saturation Flow						Inf	Inf
6/1 (New Rd W WB (exit) Lane 1)	Infinite Saturation Flow						Inf	Inf
7/1 (New Rd WB (East of Crossing))	3.50	0.00	Y	Arm 1 Ahead	Inf	100.0 %	1965	1965
8/1 (New Rd (E) - EB from crossing (exit) Lane 1)	Infinite Saturation Flow						Inf	Inf

Scenario 1: 'AM Post Dev' (FG1: '2020 Weekday AM Development Case', Plan 1: 'Network Control Plan 1')

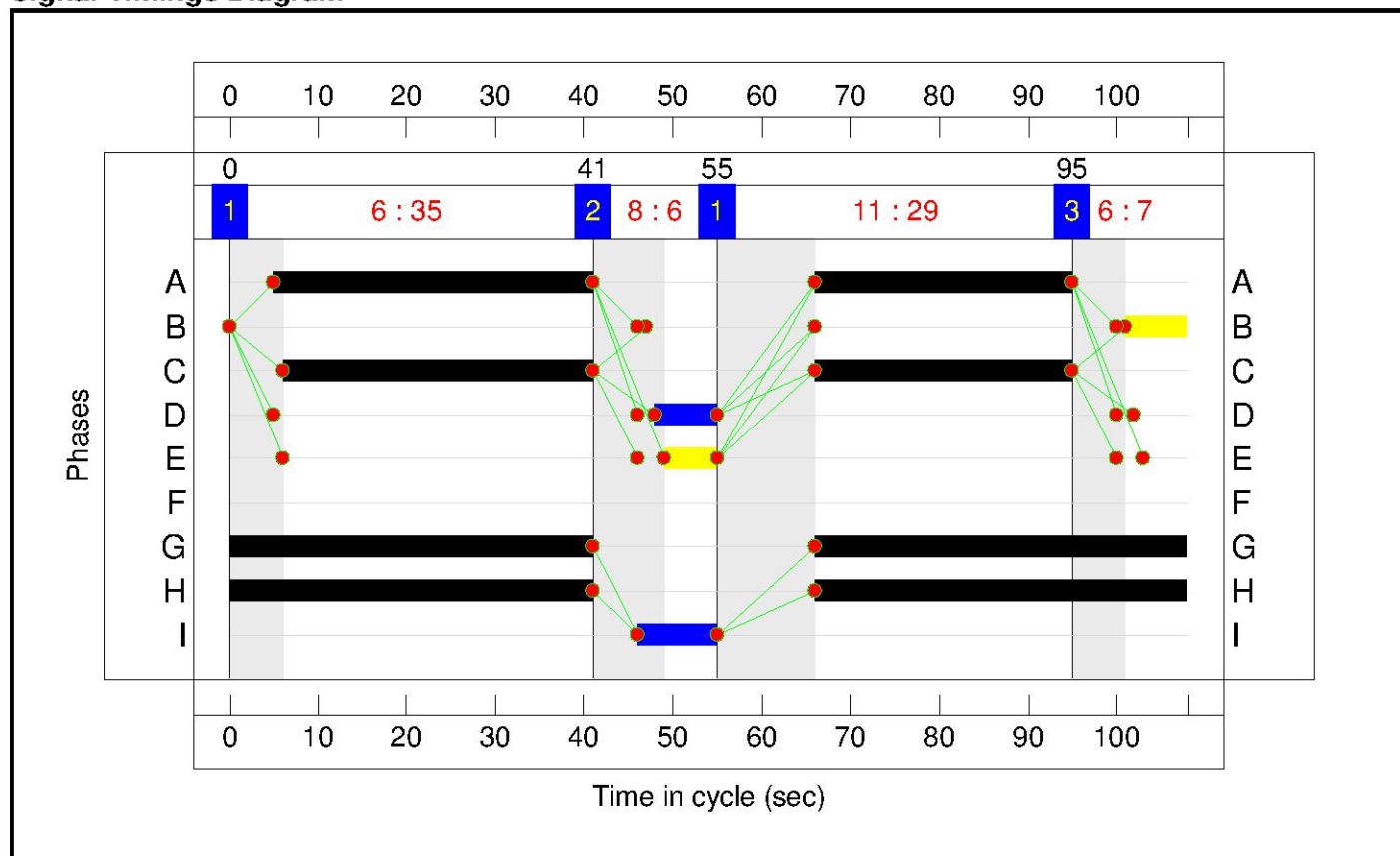
Stage Sequence Diagram

Full Input Data And Results

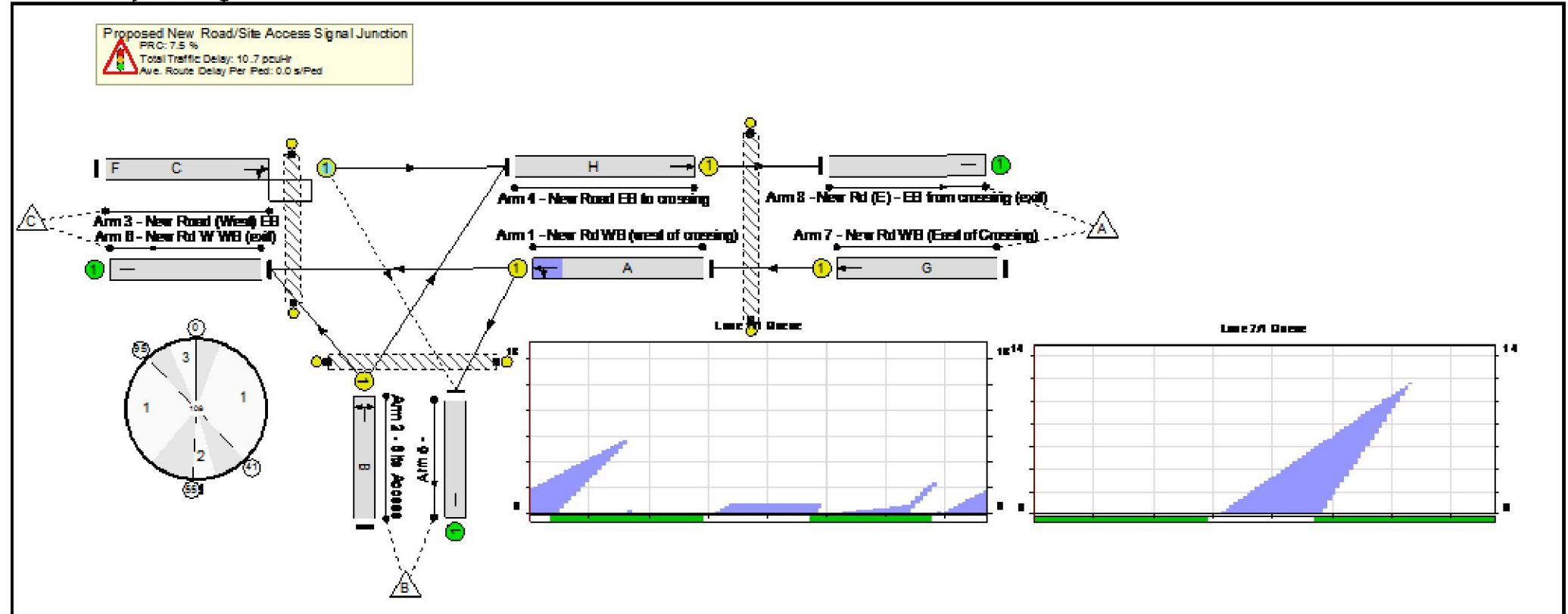
Stage Timings

Stage	1	2	1	3
Duration	35	6	29	7
Change Point	0	41	55	95

Signal Timings Diagram



Full Input Data And Results
Network Layout Diagram



Full Input Data And Results

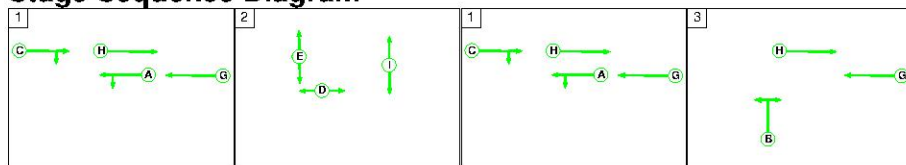
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Signalised Junction	-	-	N/A	-	-		-	-	-	-	-	-	83.7%
