

A34/M4 Chieveley Improvement

ONE YEAR AFTER STUDY

March 2006

Contents

<i>Section</i>	<i>Page</i>
Executive Summary	i
1. Introduction	1
Purpose of this Report	1
Background	1
Approach	2
Report Format	3
2. Changes in Traffic Volumes and Journey Times	4
Introduction	4
Data Collection	4
Results of Traffic Counts	7
Journey Time Results	11
3. Safety	14
Introduction	14
Pope Methodology for Accident Benefits	16
4. Economy	18
Introduction	18
The POPE methodology	18
COBA Re-evaluation	19
Comparison of POPE and COBA Methodologies	20
Route Stress	21
Re-Evaluation of Scheme Costs	21
5. Environment, Accessibility and Integration Objectives	23
Introduction	23
Noise	23
Local Air Quality	23
Landscape	24
Biodiversity	24
Heritage	24
Water	24
Accessibility	24

Integration	25
6. Appraisal and Evaluation Summary Tables	26
Introduction	26
The Evaluation Summary Table	26
7. Conclusions	28
Annex A: Automatic Traffic Counts	1
Annex B: Turning Counts	1
Annex C: Journey Times	1

List of Tables

Table 2.1 – Highways Agency Monitoring Sites	5
Table 2.2 – Changes in Flow across Screenlines	8
Table 2.3 – Comparison of Predicted and Observed AADTs	10
Table 2.4 – ‘Before’ & ‘After’ Journey Times (mm:ss) on the A34	12
Table 2.5 – Journey Times - Before	13
Table 2.6 – Journey Times via roundabout - After	13
Table 2.7 – Journey Times via Underpass – After	13
Table 3.1 – Variations in Accidents and Casualties by Year	15
Table 3.2 – Annual Rates of Accidents and Casualties	15
Table 3.3 – Projected 30-Year Accident Reductions	16
Table 3.4 – Comparison of Predicted and Actual Numbers of Accidents	16
Table 3.5 – Predicted and Actual Accident Benefits	17
Table 6.1 – Combined AST & EST	27

List of Figures

Figure 1.1 – Location of A34/M4 Chieveley Improvement	1
Figure 1.2 – Scheme Layout	2
Figure 2.1 – Locations of ‘Before’ Traffic Counts	6
Figure 2.2 – Locations of New ‘After’ Count Sites	7
Figure 2.3 – Average Weekday 24-hour Traffic Flows, ‘Before’ and ‘After’, with Screenlines	9
Figure 2.4 – ‘Before’ Journey Time Route with Timing Points	11
Figure 3.1 – Area where Accident Records were Obtained	14

Executive Summary

The Highways Agency operates a Post Opening Project Evaluation (POPE) programme to review the success of its projects, with reviews after one and five years. This report documents the 'One Year After' review for the A34/M4 Chieveley Improvement.

The A34/M4 Chieveley Improvement officially opened on the 23rd September 2004. The scheme is situated at Junction 13 of the M4 motorway, north of Newbury, and provides an underpass on the A34 to divert through-traffic from the congested roundabout. In addition, new access roads were built for the service area which contains two hotels.

'Before' and 'After' traffic data were collected, including:

- ◆ Volume counts on the A34 and slip roads;
- ◆ Turning counts at the roundabout;
- ◆ Journey time surveys; and
- ◆ Accident records covering the period from three years before opening to one year after opening.

The impact of the changes on the economic evaluation of the scheme has been assessed using:

- ◆ The 'POPE methodology', based on proportional changes to outcomes; and
- ◆ Re-running the COBA (Cost Benefit Analysis) model, used in the original assessment, with different assumptions and data.

The main findings of this 'One Year After' report are:

- ◆ Traffic crossing a screenline comprising the A34 and slip roads north of the M4 has increased by 8%.
- ◆ Traffic crossing a screenline comprising the A34 and slip roads south of the M4 has increased by 14%.
- ◆ Traffic using the M4 Junction 13 roundabout has fallen due to the construction of the underpass:
 - the number of north-south movements across the roundabout has fallen by 78%;
 - the total traffic using the roundabout has fallen by 29%;
- ◆ Construction of the underpass has speeded up journey times for through-traffic on the A34. Peak-hour time savings are up to 13 minutes southbound, and 3 minutes northbound.
- ◆ Over the course of a full day, observed time savings are less than those predicted by COBA modelling; the resultant economic benefits are therefore lower. This appears to be due to off-peak Do-Minimum junction delay times having been over-predicted in the COBA model.

ONE YEAR AFTER STUDY

A34/M4 Chieveley Improvement

- ◆ In the local area of influence of the Improvement, accident rates have fallen from 26 to 18 per year, and casualty rates from 39 to 29 per year. These reductions are considered to be mainly due to the scheme, rather than random variation.
- ◆ The actual construction cost (£69.9 million, at 2004 prices) was about 16% higher than forecast, in Present Value terms.

A 'Five-Year After' Report for the A34/M4 Chieveley Improvement will be prepared in 2009 to check these preliminary observations.

1. Introduction

PURPOSE OF THIS REPORT

- 1.1 This report represents the 'One-Year After' report for the A34/ M4 Junction 13 Chieveley Improvement, and has been prepared as part of the Highways Agency's Post Opening Project Evaluation (POPE) programme. This report specifically considers the re-evaluation of predicted benefits for the A34/ M4 Chieveley Junction Improvement.

BACKGROUND

- 1.2 The A34/M4 Chieveley Improvement officially opened on the 23rd September 2004. The scheme is situated at Junction 13 of the M4 motorway, north of Newbury, and the location is illustrated in Figure 1.1 below. The objective of the scheme was to provide an unimpeded flow of north-south through traffic on the A34 and to alleviate congestion at the roundabout and slip-roads of Junction 13 of the M4.

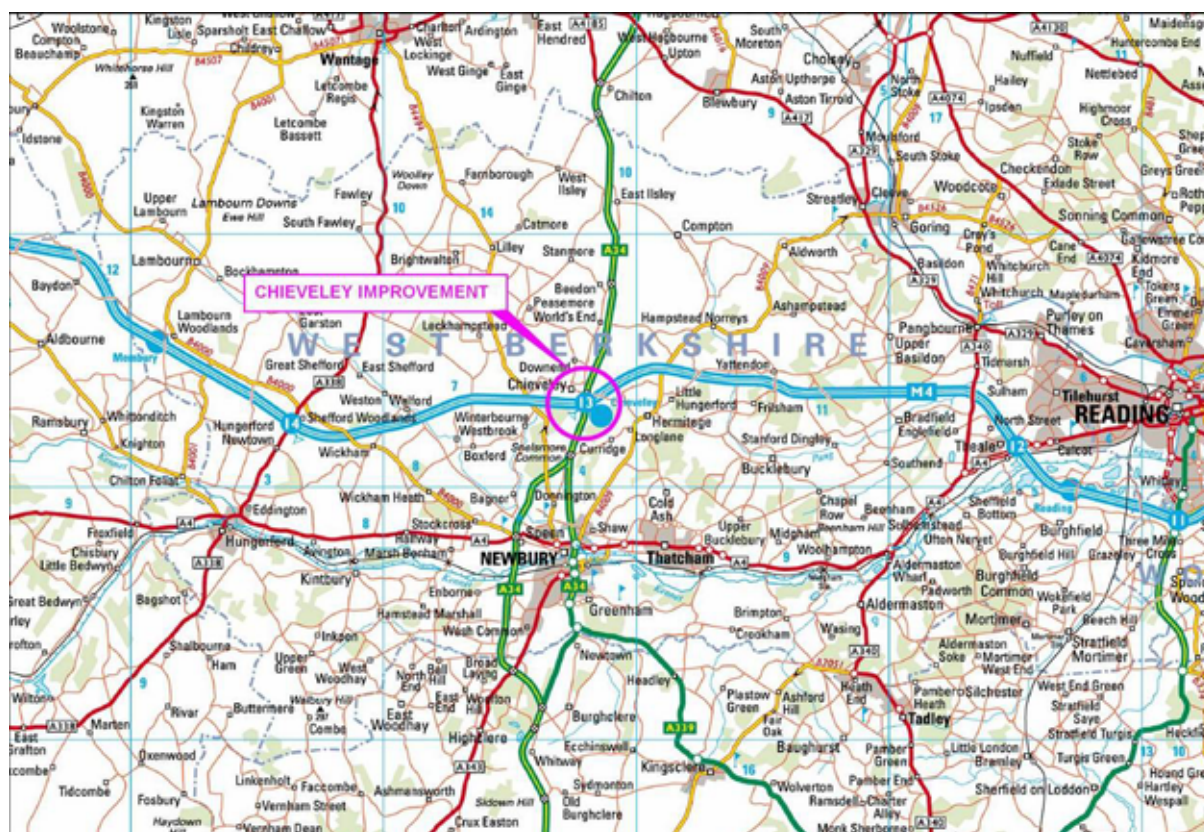


Figure 1.1 – Location of A34/M4 Chieveley Improvement

- 1.3 The scheme layout is shown in Figure 1.2. The Improvement provides nearly 3 km of new dual carriageway, diverting from the former A34 corridor at the north end of the

Newbury Bypass, crossing below the M4 motorway via an underpass west of the roundabout at Junction 13, and rejoining the existing A34 east of Chieveley village. Slip-roads connect the new A34 with the roundabout, which remains signalised. Connections with the highway network south of the M4 is provided by a new local single-carriageway Oxford Road, with a roundabout south of the Hilton Hotel, and two further roundabouts with local access roads southwest of the Chieveley Service Area.

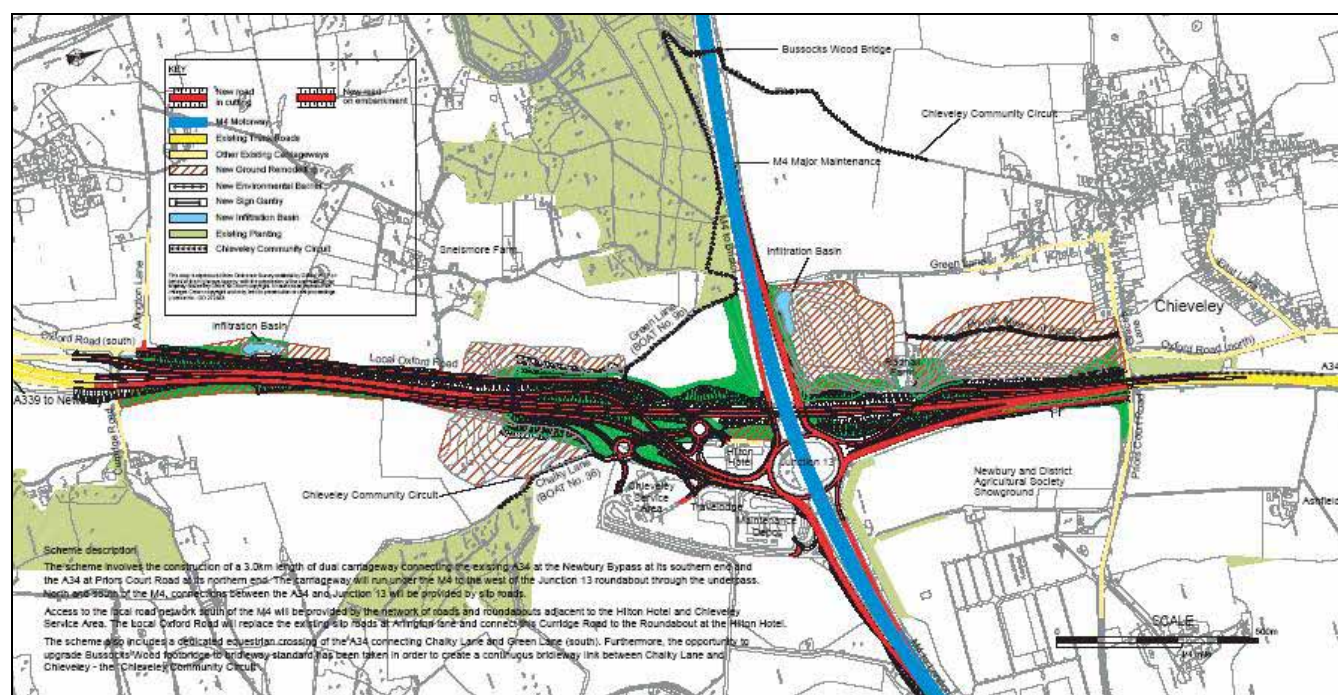


Figure 1.2 – Scheme Layout

1.4 The scheme falls within the county of West Berkshire, and within Highways Agency Area 3. The Managing Agent Contractor is Mott MacDonald Ltd.

