



LONDON BOROUGH OF BROMLEY BECKENHAM TOWN CENTRE IMPROVEMENTS

Modelling Overview

DECEMBER 2015

CONTACTS

DIMA FADDA
Assistant Engineer- Traffic
Modelling & Signal Design

Tel: ++44 (0) 203 014 9127

Email: dima.fadda@arcadis.com

CONTENTS

VERSION CONTROL	3
1 INTRODUCTION	1
1.1 Background	1
1.2 Contents of Report	1
2 BASE MODEL NETWORK.....	2
2.1 Model Area	2
2.2 Southend Road – Waitrose Entrance Junction: Existing Operation	3
3 PROPOSED DESIGN SOUTHEND ROAD – WAITROSE ENTRANCE JUNCTION	3
4 PROPOSED MODEL.....	4
4.1 Proposed Model Assumptions.....	4
4.2 Proposed Model Results	4
5 CONCLUSION.....	6

APPENDICES

APPENDIX A

Pedestrian Flow Data

1 INTRODUCTION

1.1 Background

The London Borough of Bromley (LBB) commissioned Arcadis to undertake a brief impact study investigating the replacement of the existing signalised Waitrose junction with a mini-roundabout. This work is associated with the proposed Town Centre improvements.

LBB had previously commissioned Arcadis (formerly Hyder Consulting) to test a public realm improvement scheme along the High Street and at the A222 Croydon Road – Rectory Road roundabout. This assessment was undertaken using VISSIM and LinSig modelling software. Both models were Transport for London (TfL) Model Audit Process (MAP) compliant, and were fully validated.

The Base VISSIM models for the AM, PM and Saturday peak period were used to assess the conversion of the signalised junction into a mini roundabout. The results are presented within this report.

1.2 Contents of Report

This report contains the following:

- Section 2 of the report outlines the base model network, the location of the Waitrose junction, and the existing junction operation.
- Section 3 outlines the proposed design option for the Waitrose Junction.
- Section 4 of the report details the modelling assumptions, and results of the VISSIM model.
- Section 5 outlines the conclusions.

2 BASE MODEL NETWORK

2.1 Model Area

The base model area is shown in Figure 2.1 below. Nodes included within the base VISSIM model are the following:

- Junction no. 1: Southend Road – Waitrose Entrance;
- Junction no. 2: Albemarle Road – Rectory Road – Southend Road – High Street;
- Junction no. 3: High Street – Church Avenue – Bromley Road;
- Junction no. 4: High Street – Kelsey Park Road – Manor Road – High Street;
- Junction no. 5: Church Avenue – Mark & Spencer;
- Junction no. 6: High Street – Burnhill Road;
- Junction no. 7: High Street – The Drive;
- Junction no. 8: High Street – A234 Beckenham Road – A222 Croydon Road;
- Junction no. 9: High Street – A2015 Rectory Road – Blakeney Road; and
- Junction no. 10: A2015 Rectory Road – Blakeney Road.