Proposed New Road/Site Access Signal Junction	-	-	N/A	-	-		-	-	-	-	-	-	83.7%
1/1	New Rd WB (west of crossing) Left Ahead	U	N/A	N/A	A		2	65	-	930	1791	1111	83.7%
2/1	Site Access Right Left	U	N/A	N/A	B		1	7	-	110	1792	133	82.9%
3/1	New Road (West) EB Ahead Right	O	N/A	N/A	C	F	2	64	0	465	1960	1198	38.8%
4/1	New Road EB to crossing Ahead	U	N/A	N/A	H		1	83	-	530	1965	1528	34.7%
5/1		U	N/A	N/A	-		-	-	-	39	Inf	Inf	0.0%
6/1	New Rd W WB (exit)	U	N/A	N/A	-		-	-	-	936	Inf	Inf	0.0%
7/1	New Rd WB (East of Crossing) Ahead	U	N/A	N/A	G		1	83	-	930	1965	1528	60.9%
8/1	New Rd (E) - EB from crossing (exit)	U	N/A	N/A	-		-	-	-	530	Inf	Inf	0.0%
Ped Link: P1	New Road (West)	-	N/A	-	E		1	6	-	0	-	0	0.0%
Ped Link: P2	Site Access	-	N/A	-	D		1	7	-	0	-	0	0.0%
Ped Link: P3	Unnamed Ped Link	-	N/A	-	I		1	9	-	0	-	0	0.0%

Full Input Data And Results

[illegible]