1.5 A 'Five-Year After' Report for the A34/M4 Chieveley Improvement will be prepared in 2009.

APPROACH

- 1.6 The three main elements involved are:
- ◆ To identify the costs and benefits originally forecast for the scheme and published in the Appraisal Summary Table (AST);
 - ◆ To quantify the outturn (actual) costs and the outturn level of benefits actually accruing, based on outturn traffic volume and journey time data for the scheme; and
 - ◆ To compare the results and quantify the difference in the Present Value of Benefits (PVB).

1.7 This report sets out a number of assessments, namely:

- ◆ A comparison of the 'Before' and 'After' traffic volumes on the A34 and other roads in the corridor, illustrating how traffic volumes have changed since the opening of the Improvement;
- ◆ A comparison of 'Before' and 'After' journey times on the A34;
- ◆ An evaluation of predicted and outturn economic forecasts based on changes in traffic volumes and journey times as well as other outturn effects documented in the form of an Evaluation Summary Table (EST);
- ◆ An outline of changes in accidents rates since the opening of the scheme; and
- ◆ A limited evaluation of Environment, Accessibility, and Integration appraisal objectives.

REPORT FORMAT

1.8 Following this introduction, the report has been set out as follows:

- ◆ Section 2 discusses the traffic volume and journey time changes;
- ◆ Section 3 considers safety;
- ◆ Section 4 outlines the economic benefits originally predicted by COBA (Cost-Benefit Analysis modelling) and compares these with outturn benefits calculated separately using the POPE methodology, and using updated COBA input data;
- ◆ Section 5 discusses the Environment, Accessibility and Integration appraisal objectives;
- ◆ Section 6 presents the original Appraisal Summary Table (AST), and then re-evaluates the predictions with an Evaluation Summary Table (EST).

1.9 More detailed information is provided in Annexes:

- ◆ Annex A presents detailed Automatic Traffic Count results;
- ◆ Annex B presents detailed Manual Turning Count results; and
- ◆ Annex C presents detailed Journey Time Survey.

2. Changes in Traffic Volumes and Journey Times

INTRODUCTION

- 2.1 Traffic counts and journey time surveys have been carried out to assess the actual impact of the scheme.
- 2.2 The 'Before' and 'After' traffic data consist of:
- ◆ Flows from Highways Agency monitoring sites;
 - ◆ Turning counts at the roundabout; and
 - ◆ Journey-time surveys on the A34 crossing the M4 motorway.
- 2.3 Traffic counts and journey times were observed before the start of construction (May 2002), and one year after opening (September 2005). No Traffic Impact Study was undertaken immediately after opening because of a delay in commissioning the new Highways Agency count sites on the scheme.

DATA COLLECTION

- 2.4 Table 2.1 provides a list of the Highways Agency monitoring sites used in the evaluation. During the four year spanning the 'Before' and 'After' periods, a number of sites were removed and others newly installed. There are therefore three categories of sites:
- ◆ 'Before' and 'After' data available;
 - ◆ only 'After' data available; and
 - ◆ only 'Before' data available.
- 2.5 This results in a rather incomplete and complex picture that requires some interpretation.

Screenlines

- 2.6 As many of the count sites were replaced with others after construction, the differences are not readily apparent. Therefore the flows have been totalled across screenlines intercepting traffic in the north-south corridor.
- 2.7 Three screenlines have been established:
- ◆ Screenline 1: just north of the A34/M4 junction, including the Improvement and slip roads to the M4;
 - ◆ Screenline 2: just south of the A34/M4 junction, including the Improvement and slip roads to the M4; and
 - ◆ Screenline 3: to the south of the junction between the new A34 Bypass and the A334 (the old A34).

- 2.8 In addition, the count site on the A34 at Gore Hill, about 10 km north of M4 J13, provides 'Before' and 'After' data.

Traffic Count Sites
<i>The following sites have been used to gain 'Before' and 'After' data</i>
Site 4023/4, M4 J12-13; Site 4026, M4 J13-14; Site 3081/2, A34 Gore Hill, about 10 km north of M4 J13; Site 3098/9, A34 Newbury Bypass, 'Before' & 'After'; Site 3079/80, A339 Newbury, (monitored by West Berkshire County Council and renumbered Site 262 since January 2004)
<i>The following sites have been used to gain 'Before' data only</i>
Site 3407/8, former A34 south of M4 J13; Site 3404/6, former A34 main carriageway under Priors Court Road, Chieveley; Site 3403, former offslip from A34 northbound to Priors Court Road, Chieveley; Site 3405, former onslip from Priors Court Road to A34 southbound, Chieveley
<i>The following sites have been used to gain 'After' data only</i>
Site 3421/2, M4 main carriageway over Junction 13; Site 3409/11, new A34 main carriageway under M4; Site 3412, new offslip from A34 northbound to M4 J13 roundabout; Site 3410, new onslip from M4 J13 roundabout to A34 southbound; Site 3415, new onslip from M4 J13 roundabout to A34 northbound; Site 3417, new offslip from A34 southbound to M4 J13 roundabout; Site 3416, new offslip from A34 northbound to Priors Court Road, Chieveley; Site 3418, new slip road southbound to J13 roundabout from Priors Court Road, Chieveley; Site 3419 (virtual), onslip from Junction 13 roundabout to M4 westbound; Site 3420 (virtual), offslip from M4 eastbound to Junction 13 roundabout; Site 3423 (virtual), offslip from M4 westbound to Junction 13 roundabout; Site 3424 (virtual), onslip from J13 roundabout to M4 eastbound.

Note: Site numbers refer to HA database

Table 2.1 – Highways Agency Monitoring Sites

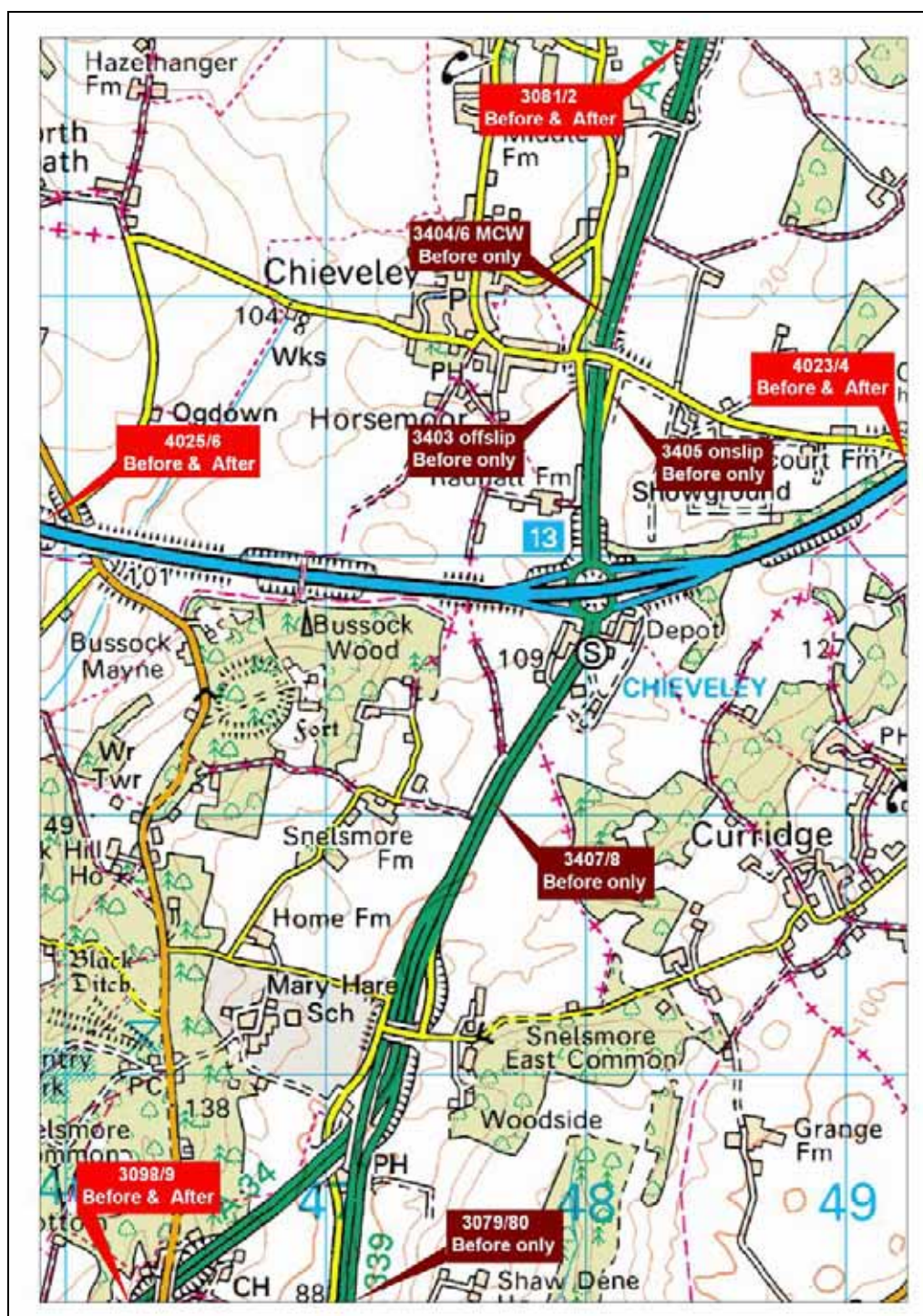
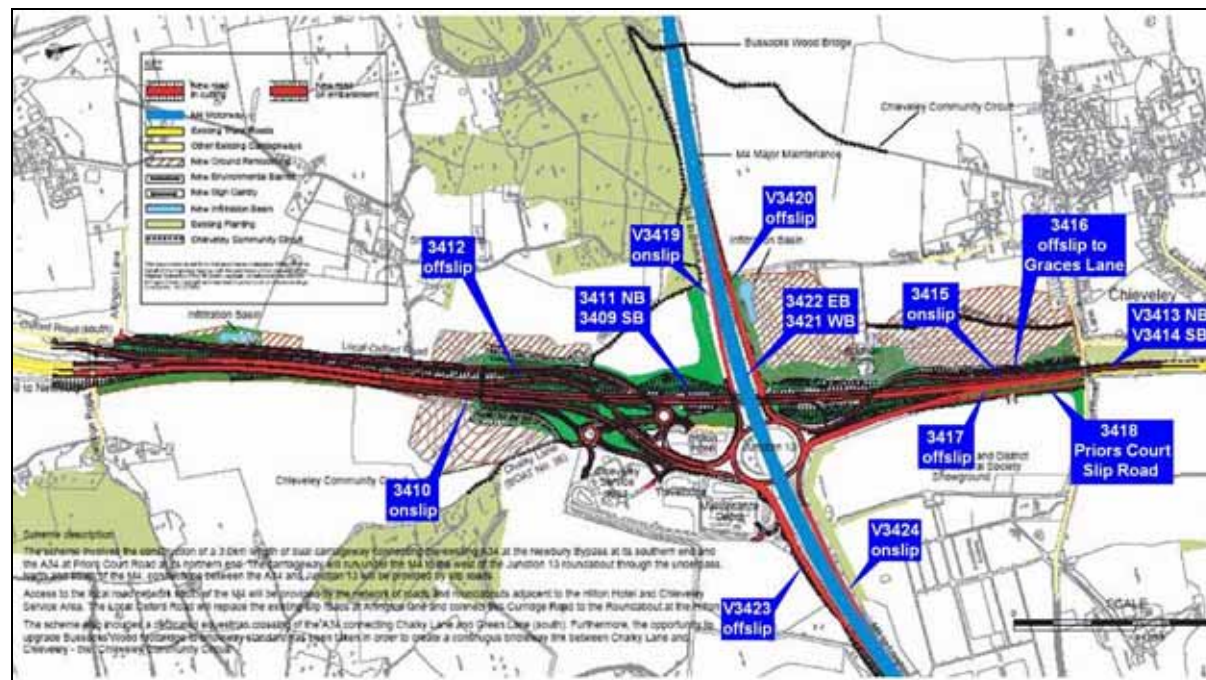


Figure 2.1 – Locations of ‘Before’ Traffic Counts

2.9 Figure 2.1 above shows the locations of ‘Before’ and ‘Before and After’ count sites. Note that distant sites have been shown on the correct links but at the map edge, rather than being shown in their exact positions on a smaller-scale map. The locations of newly-installed ‘After’ count sites are shown in Figure 2.2.