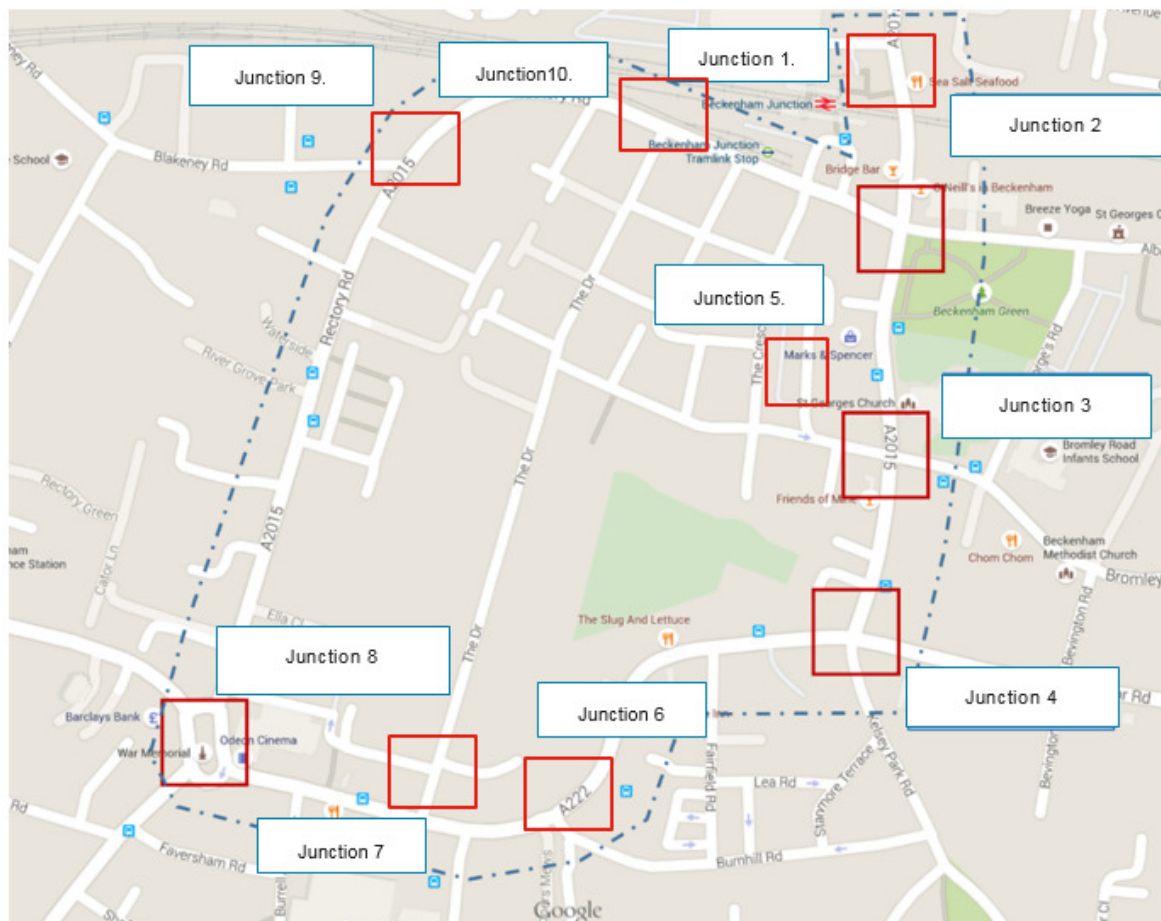


Figure 2.1 Base Model Area

The proposals involve modifications to Junction number 1, the Southend Road – Waitrose Entrance junction.

2.2 Southend Road – Waitrose Entrance Junction: Existing Operation

The Southend Road – Waitrose Entrance junction is a signalised T-junction located to the north of Beckenham Town Centre. All three arms are two-way, single carriageway movements with a flare to accommodate a left or right turn. The existing signals method of control (MOC) is shown in Figure 2.2. There are pedestrian crossings on all arms, which operate in an all-round pedestrian stage (Stage 3).

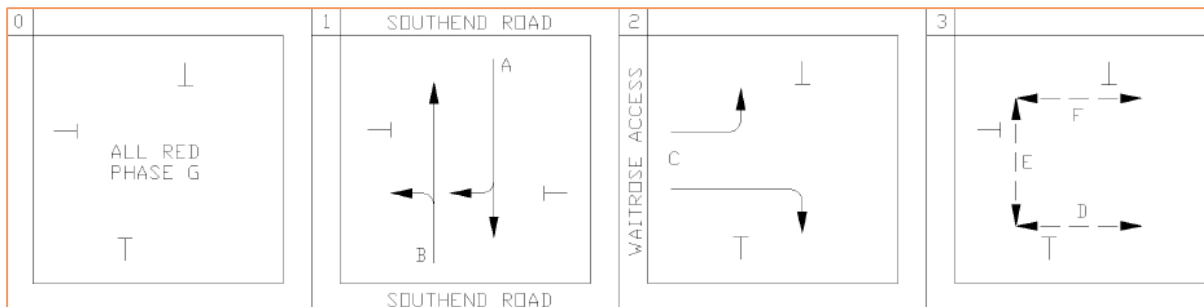


Figure 2.2 Junction 1 – Southend Road – Waitrose Entrance Existing Method of Control

3 PROPOSED DESIGN SOUTHEND ROAD – WAITROSE ENTRANCE JUNCTION

The proposal is to replace the signalised junction with a mini roundabout. There is one carriageway on all entrances and exits from the roundabout.

