ROYAL MAIL

PROPOSED MARINE ENERGY PARK DEVELOPMENT AT SOUTH KILLINGHOLME

TRANSPORT IMPLICATIONS FOR ROYAL MAIL OPERATIONS

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PROPOSED MARINE ENERGY PARK DEVELOPMENT
AT SOUTH KILLINGHOLME

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1 INTRODUCTION

1.1 Introduction

1.1.1 Able UK has submitted an application for a Development Consent Order under the provisions of the Planning Act (2008) for development of a Marine Energy Park (MEP) on land at South Killingholme, North Lincolnshire. The application is currently being considered by the Infrastructure Planning Commission, although interested parties still have the opportunity to make representations in relation to the proposals.

1.1.2 The MEP is proposed on a 294.7 hectare site on the southern bank of the river Humber, to the north of Immingham port. The proposed development would involve construction of a quay and use of the site for the manufacture and assembly of wind turbines before being shipped out to the North Sea to be installed. The location of the proposed MEP is shown in figure 1.

1.1.3 An area-wide Transport Assessment (TA) was produced by the applicants in September 2011 to assess the implications of the MEP. The report provides baseline data to establish current operation of the transport network in the South Killingholme and Immingham areas. The TA then goes on to consider the demands for movement likely to be generated by the MEP, both during construction and operation, the resulting impacts on the transport network and measures considered necessary to mitigate such impacts.

1.1.4 This report considers the potential traffic impact of traffic generated by the proposed MEP on operation of the Royal Mail Immingham Delivery Office on Middleplatt Road, Immingham and possible delays to Royal Mail delivery vehicles. This analysis is based firstly details provided in the Transport Assessment that forms part of the application to the Infrastructure Planning Commission and secondly on further more recent surveys and analysis of operation of the highway network in the vicinity of the Immingham Delivery Office, the location of which is also shown in figure1.

1.2 Scope of this Report

1.2.1 Subsequent sections of this report consider the following matters:

- Section Two – gives initial consideration to the traffic impacts arising from the proposed MEP development, providing a review of the submitted Transport Assessment and considering implications for operation of the Immingham Delivery Office
- Section Three – presents further analysis of the impact of traffic generated by the proposed MEP development and operation of the highway network in the vicinity of the Royal Mail Immingham Delivery Office
- Section Four – provides a summary and conclusion to the report

2 TRAFFIC EFFECTS OF THE MEP DEVELOPMENT

2.1 Introduction

2.1.1 This section of the report gives initial consideration to the traffic impacts arising from the proposed MEP development and provides a review of the submitted Transport Assessment.

2.1.2 Vehicular access to the MEP site is proposed from Rosper Road and The Haven. Access is available from the A180 corridor via the A160 route, for movements to and from the west and via the A1173 route, for movements to and from the east. The Immingham Delivery Office is located approximately 3.5 km south-east of the MEP site, with access available from the A1173 via Middleplatt Road.

2.2 Derivation of Baseline Traffic Flows

2.2.1 An extensive programme of traffic surveys was undertaken during 2010 (and early 2011) to establish baseline weekday morning and evening peak hour traffic flows at key locations (TA paragraph 4.3ff). The survey techniques used include manual classified counts, automatic traffic counts and automatic number plate recognition.

2.2.2 Whilst traffic surveys were not undertaken at the junction of A1173 with Middleplatt Road, which is used for access to the Immingham Delivery Office, surveys were undertaken at the adjacent mini-roundabout at the junction of A1173 with Pelham Road (TA Site 17a).

- **Comment** – The derivation of baseline traffic flows presented in the TA is considered generally satisfactory.

2.3 Traffic Generation and Distribution – Construction Phase

2.3.1 The TA estimates that during construction period there will be a maximum of 223 staff employed at the site, split between 6 shifts (TA paragraph 6.6). The analysis indicates some 1466 daily vehicle movements during construction (sum of arrivals and departures – TA tables 6.7, 6.8 and 6.9). The TA indicates that shift patterns would be structured such that there are no construction worker trips to or from the site during weekday peak hours (0800-0900 hours and 1700-1800 hours).

2.3.2 The TA bases the distribution of construction worker trips on a 'gravity' model indicating some 24.6% of trips via A1173 to the south of the site (past the Middleplatt Road junction). Whilst no additional trips are indicated on A1173 in the weekday peak hours, an additional flow of some 100 vehicles (sum of northbound and southbound traffic movements) is indicated in the periods from 0600-0700 hours and 1900-2000 hours. Traffic flows generally on the A1173 during these periods would however be well below peak levels.

2.3.3 The TA suggests that all road based deliveries during construction would be via A160/A180 to the north and not via A1173 (TA paragraphs 6.24 and table 6.9. Some 20 HGV arrivals and 20 HGV departures per hour are indicated in the period from 0700-1900 hours. The estimated number of HGV movements is based on 20% of goods being delivered by sea, 40% by rail and 40% by road (TA table 6.6)

- **Comment (1)** – The volume of traffic generated during the construction phase of major developments is difficult to estimate as traffic movements can be significantly influenced by the programme and methods adopted by the contractor, which are often not known at the planning stage. The suggestion that there will be no construction worker trips to and from the site during morning and evening peak hours will rely on shift patterns being as detailed in the TA, which may be difficult to enforce through the planning process, particularly with sub-contracting being common in the construction industry.
- **Comment (2)** – The gravity model used to distribute construction worker trips is considered generally satisfactory. The implications of variation in the number of traffic movements generated during construction should however be considered as there are no means of independently verifying the figures presented in the TA.
- **Comment (3)** – Whilst the majority of HGV movements during construction may well take place via A160/A180, it is unrealistic to consider there would be no additional HGV movements via A1173. The overall level of HGV traffic generation could also be significantly influenced by the approach to procurement adopted by the contractor, with the potential road transport being used to a greater extent than anticipated in the TA if the road based option is feasible and more cost effective than rail or sea options.

2.4 Traffic Generation and Distribution – Operational Phase

2.4.1 The TA estimates the volume of traffic likely to be generated by the MEP during operation from first principles by considering the activities that are anticipated to take place and the number of jobs indicated as being created. The TA estimates that some 4272 people would be employed at the MEP over 6 shifts (TA paragraph 6.11).

2.4.2 The TA anticipates the MEP would generate some 6756 vehicle movements per day during operation. This figure includes staff travel to and from work, with allowance for Travel Plan measures (TA table 6.18) and deliveries (TA table 6.13). Staff working the day shift (0900-1700 hours) are considered to travel during the peak hours (TA table 6.12) with peak hour arrivals and departures as indicated below:

- Morning peak hour (0800-0900 hours)
  - 557 vehicle arrivals
  - 116 vehicle departures
- Evening peak hour (1700-1800 hours)
  - 70 vehicle arrivals
  - 557 vehicle departures

2.4.3 The distribution of traffic generated during operation is based on a gravity model (the same model used for the distribution of traffic during construction). The following increases in peak hour traffic on A1173 in the vicinity of the Immingham Delivery Office are indicated during peak hours, after allowance for traffic movements associated with the established uses of the site (netting-off) and the introduction of Travel Plan measures to reduce car travel demand as follows (TA figures 6.4, 6.5, 6.7 and 6.8):

- Morning peak hour (0800-0900 hours)
  - 23 vehicles eastbound
  - 111 vehicles westbound
- Evening peak hour (1700-1800 hours)
  - 111 vehicles eastbound
  - 14 vehicles southbound

- **Comment (1)** – When considering the volume of traffic likely to be generated by development, with most land uses (such as retail or residential) traffic generation is estimated by reference to surveys undertaken at comparable established sites. The TRICS database is normally used to assist with this task. With a development such as the MEP, no comparable established sites are available and therefore it is appropriate to consider traffic generation from first principles, as presented in the TA. The difficulty with estimation from first principles is that there are no means of verifying the estimates by comparison with established developments and therefore the implications of variation in these figures should be considered.

- **Comment (2)** – Working practices adopted during operation could influence the effects of traffic generated by the proposed development on operation of the local highway network. For example, a rigid shift pattern could result in most arrivals and departures taking place over a short period of say 15 minutes at the beginning and end of each shift, leading to more significant short term impacts. The approach used in the TA is to consider traffic movement spread over a longer period of 1 hour (TA tables 6.20 and 6.21) which may tend to under estimate the effects of generated traffic.

- **Comment (3)** – A comparison of the estimates of MEP traffic generation during the construction phase (section 2.3 above) and during operation, suggests that the operational phase is likely to be more significant in terms of potential impacts on operation of the Immingham Delivery Office.

2.5 Derivation of Future Traffic Flows

2.5.1 The TA indicates that the traffic effects of committed developments that already have planning permission (TA paragraphs 4.17ff) and committed highway schemes programmed to proceed in the near future (TA paragraphs 4.19ff) have been taken into account when determining future traffic flows. The TA also indicates that allowance has been made for traffic movements generated by established uses of the application site in a 'netting-off' process (TA paragraphs 6.36ff).

2.5.2 With regard to growth in non-development traffic, the TA considers (in paragraph 4.31) that due to the number of committed developments no background traffic growth should be applied to base traffic flows. The TA then considers that as committed developments are essentially providing future traffic growth no future year assessments are necessary. Traffic flows on completion of the proposed development are therefore effectively existing traffic flows, with the addition of traffic generated by committed development and traffic generated by the proposed development, with allowance for 'netting-off' and the introduction of Travel Plan measures.

- **Comment (1)** – It is normal practice for the TA to consider the effects of committed developments and committed highway schemes. This process is usually undertaken by reference to the TA of the committed developments and the Scheme Assessment of the committed highway improvements. There is little detail in the TA about how this work has been undertaken, although presumably the process will have been scrutinised and agreed by the highway authorities during TA preparation.
- **Comment (2)** – When considering the traffic effects of development, it is normal to consider an assessment year no less than 5 years after the date of application (as indicated in paragraph 4.47 of 'Guidance on Transport Assessment, published by Government in March 2007). Paragraph 4.47 also makes provision for a longer term assessment in cases where development is likely to take place over a longer period (which could well be appropriate with the MEP development). When dealing with trunk roads, the normal practice is to consider an assessment year 10 years after the date of application (as indicated in paragraph 35 of DfT Circular 02/2007 – 'Planning and the Strategic Road Network'). The approach used in the TA is therefore inconsistent with current Government guidance.
- **Comment (3)** – The TA should normally consider traffic flows with and without development in an appropriate future assessment year. Future year traffic flows without development would normally be obtained by applying a growth factor to base year flows, to make allowance for increased vehicle ownership and usage. The TA seeks to justify the absence of a future year assessment by asserting that traffic generated by committed developments will equate to the otherwise anticipated growth in background traffic. Growth in background traffic is normally estimated by reference to the Department for Transport's TEMPRO model.

- **Comment (4)** – The failure of the TA to apply a growth factor to base year traffic is likely to under-estimate background traffic flows and thereby prejudice the reliability of the TA. It is widely recognised that many existing businesses and places of employment are currently operating at well below maximum capacity. Improvements in the economy are therefore likely to result in existing employment premises in the Immingham and South Killingholme areas being used more intensively generating more activity and more traffic, which is not allowed for in the TA.

2.6 Traffic Impact

2.6.1 The TA indicates that junction capacity assessments have been undertaken at locations where the MEP is considered to give rise to an increase in traffic of 30 or more vehicle movements per hour (TA paragraph 7.1) using normal analytical software packages. A list of 12 junctions considered in this way is provided (TA paragraph 7.2).

2.6.2 Highway improvements are proposed at the following locations where the impact of traffic generated by the proposed development is considered significant and the analysis demonstrates that peak hour traffic flows are at or approaching capacity:

- Junction of Rosper Road and Humber Road – Enhancement of the committed traffic signal control scheme is proposed to provide an additional lane for traffic turning right out of Rosper Road (TA Drawing NEA1114/01 – Appendix Q).
- A160/Top Road/Habrough Road – The A160 west approach to the roundabout is to be widened to 3-lane entry, with the westbound exit from the roundabout widened to 2-lanes.
- A160/A1173/Humber Road Roundabout – Improvement of the junction is proposed to widen the Humber Road approach and the circulatory carriageway (TA Drawing NEA1114/02 – Appendix Q).
- A1173/North Moss Lane/Kiln Lane – Improvement of the traffic signal controlled junction by widening the North Moss Lane and A1173 west (TA drawing NEA1114/06 – Appendix Q).

2.6.3 Mitigation measures to increase highway capacity are considered necessary primarily at locations relatively close to the proposed development where a concentration of additional traffic movements generated by the MEP is indicated. In addition however, mitigation measures are considered necessary at A1173/North Moss Lane/Kiln Lane, which is some 5.7km south of the MEP.

- **Comment (1)** – Paragraph 7.1 of the TA implies that detailed operational assessment has been undertaken of all junctions where an increase of 30 vehicle movements per hour is anticipated arising from the MEP development. The relevance of this figure is that an increase in traffic of 30 vehicle movements per hour is identified as the 'materiality threshold' above which a material traffic impact may arise (as set out in Government guidance provided in paragraph 2.11 of 'Guidance on Transport Assessment').
- **Comment (2)** - From tables 6.20 and 6.21 of the TA it is clear that that MEP would generate an increase in traffic of more than 30 vehicles per hour on A1173 through the junction with Middleplatt Road, which provides access to the Immingham Delivery Office and at the nearby A1173/Pelham Road mini-roundabout (as detailed in section 2.4.3 above). Detailed operational assessment of these junctions has however not been undertaken.
- **Comment (3)** – The above omission is considered significant as detailed operational assessment has been undertaken and mitigation measures considered necessary at the junction of A1173/North Moss Lane/Kiln Lane to the south and clearly all traffic movements generated by MEP passing through this junction will also pass through the junctions of A1173 with Middleplatt Road and the A1173/Pelham Road mini roundabout.
- **Comment (4)** – The TA asserts that the junctions analysed in detail (listed in TA paragraph 7.2) will operate within capacity, with the additional traffic generated by the MEP, subject to completion of the identified mitigation measures. As indicated in section 2.5 above, the TA does not provide a future year assessment and is therefore likely to under-estimate traffic flows when the MEP is on operation, with future operation of the local highway network therefore potentially worse than implied by the TA.

3 OPERATION OF THE HIGHWAY NETWORK IN THE VICINITY OF THE ROYAL MAIL DELIVERY OFFICE

3.1 Introduction

3.1.1 This section of the report presents further analysis of the impact of traffic generated by the proposed MEP development and operation of the highway network in the vicinity of the Royal Mail Immingham Delivery Office

3.2 The Local Highway Network

3.2.1 Vehicular access to the Immingham Delivery Office is available from A1173 via Middleplatt Road, which provides a single two-lane carriageway approximately 7.0 metres in width, with a footway to each side. In addition to serving the Royal Mail Delivery Office, Middleplatt Road provides access to a range of industrial premises. A Traffic Regulation Order prohibits on-street waiting at all times on Middleplatt Road and traffic movement is subject to a 30 mph speed limit.

3.2.2 Middleplatt Road joins the A1173 at a priority junction with ghost-island turning lane. This section of the A1173 route is a single two-lane carriageway road, with traffic movement subject to a 40 mph speed limit. The 3-arm mini roundabout at the junction of A1173 with Pelham Road is situated approximately 100 metres to the east of the Middleplatt Road junction.

3.3 Baseline Traffic Flows

3.3.1 A survey of traffic movements at the junction of A1173 and Pelham Road was undertaken on Thursday 27 May 2010 as part of the MEP TA (Appendix D of the MEP TA). A further peak period traffic survey was undertaken at the junction of A1173 and Middleplatt Road on behalf of Royal Mail on Wednesday 5 September 2012.

3.3.2 The results of the May 2010 survey at the junction of A1173 and Pelham Road have been factored to a 2012 level to provide consistent baseline data, by applying growth factors from TEMPRO, with local adjustment factors from the National Transport Model. Average growth factors for North Lincolnshire and North East Lincolnshire of 0.74% for the morning peak period and 0.87% for the evening peak period were used for this purpose.

3.3.3 2012 morning and evening peak hour flows in the vicinity of the Royal Mail Delivery Office are indicated diagrammatically in figures 2 and 3 and summarised in the table below. Full details of the survey at the junction of A1173 and Middleplatt Road are also presented in Appendix A. It can be seen that traffic flows on Middleplatt Road during peak periods are at a modest level, with the A1173 and Pelham Road more significantly trafficked.

Location	Direction	Morning Peak Hour (vehicles)	Evening Peak Hour (vehicles)
Middleplatt Road – north of junction with A1173	Northbound – from A1173	178	31
	Southbound – to A1173	59	109
A1173 – west of Middleplatt Road	Eastbound	236	494
	Westbound	438	252
A1173 – east of Middleplatt Road	Eastbound	203	554
	Westbound	524	234
A1173 – east of Pelham Road	Eastbound	489	656
	Westbound	622	570
Pelham Road	Northbound – to A1173	400	266
	Southbound – from A1173	213	500

Table 3.1 Baseline Peak Hour Traffic Flows (2012)

3.3.4 Recent observations on site indicate that Middleplatt Road and the junction with A1173 currently operate in a generally satisfactory manner, although some short term congestion may arise associated with HGV movements. The mini-roundabout at the junction of A1173 with Pelham Road has also been observed to operate in a generally satisfactory manner during peak periods, with some limited peak period queuing.

