Redevelopment of Churnet Works Site, Macclesfield Road, Leek

Transport Assessment
2nd Addendum Report

Sainsbury's Supermarkets Ltd.

October 2010
Final
9T7453

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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 Background

1.1.1 This Addendum Report relates to the proposed redevelopment of the Churnet Works site on Macclesfield Road in Leek. A comprehensive Transport Assessment (TA) (ref. 9T7453/R001/303776/Birm) has been prepared as part of the planning submission in January 2010 (planning application ref. 10/00041/OMAJEI), and this was subsequently followed by an Addendum Report (ref. 9T7453/R003A/310066/Birm) in February.

1.1.2 Since the planning submission, a substantial amount of technical work has been carried out in liaison with the local highway authority, Staffordshire County Council (SCC) and the local planning authority, Staffordshire Moorlands District Council (SMDC).

1.2 Scope of the Report

1.2.1 This report formally provides a summary of the additional work that has been carried out across a number of supplementary reports that have been submitted since February. A summary of the supplementary reports is provided below.

Report	Reference	Submitted
Transport Assessment	9T7453/R001/303776/Birm	January 2010
Interim Travel Plan	9T7453/R002/303776/Birm	January 2010
1st Addendum Report	9T7453/R003A/310066/Birm	February 2010
Discounted Traffic Assessment	9T7453/R005C/310066/Birm	May 2010
Town Centre Highway Improvements	9T7453/R012/310066/Birm	October 2010
Alternative Sites Transportation Assessment	9T7453/R006C/310066/Birm	May 2010
Interim Residential Travel Plan	9T7453/R010/310066/Birm	October 2010
Mixed-Use Travel Plan	9T7453/R011/310066/Birm	October 2010

Table 1.1: Summary of Reports Issued

2 LEEK TOWN CENTRE MASTERPLAN AND TRANSPORT STRATEGY

2.1 Town Centre Masterplan

2.1.1 SMDC and SCC are developing a Masterplan for Leek town centre that seeks to improve the town centre retail environment. Key areas of the town and individual development sites have been identified for regeneration.

2.2 Leek Transport Strategy

2.2.1 As part of the Town Centre Masterplan, SCC has developed a Transport Strategy that supports the Masterplan proposals by suggesting improvements to the transport networks within the town.

2.2.2 A key aspect of the Transport Strategy for Leek is that, instead of looking for developers/applicants to resolve local transport issues for individual proposals independently, it will seek financial contribution towards an area-wide improvement.

2.2.3 The Transport Strategy involved the commission of a microsimulation traffic model of the Leek town centre highway network that would help to inform area wide impacts of development and/or transport improvements and to ensure that they can successfully be accommodated together with the emerging Masterplan proposals.

2.2.4 The microsimulation model was built using VISSIM software by SCC's transport consultants, AECOM. AECOM was commissioned to assess the traffic impacts of various developments by assigning traffic flows associated with the developments into a validated base model.

2.2.5 As part of the Leek Transport Strategy, a bus service is proposed that will link the town centre with the surrounding areas. Whilst the details of the bus service are subject to further consideration, SMDC and SCC consider that a 30 minute frequency service that travels along the A523, around the town centre and stops at around three strategic locations including the bus station would be appropriate.

2.2.6 The Strategy proposes three junction improvements known as the Masterplan Junction Interventions. The schemes proposed the introduction of signal control at the A523 Church Street / A520 St Edward Street to replace the existing priority arrangement; signal control at A53 Haywood Street / Ball Haye Street / Derby Street / A523 Ashbourne Road (Clocktower) junction to replace the existing roundabout arrangement; and an improvement to the signal staging plan at the A53 Broad Street / Brook Street / A523 St Edward Street / Compton junction to include a controlled pedestrian stage. It should be noted that these improvement were based primarily to provide better pedestrian facilities and improve safety concerns, and as part of the preparation of the first draft Masterplan were not assessed for their impacts on capacity.

3 CHURNET WORKS TRAFFIC ASSESSMENT

3.1 Introduction

3.1.1 Further to the submission of the original TA and 1st Addendum Report earlier in the year, detailed discussions have taken place with SCC and SMDC regarding the highways and traffic implications of Sainsbury's proposed development.

3.1.2 In order to provide appropriate traffic flows associated with the proposed mixed-use development for input into the VISSIM model, an alternative, more detailed traffic flow scenario that considered changes in traffic patterns was prepared.

3.1.3 An important consideration should be remembered when assessing the level of impact of a new supermarket is that there is currently a significant amount of shopping trips from Leek residents that travel out of town to other towns that have similar supermarkets to the one that is proposed by Sainsbury's. As a result, the proposed development would help to retain the traffic locally and as such reduce the overall level of traffic, length of journeys and its associated noise and air emissions on the strategic roads throughout the County.

3.1.4 The traffic assessment is detailed fully in Royal Haskoning's Discounted Traffic Assessment (ref. 9T7453/R005/310066/Birm) that was submitted in May 2010, and is summarised within this section of this report.

3.2 Existing Shopping Habits

3.2.1 When assessing the impact on traffic flows of a proposed new supermarket (and bulky goods retail), it is important to consider how the existing shopping trips that would ultimately transfer to a route to the new supermarket from their current shopping route.

3.2.2 Appendix 5 of the Planning & Retail Statement that accompanied the planning application sets-out the proportions of trade that is predicted to divert to the new supermarket from the existing stores and shopping areas in and around the Leek area. The trade diversion proportions are shown in Table 3.1 below.

Existing Store	Trade Diversion of New Store
Morrison's Leek	30%
Aldi Leek	3%
Co-op Leek	7%
Netto Leek	3%
Asda Tunstall	6%
Morrison's Festival Park	9%
Sainsbury's Macclesfield	5%
Tesco Congleton	1%
Sainsbury's Stoke-on-Trent	6%
Tesco Stoke-on-Trent	3%
Tesco Longton	4%
Tesco Meir	5%
Tesco Macclesfield	6%
Buxton Supermarkets	6%
Biddulph	6%

Table 3.1: Trade Diversion of New Store

3.2.3 Traffic distributions have been mapped out to each of the existing stores taking account of the relative populations and routes from each of the four wards in Leek. A cumulative traffic flow pattern of the existing traffic movements currently being undertaken by those who would transfer their shopping trip to the new supermarket has then been established.

3.3 Discounted Traffic Scenario

3.3.1 This discounted traffic scenario for the proposed development at Churnet Works is put forward that takes into account the transfer of existing shopping trips and the impact of the proposed bus service whilst retaining the 30% reduction for linked trips within the mixed-use development. A summary of the proposed development traffic generation and the subsequent discounting is provided below.