Three Zebra crossings, one on each approach, have been provided to be consistent with the existing pedestrian crossing facilities. These pedestrian crossings are heavily used and accommodate routes leading to the railway station, which is located 20 metres away from the junction.

Adding pedestrian refuge islands were only possible on Southend Road due to the width of the road. It was not possible to fit a refuge island on the Waitrose access due to limited road width. The width of the pedestrian refuge islands have been designed to design standards to provide safe access to vulnerable road users such as wheelchairs and pushchairs.

However, given the location next to Waitrose, the roundabout was designed to accommodate HGVs (See figure 3.1 below). Turning circles were used to inform the location of carriageways and kerbs. In addition, to obtain the correct level of deflection, limit potential collisions at this junction and slow down the speed of road users, the roundabout has been placed slightly off-centre and a hatched area is proposed on the eastern section of the roundabout (green line).

The combination of the pedestrian refuge islands and the HGV turning circles made it impossible to have two lanes of traffic on Southend Road due to the width of the road at each crossing point.

Arcadis has designed and tested the roundabout shown below in Figure 3.1.

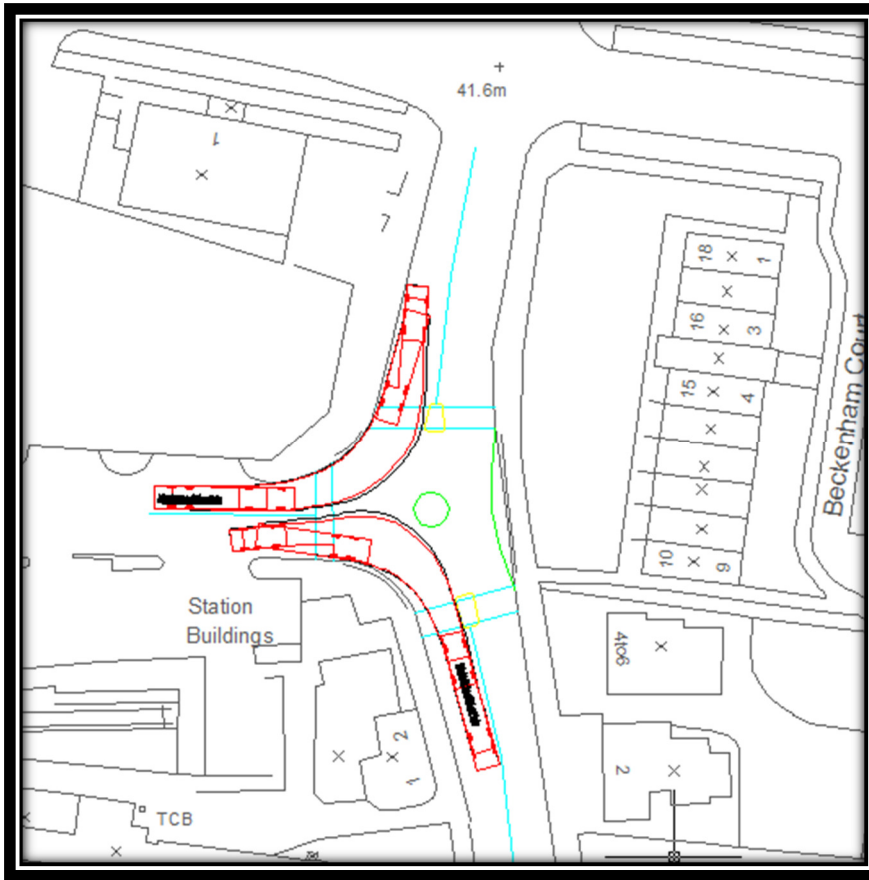


Figure 3.1 Proposed Junction 1 Southend Road – Waitrose Entrance Proposed Design

4 PROPOSED MODEL

4.1 Proposed Model Assumptions

The proposed modelling is based on the VISSIM MAP (VMAP) Stage 2&3 models for Beckenham Town Centre, and was undertaken for the AM peak period (07:45-09:45hrs), PM peak period (16:30-18:30hrs) and Saturday peak period (11:15-13:15hrs). Junction 1, Southend Road – Waitrose Entrance, was the only junction modified from the base.

4.2 Proposed Model Results

A direct comparison between the existing and proposed Average Maximum Queue has been summarised in Table 4.1. Figure 4.1 shows the locations of queue counters in the VISSIM network. The analysis is limited to Junctions 1 and 2, due to the close proximity of these two junctions.