Note: the M4 runs from top to bottom

Figure 2.2 – Locations of New ‘After’ Count Sites

Turning Counts

- 2.10 A ‘Before’ video turning survey was carried out at the roundabout at M4 Junction 13. A repeat ‘After’ survey was carried out one year after opening, when the majority of north-south through traffic had been removed.

Journey Time Surveys

- 2.11 ‘Before’ journey times were surveyed on the A34, between the slip roads to/from Priors Court Road in the north, and the slip roads to/from Curridge Road in the south.
- 2.12 ‘After’ journey times were surveyed between equivalent points, but using two alternative routes. The first route was via the roundabout, as ‘Before’, and the second route used the new underpass beneath the M4.

RESULTS OF TRAFFIC COUNTS

‘Factoring up’ for Background Growth

- 2.13 Three years separate the ‘Before’ and ‘After’ counts, during which time there has been background growth of traffic volume in the region. It is assumed that the counts on the M4 motorway reflect this growth, and are unaffected by the junction improvement. Both the M4 sites in the area recorded a 3.0% increase over this period. All ‘Before’ counts have, therefore, been factored

up by this amount, so that any remaining differences are assumed to be due solely to the effects of the junction improvement. A complete table of 'Before' and 'After' traffic flows is given in Annex A.

Automatic Counts

2.14 Table 2.2 and Figure 2.3 show average weekday 24-hour flows changes across the 3 screenlines.

2.15 The results are summarised in Appendix A. The main results are as follows.

- ◆ Traffic on the A34 at Gore Hill, north of Chieveley, has increased by 4%, from about 55,700 vehicles per day (vpd) to about 58,100 vpd.
- ◆ The total traffic crossing Screenline 1, immediately north of the M4, has risen by 8%, from about 60,300 vpd to about 65,200 vpd. This will include some local traffic travelling to and from the Chieveley area, which is not counted at Gore Hill. The fact that there is a greater increase here suggests the release of suppressed local trips due to reduced delays at the junction.
- ◆ South of the M4, traffic crossing Screenline 2 has risen by 14%, from about 66,700 vpd to about 75,700 vpd. This is even greater than north of the M4, and is expected to be due to the extensive service and hotel complex located here.
- ◆ Traffic crossing Screenline 3 rose by 1%, from about 87,500 vpd 'Before' to about 88,500 vpd 'After'. The total traffic is considerably higher than on the screenlines immediately north and south of the M4. This is because one of the count sites on Screenline 3 is located in the town of Newbury, and will include a component of local traffic. The other count site is on the Newbury Bypass, where no increase is recorded.

Screenline	Site	Before	After	Increase
A34 Gore Hill	3081/2	55,700	58,100	4%
Screenline 1 (A34 & slips N of M4)	3404/6	52,700	-	
	3403	3,400	-	
	3405	4,200	-	
	3409/11	-	38,300	
	3416	-	3,600	
	3415	-	9,900	
	3417	-	9,500	
	3418	-	3,900	
	Total	60,300	65,200	8%
Screenline 2 (A34 & slips S of M4)	3407/8	66,700	-	
	3412	-	18,600	
	3409/11	-	38,300	
	3410	-	18,800	
	Total	66,700	75,700	14%
Screenline 3 (A34 & A339 N of Newbury)	3098/9	44,700	44,700	
	3079/80	42,800	43,800	
	Total	87,500	88,500	1%

Table 2.2 – Changes in Flow across Screenlines

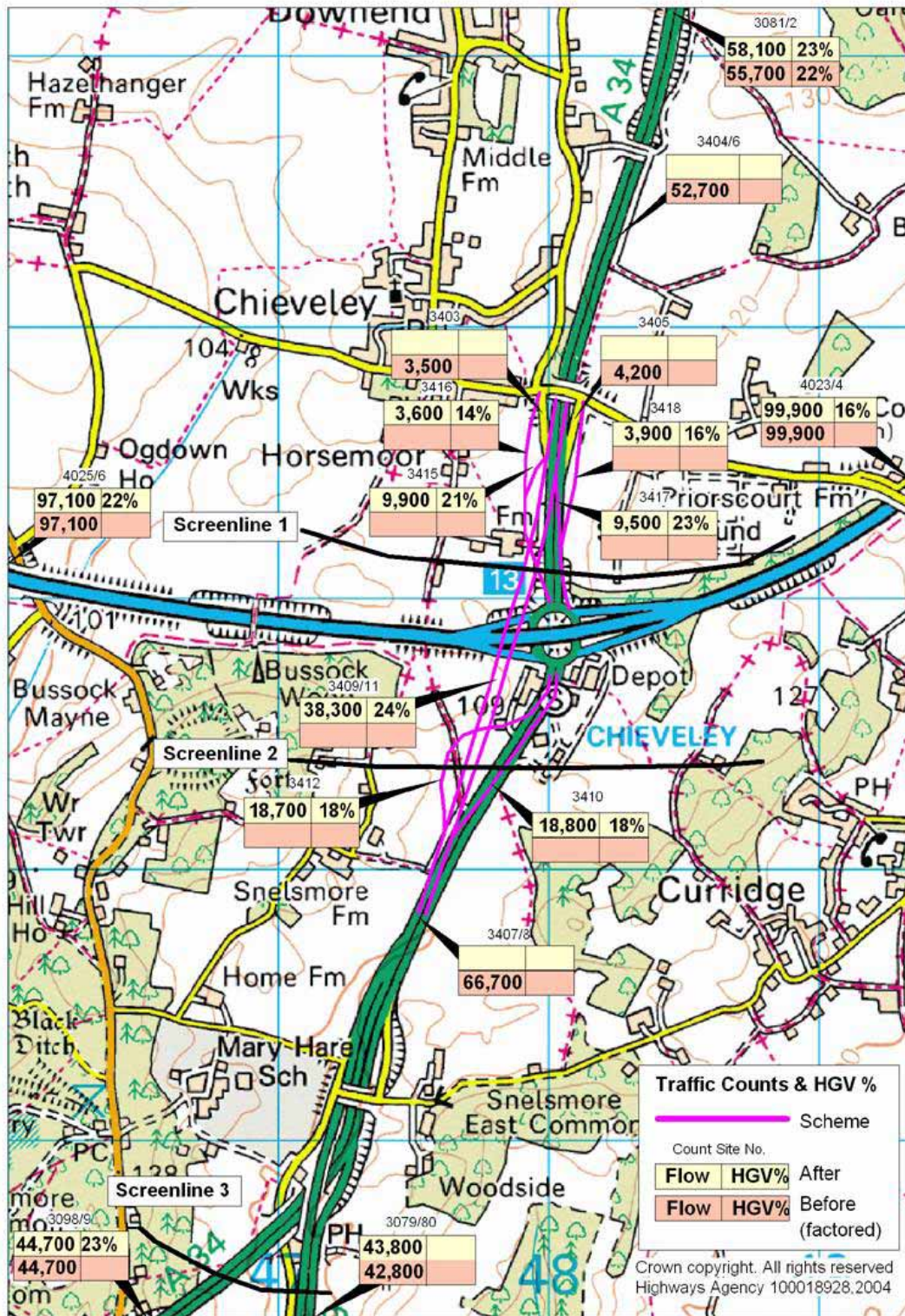


Figure 2.3 – Average Weekday 24-hour Traffic Flows, ‘Before’ and ‘After’, with Screenlines

- 2.16 It is apparent that increases have been largest close to the M4 Junction 13, and this does suggest that there has been local re-assignment as a result of the scheme. There are a number of minor roads with access to the A34, and these would have provided alternative diversion routes for local traffic wishing to avoid the Chieveley junction when congested, in the 'Before' situation.
- 2.17 A comparison of predicted and observed flows for 2005 is given in Table 2.3. Note the figures are Annual Average Daily Traffic flows (AADT), thus the observed figures may differ from the average weekday flows shown in Figure 2.3. The observed flows are significantly greater than predicted for:
- ◆ The A34 main carriageway under the M4; and
 - ◆ The southbound onslip to the A34 from the J13 roundabout.

Road Link	Predicted	Observed	Diff %
A34 main c'way under M4	28,300	36,900	31%
Offslip NB from A34 to Priors Court Rd	4,100	3,600	-13%
Slip SB from Priors Court Rd	3,600	3,900	7%
Offslip NB from A34 to J13 roundabout	17,600	17,000	-4%
Onslip SB to A34 from J13 roundabout	12,900	17,300	34%
Onslip NB to A34 from J13 roundabout	9,700	9,300	-4%
Offslip SB from A34 to J13 roundabout	9,300	8,700	-6%
Onslip WB to M4 from J13 roundabout	13,800	11,700	-15%
Offslip EB from M4 to J13 roundabout	11,100	12,800	15%
Offslip WB from M4 to J13 roundabout	14,500	12,800	-12%
Onslip EB to M4 from J13 roundabout	12,400	12,800	3%

Table 2.3 – Comparison of Predicted and Observed AADTs

Turning Counts

- 2.18 The results of the turning count surveys at the M4 Junction 13 roundabout are summarised in Annex B. Through-movements on the M4 are ignored. The figures shown are all-vehicle flows and are, as reported, without factoring for background growth. Very few U-turns were made, and these have been disregarded, apart from those made from the A34 south in the 'Before' situation. These would have been due to vehicles gaining access to the service area, but the movement is unnecessary in the 'After' road layout.
- 2.19 As would be expected from the nature of the Improvement, the biggest change has been a three-fifths (79%) reduction in north-south movements crossing the M4 (i.e. rather than using the new link), from about 28,500 both ways 'Before' (12-hour), to about 6,000 After. The cross-M4 movements which remain are likely to be using the service area, rather than being through-trips. The total number of vehicles using the roundabout over 12 hours has fallen by 31%, from about 69,000 to about 49,000.

JOURNEY TIME RESULTS

'Before' Journey Times

- 2.20 The 'Before' journey time surveys were carried out in June 2002. The route used was on the A34, between the slips to/from Priors Court Road in the north, negotiating the M4 Junction 13 roundabout, to the slips to/from Curridge Road in the south, and return. The timing points are shown in Figure 2.4 below.



Figure 2.4 – 'Before' Journey Time Route with Timing Points

- 2.21 A modification has been made to 'Before' delays A34 traffic at the roundabout, to take account of southbound queues beyond the slip roads. By referring to the Traffic Survey Report (Addendum, February 2000), the northbound times on the A34 link north of the slip roads have been subtracted from the southbound times on the same link, the differences being assumed to represent queues, which have been added to the delays times at the roundabout.