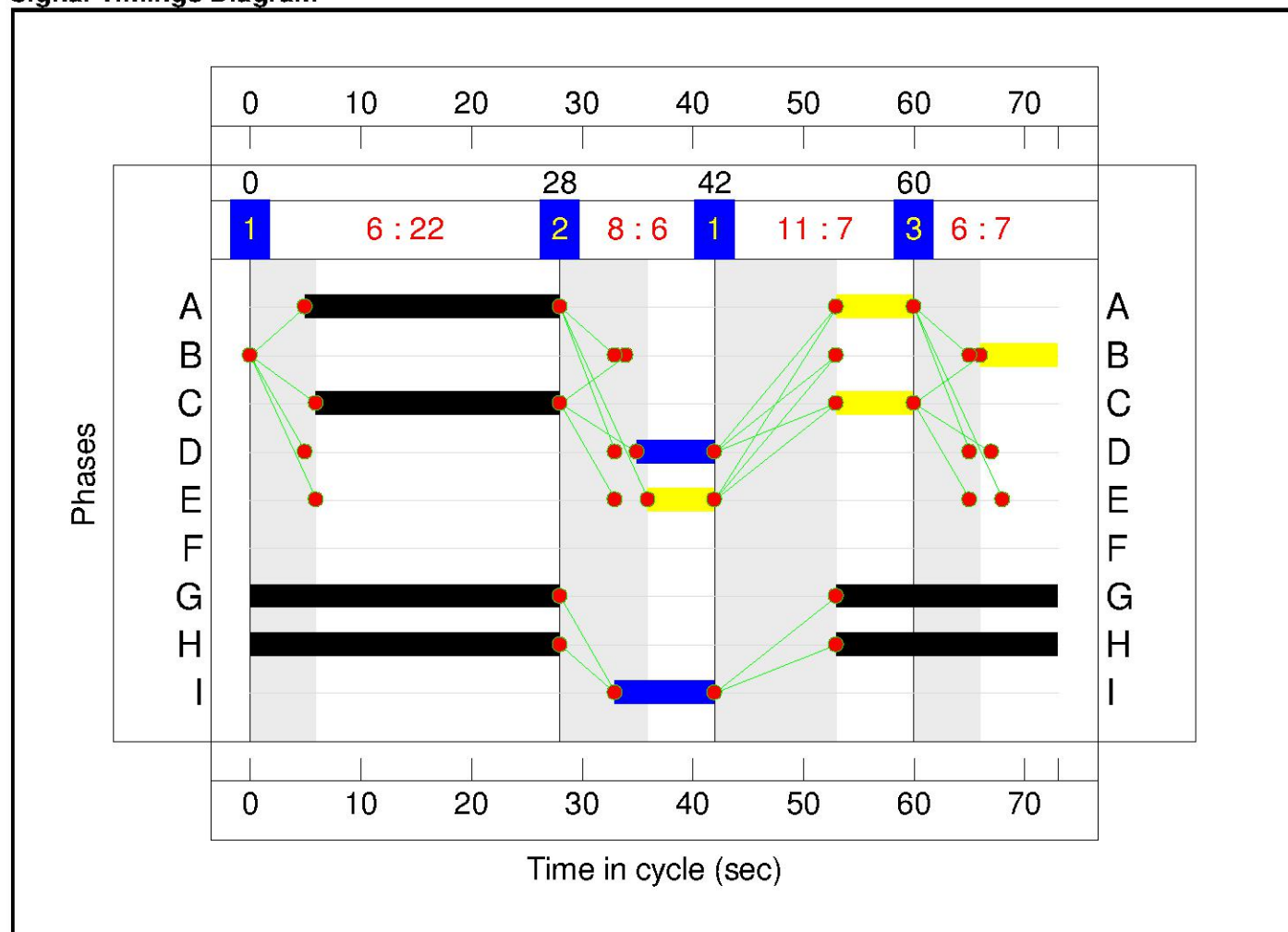
Stage Sequence Diagram



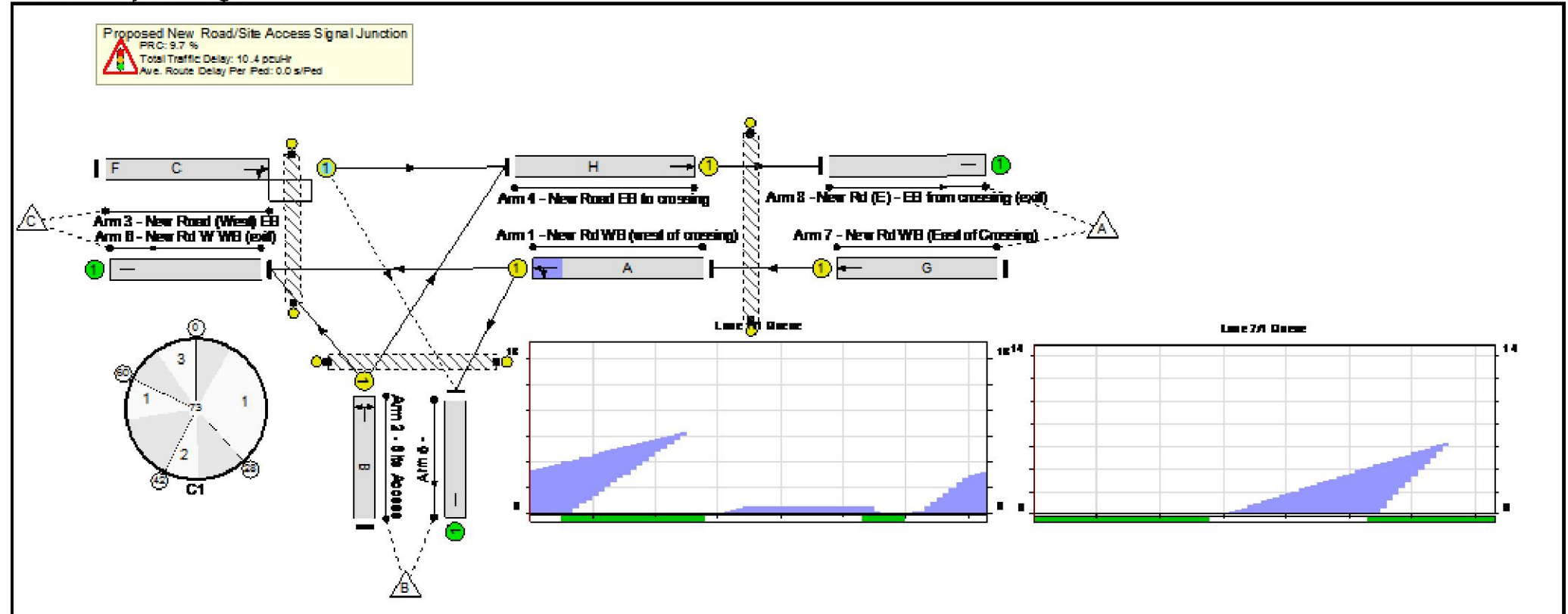
Stage Timings

Stage	1	2	1	3
Duration	22	6	7	7
Change Point	0	28	42	60

Signal Timings Diagram



Full Input Data And Results
Network Layout Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Signalised Junction	-	-	N/A	-	-		-	-	-	-	-	-	82.1%
Proposed New Road/Site Access Signal Junction	-	-	N/A	-	-		-	-	-	-	-	-	82.1%
1/1	New Rd WB (west of crossing) Left Ahead	U	N/A	N/A	A		2	30	-	649	1804	791	82.1%
2/1	Site Access Right Left	U	N/A	N/A	B		1	7	-	50	1792	196	25.5%
3/1	New Road (West) EB Ahead Right	O	N/A	N/A	C	F	2	29	0	609	1955	830	73.4%
4/1	New Road EB to crossing Ahead	U	N/A	N/A	H		1	48	-	614	1965	1319	46.6%
5/1		U	N/A	N/A	-		-	-	-	99	Inf	Inf	0.0%
6/1	New Rd W WB (exit)	U	N/A	N/A	-		-	-	-	595	Inf	Inf	0.0%