	Junction number	Description	VISSIM detector number	Base model	Proposed Model	Difference
AM	1	Waitrose access Eastbound	1	27.10	46.30	19.20
	1	Southend road Southbound	2	301.70	465.00	163.30
	1	Southend road Northbound	3	95.20	334.10	238.90
	2	Southend Road Southbound	4	131.00	125.90	-5.10
	2	Albermarle Road Westbound	5	200.70	229.20	28.50
	2	High street Northbound	6	140.30	215.20	74.90
	2	Rectory Road Eastbound	7	208.10	338.70	130.60
PM	1	Waitrose access Eastbound	1	37.90	54.40	16.50
	1	Southend road Southbound	2	339.70	502.60	162.90
	1	Southend road Northbound	3	114.60	254.70	140.10
	2	Southend Road Southbound	4	124.10	142.00	17.90
	2	Albermarle Road Westbound	5	150.10	161.90	11.80
	2	High street Northbound	6	178.50	461.80	283.30
	2	Rectory Road Eastbound	7	430.00	456.50	26.50
Saturday	1	Waitrose access Eastbound	1	51.40	113.70	62.30
	1	Southend road Southbound	2	492.00	514.50	22.50
	1	Southend road Northbound	3	101.40	236.20	134.80
	2	Southend Road Southbound	4	134.70	161.20	26.50
	2	Albermarle Road Westbound	5	104.20	123.80	19.60
	2	High street Northbound	6	173.00	199.00	26.00
	2	Rectory Road Eastbound	7	155.70	217.10	61.40
					AM	37%
					PM	32%
					Sat	23%

Table 4.1 Average Maximum Queue Comparison

The results show an increase in the average maximum queues in the proposed model when compared to the base model for both junction's approaches. The increases are 37%, 32% and 23% for the AM, PM and Saturday peak periods respectively. Furthermore, results show that the queues for the internal reservoir between the two junctions will build up significantly on Southend Road northbound. The queues in this area are predicted to increase by 251%, 122% and 133% for the AM, PM and Saturday peak periods respectively.