After Journey Times

- 2.22 The 'After' surveys were undertaken in September 2005, on two routes:
- ◆ Route 1 replicated the 'Before' route, using the roundabout, with times recorded to equivalent points on the A34, even though the alignment and slip road layout had changed. This was done in order to allow direct comparisons between 'Before' and 'After' times.-

- ◆ Route 2 was between the same timing points (1-4 and 5-8), but travelling via the new underpass (i.e. rather than the roundabout).
- 2.23 The results of the journey-time surveys between timing points are summarised in Annex C. The tables show that in the 'Before' situation, journey times were slowest in the AM peak, when queues could form at the approaches to the roundabout. Average AM queue-time on the southbound approach was about 12.1 minutes (taking into account the backing-up beyond Chieveley slip-roads), and on the northbound approach was 2.4 minutes. In the PM peak the queue times were 4.9 minutes southbound and 2.0 minutes northbound. In the interpeak period, queue times fell to about 0.3 of a minute in either direction.
- 2.24 The total 'Before' journey times over the route were over 14 minutes southbound and 4 minutes northbound in the AM peak, while they were 7 minutes southbound and 3 minutes northbound in the PM peak. Interpeak times were about 2 minutes in each direction.
- 2.25 After scheme completion, the same journeys using the roundabout take only about 2.5 minutes each way. Queue times are no more than half a minute. The PM peak journey time is virtually the same as the AM peak, but this represents less of a reduction from the 'Before' times. The interpeak times have changed little from the 'Before' situation. Journey speeds have increased to about 50-60 kph in all time periods.
- 2.26 The underpass is used for through trips on the A34 crossing the M4, and the equivalent journey between the same end-points is now only about 1.5 minutes, with no queue delays. The journey speed is approximately 90 kph in all time periods.
- 2.27 Comparative 'Before' and 'After' times for the whole route are summarised in Table 2.4 below. The 'After' columns show that there is now very little difference between peak and interpeak times, indicating a lack of congestion. The greatest time reduction is southbound in the AM peak, with over 12 minutes saved.

	Before (May 02)	After (Sep 05)		Saving	
	via Round -about	via Round -about	via Under -pass	via Round -about	via Under -pass
S'bound					
AM	14:15	02:26	01:22	11:50	12:53
IP	02:02	02:26	01:22	-00:24	00:40
PM	07:05	02:24	01:11	04:41	05:54
N'bound					
AM	04:05	02:16	01:27	01:49	02:38
IP	02:06	02:08	01:32	-00:02	00:35
PM	03:34	02:04	01:27	01:30	02:07

Table 2.4 – 'Before' & 'After' Journey Times (mm:ss) on the A34

- 2.28 In view of the importance of COBA modelling in the scheme assessment, it is interesting to compare the observed times with those given by COBA version 10.5 for links equivalent to the surveyed routes. The COBA version 10.5 files originally used to justify the scheme have been obtained as part of this 'One Year After' study. The predicted journey time comparisons for each scenario are presented in the tables below.

		COBA Low (m:s)	COBA High (m:s)	Obs (m:s)
SB	AM Peak	03:42	04:33	14:15
	Inter-Peak	03:20	10:24	02:01
	PM Peak	04:17	10:49	07:06
NB	AM Peak	16:27	16:29	04:05
	Inter-Peak	03:05	03:06	02:06
	PM Peak	11:32	14:29	03:34

Table 2.5 – Journey Times - Before

		COBA Low (m:s)	COBA High (m:s)	Obs (m:s)
SB	AM Peak	02:12	02:18	02:26
	Inter-Peak	02:13	02:03	02:26
	PM Peak	02:11	02:16	02:24
NB	AM Peak	02:20	02:32	02:16
	Inter-Peak	02:11	02:21	02:08
	PM Peak	02:27	02:36	02:04

Table 2.6 – Journey Times via roundabout - After

		COBA Low (m:s)	COBA High (m:s)	Obs (m:s)
SB	AM Peak	01:16	01:16	01:22
	Inter-Peak	01:15	01:15	01:22
	PM Peak	01:16	01:16	01:11
NB	AM Peak	01:19	01:19	01:27
	Inter-Peak	01:19	01:19	01:32
	PM Peak	01:19	01:19	01:27

Table 2.7 – Journey Times via Underpass – After

- 2.29 It is apparent that COBA version 10.5 forecasts are accurate for both routes in the 'After' case.
- 2.30 However, the 'Before' results based on COBA differ from those observed. This appears to be because junction delays form a large component of the total times; the modelling of a signalised roundabout with high traffic flows gives unstable results. This COBA model distinguished the AM peak as 'flow group 4' and the PM peak as 'flow group 5'. For the Do-Minimum, COBA showed higher delays northbound in the AM peak, and southbound in the PM peak, which is the reverse of the observed situation.

3. Safety

INTRODUCTION

- 3.1 The Appraisal Summary Table (AST) showed predictions that reductions in traffic using the Chieveley roundabout, as well as reductions in traffic rat-running to avoid the roundabout, would lead to safety improvements. Over the 30-year assessment period, it was predicted 94 accidents would be saved. The casualty reduction was predicted to be 140 (comprising 2 fatal, 16 serious and 122 slight).¹ Savings predicted by COBA are similar to these values.
- 3.2 In order to assess whether these predicted savings are likely to be fulfilled, an initial evaluation of accident savings has been undertaken.

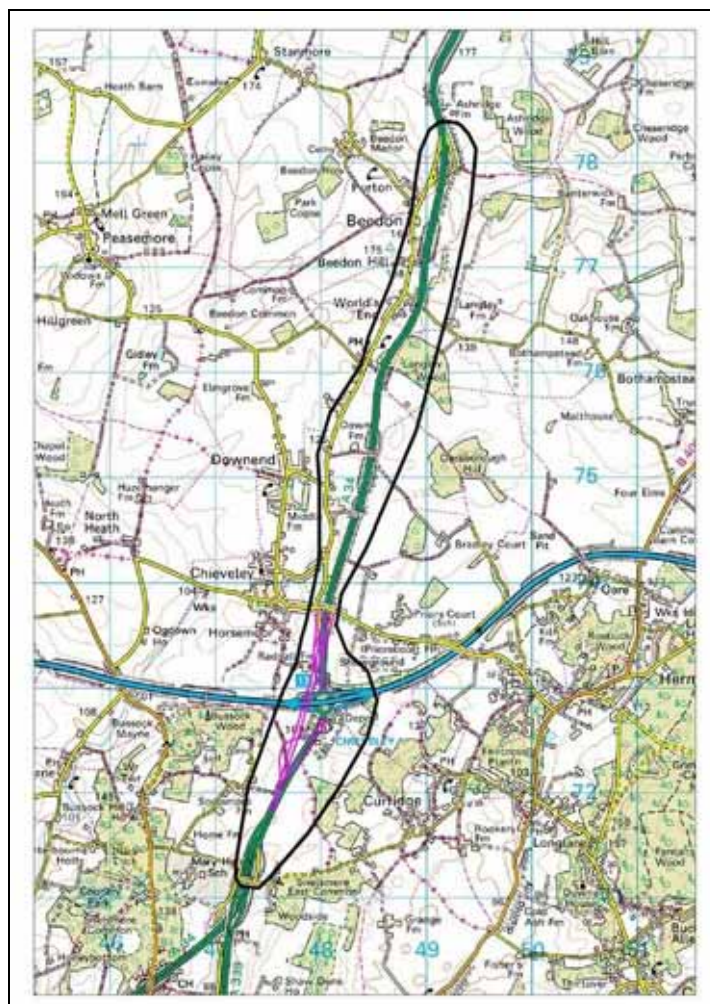


Figure 3.1 – Area where Accident Records were Obtained

¹ According to the POPE methodology, these figures are weighted in the proportion 60% low scenario and 40% high scenario forecasts.

- 3.3 Accident data have been obtained for three full years before opening, and one full year after. Data were collected on roads corresponding to the COBA network, bounded by the cordon shown in Figure 3.1. It includes the A34, some minor roads close to the A34, the roundabout, underpass, and slip roads, together with a length of the M4 motorway over the junction, between the off- and on-slips.
- 3.4 Normally accident savings are evaluated over at least three years in order to get a fair reflection in the number of accidents in a corridor, allowing for random variations. Therefore this analysis for the 'One Year After' Evaluation should be considered as only an initial indication.
- 3.5 The table below shows the numbers of accidents and casualties in each of the years 'Before' and the single year 'After' opening. A Poisson probability test has been undertaken to assess whether the observed reduction could be explained by random fluctuation. The result indicates a 60% probability that the reduction is a real effect of the junction improvement.

	Accidents	Casualties
Year -3	27	46
Year -2	27	36
Year -1	23	36
Year +1	18	29
Poisson probability of reduction	60%	

Table 3.1 – Variations in Accidents and Casualties by Year

- 3.6 Annual accident rates within the cordon are shown in Table 3.2. The 'Before' rates are the three-year figures divided by 3, and the 'After' rates are actual reported numbers for the year. It can be seen that the annual accident rate has fallen from 25.7 to 18.0, and the casualty rate has fallen from 39.3 to 29.0. The percentage reduction in accidents has been about 30%, and the percentage reduction in casualties has been approximately 26%.

	Before		After	
	Accidents	Casualties	Accidents	Casualties
Slight	21.3	33.7	11.0	22.0
Serious	4.0	5.3	5.0	5.0
Fatal	0.3	0.3	2.0	2.0
Total	25.7	39.3	18.0	29.0
KSI Index		0.144		0.241

Table 3.2 – Annual Rates of Accidents and Casualties

- 3.7 The number of fatal accidents and casualties has increased six-fold, although this result is derived from very low numbers. There was one fatal accident in the three-year 'Before' period: a single-vehicle accident on the A34 about 4 km north of the M4.

There were two fatal accidents during the one year 'After', both occurring on the M4 westbound offslip. Arguably neither was significantly influenced by the junction itself.

- 3.8 The 'KSI Index' ('Killed and Seriously Injured') shown in Table 3.3 is the ratio of Fatal+Serious to total accidents. This can be seen to have risen from 0.144 'Before' to 0.241 'After'. The ratio usually rises with vehicle speeds.
- 3.9 To derive a 30-year projection for the numbers of accidents saved, it is customary in POPE studies to assume an annual rate of traffic growth, and an accident rate dependent on the road type. This approach has not been adopted here, in view of the number of different road types within the study area. Instead, the annual saving in total accidents has been projected directly, and the severity proportions and casualty rates are based on COBA values. The resulting values are given in Table 3.3. On this basis, the observed savings may have exceeded those predicted over 30 years.

	Predicted (AST)		Observed	
	Accidents	Casualties	Accidents	Casualties
Slight	74	122	182	299
Serious	17	16	41	39
Fatal	3	2	7	5
Total	94	140	230	342

Table 3.3 – Projected 30-Year Accident Reductions

POPE METHODOLOGY FOR ACCIDENT BENEFITS

Changes in Accident Benefits

- 3.10 Table 3.4 below shows the difference between the numbers of accidents per year predicted by COBA, and those observed before and after scheme opening. The COBA low growth model predicted a saving of 3 accidents, whereas the observed saving was 10, on the same network.

		Average Number of Accidents per Year	
		Low Growth	High Growth
COBA	DM	28	31
	DS	25	27
	Saving (reduction)	3 11%	4 13%
Actual	Before	26	26
	After	18	18
	Saving (reduction)	8 30%	8 30%

Table 3.4 – Comparison of Predicted and Actual Numbers of Accidents

- 3.11 The COBA low growth assessment showed that the 'Accident Benefits' were £2.18 million (in 1994 prices), based on a saving of 3 accidents. The POPE methodology uses the same relationship between accidents saved and economic benefit.