Element	Weekday PM Peak		Saturday Peak	
	Arrivals	Departures	Arrivals	Departures
Supermarket	363	393	361	356
Retail Units	38	40	79	72
PFS	97	97	102	101
Employment	16	47	0	0
Houses	14	10	13	12
Apartments	11	6	4	6
Total Traffic Generation	539	593	559	547

Table 3.2 – Summary of Development Traffic Generation

3.3.2 The traffic generation assumptions set-out in the 1st Addendum Report to the TA remain applicable, and are repeated below for completeness:

- The PFS traffic is not considered to be new to the network, 50% is assumed to be visitors already visiting other elements of the proposed development, and the 50% is assumed to be pass-by traffic. Therefore whilst 50% of the PFS traffic

will add turning movements at the proposed access, they will not be new to the highway network within Leek;

- The proposed floor space of the employment units is to replace the existing floor space, the traffic associated with these is considered to be already on the highway network, and therefore no new trips will be included on the network other than to remove the existing trips from the Abbey Green Road access and assign all of the associated trips to the turning movements at the site access;

- It is standard practice to reduce the total trip generation by 30% where supermarkets are proposed as part of a mixed-use scheme as it is likely that visitors to the supermarket will also visit at least one of the other uses. For the purposes of this assessment, the total supermarket and retail unit traffic has been reduced by 30%.

- All residential traffic is considered new to the network.

3.3.3 The resultant trip generation is summarised in Table 3.3.

	Weekday PM Peak		Saturday Peak	
	Arrivals	Departures	Arrivals	Departures
Total Traffic Generation	306	319	325	317

Table 3.3 – Summary of Total Development Traffic Generation

3.3.4 The traffic generation in Table 3.3 is considered to be the total traffic attracted to the proposed development on top of which already is attracted there. However, it doesn't take into account any reduction in trips that are associated with different types of discounts that are applicable to the proposed development, and these include:

- the proposed bus service;
- pass-by trips; and
- transferred trips from existing shopping patterns.

3.3.5 It is anticipated that the bus service that is proposed as part of the Town Centre Masterplan would reduce the need to travel by private car to the supermarket and as such would reduce the total traffic generation by 10%. This percentage has been initially agreed with SCC officers.

3.3.6 Pass-by trips are those that are already present on the road network directly adjacent to the point(s) of access to the site, which will turn into the site, and are particularly applicable where the development is situated on a major arterial route. A pass-by reduction of 30% is typical for a supermarket, however due to the location of the Churnet Works site; a 20% pass-by reduction has been applied.

3.3.7 Transferred trips are the most significant element in discounting traffic generation. For example, a number of supermarket shoppers who currently visit the Morrison's store in Leek will switch stores in order to shop at the proposed Sainsbury's store instead. These are not classed as new trips, as they are simply transferring their existing trips to a different route to a new store.

3.3.8 Whilst these trips are not new to the network, they will change routes and so the proportion of transferred trips have been taken into account by reassigning the existing shopping trips described in section 3.2 to the proposed development at Churnet Works. Whilst the vast majority of trips to the proposed development will be transferring from their existing shopping trip, a 50% discount is considered appropriate in order to provide a robust assessment of the highway network.

3.3.9 The resulting traffic generation following the two discounts is summarised in Table 3.4.

	Weekday PM Peak		Saturday Peak	
	Arrivals	Departures	Arrivals	Departures
Bus Reduction (10%)	31	32	33	32
Pass-by Reduction (20%)	61	64	65	63
Transfer Reduction (50%)	153	160	163	159
New Trips	61	63	64	63
Total Traffic Generation	**306**	**319**	**325**	**317**

Table 3.4 – Summary of Discounted Development Traffic Generation

3.3.10 The remaining number of trips can be considered as completely new to the highway network, and as this accounts for around 20% of the total traffic generation it is considered appropriate and robust, particularly when taking the TRICS Research Report 95-2 “Pass By & Diverted Traffic – A Resume” into account, which concluded that in most cases for supermarket developments “10% or less of the total trips are completely new”.

3.3.11 The resultant traffic flows that include the discount reductions as well as the rerouted transferred trips are shown in **Figure 1** and **Figure 2** for the Weekday PM and Saturday peak periods respectively.

3.4 VISSIM Assessments

3.4.1 When the Churnet Works traffic flows were considered in conjunction with the developments proposed in the emerging Masterplan, and then assigned to the VISSIM model of the base scenario, it was apparent that junction improvements would be required to accommodate the increase and change in traffic patterns.

3.4.2 The Masterplan Junction Interventions that were presented as part of SCC’s Transport Strategy were tested initially, and it was demonstrated that they would result in a detrimental impact on traffic flow in and around the town centre.

3.4.3 A range of alternative highway improvements were consequently considered in order to provide a highways solution that would accommodate the traffic associated with the Churnet Works in conjunction with the emerging Masterplan’s developments.

4 TOWN CENTRE HIGHWAY IMPROVEMENTS

4.1 Introduction

4.1.1 Royal Haskoning, on behalf of Sainsbury's, liaised with SCC and their highway consultants, AECOM, to develop improvement schemes that would accommodate the additional traffic associated with the redevelopment of the Churnet Works in conjunction with the emerging Masterplan proposals.

4.1.2 Following the testing of a range and combination of options at various key junctions in the town centre, it was determined that three junction improvements are required to support the Sainsbury's proposals in conjunction with the potential Masterplan schemes. These proposed junction improvements are detailed fully in Royal Haskoning's Town Centre Highway Improvements report (ref. 9T7453/R012/310066/Birm) that was submitted to SMDC on 4th October 2010, and are summarised below.

4.2 A523 Church Street / A520 St Edward Street

4.2.1 It is proposed to introduce turning restrictions to prevent right-turning traffic into and out of St Edward Street in order to improve safety and traffic flow through the junction. It is also proposed to introduce a signal-controlled staggered pedestrian crossing on the eastern arm of the junction that will facilitate easier and safer pedestrian crossing movements of the A523 and encourage pedestrian movements into the town centre.

4.3 A523 Stockwell Street / Buxton Road / A53 Ball Haye Street / Ball Haye Road

4.3.1 It is proposed to widen the carriageway on the Stockwell Street approach of the junction in order to provide a storage lane for right-turning traffic into Ball Haye Street. The provision of the right-turn lane allows for the existing right-turners at this junction as well as those who currently turn right at St Edward Street, to turn right without blocking the eastbound through movement.

4.4 A53 Haywood Street / Ball Haye Street / A523 Ashbourne Road / Derby Street (Clocktower Junction)

4.4.1 It is proposed to upgrade the existing roundabout configuration with a signal-controlled junction. It is also proposed that Derby Street becomes an exit arm only from the junction. These improvements will facilitate greater control over the traffic operation of the junction and will ensure the continued flow of traffic through it.

4.4.2 With less land required for the proposed junction, the potential is created to provide an attractive pedestrian-friendly public realm area either side of the Derby Street arm. It is therefore proposed to retain the heart of the existing roundabout at the centre of an expanded landscaped area to provide an enhanced Clocktower landmark location.

4.5 SCOOT

4.5.1 As part of the Leek Town Centre Masterplan, it is a desire of SCC to implement an Urban Traffic Control (UTC) system in the town, and SCOOT (Split Cycle Offset Optimisation Technique) has been identified by SCC as the preferred system.

