A5/A47/B4666
DODWELLS ROUNDABOUT
HINCKLEY

CREST NICHOLSON (MIDLANDS) LTD

S-PARAMICS TRAFFIC MODELLING REPORT

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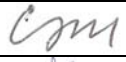
Prepared by	C J Mumford	21.04.2009	
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1. INTRODUCTION

1.1. In May 2000, planning permission was granted on appeal to Crest Strategic Projects Ltd for residential and commercial development on two sites off Coventry Road, Hinckley:

- Application No 99/00047/OUT – Residential development on land south of Coventry Road, Hinckley (250 dwellings)
- Application No 99/00048/OUT – Employment Uses B1,B2 and B8 on land north of Coventry Road and east of Harrowbrook Industrial Estate, Hinckley (11,200 sq m) (Tungsten Park).

The location of the sites is indicated on **Figure 1.** The permissions included conditions that no more than 100 dwellings or 5,000 sq m of employment should be occupied until improvements had been carried out to Dodwells Roundabout, the junction between the A5, A47 and Coventry Road to the west of the sites.

1.2. An Updated Capacity Assessment (Report C540-DOC02) prepared in December 2008 found that the traffic flows originally predicted for 2005 had not materialised. An ARCADY assessment of the existing roundabout layout for 2019 including committed development in the area indicated that, even when the predicted traffic flows from 11,015 sq m of commercial development at Tungsten Park and 86 homes at the former Greyhound Stadium are added, the existing roundabout still operates in 2019 with an RFC of less than 1, and the level of queuing remains acceptable. Accordingly that report concluded that, as the improvements had not yet been implemented and having regard to the actual level of traffic growth, it was no longer appropriate to seek those improvements as part of the planning consents originally granted in 2000.

1.3. At a meeting on 25 March, the Highways Agency expressed reservations about whether the ARCADY assessment accurately modelled lane usage and, consequently, queuing. An S-Paramics micro-simulation traffic model has therefore been built by PFA Consulting covering both Dodwells roundabout and the Longshoots traffic signal junction between the A5 and A47 some 600 metres

to the west. S-Paramics was chosen as it would model the operation of the network in greater detail, model the interaction of junctions with one another, and provide a better understanding of the operation of the network with its visual representation. **Figure 2** details the extent of the S-Paramics modelled highway network.

1.4. The S-Paramics model covers the following time periods:

- Weekday AM Peak (07:00-10:00)
- Weekday PM Peak (16:00-19:00)

2. MODEL DEVELOPMENT

2.1. The modelled highway network was constructed using Ordnance Survey digital mapping, a topographical survey for Dodwells roundabout and aerial photography. Traffic signal timings for the Longshoots junction were obtained from the Highways Agency to ensure the model reflects the actual timings (cycle time, stages, phases green times, inter-greens) for each time period modelled.

2.2. Base year turning count data for Dodwells roundabout was obtained from a traffic survey carried out for PFA Consulting on Tuesday 9 September; this also included queue length surveys. More details of this survey are given in the Updated Capacity Assessment. Faber Maunsell visited the site in January 2009 on behalf of the Highways Agency to observe the operation of Dodwells roundabout. Faber Maunsell's observations are reported in their Technical Note 1 dated 16 March 2009, reproduced in **Appendix A**. The network was calibrated to ensure that the interactions of individual vehicles with the road and each other were sensible and that the junctions in the network operated correctly in accordance with observations.

2.3. In addition to the turning count at Dodwells, traffic data for the Longshoots Junction for September 2007 were provided by the Highways Agency. This information is included in **Appendix B**. Turning proportions from this survey were applied to the Dodwells survey data to create a base year matrix covering the two junctions. The percentage of HGVs was derived from the traffic count.

2.4. Traffic flow profiles (at 15-minute intervals) over the modelled 3-hour peak periods were derived from the observed traffic counts. Separate profiles for traffic on each entry link to the modelled area were applied to the relevant Origin–Destination movements in the matrices.

Proposed and Committed Development

2.5. The proposed and committed development in the Dodwells area of Hinckley is described in the Updated Capacity Assessment. The peak hour trip generation estimated for the ARCADY assessment was extended to the three hour peaks for S-Paramics using the same TRICS data. The overall distribution adopted for the Updated Capacity Assessment was that derived from a gravity model and agreed

with the Highways Agency in 1999-2000. This distribution, included in Appendix D of the Updated Capacity Assessment, covers both Dodwells and Longshoots, and has therefore been adopted for the S-Paramics model.

2.6. At the meeting on 25 March, the Highways Agency requested that a further test should be carried out without the residential development south of Coventry Road which is the subject of the original Application No 99/00047/OUT. A total of 422 homes here were occupied at the time of the traffic survey in September 2008. Trip generation by these houses was available from turning counts at the Coventry Road/Long Meadow Drive and Coventry Road/Paddock Way junctions in April 2008. It was distributed at Dodwells roundabout in a similar way to traffic from the redevelopment of the Greyhound Stadium as included in the Updated Capacity Assessment. This traffic was deducted from the base year matrix to obtain a '2008 No Development' scenario.

Traffic Growth

2.7. The assessments have been carried out for the base year, 2008, and for 2019. Base year counts have been factored to 2019 as explained in paragraphs 3.10 to 3.14 of the Updated Capacity Assessment, and committed development was added.

3. MODEL OUTPUTS

3.1. Model runs have been undertaken for the following scenarios for each of the modelled time periods.

- 2008 Base Year
- 2008 No Development (without residential development south of Coventry Road)
- 2008 With Development (residential development south of Coventry Road and at Greyhound Stadium and employment at Tungsten Park)
- 2019 No Development (Base plus growth plus committed development)
- 2019 With Development (Base plus growth committed development plus residential development south of Coventry Road and at Greyhound Stadium and employment at Tungsten Park)

3.2. A final run was carried out for the 2019 With Development scenario to assess the effect of minor adjustments to the A5 westbound movement to improve lane usage:

- 2019 With Development and Improvement

3.3. The S-Paramics output graphs for the 2008 Base Year are included in **Appendix C** and provide validation of the model against observed conditions described in the Turley Associates/Faber Maunsell Technical Note in **Appendix B**.

3.4. **Appendix D** contains graphs of maximum queues at 10-minute intervals for each of the scenarios (2008 and 2019) at Dodwells roundabout for each time period modelled. **Appendix E** shows eastbound and westbound journey times on the A5 through the whole S-Paramics modelled network.

3.5. On the A5 West approach to Dodwells roundabout, there is minimal queuing in any of the scenarios (since the defining factor for traffic on this approach is the Longshoots traffic signals). Similarly, the variation in journey times between the scenarios is generally less than 10 seconds.

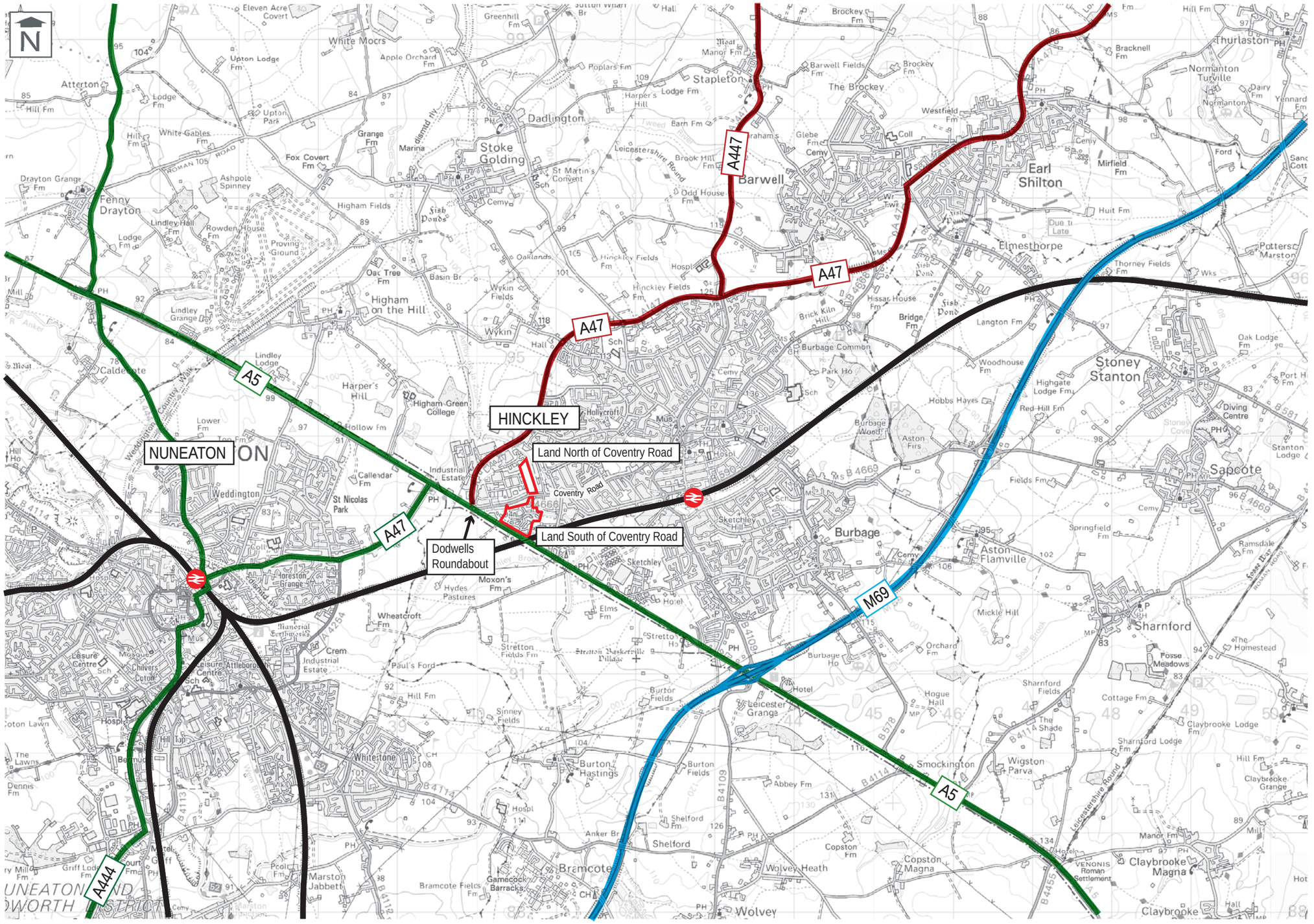
3.6. The A5 East approach shows extensive queuing in all scenarios. However, a comparison of the No Development and With Development scenarios shows that the impact of the development is in fact slight. Journey time variance between the No Development and With Development scenarios is less than 10%.

3.7. The results for the A47 Dodwells Road approach show that development has no material impact on queuing. As far as the B4666 Coventry Road is concerned, the development results in a slight increase in queuing on this local (non-trunk) road.

3.8. The S-Paramics modelling validates previous submissions that the developments south of Coventry Road, at Tungsten Park and at the Greyhound Stadium do not justify the improvements to Dodwells roundabout originally sought.

3.9. It is however demonstrated by the micro-simulation modelling exercise that current problems at Dodwells roundabout are arising as a consequence of inefficient use of the existing road space. The modelling demonstrates that some minor changes to the A5 westbound to improve lane usage would resolve existing capacity concerns.

Figures



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Site Boundary (indicative only)

Client

Crest Nicholson (Midlands) Ltd

Project

Dodwells Roundabout, Hinckley

Drawing Title

Strategic Location Plan

Figure No

Figure 1

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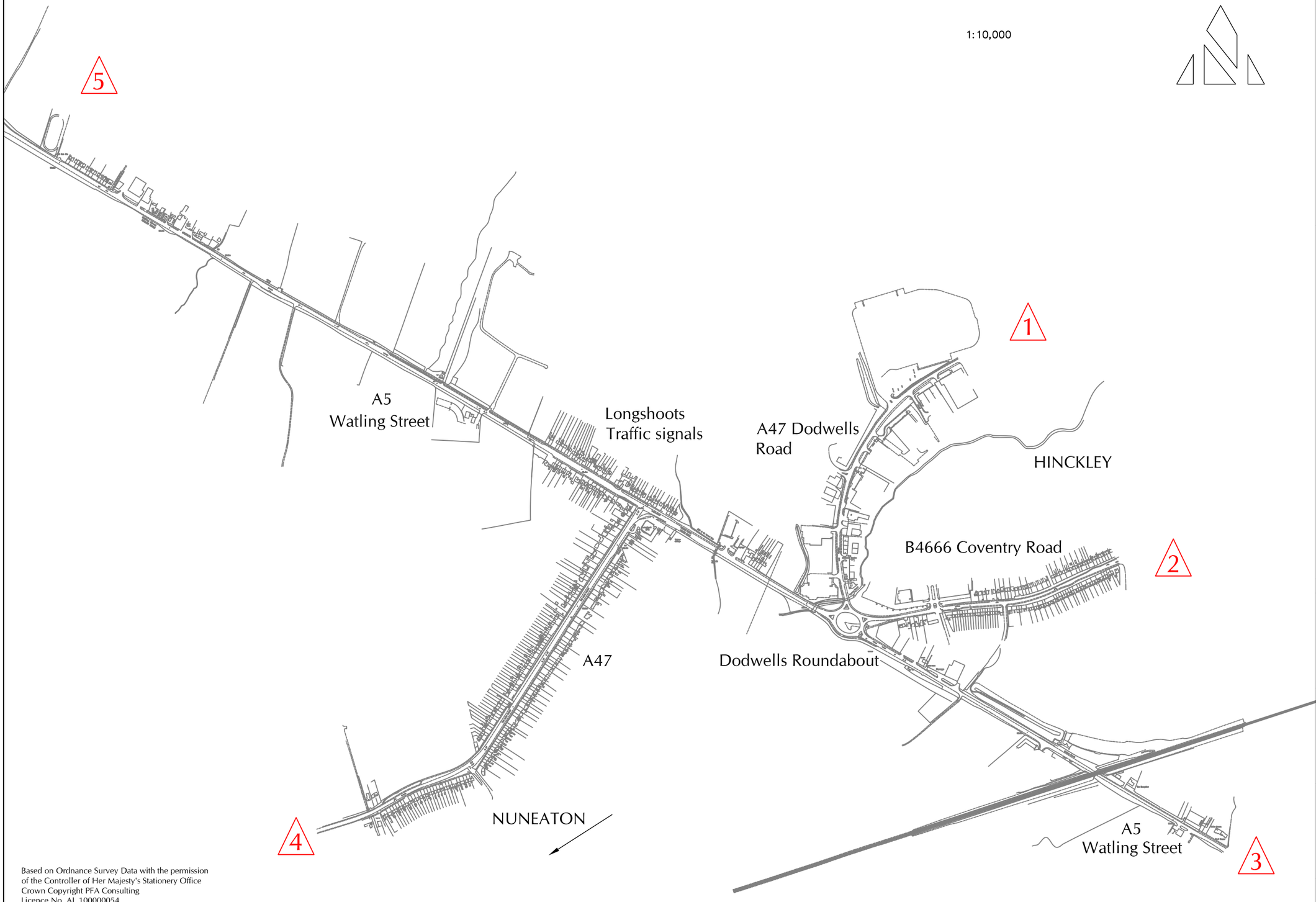

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1 S-Paramics Zone

Rev	Date	Description	Initials

Client

Crest Nicholson
(Midlands) Ltd

Project

Dodwells Roundabout
Hinckley

Drawing Title

Extent of S-Paramics
Modelled Network

Drawing No.