3.4 Traffic Movements Generated by Committed and Proposed Developments

3.4.1 Traffic movements generated by committed developments that already have planning consent and the proposed development have been taken from the MEP TA. The TA implies that all such traffic movements would be eastbound or westbound on A1173, with no turning movements to or from Middleplatt Road or Pelham Road.

3.4.2 Morning peak hour traffic movements generated by committed developments have been taken directly from MEP TA figure 4.3. Traffic movements generated by committed developments in the evening peak hour have been estimated from Table 6.11 (due to apparent inaccuracies in the diagrammatic presentation provide in TA figure 4.4). Traffic movements on the A1173 generated by committed developments have been assessed as follows:

- Morning peak hour
  - 330 vehicles eastbound
  - 223 vehicles westbound
- Evening peak hour
  - 202 vehicles eastbound
  - 268 vehicles southbound

3.4.3 Estimates of traffic movements generated by the proposed MEP development have been taken from the TA, with allowance traffic associated with established uses of the site (netting-off) and the introduction of Travel Plan measures to reduce car travel demand as follows (TA figures 6.4, 6.5, 6.7 and 6.8):

- Morning peak hour
  - 23 vehicles eastbound
  - 111 vehicles westbound
- Evening peak hour
  - 111 vehicles eastbound
  - 14 vehicles southbound

3.5 Traffic Impact

3.5.1 Government guidance set out in 'Guidance on Transport Assessment', published in March 2007 identifies a future year impact assessment as a normal requirement when considering proposals for new development. In the case of the proposed MEP development a future year assessment has not provided as the applicants consider that traffic movements generated by committed development equate to the growth in baseline traffic flows that would otherwise be considered.

3.5.2 As set out in section 2.5 above, this approach is likely to under-estimate background traffic flows as it is widely recognised that many existing businesses and places of employment are currently operating at well below maximum capacity. Improvements in the economy are therefore likely to result in existing employment premises being used more intensively and generating more traffic, which is not allowed for in the TA.

3.5.3 The purpose of the impact assessment is to compare operation of the highway network firstly, with background traffic and the additional traffic generated by committed developments (without development) and secondly, with the further addition of traffic generated by the proposed development (with development). As indicated in section 6.3 of the MEP TA, the applicants accept responsibility to bring forward mitigation measures to deliver a 'no worse off' outcome when comparing operation with and without development.

3.5.4 The applicants also indicate in section 6.1 of the MEP TA that junction capacity models will be produced for those junctions where the proposed MEP development gives rise to a 'significant impact', which the applicants define as a traffic increase of more than 30 vehicle movements per hour (two-way). Whilst the increase in traffic movements arising from the proposed MEP development at the junction of A1173 with Middleplatt Road and at A1173/Pelham Road mini roundabout will exceed this 'materiality threshold', junction capacity models are not provided in the MEP TA.

3.5.5 To provide a more appropriate assessment of the effects of the proposed MEP development in the vicinity of the Royal Mail Delivery Office, this report considers traffic impacts at the junction of A1173 with Middleplatt Road and at A1173/Pelham Road mini roundabout. Traffic impacts have been considered firstly, using the methodology set out in the MEP TA, in which a growth factor is not applied to baseline traffic and secondly, using the normal approach in which a growth factor is applied and a future year assessment considered at a 2017 level (5 years after the current date).

3.5.6 In the 'no growth' scenario, morning and evening peak hour traffic flows, with the committed developments have been obtained by adding baseline traffic flows and the additional traffic movements generated by committed developments (set out in paragraph 3.4.2 above). Traffic flows in the vicinity of the Royal Mail Delivery Office in this scenario are shown diagrammatically in figures 4 and 5. Traffic flows in the 'no growth' scenario, with the additional traffic generated by the proposed MEP development are shown in figure 6 and 7.

3.5.7 Traffic flows consistent with the approach set out in Government guidelines have been obtained by firstly factoring baseline traffic flows to a 2017 level by applying growth factors from TEMPRO, with local adjustment factors from the National Transport Model. Average growth factors for North Lincolnshire and North East Lincolnshire of 3.07% for the morning peak period and 3.31% for the evening peak period were used for this purpose. Peak hour traffic movements in 2017, with the addition of traffic generated by committed developments are shown in figures 8 and 9, and with the further addition of traffic generated by the proposed MEP development in figures 10 and 11.

3.6 Operational Analysis

3.6.1 Operation of key junctions in the vicinity of the Royal Mail Delivery Office has been analysed using appropriate Transport Laboratory software. The computer program PICADY has been used to analyse operation of the junction of A1173 with Middleplatt Road and ARCADY for analysis of the mini-roundabout at the nearby junction A1173 with Pelham Road. The analysis considers current peak hour operation, future operation with committed developments and future operation with the further addition of traffic generated by the proposed MEP development. Scenarios with and without the application of a growth factor to baseline traffic have also been considered. The results of this analysis are summarised in the tables below and presented in full in Appendices B and C.

3.6.2 The analysis indicates (in tables 3.2 and 3.4) that traffic flows at the junction of A1173 and Middleplatt Road remain within capacity in all scenarios with committed and proposed developments, irrespective of whether a growth factor is applied to baseline traffic. Whilst the proposed MEP development would result in an increase in traffic of more than 30 vehicles per hour in the morning and evening peak hours, there would be no additional turning movements to or from Middleplatt Road.

3.6.3 Traffic flows at the mini roundabout at the junction of A1173 and Pelham Road are shown (in tables 3.3 and 3.5) to exceed capacity with the addition of traffic generated by committed development, with a further significant increase in queue lengths arising from the additional traffic generated by the proposed MEP development. The analysis indicates peak hour queues of more than 100 vehicles on A1173 at the mini roundabout, following the addition of traffic generated by the proposed development, irrespective of whether a growth factor is applied to baseline traffic. It can be seen from the analysis that the effect of traffic generated by the proposed MEP development is to increase the maximum queue length on A1173 by more than 50 vehicles during peak hours.

3.6.4 It is clear from the analysis that significant traffic congestion is likely in future years at the junction of A1173 and Pelham Road traffic flows, resulting in extensive delays to Royal Mail vehicles and traffic generally. The analysis indicates that traffic movements generated by the proposed MEP development in the evening peak will result in traffic queues on the A1173 eastbound approach to the mini-roundabout increasing to an extent that traffic movements into and out of Middlplatt Road will be obstructed. It is clear therefore from the analysis that significant improvements at the A1173/Pelham Road junction are required to increase the capacity of the junction and mitigate the impact of the proposed MEP development.

Approach	BASELINE TRAFFIC (2012)				WITH COMMITTED DEVELOPMENT				WITH COMMITTED AND PROPOSED DEVELOPMENT			
	MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR	
	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue
Middleplatt Road	0.167	0.2	0.291	0.4	0.256	0.3	0.370	0.6	0.287	0.4	0.417	0.7
A1173 right turn to Middleplatt Road	0.216	0.3	0.038	0.0	0.261	0.4	0.044	0.0	0.265	0.4	0.017	0.0

Table 3.2 Operational Analysis – Junction of A1173 and Middleplatt Road (No Traffic Growth Scenario)

Approach	BASELINE TRAFFIC (2012)				2017 WITH COMMITTED DEVELOPMENT				2017 WITH COMMITTED AND PROPOSED DEVELOPMENT			
	MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR	
	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue
Middleplatt Road	0.167	0.2	0.291	0.4	0.271	0.4	0.390	0.6	0.305	0.4	0.441	0.8
A1173 right turn to Middleplatt Road	0.216	0.3	0.038	0.0	0.271	0.4	0.047	0.0	0.275	0.4	0.051	0.1

Table 3.3 Operational Analysis – Junction of A1173 and Middleplatt Road (With TEMPRO Traffic Growth)

NB. The ratio of flow to capacity provides a measure of junction operation, with a ratio of flow to capacity of 1.0 indicating that traffic flows have reached capacity. The maximum queue is measured in vehicles.

Approach	BASELINE TRAFFIC (2012)				WITH COMMITTED DEVELOPMENT				WITH COMMITTED AND PROPOSED DEVELOPMENT			
	MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR	
	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue
A1173 Kings Road	0.822	4.1	0.813	4.1	1.112	57.4	1.185	82.1	1.259	131.1	1.194	87.5
Pelham Road	0.843	4.2	0.427	0.7	1.031	17.8	0.520	1.1	1.065	14.4	0.525	1.1
A1173 West	0.282	0.4	0.715	2.4	0.732	2.6	0.967	14.3	0.759	1.7	1.110	57.0

Table 3.4 Operational Analysis – Junction of A1173 and Pelham Road (No Traffic Growth Scenario)

Approach	BASELINE TRAFFIC (2012)				2017 WITH COMMITTED DEVELOPMENT				2017 WITH COMMITTED AND PROPOSED DEVELOPMENT			
	MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR		MORNING PEAK HOUR		EVENING PEAK HOUR	
	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue	Max Ratio of Flow to Capacity	Max Queue
A1173 Kings Road	0.822	4.1	0.813	4.1	1.145	71.1	1.222	98.3	1.292	153.9	1.229	105.2
Pelham Road	0.843	4.2	0.427	0.7	1.068	23.6	0.538	1.1	1.101	29.8	0.544	1.2
A1173 West	0.282	0.4	0.715	2.4	0.744	2.8	1.005	21.4	0.771	3.2	1.149	72.5

Table 3.5 Operational Analysis – Junction of A1173 and Pelham Road (With TEMPRO Traffic Growth)

NB. The ratio of flow to capacity provides a measure of junction operation, with a ratio of flow to capacity of 1.0 indicating that traffic flows have reached capacity. The maximum queue is measured in vehicles.

4 SUMMARY AND CONCLUSION

4.1 Introduction

4.1.1 This report gives initial consideration to the potential traffic impact of traffic generated by the proposed Marine Energy Park (MEP) on operation of the Royal Mail Immingham Delivery Office on Middleplatt Road, Immingham.

4.2 MEP Transport Assessment

4.2.1 An area-wide Transport Assessment (TA) was produced by the applicants in September 2011 to assess the implications of the MEP. The report provides baseline data to establish current operation of the transport network in the South Killingholme and Immingham areas. The TA then goes on to consider the demands for movement likely to be generated by the MEP both during construction and operation, the resulting impacts on the transport network and measures considered necessary to mitigate such impacts.

4.2.2 Comments on the MEP TA may be summarised as follows:

- The derivation of baseline traffic flows is considered generally satisfactory.
- Estimates of MEP traffic generation provided in the TA for the construction and operational phases have been derived from first principles. As no similar established developments are available for comparison it would be advisable to consider the implications of variation in these figures.
- A comparison of the estimates of MEP traffic generation during the construction phase and during operation, suggests that the operational phase is likely to be more significant in terms of the impact of generated traffic on the highway network.
- The MEP TA makes allowance the effects of committed developments and committed highway schemes, however the analysis fails to take account of future growth in baseline traffic flows and is therefore likely to under-estimate traffic flows when the MEP is on operation.
- The TA proposes mitigation measures to increase highway capacity considered necessary at three locations close to the MEP and at the A1173/North Moss Lane/Kiln Lane. Clearly all traffic movements generated by MEP passing through this junction will also pass through the junctions of A1173 with Middleplatt Road which provides access to the Immingham Delivery Office and the A1173/Pelham Road mini roundabout.

4.3 Operation of the Highway Network in the Vicinity of the Royal Mail Delivery Office

4.3.1 The MEP TA indicates that junction capacity models will be produced for those junctions where the proposed MEP development gives rise to a 'significant impact', which the applicants define as a traffic increase of more than 30 vehicle movements per hour (two-way). Whilst the increase in traffic movements arising from the proposed MEP development at the junction of A1173 with Middleplatt Road and at A1173/Pelham Road mini roundabout will exceed this 'materiality threshold', junction capacity models are not provided in the MEP TA.

4.3.2 The junction capacity assessments provided in this report indicate that traffic flows at the junction of A1173 with Middleplatt Road would remain within capacity on completion of the proposed MEP development. Traffic flows at the nearby junction of A1173 with Pelham Road are indicated to significantly exceed capacity, with traffic generated by the proposed MEP development giving rise to peak hour queues of more than 100 vehicles on the A1173 at the mini roundabout.

4.3.3 Such traffic congestion is likely to result in extensive delays to Royal Mail vehicles and traffic generally and cannot be considered satisfactory. It is clear therefore that significant improvements at the A1173/Pelham Road junction are required to increase the capacity and mitigate the impact of the proposed MEP development.