7/1	New Rd WB (East of Crossing) Ahead	U	N/A	N/A	G		1	48	-	649	1965	1319	49.2%
8/1	New Rd (E) - EB from crossing (exit)	U	N/A	N/A	-		-	-	-	614	Inf	Inf	0.0%
Ped Link: P1	New Road (West)	-	N/A	-	E		1	6	-	0	-	0	0.0%
Ped Link: P2	Site Access	-	N/A	-	D		1	7	-	0	-	0	0.0%
Ped Link: P3	Unnamed Ped Link	-	N/A	-	I		1	9	-	0	-	0	0.0%

Full Input Data And Results

Item	Arriving (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Signalised Junction	-	-	23	0	7	5.7	4.7	0.1	10.4	-	-	-	-
Proposed New Road/Site Access Signal Junction	-	-	23	0	7	5.7	4.7	0.1	10.4	-	-	-	-
1/1	649	649	-	-	-	1.9	2.2	-	4.2	23.1	9.4	2.2	11.6
2/1	50	50	-	-	-	0.4	0.2	-	0.6	42.1	0.9	0.2	1.1
3/1	609	609	23	0	7	1.9	1.4	0.1	3.3	19.6	6.0	1.4	7.3
4/1	614	614	-	-	-	0.4	0.4	-	0.8	4.9	1.4	0.4	1.8
5/1	99	99	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	595	595	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	649	649	-	-	-	1.1	0.5	-	1.5	8.6	6.3	0.5	6.8
8/1	614	614	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
Ped Link: P1	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P2	0	0	-	-	-	-	-	-	-	-	-	-	-
Ped Link: P3	0	0	-	-	-	-	-	-	-	-	-	-	-
C1 PRC for Signalled Lanes (%): 9.7 Total Delay for Signalled Lanes (pcuHr): 10.43 Cycle Time (s): 73 PRC Over All Lanes (%): 9.7 Total Delay Over All Lanes(pcuHr): 10.43													

Appendix B
Beam Parkway Concept Design Plans



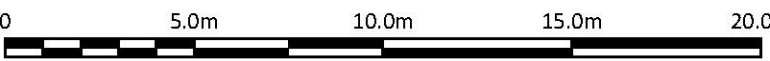
			
Client: LONDON BOROUGH OF HAVERING			
Project Title: BEAM PARKWAY STEP 2			
Drawing Title: DOVERS CORNER / NEW ROAD			
Status: WORK IN PROGRESS			
Size: A1	Scale: 1:200	Suitability S0	Rev. P0
Drawing No. 22839903-STR-HGN-BP00-DR-D-01315			

