

**Proposed residential development
for 47 dwellings
on
land at Portsdown Hill,
Bedhampton,
Havant**

TRANSPORT STATEMENT



David Wilson Homes

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on
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Bedhampton,
Havant**

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February 2014

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1. INTRODUCTION

- 1.1 This report has been prepared on behalf of the developer, David Wilson Homes, to accompany a planning application for a residential redevelopment of 47 dwellings on land at Portsdown Hill, Bedhampton, Havant. This report contains a Transport Statement even though the size of the proposed development is below the lowest threshold set out in the DfT Guidance on Transport Assessments (March 2007) for which these reports are considered necessary ('*normally only necessary for 50 -80 dwellings*'). These thresholds are based on the expected additional peak hour traffic. However because of the proximity of the site to the Rusty Cutter interchange between the A3(M) and the A2030 Havant Road both the local highway authority and the Trunk road authority require reasonably detailed estimates of the additional traffic and the impact it would have on this major intersection. Therefore this report contains all the essential transport and highway information to enable an informed decision to be made, particularly as it relates to the Rusty Cutter.. This report should be read in conjunction with the other supporting documents submitted with the application.
- 1.2 The site lies on the north side of the A2030 Havant Road and some 150m west of the Rusty Cutter A3(M) / A2030 interchange. The site is currently in agricultural use and there is residential development along the eastern and northern boundaries. It is identified as site UE5 in Havant's Emerging Local Plan. In the last two years there has been frequent discussions with the local highway authority, Hampshire CC, through their representative in Havant BC and also with the Highways Agency. These discussions have determined the extent and scope of this report.
- 1.3 The scope of this Transport Statement follows the advice in the DfT document and sets out a description of the transport infrastructure in the area ; the results of recent traffic counts near the site; an estimate of the expected traffic generation from the development and how this will distribute onto the adjoining highway network. The impact of this traffic, particularly on local junctions is assessed and any mitigation identified. Although small and below the normal threshold, a draft Travel Plan is submitted at the specific request of the local highway authority. .

2. LOCATION AND DESCRIPTION OF THE SITE

Location

- 2.1 The application site is located some 2km west of the centre of Havant, 3km south of Waterlooville and 8km north-east of Portsmouth city centre. The site lies on the north side of the A2030 Havant Road which links Cosham with Havant. The site has a 40m frontage onto Havant Road although all access will be taken from the end of the Bedhampton Hill Road cul-de-sac. The site location within the local area is identified in Figure 1.
- 2.2 There is residential development to the east and north of the site.
- 2.3 The administrative boundary with Portsmouth City Council lies 600m to the west. This is relevant because whilst the most of the nearest public facilities (ie shops, churches, fast-food etc.) lie to the west, the other publicly provided facilities (ie schools) lie on the other side of the A3(M).

Description

- 2.4 The site is approximately triangular with a narrow 40m frontage onto Havant Road and with the eastern and northern boundaries extending to some 300m. The ground rises up from the south and is currently in agricultural use.
- 2.5 Havant Road runs westwards from the Rusty Cutter interchange and across the site frontage is effectively a dual carriageway as the road widens out with a large grassed central island between the two carriageways. It has wide verges on either side and that on the north side contains a joint footway and cycleway. Bedhampton Hill Road was realigned when the A3(M) and the Rusty Cutter interchange was constructed and now has a short west-facing stub from which all access to the development will be taken. The existing highway layout is identified in Figure 2.

3. ACCESSIBILITY OF THE SITE

3.1 The recently published NPPF¹ states throughout that

there is a presumption in favour of sustainable development

Sustainable development, in transport terms, means the ability to access facilities without the reliance on the use of the motor car.

3.2 Figures set out in the now superseded, but still relevant advice in PPG13 'Good Practice Guide', and confirmed in the annual National Travel Survey published by the DfT, indicate that walking is the most frequently used mode of travel for distances up to 1.6km and that people will frequently walk up to 2.5km to work or school. It is only over 2.5km that the bus, car or cycle become the preferred alternatives.

3.3 Some of the local facilities within these distances, ie a short walk or cycle from the site, are listed in Table 1 below.

Table 1: Proximity of local shops, schools and services to application site

walk /cycle distance*	type of facility
250m	Rusty Cutter public house, restaurant, Premier Inn hotel
750m	St Andrews church, Farlington
850m	dental practice, Havant Road, Farlington
900m	newsagent, hairdressers, fast food (Belmont Grove)
1100m	Tesco Express + Post office , Farlington
1250m	local shops (off-licence, newsagent, tyres) Bedh'mptn Rd)
1350m	Bidbury Infant and Junior Schools
1500m	Bedhampton railway station
2000m	Sainsbury , Farlington and a Retail Park
2100m	Asda superstore
2200m	Tesco superstore (Havant)
2300m	Havant town centre
3700m	Queen Alexandra Hospital

* all distances measured from front of the site

3.4 To the east, west and south of the site the topography of the land in the area is reasonably flat and so it is reasonable to consider a 5 -8km cycle to access a large number of employment opportunities, including most of Havant and north Portsmouth around Cosham and the QA hospital. The presence of the cycleway along the north side of Havant Road makes this corridor particularly attractive to cyclists.

¹ NPPF National Planning Policy Framework DCLG March 2012

4. EXISTING TRANSPORT INFRASTRUCTURE

Highway network

- 4.1 The local highway network in the vicinity of the application site is identified in Figure 1.
- 4.2 200m east of the application site is the **A3(M)** which is part of the national Strategic Highway Network and provides access northwards to Petersfield, Guildford, the M25 and London and southwards to Portsmouth, Chichester, the A27, the M27 and Southampton to the south. Only three of the four possible movements at this interchange are directly accessible as the southbound 'on-slip' does not exist and it is necessary to travel along Harts Farm Way to reach the A27 on-slip roads.
- 4.3 The major interchange between the A3(M) and the A2030 is known locally as the Rusty Cutter because of the pub in the north-east corner. It is a grade –separated interchange with the A3(M) passing over a large 150m diameter roundabout. In the last two years there have been various developer funded improvements at this junction so that now both the A3(M) off-slips are traffic signal controlled, whilst the other three arms; Hunts Farm Way (from the south-east) has 3 lanes; Havant Road (from the west) also has three lanes and Bedhampton Hill (from the north-east) has two lanes. There is a signed footway and cycleway around the north side of this junction. This junction is part of the Strategic Road Network and the responsibility of the Highways Agency.
- 4.4 The **A2030 Havant Road** runs east-west across the southern edge of the application site and this provides an important east-west link from Havant and the A3(M) to the northern suburbs of Portsmouth. East of the rusty Cutter it continues through Bedhampton into Havant centre. It is an important bus route.
- 4.5 Although the Havant Road approach from the west into the Rusty Cutter roundabout is not signalised it benefits from gaps created by the signals on the A3(M) northbound off-slip and therefore only limited queuing occurs on this approach. The main carriageway is marked with 'Keep Clear' road markings on the carriageway at the junction with Bedhampton Hill Road but as this crossing is some 70m back from the Give Way line onto the roundabout (ie 10 vehicle lengths) they are rarely necessary. Recent traffic counts have been carried out at this point and are described below.
- 4.6 Some 75m west of the roundabout **Bedhampton Hill Road** has a junction with Havant Road. The layout is identified in Figure 2. Traffic can only turn left out of Bedhampton Hill Road, performing a tight left–turn manoeuvre. Traffic can turn into Bedhampton Hill road from east or west, the right–turn from the east benefits from a right-turning lane that starts at the roundabout and gradually gets wider. From measurement, it would be able to accommodate up to 9 vehicles before there was any interference with other

traffic travelling west along Havant Road. The recent surveys show the actual queueing is much less than this.

- 4.7 North of Bedhampton Hill Road the road changes to Glebe Park Avenue. This has become a bit of a rat-run in recent years by traffic wishing to access the A3(M) via the Rusty Cutter interchange. The highway authority has introduced some yellow lines restricting parking to protect the flow of traffic but there is still a lot of day-time parking in this area, much of it by vans. The route northwards up Glebe Park Avenue leads to the B2177 Portsmouth Hill where there is a difficult junction.

Bus network

- 4.8 There are two regular bus services that pass along Havant Road. These are summarised in Table 2, The nearest bus stops are in Havant Road 100m west of the proposed access

Table 2: Summary of bus services passing along Havant Road

Service	route	weekday frequency daytime (each way)	weekday first and last bus
Stagecoach 21	Portsmouth (The Hard) – Copnor – Anchorage Park – Farlington – Havant road – Bedhampton – Havant -	2 per hour	06.05 - 23.20
Stagecoach 23	Southsea – Portsmouth - Commercial Rd – North End - Cosham – Farlington – Havant Road – Havant town centre – Leigh Park	6 per hour	05.40 – 23.30

- 4.9 Hence there are 8 buses per hour passing the site in each direction. These could also act as feeder buses to the railway stations in Bedhampton, Havant or Cosham where there are regular train services to give access to most destinations east, west and north of Havant.