Figure 2

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Appendices

Appendix A

Technical Note 1

Project:	**Highways Agency Spatial Planning Framework**	Job No:	**60043053**
Subject:	**A5 Dodwells Roundabout, Hinckley**	Date:	**16th March 2009**
HA Ref:		Workstage:	**6254**

1 Introduction

This Technical Note (TN) is written in response to the December 2008 report from PFA Consulting on behalf of Crest Nicholson, owners of the Coventry Road site, which is the subject of the current query with the Highways Agency. The report considers the A5/A47/B4666 Dodwells Roundabout, an agreed improvement scheme mitigating the permitted development off Coventry Road, comprising of residential and employment land.

The developer, Crest Nicholson, applied for planning permission for two sites in 1999; land south of Coventry Road for 250 dwellings and land to the north of Coventry Road for 11,200sqm of employment land (B1, B2 and B8). Following a public inquiry a condition was attached to provide a mitigation scheme at the A5 Dodwells Roundabout and that no more than 100 dwellings or 5000sqm of employment land should be occupied prior to completion of the improvement works.

PFA have provided the report to support their view that the mitigation is no longer necessary.

2 Planning History and position

This is being looked at separately by Turley Associates and will be reported independently.

3 Updated Capacity Assessment

In order to demonstrate that the agreed improvement works are no longer necessary PFA have undertaken a new capacity assessment of the roundabout using updated flows.

3.1 Traffic Surveys

Updated traffic flows were obtained from a traffic count undertaken on Tuesday the 9th of September 2008 which showed that flows at the junction were actually lower than the predictions made in 1999 for the 2005 design year flows. The 2008 survey includes traffic generated by the residential part of the development as it had been completed and occupied prior to the survey being undertaken.

FM has compared the survey data given in the PFA report with TRADS data and local authority traffic count data (supplied by Leicestershire County Council), both of which show a good level of correlation to the PFA flows. Indeed, TRADS data for the A5 just north of Dodwells Roundabout indicates a slight reduction in overall traffic volumes since 2000 in the eastbound direction (traffic data for the westbound is only available back to 2004 at the same site and shows a slight increase since then).

However, although the actual traffic *flows* have not increased, it is possible that the traffic *demand* has still increased. Congestion on the route may suppress demand or result in trips being diverted to other routes causing increased congestion problems elsewhere on the network. It is also worth noting that works to upgrade M69 J1 (to the southeast on the A5) took place from March to December 2007 and the resultant congestion is likely to have resulted in temporary reassignment of traffic to other routes.

A review of TRADS data for the westbound traffic from 2000 to 2008 (during May each year) shows a significant drop in the daily flows between 2002 and 2003 (see *Figure 3.1*). While it is not clear what caused this the graphs do show consistent traffic growth before and after this drop which is likely to continue; however the drop shows why the predicted traffic growth does not appear to have materialised. A corresponding pattern can also be seen in the AM and PM peak hour flows.

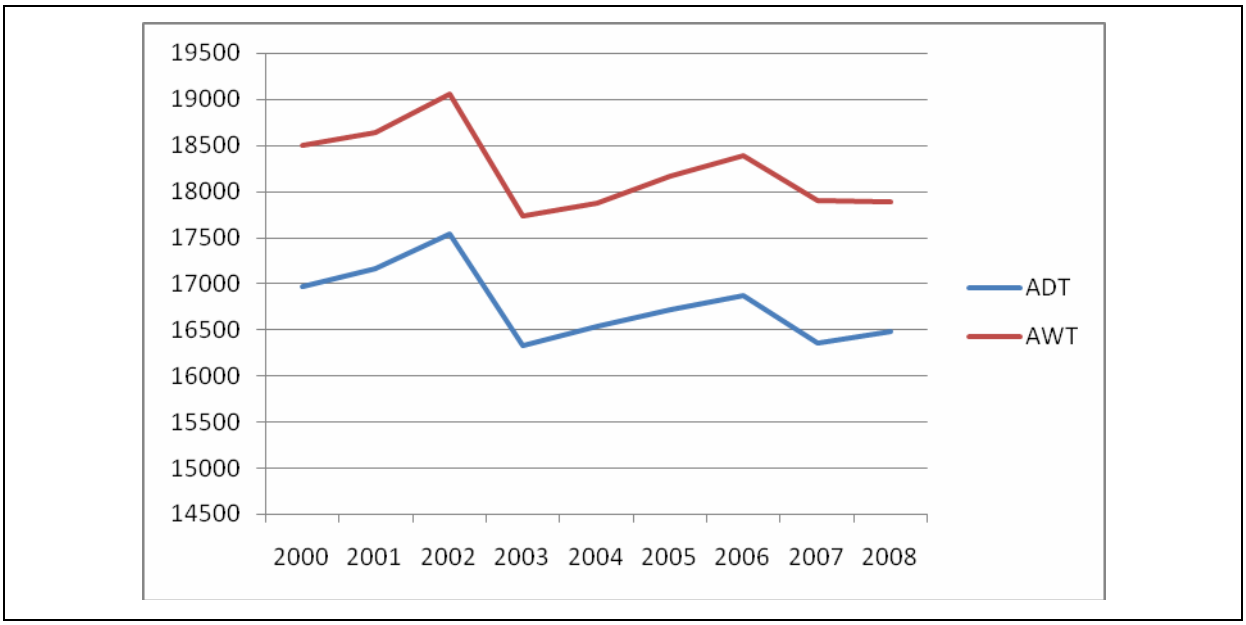

Figure 3.1 – Trads Data for A5 Westbound (site 11/9324) of May ADT and AWT between 2000 and 2008

The second drop in flows shown on the graph (between 2006 and 2007) is likely to be as a result of the aforementioned M69/A5 signalisation works causing temporary re-assignment. The graph also indicates that this traffic had not fully returned to the A5 by May 2008 but that background traffic growth is still present.

3.2 ARCADY Modelling

A number of ARCADY models have been made by PFA using different flow sets. The key ones of interest are the 2008 base year model and the future year with and without development models. The results from the PFA report are set out in *Table 3.1* below.

Arm	Approach	AM Peak		PM Peak	
		Max Queue	Max RFC	Max Queue	Max RFC
2008 Surveyed Traffic Flows					
Arm A	A5 West	3	0.751	3	0.764
Arm B	Dodwells Road	2	0.708	3	0.726
Arm C	Coventry Road	1	0.576	1	0.514
Arm D	A5 East	4	0.804	2	0.661

Table 3.1 – PFA 2008 ARCADY model results

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While PFA claim that these results show the junction to be operating within capacity, both in the present and in 2019 with the development, discussions with the MAC for the area (Optima) have presented a much different picture of the operation of the junction with observations showing queues extending for some distance on the A5. This has been further supported by a site visit undertaken by FM in January 2009 (see section 4 below) which observed queue lengths well above those predicted by the PFA 2008 model.

FM has reviewed the geometry used in the ARCADY modelling and considers it to provide a good representation of the junction, although a detailed check has not been made. However, the model does not account for unequal lane flows on the approaches which can severely alter the performance of a roundabout (see "ARCADY Health Warning: Account for unequal Lane Usage or risk damaging the public purse!" by Barbara Chard). At this junction there are unequal lane flows on both A5 arms and FM's site observations have shown that unbalanced lane usage occurs on the Coventry Road approach as well.

The paper by Barbara Chard referenced above offers a calculation for intercept correction values to adjust ARCADY models and account for unequal lane usage at roundabout approaches. As these calculations are flow specific they need to be calculated for each flow set modelled.

4 Faber Maunsell Site Visit

FM conducted site visits to Dodwells Roundabout on the 13th and 14th of January 2009 to observe the PM and AM peak periods respectively. The main objective of the site visits was to observe the junction operation and levels of queuing that may exist as well as observing driver behaviour and any external factors that may influence the capacity / operation of the junction.

One of the key observations points was lane usage on the roundabout approaches. All of the arms, with the exception of the A5 west arm, were noted to have unbalanced queues and usage in both peak periods. Figures 4.1 and 4.2 demonstrate the dominance of flow in the left hand lane at the A5 east and Coventry Road approaches.



Figure 4.1 – Unequal lane flow on A5 east Approach



Figure 4.2 Unequal lane flow on Coventry Road Approach

On the A47 Dodwells Road approach the majority of the flow used the right hand lane as shown in Figure 4.3; however observations were also made where the queuing in the left hand lane dominated

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as shown in Figure 4.4. Overall it was observed that the right hand lane dominated for the majority of both peak periods.



Figure 4.3 – Right hand lane dominating on A47 Dodwells Road Approach



Figure 4.4 – Left hand lane dominating on A47 Dodwells Road Approach

No significant queuing was observed on the A5 west arm and hence it was difficult to determine if the lane usage was balanced. In general it was observed that there was no obvious imbalance in the lane flows.





Figure 4.5 – Extensive queuing on A5 east approach

In both peaks the queues on the A5 east approach extended beyond the visible horizon of approximately 30 vehicles, however in both peaks these queues had cleared either by the end of or only a short duration after the end of the hour. It was also noted that during both peak hours traffic queues from the Longshoot signalled junction blocked back onto the roundabout, although in both cases this only occurred for a period of around 15 minutes and after queues on the A5 east arms had stretched beyond the visible horizon.

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Figure 4.6 – Blocking back from Longshoot junction



Figure 4.7 – Queuing on Coventry Road during the AM peak

During the AM peak queues on Coventry Road built up early on in the peak hour and extended to over 30 vehicles. By 08:35 this queue had mostly cleared and by the end of the peak there was no queue on this approach.

The most persistent queues were observed on the A47 Dodwells Road approach where the queues were at least 10 to 15 vehicles long through the duration of the observed hour and extended to well over 25 vehicles during the busiest periods in both peak hours.





Figure 4.8 – Queuing on A47 Dodwells Road during both peak hours

During the PM peak observations it was noted that half a dozen vehicles were wheel spinning when entering the roundabout from a standing start, the majority of these occurring on the A47 Dodwells Road approach. Although the road was wet from earlier rain this may indicate that the road surface is worn and provides inadequate skid resistance.

Around a dozen cyclists were observed traversing the cycle paths on the north side of the junction during the PM peak. The majority of these were travelling from the A5 west and Dodwells Road arms to the Coventry Road arm.

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5 Future Year Modelling

As there is concern over the validity of the base year models FM has only considered the general approach taken for the future year modelling undertaken by PFA and the following is provided for information only. Once the base year modelling has been validated and agreed then the future year modelling will need to be revisited and the subsequent comments may be subject to change.

5.1 Committed Developments

A number of committed developments in the area have been included in the background traffic flows by PFA. The trips passing through Dodwells roundabout have generally been derived using TRICS average trip rates and a trip distribution model or using information from the development Transport Assessments / Statements.

FM considers that where trip rates are derived from TRICS they should be based on 85th percentile rates unless a suitable representative site (or set of sites) can be found, in line with the Guidance on Transport Assessment. In most cases this will make very little difference to the figures however, particularly in the case of the B1 land use, trip rates can have significant variation between average and 85th percentile rates.

5.2 Growth Factors

The surveyed flows have been growthed by PFA from 2008 to a horizon year of 2019 (as the developer is considering submitting an application in 2009 for withdrawal of the condition). The growth factor has been derived using both NRTF and TEMPRO figures.

The TEMPRO figures have been adjusted to account for a large percentage of the allocated growth being included separately through committed developments (see section 3.2 above), this includes 31% of the allocated housing and 26% of the allocated employment. FM agrees with the methodology used and the adjusted figures used.

These adjusted TEMPRO figures have then been used to adjust the NRTF growth factor in accordance with the TEMPRO guidance. NRTF low forecasts have been used, based on growth in recent years being minimal and a belief that “growth here may well be constrained by the ability of adjacent parts of the network to accommodate additional traffic.” However there is no evidence provided by PFA that this was, or will continue to be, the case and as aforementioned, recent works to M69 J1 may have resulted in temporary reassignment of traffic away from the A5. Hence FM considers that NRTF central forecasts should be used as a more robust estimate.

5.3 Development Flows

As mentioned in section 3.1, the traffic flows from the residential development to the south of Coventry Road is included in the traffic survey. This traffic has not subsequently been removed from the traffic flows and is hence included as “background traffic” which means that it has been included in the growth calculations and also in the ‘without development’ scenario.