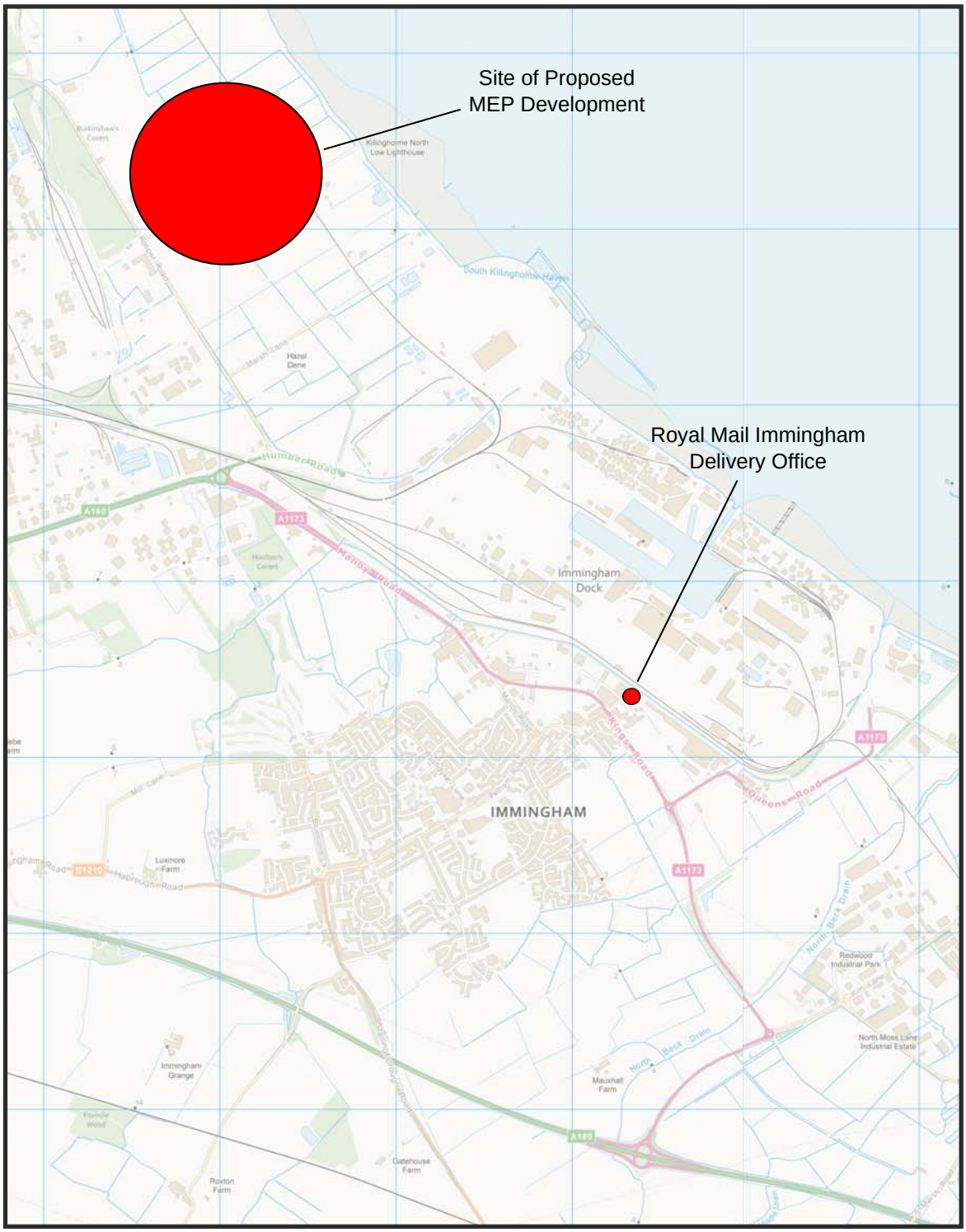

Figure 1
Location Plan

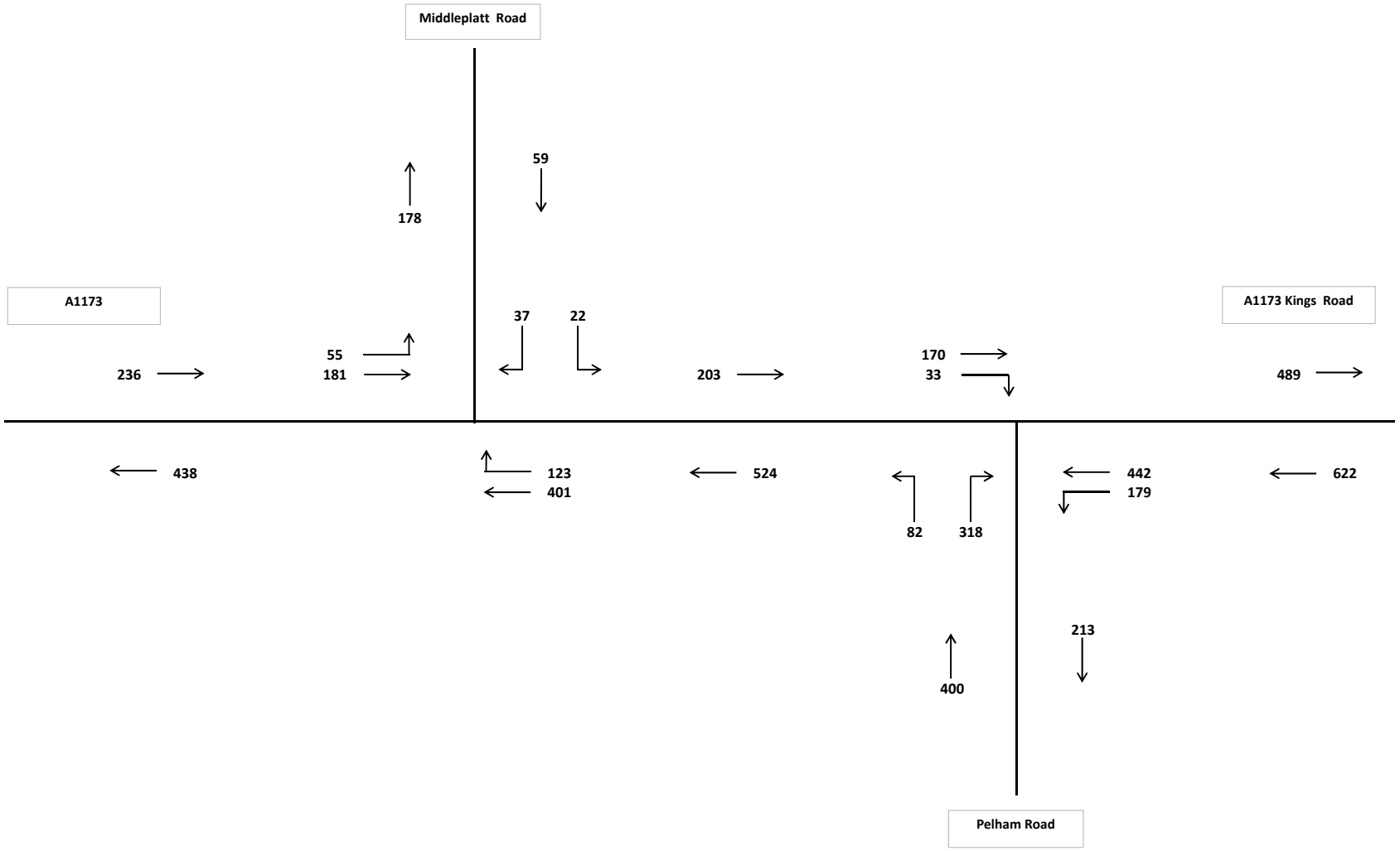

Figure 2.
Baseline Morning Peak Hour Traffic Flows (2012)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

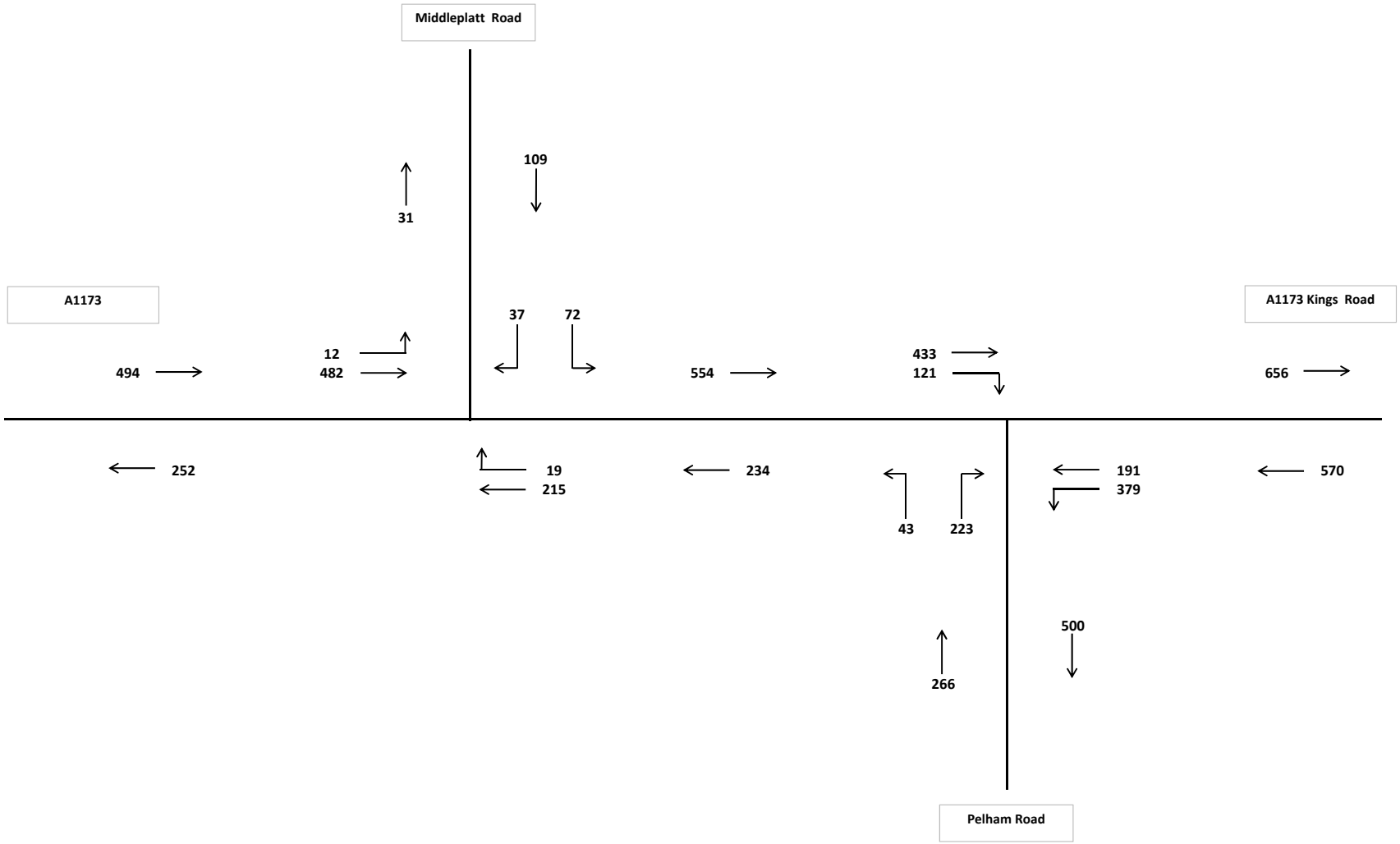

Figure 3.
Baseline Evening Peak Hour Traffic Flows (2012)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

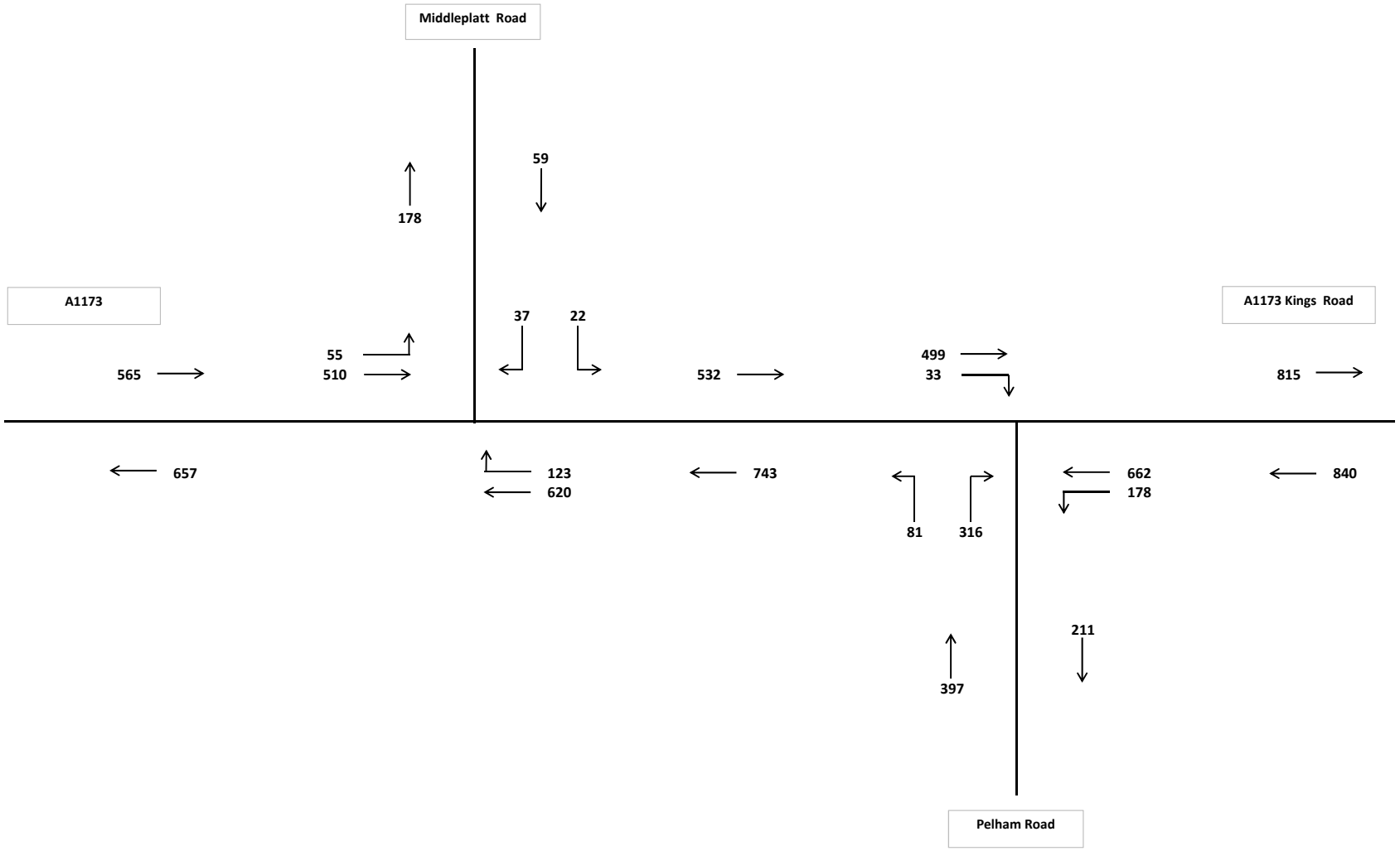

Figure 4.
Morning Peak Hour Traffic Flows With Committed Developments (No Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

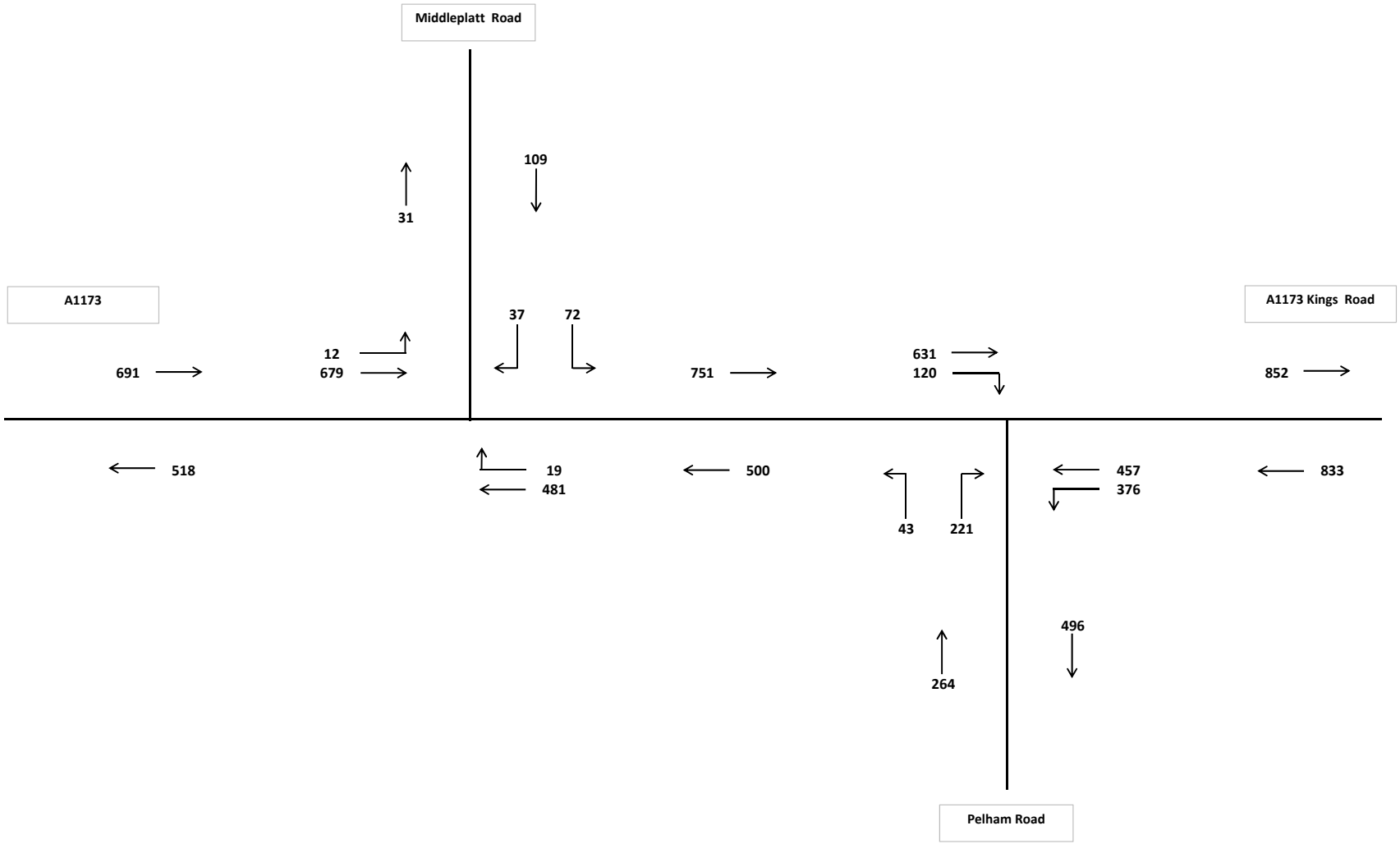

Figure 5.
Evening Peak Hour Traffic Flows With Committed Developments (No Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

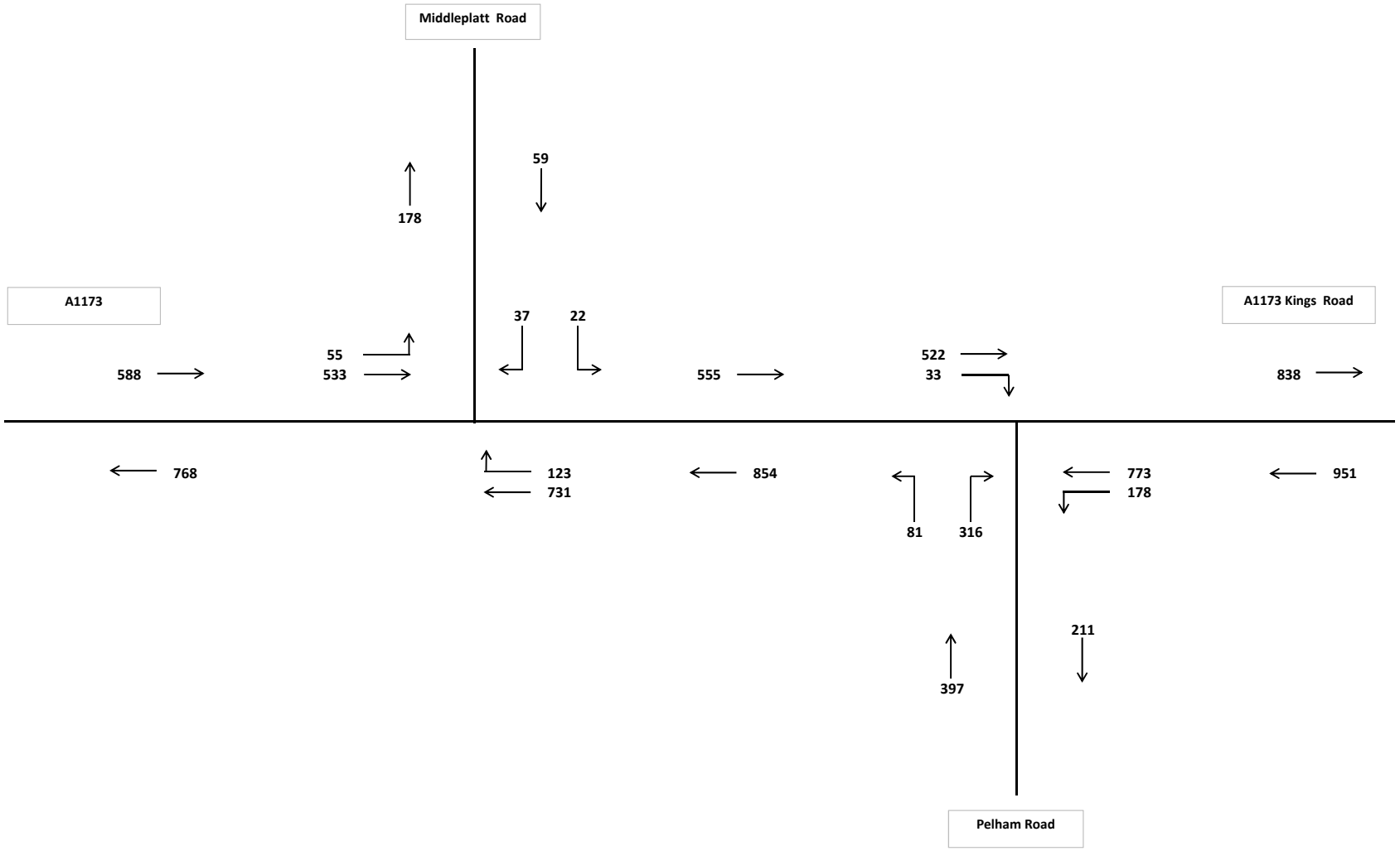

Figure 6.
Morning Peak Hour Traffic Flows With Committed and Proposed Developments (No Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