Pedestrian facilities and Rights of Way

- 4.10 There is the joint footway / cycleway along the north side of Havant Road which continues around the Rusty cutter roundabout with some crossings signalised. Interestingly there are no Public Footpaths or Bridleways at all in the area, so all pedestrian access is limited to the use of the adopted highway network.

Road accident data

- 4.11 The 3-year accident record for roads in the vicinity of the site has been obtained from Crashmap for the period 1st January 2010 until 31st December 2012. During this period there have been a number of crashes on the Rusty Cutter roundabout including six at the Havant Road 'give-way' line where it meets the roundabout.

- 4.12 There have been three recorded crashes at the Havant Road / Bedhampton Hill Road 'crossing' in this period. These are summarised below.

Table 3: Summary of reported injury 'crashes' at Havant Rd / Bedhampton Hill Road (BHR) crossing

1	9 November 2010 @ 6.04 pm	slight	Car 1 making a right –turn into BHR; car 2 decides to change lanes on Havant Rd, they collide and hit car 3 waiting to turn left out of BHR
2	2 Sept 2011 @ 2.15 pm	slight	car turns right into BHR and collides with eastbound car on Havant Road
3	29 June 2012 @ 1.29 pm	slight	car 1 slows to allow vehicle to cross in front and is hit in rear by following vehicle

Existing traffic flows

- 4.13 Peak hour surveys have been undertaken of the turning movements in and out of Bedhampton Hill Road on three occasions; in October 2009, September 2013 and February 2014. The two most recent surveys were more comprehensive than the 2009 counts and covered the whole of the peak period from 07.30 – 09.00 and from 16.00 – 18.00. The results were very similar with identical two-way flows on Bedhampton Hill Rd / Glebe Park Avenue during the AM peak and flows some 8-10% higher on all roads in the 2014 PM peak, A comparison of the survey results from September 2013 and February 2014 is set out in Table 4 below.

Table 4: comparison of observed counts: September 2013 and February 2014

2-way (vehs / hr)	AM peak			PM peak		
	2-way flow Sept 2013	2-way flow Feb 2014	diff	2-way flow Sept 2013	2-way flow Feb 2014	diff
BHR* and Glebe Park Avenue	235	235	nil	264	292	+28
Havant Road (eastbound into roundabout)	886	816	-70	804	860	+ 54
right-turn off Havant Rd into BHR*	88	111	+23	130	142	+12

* BHR = Bedhampton Hill Road

- 4.14 To ensure a robust analysis the highest observed figure from either of these two surveys has been taken to be the 'existing' traffic flows set out in Figure 3.
- 4.15 The maximum queue in either AM or PM peak of vehicles turning off the westbound Havant Road into Bedhampton Hill Road was identified for each 10 minute interval throughout the 4 hours (2 hours AM and 2 hours PM) of the surveys. On one occasion it



amounted to 5 vehicles but throughout the rest of the 4 hour period it was generally 2 -3 vehicles in the AM peak period and 3 - 4 vehicles in the PM peak period. There are 'Keep Clear' markings on the carriageway at this junction with Bedhampton Hill Road and this seems to be well observed and ensures minimum delay to crossing vehicles.

- 4.16 Queues of vehicles waiting to turn left out of Bedhampton Hill Road were also noted. On no occasion did they 4 vehicles. These are summarised in Table 5.

Table 5 Queues out of Bedhampton Hill Road and into Bedhampton Hill Road

	Max observed queue (between 07.30 - 09.00)	Max observed queue (between 16.00 – 18.00)
right –turn off Havant road into Bedhampton Hill Rd	3	5
left-turn out of Bedhampton Hill road onto Havant Road	3	4

5. PROPOSED DEVELOPMENT

Description

- 5.1 The application is for 47 dwellings of a mix of sizes and with 30% in the affordable sector and 70% in the affordable sector. The proposed layout is identified at Figure 8. There would be a single access into the site located off the existing cul-de-sac section of Bedhampton Hill Road. This access would also provide the only pedestrian and cycle access to the site.

Composition, access and parking

- 5.2 The housing composition and level of parking provision is set out in Table 5.

Table 5: Housing composition and parking

house size	number of units		parking provision per unit* (all allocated)*
	private	affordable	
2-bed	-	6	2
3-bed	2	8	2
4-bed	21	-	3
5-bed	10	-	4
Total	33	14 = 47	-

* includes garages

- 5.3 Overall there will be 149 allocated parking spaces for the 47 dwellings, approximately 3 spaces per dwelling on average. In addition to these allocated spaces, there will be a total of 12 unallocated visitor parking spaces spread around the site. Many properties have their own single or double garage, with the dimensions of single garages at least 6m x 3m so they can accommodate cycle storage. Those properties without a garage will have access to secure and covered cycle storage.
- 5.5 The access off Bedhampton Hill Road is an extension of the existing cul-de-sac that serves two dwellings, No.s 68 and 70. This access will bend around a 30m radius curve and enter the site. To re-inforce the need for speeds to remain low and to enable the existing footway /cycleway along the north side of Havant Road to pass over the access with minimum disruption there would be a traffic calming 'table-top' at this point (see Figure 7). The spine road within the site will not be offered for adoption and so a full-size turning head will be provided just inside the access.

Traffic generation

- 5.6 The traffic generation from the new development has been derived based on traffic generation rates in developments in southern Hampshire and Dorset with a similar level of car ownership. These are slightly higher than the normal HCC rates because of the

proposed housing mix. The expected traffic generation will amount to some 30 vehicles in the AM peak and 33 vehicles in the PM peak. The derivation is set out on Table 6.

Table 6 : Summary of traffic generation

47 dwelling	vehicle movements per unit			vehicle movements / hour		
	Total	IN	OUT	Total	IN	OUT
AM peak	0.65	0.18	0.47	30	8	22
PM peak	0.70	0.43	0.27	33	20	13

5.7 There is no existing use of the site so all this traffic will be 'new' to the network.

Trip Distribution

5.8 The layout of the existing road network means that traffic leaving the site has only two choices; via the Rusty Cutter roundabout or up along Glebe Park Avenue to Portsmouth Hill Road. Analysis of the existing turning movements suggests that 2/3rds of the traffic leaving the site will travel eastwards onto the Rusty Cutter roundabout with the remainder travelling up Glebe Park Avenue. Traffic returning to the site has three choices as it is possible to make the left turn in from Havant Road. Approximately half of the traffic entering the site will have come from the Rusty Cutter roundabout (and made the right turn across Havant Road) with the other half divided between Havant Road and Glebe Park Avenue.

5.9 Traffic will dissipate further onto the network beyond these roads. This distribution of the generated traffic is shown on Figure 5 which identifies the AM and PM incremental traffic on individual roads from the development.

5.10 The additional traffic on the various sections of road and junctions in both the AM and PM peak periods is identified in Table 7.

Table 7: Additional traffic from development on parts of the highway network

	additional traffic	
	AM peak	PM peak
47 dwellings on application site	30	33
Rusty Cutter roundabout	20	20
Glebe Park Avenue	9	10
right -turn off Havant Road into BHR	5	11
Havant Rd (west of site)	3	4
Bedhampton Hill / Maylands Rd	7	8

6. IMPACT OF THE PROPOSED DEVELOPMENT

- 6.1 The highway and transport impact of the proposed development will effect; some sections of highway, some junctions, the footway /cycleway alongside Havant Road and will also have some impact on road safety. This will be dealt with in order.

Impact on the highway

- 6.2 The development will only generate a total of 30 additional vehicle movements in the AM peak and 33 additional vehicle movements in the PM peak. This is at the bottom threshold of the suggested DTp point of intervention which states² ;

Whilst there is no suggestion that 30 two-way vehicle trips would in themselves, cause a detrimental impact, it is useful as a starting pint of reference from which to commence discussions

Hence, the total traffic from the development is at the bottom end of one suggested level of significance. Once the traffic starts distributing through the network the additional traffic on any section of road or junction reduces to even lower levels.

- 6.3 Figure 5 (and Table 7) show the likely additional traffic on various sections of road. The addition of 9 -10 vehicles per hour to **Glebe Park Avenue** is not significant. It already carries up to 265 vehicle per hour (two-way) in the peak hours and the recent introduction of parking restrictions at the bottom end of this road to ensure parked vehicle keep away from the junction has improved flow. There is frequent on-street parking on this road and along the short section of Bedhampton Hill Road and any further controls considered necessary are available to the local highway authority.
- 6.4 The greatest increment in traffic will occur on **Havant Road** but this is effectively a dual carriageway near the application site. The eastbound carriageway (ie into the roundabout) will have 15 additional vehicle in the AM peak and 9 in the PM peak. These represent 1.7% and 1.0% respectively of the existing AM and PM peak flows. This is much less than the normal daily variation if traffic flow.
- 6.5 Similarly the additional traffic using the Rusty Cutter roundabout amount to 20 additional vehicles in each peak period. This is only a very smallproportion of the traffic using this junction and is below the normal DfT threshold. The effect on entry capacity is set out below.
- 6.6 The additional traffic making the right-turn off the westbound **Havant Road** will amount to 5 vehicles in the AM peak hour and 11 vehicles in the PM peak hour. These represent increase of 4.5% and 7.7% respectively. The observed maximum queue making this

² para 2.11 , Guidance on Transport Assessment DTP 2007

manoeuvre was 3 (AM period) and 5 PM period, so the additional of 11 vehicles per hour, ie one every 5 minutes will not make a material difference. This has been the subject of PICADY analysis (see below).