As the report intends to demonstrate that the previously agreed mitigation for the developments by Crest Nicholson is not required, any traffic generated by the developments, either north or south of Coventry Road, should be included as development traffic and not as background traffic to enable the impact of the development traffic to be fully assessed. Hence the flows from the residential development should be removed from the surveyed flows prior to application of growth factors and re-added as development flows where appropriate.

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The flows for the employment land (known as Tungsten park) were derived from trips rates obtained from TRICS; the same trips rates as used for the committed developments was used and as before 85th percentile rates should be used.

The trip distribution has been based on previous work by WSP for the development from 2006 which FM considers provides a reasonable model for the distribution of trips from the developments.

In addition, PFA have included trip generation for a proposed development at the former Greyhound Stadium as Crest Nicholson intends to submit a planning application for 86 dwellings at this location. It is understood that this development would have access through the existing development south of Coventry Road and also onto Nutts Lane to the east. A previous application for development on this site was submitted in 2006 by Crest Nicholson which was rejected (application reference 06/00638/FUL).

5.4 ARCADY Modelling

The 2019 ARCADY models from the PFA report are set out in *Table 5.1* below.

Arm	Approach	AM Peak		PM Peak	
		Max Queue	Max RFC	Max Queue	Max RFC
2019 Without Development (Includes already completed residential development south of Coventry Lane)					
Arm A	A5 West	6	0.863	8	0.898
Arm B	Dodwells Road	8	0.902	8	0.901
Arm C	Coventry Road	3	0.723	2	0.697
Arm D	A5 East	14	0.957	4	0.818
2019 With Development					
Arm A	A5 West	8	0.898	9	0.913
Arm B	Dodwells Road	11	0.943	9	0.916
Arm C	Coventry Road	3	0.767	3	0.783
Arm D	A5 East	22	0.994	5	0.847

Table 5.1 – PFA 2019 ARCADY model results

FM has calculated intercept corrections for the A5 approaches (site observations for Coventry Road were not available at the time) and remodelled the 2019 including development flows from the PFA report, the results of which are given below in *Table 5.2*. These results suggest a much different level of capacity and queuing to the PFA model.

Arm	Approach	AM Peak		PM Peak	
		Max Queue	Max RFC	Max Queue	Max RFC
2019 With Development					
Arm A	A5 West	8.4	0.903	7.2	0.885
Arm B	Dodwells Road	9.7	0.926	8.1	0.905
Arm C	Coventry Road	3.1	0.768	3.3	0.778
Arm D	A5 East	241.0	1.497	125.7	1.311

Table 5.2 – FM ARCADY model results using intercept corrections for unequal lane usage on A5 arms

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As already mentioned, the future year modelling will need to be revised once the base year models have been fully validated.

6 Highways Agency Improvement Scheme

The PFA report makes mention of a Highways Agency improvement scheme for Dodwells Roundabout. FM understands that at the moment there is no firm commitment from the HA to provide an improvement scheme.

7 Developer Improvement Scheme

As the currently agreed improvement scheme was developed back in 1999 it may no longer be suitable for the current situation at the junction. Hence, following corrections to the ARCADY assessments, as noted above in section 3.5, further assessments have been undertaken to determine if the agreed scheme will provide any benefit or if there is a better alternative that should be provided.

FM has reviewed the proposed signalisation mitigation scheme (as shown on Atkins drawings 5051636/001 and 5051636/002) and conducted simple check calculations, as to the capacity of individual nodes, coordination between nodes, flare lengths and storage space. These calculations indicate that the junction would be expected to be operating at or close to capacity under the 2019 with development flows quoted by PFA. TD35/06 mandates MOVA control for traffic signal installations on the trunk road network. Brief consideration of possible MOVA configurations has not identified a clear preferred option.

From these calculations it has not been possible fully to determine if the scheme would provide acceptable operation in 2019 (based on the PFA flows) without modelling the proposed mode of operation. If such modelling is required FM would recommend this be undertaken using micro-simulation modelling and PCMOVA. This would be particularly useful in determining the optimum MOVA configuration and could be used to assess the sensitivity of the junction to variations in traffic flows.

In reviewing the proposed design FM has noted that there may be a benefit in revising some of the lane allocation and markings. The lane allocation issues are related to the traffic flows and lane balance across internal stoplines on the eastern side of the junction, which are affected by the capacity of individual nodes, coordination between nodes, storage space and the proposed mode of operation. Modelling work would assist in determining the optimum lane allocations.

Due to the HA's aspirations to provide a longer term mitigation scheme FM considers that it would be worth considering the implications of the development and mitigation proposal on the HA's improvement scheme.

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8 Summary and Conclusions

PFA have submitted a report which seeks to justify that the agreed mitigation works at Dodwells roundabout are not needed as the junction is operating, and is anticipated to continue to operate, within capacity. Both revised modelling work and site observations have shown that the junction is not currently operating within capacity leading to significant levels of queuing on 3 of the 4 arms.

Further work is required by PFA to amend and validate the modelling to provide a realistic assessment of the junction operation.

At this stage it is difficult to determine the extent to which the development flows have contributed to this congestion and more modelling work may be needed to determine this.

A review of the mitigation scheme has identified that it will provide a capacity benefit, although more detailed modelling work would be required to determine if it would be expected to operate within capacity by 2019.

Prepared by: *M Roxburgh*……..
Mark Roxburgh
Technician

Approved by: *V Ryan*…….
Vanessa Ryan
Associate Director

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St James's Street
Nottingham NG1 6FG

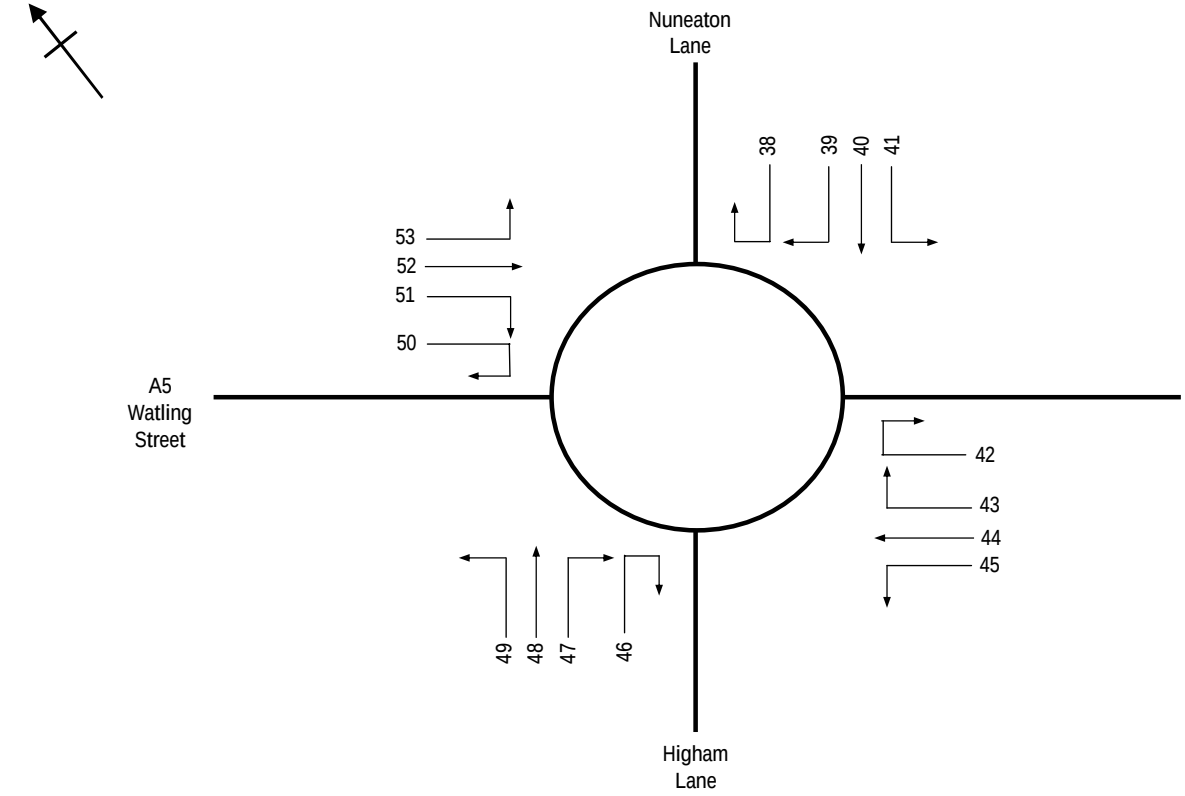
Appendix B

A5 Watling Street/A47 - Wednesday 26 September 2007

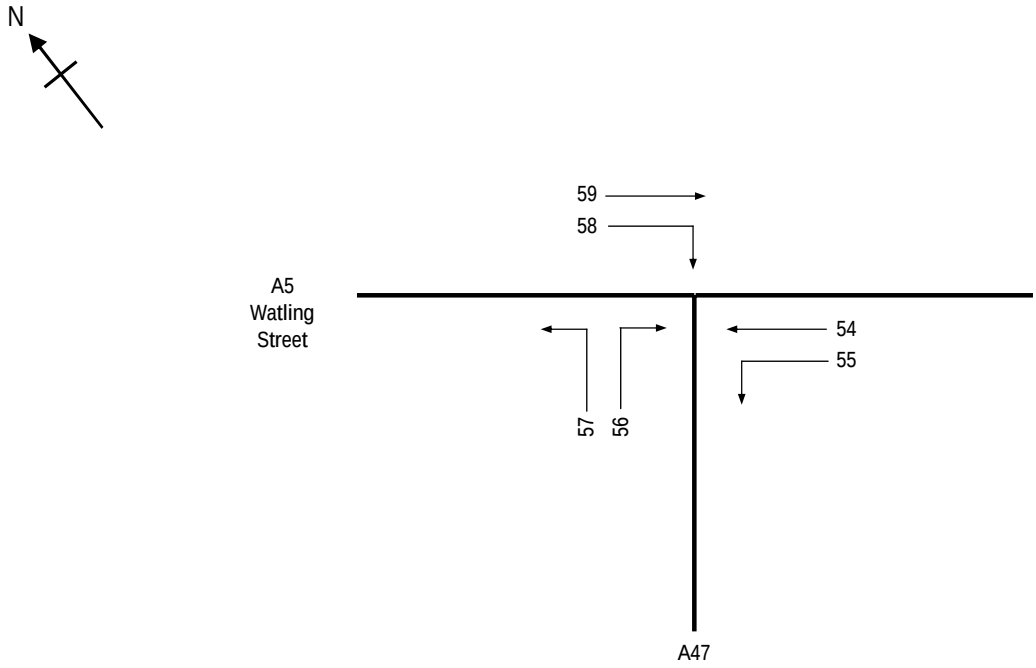
Time Beginning	54							55							56						
	PC	MC	CAR	LGV	OGV1	OGV2	PSV	PC	MC	CAR	LGV	OGV1	OGV2	PSV	PC	MC	CAR	LGV	OGV1	OGV2	PSV
0700	0	0	99	14	4	10	0	2	1	128	14	1	6	0	5	2	122	7	4	4	1
0715	0	2	105	20	5	21	0	0	2	138	15	6	0	5	2	3	129	12	5	3	5
0730	0	1	108	16	3	18	2	0	3	138	24	8	3	1	1	3	194	12	7	5	4
0745	0	1	121	23	10	26	0	1	0	190	15	6	1	0	3	2	173	15	10	5	1
0800	0	1	130	21	3	17	1	2	2	222	28	12	2	3	0	2	182	17	4	5	1
0815	0	0	128	19	2	19	0	0	3	177	19	5	5	2	0	0	174	14	6	2	0
0830	0	0	122	22	5	20	0	0	2	207	22	7	2	3	0	0	119	11	4	3	1
0845	0	5	104	18	6	20	1	1	1	192	21	7	6	5	0	4	120	17	7	6	2
0900	0	0	80	18	6	29	1	0	3	150	18	9	2	3	0	0	112	10	6	6	5
0915	0	1	92	26	6	25	1	0	1	145	15	7	2	3	0	0	110	12	8	6	2
0930	0	0	81	18	4	20	1	0	0	125	18	8	7	2	0	1	83	11	11	5	2
0945	0	0	72	19	7	22	2	0	1	110	21	8	2	1	0	0	80	14	7	7	2
1600	1	1	125	9	5	14	1	4	6	204	15	8	3	3	0	3	180	22	1	3	1
1615	0	3	156	17	2	12	1	0	2	174	20	6	4	3	0	1	154	14	5	2	1
1630	0	4	135	17	3	18	0	1	3	160	19	3	4	2	0	3	188	16	3	5	0
1645	0	2	135	18	2	11	0	4	1	144	24	3	1	2	2	0	201	10	3	4	3
1700	0	0	152	10	2	11	1	7	3	132	15	0	0	1	4	2	190	16	1	1	3
1715	0	0	162	12	4	12	0	4	1	203	21	2	3	3	0	6	184	10	3	1	0
1730	0	1	144	12	2	10	0	0	1	166	12	1	1	1	2	2	197	12	3	2	2
1745	0	0	155	13	4	12	0	0	0	175	12	3	1	1	1	2	190	14	1	0	2
1800	0	2	157	16	3	10	1	0	2	164	14	1	2	1	0	2	175	12	1	1	1
1815	0	3	155	7	4	8	1	0	5	146	10	0	2	2	0	0	129	9	1	0	0
1830	0	2	98	6	0	5	0	0	0	128	9	1	4	0	0	3	161	10	1	4	0
1845	0	1	102	6	1	9	0	0	1	99	8	4	2	3	1	2	112	4	0	3	2