4.5.2 SCOOT is a tool for managing and controlling traffic signals in urban areas. It is an adaptive system that responds automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road. It coordinates the operation of all the traffic signals in an area to give good progression to vehicles through the network.

4.5.3 It is therefore proposed that as part of the proposed junction improvements associated with the Churnet Works development that the signals at the improved junctions as well as the existing St Edward Street / Compton / Broad Street / Brook Street junction will be designed and/or upgraded to facilitate SCOOT control.

4.5.4 A SCOOT system in Leek will provide SCC with the capability to actively manage traffic flow within the network and thus will provide a significant benefit to road users in Leek and to SCC as the local highway authority.

4.6 Complementary Measures

4.6.1 It is considered necessary to support these improvements with additional measures that would prevent / mitigate any potential resultant adverse effects.

4.6.2 A signing strategy will be implemented that will take account of the changes in turning movements at the improved junctions and will involve amendments to existing signs as well as the introduction of new signs.

4.6.3 It is proposed to implement a traffic calming scheme along the Salisbury Street / Sneyd Street link that runs between the A523 and the A53 in order to discourage any potential rat-running caused by the proposed junction improvements.

4.6.4 These complementary measures are further discussed in Royal Haskoning's Town Centre Highway Improvements report.

4.7 Ashbourne Road / Springfield Road

4.7.1 In addition to the junction improvement measures that are proposed, SCC has identified an opportunity to reroute a proportion of left-turning traffic from A523 Buxton Road into A53 Ball Haye Street via Springfield Road that links the A53 to A523 Ashbourne Road.

4.7.2 This diversion would bring traffic to the Ashbourne Road approach to the Clocktower junction, where the left-turn filter arrow of the proposed signals would create additional capacity. The resultant reduction in traffic at the existing Buxton Road signals junction would create a benefit to right-turners into Ball Haye Street by reducing the number of vehicles they are opposed to and thus increasing capacity.

4.7.3 In order for the diversion to work, spare capacity is required at the existing Ashbourne Road / Springfield Road priority junction, and so a PICADY assessment has been carried out, firstly to assess the background situation and then to predict the capacity of right-turners out of Springfield Road once the development traffic along Ashbourne Road has been assigned. The results of the PICADY assessment are provided in full at **Appendix A** and are summarised below.

4.7.4 An analysis of the operation of the junction identified a peak period between 16.00 and 17.00 in the PM Peak, during which the junction is operating at capacity. However this can be attributed to the two schools situated along Springfield Road whose days finish at 15.50. The 17.00-18.00 peak period, the hour modelled in VISSIM, demonstrates spare capacity at the junction, and the base situation and base + development scenarios are summarised below.

	Base Scenario			Base + Development Scenario		
Arm	RFC	Queue	Delay	RFC	Queue	Delay
Springfield Road	0.589	1.37	0.29	0.573	1.30	0.28
Ashbourne Road	0.340	0.51	0.16	0.346	0.53	0.17

Table 4.1 – Summary of Ashbourne Road / Springfield Road PICADY Results

4.7.5 An assessment has subsequently been made to determine the number of additional right-turners from Springfield Road, representing the proposed diverted traffic, that could pass through the junction before RFC values of 0.850 and 1.000 occur. These results are summarised below.

	Additional 36 Right Turners			Additional 58 Right Turners		
Arm	RFC	Queue	Delay	RFC	Queue	Delay
Springfield Road	**0.856**	4.21	1.58	**1.000**	11.01	2.33
Ashbourne Road	0.346	0.53	0.17	0.346	0.53	0.17

Table 4.2 – Summary of Ashbourne Road / Springfield Road PICADY Results

4.7.6 The results in Table 4.2 demonstrate that an additional 36 and 58 right turners can leave Springfield Road before RFC values of 0.850 and 1.000 occur respectively. This indicates that there is spare capacity at the junction to divert a proportion of traffic from Buxton Road and thus improving capacity at the Buxton Road and Clocktower signal junctions.

4.7.7 Whilst the diversion of traffic along Springfield Road is recognised to benefit the two signal junctions, it is considered that it is not a requirement to accommodate Sainsbury's proposed development at Churnet Works in conjunction with the emerging Masterplan's developments, as the traffic modelling work to date demonstrates.

5 SEQUENTIAL SITES TESTING

5.1 Introduction

5.1.1 In order for the planning submission to demonstrate that a full assessment of alternative sites in the town centre has been carried out, a sequential test has been undertaken for four alternative sites identified by SMDC. As part of this sequential test, a comprehensive traffic assessment has been carried out for each of the alternative sites in order to provide similar traffic scenarios to those of the Churnet Works development so that they can be assessed with the VISSIM model. The alternative sites are listed below:

- Eaton House;
- Compton Mill Area;
- Pickwood Road Area;
- Smithfield Centre and Bus Station.

5.1.2 The traffic assessments for the sites are detailed fully in Royal Haskoning's Alternative Sites Transportation Assessment report (ref. 9T7453/R006C/310066/Birm), submitted to SMDC on 18th May 2010, which assessed the traffic impact of each site at the nearby signal-controlled junction at Brook Street/Broad Street. Since the submission of this Assessment and in order to be consistent, each site has also been tested within the VISSIM model. All of the results are summarised below.

5.2 Eaton House

5.2.1 The Eaton House site was formally the subject of a planning application for a supermarket by Tesco. A review of the Transport Assessment for the application demonstrated that the proposed access would not be an appropriate design and the implications for the surrounding highway network would be so severe as to rule out such a development on this site.

5.2.2 In April 2010 the application was refused at planning committee for various reasons including traffic and transport issues. It is therefore concluded that the Eaton House site is not suitable for a supermarket due to the subsequent impact on traffic in the immediate vicinity of the site access on Buxton Road.

5.2.3 Whilst this site was considered as part of the sequential sites testing, due to the recent planning refusal for a foodstore on the site, it would not be necessary to carry out any further traffic assessment work for it because it has already been demonstrated that it is unsuitable for a supermarket development.

5.3 Compton Mill Area

5.3.1 Due to the proximity of the Compton Mill site to the signalised junction at Brook Street / Broad Street, the assessment concluded that the addition turning movements together with likely limited car parking provision would result in a significant detrimental impact on the junction's operation, and this alone would lead to an unacceptable situation on the highway network.

5.3.2 This site is therefore considered inappropriate for a supermarket development.

5.4 Pickwood Road Area

5.4.1 As with the previous site, the Pickwood Road site would have a significant impact on the operation of the Brook Street / Broad Street junction. Whilst the impacts of the traffic alone would not be as detrimental as the Compton Mill site, the cumulative impact of the restricted parking provision and the required access arrangements is considered to result in an inappropriate location for a supermarket.

5.5 Smithfield Centre and Bus Station

5.5.1 The assessment for the Smithfield Centre site concluded that whilst the site itself would be impractical to accommodate a supermarket, even if it could, the associated traffic movements through the nearby signalised junction would have a detrimental impact on the local highway network, particularly when considering the cumulative impact of the restricted parking provision and access arrangements. It is therefore considered that a supermarket on this site would also be unacceptable due to the resultant traffic issues that would be created.