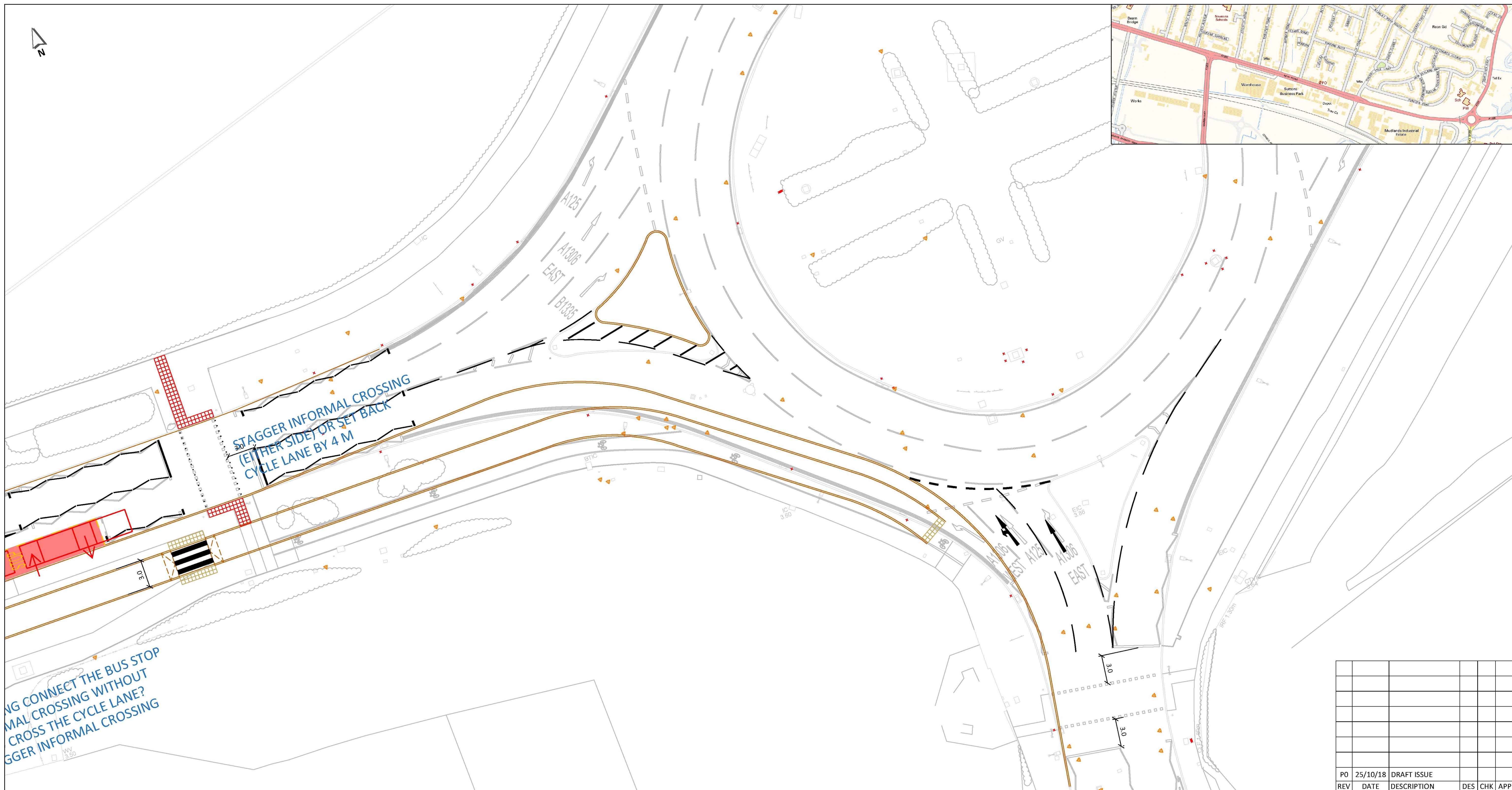
PROPOSED KERBLINE

PROPOSED ROAD MARKINGS

PROPOSED FLUSH CENTRAL MEDIAN

1. THIS DRAWING IS BASED UPON OS BASE MAPPING (LICENSE 100024327) AND ON TOPOGRAPHIC SURVEY BY CAT SURVEYS LTD. RECEIVED ON 28/09/2017
2. SCHEME BOUNDARIES BASED ON HIGHWAY BOUNDARIES RECEIVED FROM LONDON BOROUGH OF HAVERING
3. DO NOT SCALE FROM THIS DRAWING. IF IN DOUBT REFER TO THE PROJECT MANAGER FOR CLARIFICATION.
4. EXISTING FEATURES ARE SHOWN IN GREY, PROPOSED FEATURES SHOWN IN BOLD.
5. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
6. LOCATION OF TREES AND OTHER LANDSCAPING FEATURES IS INDICATIVE
7. LOCATION AND LAYOUT OF BUS STOPS TO BE FURTHER REFINED IN LIAISON WITH LONDON BUSES





PO	25/10/18	DRAFT ISSUE			
REV	DATE	DESCRIPTION	DES	CHK	APP

LEGEND:

- PROPOSED KERBLINE
- PROPOSED ROAD MARKINGS
- PROPOSED FLUSH CENTRAL MEDIAN

NOTES:

1. THIS DRAWING IS BASED UPON OS BASE MAPPING (LICENSE 100024327) AND ON TOPOGRAPHIC SURVEY BY CAT SURVEYS LTD. RECEIVED ON 28/09/2017
2. SCHEME BOUNDARIES BASED ON HIGHWAY BOUNDARIES RECEIVED FROM LONDON BOROUGH OF HAVERING
3. DO NOT SCALE FROM THIS DRAWING. IF IN DOUBT REFER TO THE PROJECT MANAGER FOR CLARIFICATION.
4. EXISTING FEATURES ARE SHOWN IN GREY, PROPOSED FEATURES SHOWN IN BOLD.
5. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
6. LOCATION OF TREES AND OTHER LANDSCAPING FEATURES IS INDICATIVE
7. LOCATION AND LAYOUT OF BUS STOPS TO BE FURTHER REFINED IN LIAISON WITH LONDON BUSES

steer

www.steergroup.com

Client: LONDON BOROUGH OF HAVERING