	Low Growth		High Growth	
	Difference	Benefit	Difference	Benefit
COBA	3	£2.18m	4	£3.16m
Actual	8	£5.81m	8	£6.32m

Table 3.5 – Predicted and Actual Accident Benefits

- 3.12 Table 3.7 above summarises the POPE estimate of benefits for both Low and High Growth, for the Chieveley scheme, and shows:
- ◆ **Low Growth** – outturn benefits are estimated to be £5.81m, which are more than 2 ½ times (267%) those predicted;
 - ◆ **High Growth** – outturn benefits are estimated to be £6.32m, which are two time (200%) those predicted;
- 3.13 The estimated actual accident benefit, using the POPE methodology, weighted in the proportion 60% low growth/ 40% high growth, is £6.01 million. This is over twice (2.3 times) that originally forecast.
- 3.14 The above calculation is based on a single year's 'After' data. The 'Five Year After' Report, due in 2009, will give a more robust assessment.

4. Economy

INTRODUCTION

- 4.1 As part of the 'One-Year' After Study, this Report compares the predicted economic benefits with those actually accrued. The actual benefits are calculated separately by two different methods:
- The POPE methodology; and
 - The COBA methodology, with updated inputs.

THE POPE METHODOLOGY

- 4.2 The basis of this methodology is that through previous COBA evaluations it has been identified that the majority of benefits are derived primarily from two areas: 'Vehicle-Hour' time savings, and 'Accident Savings'. The premise of the POPE methodology is, therefore, that the observed changes in annual vehicle-hours and accidents are related directly to the economic benefits of the scheme.
- 4.3 Link and junction vehicle-hours, and the numbers of accidents can be collected from surveys 'Before' and After scheme opening, and the difference between these observed values can be compared with the differences shown for the same links shown in COBA.

Vehicle-Hours

- 4.4 For the comparison, all movements using the junction at the roundabout and underpass ('After' only) have been considered. The routes are those where journey-time surveys have been undertaken, plus the M4 slip roads. For the latter, COBA link times have had to be employed in the 'Observed' calculation (in the absence of surveyed times), but in conjunction with actually recorded traffic volumes.
- 4.5 Where used, the original COBA values have been taken without alteration, since the Journey Time Year and Traffic Count Year were both set at 2004, which is suitable for this purpose.
- 4.6 In view of the fact that traffic using the junction has increased more than the background rate of growth, and that this increase is attributable to the junction improvement itself, it was felt appropriate to calculate the outturn benefit using the 'rule of half' methodology. This differs from the COBA method, where a fixed trip matrix is used.
- 4.7 The following table compares predicted and observed values of the vehicle-hour savings in the first year, and the benefits over 30 years (1994 present value). It shows that COBA predicted 1,037,741 vehicle-hours would be saved in the first year, with an associated benefit of £122.7 million over 30 years. The observed saving is calculated to be 633,030 vehicle hours in the first year, or 61% of the predicted value. Assuming the same proportion for the monetary benefit, this works out to £74.8 million.

	Annual V-Hr Saving	30-Yr Time Benefit (£m)
COBA	1,037,741	122.7
Observed	633,030	74.8

Table 4.1 – Time Benefit Comparisons

- 4.8 In considering the difference between Predicted and Observed vehicle-hours, the following points may be noted.
- ◆ Traffic using the junction has increased, even when background growth - as indicated by traffic passing through the M4 motorway - is allowed for (see Table 2.1). Therefore the 'Vehicle' component of the 'Vehicle-Hours' measure has risen, and half the benefit experienced by the additional users has been included. This is not reflected in COBA, which uses a fixed trip matrix.
 - ◆ The 'Before' journey-time surveys showed that queuing delays were significant in the AM and PM peaks, but less so at other times. The combined 'peak' and 'shoulder', for which peak delays have been applied, account for 1260 out of the annual 8760 hours in COBA (14%). Thus, when considering annual vehicle-hours, the peak delays carry relatively little weight.
 - ◆ Delays at M4 Junction 13 (a signalised roundabout) appear to have been poorly modelled by COBA. This would account for a high value for the COBA-before vehicle-hours, and hence also for the benefit.

COBA RE-EVALUATION

- 4.9 The economic benefits of Highways Agency schemes have been traditionally assessed using the Government's COBA (**C**ost **B**enefit **A**nalysis) program, which considers changes in:
- ◆ Link transit time, which is the time on each affected link both 'Before' and 'After' opening weighted by vehicle flows;
 - ◆ Vehicle operating costs (VOC), reflecting fuel and other operating costs calculated by a change in total distance travelled on the affected links, but also considering vehicle speeds; and
 - ◆ Accident rates and costs, which change as a result of infrastructure improvements as accidents are normally less frequent on new roads.
- 4.10 The COBA network used in the original economic evaluation comprised the A34 from Curridge Lane in the south to the junction with Oxford Road, Beedon in the north, together with parallel local roads and the M4 slips.
- 4.11 The COBA model has been re-run, firstly with the original traffic flows, to check the same output was replicated, and then repeated but substituting *observed* link flows in the Do-Minimum. To preserve the fixed-trip matrix, entry flows were maintained for the Do-Something case, but the flows within the network were distributed in accordance with observed traffic proportions. The First Year and the Traffic Flow Year were both maintained at 2004, and observed counts were factored to that year.

	Original COBA			'Observed' COBA		
	Low	High	Weighted	Low	High	Weighted
Benefits						
Time - Link	1.012	1.543	1.224	-1.578	-1.894	-1.704
Time - Junction	93.154	164.02	121.500	59.351	71.088	64.046
Veh Operating Costs	0.507	0.52	0.512	-0.78	-0.738	-0.763
Accidents - Links	1.671	2.577	2.033	1.744	3.009	2.250
Accidents - Junctions	0.184	0.587	0.345	0.738	1.602	1.084
Present Value of Benefits	96.528	169.247	125.616	59.475	73.067	64.912
Present Value of Cost	27.439	27.439	27.439	27.439	27.439	27.439
Net Present Value	69.089	141.808	98.1766	32.036	45.628	37.4728
Benefit/ Cost Ratio	3.518	6.168	4.578	2.168	2.663	2.366

Table 4.2 – COBA Results in £ million, at 1994 Prices discounted to 1994

- 4.12 The benefits shown by the 'Observed' COBA are clearly lower than in the original, the main difference being in the time benefit. The sum of the link and junction benefits is £62.3 million. This is about half the value predicted, and is lower than the £74.8 million shown for the POPE methodology in Table 4.1.
- 4.13 With regard to the link time disbenefit, this arises because a higher proportion of A34 traffic crossing the M4 actually uses the underpass than is modelled in COBA, increasing the Do-Something vehicle-hours for links.
- 4.14 With regard to the lower junction benefit, this arises because, on average, the observed 'Before' traffic flows at the M4 Junction 13 roundabout were actually only 92% of the values entered into the original COBA. Although this is a relatively small difference, it results in the calculated Do-Minimum junction delay falling disproportionately in the new run, hence the improved Do-Something delay is now compared with a less serious situation (compared with the actual 'Before' situation).
- 4.15 The 'Observed' COBA run does not include actual accidents; therefore this does not reflect observed accident savings as detailed earlier.

COMPARISON OF POPE AND COBA METHODOLOGIES

- 4.16 The POPE methodology is an extrapolation which for many schemes has yielded results similar to those given by COBA. Although some of the assumptions differ between the two methods, the time results for the Chieveley Improvement are of a similar magnitude, suggesting both are realistic estimates of the actual time benefit.
- 4.17 Table 4.3 below compares time benefits, the first two entries being different versions of the 'observed' benefit, and the third being the benefit originally predicted by COBA. Both the 'observed' figures are well below the predicted value.

Comparison of Time Benefits	
POPE Methodolgy - Observed	£74.8m
Re-run COBA - Observed	£62.3m
Original COBA - Predicted	£122.7m

Table 4.3 – Comparison of Predicted and ‘Observed’ Time Benefits

- 4.18 Both COBA runs (the Predicted and the ‘Observed’) use a fixed trip matrix, whereas observed traffic counts have shown an increase in traffic over and above background growth. That is to say, the scheme appears to have resulted in more traffic using the junction, either due to reassignment or released suppression.
- 4.19 Both COBA runs exaggerated the delays at the congested M4 Junction 13 in the Do-Minimum, thus the uncongested Do-Something times were subtracted from figures that were too large. The traffic flows used in the ‘Observed’ COBA happened to be a little lower than those entered in the original run, resulting in modelled delays that were much less. This illustrates the sensitivity of modelled junction delays to volume changes.

ROUTE STRESS

- 4.20 Route stress is an index based on traffic volume in relation to road capacity, and is applicable to road links but not to junctions. It is used to give an indication of journey time reliability, with a lower figure showing higher reliability. The AST quotes ‘Before’ and ‘After’ route stress for this scheme. For the purpose of this ‘One Year After’ study, stress has been calculated for the underpass route. The resulting value is 74%, virtually identical to the predicted ‘After’ value of 75% quoted in the AST. However, stress has not been calculated for the ‘Before’ case, when the effects of the signalised roundabout were dominant.

RE-EVALUATION OF SCHEME COSTS

- 4.21 As part of the ‘One Year After’ assessment, a review of predicted and actual costs has been undertaken. There are several known sources of predicted costs, and these are tabulated in Table 4.4

	Final Economic Assessment 2000 1998 prices	Appraisal Summary Table 2000 prices	Appraisal Summary Table PVC 1994	Order Publication Report 1991 1991 prices	COBA PVC 1994
Construction	37.2			22.9	
Land	4.7			4.5	
Preparation	2.5			1.3	
Supervision	2.1			1.3	
Total	46.6	54.8	27.0	29.9	27.4

Table 4.4 – Cost Estimates from Various Sources (£ million)

- 4.22 The AST gave an estimated cost of £54.8m at 2000 prices, and also quoted a Present Value of Cost (PVC) of £27.0m. This is in accord with the COBA value of the PVC, which is £27.4m at 1994 prices, discounted to 1994.
- 4.23 Actual outturn costs for 2004 have been obtained. These are categorised into Construction, Land, and Preparation & Supervision costs, and are summarised in the table below. The costs at 1994 prices have been derived from the 2004 costs using retail price indices, and (for Construction) relative price factors.

	Cost (£ million)	
	2004	1994
Construction	56.6	44.8
Land	8.8	6.8
Prep & Sup	4.5	3.5
Total	69.9	55.1

Table 4.5 – Actual Costs (£ million)

- 4.24 In order to be comparable with the PVC given in COBA, the cost should also be discounted. Applying an annual discount rate of 6%, as in COBA, reduces the 1994 cost to £31.7m. The following table compares actual costs with the COBA prediction.
- 4.25 Table 4. shows the actual outturn costs exceeded the PVC quoted in COBA by about 16%.

	Total Costs (£ m)	
	2004	1994 *
Predicted	60.5	27.4
Actual	69.9	31.7

* Discounted at 6%

Table 4.6 – Comparison of Costs (£ million)

5. Environment, Accessibility and Integration Objectives

INTRODUCTION

- 5.1 The A34 Chieveley Improvement is not a scheme for which detailed evaluation of environmental effects is required for the 'One Year After' study. Nevertheless, certain outcomes are dependent upon traffic volumes, which have been measured. Also, studies on certain aspects of the environment have been conducted for purposes other than POPE. These studies have been made available, and the conclusions are summarised here.
- 5.2 Six environmental sub-objectives were originally listed in the Appraisal Summary Table (AST) - see Table 6.1. These were Noise, Local Air Quality, Landscape, Biodiversity, Heritage and Water. Full details were given in the Environmental Statement (ES) for the scheme. Comments on these sub-objectives are given below.

NOISE

- 5.3 The AST stated that there would be no change in noise levels perceptible in properties in the area, due to mitigation provided by a noise barrier and landscape modelling.
- 5.4 Traffic has increased across screenlines north and south of M4 Junction 13 (see Table 2.1), and it would normally be assumed that traffic noise levels should rise accordingly. Low-noise road surfacing was specified for this junction. Surveys carried out by Cole Jarman Associates, in which noise levels were measured at eighteen locations close to properties near the junction, in 1999/2000 ('Before') and again in 2005 ('After') have shown no increases in measured noise. At two sites, there was no change, and at sixteen sites there were marginal decreases of up to 8dB. These results confirm the prediction of negligible change in noise levels.