5.6 VISSIM Assessments

5.6.1 Whilst all four sites were demonstrated to be inappropriate for a supermarket development, their respective traffic flow scenarios were assigned to the VISSIM model in order to provide a consistent and robust traffic assessment of all the sites.

5.6.2 The VISSIM assessments demonstrated that only the Churnet Works and Pickwood Road sites did not result in the highway network locking up during either peak period, and of these two sites, the Churnet Works site resulted in lower overall queue levels.

5.6.3 It was therefore concluded that the most favourable site for a supermarket development is the Churnet Works site with the condition that the proposed junction improvements and complementary measures, discussed in section 4 of this report.

6 TRAVEL PLAN MEASURES

6.1 Introduction

6.1.1 The post submission discussions with SCC identified the requirement for a more comprehensive Travel Plan for the mixed-use elements of the site from the outset. The original Interim Travel Plan that formed part of the planning application has therefore been revised to provide separate Plans for the residential and mixed-use elements, with the mixed-use Plan providing a more comprehensive range of measures and potential remedies.

6.2 Interim Residential Travel Plan

6.2.1 The residential element of the Travel Plan was originally detailed within Section 13 of the Interim Travel Plan that formed part of the planning application. Whilst the content of the Plan remains fundamentally the same, it is now delivered as a separate entity, which will allow easier transfer to a residential developer, once secured. The Travel Plan now forms Royal Haskoning's report Interim Residential Travel Plan (ref. 9T7453/R010/310066/Birm).

6.3 Mixed-Use Travel Plan

6.3.1 The Mixed-Use Travel Plan has been revised in liaison with officers at SCC, and now commits Sainsbury's and future site operators to a more developed range of measures and potential remedies. The Travel Plan set out in Royal Haskoning's report (ref. 9T7453/R011/310066/Birm) provides full details and the key commitments are summarised below:

- A free of charge bus service linking the site with the town centre operating on a 30 minute frequency, funded by Sainsbury's for an initial 2 years;
- Permanent monitoring of traffic arriving and leaving the site via Automatic Traffic Counters (ATCs) at the access;
- A car park management system to restrict the duration of stay to 3 hours within the retail parking area, in order to avoid any misuse of the car park by long stay parkers such as commuters, but will still encourage linked trips with the town centre;
- A traffic management scheme that provides signal control on the exit of the site, that allows a restriction on the level of traffic leaving the site should congestion issues occur in the town centre as a result of the development traffic;
- A commitment to assisting in the monitoring to the impact of the proposed highway improvements with a contribution to the cost of necessary traffic surveys that are deemed necessary once all improvements have been carried out;
- A commitment to operating the Travel Plan for the lifetime of the supermarket.

7 SUMMARY AND CONCLUSIONS

7.1 Summary

7.1.1 Since the planning application was submitted in January 2010, there has been a substantial amount of post-application submission assessment work carried out in order to fully demonstrate the effects of the proposed development.

7.1.2 A key element of this work was the sequential testing of alternative development sites in the town centre. This assessment demonstrated that the Churnet Works site was the most favourable in traffic terms, and that three of the remaining sites were unsuitable. Turley Associates (Planning Consultants) has submitted more detailed information on other aspects of the sequential testing.

7.1.3 Various off-site highway improvements are proposed for the town centre that will accommodate the Churnet Works development in conjunction with the forthcoming Masterplan sites. These improvements include the upgrade of three key junctions in the town as well as the implementation of SCOOT control for the town that will provide a long-term benefit to SCC.

7.1.4 The Travel Plan for the proposed development has been revised to provide a more comprehensive Plan for the mixed-use element of the site, and commits to more detailed measures and remedies.

7.2 Conclusion

7.2.1 It is concluded that the substantial amount of post-application submission traffic assessment work has demonstrated that:

- the Churnet Works development can be accommodated in conjunction with the potential emerging Masterplan sites with the introduction of the proposed highway improvements and travel plan measures; and
- the Churnet Works site is in the sequentially preferable location compared to the four other sites identified by SMDC in the town centre.

7 SUMMARY AND CONCLUSIONS

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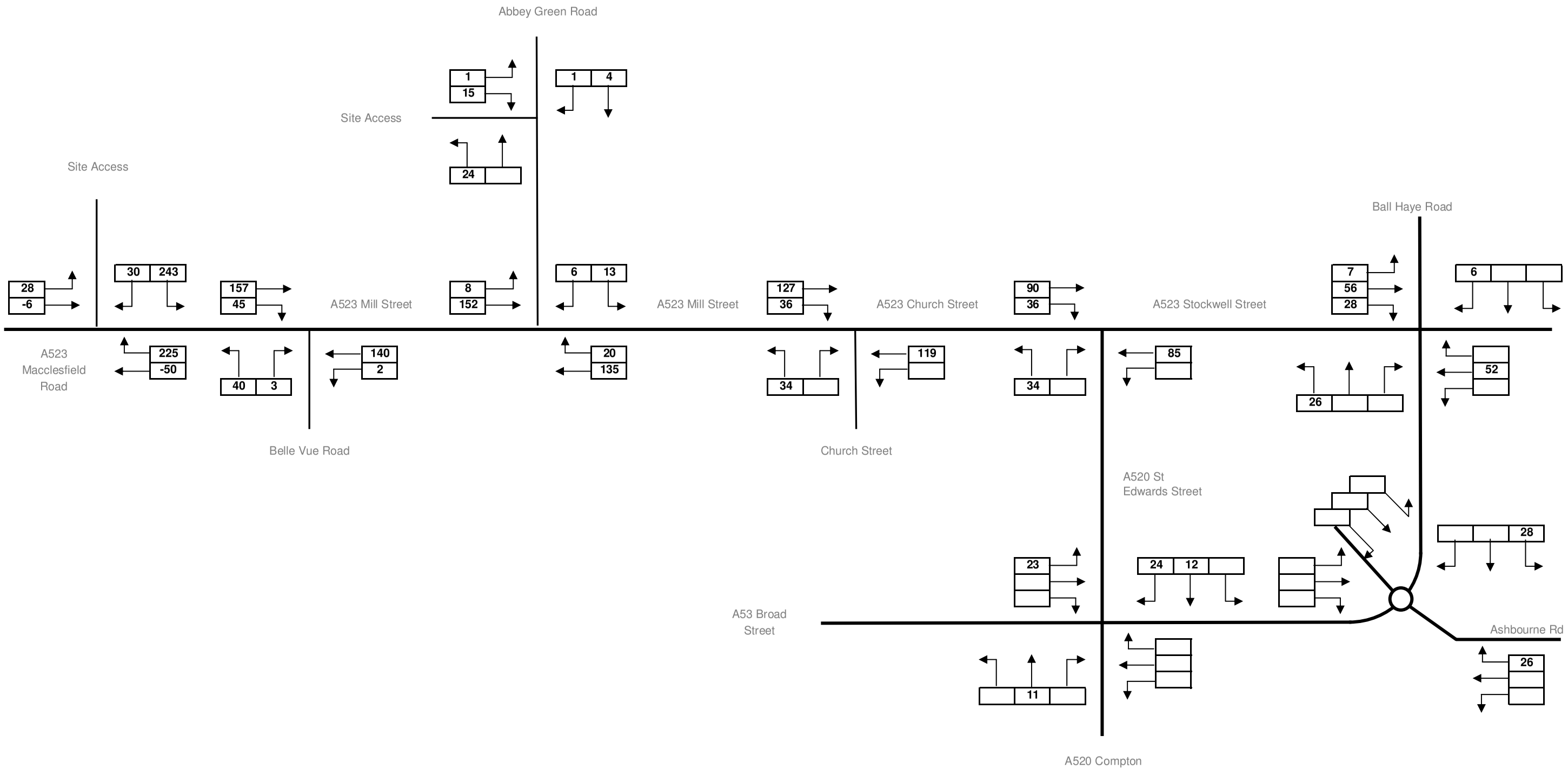
Figures