Project Title: **BEAM PARKWAY STEP 2**

Drawing Title:

DOVERS CORNER
SHEET 1 OF 2

Status:

WORK IN PROGRESS

size: A1

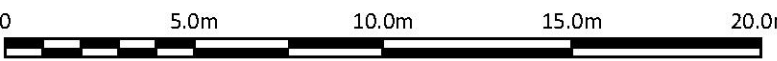
Scale:
1:

50

PO

Drawing No.

22839903-STR-HGN-BP00-DR-D-01316



Appendix C
Technically Approved Priority Junction Layout

Appendix D
PI CADY Outputs

Junctions 9									
PICADY 9 - Priority Intersection Module									
Version: 9.5.1.7462 © Copyright TRL Limited, 2019									
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk									
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution									

Filename: Dovers Corner Site Access PICADY.j9
Path: C:\Users\btong\Desktop\Dovers Corner PICADY
Report generation date: 28/01/2020 14:40:19

»2020 Dev Case , AM
 »2020 Dev Case, PM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
2020 Dev Case										
Stream B-AC	D1	0.9	28.85	0.49	D	D2	0.2	14.15	0.18	B
Stream C-B		0.0	8.92	0.03	A		0.1	7.72	0.07	A

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

File summary

File Description

Title	
Location	
Site number	
Date	28/01/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ARDENTCE\btong
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2020 Dev Case	AM	ONE HOUR	08:00	09:30	15	✓
D2	2020 Dev Case	PM	ONE HOUR	17:00	18:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2020 Dev Case , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		2.18	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	New Road (East)		Major
B	Site Access		Minor
C	New Road (West)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.00		✓	3.00	106.0		-