- 6.7 Elsewhere there is no location on the local highway network that is likely to experience any noticeable change in operating conditions.

Impact on junctions

- 6.8 Two junctions have been the subject of capacity analysis using the standard DfT / Highways Agency program PICADY. To ensure a robust analysis the existing flows set out in Figure 4 (actually these were a combination of the two observations made in 2013 and 2014 with the highest observed figure taken) and were further increased by 10% to represent 5 years growth and then the development traffic (Figure 5) was added in. The resulting with development traffic flows are set out in Figure 6.
- 6.9 The junction of Bedhampton Hill road and Havant Road has been treated as a cross-roads junction, although some of the manoeuvres are not permissible. The results for the future year AM and PM peak with and without the development are set out in Table 8. The PICADY output is included in the Annex 1 to this report.

Table 8: Junction capacity analysis Bedhampton Hill Rd / Havant Road

	Future* year (approx. 2018)			
	AM peak		PM peak	
	rfc [#]	queue	rfc [#]	queue
a) future NO development				
Havant Rd (east of crossing)	-	-	-	-
right turn into Bedhampton Hill Rd	0.29	1	0.38	1
Havant Rd (west of crossing)	-	-	-	-
Bedhampton Hill Road	0.38	1	0.36	1
b) future WITH development				
Havant Rd (east of crossing)	-	-	-	-
right turn into Bedhampton Hill Rd	0.30	1	0.40	1
Havant Rd (west of crossing)	-	-	-	-
Bedhampton Hill Road	0.42	1	0.38	1

Note: * future = 2013 /2014 highest plus 10%
rfc = ratio of flow to capacity

- 6.10 It can be argued that the computer modelling of junction capacity is an inexact estimate. However what is important is the relative performance of the junction in the 'With' and 'Without' situations as this eliminates any inherent modelling inaccuracies. This analysis shows that the critical manoeuvre (the right –turn off Havant Road into Bedhampton Hill Road) is hardly affected by the additional traffic, with the rfc increasing from 0.38 to 0.40 in the PM peak with no discernable change in queue length. .

- 6.11 The entry of Havant Road (west) onto the Rusty Cutter roundabout has also been the subject of capacity analysis. No traffic figures are available for the whole roundabout and it is also partially signalised. In any event only the Havant Road (west) entry is relevant and so it has been analysed as a left-turn only priority junction. The results for the future year AM and PM peak with and without the development are set out in Table 9. The PICADY output is included in the Annex 2.

Table 9: Junction capacity analysis of Havant Road (west) entry to Rusty Cutter

	Future* year (approx. 2018)			
	AM peak		PM peak	
	rfc [#]	queue	rfc [#]	queue
a) future with NO development				
circulating traffic on roundabout	-	-	-	-
Havant Rd entry to roundabout	0.57	1	0.58	1
upstream arm of roundabout	-	-	-	-
b) future WITH development				
circulating traffic on roundabout	-	-	-	-
Havant Rd entry to roundabout	0.58	1	0.58	1
upstream arm of roundabout	-	-	-	-

Note: * future = 2013 /2014 highest plus 10%
rfc = ratio of flow to capacity

- 6.12 This analysis indicates that the 15 extra vehicles in the AM peak and the 9 extra vehicles in the PM peak make little difference to the rfc on this arm or to the queueing on the Havant Road (west) approach. In practice, the circulating traffic on the roundabout is split into platoons because of the effect of the traffic signals on the A3(M) northbound off-slip interrupting the traffic. This has the effect of dissipating the Havant Road queue.

Impact on road safety

- 6.13 There have been a number of 'shunt' accidents at the Havant Road entry onto the Rusty Cutter roundabout, the addition of less than 2% to this flow will not change this situation. The accidents that have occurred at the Bedhampton Hill Road crossing are infrequent and do not display any inherent deficiency in the highway layout.

Impact on non-road users

- 6.14 There are pedestrian and cycle facilities around the north and east sides of this junction. There is a joint footway and cycle lane running along the north side of Havant Road which then passes round the north side of the roundabout. This route is part of the signposted Havant – Portsmouth cycleway network. The crossing of the northbound A3(M) on-slip is not signalised, but the crossing of the southbound A3(M) off-slip benefits from signals on the slip road (albeit with no pedestrian /cycle call-up). For a pedestrian /cyclist travelling east to west there is little problem with the northbound on-slip as the individual is facing the traffic as it turns to travel up the slip road. For

someone travelling in the opposite direction (ie west to east) the traffic appears over their shoulder, but the layout of the crossing has been designed to ensure cyclists and pedestrians do not have to make a decision until they are at right –angles to the traffic. This deflection could be increased slightly by cutting into the bank to create a jug-handle layout.

- 6.15. The operation of this junction has been discussed at length with the ITS³ section of HCC. Apparently the introduction of a signalised crossing of the on-slip was considered when the Rusty Cutter upgrade was being designed. To ensure adequate queuing length the pedestrian /cycle route would have had to be diverted northwards up the slip road and this would have a negative effect on the usage of this route (from observations in the PM peak hour less than half the cyclists use this route anyway, as many prefer to stay on the main circulatory carriageway) and pedestrian flows are low anyway. Various Safety Audits of this junction have been undertaken⁴ and none have identified this layout as a problem. The proposed widening of the footway/cycleway and introduction of tactile paving was considered sufficient.
- 6.16 The introduction of 47 new homes will add some usage this pedestrian / cycleway although the existing usage is not high. In February 2014 the number of pedestrian and cyclists crossing the 'mouth' of Bedhampton Hill Road was observed to be 5 pedestrians and 18 cyclists in the two hours between 7am and 9am and 11 pedestrians and 16 cyclists in the two hours between 4pm and 6pm.

³ ITS – Intelligent Transport Systems –the section of HCC responsible for all signal installations
⁴ Stage 1 = design ; Stage 2 =detailed design , Stage 3, 12 months after completion

7. MITIGATION AND CONTRIBUTIONS

Mitigation

- 7.1 The design of the scheme includes various measures to make the site sustainable and to minimise any effect on existing road users.
- 7.2 The access into the site is based on a 30m radius bend that crosses the existing footway /cycleway alongside Havant Road. Where they overlap would be a 'table-top' traffic calming feature to ensure slow speed and also so that pedestrians and cyclists do not have to endure a change in level.
- 7.3 Minor works would also be undertaken to the kerb along the cul-de-sac section of Bedhampton Hill Road . It is an existing complaint of road users that the narrow 'mouth' of Bedhampton Hill Road sometimes leads to delays as emerging traffic blocks the middle of the road and stops vehicles entering. It is proposed that the kerb on the west side would be set back 1m to ensure that there is less likelihood of any delay. Similarly the kerb alongside the cul-de-sac section would be set back by 0.5m to minimise the chance of delays along the access. These improvements are identified on Figure 7.
- 7.4 A draft Travel Plan has been submitted and the proposed measures will be applied to all residents of the development.

Contributions

- 7.5 In line with the HCC Transport Contribution Policy there is a requirement to make a financial contribution towards local transport improvements. However in order for any contribution to meet the requirements of the NPPF para 204 the contribution must meet all of the following three tests, namely it is ;

- a) *necessary to make the development acceptable in planning terms*
- b) *directly related to the development*
- c) *fairly and reasonable related to scale and kind to the development*

Details of the proposed infrastructure improvements that any contribution will be used for will have to be provided by Havant BC before any transport infrastructure contribution can be made.