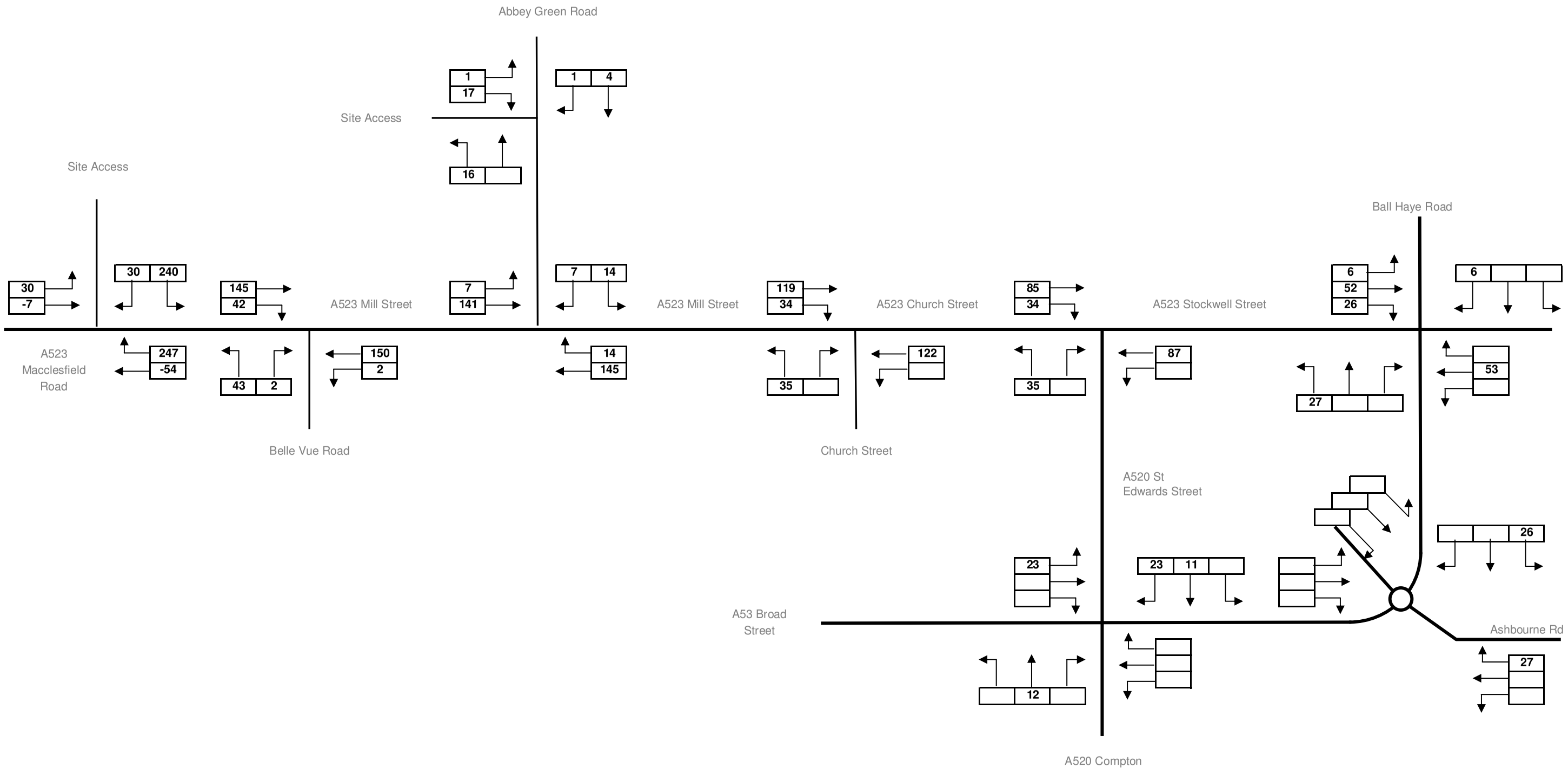
Notes:

1) All flows are in passenger car units (PCUs)

	Total	Retail	Resi
Arrivals	227	201	25
Departures	242	226	16

SAINSBURY'S DISCOUNTED DEVELOPMENT TRIPS - WEEKDAY PEAK

-



Notes:

1) All flows are in passenger car units (PCUs)

	Total	Retail	Resi
Arrivals	233	215	17
Departures	227	209	18

SAINSBURY'S DISCOUNTED DEVELOPMENT TRIPS - SATURDAY PEAK

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Appendix A

Ashbourne Road / Springfield Road PICADY Results

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

PICADY 5.1 ANALYSIS PROGRAM
RELEASE 4.0 (SEPT 2008)

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PROGRAM ADVICE AND MAINTENANCE CONTACT:
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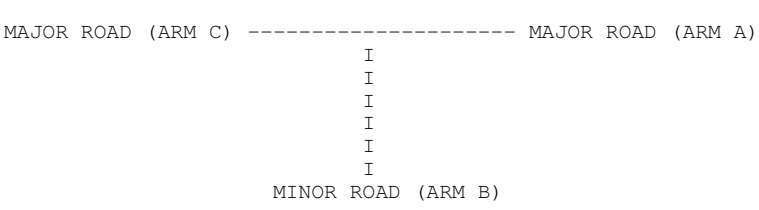
Run with file:-
L:\Sites\EU-Central\Project\9T7453\Technical_Data\Junction Assessments\A523 - Springfield Rd\PICADY\
Springfield Rd - Ashbourne Rd VISSIM flows.vpi"
drive-on-the-left) at 11:11:21 on Friday, 8 October 2010

RUN INFORMATION

RUN TITLE	: Leek (Springfield Rd - Ashbourne Rd)
LOCATION	: L:eek
DATE	: 24/09/10
CLIENT	: SSL
ENUMERATOR	: 303838 [D04123]
JOB NUMBER	: 9T7453
STATUS	:
DESCRIPTION	:

MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS Ashbourne Rd (SE)
ARM B IS Springfield Rd
ARM C IS Ashbourne Rd (NW)