Time Beginning	57							58							59						
	PC	MC	CAR	LGV	OGV1	OGV2	PSV	PC	MC	CAR	LGV	OGV1	OGV2	PSV	PC	MC	CAR	LGV	OGV1	OGV2	PSV
0700	0	0	7	2	0	2	0	0	1	6	2	0	0	0	0	0	138	24	5	28	0
0715	1	0	12	2	0	1	0	0	0	12	3	0	0	0	0	2	163	20	6	21	1
0730	0	0	10	2	1	1	0	0	0	7	4	1	3	0	0	3	142	24	1	21	0
0745	1	0	16	3	1	0	0	0	0	10	3	0	1	0	0	1	141	29	5	15	0
0800	0	0	12	4	2	0	0	0	0	11	5	1	1	0	0	2	133	20	6	16	0
0815	1	0	18	3	2	1	0	0	0	16	2	0	2	0	0	0	131	14	4	20	1
0830	0	0	14	3	1	0	0	0	0	18	3	0	5	0	0	1	131	14	6	21	3
0845	0	0	15	3	0	0	0	0	0	19	4	0	0	0	0	1	131	20	5	22	1
0900	1	0	15	7	2	1	1	0	0	15	3	0	1	0	0	1	102	22	7	18	1
0915	1	0	7	2	0	0	0	0	0	11	4	0	1	2	0	1	90	21	8	20	0
0930	0	0	8	5	1	1	0	0	0	13	4	0	0	0	0	0	74	22	5	18	0
0945	1	0	11	5	1	0	0	0	0	13	5	1	3	0	0	1	63	10	7	20	0
1600	0	0	17	3	2	1	0	0	0	11	3	0	1	0	1	2	97	16	7	15	2
1615	0	0	14	1	1	0	0	0	0	14	3	2	0	0	1	1	125	20	4	9	1
1630	1	0	24	3	3	1	0	0	0	12	1	2	1	0	2	3	134	24	5	10	0
1645	0	0	23	1	1	0	0	0	0	14	2	0	1	0	1	0	123	15	4	9	1
1700	0	0	21	1	0	0	0	0	0	10	3	0	0	0	0	2	122	15	3	11	1
1715	0	0	21	2	1	0	0	0	0	11	0	0	0	1	0	1	143	21	3	10	0
1730	0	0	20	2	0	1	0	0	0	19	1	1	0	0	0	0	133	8	2	9	0
1745	0	0	21	1	0	0	0	0	0	14	1	1	0	0	0	2	122	11	4	7	1
1800	0	0	20	3	0	0	0	0	0	14	0	0	0	0	0	2	89	10	1	9	0
1815	0	0	7	0	0	0	0	0	0	12	1	0	0	0	0	2	83	8	2	7	1
1830	0	0	10	1	1	0	0	0	0	15	0	0	0	0	1	1	86	9	0	9	0
1845	0	0	9	1	0	0	0	0	0	9	0	1	0	0	1	0	65	8	1	11	0

JUNCTION 4



JUNCTION 5



DRAWING TITLE: TRAFFIC MOVEMENT REFERENCE			
JOB TITLE: 2007.230 NUNEATON			
DRAWN BY: RKN	DATE: SEPT 2007	SCALE: NTS	REF: FIGURE 2

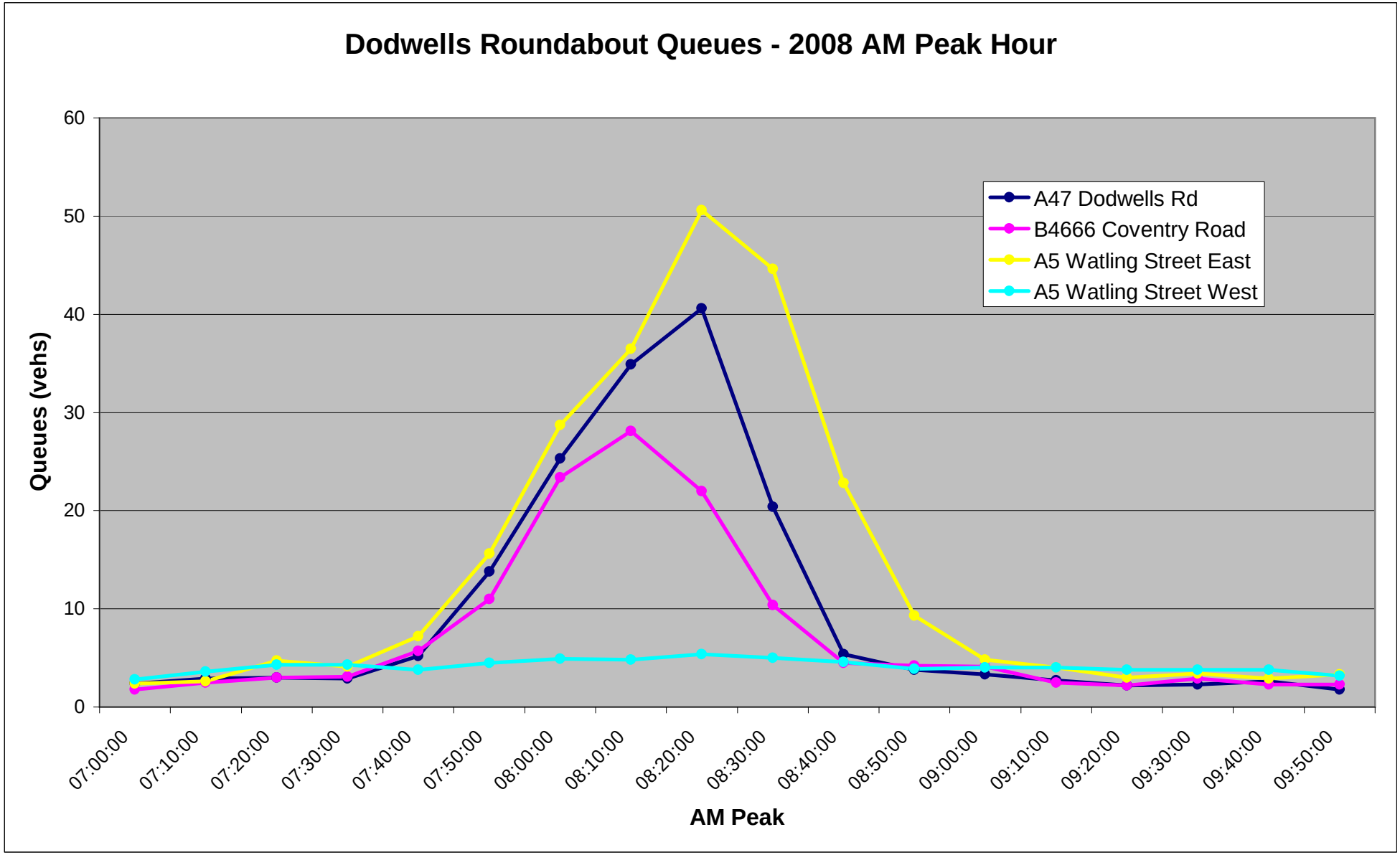
signal surveys

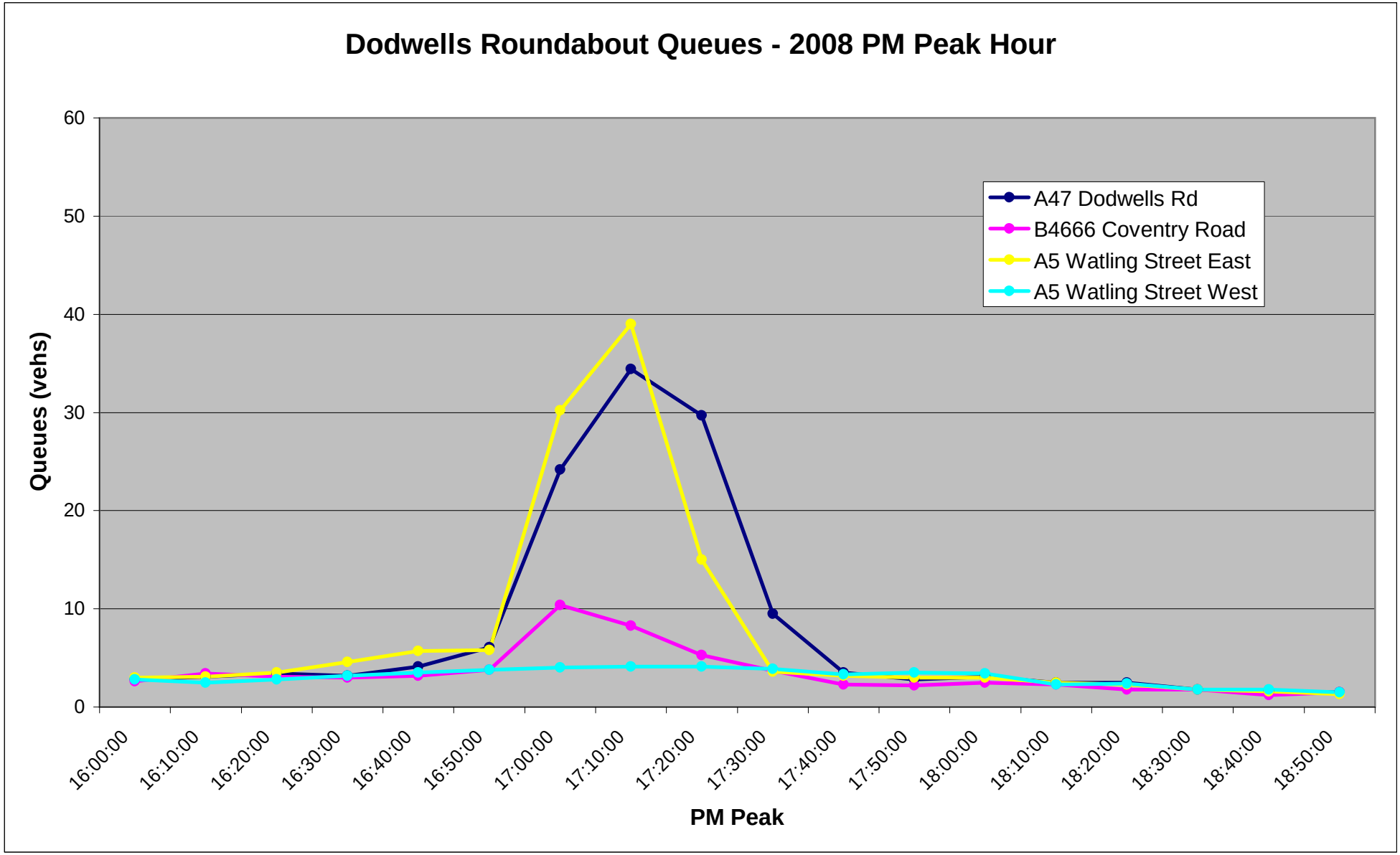
Traffic Counts and Car Park Surveys

Parkway House, Palatine Road, Northenden, Manchester, M22 4DB

Tel 0161 998 4226 Fax 0161 998 1189

Appendix C


Dodwells Roundabout Queues - 2008 AM Peak Hour
Queues (vehs)
60
50
40
30
20
10
0
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
08:40:00
08:50:00
09:00:00
09:10:00
09:20:00
09:30:00
09:40:00
09:50:00
AM Peak
A47 Dodwells Rd
B4666 Coventry Road
A5 Watling Street East
A5 Watling Street West


Dodwells Roundabout Queues - 2008 PM Peak Hour
Queues (vehs)
60
50
40
30
20
10
0
A47 Dodwells Rd
B4666 Coventry Road
A5 Watling Street East
A5 Watling Street West
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
17:40:00
17:50:00
18:00:00
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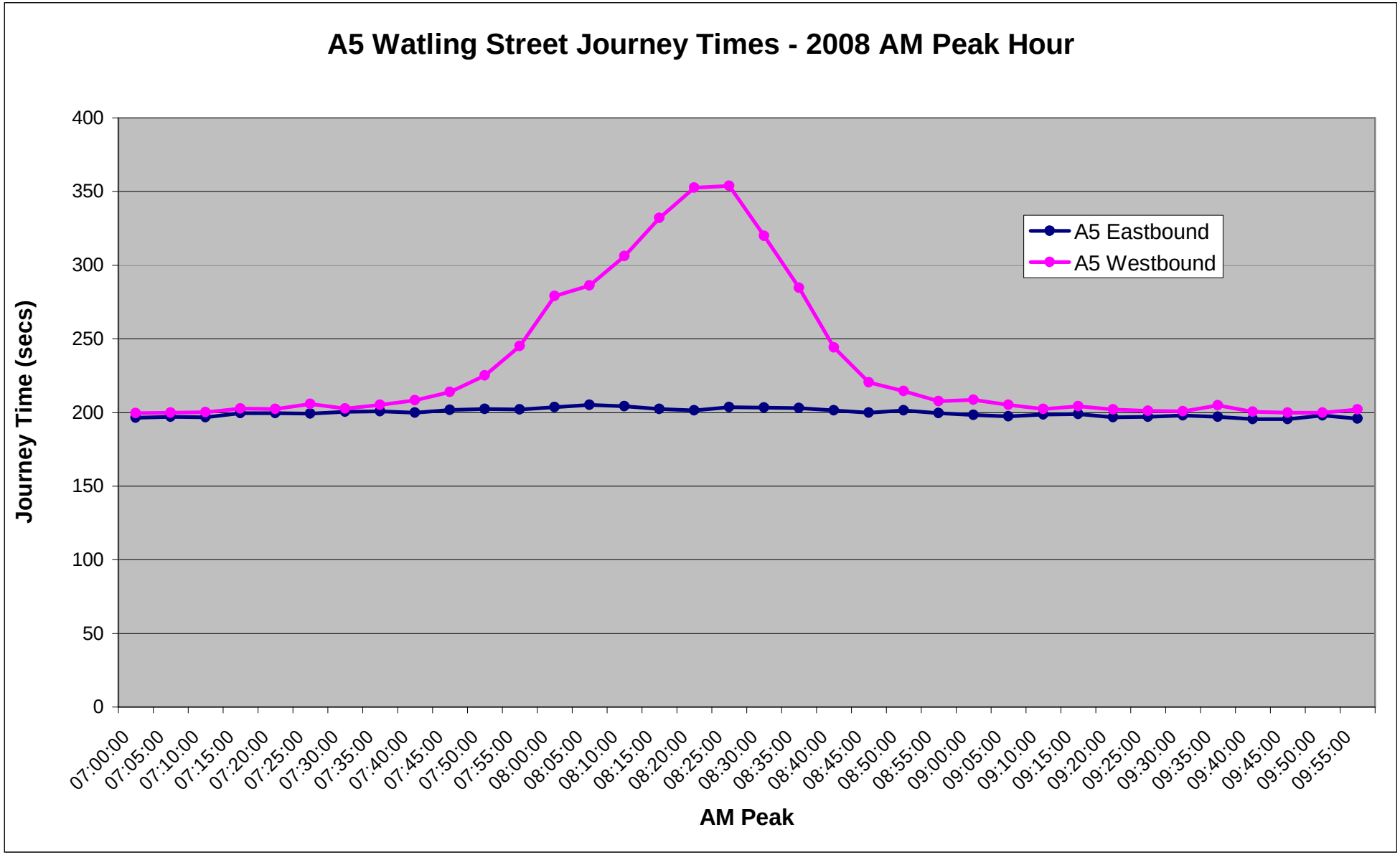
18:20:00
18:30:00
18:40:00
18:50:00
PM Peak