8. CONCLUSIONS

- 8.1 This is a site identified in the emerging Havant Local Plan (Allocations) report of December 2013. There have been frequent discussions with the LPA, the local highway authority and the Highways Agency. There has been a public exhibition and a presentation to the Havant Development Control Forum. The proposed layout and the proposed means of access are a result of these consultations.
- 8.2 There would be a single means of access off the cul-de-sac section of Bedhampton Hill Road. The traffic can dissipate in two directions, although the majority will travel towards the Rusty Cutter intersection of the A3(M) and the A2030 Havant Road. The site will generate some 30 new vehicle movements in the AM peak and 33 vehicle movements in the PM peak, however only 20 of these vehicle movements will travel through the Rusty Cutter interchange. Capacity analysis of the critical parts of the adjoining highway network identify that the additional traffic from the development will have little effect on the operation of the network.
- 8.3 Consultation with the Highways Agency⁵ advised that provided there was no more than 30 vehicle movements in either peak period; there is adequate capacity at the right-turn off Havant Road into Bedhampton Hill Road and there was no queueing back to the Rusty Cutter roundabout then they would not object. The analysis in this report confirms that these conditions are met.
- 8.4 The site is accessible to a number of local facilities and shops without the need to use the motor car.
- 8.5 Minor improvements would be made to the existing kerbing on Bedhampton Hill Road. Similarly a transport contribution would be made provided that works that are necessary and directly related to this site have been identified.
- 8.6 Paragraph 32 of the NPPF states that;
'development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.'
 It is clear that the transport impact of this scheme is limited. The application therefore should not be refused on transport grounds.

⁵ Letter from Highways Agency , Dorking dated 28 January 2014

Annex 1

PICADY capacity analysis of right-turn into Bedhampton Hill Road off Havant Road

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
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Havant Road
right turn into Bedhampton Hill Rd
Future (2013 +10%)
2018 AM peak
no development

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

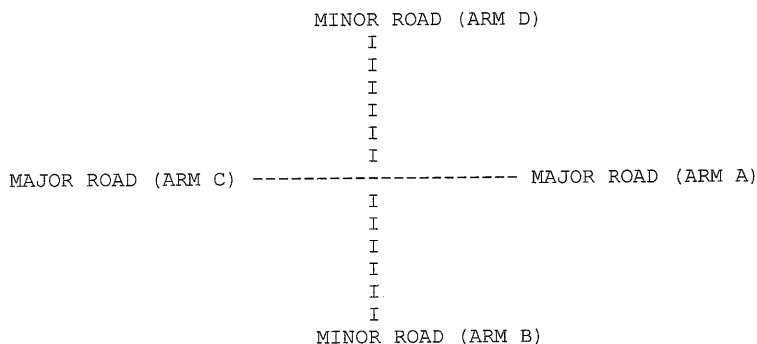
"C:\Picady data\Portsmouth Bedhampton Hill turn 2018 AM No dev v1.vpi"
(drive-on-the-left) at 17:49:31 on Friday, 21 February 2014

RUN TITLE

Portsmouth Hill R-T off Havant Road into Bedhampton Hill 2018 AM peak No Dev

MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS Havant Road (east of crossing)
ARM B IS right turn into Bedhampton Hill Rd
ARM C IS Havant Rd (west of crossing)
ARM D IS Bedhampton Hill Road

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

I	DATA ITEM	I	MINOR ROAD B	I	MINOR ROAD D	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I	(W) 7.30 M.	I	(W) 7.30 M.	I
I	CENTRAL RESERVE WIDTH	I	(WCR) 0.00 M.	I	(WCR) 0.00 M.	I
I		I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I	(WC-B) 2.20 M.	I	(WA-D) 2.20 M.	I
I	- VISIBILITY	I	(VC-B) 100.0 M.	I	(VA-D) 100.0 M.	I
I	- BLOCKS TRAFFIC	I	NO	I	NO	I
I		I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I	(VB-C) 100.0 M.	I	(VD-A) 90.0 M.	I
I	- VISIBILITY TO RIGHT	I	(VB-A) 90.0 M.	I	(VD-C) 90.0 M.	I
I	- LANE 1 WIDTH	I	(WB-C) 5.00 M.	I	(WD-A) 3.00 M.	I
I	- LANE 2 WIDTH	I	(WB-A) 0.00 M.	I	(WD-C) 0.00 M.	I

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			I	RATE OF FLOW (VEH/MIN)			I
I	ARM	I	FLOW STARTS	I	TOP OF PEAK	I	FLOW STOPS	I	BEFORE
I	I	I	TO RISE	I	IS REACHED	I	FALLING	I	AT TOP
I	I	I		I		I		I	AFTER
I	ARM A	I	15.00	I	45.00	I	75.00	I	0.00
I	ARM B	I	15.00	I	45.00	I	75.00	I	1.59
I	ARM C	I	15.00	I	45.00	I	75.00	I	10.39
I	ARM D	I	15.00	I	45.00	I	75.00	I	1.91

I	TURNING PROPORTIONS								I
I	TURNING COUNTS (VEH/HR)								I
I	(PERCENTAGE OF H.V.S)								I
I									I
I	TIME	I	FROM/TO	I	ARM A	I	ARM B	I	ARM C
I	07.45 - 09.15	I		I		I		I	
I		I	ARM A	I	0.000	I	0.000	I	0.000
I		I		I	1.000	I	1.000	I	1.000
I		I		I	(0.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	
I		I	ARM B	I	0.039	I	0.000	I	0.961
I		I		I	5.0	I	0.0	I	122.0
I		I		I	(0.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	
I		I	ARM C	I	0.989	I	0.000	I	0.011
I		I		I	822.0	I	0.0	I	9.0
I		I		I	(7.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	
I		I	ARM D	I	1.000	I	0.000	I	0.000
I		I		I	153.0	I	0.0	I	0.0
I		I		I	(0.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	07.45-08.00									I
I	B-ACD	1.59	9.07	0.175		0.0	0.2	3.0		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.24	0.000		0.0	0.0	0.0		I
I	D-ABC	1.91	8.60	0.222		0.0	0.3	4.1		I
I	C-D	0.11								I
I	C-A	10.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.00-08.15									I
I	B-ACD	1.90	8.67	0.219		0.2	0.3	4.0		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.79	0.000		0.0	0.0	0.0		I
I	D-ABC	2.28	8.06	0.283		0.3	0.4	5.6		I
I	C-D	0.13								I
I	C-A	12.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.15-08.30									I
I	B-ACD	2.32	8.12	0.286		0.3	0.4	5.7		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.16	0.000		0.0	0.0	0.0		I
I	D-ABC	2.80	7.33	0.382		0.4	0.6	8.6		I
I	C-D	0.16								I
I	C-A	15.03								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.30-08.45									I
I	B-ACD	2.32	8.12	0.286		0.4	0.4	5.9		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.16	0.000		0.0	0.0	0.0		I
I	D-ABC	2.80	7.33	0.382		0.6	0.6	9.1		I
I	C-D	0.16								I
I	C-A	15.03								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.45-09.00									I
I	B-ACD	1.90	8.67	0.219		0.4	0.3	4.4		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.79	0.000		0.0	0.0	0.0		I
I	D-ABC	2.28	8.06	0.283		0.6	0.4	6.3		I
I	C-D	0.13								I
I	C-A	12.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	09.00-09.15									I
I	B-ACD	1.59	9.07	0.175		0.3	0.2	3.3		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.24	0.000		0.0	0.0	0.0		I
I	D-ABC	1.91	8.60	0.222		0.4	0.3	4.5		I
I	C-D	0.11								I
I	C-A	10.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I
I										I

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.3
08.30	0.4
08.45	0.4
09.00	0.3
09.15	0.2

QUEUE FOR STREAM A-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.3	
08.15	0.4	
08.30	0.6	*
08.45	0.6	*
09.00	0.4	
09.15	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING *	* INCLUSIVE QUEUEING *
		* DELAY *	* DELAY *
(VEH)	(VEH/H)	(MIN)	(MIN/VEH)
B-ACD	174.1	26.4	0.15
A-B	0.0		
A-C	0.0		
A-D	0.0	0.0	0.00
D-ABC	209.8	38.2	0.18
C-D	12.3	8.2	
C-A	1127.1	751.4	
C-B	0.0	0.0	0.00
ALL	1523.4	64.6	0.04

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
 * THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** PICADY 4 run completed.