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

DATA ITEM	MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W) 7.60 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 3.00 M.
- VISIBILITY	(VC-B) 200.00 M.
- BLOCKS TRAFFIC	YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 41.0 M.
- VISIBILITY TO RIGHT	(VB-A) 250.0 M.
- LANE 1 WIDTH	(WB-C) -
- LANE 2 WIDTH	(WB-A) -
WIDTH AT 0 M FROM JUNCTION	5.60 M.
WIDTH AT 5 M FROM JUNCTION	4.90 M.
WIDTH AT 10 M FROM JUNCTION	4.30 M.
WIDTH AT 15 M FROM JUNCTION	4.20 M.
WIDTH AT 20 M FROM JUNCTION	4.00 M.
- LENGTH OF FLARED SECTION	1 VEHS

SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
749.84	0.27	0.27

(NB These values do not allow for any site specific corrections)

GEOMETRIC DELAY DATA

	ARM SPEED (KPH)		ENTRY RADIUS	EXIT RADIUS
	ENTRY	EXIT	ER (M)	EXR (M)
ARM A	53.0	53.0	18.2	
ARM B	32.0	32.0	11.5	19.0
ARM C	53.0	53.0		

JUNCTION VISIBILITIES DO NOT CONFORM TO STANDARDS LAID DOWN IN TD42/95

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: AM Base 08:00 - 09:00

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

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

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF 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	5.95	8.92	5.95
ARM B	15.00	45.00	75.00	3.90	5.85	3.90
ARM C	15.00	45.00	75.00	9.32	13.99	9.32

Demand set: AM Base 08:00 - 09:00

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
07.45 - 08.00	ARM A	0.000	0.372	0.628
		0.0	177.0	299.0
		(0.0)	(0.0)	(0.0)
	ARM B	0.410	0.000	0.590
		128.0	0.0	184.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.731	0.269	0.000
		545.0	201.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET AM Base 08:00 - 09:00
AND FOR TIME PERIOD 1

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-C	2.31	11.00	0.210		0.00	0.26	3.8	3.6	0.11
B-A	1.61	6.28	0.256		0.00	0.34	4.8	3.4	0.21
C-AB	2.52	10.88	0.232		0.00	0.30	4.4	2.8	0.12
A-B	2.22							2.6	
A-C	3.75							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-C	2.76	10.37	0.266		0.26	0.36	5.2	4.3	0.13
B-A	1.92	5.63	0.341		0.34	0.50	7.2	4.1	0.27
C-AB	3.01	10.57	0.285		0.30	0.39	5.9	3.4	0.13
A-B	2.65							3.1	
A-C	4.48							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-C	3.38	9.09	0.372		0.36	0.58	8.4	5.3	0.17
B-A	2.35	4.67	0.503		0.50	0.96	13.2	5.0	0.42
C-AB	3.69	10.14	0.364		0.39	0.57	8.5	4.2	0.15
A-B	3.25							3.8	
A-C	5.49							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-C	3.38	9.03	0.374		0.58	0.59	8.8	5.3	0.18
B-A	2.35	4.66	0.504		0.96	0.99	14.6	5.1	0.43
C-AB	3.69	10.14	0.364		0.57	0.57	8.6	4.2	0.16
A-B	3.25							3.8	
A-C	5.49							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-C	2.76	10.32	0.267		0.59	0.37	5.7	4.4	0.13
B-A	1.92	5.62	0.341		0.99	0.53	8.5	4.2	0.27
C-AB	3.01	10.57	0.285		0.57	0.40	6.1	3.4	0.13
A-B	2.65							3.1	
A-C	4.48							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.00-09.15									
B-C	2.31	10.97	0.210		0.37	0.27	4.1	3.7	0.12
B-A	1.61	6.27	0.256		0.53	0.35	5.5	3.5	0.22
C-AB	2.52	10.88	0.232		0.40	0.30	4.6	2.9	0.12
A-B	2.22							2.6	
A-C	3.75							0.0	

WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

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 B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
08.00	0.3	
08.15	0.5	*
08.30	1.0	*
08.45	1.0	*
09.00	0.5	*
09.15	0.4	

QUEUE FOR STREAM C-AB

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	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	253.3	168.8	36.1	0.14	36.1	0.14
B-A	176.2	117.5	53.8	0.31	53.9	0.31
C-AB	276.7	184.4	38.1	0.14	38.1	0.14
A-B	243.6	162.4				
A-C	411.6	274.4				
ALL	2111.4	1407.6	128.0	0.06	128.1	0.06

* 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.

INCLUSIVE GEOMETRIC DELAY

ARM	TOTAL DEMAND		GEOMETRIC DELAY BY TURN (VEH MIN) (GEOMETRIC DELAY PER LIGHT VEHICLE (SEC))			TOTAL GEOM. DELAY VEH MIN
	(VEH)	(VEH/H)	ARM A	ARM B	ARM C	
A	655.2	436.8	0.0	18.9	0.0	18.9
			(0.0)	(4.7)	(0.0)	
B	429.4	286.3	25.4	0.0	26.7	52.1
			(8.7)	(0.0)	(6.3)	
C	1026.8	684.5	0.0	20.8	0.0	20.8
			(0.0)	(4.5)	(0.0)	
ALL	2111.4	1407.6				91.8

POINT TO POINT JOURNEY TIME TABLE

Point to Point journey times From / To (entry point) (exit point)	Arm A	Arm B	Arm C	
ARM A	0.0	94.9	69.3	0.0
ARM B	117.2	0.0	105.1	0.0
ARM C	69.3	103.0	0.0	0.0
ARM D	0.0	0.0	0.0	0.0

JOURNEY TIME CALCULATION STARTING/ENDING ON ARM A BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM B BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM C BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT

*******END OF RUN*******

SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B

749.84	0.27	0.27

(NB These values do not allow for any site specific corrections

GEOMETRIC DELAY DATA

	ARM SPEED (KPH)		ENTRY RADIUS	EXIT RADIUS
	ENTRY	EXIT	ER (M)	EXR (M)
ARM A	53.0	53.0	18.2	
ARM B	32.0	32.0	11.5	19.0
ARM C	53.0	53.0		

JUNCTION VISIBILITIES DO NOT CONFORM TO STANDARDS LAID DOWN IN TD42/95

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: PM Base + Dev 17:00 - 18:00

TIME PERIOD BEGINS 15.45 AND ENDS 17.15

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

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	8.77	13.16	8.77
ARM B	15.00	45.00	75.00	4.75	7.13	4.75
ARM C	15.00	45.00	75.00	7.85	11.77	7.85

Demand set: PM Base + Dev 17:00 - 18:00

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
15.45 - 16.00	ARM A	0.000	0.232	0.768
		0.0	163.0	539.0
		(0.0)	(0.0)	(0.0)
	ARM B	0.321	0.000	0.679
		122.0	0.0	258.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.726	0.274	0.000
		456.0	172.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET PM Base + Dev 17:00 - 18:00
AND FOR TIME PERIOD 2