A5 Watling Street Journey Times - 2008 AM Peak Hour
Journey Time (secs)
400
350
300
250
200
150
100
50
0
A5 Eastbound
A5 Westbound
07:00:00
07:05:00
07:10:00
07:15:00
07:20:00
07:25:00
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00
09:10:00
09:15:00
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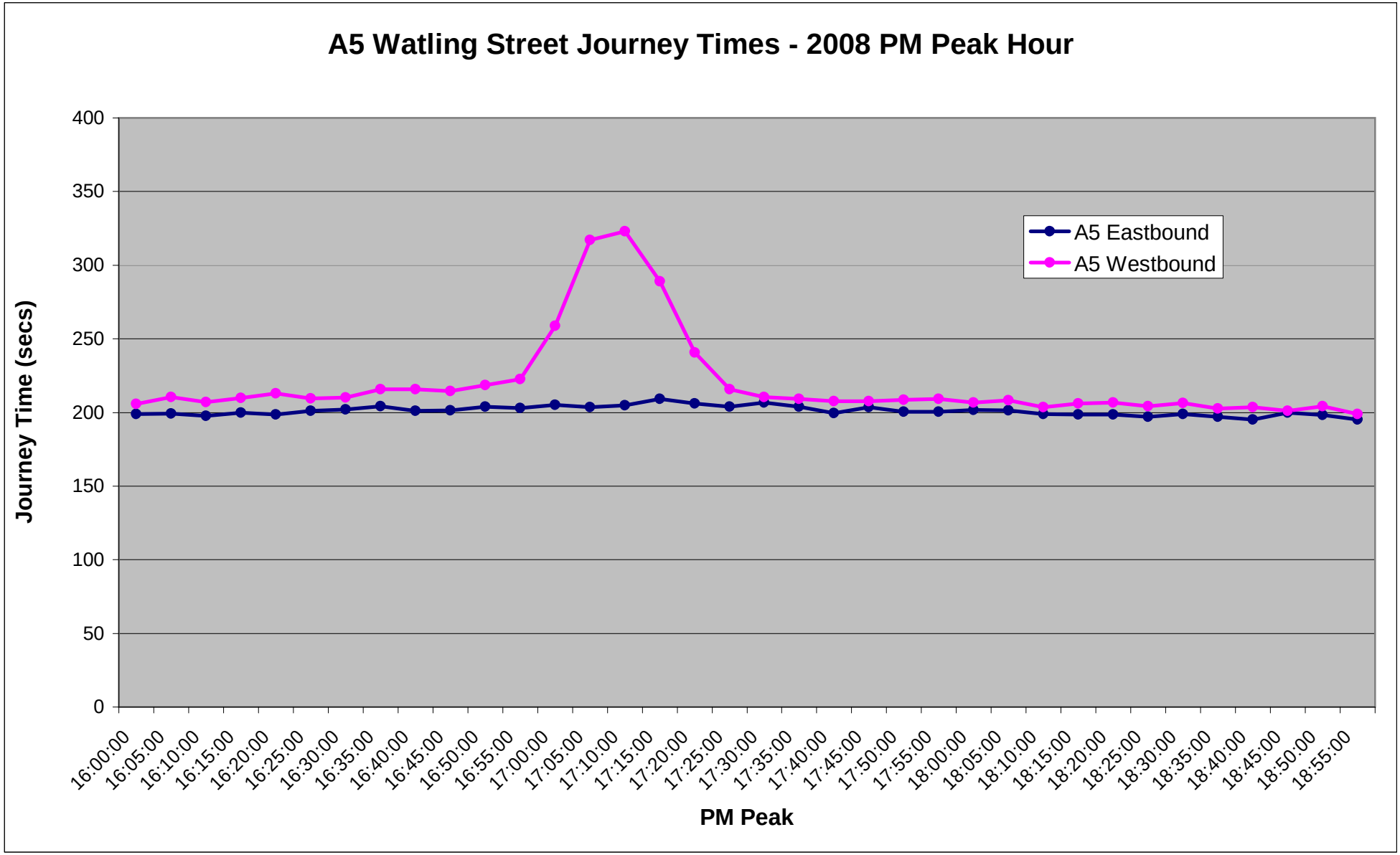
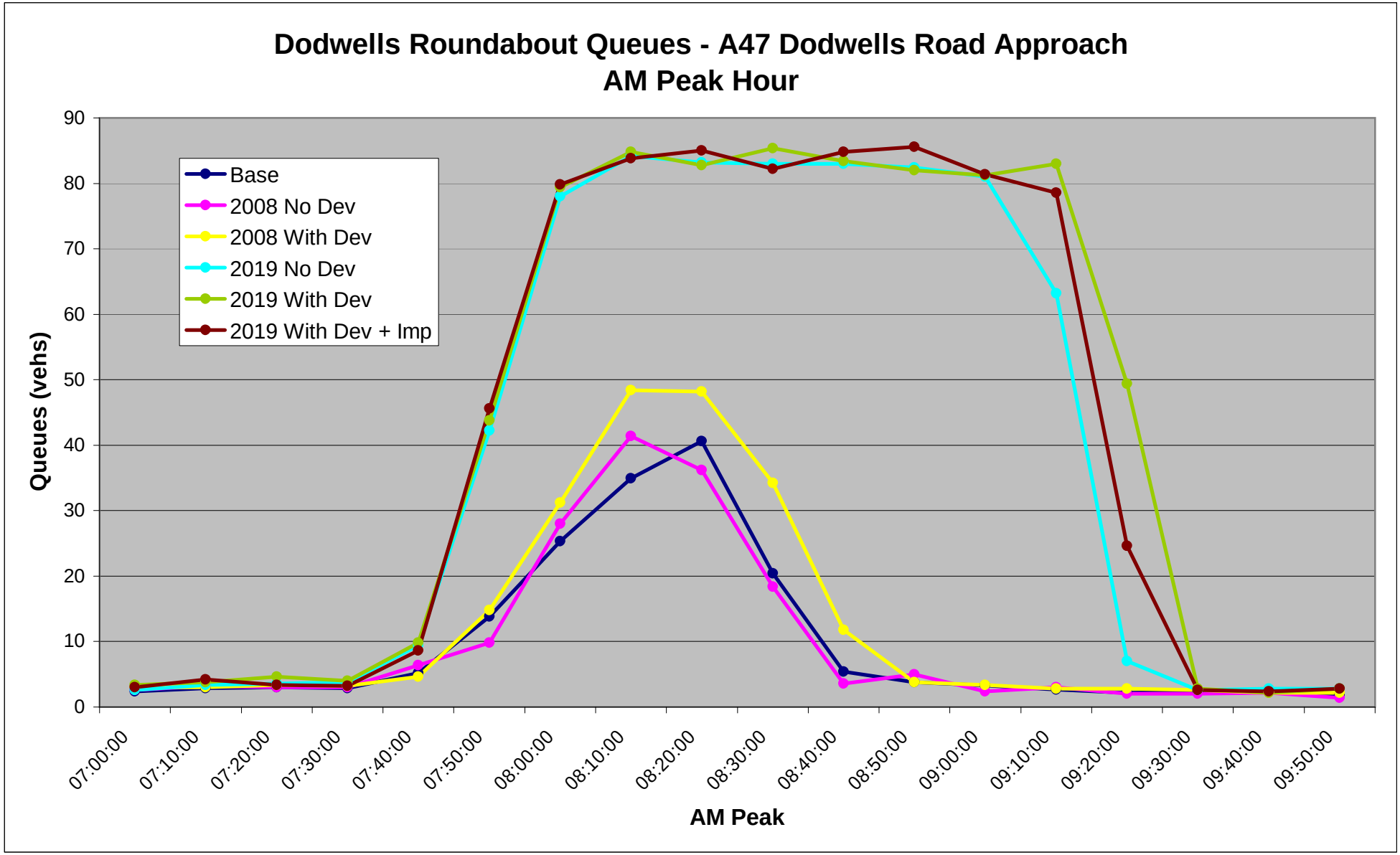
09:40:00
09:45:00
09:50:00
09:55:00
AM Peak


A5 Watling Street Journey Times - 2008 PM Peak Hour
Journey Time (secs)
400
350
300
250
200
150
100
50
0
A5 Eastbound
A5 Westbound
16:00:00
16:05:00
16:10:00
16:15:00
16:20:00
16:25:00
16:30:00
16:35:00
16:40:00
16:45:00
16:50:00
16:55:00
17:00:00
17:05:00
17:10:00
17:15:00
17:20:00
17:25:00
17:30:00
17:35:00
17:40:00
17:45:00
17:50:00
17:55:00
18:00:00
18:05:00
18:10:00
18:15:00
18:20:00
18:25:00
18:30:00
18:35:00
18:40:00
18:45:00
18:50:00
18:55:00
PM Peak