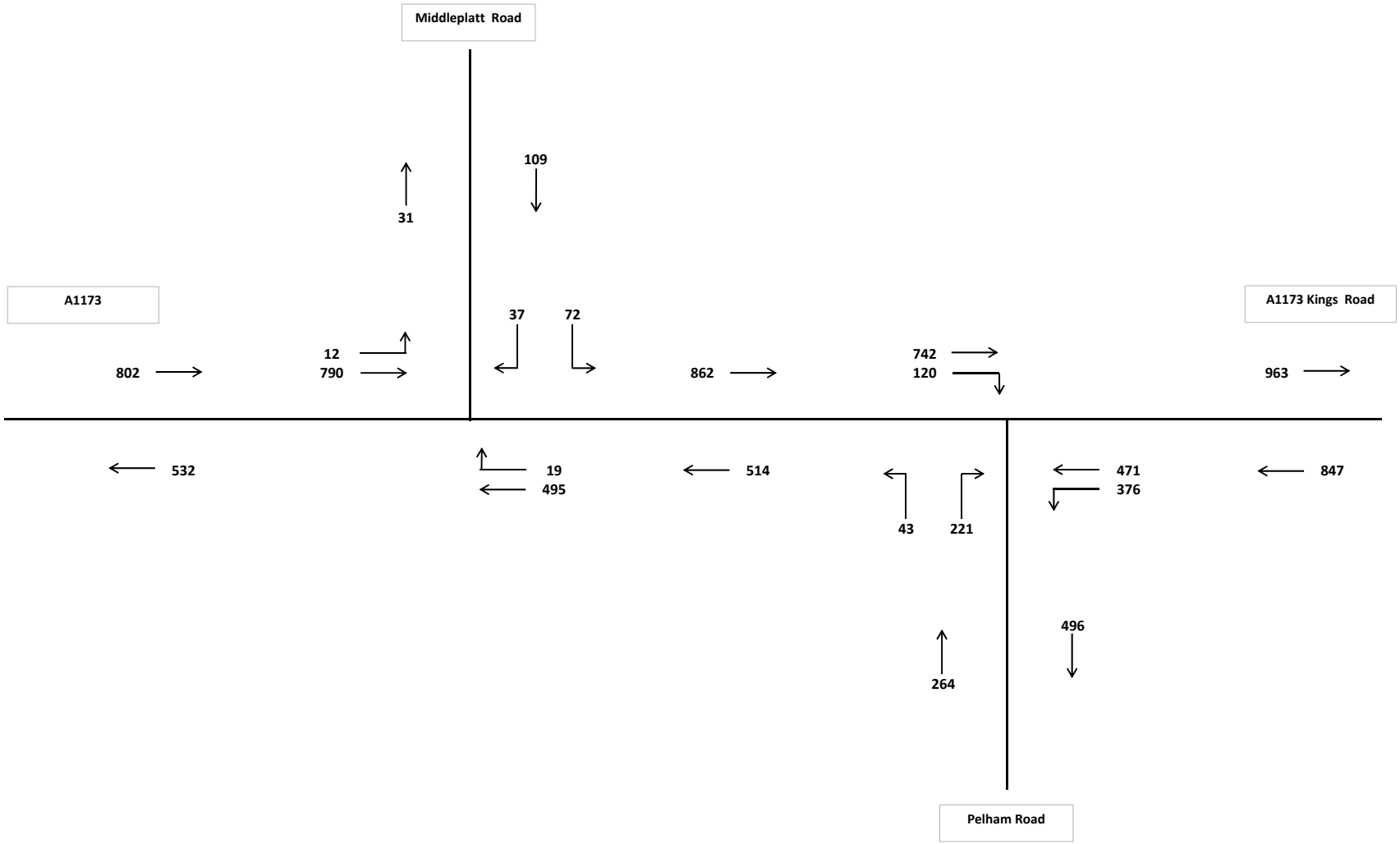

Figure 7.
Evening Peak Hour Traffic Flows With Committed and Proposed Developments (No Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

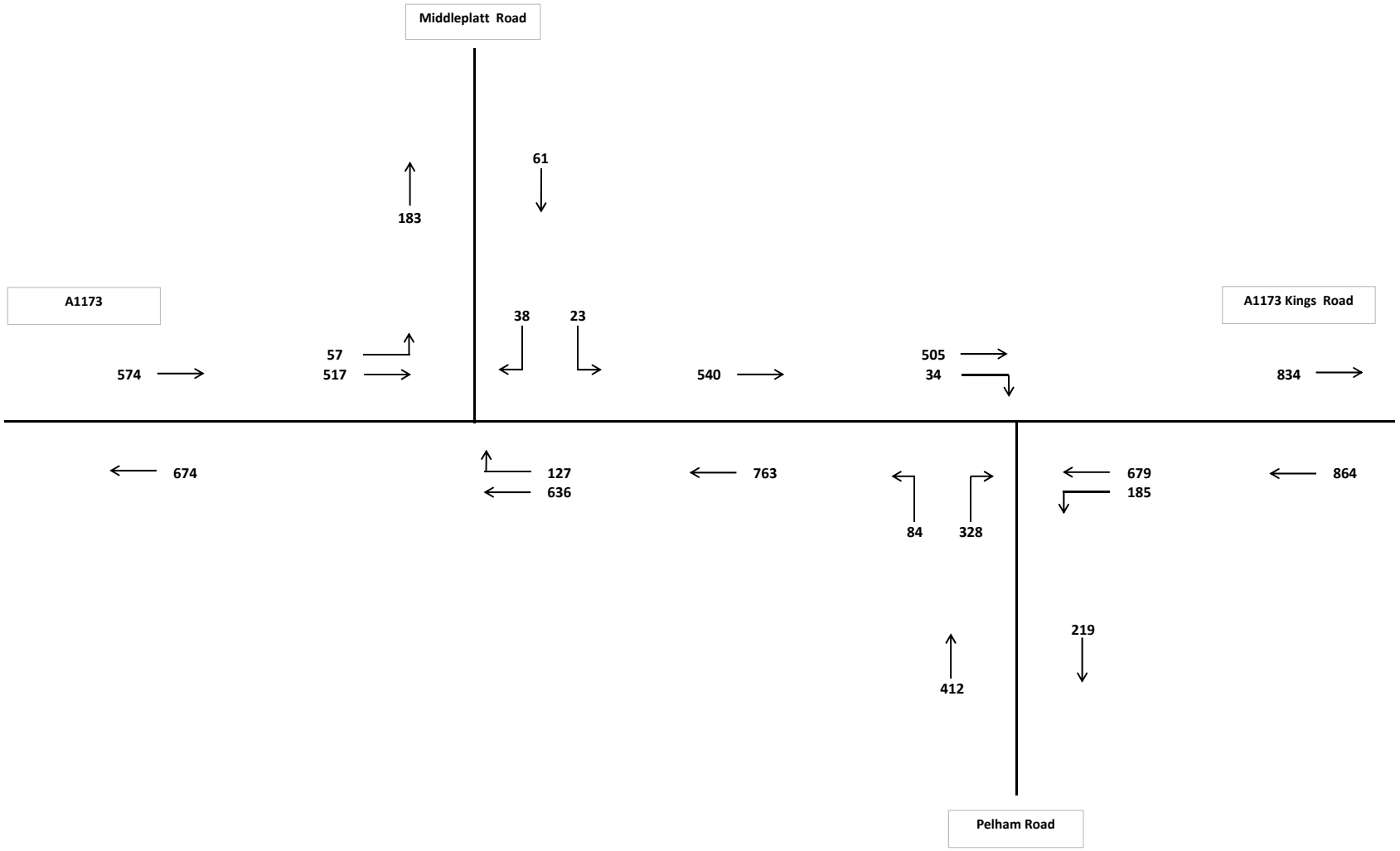

Figure 8.
2017 Morning Peak Hour Traffic Flows With Committed Developments (TEMPRO Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

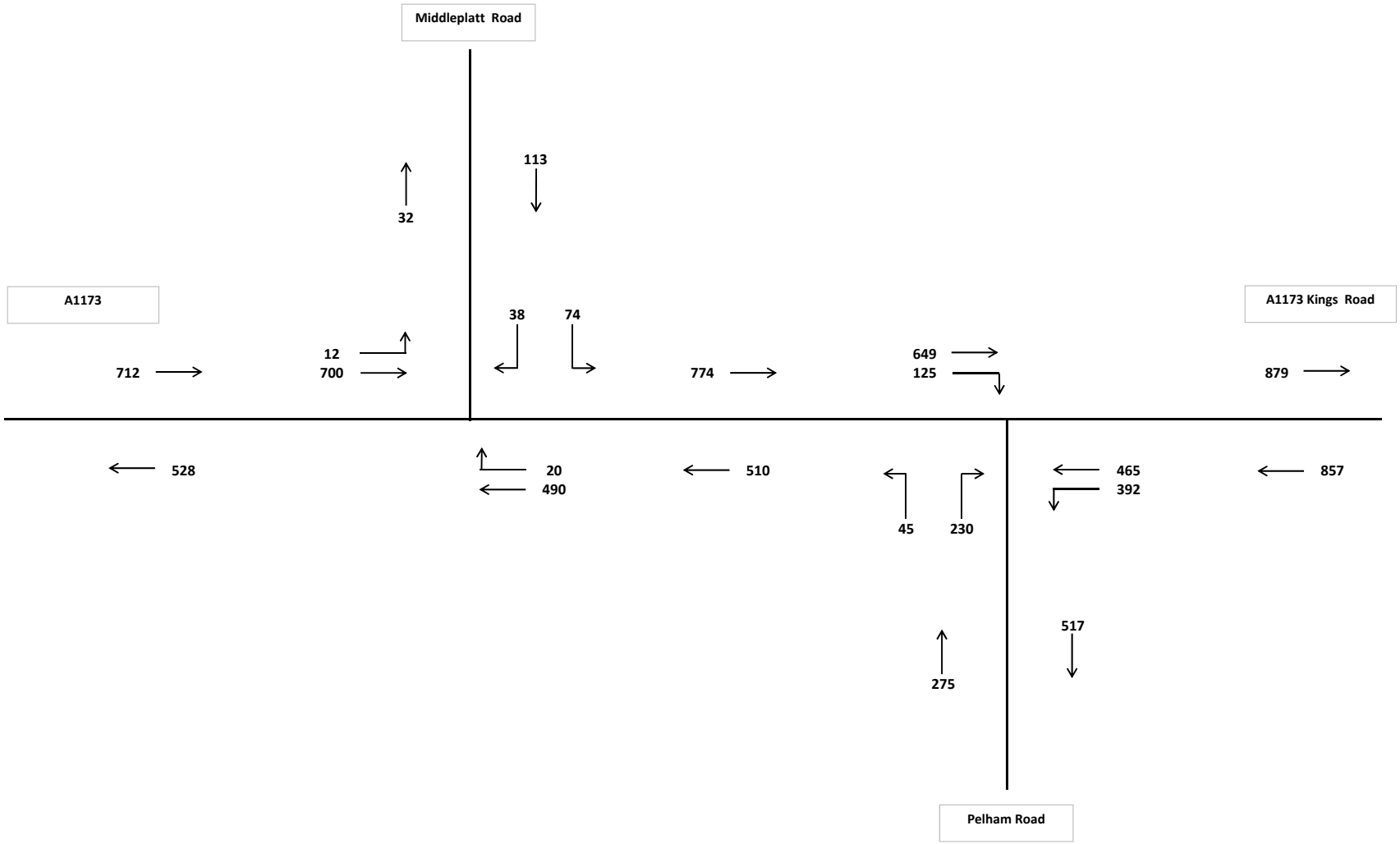

Figure 9.
2017 Evening Peak Hour Traffic Flows With Committed Developments (TEMPRO Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

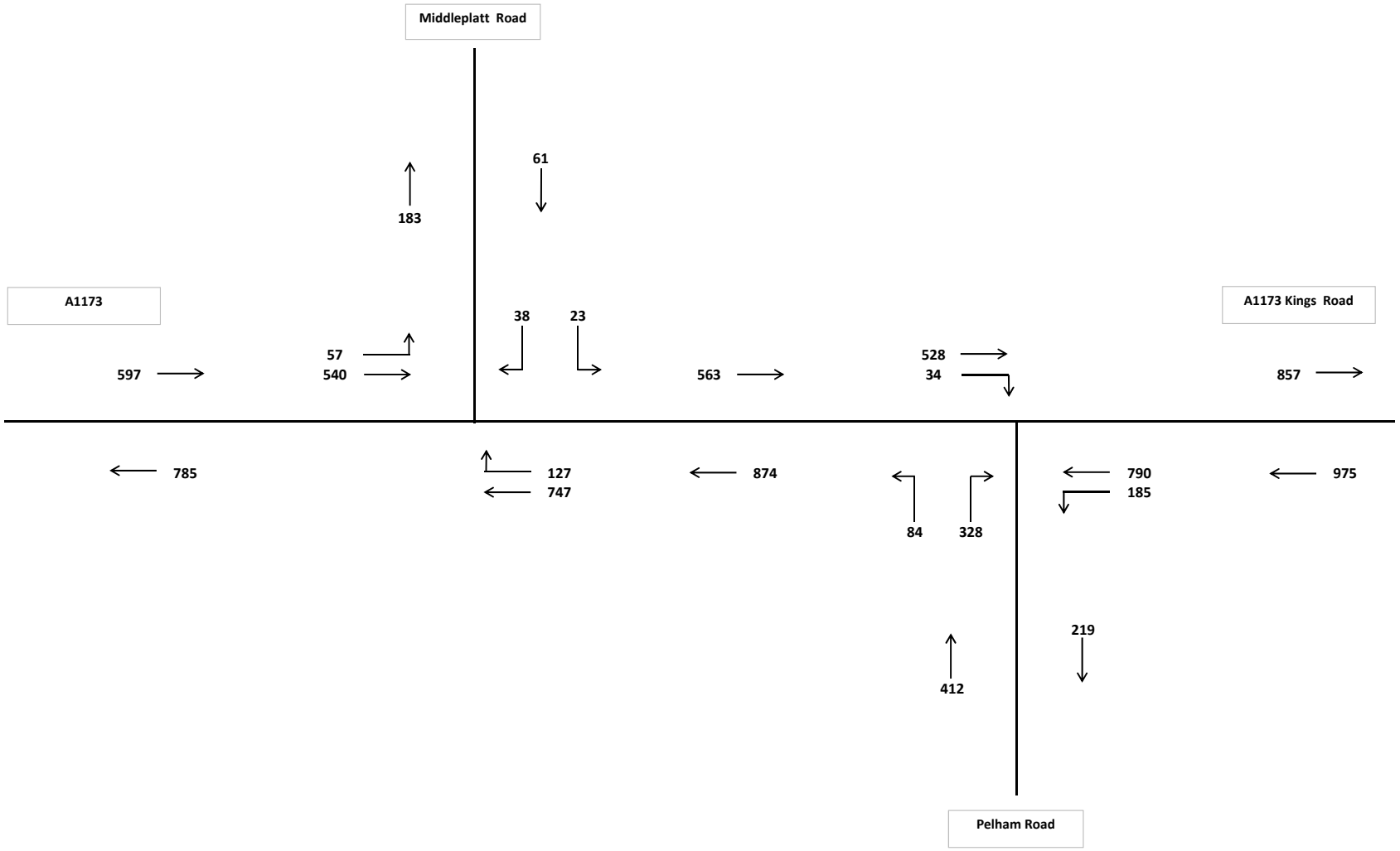

Figure 10.
2017 Morning Peak Hour Traffic Flows with Committed and Proposed Developments (TEMPRO Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