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.45-16.00									
B-C	3.24	10.47	0.309		0.00	0.44	6.3	5.1	0.14
B-A	1.53	5.58	0.274		0.00	0.37	5.2	3.3	0.24
C-AB	2.16	10.12	0.213		0.00	0.27	4.0	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.00-16.15									
B-C	3.87	9.45	0.409		0.44	0.68	9.8	6.1	0.18
B-A	1.83	4.91	0.373		0.37	0.58	8.2	3.9	0.32
C-AB	2.58	9.65	0.267		0.27	0.36	5.4	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.15-16.30									
B-C	4.73	8.03	0.590		0.68	1.37	19.0	7.4	0.30
B-A	2.24	3.42	0.655		0.58	1.66	21.3	4.7	0.76
C-AB	3.16	9.02	0.350		0.36	0.53	8.0	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-C	4.73	7.80	0.607		1.37	1.49	21.8	7.5	0.32
B-A	2.24	3.37	0.664		1.66	1.81	26.3	4.8	0.86
C-AB	3.16	9.02	0.350		0.53	0.54	8.1	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-C	3.87	9.31	0.415		1.49	0.72	11.5	6.2	0.19
B-A	1.83	4.91	0.373		1.81	0.61	10.3	4.1	0.34
C-AB	2.58	9.65	0.267		0.54	0.37	5.6	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-C	3.24	10.43	0.311		0.72	0.46	7.1	5.1	0.14
B-A	1.53	5.57	0.275		0.61	0.39	6.1	3.3	0.25
C-AB	2.16	10.12	0.213		0.37	0.27	4.1	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							0.0	

WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.4	
16.15	0.7	*
16.30	1.4	*
16.45	1.5	*
17.00	0.7	*
17.15	0.5	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.4	
16.15	0.6	*
16.30	1.7	**
16.45	1.8	**
17.00	0.6	*
17.15	0.4	

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.3	
16.15	0.4	
16.30	0.5	*
16.45	0.5	*
17.00	0.4	
17.15	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	355.1	236.7	75.5	0.21	75.5	0.21
B-A	167.9	111.9	77.3	0.46	77.3	0.46
C-AB	236.7	157.8	35.1	0.15	35.1	0.15
A-B	224.4	149.6				
A-C	741.9	494.6				
ALL	2353.7	1569.1	187.9	0.08	187.9	0.08

* 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.

INCLUSIVE GEOMETRIC DELAY

ARM	TOTAL DEMAND		GEOMETRIC DELAY BY TURN (VEH MIN) (GEOMETRIC DELAY PER LIGHT VEHICLE (SEC))			TOTAL GEOM. DELAY VEH MIN
	(VEH)	(VEH/H)	ARM A	ARM B	ARM C	
A	966.3	644.2	0.0	17.4	0.0	17.4
			(0.0)	(4.7)	(0.0)	
B	523.0	348.7	24.2	0.0	37.4	61.6
			(8.7)	(0.0)	(6.3)	
C	864.4	576.3	0.0	17.8	0.0	17.8
			(0.0)	(4.5)	(0.0)	
ALL	2353.7	1569.1				96.8

POINT TO POINT JOURNEY TIME TABLE

Point to Point journey times From / To (entry point) (exit point)	Arm A	Arm B	Arm C	
ARM A	0.0	94.9	69.3	0.0
ARM B	126.5	0.0	109.3	0.0
ARM C	69.3	103.6	0.0	0.0
ARM D	0.0	0.0	0.0	0.0

JOURNEY TIME CALCULATION STARTING/ENDING ON ARM A BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM B BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM C BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT

*******END OF RUN*******

SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B

	749.84	0.27	0.27

(NB These values do not allow for any site specific corrections

GEOMETRIC DELAY DATA

	ARM SPEED (KPH)		ENTRY RADIUS	EXIT RADIUS
	ENTRY	EXIT	ER (M)	EXR (M)
ARM A	53.0	53.0	18.2	
ARM B	32.0	32.0	11.5	19.0
ARM C	53.0	53.0		

JUNCTION VISIBILITIES DO NOT CONFORM TO STANDARDS LAID DOWN IN TD42/95

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: PM Base + Dev 17:00 - 18:00 (27 Right turners)

TIME PERIOD BEGINS 15.45 AND ENDS 17.15

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

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	8.77	13.16	8.77
ARM B	15.00	45.00	75.00	5.09	7.63	5.09
ARM C	15.00	45.00	75.00	7.85	11.77	7.85

Demand set: PM Base + Dev 17:00 - 18:00 (27 Right turners)

TIME	TURNING PROPORTIONS / TURNING COUNTS (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
15.45 - 16.00	ARM A	0.000	0.232	0.768
		0.0	163.0	539.0
		(0.0)	(0.0)	(0.0)
	ARM B	0.366	0.000	0.634
		149.0	0.0	258.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.726	0.274	0.000
		456.0	172.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET PM Base + Dev 17:00 - 18:00 (27 Right turners)
AND FOR TIME PERIOD 2

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.45-16.00									
B-C	3.24	10.27	0.315		0.00	0.45	6.5	5.1	0.14
B-A	1.87	5.59	0.335		0.00	0.49	6.8	4.0	0.26
C-AB	2.16	10.12	0.213		0.00	0.27	4.0	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.00-16.15									
B-C	3.87	9.25	0.418		0.45	0.70	10.1	6.1	0.18
B-A	2.23	4.73	0.472		0.49	0.85	11.9	4.8	0.39
C-AB	2.58	9.65	0.267		0.27	0.36	5.4	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.15-16.30									
B-C	4.73	6.35	0.746		0.70	2.57	32.7	7.3	0.54
B-A	2.73	3.32	0.823		0.85	3.20	37.3	5.6	1.17
C-AB	3.16	9.02	0.350		0.36	0.53	8.0	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-C	4.73	5.68	0.834		2.57	3.94	51.8	7.3	0.88
B-A	2.73	3.20	0.855		3.20	4.12	56.0	5.8	1.65
C-AB	3.16	9.02	0.350		0.53	0.54	8.1	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-C	3.87	8.87	0.436		3.94	0.79	14.0	6.4	0.22
B-A	2.23	4.62	0.483		4.12	0.99	19.1	5.3	0.50
C-AB	2.58	9.65	0.267		0.54	0.37	5.6	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-C	3.24	10.21	0.317		0.79	0.47	7.3	5.1	0.14
B-A	1.87	5.56	0.336		0.99	0.52	8.3	4.1	0.28
C-AB	2.16	10.12	0.213		0.37	0.27	4.1	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							0.0	

WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.5	
16.15	0.7	*
16.30	2.6	***
16.45	3.9	****
17.00	0.8	*
17.15	0.5	

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.5	
16.15	0.9	*
16.30	3.2	***
16.45	4.1	****
17.00	1.0	*
17.15	0.5	*

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.3	
16.15	0.4	
16.30	0.5	*
16.45	0.5	*
17.00	0.4	
17.15	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	355.1	236.7	122.4	0.34	122.5	0.34
B-A	205.1	136.7	139.5	0.68	139.5	0.68
C-AB	236.7	157.8	35.1	0.15	35.1	0.15
A-B	224.4	149.6				
A-C	741.9	494.6				
ALL	2390.9	1593.9	297.1	0.12	297.1	0.12

* 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.