===== end of file =====

[Printed at 17:49:45 on 21/02/2014]

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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FOR SALES AND DISTRIBUTION INFORMATION,
PROGRAM ADVICE AND MAINTENANCE CONTACT:

TRL SOFTWARE BUREAU
TEL: CROWTHORNE (01344) 770758, FAX: 770864
EMAIL: SoftwareBureau@trl.co.uk

Havant Road
right turn into Bedhampton Hill Rd
Future (2013 +10%)
2018 AM peak
with 47 units

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Picady data\Portsmouth Hill turn 2018 AM With dev vl.vpi"
(drive-on-the-left) at 17:50:52 on Friday, 21 February 2014

RUN TITLE

Portsmouth Hill R-T off Havant Road into Bedhampton Hill 2018 AM peak With Dev

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA

```

                                MINOR ROAD (ARM D)
                                I
                                I
                                I
                                I
                                I
                                I
MAJOR ROAD (ARM C) ----- MAJOR ROAD (ARM A)
                                I
                                I
                                I
                                I
                                I
                                I
                                MINOR ROAD (ARM B)

```

ARM A IS Havant Road (east of crossing)
ARM B IS right turn into Bedhampton Hill Rd
ARM C IS Havant Rd (west of crossing)
ARM D IS Bedhampton Hill Road

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

GEOMETRIC DATA

I	DATA ITEM	I	MINOR ROAD B	I	MINOR ROAD D	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I	(W) 7.30 M.	I	(W) 7.30 M.	I
I	CENTRAL RESERVE WIDTH	I	(WCR) 0.00 M.	I	(WCR) 0.00 M.	I
I		I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I	(WC-B) 2.20 M.	I	(WA-D) 2.20 M.	I
I	- VISIBILITY	I	(VC-B) 100.0 M.	I	(VA-D) 100.0 M.	I
I	- BLOCKS TRAFFIC	I	NO	I	NO	I
I		I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I	(VB-C) 100.0 M.	I	(VD-A) 90.0 M.	I
I	- VISIBILITY TO RIGHT	I	(VB-A) 90.0 M.	I	(VD-C) 90.0 M.	I
I	- LANE 1 WIDTH	I	(WB-C) 5.00 M.	I	(WD-A) 3.00 M.	I
I	- LANE 2 WIDTH	I	(WB-A) 0.00 M.	I	(WD-C) 0.00 M.	I

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN	I	RATE OF FLOW (VEH/MIN)	I
I	ARM	I FLOW STARTS I TOP OF PEAK I FLOW STOPS	I	I BEFORE I AT TOP I AFTER I	I
I	I	I TO RISE I IS REACHED I FALLING	I	I PEAK I OF PEAK I PEAK	I
I	ARM A	I 15.00 I 45.00 I 75.00	I	0.00 I 0.00 I 0.00	I
I	ARM B	I 15.00 I 45.00 I 75.00	I	1.65 I 2.47 I 1.65	I
I	ARM C	I 15.00 I 45.00 I 75.00	I	10.40 I 15.60 I 10.40	I
I	ARM D	I 15.00 I 45.00 I 75.00	I	2.10 I 3.15 I 2.10	I

		TURNING PROPORTIONS							
		TURNING COUNTS (VEH/HR)							
		(PERCENTAGE OF H.V.S)							
TIME		FROM/TO	ARM A	ARM B	ARM C	ARM D			
07.45 - 09.15		ARM A	0.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			
		ARM B	0.038	0.000	0.000	0.962			
			5.0	0.0	0.0	127.0			
			0.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			
		ARM C	0.988	0.000	0.000	0.012			
			822.0	0.0	0.0	10.0			
			7.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			
		ARM D	1.000	0.000	0.000	0.000			
			168.0	0.0	0.0	0.0			
			0.000	0.000	0.000	0.000			
			0.000	0.000	0.000	0.000			

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	07.45-08.00									I
I	B-ACD	1.65	9.06	0.182		0.0	0.2	3.2		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.24	0.000		0.0	0.0	0.0		I
I	D-ABC	2.10	8.60	0.244		0.0	0.3	4.6		I
I	C-D	0.13								I
I	C-A	10.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.00-08.15									I
I	B-ACD	1.97	8.67	0.227		0.2	0.3	4.2		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.79	0.000		0.0	0.0	0.0		I
I	D-ABC	2.51	8.06	0.311		0.3	0.4	6.4		I
I	C-D	0.15								I
I	C-A	12.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.15-08.30									I
I	B-ACD	2.41	8.11	0.297		0.3	0.4	6.0		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.16	0.000		0.0	0.0	0.0		I
I	D-ABC	3.07	7.33	0.419		0.4	0.7	10.0		I
I	C-D	0.18								I
I	C-A	15.03								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.30-08.45									I
I	B-ACD	2.41	8.11	0.297		0.4	0.4	6.3		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.16	0.000		0.0	0.0	0.0		I
I	D-ABC	3.07	7.33	0.419		0.7	0.7	10.6		I
I	C-D	0.18								I
I	C-A	15.03								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.45-09.00									I
I	B-ACD	1.97	8.67	0.227		0.4	0.3	4.6		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.79	0.000		0.0	0.0	0.0		I
I	D-ABC	2.51	8.06	0.311		0.7	0.5	7.2		I
I	C-D	0.15								I
I	C-A	12.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	09.00-09.15									I
I	B-ACD	1.65	9.06	0.182		0.3	0.2	3.5		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.24	0.000		0.0	0.0	0.0		I
I	D-ABC	2.10	8.60	0.244		0.5	0.3	5.1		I
I	C-D	0.13								I
I	C-A	10.27								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.3
08.30	0.4
08.45	0.4
09.00	0.3
09.15	0.2

QUEUE FOR STREAM A-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.3	
08.15	0.4	
08.30	0.7	*
08.45	0.7	*
09.00	0.5	
09.15	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING *	* INCLUSIVE QUEUEING *
		* DELAY *	* DELAY *
(VEH)	(VEH/H)	(MIN)	(MIN/VEH)
B-ACD	181.0	120.7	27.8
A-B	0.0	0.0	0.15
A-C	0.0	0.0	
A-D	0.0	0.0	
D-ABC	230.4	153.6	43.9
C-D	13.7	9.1	0.19
C-A	1127.1	751.4	0.00
C-B	0.0	0.0	0.00
ALL	1552.2	1034.8	71.8

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** PICADY 4 run completed.

===== end of file =====

[Printed at 17:51:05 on 21/02/2014]

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 4.0 (NOV 2003)

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TRL SOFTWARE BUREAU
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EMAIL: SoftwareBureau@trl.co.uk

Havant Road
right turn into Bedhampton Hill Rd
Future (2013 +10%)
2018 PM peak
no development

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

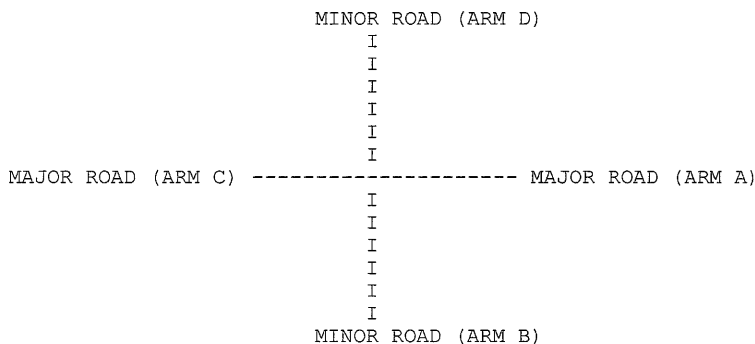
Run with file:-
"C:\Picady data\Portstown Bedhmpston Hill turn 2018 PM no dev vl.vpi"
(drive-on-the-left) at 17:53:45 on Friday, 21 February 2014

RUN TITLE

Portstown Hill R-T off Havant Road into Bedhmpston Hill 2018 PM peak no dev

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS Havant Road (east of crossing)
ARM B IS right turn into Bedhampton Hill Rd
ARM C IS Havant Rd (west of crossing)
ARM D IS Bedhampton Hill R&d

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B
STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C
ETC.

GEOMETRIC DATA

I	DATA ITEM	I	MINOR ROAD B	I	MINOR ROAD D	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I	(W) 7.30 M.	I	(W) 7.30 M.	I
I	CENTRAL RESERVE WIDTH	I	(WCR) 0.00 M.	I	(WCR) 0.00 M.	I
I		I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I	(WC-B) 2.20 M.	I	(WA-D) 2.20 M.	I
I	- VISIBILITY	I	(VC-B) 100.0 M.	I	(VA-D) 100.0 M.	I
I	- BLOCKS TRAFFIC	I	NO	I	NO	I
I		I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I	(VB-C) 100.0 M.	I	(VD-A) 90.0 M.	I
I	- VISIBILITY TO RIGHT	I	(VB-A) 90.0 M.	I	(VD-C) 90.0 M.	I
I	- LANE 1 WIDTH	I	(WB-C) 5.00 M.	I	(WD-A) 3.00 M.	I
I	- LANE 2 WIDTH	I	(WB-A) 0.00 M.	I	(WD-C) 0.00 M.	I

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.

LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			I	RATE OF FLOW (VEH/MIN)			I
I	ARM	I	FLOW STARTS	I	TOP OF PEAK	I	FLOW STOPS	I	BEFORE
I		I	TO RISE	I	IS REACHED	I	FALLING	I	AT TOP
I		I		I		I		I	AFTER
I	ARM A	I	15.00	I	45.00	I	75.00	I	0.00
I	ARM B	I	15.00	I	45.00	I	75.00	I	2.01
I	ARM C	I	15.00	I	45.00	I	75.00	I	10.24
I	ARM D	I	15.00	I	45.00	I	75.00	I	1.83

		TURNING PROPORTIONS							
		TURNING COUNTS (VEH/HR)							
		(PERCENTAGE OF H.V.S)							
I	TIME	I	FROM/TO	I	ARM A	I	ARM B	I	ARM C
I	16.45 - 18.15	I		I		I		I	
I		I	ARM A	I	0.000	I	0.000	I	0.000
I		I		I	0.000	I	0.000	I	0.000
I		I		I	(0.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	
I		I	ARM B	I	0.031	I	0.000	I	0.969
I		I		I	5.0	I	0.0	I	156.0
I		I		I	(0.0)	I	(0.0)	I	(5.0)
I		I		I		I		I	
I		I	ARM C	I	0.977	I	0.000	I	0.023
I		I		I	800.0	I	0.0	I	19.0
I		I		I	(7.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	
I		I	ARM D	I	1.000	I	0.000	I	0.000
I		I		I	146.0	I	0.0	I	0.0
I		I		I	(0.0)	I	(0.0)	I	(0.0)
I		I		I		I		I	

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	16.45-17.00									I
I	B-ACD	2.01	8.69	0.232		0.0	0.3	4.3		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.28	0.000		0.0	0.0	0.0		I
I	D-ABC	1.83	8.66	0.211		0.0	0.3	3.8		I
I	C-D	0.24								I
I	C-A	10.00								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.00-17.15									I
I	B-ACD	2.40	8.31	0.289		0.3	0.4	5.8		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.83	0.000		0.0	0.0	0.0		I
I	D-ABC	2.18	8.14	0.268		0.3	0.4	5.2		I
I	C-D	0.28								I
I	C-A	11.94								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.15-17.30									I
I	B-ACD	2.94	7.80	0.377		0.4	0.6	8.5		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.22	0.000		0.0	0.0	0.0		I
I	D-ABC	2.67	7.42	0.360		0.4	0.6	7.9		I
I	C-D	0.35								I
I	C-A	14.62								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.30-17.45									I
I	B-ACD	2.94	7.80	0.377		0.6	0.6	9.0		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.22	0.000		0.0	0.0	0.0		I
I	D-ABC	2.67	7.42	0.360		0.6	0.6	8.3		I
I	C-D	0.35								I
I	C-A	14.62								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.45-18.00									I
I	B-ACD	2.40	8.31	0.289		0.6	0.4	6.4		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.83	0.000		0.0	0.0	0.0		I
I	D-ABC	2.18	8.14	0.268		0.6	0.4	5.8		I
I	C-D	0.28								I
I	C-A	11.94								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	18.00-18.15									I
I	B-ACD	2.01	8.69	0.232		0.4	0.3	4.7		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.28	0.000		0.0	0.0	0.0		I
I	D-ABC	1.83	8.66	0.211		0.4	0.3	4.2		I
I	C-D	0.24								I
I	C-A	10.00								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I
I										I

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.4	
17.30	0.6	*
17.45	0.6	*
18.00	0.4	
18.15	0.3	

QUEUE FOR STREAM A-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.0	
17.15	0.0	
17.30	0.0	
17.45	0.0	
18.00	0.0	
18.15	0.0	

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.4	
17.30	0.6	*
17.45	0.6	*
18.00	0.4	
18.15	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.0	
17.15	0.0	
17.30	0.0	
17.45	0.0	
18.00	0.0	
18.15	0.0	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING *	* INCLUSIVE QUEUEING *
		* DELAY *	* DELAY *
(VEH)	(VEH/H)	(MIN)	(MIN/VEH)
B-ACD	220.8	38.7	0.18
A-B	0.0		
A-C	0.0		
A-D	0.0	0.0	0.00
D-ABC	200.2	35.2	0.18
C-D	26.1	17.4	
C-A	1097.0	731.3	
C-B	0.0	0.0	0.00
ALL	1544.0	74.0	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** PICADY 4 run completed.

===== end of file =====

[Printed at 17:53:58 on 21/02/2014]

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

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TEL: CROWTHORNE (01344) 770758, FAX: 770864
EMAIL: SoftwareBureau@trl.co.uk

Havant Road
right turn into Bedhampton Hill Rd
Future (2013 +10%)
2016 PM peak
with 47 units

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Picady data\Portsmouth Hill turn 2018 PM With dev vl.vpi"
(drive-on-the-left) at 17:54:56 on Friday, 21 February 2014

RUN TITLE

Portsmouth Hill R-T off Havant Road into Bedhampton Hill 2018 PM peak With dev

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA

```

                                MINOR ROAD (ARM D)
                                I
                                I
                                I
                                I
                                I
                                I
MAJOR ROAD (ARM C) ----- MAJOR ROAD (ARM A)
                                I
                                I
                                I
                                I
                                I
                                I
                                MINOR ROAD (ARM B)

```

ARM A IS Havant Road (east of crossing)
ARM B IS right turn into Bedhampton Hill Rd
ARM C IS Havant Rd (west of crossing)
ARM D IS Bedhampton Hill Rd

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

TRAFFIC DEMAND DATA

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	16.45-17.00									I
I	B-ACD	2.15	8.68	0.248		0.0	0.3	4.7		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.27	0.000		0.0	0.0	0.0		I
I	D-ABC	1.94	8.65	0.224		0.0	0.3	4.1		I
I	C-D	0.28								I
I	C-A	10.00								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.00-17.15									I
I	B-ACD	2.57	8.30	0.309		0.3	0.4	6.4		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.82	0.000		0.0	0.0	0.0		I
I	D-ABC	2.31	8.13	0.284		0.3	0.4	5.7		I
I	C-D	0.33								I
I	C-A	11.94								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.15-17.30									I
I	B-ACD	3.14	7.79	0.404		0.4	0.7	9.5		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.20	0.000		0.0	0.0	0.0		I
I	D-ABC	2.83	7.41	0.382		0.4	0.6	8.7		I
I	C-D	0.40								I
I	C-A	14.62								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.30-17.45									I
I	B-ACD	3.14	7.79	0.404		0.7	0.7	10.0		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.20	0.000		0.0	0.0	0.0		I
I	D-ABC	2.83	7.41	0.382		0.6	0.6	9.1		I
I	C-D	0.40								I
I	C-A	14.62								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.45-18.00									I
I	B-ACD	2.57	8.30	0.309		0.7	0.5	7.1		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	6.82	0.000		0.0	0.0	0.0		I
I	D-ABC	2.31	8.13	0.284		0.6	0.4	6.3		I
I	C-D	0.33								I
I	C-A	11.94								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	18.00-18.15									I
I	B-ACD	2.15	8.68	0.248		0.5	0.3	5.2		I
I	A-B	0.00								I
I	A-C	0.00								I
I	A-D	0.00	7.27	0.000		0.0	0.0	0.0		I
I	D-ABC	1.94	8.65	0.224		0.4	0.3	4.5		I
I	C-D	0.28								I
I	C-A	10.00								I
I	C-B	0.00	9.57	0.000		0.0	0.0	0.0		I
I										I

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.4	
17.30	0.7	*
17.45	0.7	*
18.00	0.5	
18.15	0.3	

QUEUE FOR STREAM A-D

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.0	
17.15	0.0	
17.30	0.0	
17.45	0.0	
18.00	0.0	
18.15	0.0	

QUEUE FOR STREAM D-ABC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.3	
17.15	0.4	
17.30	0.6	*
17.45	0.6	*
18.00	0.4	
18.15	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.0	
17.15	0.0	
17.30	0.0	
17.45	0.0	
18.00	0.0	
18.15	0.0	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING *	* INCLUSIVE QUEUEING *
		* DELAY *	* DELAY *
(VEH)	(VEH/H)	(MIN)	(MIN/VEH)
B-ACD	235.8	42.8	0.18
A-B	0.0		
A-C	0.0		
A-D	0.0	0.0	0.00
D-ABC	212.5	38.4	0.18
C-D	30.2		
C-A	1097.0		
C-B	0.0	0.0	0.00
ALL	1575.5	81.2	0.05

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
 * INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
 * THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** PICADY 4 run completed.