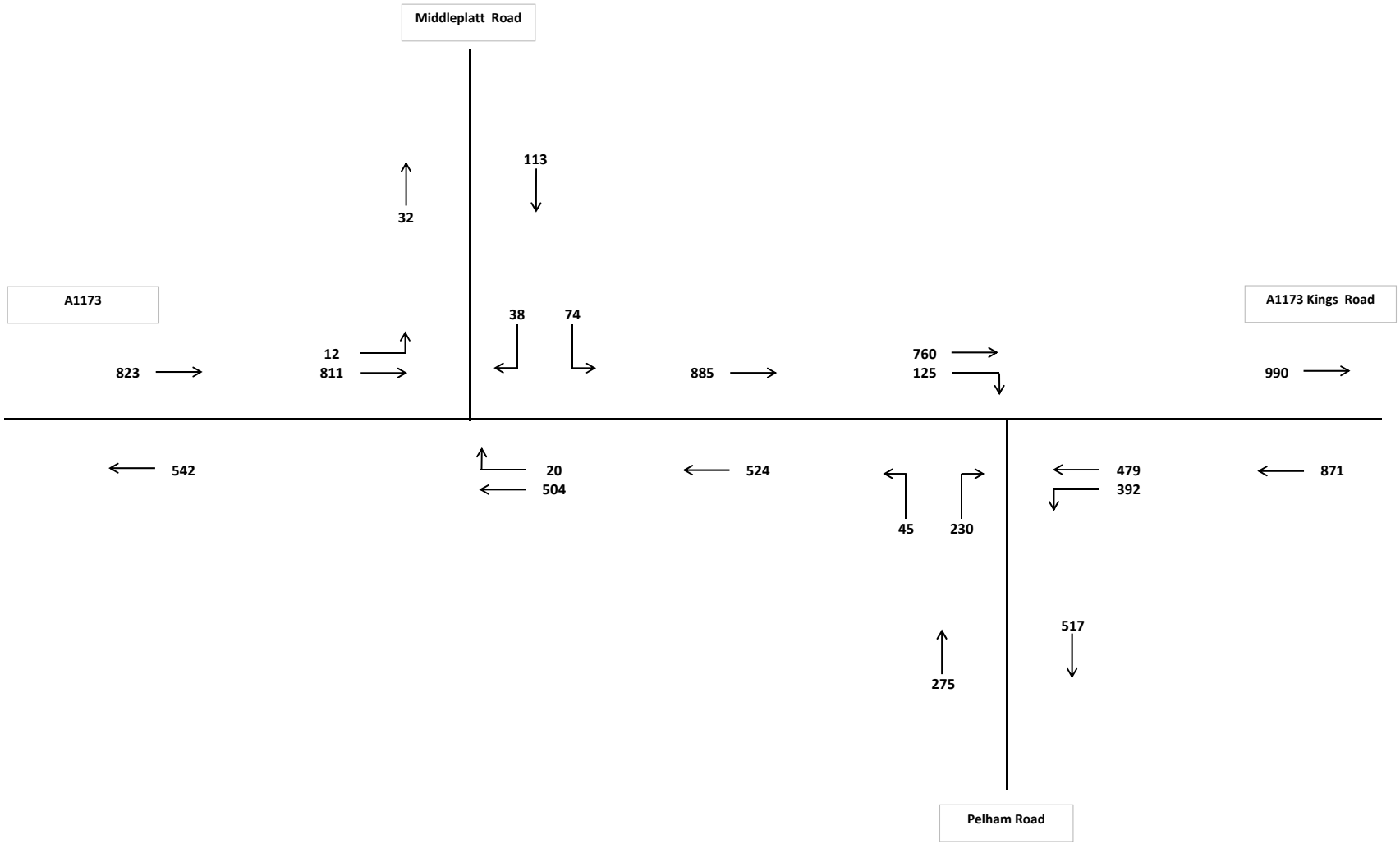

Figure 11.
2017 Evening Peak Hour With Committed and Proposed Developments
(TEMPRO Traffic Growth)

Northern Transport Planning Ltd
Suite 7, Vincent House
136 Westgate
WAKEFIELD
WF2 9SR

Appendix A

Middleplatt Road Traffic Survey - Wednesday 5 September 2012

0730-0745 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	17	1	0	1	0	19
Middleplatt Road left turn to A1173	4	0	0	0	0	4
A1173 right turn to Middleplatt Road	40	1	0	2	1	44
Middleplatt Road right turn to A1173	5	3	0	0	0	8

0745-0800 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	12	2	0	0	0	14
Middleplatt Road left turn to A1173	3	2	0	0	0	5
A1173 right turn to Middleplatt Road	36	1	0	1	0	38
Middleplatt Road right turn to A1173	9	3	0	0	0	12

0800-0815 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	10	2	0	0	0	12
Middleplatt Road left turn to A1173	8	2	0	0	0	10
A1173 right turn to Middleplatt Road	16	3	0	0	0	19
Middleplatt Road right turn to A1173	5	4	0	0	0	9

0815-0830 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	10	0	0	0	0	10
Middleplatt Road left turn to A1173	3	0	0	0	0	3
A1173 right turn to Middleplatt Road	19	3	0	0	0	22
Middleplatt Road right turn to A1173	6	2	0	0	0	8

0830-0845 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	9	2	0	0	0	11
Middleplatt Road left turn to A1173	9	0	0	0	0	9
A1173 right turn to Middleplatt Road	12	3	0	0	0	15
Middleplatt Road right turn to A1173	8	1	0	0	0	9

0845-0900 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	11	1	0	0	0	12
Middleplatt Road left turn to A1173	8	2	0	0	0	10
A1173 right turn to Middleplatt Road	16	2	0	0	1	19
Middleplatt Road right turn to A1173	13	5	0	0	0	18

0730-0830 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	49	5	0	1	0	55
Middleplatt Road left turn to A1173	18	4	0	0	0	22
A1173 right turn to Middleplatt Road	111	8	0	3	1	123
Middleplatt Road right turn to A1173	25	12	0	0	0	37

Middleplatt Road Traffic Survey - Wednesday 5 September 2012

1630-1645 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	2	1	0	0	0	3
Middleplatt Road left turn to A1173	17	1	0	1	0	19
A1173 right turn to Middleplatt Road	4	1	0	0	0	5
Middleplatt Road right turn to A1173	11	2	0	0	0	13

1645-1700 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	2	2	0	0	0	4
Middleplatt Road left turn to A1173	6	1	0	0	0	7
A1173 right turn to Middleplatt Road	6	0	0	0	0	6
Middleplatt Road right turn to A1173	2	0	0	1	0	3

1700-1715 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	1	0	0	0	0	1
Middleplatt Road left turn to A1173	29	0	0	1	1	31
A1173 right turn to Middleplatt Road	2	1	0	0	0	3
Middleplatt Road right turn to A1173	13	0	0	0	0	13

1715-1730 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	2	2	0	0	0	4
Middleplatt Road left turn to A1173	15	0	0	0	0	15
A1173 right turn to Middleplatt Road	3	2	0	0	0	5
Middleplatt Road right turn to A1173	7	1	0	0	0	8

1730-1745 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	4	1	0	0	0	5
Middleplatt Road left turn to A1173	17	1	0	0	0	18
A1173 right turn to Middleplatt Road	3	2	0	0	0	5
Middleplatt Road right turn to A1173	8	1	0	1	0	10

1745-1800 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	3	0	0	0	0	3
Middleplatt Road left turn to A1173	15	1	0	0	1	17
A1173 right turn to Middleplatt Road	5	1	0	0	0	6
Middleplatt Road right turn to A1173	7	0	0	0	0	7

1630-1730 hours	Cars and Light Vans	HGV	PSV	M/C	P/C	Total
A1173 left turn to Middleplatt Road	7	5	0	0	0	12
Middleplatt Road left turn to A1173	67	2	0	2	1	72
A1173 right turn to Middleplatt Road	15	4	0	0	0	19
Middleplatt Road right turn to A1173	33	3	0	1	0	37

Appendix B

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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Run with file:- "c:\Users\Andy\Documents\PICADY\middleplatt base am.vpi" at 10:11:42 on Tuesday, 11 September 2012

RUN TITLE
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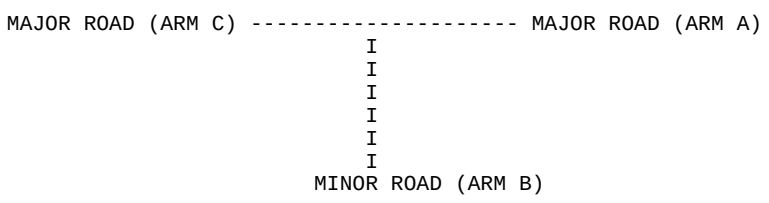
Middleplatt Road/A1173 - Base Flows AM

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY

INPUT DATA



ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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) 6.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 4.20 M.
- VISIBILITY	(VC-B) 100.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 100.0 M.
- VISIBILITY TO RIGHT	(VB-A) 30.0 M.
- LANE 1 WIDTH	(WB-C) 3.50 M.
- LANE 2 WIDTH	(WB-A) 0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	2.94	4.41	2.94
ARM B	15.00	45.00	75.00	0.74	1.11	0.74
ARM C	15.00	45.00	75.00	6.50	9.75	6.50

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.234	0.766
		0.0	55.0	180.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.627	0.000	0.373
		37.0	0.0	22.0
		(10.0)	(0.0)	(10.0)
	ARM C	0.763	0.237	0.000
		397.0	123.0	0.0
		(10.0)	(10.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
07.15-07.30								
B-AC	0.74	7.29	0.101		0.0	0.1	1.6	
C-A	4.96							
C-B	1.54	10.79	0.142		0.0	0.2	2.4	
A-B	0.69							
A-C	2.25							

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)
07.30-07.45								
B-AC	0.88	6.95	0.127		0.1	0.1	2.1	
C-A	5.93							
C-B	1.84	10.63	0.173		0.2	0.2	3.0	
A-B	0.82							
A-C	2.69							

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)
07.45-08.00								
B-AC	1.08	6.46	0.167		0.1	0.2	2.9	
C-A	7.26							
C-B	2.25	10.39	0.216		0.2	0.3	4.0	
A-B	1.01							
A-C	3.29							

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)
08.00-08.15								
B-AC	1.08	6.46	0.167		0.2	0.2	3.0	
C-A	7.26							
C-B	2.25	10.39	0.216		0.3	0.3	4.1	
A-B	1.01							
A-C	3.29							

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)
08.15-08.30								
B-AC	0.88	6.94	0.127		0.2	0.1	2.3	
C-A	5.93							
C-B	1.84	10.63	0.173		0.3	0.2	3.2	
A-B	0.82							
A-C	2.69							

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)
08.30-08.45								
B-AC	0.74	7.29	0.101		0.1	0.1	1.8	
C-A	4.96							
C-B	1.54	10.79	0.142		0.2	0.2	2.6	
A-B	0.69							
A-C	2.25							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.1
07.45	0.1
08.00	0.2
08.15	0.2
08.30	0.1
08.45	0.1

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.2
07.45	0.2
08.00	0.3
08.15	0.3
08.30	0.2
08.45	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	80.9	53.9	13.6	0.17	13.6	0.17
C-A	544.4	362.9				
C-B	168.7	112.4	19.3	0.11	19.3	0.11
A-B	75.4	50.3				
A-C	246.8	164.5				
ALL	1116.2	744.1	32.9	0.03	32.9	0.03

* 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

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[Printed at 10:14:22 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

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Middleplatt Road/A1173 - Base PM

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
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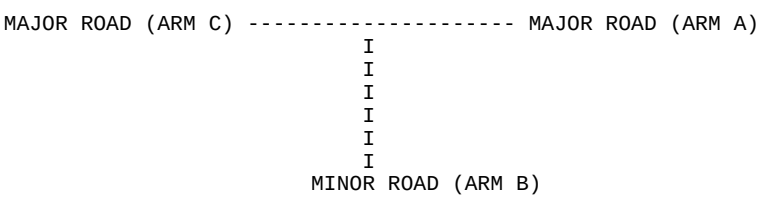

ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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) 6.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 4.20 M.
- VISIBILITY	(VC-B) 100.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 100.0 M.
- VISIBILITY TO RIGHT	(VB-A) 30.0 M.
- LANE 1 WIDTH	(WB-C) 3.50 M.
- LANE 2 WIDTH	(WB-A) 0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	6.11	9.17	6.11
ARM B	15.00	45.00	75.00	1.36	2.04	1.36
ARM C	15.00	45.00	75.00	2.90	4.35	2.90

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.025	0.975
		0.0	12.0	477.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.339	0.000	0.661
		37.0	0.0	72.0
		(10.0)	(0.0)	(10.0)
	ARM C	0.918	0.082	0.000
		213.0	19.0	0.0
		(10.0)	(10.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
16.15-16.30								
B-AC	1.36	7.71	0.177		0.0	0.2	3.0	
C-A	2.66							
C-B	0.24	9.86	0.024		0.0	0.0	0.4	
A-B	0.15							
A-C	5.96							

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)
16.30-16.45								
B-AC	1.63	7.35	0.221		0.2	0.3	4.1	
C-A	3.18							
C-B	0.28	9.51	0.030		0.0	0.0	0.4	
A-B	0.18							
A-C	7.12							

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								
B-AC	1.99	6.86	0.291		0.3	0.4	5.8	
C-A	3.89							
C-B	0.35	9.03	0.038		0.0	0.0	0.6	
A-B	0.22							
A-C	8.72							

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								
B-AC	1.99	6.86	0.291		0.4	0.4	6.1	
C-A	3.89							
C-B	0.35	9.03	0.038		0.0	0.0	0.6	
A-B	0.22							
A-C	8.72							

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								
B-AC	1.63	7.35	0.221		0.4	0.3	4.5	
C-A	3.18							
C-B	0.28	9.51	0.030		0.0	0.0	0.5	
A-B	0.18							
A-C	7.12							

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								
B-AC	1.36	7.71	0.177		0.3	0.2	3.4	
C-A	2.66							
C-B	0.24	9.86	0.024		0.0	0.0	0.4	
A-B	0.15							
A-C	5.96							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.2
16.45	0.3
17.00	0.4
17.15	0.4
17.30	0.3
17.45	0.2

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	149.5	99.6	26.8	0.18	26.8	0.18
C-A	292.1	194.7				
C-B	26.1	17.4	2.8	0.11	2.8	0.11
A-B	16.5	11.0				
A-C	654.1	436.0				
ALL	1138.1	758.7	29.7	0.03	29.7	0.03

* 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

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

[Printed at 10:16:28 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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Run with file:- "c:\Users\Andy\Documents\PICADY\middleplatt 2017am withcom.vpi" at 11:11:23 on Tuesday, 11 September 2012

RUN TITLE
****
Middleplatt Road/A1173 - 2017AM With Committed Developments

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

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

ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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) 6.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 4.20 M.
- VISIBILITY	(VC-B) 100.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 100.0 M.
- VISIBILITY TO RIGHT	(VB-A) 30.0 M.
- LANE 1 WIDTH	(WB-C) 3.50 M.
- LANE 2 WIDTH	(WB-A) 0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	7.18	10.76	7.18
ARM B	15.00	45.00	75.00	0.76	1.14	0.76
ARM C	15.00	45.00	75.00	9.54	14.31	9.54

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.099	0.901
		0.0	57.0	517.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.623	0.000	0.377
		38.0	0.0	23.0
		(10.0)	(0.0)	(10.0)
	ARM C	0.834	0.166	0.000
		636.0	127.0	0.0
		(10.0)	(10.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
07.15-07.30								
B-AC	0.76	5.78	0.132		0.0	0.1	2.1	
C-A	7.95							
C-B	1.59	9.55	0.166		0.0	0.2	2.9	
A-B	0.71							
A-C	6.46							

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)
07.30-07.45								
B-AC	0.91	5.10	0.179		0.1	0.2	3.1	
C-A	9.49							
C-B	1.90	9.14	0.207		0.2	0.3	3.8	
A-B	0.85							
A-C	7.72							

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)
07.45-08.00								
B-AC	1.12	4.11	0.271		0.2	0.4	5.1	
C-A	11.63							
C-B	2.32	8.57	0.271		0.3	0.4	5.3	
A-B	1.04							
A-C	9.45							

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)
08.00-08.15								
B-AC	1.12	4.11	0.271		0.4	0.4	5.5	
C-A	11.63							
C-B	2.32	8.57	0.271		0.4	0.4	5.5	
A-B	1.04							
A-C	9.45							

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)
08.15-08.30								
B-AC	0.91	5.09	0.179		0.4	0.2	3.5	
C-A	9.49							
C-B	1.90	9.14	0.207		0.4	0.3	4.1	
A-B	0.85							
A-C	7.72							

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)
08.30-08.45								
B-AC	0.76	5.77	0.132		0.2	0.2	2.4	
C-A	7.95							
C-B	1.59	9.55	0.166		0.3	0.2	3.1	
A-B	0.71							
A-C	6.46							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.1
07.45	0.2
08.00	0.4
08.15	0.4
08.30	0.2
08.45	0.2

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.2
07.45	0.3
08.00	0.4
08.15	0.4
08.30	0.3
08.45	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	83.6	55.8	21.7	0.26	21.7	0.26
C-A	872.1	581.4				
C-B	174.1	116.1	24.7	0.14	24.7	0.14
A-B	78.2	52.1				
A-C	708.9	472.6				
ALL	1917.0	1278.0	46.4	0.02	46.4	0.02