LOCAL AIR QUALITY

- 5.5 The AST predicted that air quality would improve at seventeen properties, and would worsen at six properties. Two of these properties (Radnall Farm and Harvest Cottage) would experience NO₂ levels above the Air Quality objective, but the objective in respect of PM₁₀ would not be exceeded.
- 5.6 Pollution is related to traffic levels, other things being equal, and the comment on increased volumes also applies to air quality. However, the reduction in queuing at the M4 Junction 13 roundabout can be expected to reduce emissions from acceleration and deceleration. In the absence of air quality measurements, it may be expected that the scheme has not given rise to any significant overall deterioration.

LANDSCAPE

- 5.7 The AST predicted an overall neutral effect, with a slight adverse impact on the North Wessex Downs AONB, but a slight visual benefit at Chieveley village in the long term. The ES explains that the improvement would be due to mounding throughout the scheme, and ground modelling northwest of M4 Junction 13, together with the maturing of planted vegetation.
- 5.8 The Highways Agency has commissioned a Visual Intrusion Study for this scheme. The results are awaited, and will be summarised in a later version of this report when available.

BIODIVERSITY

- 5.9 The AST predicted a slight negative impact. The ES stated that mitigation would be provided by the planting of trees, shrubs and grassland, and this has been accomplished.

HERITAGE

- 5.10 The AST predicted a slight negative impact on the landscape setting of Chieveley village and its listed buildings. It is expected that this prediction has been fulfilled. However no enquiries have been made regarding archaeological sites.

WATER

- 5.11 The AST predicted a slight negative impact, in that the increased carriageway area and cut slope areas would increase the risk of pollution in the catchment of a major aquifer. The inclusion of petrol/ oil interceptors was expected to mitigate this.
- 5.12 The Highways Agency has commissioned a Water Quality Study for this scheme. The results are awaited, and will be summarised in a later version of this report when available.

ACCESSIBILITY

Public Transport

- 5.13 AST predicted no significant impact.

Severance

- 5.14 The AST predicted a slight positive impact. With the reduction in congestion at M4 Junction 13 roundabout, this is judged to have been fulfilled.

Pedestrians and others

- 5.15 The AST predicted a slight positive impact, with pedestrians and equestrians having longer but safer crossing routes, and cyclists benefiting from improved local road conditions. The scheme provided for a new equestrian bridge linking Green Lane and

Chalky Lane (crossing the A34 south of the service area). The AST predictions are judged to have been fulfilled.

INTEGRATION

- 5.16 The AST states that the scheme assists policies for freight, pedestrians, cyclists, public transport and equestrians. Apart from the inconsistency over public transport (see 5.13 above), this is considered to be valid.
- 5.17 The AST predicts adverse impacts in respect of surrounding land, in particular areas of outstanding natural beauty, and agricultural policies. There is no reason to believe that these impacts have been mitigated.
- 5.18 The AST lists a number of policies that are in accordance with the scheme and some other policies that are in opposition to it, but comes out with an overall assessment of 'positive'. Available information does not contradict this assessment.

6. Appraisal and Evaluation Summary Tables

INTRODUCTION

- 6.1 In order to present the effects of the opening of the A34 Chieveley/ M4 Junction 13 Improvement, a review of the original Appraisal Summary Table (AST) has been undertaken.
- 6.2 The AST summarises the predicted impacts of the scheme across a range of different sub-objectives. The sub-objectives considered within an AST are:
- ◆ **Safety** – measuring reduction in accidents;
 - ◆ **Economy** – including savings in Journey time and Vehicle Operating Costs, Scheme Cost and Reliability of journeys;
 - ◆ **Environmental** – such as Noise, Local Air Quality, Landscape, Biodiversity, Heritage and Water;
 - ◆ **Accessibility** – such as change in access to public transport, severance within communities and impact on pedestrian and other modes; and
 - ◆ **Integration** – measured by how the scheme accords with local policy.

THE EVALUATION SUMMARY TABLE

- 6.3 In order to assess the actual or outturn effects of the opening of the scheme, an Evaluation Summary Table (EST) has been produced, which mirrors the appearance of the AST, and includes details of the actual sub-objectives that have been evaluated.
- 6.4 The POPE process concentrates, at present, on economy and safety impacts of new schemes, but this may in future be widened to include environmental effects; guidance is currently being written to outline the best approach for these objectives.
- 6.5 Summaries of effects across all evaluation sub-objectives are included in an EST. The EST and AST for the A34 Chieveley Improvement, has been combined into one table for ease of comparison. The table below shows this, with the EST comments in grey shaded rows in red below the AST comments.

ONE YEAR AFTER STUDY

A34/M4 Chieveley Improvement

A34 Chieveley/ M4 Junction 13 Improvement Scheme (GOSE)		Cost £54.8m (Q2 2000) Cost £69.9m (2004)	
PROBLEMS			
55,000 AADT (16% HGV) – about 44% are through A34 movements. Delays at junction due to usage exceeding capacity. Queues in excess of 2.5 km on the A34 southbound in peak. Rat-running affects local villages. Northbound A34 queuing problem and excessive queuing on circulatory carriageway on Junction 13 during peak hours.			
OTHER OPTIONS			
Smaller scale schemes, eg providing free-flow slips to 3 out of 4 quadrants would not provide full solution. Widening of approach arms to Junction 13 are programmed to be completed March 2000 and will temporarily reduce peak hour queues on approaches to Junction 13.			
CRITERIA	SUB-CRITERIA	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE
ENVIRONMENTAL IMPACT	Noise	Change in traffic noise levels would generally be imperceptible to properties within the area due to mitigation provided by noise barriers located on the west side of the A34 corridor and proposed landscape modelling to the northwest of Junction 13 roundabout.	No. properties experiencing (w/s) increase in noise 0 Decrease in noise 0 Less noise at 16 out of 18 sites
	Local Air Quality	A full DMRB Stage 3 assessment has been completed for all representative receptors within the proposed scheme. Two properties experiencing an increase in NO ₂ concentrations will experience pollution levels exceeding NO ₂ air quality objective in 2005. These are Radnall Farm and Harvest Cottage. For PM ₁₀ no properties experiencing an increase in PM10 concentrations exceed the air quality objective for this pollutant in 2005 or beyond.	+3 PM ₁₀ 30 NO ₂ Slight +ve
	Landscape	Increase in traffic using the junction offset by reduction in congestion at N4 Junction, 13 roundabout... Slight adverse impact on North Wessex Downs AONB with slight visual benefit at Chieveley village in the long term Visual intrusion survey report pending	Not measured. Neutral
	Biodiversity	No significant direct impact New planting will mitigate habitat loss.	Pending Slight –ve
Heritage		Slight impact on landscape setting of Chieveley village and its listed buildings. If as yet unknown archaeological sites survive within the route corridor then the impact upon them could be negative and should be mitigated in advance of and during construction. However the presence or absence of unknown remains should first be determined empirically by a combination of field-walking, geophysical survey and trial trench evaluation... Not evaluated	Neutral / slight -ve
	Water	Scheme lies within catchment area of major aquifer. The increased carriageway and cut slope areas included in the scheme increase the risk of pollution which is offset against the inclusion of petrol/ oil interceptors. Water Quality Report Pending	Not evaluated Slight -ve
SAFETY		The introduction of measures to assist through trips on the A34 will reduce the number of vehicles undertaking turning movements at Junction 13 roundabout. Additional benefits would be achieved through the transfer of at-running trips on local roads to the main road network following relief of the existing roundabout.	Accidents Deaths Serious Slight (HG) 119 2 20 154 (LG) 77 2 14 100
ECONOMY	Journey times & VOCs	Improvements have exceeded predictions, in the limited time for which After data is available	230 5 39 299 (HG) 10.4 min Peak, 5.4 min IP (LG) 7.7 min Peak, 1.9 min IP
	Cost	The introduction of measures to assist through trips on the A34 will result in substantial journey time savings for north/south traffic and for those trips undertaking turning movements at the relieved Junction 13 roundabout. Substantial time savings.	PVB £62.3m 197% of PVC PVC £27.4m PVC £31.7m
ACCESSIBILITY	Reliability	The existing queues on the A34 southbound approach will be significantly reduced following the introduction of the through-route resulting in a balanced and improved operation of the Junction 13 roundabout. Overall, the journey time reliability is considered moderate. Conditions at roundabout have improved. After stress is based on underpass route, and accords with predicted value.	Route Stress Before: 91% After: 75% Moderate +ve
	Regeneration		Serves regeneration area? No Not assessed
INTEGRATION	Public Transport	No significant impact No significant impact	Not assessed Neutral
	Severance	Removal of rat-running A34 through traffic from local roads	Slight +ve Slight +ve
COBA	Pedestrians and others	Pedestrians and equestrians would have longer but safer crossing routes; cyclists benefit from better local road conditions Not assessed	Slight +ve Not assessed
	Others	Reducing congestion would assist policies for freight, pedestrians, cyclists, public transport and equestrians. The introduction of the scheme would have adverse impacts for the surrounding land in particular areas of outstanding natural beauty and agricultural policies. Difficult to reconcile opposing policies.	Positive
Cost Benefit Analysis (COBA 10)			
(HG) PVB £176m PVC £27m NPV £148m BCR 6.4 (LG) PVB £102m PVC £27m NPV £74m BCR 3.7 PVB £64.9m PVC £31.7m NPV £33.2m BCR 2.0			

Table 6.1 – Combined AST & EST

7. Conclusions

- 7.1 The A34/M4 Chieveley Improvement officially opened on the 23rd September 2004. The scheme is situated at Junction 13 of the M4 motorway, north of Newbury, and has provided an underpass on the A34 to divert through-traffic from the congested roundabout. In addition, new access roads were built for the service area which contains two hotels.
- 7.2 This 'One Year After' study reviews the levels of traffic, traffic speeds and accident levels and assesses the accuracy of the original forecasts that supported the scheme.
- 7.3 The main findings of this report are:
- ◆ Traffic crossing a screenline comprising the A34 and slip roads north of the M4 has increased by 8%; from 60,300 vehicles per day (vpd) to 65,200 vpd.
 - ◆ Traffic crossing a screenline comprising the A34 and slip roads south of the M4 has increased by 14%; from 66,700 vpd to 75,500 vpd.
 - ◆ Traffic using the M4 Junction 13 roundabout has fallen due to the construction of the underpass. The number of north-south movements across the roundabout has fallen by 78%; from about 28,500 vpd to about 6,000 vpd both ways, over a 12-hour period.²
 - ◆ The total traffic using the roundabout has fallen by 29%; from about 69,000 vpd to about 49,000 vpd over a 12-hour period.
 - ◆ Construction of the underpass has speeded up journey times for through-traffic on the A34: peak-hour time savings are up to 13 minutes southbound, and 3 minutes northbound.
 - ◆ Over the course of a full day, 'Observed' journey time savings are less than those originally predicted by the COBA model; the resultant financial benefits are therefore lower. This appears to be due to off-peak Do-Minimum junction delay times having been over-predicted in the COBA model.
 - ◆ In the local area of influence of the scheme, accident rates have fallen from 26 to 18 personal injury accidents per year, and casualty rates from 39 to 29 per year. These changes are considered to be primarily due to the scheme, rather than random variation. However, these observations are based on one years after data only, so must be treated with caution.
 - ◆ The out-turn cost was nearly 16% higher than the estimated cost. The actual construction cost was £66.9 million (at 2004 prices), which corresponds to a Present Value of Cost (PVC) of £31.7 million (at 1994 prices, discounted to 1994), and compares with a forecast PVC of £27.4 million.
- 7.4 A 'Five-Year After' Report for the A34/M4 Chieveley Improvement will be prepared in 2009 to expand on these preliminary observations.