Appendix D


Dodwells Roundabout Queues - A47 Dodwells Road Approach
AM Peak Hour
Queues (vehs)
AM Peak
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
0
10
20
30
40
50
60
70
80
90
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
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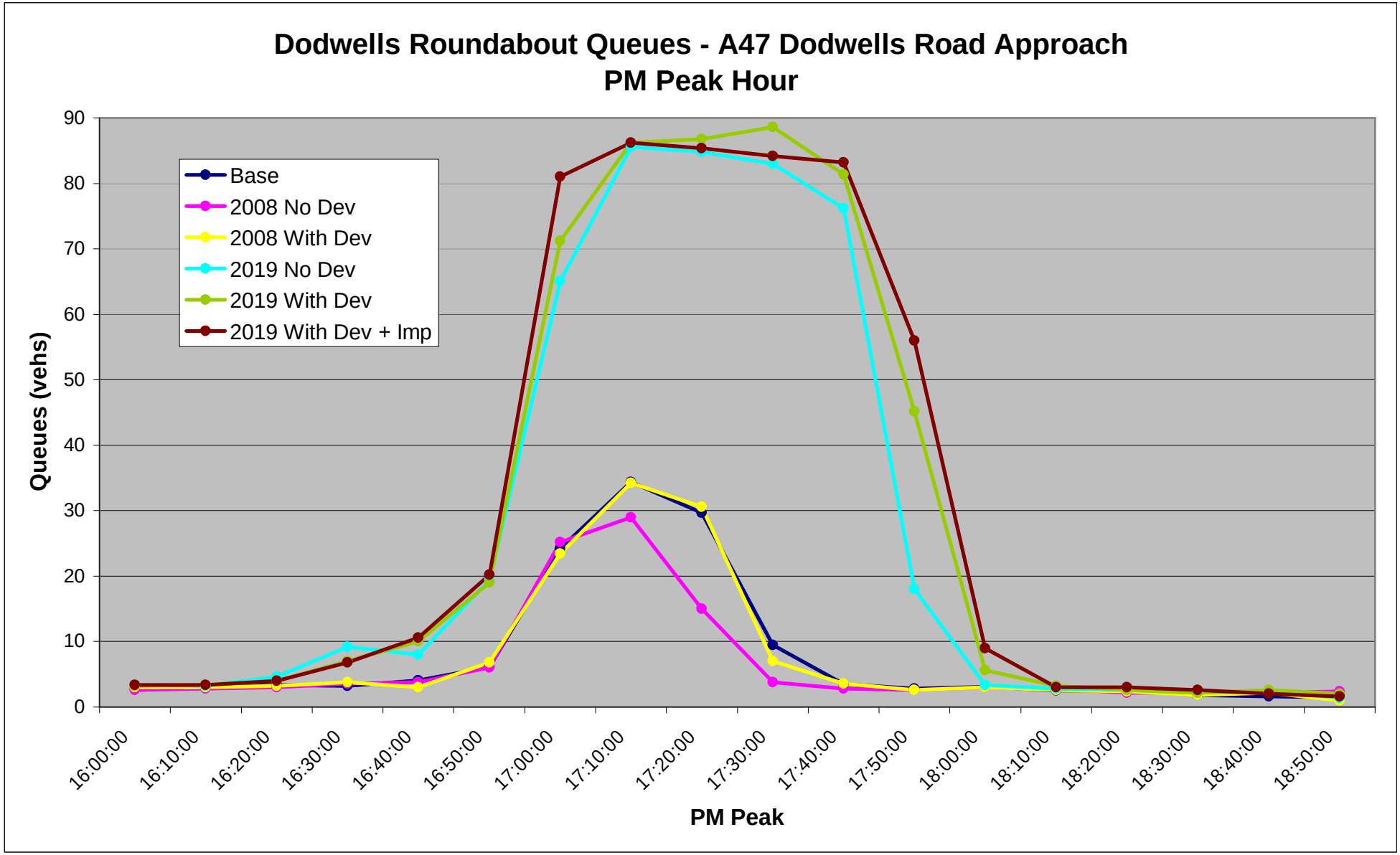
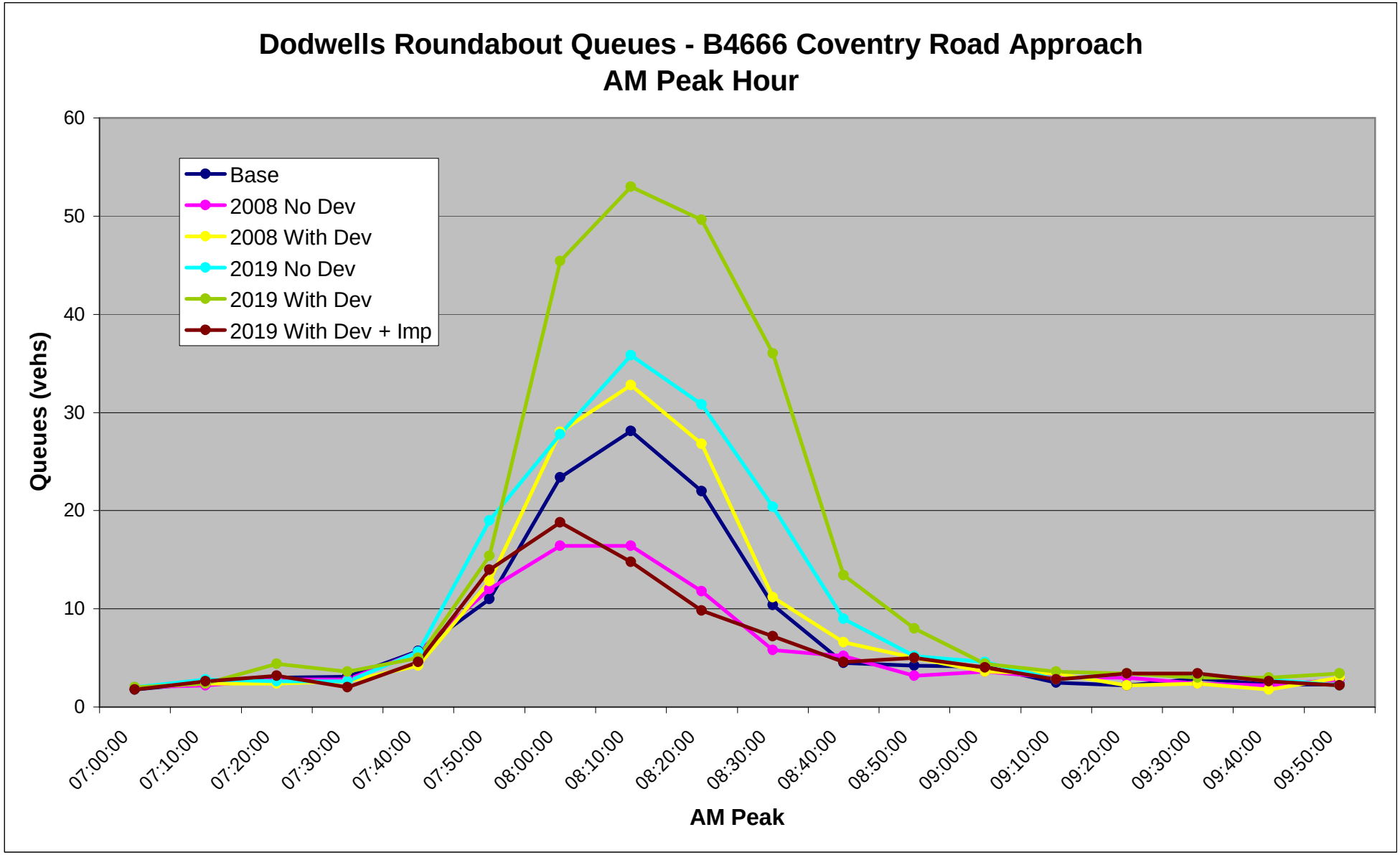
09:40:00
09:50:00


Dodwells Roundabout Queues - A47 Dodwells Road Approach
PM Peak Hour
Queues (vehs)
90
80
70
60
50
40
30
20
10
0
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
17:40:00
17:50:00
18:00:00
18:10:00
18:20:00
18:30:00
18:40:00
18:50:00
PM Peak


Dodwells Roundabout Queues - B4666 Coventry Road Approach
AM Peak Hour
Queues (vehs)
60
50
40
30
20
10
0
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
08:40:00
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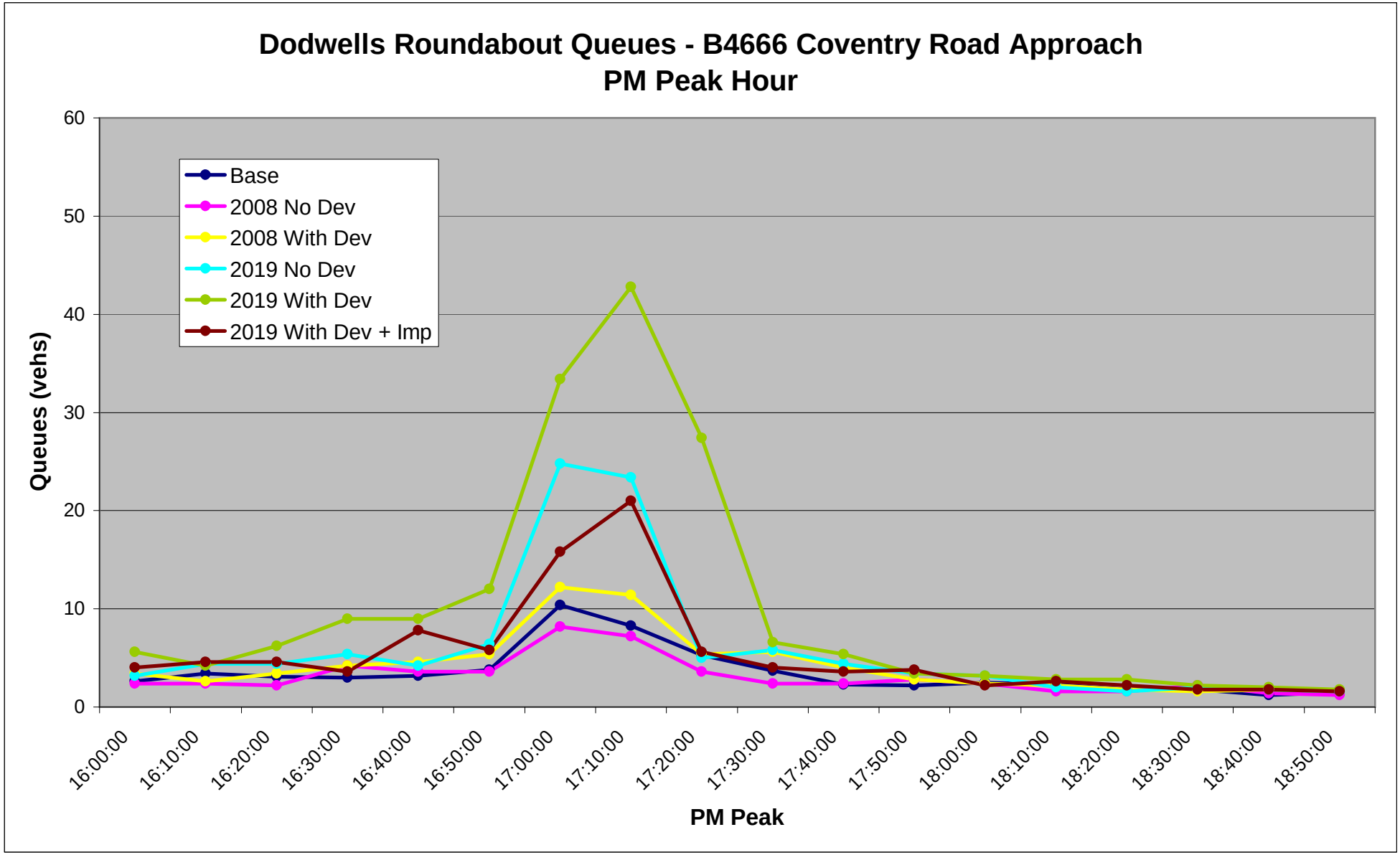
09:40:00
09:50:00
AM Peak


Dodwells Roundabout Queues - B4666 Coventry Road Approach
PM Peak Hour
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
Queues (vehs)
0
10
20
30
40
50
60
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
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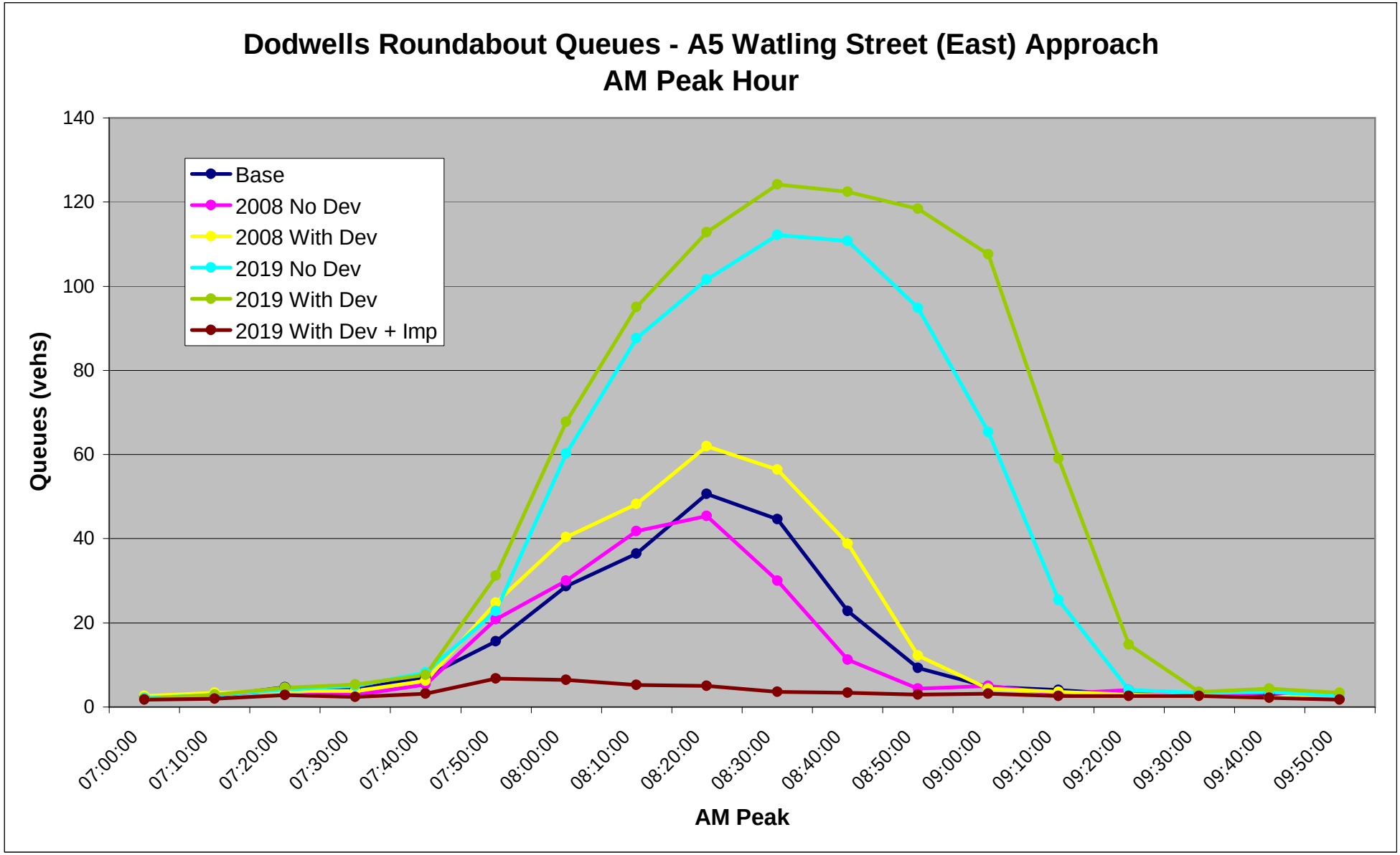
18:40:00
18:50:00
PM Peak