* 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

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

[Printed at 11:12:34 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

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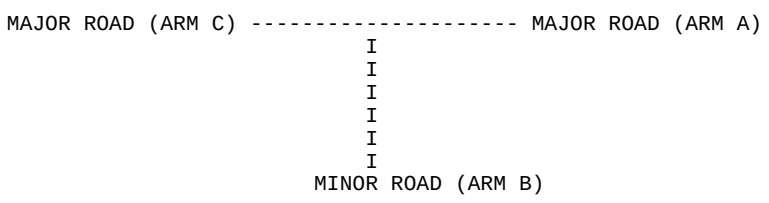
Run with file:- "c:\Users\Andy\Documents\PICADY\middleplatt 2017am with comandprop.vpi" at 11:13:38 on Tuesday, 11 Septembe

RUN TITLE
****
Middleplatt Road/A1173 - 2017AM With Committed and Proposed Developments

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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) 6.30 M.
CENTRAL RESERVE WIDTH	(WCR) 0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B) 4.20 M.
- VISIBILITY	(VC-B) 100.0 M.
- BLOCKS TRAFFIC	NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C) 100.0 M.
- VISIBILITY TO RIGHT	(VB-A) 30.0 M.
- LANE 1 WIDTH	(WB-C) 3.50 M.
- LANE 2 WIDTH	(WB-A) 0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	7.46	11.19	7.46
ARM B	15.00	45.00	75.00	0.76	1.14	0.76
ARM C	15.00	45.00	75.00	10.93	16.39	10.93

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.095	0.905
		0.0	57.0	540.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.623	0.000	0.377
		38.0	0.0	23.0
		(10.0)	(0.0)	(10.0)
	ARM C	0.855	0.145	0.000
		747.0	127.0	0.0
		(10.0)	(10.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
07.15-07.30								
B-AC	0.76	5.50	0.139		0.0	0.2	2.3	
C-A	9.34							
C-B	1.59	9.46	0.168		0.0	0.2	2.9	
A-B	0.71							
A-C	6.75							

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)
07.30-07.45								
B-AC	0.91	4.75	0.192		0.2	0.2	3.3	
C-A	11.15							
C-B	1.90	9.04	0.210		0.2	0.3	3.8	
A-B	0.85							
A-C	8.06							

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)
07.45-08.00								
B-AC	1.12	3.66	0.305		0.2	0.4	5.9	
C-A	13.66							
C-B	2.32	8.45	0.275		0.3	0.4	5.4	
A-B	1.04							
A-C	9.87							

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)
08.00-08.15								
B-AC	1.12	3.66	0.305		0.4	0.4	6.4	
C-A	13.66							
C-B	2.32	8.45	0.275		0.4	0.4	5.6	
A-B	1.04							
A-C	9.87							

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)
08.15-08.30								
B-AC	0.91	4.75	0.192		0.4	0.2	3.8	
C-A	11.15							
C-B	1.90	9.04	0.210		0.4	0.3	4.2	
A-B	0.85							
A-C	8.06							

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)
08.30-08.45								
B-AC	0.76	5.50	0.139		0.2	0.2	2.6	
C-A	9.34							
C-B	1.59	9.46	0.168		0.3	0.2	3.1	
A-B	0.71							
A-C	6.75							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.2
07.45	0.2
08.00	0.4
08.15	0.4
08.30	0.2
08.45	0.2

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.2
07.45	0.3
08.00	0.4
08.15	0.4
08.30	0.3
08.45	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
B-AC	83.6	55.8	24.3	0.29	24.3	0.29
C-A	1024.3	682.9				
C-B	174.1	116.1	25.1	0.14	25.1	0.14
A-B	78.2	52.1				
A-C	740.5	493.6				
ALL	2100.7	1400.5	49.4	0.02	49.4	0.02

* 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

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

[Printed at 11:14:46 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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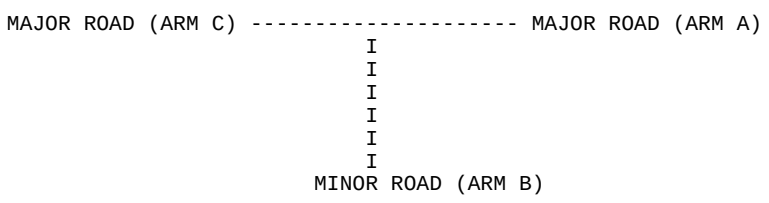
Run with file:- "c:\Users\Andy\Documents\PICADY\middleplatt 2017pm withcom.vpi" at 11:24:40 on Tuesday, 11 September 2012

RUN TITLE
****
Middleplatt Road/A1173 - 2017PM With Committed Developments

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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)	6.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	4.20 M.
- VISIBILITY	(VC-B)	100.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	100.0 M.
- VISIBILITY TO RIGHT	(VB-A)	30.0 M.
- LANE 1 WIDTH	(WB-C)	3.50 M.
- LANE 2 WIDTH	(WB-A)	0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	8.90	13.35	8.90
ARM B	15.00	45.00	75.00	1.40	2.10	1.40
ARM C	15.00	45.00	75.00	6.38	9.56	6.38

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.017	0.983
		0.0	12.0	700.0
		(0.0)	(10.0)	(10.0)
	ARM B	0.339	0.000	0.661
		38.0	0.0	74.0
		(10.0)	(0.0)	(10.0)
	ARM C	0.961	0.039	0.000
		490.0	20.0	0.0
		(10.0)	(10.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
16.15-16.30								
B-AC	1.40	6.68	0.210		0.0	0.3	3.7	
C-A	6.13							
C-B	0.25	9.04	0.028		0.0	0.0	0.4	
A-B	0.15							
A-C	8.75							

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)
16.30-16.45								
B-AC	1.67	6.09	0.274		0.3	0.4	5.3	
C-A	7.31							
C-B	0.30	8.53	0.035		0.0	0.0	0.5	
A-B	0.18							
A-C	10.45							

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								
B-AC	2.05	5.25	0.390		0.4	0.6	8.8	
C-A	8.96							
C-B	0.37	7.83	0.047		0.0	0.0	0.7	
A-B	0.22							
A-C	12.80							

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								
B-AC	2.05	5.25	0.390		0.6	0.6	9.4	
C-A	8.96							
C-B	0.37	7.83	0.047		0.0	0.0	0.7	
A-B	0.22							
A-C	12.80							

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								
B-AC	1.67	6.09	0.274		0.6	0.4	6.1	
C-A	7.31							
C-B	0.30	8.53	0.035		0.0	0.0	0.6	
A-B	0.18							
A-C	10.45							

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								
B-AC	1.40	6.68	0.210		0.4	0.3	4.2	
C-A	6.13							
C-B	0.25	9.04	0.028		0.0	0.0	0.4	
A-B	0.15							
A-C	8.75							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.3	
16.45	0.4	
17.00	0.6	*
17.15	0.6	*
17.30	0.4	
17.45	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	153.6	102.4	37.5	0.24	37.5	0.24
C-A	671.9	447.9				
C-B	27.4	18.3	3.4	0.12	3.4	0.12
A-B	16.5	11.0				
A-C	959.8	639.9				
ALL	1829.2	1219.5	40.8	0.02	40.9	0.02

* 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

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

[Printed at 11:25:03 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

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

Visual PICADY 4 ANALYSIS PROGRAM
RELEASE 2.1 (DEC 1998)

ADAPTED FROM PICADY/3 WHICH IS CROWN COPYRIGHT
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Run with file:- "c:\Users\Andy\Documents\PICADY\middleplatt 2017pm with comandprop.vpi" at 11:19:51 on Tuesday, 11 Septembe

RUN TITLE
****
Middleplatt Road/A1173 - 2017PM With Committed and Proposed Developments

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA

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

ARM A IS A1173 West
ARM B IS Middleplatt Road
ARM C IS A1173 East

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)	6.30 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	4.20 M.
- VISIBILITY	(VC-B)	100.0 M.
- BLOCKS TRAFFIC		NO
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	100.0 M.
- VISIBILITY TO RIGHT	(VB-A)	30.0 M.
- LANE 1 WIDTH	(WB-C)	3.50 M.
- LANE 2 WIDTH	(WB-A)	0.00 M.

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	10.29	15.43	10.29
ARM B	15.00	45.00	75.00	1.40	2.10	1.40
ARM C	15.00	45.00	75.00	6.55	9.83	6.55

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000 0.0 (0.0)	0.015 12.0 (10.0)	0.985 811.0 (10.0)
	ARM B	0.339 38.0 (10.0)	0.000 0.0 (0.0)	0.661 74.0 (10.0)
	ARM C	0.962 504.0 (10.0)	0.038 20.0 (10.0)	0.000 0.0 (0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

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)
16.15-16.30								
B-AC	1.40	6.29	0.223		0.0	0.3	4.0	
C-A	6.30							
C-B	0.25	8.63	0.029		0.0	0.0	0.4	
A-B	0.15							
A-C	10.14							

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)
16.30-16.45								
B-AC	1.67	5.62	0.297		0.3	0.4	5.9	
C-A	7.52							
C-B	0.30	8.04	0.037		0.0	0.0	0.6	
A-B	0.18							
A-C	12.11							

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								
B-AC	2.05	4.64	0.441		0.4	0.8	10.5	
C-A	9.21							
C-B	0.37	7.23	0.051		0.0	0.1	0.8	
A-B	0.22							
A-C	14.83							

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								
B-AC	2.05	4.64	0.441		0.8	0.8	11.5	
C-A	9.21							
C-B	0.37	7.23	0.051		0.1	0.1	0.8	
A-B	0.22							
A-C	14.83							

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								
B-AC	1.67	5.62	0.297		0.8	0.4	6.9	
C-A	7.52							
C-B	0.30	8.04	0.037		0.1	0.0	0.6	
A-B	0.18							
A-C	12.11							

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								
B-AC	1.40	6.29	0.223		0.4	0.3	4.5	
C-A	6.30							
C-B	0.25	8.63	0.029		0.0	0.0	0.5	
A-B	0.15							
A-C	10.14							

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.3	
16.45	0.4	
17.00	0.8	*
17.15	0.8	*
17.30	0.4	
17.45	0.3	

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.30	0.0
16.45	0.0
17.00	0.1
17.15	0.1
17.30	0.0
17.45	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	153.6	102.4	43.4	0.28	43.4	0.28
C-A	691.1	460.7				
C-B	27.4	18.3	3.6	0.13	3.6	0.13
A-B	16.5	11.0				
A-C	1112.1	741.4				
ALL	2000.6	1333.7	47.0	0.02	47.0	0.02

* 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

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

[Printed at 11:21:00 on 11/09/2012]

Appendix C

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.0 (APR 2000)

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

Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham 2012am.vai" at 15:18:59 on Monday, 10 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 - 2012 AM

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	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	7.76	11.64	7.76
ARM B	15.00	45.00	75.00	5.00	7.50	5.00
ARM C	15.00	45.00	75.00	2.54	3.81	2.54

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.288	0.712
		0.0	179.0	442.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.795	0.000	0.205
		318.0	0.0	82.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.837	0.163	0.000
		170.0	33.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
07.15-07.30							
ARM A	7.76	13.92	0.558		0.0	1.2	17.3
ARM B	5.00	10.22	0.489		0.0	0.9	13.1
ARM C	2.54	14.26	0.178		0.0	0.2	3.1
07.30-07.45							
ARM A	9.27	13.87	0.668		1.2	1.9	27.2
ARM B	5.97	9.57	0.624		0.9	1.6	22.1
ARM C	3.03	13.76	0.220		0.2	0.3	4.1
07.45-08.00							
ARM A	11.35	13.80	0.822		1.9	4.1	53.7
ARM B	7.31	8.73	0.837		1.6	4.2	52.3
ARM C	3.71	13.15	0.282		0.3	0.4	5.7
08.00-08.15							
ARM A	11.35	13.80	0.822		4.1	4.3	63.5
ARM B	7.31	8.68	0.843		4.2	4.7	67.1
ARM C	3.71	13.08	0.284		0.4	0.4	5.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30							
ARM A	9.27	13.87	0.668		4.3	2.1	34.3
ARM B	5.97	9.49	0.629		4.7	1.8	30.6
ARM C	3.03	13.64	0.222		0.4	0.3	4.4

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45							
ARM A	7.76	13.92	0.558		2.1	1.3	20.4
ARM B	5.00	10.16	0.492		1.8	1.0	15.8
ARM C	2.54	14.21	0.179		0.3	0.2	3.3

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.2	*
07.45	1.9	**
08.00	4.1	****
08.15	4.3	****
08.30	2.1	**
08.45	1.3	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.9	*
07.45	1.6	**
08.00	4.2	****
08.15	4.7	*****
08.30	1.8	**
08.45	1.0	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
07.30	0.2
07.45	0.3
08.00	0.4
08.15	0.4
08.30	0.3
08.45	0.2

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	851.5	567.7	216.5	0.25	216.5	0.25
B	548.5	365.7	201.1	0.37	201.1	0.37
C	278.4	185.6	26.6	0.10	26.6	0.10
ALL	1678.4	1118.9	444.1	0.26	444.2	0.26

* 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 15:21:07 on 10/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.0 (APR 2000)

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

Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham 2012pm.vai" at 15:17:50 on Monday, 10 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 - 2012 PM

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	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	7.13	10.69	7.13
ARM B	15.00	45.00	75.00	3.33	4.99	3.33
ARM C	15.00	45.00	75.00	6.93	10.39	6.93

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.665	0.335
		0.0	379.0	191.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.838	0.000	0.162
		223.0	0.0	43.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.782	0.218	0.000
		433.0	121.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.15-16.30							
ARM A	7.13	13.26	0.537		0.0	1.1	16.0
ARM B	3.33	12.06	0.276		0.0	0.4	5.4
ARM C	6.93	15.01	0.461		0.0	0.8	12.1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.30-16.45							
ARM A	8.51	13.07	0.651		1.1	1.8	25.3
ARM B	3.97	11.78	0.337		0.4	0.5	7.3
ARM C	8.27	14.65	0.564		0.8	1.3	18.2

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00							
ARM A	10.42	12.83	0.812		1.8	3.8	50.4
ARM B	4.86	11.41	0.426		0.5	0.7	10.6
ARM C	10.13	14.18	0.714		1.3	2.4	32.8

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15							
ARM A	10.42	12.82	0.813		3.8	4.1	59.5
ARM B	4.86	11.39	0.427		0.7	0.7	11.0
ARM C	10.13	14.17	0.715		2.4	2.4	36.2

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30							
ARM A	8.51	13.06	0.651		4.1	1.9	31.8
ARM B	3.97	11.74	0.338		0.7	0.5	8.0
ARM C	8.27	14.64	0.565		2.4	1.3	21.1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45							
ARM A	7.13	13.25	0.538		1.9	1.2	18.8
ARM B	3.33	12.03	0.276		0.5	0.4	5.9
ARM C	6.93	14.99	0.462		1.3	0.9	13.6

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	1.1	*
16.45	1.8	**
17.00	3.8	****
17.15	4.1	****
17.30	1.9	**
17.45	1.2	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.4	
16.45	0.5	*
17.00	0.7	*
17.15	0.7	*
17.30	0.5	*
17.45	0.4	

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.8	*
16.45	1.3	*
17.00	2.4	**
17.15	2.4	**
17.30	1.3	*
17.45	0.9	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	781.6	521.1	201.7	0.26	201.7	0.26
B	364.7	243.2	48.3	0.13	48.3	0.13
C	759.7	506.4	133.9	0.18	133.9	0.18
ALL	1906.0	1270.7	383.9	0.20	384.0	0.20

* 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 15:18:18 on 10/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

ARCADY 5.0 ANALYSIS PROGRAM
RELEASE 1.0 (APR 2000)

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Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham am with com.vai" at 10:40:59 on Tuesday, 11 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 AM With Committed Development (No Growth)

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	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	10.50	15.75	10.50
ARM B	15.00	45.00	75.00	4.96	7.44	4.96
ARM C	15.00	45.00	75.00	6.65	9.98	6.65

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.212	0.788
		0.0	178.0	662.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.796	0.000	0.204
		316.0	0.0	81.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.938	0.062	0.000
		499.0	33.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
07.15-07.30							
ARM A	10.50	13.92	0.754		0.0	2.9	37.7
ARM B	4.96	8.64	0.574		0.0	1.3	17.7
ARM C	6.65	14.29	0.465		0.0	0.9	12.2
07.30-07.45							
ARM A	12.54	13.87	0.904		2.9	6.9	84.4
ARM B	5.93	7.73	0.767		1.3	2.9	37.7
ARM C	7.94	13.81	0.575		0.9	1.3	18.8
07.45-08.00							
ARM A	15.36	13.81	1.112		6.9	33.4	310.2
ARM B	7.26	7.11	1.020		2.9	11.6	119.1
ARM C	9.73	13.38	0.727		1.3	2.5	34.4
08.00-08.15							
ARM A	15.36	13.80	1.112		33.4	57.4	681.2
ARM B	7.26	7.04	1.031		11.6	17.8	222.7
ARM C	9.73	13.29	0.732		2.5	2.6	38.8