===== end of file =====

[Printed at 17:55:09 on 21/02/2014]

Annex 2

ARCADY capacity analysis of Havant Road entry onto Rusty Cutter roundabout

TRL LIMITED

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CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

ADAPTED FROM ARCADY/3 WHICH IS CROWN COPYRIGHT
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FOR SALES AND DISTRIBUTION INFORMATION,
PROGRAM ADVICE AND MAINTENANCE CONTACT:

TRL SOFTWARE BUREAU

TEL: CROWTHORNE (01344) 770758, FAX: 770864

EMAIL: SoftwareBureau@trl.co.uk

Rusty Cutter
Havant Road (from west) approach
Future (2013 +10%)
2018 AM peak
no development

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Arcady data\Portsdown Hill Rd Havant Rd entry 2018 AM No Dev vl.vai"
(drive-on-the-left) at 18:18:13 on Friday, 21 February 2014

ROUNDAABOUT CAPACITY AND DELAY

RUN TITLE

Portsdown Hill Havant rd entry onto Rusty Cutter 2018 AM peak no Dev vl

INPUT DATA

ARM A - from south
ARM B - Havant Rd - from west)
ARM C - from east

GEOMETRIC DATA

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)
I	ARM A	I	12.00	I	16.00	I	20.00	I	40.00	I	90.00	I	30.0	I	0.856	I	74.700
I	ARM B	I	7.50	I	12.00	I	20.00	I	70.00	I	90.00	I	30.0	I	0.673	I	52.872
I	ARM C	I	10.00	I	15.00	I	10.00	I	50.00	I	90.00	I	30.0	I	0.749	I	61.978

V = approach half-width
E = entry width

L = effective flare length
R = entry radius

D = inscribed circle diameter
PHI = entry angle

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)		
		FLOW STARTS	TOP OF PEAK	FLOW STOPS	BEFORE	AT TOP	AFTER
I	I	TO RISE	IS REACHED	IF FALLING	PEAK	OF PEAK	PEAK
I	ARM A	15.00	45.00	75.00	19.25	28.88	19.25
I	ARM B	15.00	45.00	75.00	12.19	18.28	12.19
I	ARM C	15.00	45.00	75.00	0.00	0.00	0.00

I	I	TURNING PROPORTIONS		
		TURNING COUNTS (VEH/HR)		
I	I	(PERCENTAGE OF H.V.S)		
		FROM/TO	ARM A	ARM B
I	07.45 - 09.15	ARM A	0.000	0.000
I			0.0	0.0
I			(0.0)	(0.0)
I		ARM B	0.000	0.000
I			0.0	0.0
I			(0.0)	(0.0)
I		ARM C	0.000	0.000
I			I???????	I???????
I			I (0.0)	I (0.0)
I			I	I

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
I	07.45-08.00								
I	ARM A	19.25	69.81	0.276		0.0	0.4	5.6	
I	ARM B	12.19	37.18	0.328		0.0	0.5	7.2	
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
I	08.00-08.15								
I	ARM A	22.99	69.81	0.329		0.4	0.5	7.3	
I	ARM B	14.55	34.60	0.421		0.5	0.7	10.6	
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
I	08.15-08.30								
I	ARM A	28.15	69.81	0.403		0.5	0.7	10.0	
I	ARM B	17.82	31.07	0.574		0.7	1.3	19.3	
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
I	08.30-08.45								
I	ARM A	28.15	69.81	0.403		0.7	0.7	10.1	
I	ARM B	17.82	31.06	0.574		1.3	1.3	20.0	
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.45-09.00									I
I	ARM A	22.99	69.81	0.329		0.7	0.5	7.4		I
I	ARM B	14.55	34.59	0.421		1.3	0.7	11.2		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	09.00-09.15									I
I	ARM A	19.25	69.81	0.276		0.5	0.4	5.8		I
I	ARM B	12.19	37.15	0.328		0.7	0.5	7.5		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.4
08.15	0.5
08.30	0.7 *
08.45	0.7 *
09.00	0.5
09.15	0.4

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.5
08.15	0.7 *
08.30	1.3 *
08.45	1.3 *
09.00	0.7 *
09.15	0.5

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND		I	* QUEUEING *		I	* INCLUSIVE QUEUEING *		I
I		I			I	* DELAY *		I	* DELAY *		I
I		I			I			I			I
I		I	(VEH)	(VEH/H)	I	(MIN)	(MIN/VEH)	I	(MIN)	(MIN/VEH)	I
I	A	I	2111.7	I 1407.8	I	46.3	I 0.02	I	46.3	I 0.02	I
I	B	I	1336.9	I 891.3	I	75.8	I 0.06	I	75.8	I 0.06	I
I	C	I	0.0	I 0.0	I	0.0	I 0.00	I	0.0	I 0.00	I
I	ALL	I	3448.6	I 2299.1	I	122.1	I 0.04	I	122.1	I 0.04	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** ARCADY 5 run completed.

===== end of file =====

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CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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Rusty Cutter
Havant Road (from west) approach
Future (2013 +10%)
2018 AM peak
with 47 development of dwellings

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Arcady data\Portsmouth Hill Rd Havant Rd entry 2018 AM WithDev v1.vai"

(drive-on-the-left) at 18:22:14 on Friday, 21 February 2014

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Portsmouth Hill Havant rd entry onto Rusty Cutter 2018 AM peak with Dev v1

INPUT DATA

ARM A - from south

ARM B - Havant Rd - from west)

ARM C - from east

GEOMETRIC DATA

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)
I	ARM A	I	12.00	I	16.00	I	20.00	I	40.00	I	90.00	I	30.0	I	0.856	I	74.700
I	ARM B	I	7.50	I	12.00	I	20.00	I	70.00	I	90.00	I	30.0	I	0.673	I	52.872
I	ARM C	I	10.00	I	15.00	I	10.00	I	50.00	I	90.00	I	30.0	I	0.749	I	61.978

V = approach half-width

E = entry width

L = effective flare length

R = entry radius

D = inscribed circle diameter

PHI = entry angle

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.

LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)			I
		I FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER	
I	I	I TO RISE	I IS REACHED	I FALLING	I PEAK	I OF PEAK	I PEAK	I
I	ARM A	I 15.00	I 45.00	I 75.00	I 19.25	I 28.88	I 19.25	I
I	ARM B	I 15.00	I 45.00	I 75.00	I 12.38	I 18.56	I 12.38	I
I	ARM C	I 15.00	I 45.00	I 75.00	I 0.00	I 0.00	I 0.00	I

TIME	TURNING PROPORTIONS					
	TURNING COUNTS (VEH/HR)					
	(PERCENTAGE OF H.V.S)					
	FROM/TO	ARM A	ARM B	ARM C		
07.45 - 09.15	ARM A	0.000	0.000	1.000		
		0.0	0.0	1540.0		
		(0.0)	(0.0)	(7.0)		
	ARM B	0.000	0.000	1.000		
		0.0	0.0	990.0		
		(0.0)	(0.0)	(5.0)		
	ARM C	0.000	0.000	0.000		
		I???????	I???????	I???????		
		(0.0)	(0.0)	(0.0)		

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	07.45-08.00									I
I	ARM A	19.25	69.81	0.276		0.0	0.4	5.6		I
I	ARM B	12.38	37.18	0.333		0.0	0.5	7.3		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.00-08.15									I
I	ARM A	22.99	69.81	0.329		0.4	0.5	7.3		I
I	ARM B	14.78	34.60	0.427		0.5	0.7	10.9		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.15-08.30									I
I	ARM A	28.15	69.81	0.403		0.5	0.7	10.0		I
I	ARM B	18.10	31.07	0.583		0.7	1.4	20.0		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.30-08.45									I
I	ARM A	28.15	69.81	0.403		0.7	0.7	10.1		I
I	ARM B	18.10	31.06	0.583		1.4	1.4	20.8		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	08.45-09.00									I
I	ARM A	22.99	69.81	0.329		0.7	0.5	7.4		I
I	ARM B	14.78	34.59	0.427		1.4	0.8	11.5		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	09.00-09.15									I
I	ARM A	19.25	69.81	0.276		0.5	0.4	5.8		I
I	ARM B	12.38	37.15	0.333		0.8	0.5	7.6		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.4
08.15	0.5
08.30	0.7 *
08.45	0.7 *
09.00	0.5
09.15	0.4

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.5
08.15	0.7 *
08.30	1.4 *
08.45	1.4 *
09.00	0.8 *
09.15	0.5 *

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND		I	* QUEUEING *		I	* INCLUSIVE QUEUEING *		I
I		I			I	* DELAY *		I	* DELAY *		I
I		I	(VEH)	(VEH/H)	I	(MIN)	(MIN/VEH)	I	(MIN)	(MIN/VEH)	I
I	A	I	2111.7	I 1407.8	I	46.3	I 0.02	I	46.3	I 0.02	I
I	B	I	1357.5	I 905.0	I	78.2	I 0.06	I	78.2	I 0.06	I
I	C	I	0.0	I 0.0	I	0.0	I 0.00	I	0.0	I 0.00	I
I	ALL	I	3469.2	I 2312.8	I	124.4	I 0.04	I	124.4	I 0.04	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** ARCADY 5 run completed.