Dodwells Roundabout Queues - A5 Watling Street (East) Approach
AM Peak Hour
Queues (vehs)
140
120
100
80
60
40
20
0
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
08:40:00
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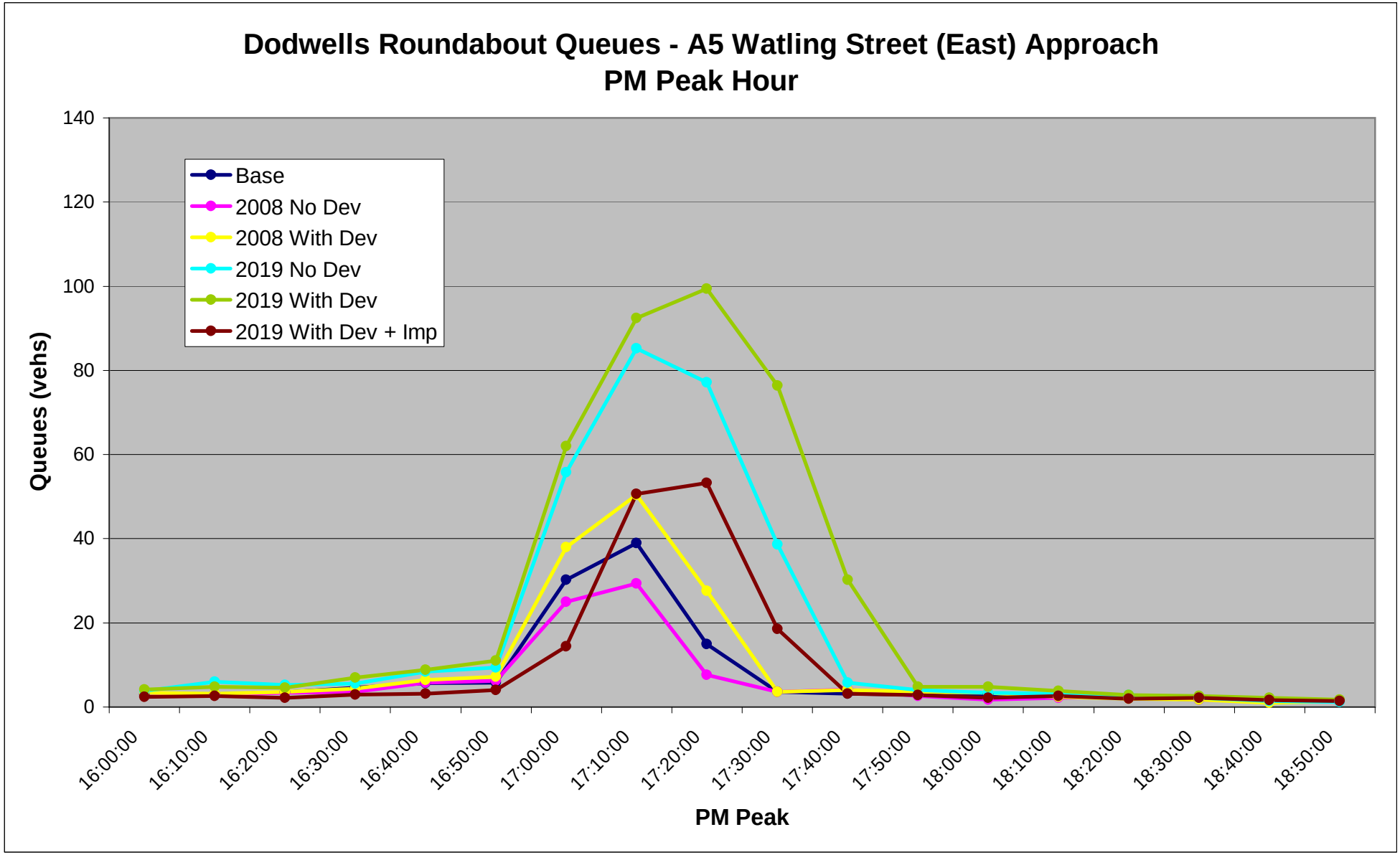
09:00:00
09:10:00
09:20:00
09:30:00
09:40:00
09:50:00
AM Peak


Dodwells Roundabout Queues - A5 Watling Street (East) Approach
PM Peak Hour
Queues (vehs)
140
120
100
80
60
40
20
0
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
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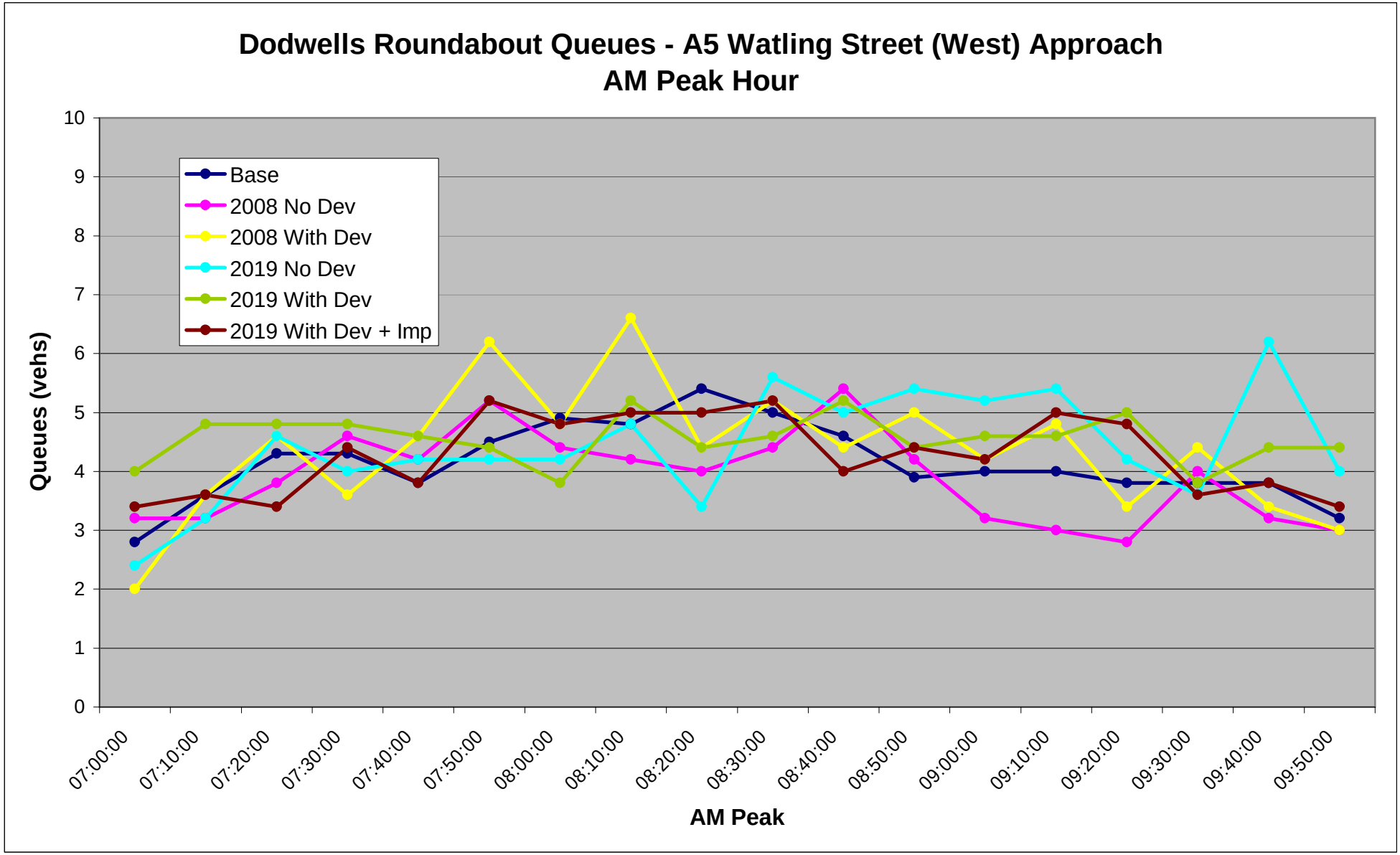
18:40:00
18:50:00
PM Peak


Dodwells Roundabout Queues - A5 Watling Street (West) Approach
AM Peak Hour
Queues (vehs)
AM Peak
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
0
1
2
3
4
5
6
7
8
9
10
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
08:40:00
08:50:00
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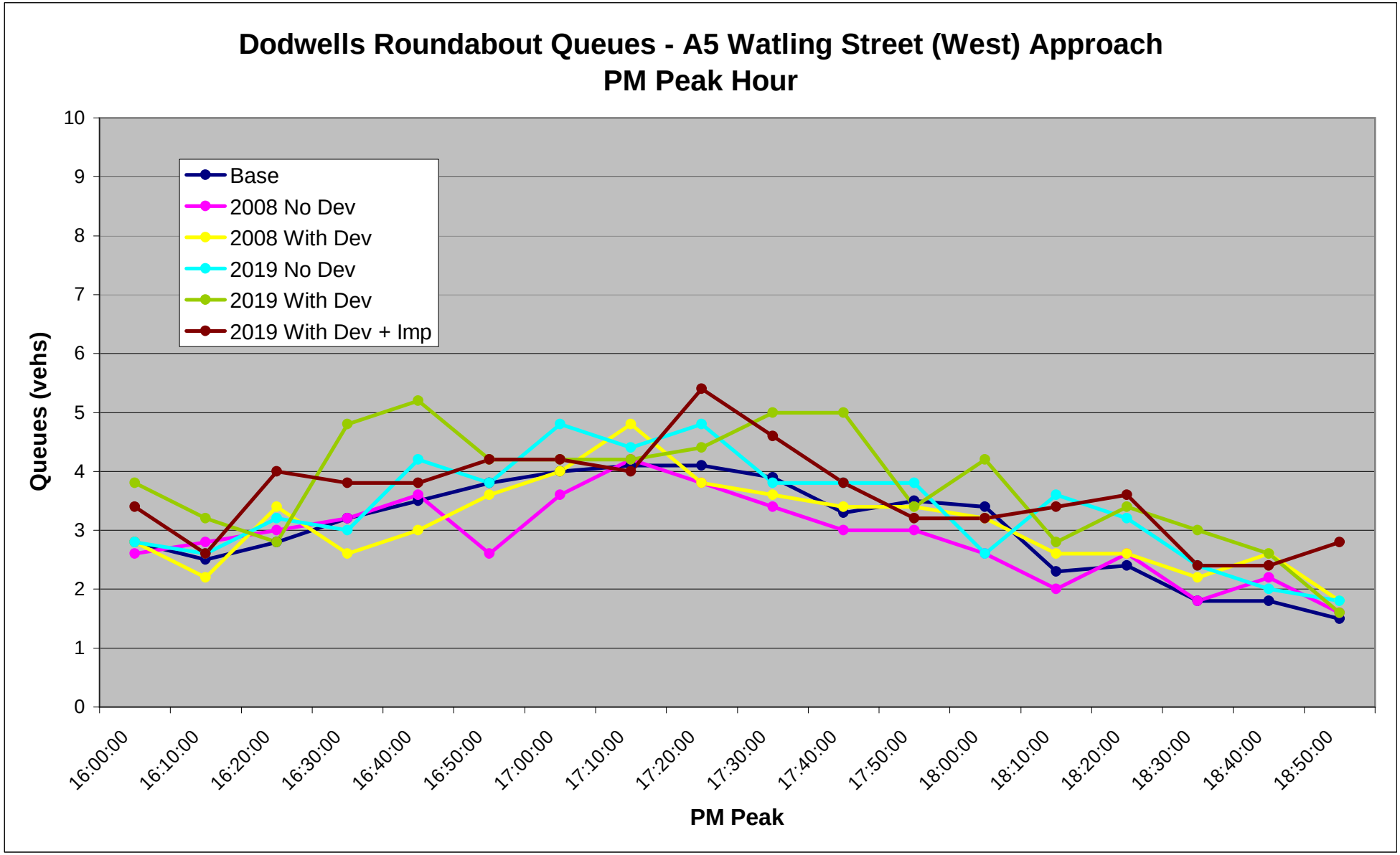
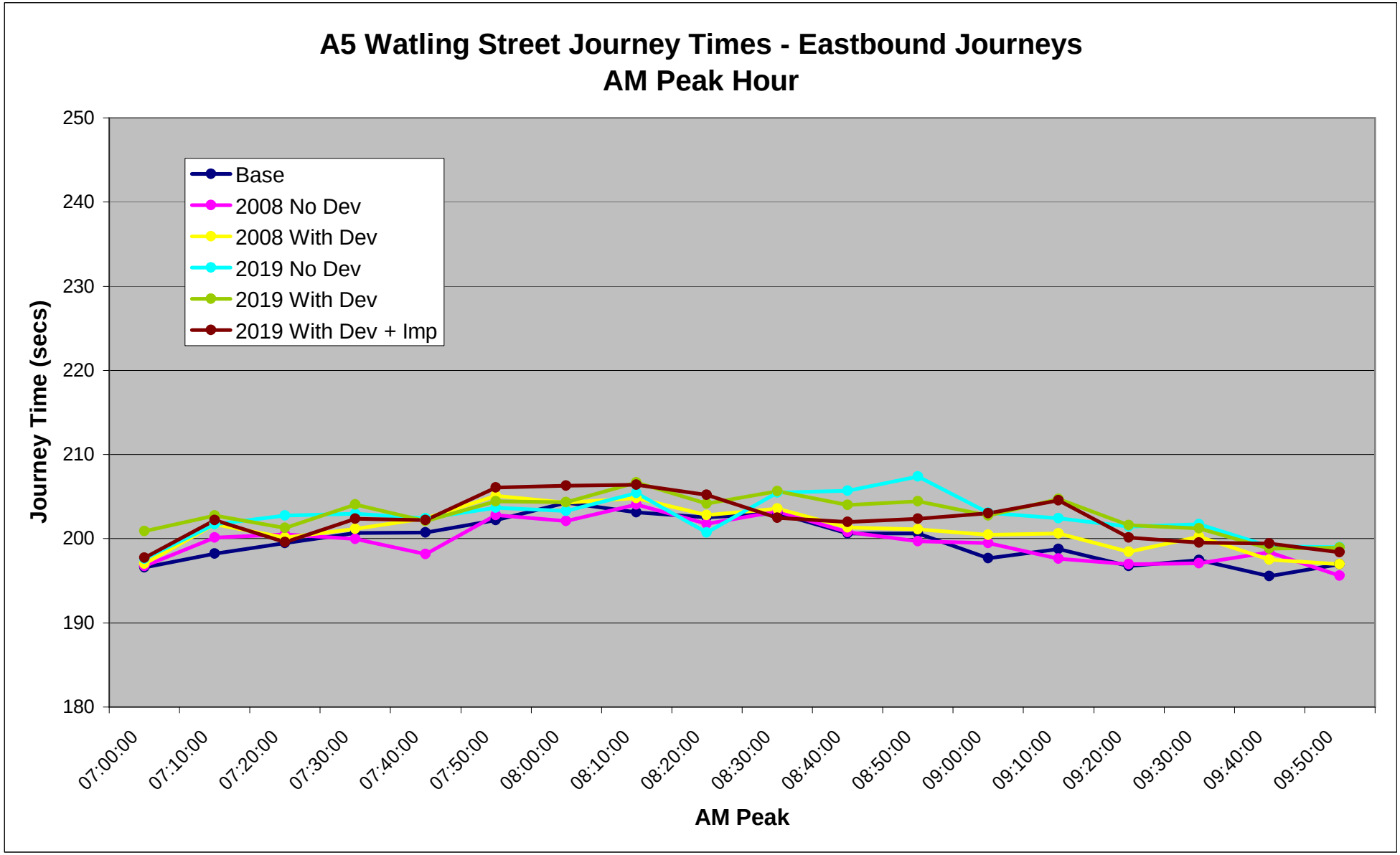
09:20:00
09:30:00
09:40:00
09:50:00