² 07.00-19.00

Annex A: Automatic Traffic Counts

Site No.	Location	Before (factored to September 2005)						After (September 2005)					
		24hr ADT	24hr AWT	12hr ADT	12hr AWT	HGV%	24hr/12hr	24hr ADT	24hr AWT	12hr ADT	12hr AWT	HGV%	24hr/12hr
4023/4	M4, J12-13	95,126	99,993	73,446	77,622		1.288	95,258	99,967	73,209	77,712	16	1.286
4025/6	M4, J13-14	93,250	97,099	71,875	75,244		1.290	94,147	97,124	72,190	75,004	22	1.295
3421/2	M4, main c'way over J13							69,669	71,037	52,627	53,837	18	1.319
3081/2	A34 Gore Hill, N of M4	51,185	55,696	40,826	44,728	22	1.245	55,281	58,144	44,132	46,947	23	1.239
3098/9	A34 Newbury Bypass	41,689	44,703	32,703	35,153		1.272	42,099	44,696	33,214	35,328	23	1.265
3079/80	A339 Newbury, N of A4 (site 262 After)	39,118	42,792	33,099	36,190		1.182	40,121	43,759	33,080	36,740		1.224
3407/8	A34 S of M4 J13	61,939	66,731	49,191	53,295	20	1.252						
3404/6	A34 main c'way under Priors Court Rd	49,973	52,689	39,128	41,559		1.268	36,918	38,280	29,320	30,637	24	1.249
3409/11	A34 main c'way under M4												
3403	Offslip NB from A34 to Priors Court Rd	3,370	3,460	2,751	2,825		1.225						
3416	Offslip NB from A34 to Priors Court Rd							3,598	3,603	2,946	2,930	14	1.230
3405	Onslip SB to A34 from Priors Court Rd	3,897	4,175	3,332	3,580		1.166						
3418	Slip SB from Priors Court Rd							3,866	3,898	3,261	3,332	16	1.170
3412	Offslip NB from A34 to J13 roundabout							16,950	18,653	13,761	15,305	18	1.219
3410	Onslip SB to A34 from J13 roundabout							17,271	18,807	14,027	15,592	18	1.206
3415	Onslip NB to A34 from J13 roundabout							9,282	9,947	7,478	8,183	21	1.216
3417	Offslip SB from A34 to J13 roundabout							8,731	9,506	6,955	7,729	23	1.230
V3419	Onslip WB to M4 from J13 roundabout							11,688	12,661	9,355	10,213	21	1.240
V3420	Offslip EB from M4 to J13 roundabout							12,795	13,429	10,210	10,956	26	1.226
V3423	Offslip WB from M4 to J13 roundabout							12,756	14,483	10,490	12,026	11	1.204
V3424	Onslip EB to M4 from J13 roundabout							12,841	14,451	10,095	11,850	13	1.219