===== end of file =====

[Printed at 18:22:25 on 21/02/2014]

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CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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RELEASE 1.1 (MAY 2001)

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Rusty Cutter
Havant Road (from west) approach
Future (2013 +10%)
2018 PM peak
no development

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Arcady data\Portsmouth Hill Rd Havant Rd entry 2018 PM No Dev vl.vai"
(drive-on-the-left) at 18:32:42 on Friday, 21 February 2014

ROUNDAABOUT CAPACITY AND DELAY

RUN TITLE

Portsmouth Hill Havant rd entry onto Rusty Cutter 2018 PM peak No Dev vl

INPUT DATA

ARM A - from south
ARM B - Havant Rd - from west)
ARM C - from east

GEOMETRIC DATA

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)
I	ARM A	I	12.00	I	16.00	I	20.00	I	40.00	I	90.00	I	30.0	I	0.856	I	74.700
I	ARM B	I	7.50	I	12.00	I	20.00	I	70.00	I	90.00	I	30.0	I	0.673	I	52.872
I	ARM C	I	10.00	I	15.00	I	10.00	I	50.00	I	90.00	I	30.0	I	0.749	I	61.978

V = approach half-width
E = entry width

L = effective flare length
R = entry radius

D = inscribed circle diameter
PHI = entry angle

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	20.46	30.69	20.46
ARM B	15.00	45.00	75.00	11.84	17.76	11.84
ARM C	15.00	45.00	75.00	0.00	0.00	0.00

TIME		FROM/TO	ARM A	ARM B	ARM C
16.45 - 18.15		ARM A	0.000	0.000	1.000
			0.0	0.0	1637.0
			(0.0)	(0.0)	(7.0)
		ARM B	0.000	0.000	1.000
			0.0	0.0	947.0
			(0.0)	(0.0)	(5.0)
		ARM C	0.000	0.000	0.000
			I???????	I???????	I???????
			(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
ARM A	20.46	69.81	0.293		0.0	0.4	6.1	
ARM B	11.84	36.35	0.326		0.0	0.5	7.1	
ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
ARM A	24.43	69.81	0.350		0.4	0.5	8.0	
ARM B	14.14	33.61	0.421		0.5	0.7	10.6	
ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
ARM A	29.93	69.81	0.429		0.5	0.7	11.1	
ARM B	17.31	29.85	0.580		0.7	1.4	19.8	
ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
ARM A	29.93	69.81	0.429		0.7	0.7	11.2	
ARM B	17.31	29.84	0.580		1.4	1.4	20.5	
ARM C	0.00	61.98	0.000		0.0	0.0	0.0	

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.45-18.00									I
I	ARM A	24.43	69.81	0.350		0.7	0.5	8.2		I
I	ARM B	14.14	33.60	0.421		1.4	0.7	11.2		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	18.00-18.15									I
I	ARM A	20.46	69.81	0.293		0.5	0.4	6.3		I
I	ARM B	11.84	36.32	0.326		0.7	0.5	7.4		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.4
17.15	0.5 *
17.30	0.7 *
17.45	0.7 *
18.00	0.5 *
18.15	0.4

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.5
17.15	0.7 *
17.30	1.4 *
17.45	1.4 *
18.00	0.7 *
18.15	0.5

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND	I	* QUEUEING *	I	* INCLUSIVE QUEUEING *	I
I		I		I	* DELAY *	I	* DELAY *	I
I		I		I		I		I
I		I	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
I	A	I	2244.7	I 1496.4	I 50.9	I 0.02	I 50.9	I 0.02
I	B	I	1298.5	I 865.7	I 76.6	I 0.06	I 76.6	I 0.06
I	C	I	0.0	I 0.0	I 0.0	I 0.00	I 0.0	I 0.00
I	ALL	I	3543.2	I 2362.1	I 127.5	I 0.04	I 127.6	I 0.04

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** ARCADY 5 run completed.

===== end of file =====

[Printed at 18:32:53 on 21/02/2014]

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CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.1 (MAY 2001)

ADAPTED FROM ARCADY/3 WHICH IS CROWN COPYRIGHT
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Rusty Cutter

Havant Road (from west) approach

Future (2013 +10%)

2018 PM peak

with 47 development of dwellings

THE USER OF THIS COMPUTER PROGRAM FOR THE SOLUTION OF AN ENGINEERING PROBLEM IS
IN NO WAY RELIEVED OF HIS RESPONSIBILITY FOR THE CORRECTNESS OF THE SOLUTION

Run with file:-

"C:\Arcady data\Portsmouth Hill Rd Havant Rd entry 2018 PM With Dev v1.vai"

(drive-on-the-left) at 18:26:49 on Friday, 21 February 2014

ROUNDAABOUT CAPACITY AND DELAY

RUN TITLE

Portsmouth Hill Havant rd entry onto Rusty Cutter 2018 PM peak With Dev v1

INPUT DATA

ARM A - from south

ARM B - Havant Rd - from west)

ARM C - from east

GEOMETRIC DATA

I	ARM	I	V (M)	I	E (M)	I	L (M)	I	R (M)	I	D (M)	I	PHI (DEG)	I	SLOPE	I	INTERCEPT (PCU/MIN)
I	ARM A	I	12.00	I	16.00	I	20.00	I	40.00	I	90.00	I	30.0	I	0.856	I	74.700
I	ARM B	I	7.50	I	12.00	I	20.00	I	70.00	I	90.00	I	30.0	I	0.673	I	52.872
I	ARM C	I	10.00	I	15.00	I	10.00	I	50.00	I	90.00	I	30.0	I	0.749	I	61.978

V = approach half-width

E = entry width

L = effective flare length

R = entry radius

D = inscribed circle diameter

PHI = entry angle

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.45 AND ENDS 18.15

LENGTH OF TIME PERIOD - 90 MINUTES.

LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	NUMBER OF MINUTES FROM START WHEN			RATE OF FLOW (VEH/MIN)			I
		I FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER	
I	I	I TO RISE	I IS REACHED	I FALLING	I PEAK	I OF PEAK	I PEAK	I
I ARM A	I	15.00	I 45.00	I 75.00	I 20.46	I 30.69	I 20.46	I
I ARM B	I	15.00	I 45.00	I 75.00	I 11.94	I 17.91	I 11.94	I
I ARM C	I	15.00	I 45.00	I 75.00	I 0.00	I 0.00	I 0.00	I

I		I	TURNING PROPORTIONS				I				
I		I	TURNING COUNTS (VEH/HR)				I				
I		I	(PERCENTAGE OF H.V.S)				I				
I			-----								
I	TIME	I	FROM/TO	I	ARM A	I	ARM B	I	ARM C	I	
			-----					-----			
I	16.45 - 18.15	I		I		I		I		I	
I		I	ARM A	I	0.000	I	0.000	I	1.000	I	
I		I		I	0.0	I	0.0	I	1637.0	I	
I		I		I	(0.0)	I	(0.0)	I	(7.0)	I	
I		I		I		I		I		I	
I		I	ARM B	I	0.000	I	0.000	I	1.000	I	
I		I		I	0.0	I	0.0	I	955.0	I	
I		I		I	(0.0)	I	(0.0)	I	(5.0)	I	
I		I		I		I		I		I	
I		I	ARM C	I	0.000	I	0.000	I	0.000	I	
I		I		I	I???????	I	I???????	I	I???????	I	
I		I		I	(0.0)	I	(0.0)	I	(0.0)	I	
I		I		I		I		I		I	

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	16.45-17.00									I
I	ARM A	20.46	69.81	0.293		0.0	0.4	6.1		I
I	ARM B	11.94	36.35	0.328		0.0	0.5	7.2		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.00-17.15									I
I	ARM A	24.43	69.81	0.350		0.4	0.5	8.0		I
I	ARM B	14.25	33.61	0.424		0.5	0.7	10.8		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.15-17.30									I
I	ARM A	29.93	69.81	0.429		0.5	0.7	11.1		I
I	ARM B	17.46	29.85	0.585		0.7	1.4	20.2		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.30-17.45									I
I	ARM A	29.93	69.81	0.429		0.7	0.7	11.2		I
I	ARM B	17.46	29.84	0.585		1.4	1.4	21.0		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	17.45-18.00									I
I	ARM A	24.43	69.81	0.350		0.7	0.5	8.2		I
I	ARM B	14.25	33.60	0.424		1.4	0.7	11.4		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

I	TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	I
I	18.00-18.15									I
I	ARM A	20.46	69.81	0.293		0.5	0.4	6.3		I
I	ARM B	11.94	36.32	0.329		0.7	0.5	7.5		I
I	ARM C	0.00	61.98	0.000		0.0	0.0	0.0		I

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.4
17.15	0.5 *
17.30	0.7 *
17.45	0.7 *
18.00	0.5 *
18.15	0.4

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.5
17.15	0.7 *
17.30	1.4 *
17.45	1.4 *
18.00	0.7 *
18.15	0.5

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

I	ARM	I	TOTAL DEMAND		I	* QUEUEING *		I	* INCLUSIVE QUEUEING *		I
I		I			I	* DELAY *		I	* DELAY *		I
I		I			I			I			I
I		I	(VEH)	(VEH/H)	I	(MIN)	(MIN/VEH)	I	(MIN)	(MIN/VEH)	I
I	A	I	2244.7	I 1496.4	I	50.9	I 0.02	I	50.9	I 0.02	I
I	B	I	1309.5	I 873.0	I	77.9	I 0.06	I	77.9	I 0.06	I
I	C	I	0.0	I 0.0	I	0.0	I 0.00	I	0.0	I 0.00	I
I	ALL	I	3554.2	I 2369.5	I	128.8	I 0.04	I	128.9	I 0.04	I

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.

* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.

* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

***** ARCADY 5 run completed.

===== end of file =====

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