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30							
ARM A	12.54	13.87	0.904		57.4	41.0	737.5
ARM B	5.93	7.10	0.835		17.8	7.1	177.4
ARM C	7.94	13.39	0.593		2.6	1.5	23.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45							
ARM A	10.50	13.92	0.754		41.0	3.7	281.7
ARM B	4.96	7.40	0.671		7.1	2.2	43.0
ARM C	6.65	14.09	0.472		1.5	0.9	14.2

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	2.9	***
07.45	6.9	*******
08.00	33.4	**********
08.15	57.4	**********
08.30	41.0	**********
08.45	3.7	****

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.3	*
07.45	2.9	***
08.00	11.6	**********
08.15	17.8	**********
08.30	7.1	*******
08.45	2.2	**

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.9	*
07.45	1.3	*
08.00	2.5	***
08.15	2.6	***
08.30	1.5	*
08.45	0.9	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1151.8	767.9	2132.7	1.85	2133.2	1.85
B	544.4	362.9	617.6	1.13	617.9	1.14
C	729.5	486.3	142.4	0.20	142.4	0.20
ALL	2425.7	1617.1	2892.7	1.19	2893.5	1.19

* 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 10:46:49 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham am with comandprop.vai" at 10:48:03 on Tuesday, 11 Septemb

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 AM With Committed and Propoed Developments (No Growth)

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 07.15 AND ENDS 08.45

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	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	11.89	17.83	11.89
ARM B	15.00	45.00	75.00	4.96	7.44	4.96
ARM C	15.00	45.00	75.00	6.94	10.41	6.94

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
07.15 - 08.45	ARM A	0.000	0.187	0.813
		0.0	178.0	773.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.796	0.000	0.204
		316.0	0.0	81.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.941	0.059	0.000
		522.0	33.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
07.15-07.30							
ARM A	11.89	13.92	0.854		0.0	4.9	60.0
ARM B	4.96	7.89	0.629		0.0	1.6	21.4
ARM C	6.94	14.31	0.485		0.0	0.9	13.2
07.30-07.45							
ARM A	14.19	13.87	1.023		4.9	17.8	183.1
ARM B	5.93	7.04	0.842		1.6	4.1	51.0
ARM C	8.28	13.84	0.598		0.9	1.4	20.6
07.45-08.00							
ARM A	17.39	13.81	1.259		17.8	72.1	676.1
ARM B	7.26	6.83	1.063		4.1	14.9	150.0
ARM C	10.15	13.44	0.755		1.4	2.9	38.8
08.00-08.15							
ARM A	17.39	13.80	1.259		72.1	125.9	1485.1
ARM B	7.26	6.82	1.065		14.9	23.2	286.9
ARM C	10.15	13.36	0.759		2.9	3.0	44.4

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.15-08.30							
ARM A	14.19	13.87	1.024		125.9	131.1	1927.9
ARM B	5.93	6.79	0.872		23.2	14.4	282.2
ARM C	8.28	13.46	0.616		3.0	1.7	26.5

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
08.30-08.45							
ARM A	11.89	13.92	0.854		131.1	102.3	1750.6
ARM B	4.96	6.81	0.729		14.4	3.1	94.4
ARM C	6.94	13.87	0.500		1.7	1.0	16.0

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	4.9	*****
07.45	17.8	******************
08.00	72.1	**********
08.15	125.9	**********
08.30	131.1	**********
08.45	102.3	**********

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	1.6	**
07.45	4.1	****
08.00	14.9	***************
08.15	23.2	**********
08.30	14.4	**************
08.45	3.1	***

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
07.30	0.9	*
07.45	1.4	*
08.00	2.9	***
08.15	3.0	***
08.30	1.7	**
08.45	1.0	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1304.0	869.3	6082.9	4.66	6458.7	4.95
B	544.4	362.9	885.9	1.63	886.7	1.63
C	761.0	507.3	159.5	0.21	159.6	0.21
ALL	2609.4	1739.6	7128.4	2.73	7504.9	2.88

* 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 10:52:11 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham base pm.vai" at 10:53:30 on Tuesday, 11 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 - Base PM

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width
E = entry width
Lm = effective flare length
Vm = minimum approach half-width
A = distance between arms
K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	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	7.06	10.59	7.06
ARM B	15.00	45.00	75.00	3.30	4.95	3.30
ARM C	15.00	45.00	75.00	6.86	10.29	6.86

TIME	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) FROM/TO	ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.665	0.335
		0.0	376.0	189.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.837	0.000	0.163
		221.0	0.0	43.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.781	0.219	0.000
		429.0	120.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.15-16.30							
ARM A	7.06	13.26	0.532		0.0	1.1	15.7
ARM B	3.30	12.07	0.273		0.0	0.4	5.4
ARM C	6.86	15.02	0.457		0.0	0.8	11.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.30-16.45							
ARM A	8.43	13.08	0.645		1.1	1.7	24.7
ARM B	3.94	11.79	0.334		0.4	0.5	7.2
ARM C	8.19	14.67	0.559		0.8	1.2	17.8

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00							
ARM A	10.33	12.84	0.804		1.7	3.7	48.5
ARM B	4.83	11.43	0.422		0.5	0.7	10.4
ARM C	10.04	14.20	0.707		1.2	2.3	31.8

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15							
ARM A	10.33	12.83	0.805		3.7	3.9	56.9
ARM B	4.83	11.41	0.423		0.7	0.7	10.8
ARM C	10.04	14.19	0.707		2.3	2.4	34.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30							
ARM A	8.43	13.07	0.645		3.9	1.9	30.8
ARM B	3.94	11.76	0.335		0.7	0.5	7.9
ARM C	8.19	14.66	0.559		2.4	1.3	20.5

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45							
ARM A	7.06	13.25	0.533		1.9	1.2	18.4
ARM B	3.30	12.05	0.274		0.5	0.4	5.9
ARM C	6.86	15.00	0.457		1.3	0.9	13.3

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	1.1	*
16.45	1.7	**
17.00	3.7	****
17.15	3.9	****
17.30	1.9	**
17.45	1.2	*

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.4	
16.45	0.5	
17.00	0.7	*
17.15	0.7	*
17.30	0.5	*
17.45	0.4	

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.8	*
16.45	1.2	*
17.00	2.3	**
17.15	2.4	**
17.30	1.3	*
17.45	0.9	*

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	774.7	516.5	195.0	0.25	195.0	0.25
B	362.0	241.3	47.6	0.13	47.6	0.13
C	752.8	501.9	130.2	0.17	130.2	0.17
ALL	1889.5	1259.7	372.8	0.20	372.9	0.20

* 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 10:54:45 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham pm withcom.vai" at 11:01:43 on Tuesday, 11 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 - PM With Committed Developments (No Growth)

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	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	10.41	15.62	10.41
ARM B	15.00	45.00	75.00	3.30	4.95	3.30
ARM C	15.00	45.00	75.00	9.39	14.08	9.39

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.451	0.549
		0.0	376.0	457.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.837	0.000	0.163
		221.0	0.0	43.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.840	0.160	0.000
		631.0	120.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.15-16.30							
ARM A	10.41	13.27	0.785		0.0	3.3	42.8
ARM B	3.30	10.14	0.325		0.0	0.5	6.8
ARM C	9.39	15.03	0.625		0.0	1.6	22.5

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.30-16.45							
ARM A	12.43	13.09	0.950		3.3	9.6	109.5
ARM B	3.94	9.55	0.412		0.5	0.7	9.9
ARM C	11.21	14.67	0.764		1.6	3.0	41.0

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00							
ARM A	15.23	12.89	1.182		9.6	46.2	423.0
ARM B	4.83	9.30	0.519		0.7	1.0	14.9
ARM C	13.73	14.20	0.967		3.0	11.1	122.3

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15							
ARM A	15.23	12.85	1.185		46.2	82.1	962.6
ARM B	4.83	9.29	0.520		1.0	1.1	15.9
ARM C	13.73	14.19	0.967		11.1	14.3	192.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30							
ARM A	12.43	13.01	0.956		82.1	75.8	1184.1
ARM B	3.94	9.28	0.425		1.1	0.8	11.8
ARM C	11.21	14.65	0.765		14.3	3.5	79.4

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45							
ARM A	10.41	13.24	0.786		75.8	35.9	837.7
ARM B	3.30	9.21	0.358		0.8	0.6	8.8
ARM C	9.39	15.00	0.626		3.5	1.7	27.8

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	3.3	***
16.45	9.6	**********
17.00	46.2	**********
17.15	82.1	**********
17.30	75.8	**********
17.45	35.9	**********

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.5	
16.45	0.7	*
17.00	1.0	*
17.15	1.1	*
17.30	0.8	*
17.45	0.6	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	1.6	**
16.45	3.0	***
17.00	11.1	**********
17.15	14.3	**********
17.30	3.5	****
17.45	1.7	**

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1142.2	761.5	3559.7	3.12	3608.4	3.16
B	362.0	241.3	68.2	0.19	68.2	0.19
C	1029.8	686.5	485.9	0.47	486.0	0.47
ALL	2534.0	1689.3	4113.8	1.62	4162.6	1.64

* 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 11:02:11 on 11/09/2012]

TRANSPORT RESEARCH LABORATORY

CAPACITIES, QUEUES AND DELAYS AT ROUNDABOUTS

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Run with file:- "C:\Program Files (x86)\Junction\ARCADY 5\pelham pm withcom.vai" at 10:56:00 on Tuesday, 11 September 2012

ROUNDABOUT CAPACITY AND DELAY

RUN TITLE

Pelham Road/A1173 - PM With Committed Developments

INPUT DATA

ARM A - Kings Road
ARM B - Pelham Road
ARM C - A1173

MINI-ROUNDABOUT GEOMETRIC DATA

LIGHTING CONDITIONS : NORMAL

ROAD SURFACE CONDITION: NORMAL

ARM	V (m)	E (m)	Lm(M)	Vm(M)	A (M)	K (M)	G (%)	SLOPE	INTERCEPT (PCU/MIN)
ARM A	4.00	5.30	10.00	4.00	18.00	11.80	0.00	0.609	15.588
ARM B	3.60	5.00	10.00	3.60	17.10	11.80	0.00	0.592	14.799
ARM C	3.20	6.30	30.00	3.20	17.30	11.80	0.00	0.640	18.454

V = approach half-width Lm = effective flare length A = distance between arms
E = entry width Vm = minimum approach half-width K = entry corner kerb line
G = gradient over 50m

TRAFFIC DEMAND DATA

TIME PERIOD BEGINS 16.15 AND ENDS 17.45

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	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	10.41	15.62	10.41
ARM B	15.00	45.00	75.00	3.30	4.95	3.30
ARM C	15.00	45.00	75.00	9.39	14.08	9.39

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
16.15 - 17.45	ARM A	0.000	0.451	0.549
		0.0	376.0	457.0
		(10.0)	(10.0)	(10.0)
	ARM B	0.837	0.000	0.163
		221.0	0.0	43.0
		(10.0)	(10.0)	(10.0)
	ARM C	0.840	0.160	0.000
		631.0	120.0	0.0
		(10.0)	(10.0)	(10.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA
DEFAULT PROPORTIONS OF HEAVY VEHICLES ARE USED

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.15-16.30							
ARM A	10.41	13.27	0.785		0.0	3.3	42.8
ARM B	3.30	10.14	0.325		0.0	0.5	6.8
ARM C	9.39	15.03	0.625		0.0	1.6	22.5

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.30-16.45							
ARM A	12.43	13.09	0.950		3.3	9.6	109.5
ARM B	3.94	9.55	0.412		0.5	0.7	9.9
ARM C	11.21	14.67	0.764		1.6	3.0	41.0

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00							
ARM A	15.23	12.89	1.182		9.6	46.2	423.0
ARM B	4.83	9.30	0.519		0.7	1.0	14.9
ARM C	13.73	14.20	0.967		3.0	11.1	122.3

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15							
ARM A	15.23	12.85	1.185		46.2	82.1	962.6
ARM B	4.83	9.29	0.520		1.0	1.1	15.9
ARM C	13.73	14.19	0.967		11.1	14.3	192.9

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30							
ARM A	12.43	13.01	0.956		82.1	75.8	1184.1
ARM B	3.94	9.28	0.425		1.1	0.8	11.8
ARM C	11.21	14.65	0.765		14.3	3.5	79.4

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	CROSSING USE PER MIN	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45							
ARM A	10.41	13.24	0.786		75.8	35.9	837.7
ARM B	3.30	9.21	0.358		0.8	0.6	8.8
ARM C	9.39	15.00	0.626		3.5	1.7	27.8

QUEUE AT ARM A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	3.3	***
16.45	9.6	**********
17.00	46.2	**********
17.15	82.1	**********
17.30	75.8	**********
17.45	35.9	**********

QUEUE AT ARM B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	0.5	
16.45	0.7	*
17.00	1.0	*
17.15	1.1	*
17.30	0.8	*
17.45	0.6	*

QUEUE AT ARM C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
16.30	1.6	**
16.45	3.0	***
17.00	11.1	**********
17.15	14.3	**********
17.30	3.5	****
17.45	1.7	**

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

ARM	TOTAL DEMAND		* QUEUEING * DELAY *		* INCLUSIVE QUEUEING * DELAY *	
	(VEH)	(VEH/H)	(MIN)	(MIN/VEH)	(MIN)	(MIN/VEH)
A	1142.2	761.5	3559.7	3.12	3608.4	3.16
B	362.0	241.3	68.2	0.19	68.2	0.19
C	1029.8	686.5	485.9	0.47	486.0	0.47
ALL	2534.0	1689.3	4113.8	1.62	4162.6	1.64

* 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 10:58:01 on 11/09/2012]

BNP PARIBAS
REAL ESTATE

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12 September 2012

Your ref: TR030001
Our ref: PBF L120912

Dear Sirs

ABLE MARINE ENERGY PARK DEVELOPMENT CONSENT ORDER APPLICATION

REPRESENTATIONS ON BEHALF OF ROYAL MAIL (UNIQUE REFERENCE NUMBER: ABLE-0027)

We have been instructed by our client, Royal Mail Group Property ("Royal Mail") to submit representations on the Able Marine Energy Park (AMEP) in respect of the Immingham Delivery Office (DO), Middleplatt Road, Immingham.

Background

Royal Mail, formerly Consignia Plc, is the successor to the former statutory corporation, The Post Office. Although its management operates independently, Royal Mail is wholly owned by the Government through the Secretary of State for Business, Innovation and Skills. Its services are regulated by Ofcom. Its letters business, Royal Mail, is the operator of universal postal service functions through the Royal Mail letter post delivery and collection services, handling letters, postal packets and high value (registered) packets. Royal Mail Group also operates Parcelforce Worldwide, which is a parcels carrier. Post Office Ltd (a "sister" company to Royal Mail) operates the national network of post offices and sub post offices.

Royal Mail is also statutory undertaker and is therefore a statutory consultee on Schedule 1 of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and must be consulted where a Nationally Significant Infrastructure Project is likely to impact on its statutory functions.

The United Kingdom letter post business has been fully liberalised since the Postal Services Act 2000 and Royal Mail now operates in a highly competitive market place. As such, it effectively operates like any other business and is continually seeking to find ways to improve the efficiency of its business (e.g. increased automation) and respond to the changes in communications technology (e.g. email and internet). Put simply, the nature of the mail industry has, and continues to change and Royal Mail's real estate needs to respond accordingly.

Royal Mail operates the Immingham DO, which is located on Middleplatt Road, Immingham. The site is an operational Delivery Office and is an important part of Royal Mail's postal service in the

area. Mail is sorted at the Immingham DO before being delivered to its final delivery destination within Immingham and the surrounding area.

The Immingham DO delivers to and collects mail from the DN39, DN40 and DN41 postcode areas (Immingham and the surrounding areas). It receives mail for delivery, and transports collected mail to the Doncaster Mail Centre, which is located in the centre of Doncaster. The Immingham DO also operates a Caller's Office for members of the public to collect mail. The Immingham DO operates from 06.30 to 15.30 Monday to Friday and 06.30 to 14.15 on Saturdays. Approximately 30 people are employed at the Immingham DO and 13 vehicles operate from the site. Main delivery times to the site are at 05.35 Monday to Saturday, as well as at 06.30 and 07.45 Tuesday to Saturday. Peak staff vehicle movements to the Immingham DO are between the hours of 06.00 to 08.00 in the morning and 14.00 to 16.00 in the afternoon.

Under Section 4 of the Postal Services Act 2000, Royal Mail has a statutory duty to maintain a continuous, effective and efficient postal service. It is therefore vital that Royal Mail's operations at the Immingham DO are protected, not only to allow Royal Mail to carry out its statutory functions, but to also ensure it continues to offer an important service to businesses and residents of Immingham and the surrounding area.

To date, Royal Mail has not been actively involved in the Examination of the Able Marine Energy Park (AMEP), but has been monitoring it progress and has been receiving update letters from the Planning Inspectorate due to its role as a statutory consultee.

Royal Mail has become concerned over the potential transport impacts of the proposed development on the operation of the Immingham DO and has therefore recently commissioned transport consultants, Northern Transport Planning (NTP) to look in detail at the Transport Assessment (TA) and the other transport related documents submitted with the AMEP Development Consent Order (DCO) application. NTP considers that there is the potential for the proposed development to negatively impact on the Royal Mail's operations out of the Immingham DO. Furthermore, NTP considers that there are errors in the methodology of the TA and considers that it does not fully assess the impact of the proposed development on all the necessary junctions in the surrounding area.