Annex B: Turning Counts

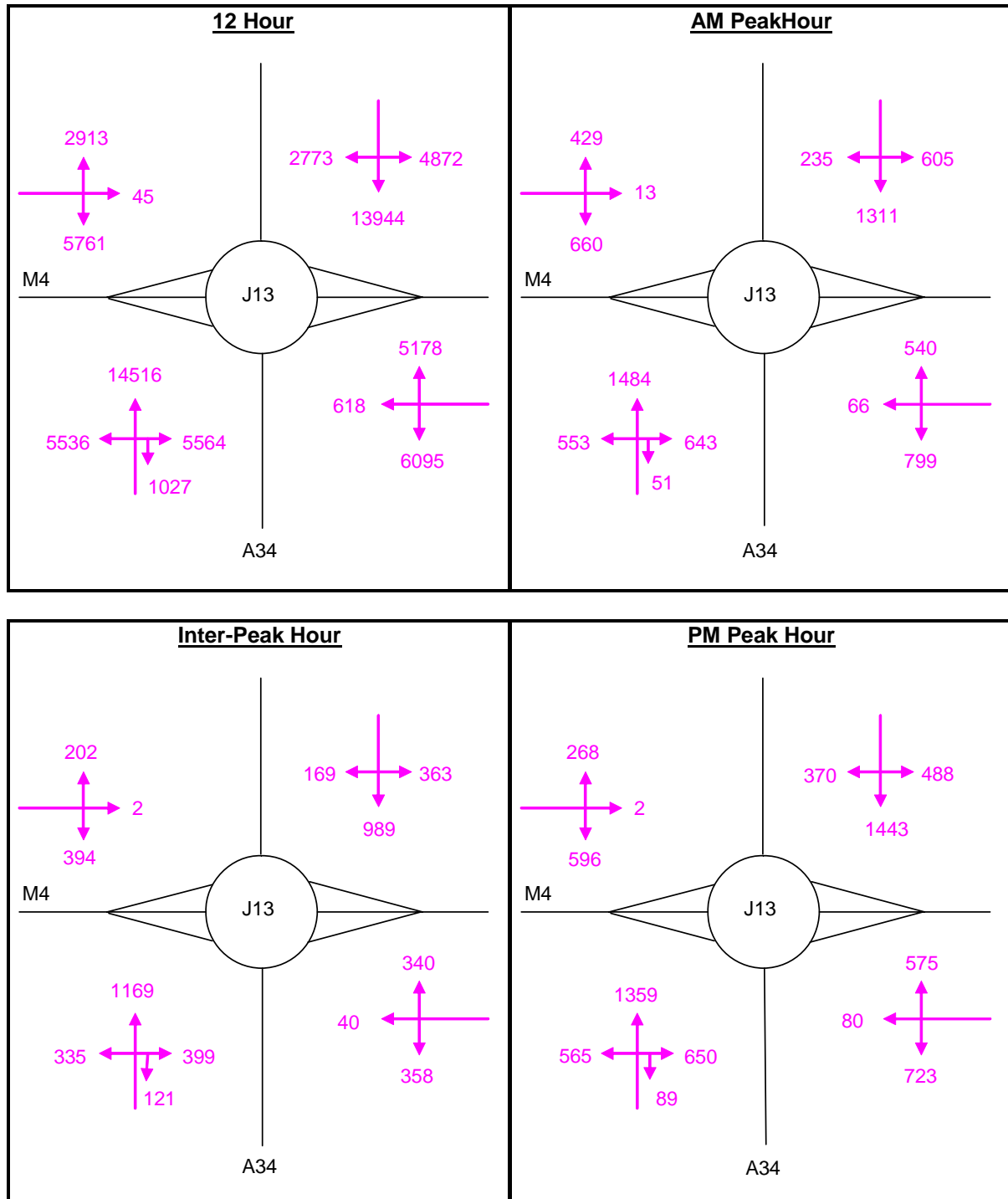


Figure B.1 – 'Before' Turning Flows at M4 Junction 13

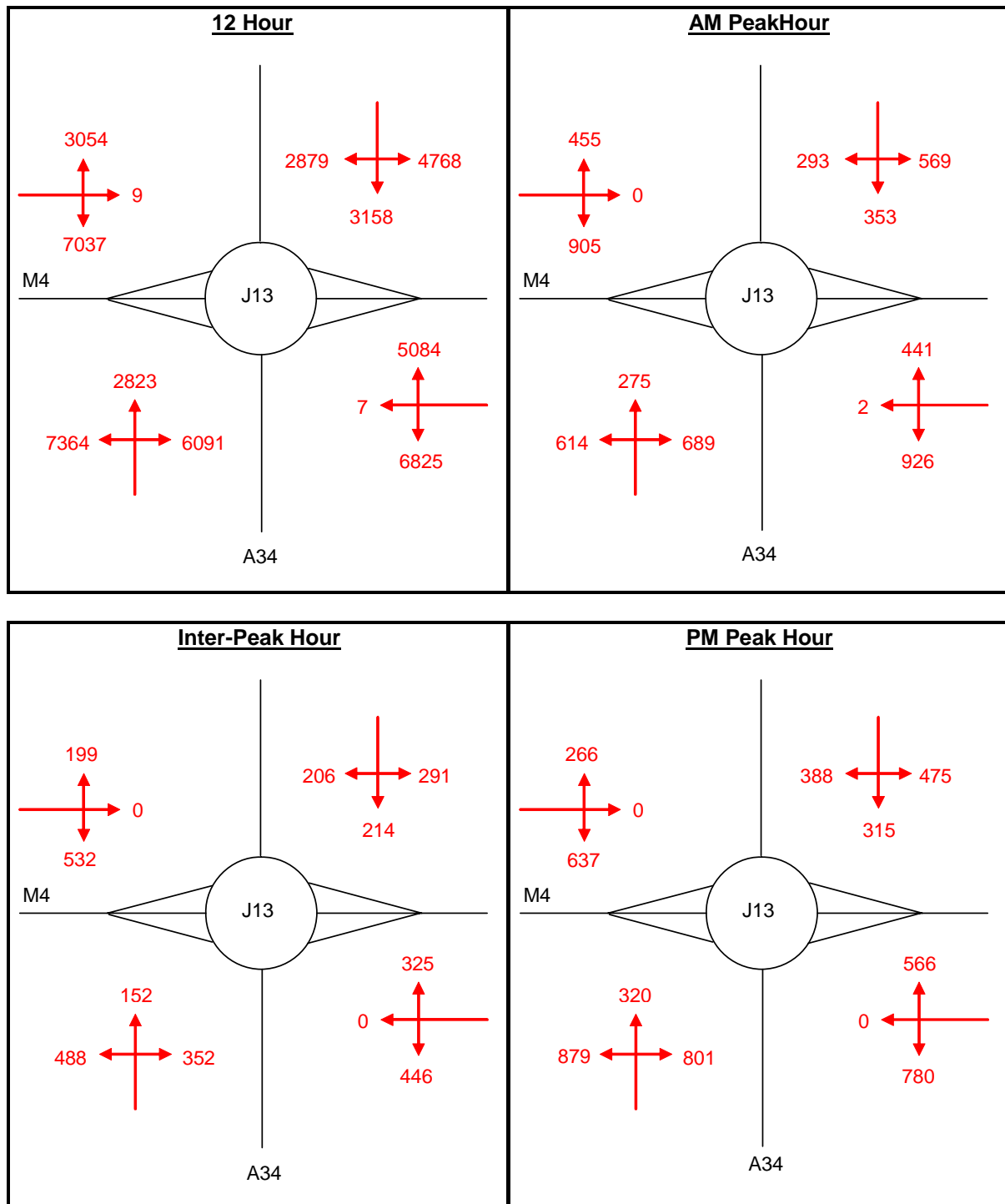


Figure B.2 – ‘After’ Turning Flows at M4 Junction 13

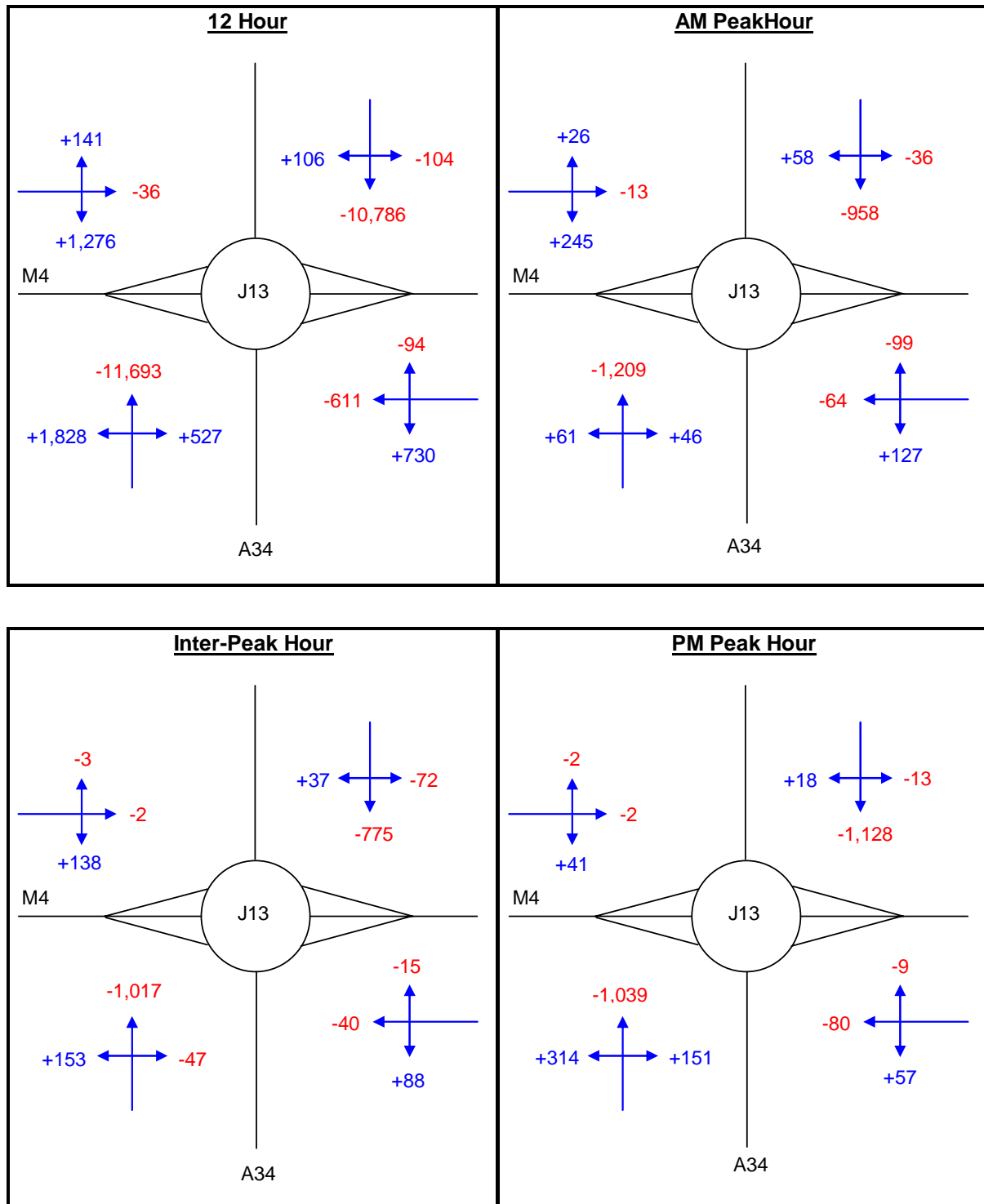
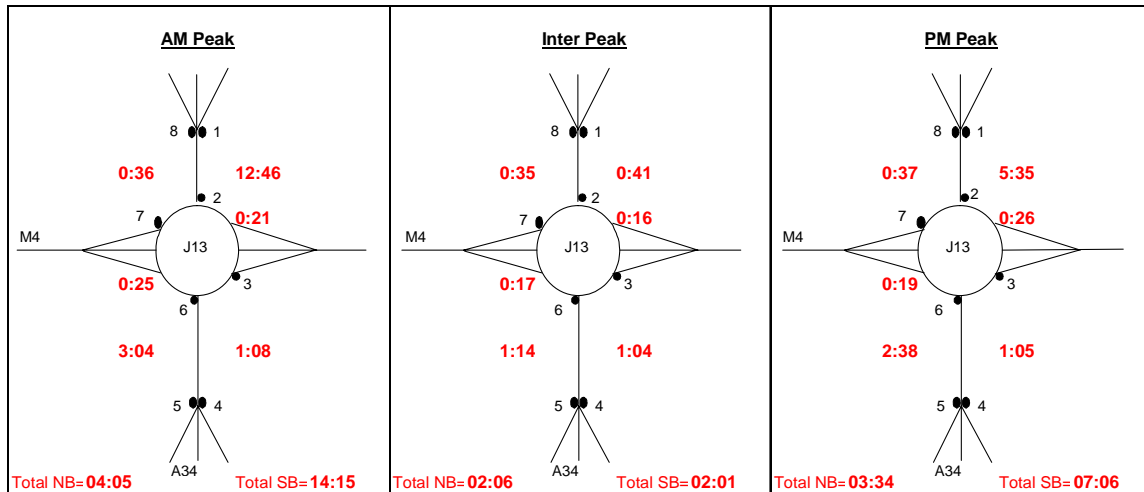


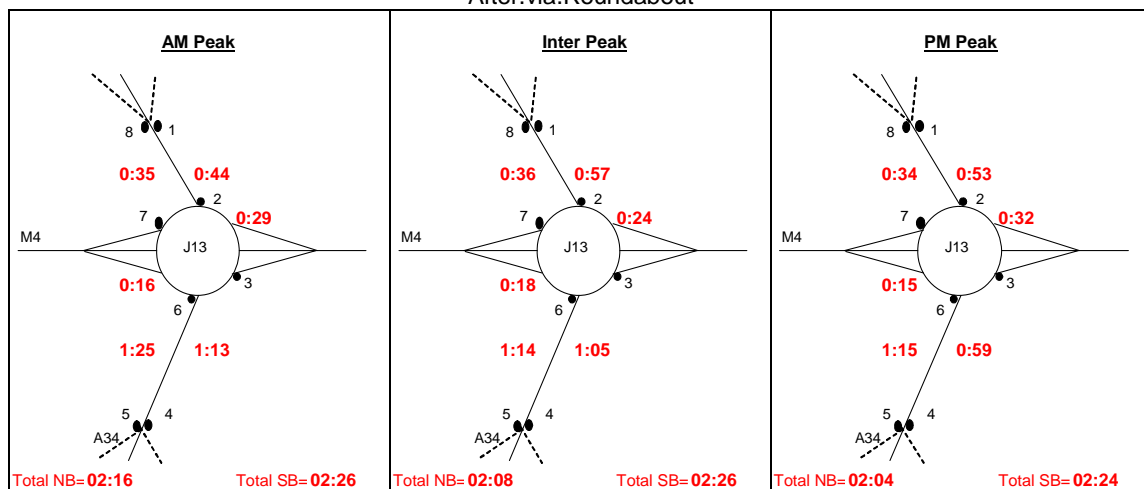
Table B.3 – Differences in 'Before' and 'After' Turning Flows

Annex C: Journey Times

Before



After.via.Roundabout



After.via.Underpass

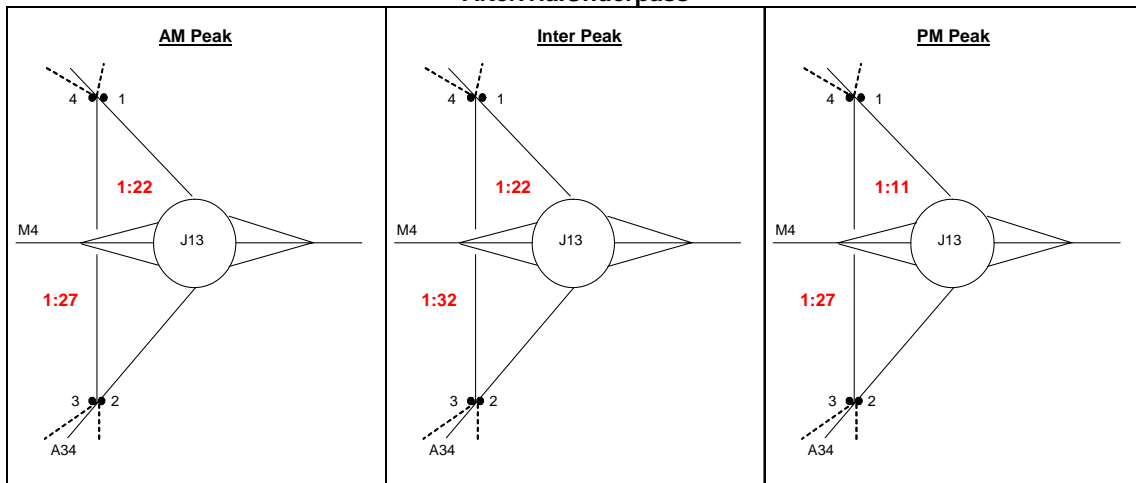


Figure C.1 - 'Before' and 'After' Journey Times

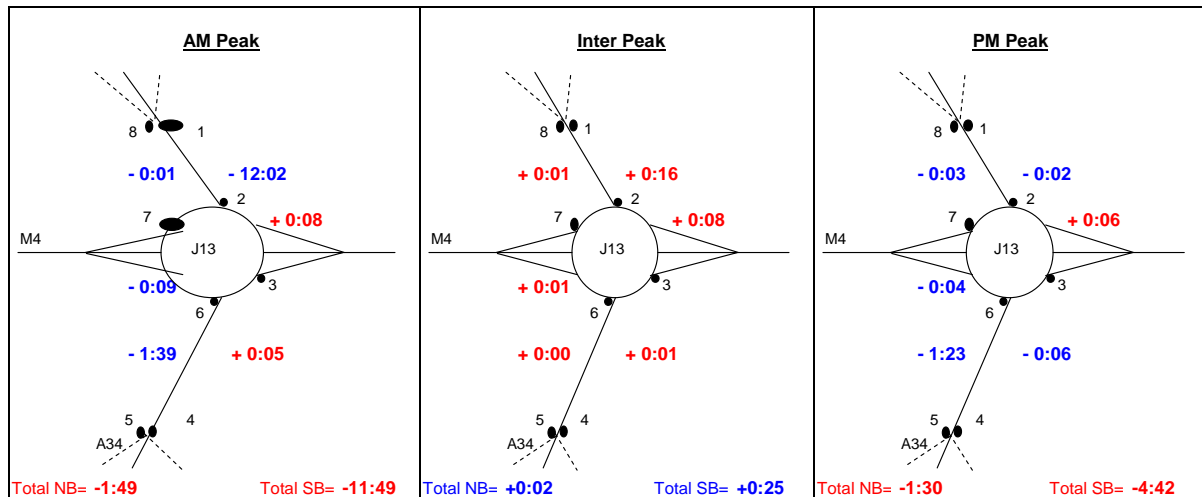


Figure C.2 – Journey Time Differences via Roundabout

Journey Segment	AM Peak		Inter Peak		PM Peak	
	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)
S'bound						
1-2	12:46	12:05	00:41	00:19	05:35	04:55
2-3	00:21	00:03	00:16	00:00	00:26	00:06
3-4	01:08	00:00	01:04	00:00	01:05	00:00
	14:15	12:08	02:02	00:19	07:05	05:01
N'bound						
5-6	03:04	02:24	01:14	00:22	02:38	02:02
6-7	00:25	00:05	00:17	00:06	00:19	00:03
7-8	00:36	00:00	00:35	00:00	00:37	00:00
	04:05	02:28	02:06	00:28	03:34	02:05

Table C.1 – 'Before' Journey Times

Journey Segment	AM Peak		Inter Peak		PM Peak	
	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)
S'bound						
1-2	00:44	00:08	00:57	00:24	00:53	00:20
2-3	00:29	00:13	00:24	00:06	00:32	00:16
3-4	01:13	00:00	01:05	00:00	00:59	00:00
	02:26	00:20	02:26	00:30	02:24	00:36
N'bound						
5-6	01:25	00:17	01:14	00:05	01:15	00:07
6-7	00:16		00:18	00:03	00:15	00:00
7-8	00:35		00:36	00:00	00:34	00:00
	02:16	00:17	02:08	00:07	02:04	00:07

Table C.2 – 'After' Journey Times, using Roundabout

Journey Segment	AM Peak		Inter Peak		PM Peak	
	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)	Total Link Time (m:s)	Queue Time (m:s)
S'bound						
1-2	01:22		01:22		01:11	
N'bound						
3-4	01:27		01:32		01:27	

Table C.3 – 'After' Journey Times, using Underpass