INCLUSIVE GEOMETRIC DELAY

ARM	TOTAL DEMAND		GEOMETRIC DELAY BY TURN (VEH MIN) (GEOMETRIC DELAY PER LIGHT VEHICLE (SEC))			TOTAL GEOM. DELAY VEH MIN
	(VEH)	(VEH/H)	ARM A	ARM B	ARM C	
A	966.3	644.2	0.0	17.4	0.0	17.4
			(0.0)	(4.7)	(0.0)	
B	560.2	373.5	29.6	0.0	37.4	67.0
			(8.7)	(0.0)	(6.3)	
C	864.4	576.3	0.0	17.8	0.0	17.8
			(0.0)	(4.5)	(0.0)	
ALL	2390.9	1593.9				102.2

POINT TO POINT JOURNEY TIME TABLE

Point to Point journey times From / To (entry point) (exit point)	Arm A	Arm B	Arm C	
ARM A	0.0	94.9	69.3	0.0
ARM B	139.7	0.0	117.2	0.0
ARM C	69.3	103.6	0.0	0.0
ARM D	0.0	0.0	0.0	0.0

JOURNEY TIME CALCULATION STARTING/ENDING ON ARM A BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM B BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM C BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT

*******END OF RUN*******

SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For STREAM B-C	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B
0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM B-A	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B	Slope For Opposing STREAM C-A	Slope For Opposing STREAM C-B
0.00	0.00	0.00	0.00	0.00

Due to the presence of a flare, data is not available

Intercept For STREAM C-B	Slope For Opposing STREAM A-C	Slope For Opposing STREAM A-B

	749.84	0.27	0.27

(NB These values do not allow for any site specific corrections

GEOMETRIC DELAY DATA

	ARM SPEED (KPH)		ENTRY RADIUS	EXIT RADIUS
	ENTRY	EXIT	ER (M)	EXR (M)
ARM A	53.0	53.0	18.2	
ARM B	32.0	32.0	11.5	19.0
ARM C	53.0	53.0		

JUNCTION VISIBILITIES DO NOT CONFORM TO STANDARDS LAID DOWN IN TD42/95

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: PM Base + Dev 17:00 - 18:00 (50 Right turners)

TIME PERIOD BEGINS 15.45 AND ENDS 17.15

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

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	8.77	13.16	8.77
ARM B	15.00	45.00	75.00	5.38	8.06	5.38
ARM C	15.00	45.00	75.00	7.85	11.77	7.85

Demand set: PM Base + Dev 17:00 - 18:00 (50 Right turners)

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
15.45 - 16.00	ARM A	0.000	0.232	0.768
		0.0	163.0	539.0
		(0.0)	(0.0)	(0.0)
	ARM B	0.400	0.000	0.600
		172.0	0.0	258.0
		(0.0)	(0.0)	(0.0)
	ARM C	0.726	0.274	0.000
		456.0	172.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET PM Base + Dev 17:00 - 18:00 (50 Right turners)
AND FOR TIME PERIOD 2

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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.45-16.00									
B-C	3.24	9.83	0.329		0.00	0.48	6.9	5.1	0.15
B-A	2.16	5.67	0.381		0.00	0.60	8.3	4.6	0.28
C-AB	2.16	10.12	0.213		0.00	0.27	4.0	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.00-16.15									
B-C	3.87	8.57	0.451		0.48	0.80	11.4	6.1	0.21
B-A	2.58	4.76	0.541		0.60	1.11	15.3	5.5	0.44
C-AB	2.58	9.65	0.267		0.27	0.36	5.4	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.15-16.30									
B-C	4.73	4.76	0.994		0.80	7.83	78.0	6.7	1.43
B-A	3.16	3.21	0.982		1.11	6.17	63.1	6.1	1.81
C-AB	3.16	9.02	0.350		0.36	0.53	8.0	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-C	4.73	4.70	1.008		7.83	11.71	148.2	7.1	2.46
B-A	3.16	3.19	0.990		6.17	8.80	113.5	6.5	2.88
C-AB	3.16	9.02	0.350		0.53	0.54	8.1	3.6	0.17
A-B	2.99							3.5	
A-C	9.89							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-C	3.87	7.46	0.518		11.71	1.13	36.5	7.2	0.43
B-A	2.58	4.35	0.592		8.80	1.61	45.1	6.6	0.97
C-AB	2.58	9.65	0.267		0.54	0.37	5.6	2.9	0.14
A-B	2.44							2.8	
A-C	8.08							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)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-C	3.24	9.72	0.333		1.13	0.51	8.0	5.2	0.16
B-A	2.16	5.64	0.383		1.61	0.64	10.5	4.8	0.30
C-AB	2.16	10.12	0.213		0.37	0.27	4.1	2.4	0.13
A-B	2.05							2.4	
A-C	6.76							0.0	

WARNING* NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.5	
16.15	0.8	*
16.30	7.8	********
16.45	11.7	**********
17.00	1.1	*
17.15	0.5	*

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.6	*
16.15	1.1	*
16.30	6.2	******
16.45	8.8	*********
17.00	1.6	**
17.15	0.6	*

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.00	0.3	
16.15	0.4	
16.30	0.5	*
16.45	0.5	*
17.00	0.4	
17.15	0.3	

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-C	355.1	236.7	289.1	0.81	289.1	0.81
B-A	236.7	157.8	255.8	1.08	255.8	1.08
C-AB	236.7	157.8	35.1	0.15	35.1	0.15
A-B	224.4	149.6				
A-C	741.9	494.6				
ALL	2422.5	1615.0	580.0	0.24	580.1	0.24

* 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.

INCLUSIVE GEOMETRIC DELAY

ARM	TOTAL DEMAND		GEOMETRIC DELAY BY TURN (VEH MIN) (GEOMETRIC DELAY PER LIGHT VEHICLE (SEC))			TOTAL GEOM. DELAY VEH MIN
	(VEH)	(VEH/H)	ARM A	ARM B	ARM C	
A	966.3	644.2	0.0	17.4	0.0	17.4
			(0.0)	(4.7)	(0.0)	
B	591.9	394.6	34.2	0.0	37.4	71.5
			(8.7)	(0.0)	(6.3)	
C	864.4	576.3	0.0	17.8	0.0	17.8
			(0.0)	(4.5)	(0.0)	
ALL	2422.5	1615.0				106.8

POINT TO POINT JOURNEY TIME TABLE

Point to Point journey times From / To (entry point) (exit point)	Arm A	Arm B	Arm C	
ARM A	0.0	94.9	69.3	0.0
ARM B	163.7	0.0	145.4	0.0
ARM C	69.3	103.6	0.0	0.0
ARM D	0.0	0.0	0.0	0.0

JOURNEY TIME CALCULATION STARTING/ENDING ON ARM A BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM B BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT
JOURNEY TIME CALCULATION STARTING/ENDING ON ARM C BEGINS/ENDS 500.0M FROM STOP LINE/AFTER EXIT

*******END OF RUN*******

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

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