In light of the above, please find below Royal Mail's representations on the proposed AMEP.

Representations on the AMEP

Royal Mail is concerned that the traffic that will be generated by the proposed AMEP, during both the construction and operational phases, will have a negative impact on its operations out of the Immingham DO. In particular, Royal Mail is concerned that due to the volume of vehicle trips that could potentially be generated by the proposed development; its delivery vehicles could face significant delays on the local road network due to the volumes of traffic and queuing traffic at junctions, particularly along the A1173 and A160. Any delays to its delivery vehicles is likely to reduce Royal Mail's ability to carry out an efficient and effective mail delivery service as it is required to do so under the Postal Services Act 2000.

It is considered that are significant assumptions, errors and omissions in the TA and as a result, it under-estimates the potential impacts of the proposed development on the road network. These are discussed below.

Traffic Generation and Distribution – Construction Phase

The TA suggests that all road-based deliveries during the construction phase will take place via the A160 / A180 and not via the A1173. It also suggests that only 40% of goods will be delivered by road, with the remainder being delivered by a combination of rail and sea. The TA also indicates that construction traffic will only take place between the hours of 0600-0700 and 1900-2000.

It is considered that the TA makes a number of assumptions regarding the above. In particular, the suggestion that there will be no construction worker trips during peak hours will rely on shift patterns being as detailed in the TA. Given that construction activities are likely to contracted out (and even potentially sub-contracted further, as is common in the construction industry), shift patterns will ultimately by determined by the contractor(s). It is considered that it would be difficult to enforce particular shift patters and the hours of vehicle movements through the planning process.

The overall level of goods delivered on road by HGVs will also be significantly influenced by the approach to procurement adopted by the chosen contractor(s), with the potential for road transport to be greater than anticipated in the TA if it proves to be more feasible and / or cost effective than rail or sea transport. Furthermore, it is considered unrealistic that all HGV movements will take place from the north along the A160 / A180 and none along the A1173, as this would be dependant on where material is sourced.

In light of the above, it is therefore considered that the TA under-estimates the level of construction traffic that will be generated by the proposed development on the local road network and under-values the potential impact that construction traffic will have, particularly on the A1173 and other roads and junctions to the south of the application site.

Traffic Generation and Distribution – Operational Phase

The TA estimates the volume of traffic likely to be generated by the proposed development during the operational phase from first principles by considering the activities that are anticipated to take place on the site and the number of jobs likely to be created. Based on these first principles, the TA estimates that the operational phase of the proposed development would generate 6,756 vehicle movements per day. The TA then uses this estimate of vehicle movements to assess the likely impacts on the surrounding highway network.

No assessment is made however on the impact on the local road network if these figures were to vary. Given that the amount of vehicle movements is estimated on first principles and there are no similar developments to compare these figures with, the anticipated number of trips is ultimately based on a number of assumptions. It is therefore considered likely that actual numbers of vehicle movements will differ from those contained in the TA and the actually impact on the surrounding road network may be different from what is stated in the TA.

Therefore, in order to fully assess the likely impacts on the surrounding road network, it is considered that the TA should consider the potential impact of any variations in these figures.

The TA states that the majority of staff vehicle movements will take place during shift changes. The approach taken in the TA to assess the impact of staff vehicle movements on the surrounding road network is to spread these movements across a 1 hour period. However, it is considered more likely that the majority of staff vehicle movements before and after shift changes will occur in a much shorter time window, possibly of around 15 minutes before and after shift changes. This would result in higher much acuter impacts on the surrounding road network than currently stated in the TA. It is therefore considered that the TA under-estimates the potential impacts of staff vehicle movements on the local road network and in reality there will be more significant short term impacts.

Derivation of Future Traffic Flows

Government guidance in the document *"Guidance on Transport Assessment"* (2007) advocates the consideration of "future year assessments". Normal practice is to consider a future year assessment of no less than 5 years after the date of application. However, where the proposed development is likely to take place over a longer period (as is most likely with the AMEP), a longer-term assessment is usually considered. In addition, when dealing with trunk roads, the normal

practice is to consider an assessment year 10 years after the date of application (as indicated in Circular 02/2007 *"Planning and the Strategic Road Network"*).

The TA does not use this approach, and contrary to Government advice does not undertake a future year assessment. Instead it assesses traffic flows from committed developments in the area and considers these to essentially act as traffic growth.

It is considered that this approach is fundamentally flawed as it does not take into account increased levels of residential car ownership and usage from the nearby local population centres. It also does not take into consideration growth in operations of existing local businesses. It is widely recognised that many businesses are operating well below maximum capacity due to the economic downturn. Improvements in the economy is likely to see more intensive operations from these businesses and increased vehicle use as a result, including increases in staff vehicles and increases in deliveries, for example.

By not taking into account the growth in car ownership and usage and increased vehicle activity from existing businesses it is considered that the TA misses a large percentage of future traffic growth, which would be additional to that generated by the committed developments already considered in the TA.

Growth in background traffic is normally estimated by reference to the Department for Transport computer program TEMPRO, which indicates the following average levels of peak traffic growth for North Lincolnshire and North East Lincolnshire:

- 2011-2016 AM – 1.9%
- 2011-2016 PM – 2.1%
- 2011-2021 AM – 8.5%
- 2011-2021 PM – 9.0%

As stated above, given the anticipated long build out period of the proposed development, and because trunk roads will be affected, it is considered that a longer term future assessment would normally be used in this situation (i.e. a future assessment year of 2021 / 22). Therefore by omitting growth in background traffic over this period, the assessment is under-estimating the amount of traffic on local roads, before the AMEP is taken into consideration, by between 8.5%-9.0%. This is a significant under-estimation. If the example of the morning peak hour of 8 am to 9 am is taken, the TA estimates that base two way traffic flows on all surrounding roads, without the proposed development, is 13,476 vehicles (Table 4.3 in the TA). Making reference to the TEMPRO growth figures, this could be expected to grow over the period up to 2021 by approximately 1,146 additional vehicles (8.5%).

Such an increase in vehicles would have a significant impact on the operation of the local road network, and therefore by ignoring future growth in background traffic, it is considered that the TA significantly under-estimates the potential impacts on the surrounding road network and its findings are therefore unsound.

Operational Assessments of Junctions

Government guidance in *"Guidance on Transport Assessments"* identifies that an increase in traffic of 30 vehicle movements per hour is a "materiality threshold" above which a material traffic impact may arise.

Following this guidance, the TA indicates that junction capacity assessments have been undertaken at all junctions where the AMEP is considered to give rise to an increase in traffic of 30

or more vehicle movements per hour. The TA then provides a list of 12 junctions where assessments have been undertaken.

The junction of the A1173 with Middleplatt Road and the junction of the A1173 with Pelham Road have not been included on this list and junction assessments of these junctions have therefore not be undertaken. However, the TA makes it clear that the AMEP would result in an increase of in excess of 30 vehicle movements per hour on the A1173 through both of these junctions. Following guidance in the *"Guidance on Transport Assessments"* document, there is therefore the potential for the AMEP to create material traffic impacts at these junctions, and detailed junction assessments should therefore be undertaken.

It is considered that the omission of detailed assessments of these junctions is a significant shortfall of the TA and reduces its overall robustness. This is because the applicant has undertaken a detailed junction assessment of the A1173 / North Moss Lane / Kiln Lane Junction, which is located to the south of the A1173 / Middleplatt Road and A1173 / Pelham Road Junctions, and has identified that the increase in traffic passing through this junction as a result of the AMEP would have a significant material impact on the operation of this junction and mitigation measures have been considered necessary in the TA. All traffic movements from the AMEP through this junction will also pass through the A1173 / Middleplatt Road and A1173 / Pelham Road Junctions. It is therefore likely that significant material traffic impacts requiring mitigation will also occur at these junctions. This is considered to be particularly true given the significant volume of traffic that currently uses these junctions. Significant volumes of traffic, including HGVs from the Middleplatt Road Industrial Estate and including Royal Mail vehicles, use the Middleplatt Road junction, and the Pelham Road Junction is the main junction in to the centre and residential areas of Immingham.

In light of the above, it is considered that the volume of traffic generated by the AMEP is likely to have a significant material impact on the operation of the A1173 / Middleplatt Road and A1173 / Pelham Road Junctions and mitigation measures would be required at these junctions, given that the TA acknowledges that mitigations measures will be required at he A1173 / North Moss Lane / Kiln Lane Junction. The failure to undertake detail junction assessments of these junctions is therefore considered to be a fundamental omission from the TA which reduces its overall robustness by failing to asses the traffic impact of the AMEP on two important junctions in the area.

As a result of this, Royal Mail commissioned NTP to undertake detailed operational analysis of these two junctions to identify the potential implications that the development of the AMEP would have on the operation of these junctions. A report detailing NTP's findings is enclosed for your information, and is summarised below.

NTP undertook peak traffic surveys of these two junctions on Wednesday 5 September 2012 and also applied TEMPRO growth factors to the May 2010 traffic survey results for these junctions from the AMEP TA to provide a consistent baseline.

The results of the survey indicate that the Middleplatt Road / A1173 junction currently operates in a generally satisfactory manner, although some short term congestion may arise due to HGV movements at this junction. The A1173 / Pelham Road junction was also observed to currently operate in a generally satisfactorily manner during peak periods, with some limited queuing at peak times.

When an analysis of the operation of these junctions took into consideration committed developments and the further traffic to be generated by the AMEP, it was observed using PICADY software that the A1173 / Middleplatt Road junction would remain in capacity. However, when an assessment of the A1173 / Pelham road mini-roundabout junction was assessed using ARCADY software, the analysis indicated that traffic flows at this junction would exceed capacity when traffic flows from committed developments were taken into consideration. When the additional traffic generated by the AMEP was also taken into consideration, the analysis identified that there would be further significant queues at this junction. The analysis indicated peak hour queues of more

than 100 vehicles on the A1173 at the mini-roundabout. The analysis therefore indicates that the effect of the traffic generated by the AMEP at this junction is likely to increase the maximum queue length of the A1173 by more than 50 vehicles during peak hours.

It is therefore clear that significant congestion is likely in future years at the A1173 / Pelham Road junction. Furthermore, the analysis indicates that traffic movements generated by the AMEP in the evening peak will result in traffic queues on the A1173 eastbound approach to the mini-roundabout increasing to an extent that traffic movements into and out of Middleplatt Road will be obstructed.

The failure of the TA to assess the implications of the proposed development on these two junctions is therefore considered to be a significant omission. The surveys and analysis undertaken by NTP indicates that traffic flows from the AMEP would have a severe impact on the operation of these junctions, and therefore mitigation measures would be necessary.

Potential Implications for Royal Mail's Operations

It is considered that there is the potential for significant impacts on Royal Mail's operations in the Immingham area during the operational stage of the AMEP through delays to delivery vehicles. This would reduce Royal Mail's ability to efficiently and effectively undertake its statutory functions.

In particular, as shown in NTP's analysis, it is likely that the AMEP will exceed the capacity of the A1173 / Pelham Road junction, and queuing traffic at this junction would obstruct traffic entering / exiting the A1173 / Middleplatt Road junction. This would therefore result in significant delays to Royal Mail's delivery vehicles entering / exiting Middleplatt Road and entering / existing Pelham Road, which is the main access to the central and residential areas of Immingham.

The TA did not assess the impact of the traffic flows generated by the proposed development on these junctions, despite acknowledging that as a result of the AMEP it was likely that there would by significant increases in traffic flows at these junctions above the material impact threshold stated in Government guidance and referred to in the TA. This is a significant omission from the TA, as it is considered that mitigation measures would be required at these junctions in order to ensure that they continue to operate efficiently.

Furthermore, due to the failure of the TA to take into account future growth in background traffic and other errors and assumptions in the TA, it is considered that it significantly under-estimates the impact of the AMEP on the surrounding road network. This is considered to be particularly the case to the south of the application site, close to the area's major population centre of Immingham. It is therefore likely that the AMEP will have a greater impact on the safe and efficient operation of the road network than currently anticipated in the TA.

There is therefore significant uncertainty over the impact of the AMEP on the surrounding road network and on Royal Mail's operations. Due to these uncertainties, errors and omissions from the TA, Royal Mail is extremely concerned over the potential impact on its ability to undertake its statutory functions from the Immingham DO and meet the needs of its customers.

It is therefore not considered possible for a decision to be made as to whether a DCO should be granted until these uncertainties have been clarified and the errors and omissions from the TA have been rectified, as the TA does not, a present, provide an accurate reflection of the potential traffic impacts of the proposed AMEP, and does not proposes sufficient mitigation measures at all junctions where it would be necessary.

Conclusion

Royal Mail is extremely concerned over the potential impact of the traffic that will generated by the proposed AMEP. In particular, these concerns relate to the extent to which the traffic generated by the AMEP during its operational phase will result in congestion and queuing traffic at road

junctions, creating delays to its delivery vehicles and thereby reducing Royal Mail's ability to perform its statutory functions efficiently and effectively.

Furthermore, Royal Mail remains unsure as to the extent of the impact on its operations due to a number of assumptions, errors and omissions in the TA. These include:

- An assumption that 60% of construction goods will be transported by a mixture of road and rail. This may not be the case if road transportation turns out to be more economical and feasible than road and rail transport, and the volume of goods transported by road could increase significantly;

- An assumption that no construction worker trips will take place within peak hours. This will ultimately depend on contractors (and sub-contractors) and would be difficult to enforce;

- Operational staff vehicle movements have been estimated based on first principles. There are no similar developments to verify these figures against and therefore it is likely that actual vehicles movements could differ. No assessment has been made however on the impact on the local road network if these figures do vary. Obviously, if a higher number of actual vehicle movements occur, the impact on the local road network will be greater;

- The TA assumes that staff vehicles movements at the end of shifts will take place over the period of one hour. However, it is considered more likely that the vast majority of these trips will take place within a much shorter time window before and after shift changes. This would result in more acute impacts on the local road network during this time, which the TA has not assessed;

- Contrary to Government guidance, the TA does not undertake a future year assessment and instead it considers that the traffic likely to be generated by other committed developments will essential act as traffic growth. This approach is considered to be flawed however, as it does not take into consideration growth in residential car ownership and the intensification and expansion of existing businesses. This could result in an increase of between 8.5% and 9.0% in background traffic during peak times. This growth is not considered in any of the assessments undertaken in the TA, and therefore it significantly under-estimates that amount of background traffic that may be present in the area once the AMEP has been constructed. As a result, the impact of the proposed development on the local road network, when background traffic has been considered is significantly under-estimated; and

- In line with Government guidance, the TA states that detailed junction assessments have been undertaken for all junctions where it is anticipated that the AMEP will result in an increase in traffic movements by 30 vehicles or more. The TA acknowledges that there will be an increase of 30 or more vehicles at the junctions of the A1173 with Middleplatt Road and the junction with Pelham Road; however no detailed junction assessments have been undertaken. A detailed assessment of the A1173 / North Moss Lane / Kiln Lane Junction identified that the AMEP would have a significant material impact on this junction and therefore mitigation measures would be necessary to ensure that this junction continued to operate within capacity. All traffic generated by the AMEP passing through this junction will also need to pass through the A1173 / Middleplatt Road Junction and the A1173 / Pelham Road Junction and is therefore likely to have similar impacts. Furthermore, a detailed operational assessment of these junctions by NTP on behalf of Royal Mail has indicated that traffic flows from the AMEP would result in the A1173 / Pelham Road junction exceeding capacity, resulting in significant vehicle queues along the A1173 that would block access to and exit from Middleplatt Road from the A1173. Mitigation measures are therefore likely to be necessary in order for this junction to operate efficiently and within capacity.

The final bullet point is of particular concern to Royal Mail. The A1173 / Middleplatt Road Junction is the only access to the Immingham DO. If the AMEP was to severely impact on this junction and

the A1173 / Pelham Road junction, as NTP's enclosed operational assessment indicates it would do, it would severely restrict Royal Mail's ability to carry out an efficient and effective postal delivery services, as required by the Postal Services Act 2000 by restricting and delaying access to and from the Immingham DO and to the residential and central areas of Immingham where Royal Mail delivers and collects mail.

It is therefore considered that Able should undertake a detailed assessment of these junctions and agree to undertake appropriate mitigation measures to ensure that these junctions continue to operate within capacity after the development of the AMEP.

Furthermore, whilst there are still a number of errors, omissions and assumptions in the TA, as outlined above, it is not considered that the TA provides a full and robust assessment of the potential impacts of the AMEP on the local road network. It is therefore considered that a decision as to whether to grant a DCO cannot be taken until these errors, omissions and assumptions have been rectified.

We reserve the right to amend or withdraw these representations if necessary.

Finally we trust the above is clear and satisfactory; however, if you have any queries or would like to discuss the above please do not hesitate to contact Paul Forshaw at the above office.

Yours faithfully

BNP Paribas Real Estate

BNP Paribas Real Estate

Cc Mr D Poole – Royal Mail

Enc NTP Transport Implications Report