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	2.75	130	87

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	550	0.100	0.253	0.159	0.362
B-C	662	0.101	0.256	-	-
C-B	691	0.268	0.268	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2020 Dev Case	AM	ONE HOUR	08:00	09:30	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	930	100.000
B		ONE HOUR	✓	110	100.000
C		ONE HOUR	✓	465	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A	B	C
	A	0	27	903
	B	77	0	33
	C	453	12	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A	B	C
	A	0	4	8
	B	1	0	0
	C	8	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-AC	0.49	28.85	0.9	D	101	151
C-A					416	624
C-B	0.03	8.92	0.0	A	11	17
AB					25	37
AC					829	1243

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	83	21	355	0.233	82	0.0	0.3	13.198	B
C-A	341	85			341				
C-B	9	2	503	0.018	9	0.0	0.0	7.282	A
AB	20	5			20				
AC	680	170			680				

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	99	25	310	0.319	98	0.3	0.5	17.068	C
C-A	407	102			407				
C-B	11	3	467	0.023	11	0.0	0.0	7.891	A
A-B	24	6			24				
A-C	812	203			812				

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	121	30	246	0.492	119	0.5	0.9	28.119	D
C-A	499	125			499				
C-B	13	3	417	0.032	13	0.0	0.0	8.922	A
A-B	30	7			30				
A-C	994	249			994				

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	121	30	246	0.492	121	0.9	0.9	28.854	D
C-A	499	125			499				
C-B	13	3	417	0.032	13	0.0	0.0	8.922	A
A-B	30	7			30				
A-C	994	249			994				

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	99	25	310	0.319	101	0.9	0.5	17.470	C
C-A	407	102			407				
C-B	11	3	467	0.023	11	0.0	0.0	7.893	A
A-B	24	6			24				
A-C	812	203			812				

09:15 - 09:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	83	21	355	0.233	84	0.5	0.3	13.388	B
C-A	341	85			341				
C-B	9	2	503	0.018	9	0.0	0.0	7.286	A
A-B	20	5			20				
A-C	680	170			680				

2020 Dev Case, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.72	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2020 Dev Case	PM	ONE HOUR	17:00	18:30	15	✓

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

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A		ONE HOUR	✓	649	100.000
B		ONE HOUR	✓	50	100.000
C		ONE HOUR	✓	609	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
	A	B	C	
From	A	0	69	580
	B	35	0	15
	C	579	30	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
	A	B	C	
From	A	0	0	6
	B	0	0	0
	C	6	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-AC	0.18	14.15	0.2	B	46	69
C-A					531	797
C-B	0.07	7.72	0.1	A	28	41
A-B					63	95
A-C					532	798

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	38	9	398	0.095	37	0.0	0.1	9.970	A
C-A	436	109			436				
C-B	23	6	560	0.040	22	0.0	0.0	6.696	A
A-B	52	13			52				
A-C	437	109			437				

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	45	11	361	0.124	45	0.1	0.1	11.372	B
C-A	521	130			521				
C-B	27	7	535	0.050	27	0.0	0.1	7.091	A
A-B	62	16			62				
A-C	521	130			521				

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	55	14	309	0.178	55	0.1	0.2	14.118	B
C-A	637	159			637				
C-B	33	8	499	0.066	33	0.1	0.1	7.716	A
A-B	76	19			76				
A-C	639	160			639				

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	55	14	309	0.178	55	0.2	0.2	14.150	B
C-A	637	159			637				
C-B	33	8	499	0.066	33	0.1	0.1	7.718	A
A-B	76	19			76				
A-C	639	160			639				

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	45	11	361	0.124	45	0.2	0.1	11.405	B
C-A	521	130			521				
C-B	27	7	535	0.050	27	0.1	0.1	7.096	A
A-B	62	16			62				
A-C	521	130			521				

18:15 - 18:30

Stream	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	38	9	398	0.095	38	0.1	0.1	10.001	B
C-A	436	109			436				
C-B	23	6	560	0.040	23	0.1	0.0	6.702	A
A-B	52	13			52				
A-C	437	109			437				