Dodwells Roundabout Queues - A5 Watling Street (West) Approach
PM Peak Hour
Queues (vehs)
PM Peak
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
0
1
2
3
4
5
6
7
8
9
10
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
17:40:00
17:50:00
18:00:00
18:10:00
18:20:00
18:30:00
18:40:00
18:50:00

Appendix E


A5 Watling Street Journey Times - Eastbound Journeys
AM Peak Hour
Journey Time (secs)
250
240
230
220
210
200
190
180
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
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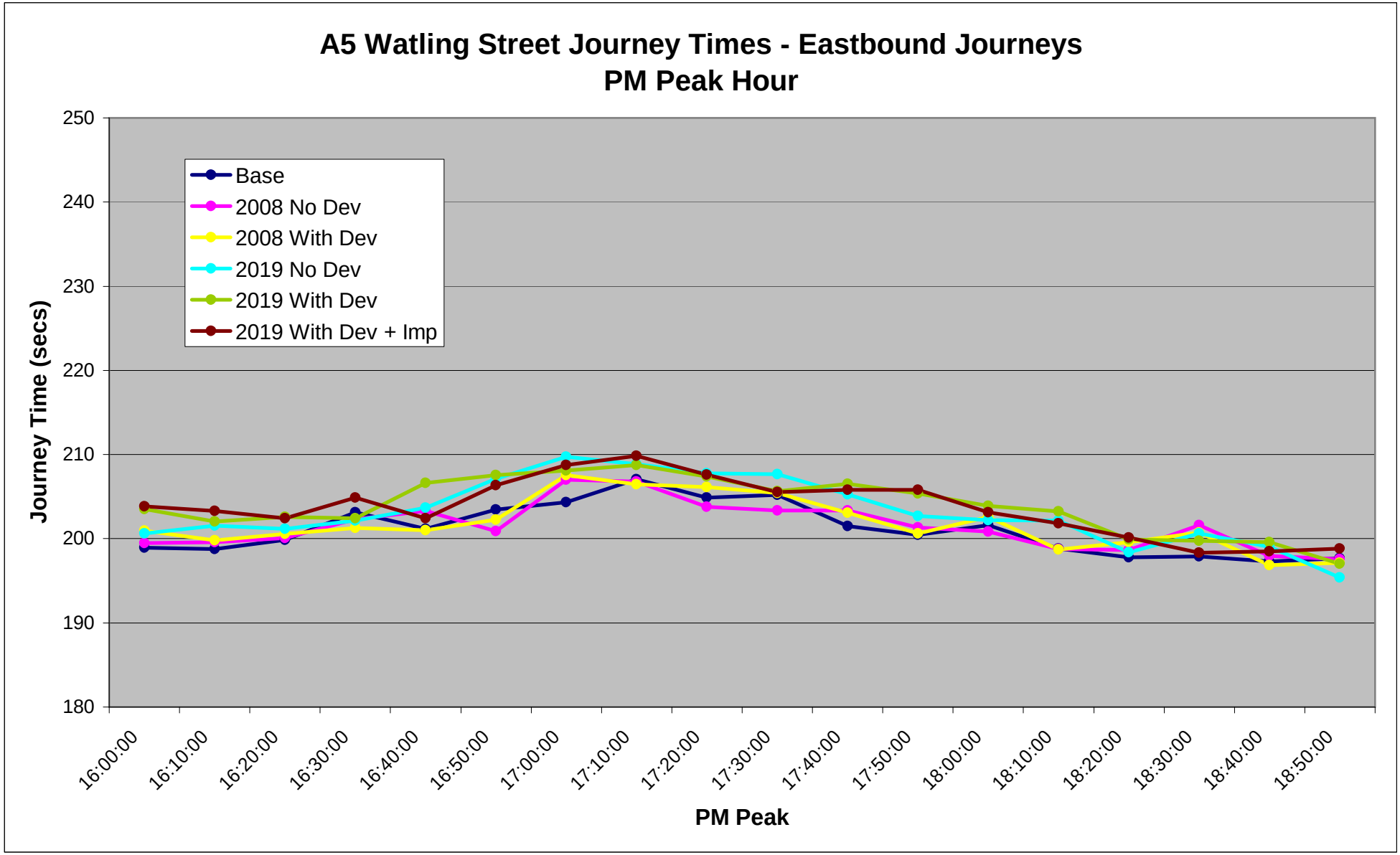
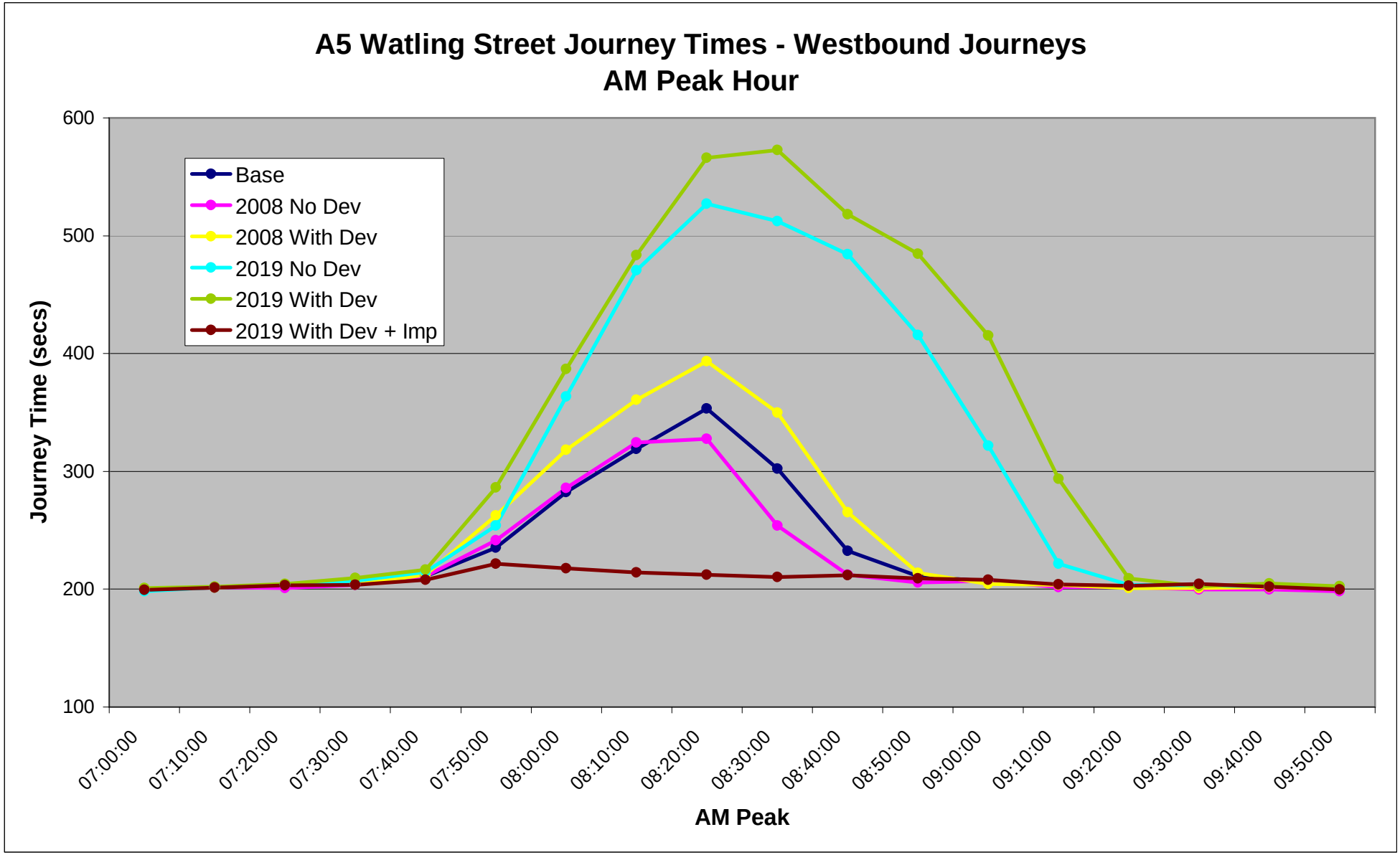
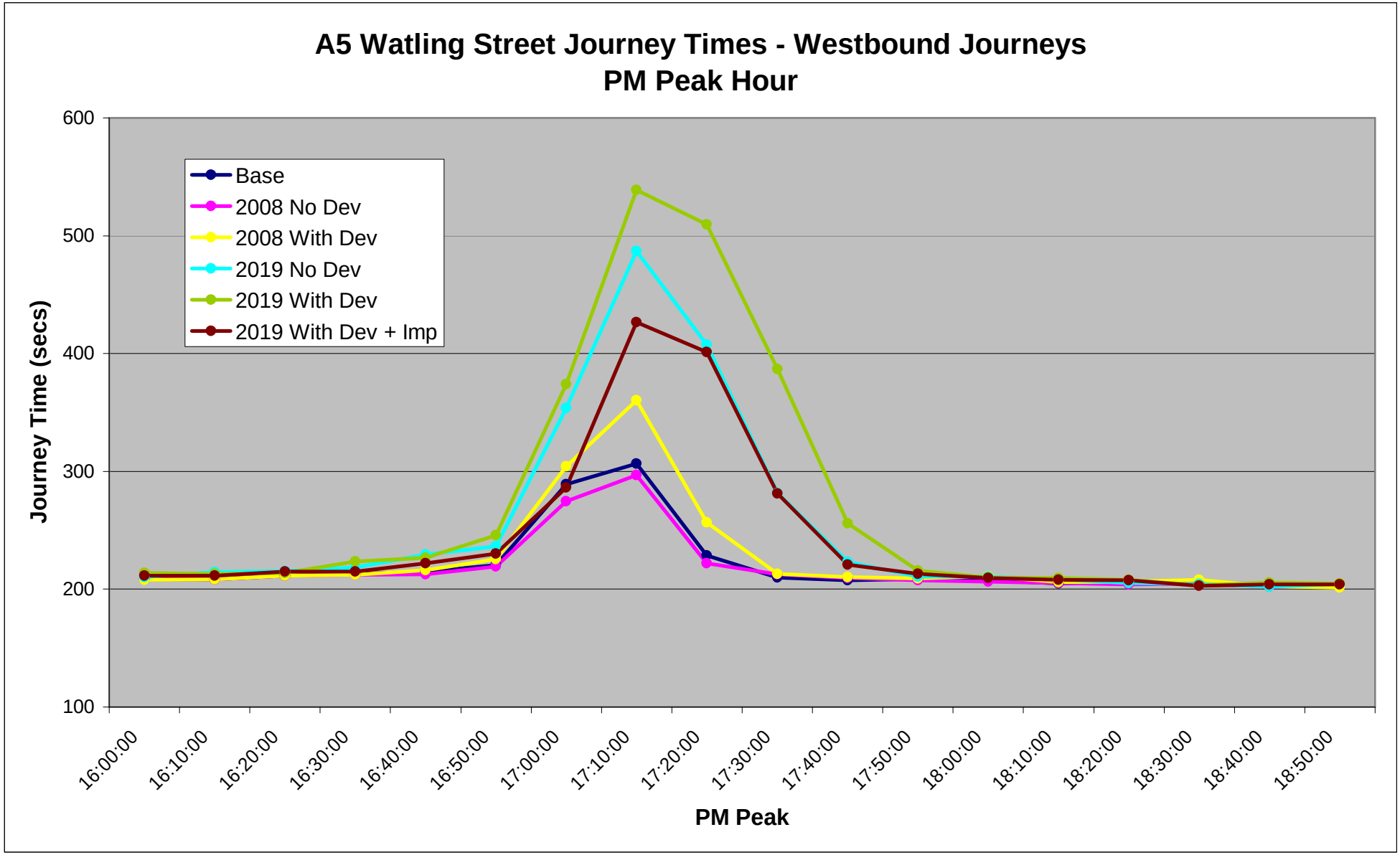
09:20:00
09:30:00
09:40:00
09:50:00
AM Peak


A5 Watling Street Journey Times - Eastbound Journeys
PM Peak Hour
Journey Time (secs)
250
240
230
220
210
200
190
180
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
17:40:00
17:50:00
18:00:00
18:10:00
18:20:00
18:30:00
18:40:00
18:50:00
PM Peak


A5 Watling Street Journey Times - Westbound Journeys
AM Peak Hour
Journey Time (secs)
600
500
400
300
200
100
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
07:00:00
07:10:00
07:20:00
07:30:00
07:40:00
07:50:00
08:00:00
08:10:00
08:20:00
08:30:00
08:40:00
08:50:00
09:00:00
09:10:00
09:20:00
09:30:00
09:40:00
09:50:00
AM Peak


A5 Watling Street Journey Times - Westbound Journeys
PM Peak Hour
Journey Time (secs)
600
500
400
300
200
100
Base
2008 No Dev
2008 With Dev
2019 No Dev
2019 With Dev
2019 With Dev + Imp
16:00:00
16:10:00
16:20:00
16:30:00
16:40:00
16:50:00
17:00:00
17:10:00
17:20:00
17:30:00
17:40:00
17:50:00
18:00:00
18:10:00
18:20:00
18:30:00
18:40:00
18:50:00
PM Peak