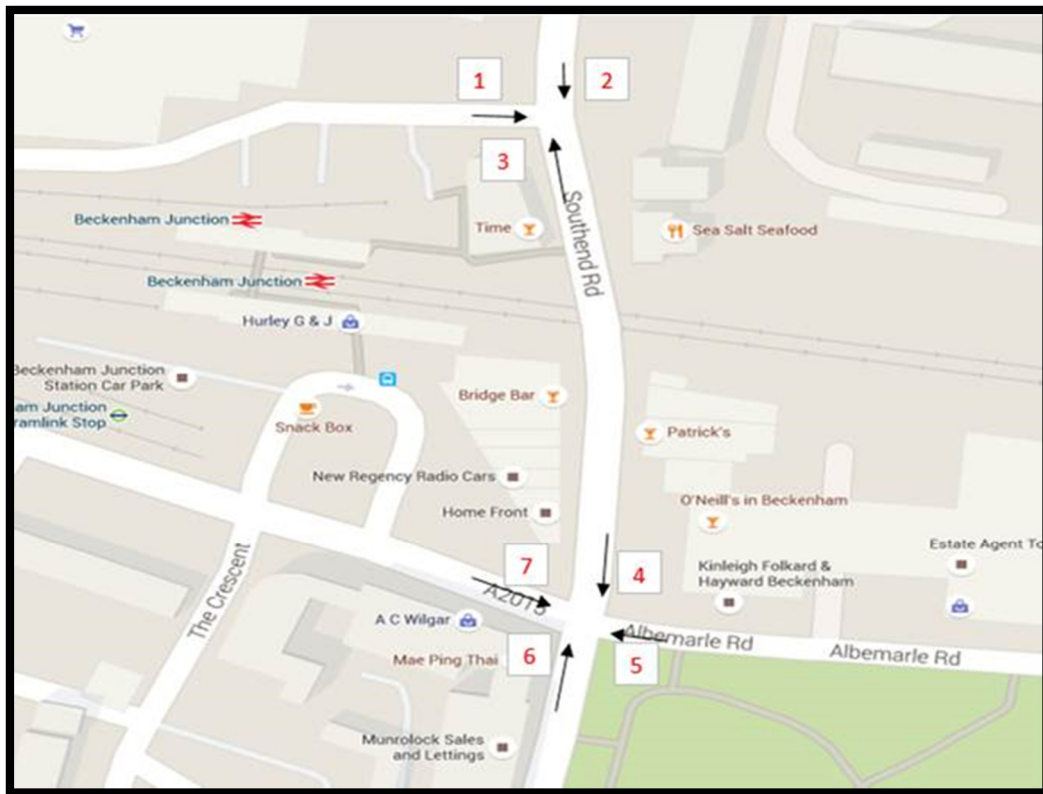


Figure 4.1 Queue Counter Locations

5 CONCLUSION

The modelling results show that converting the existing signalised junction to a mini-roundabout will increase the overall queueing on each approach by 37%, 32% and 23% for the AM, PM and Saturday peak periods respectively. Furthermore, there are particular concerns regarding the internal reservoir between the Waitrose Junction and the Rectory Road – High street junction, which will consistently fill up on Southend Road northbound during peak hours. The queue in this location is predicted to increase by 251%, 122% and 133% for the AM, PM and Saturday peak periods respectively.

APPENDIX A

Pedestrian Flow Data

Location: Waitrose Junction

Date: Thursday 17th July 2014, Saturday 19th July 2014

Hours: 0700-1000; 1600-1900(Thursday), 16:00-19:00 (Saturday).

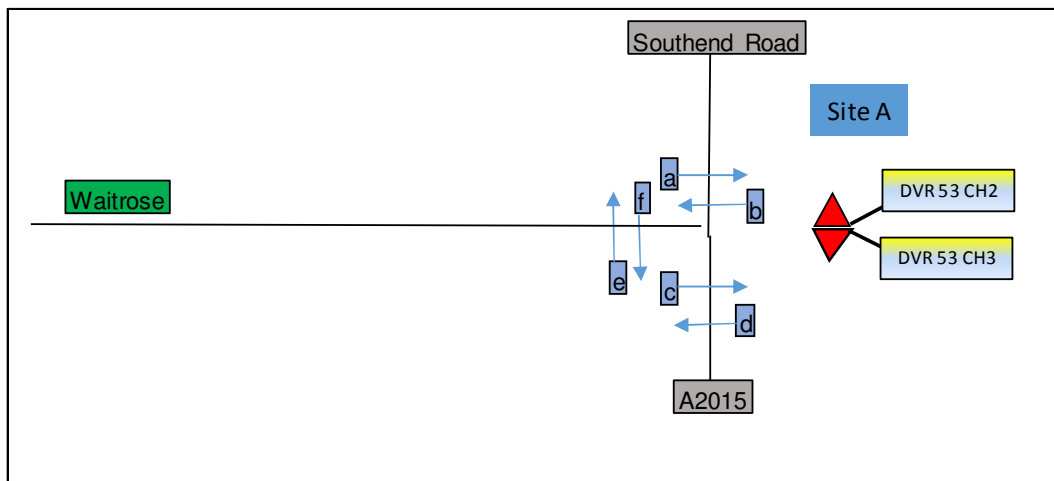


Figure 1 Pedestrians counting locations

AM Peak	a	b			c	d			e	f	
07:45	2	26	28	07:45	3	39	42	07:45	10	25	35
08:00	2	11	13	08:00	4	32	36	08:00	17	30	47
08:15	7	21	28	08:15	5	23	28	08:15	4	25	29
08:30	31	12	43	08:30	3	22	25	08:30	14	27	41
08:45	10	16	26	08:45	7	10	17	08:45	11	27	38
09:00	4	7	11	09:00	6	15	21	09:00	10	37	47
09:15	9	9	18	09:15	2	15	17	09:15	12	23	35
09:30	1	6	7	09:30	8	12	20	09:30	7	17	24
09:45	6	6	12	09:45	9	10	19	09:45	11	25	36
8:15_9:15	Sum		108		Sum		91		Sum		155

Table 1 Pedestrian Flow_ Waitrose Junction_ AM peak

PM Peak	a	b			c	d			e	f	
16:30	4	15	19	16:30	9	8	17	16:30	31	15	46
16:45	4	6	10	16:45	4	10	14	16:45	16	18	34
17:00	8	2	10	17:00	8	6	14	17:00	25	12	37
17:15	14	3	17	17:15	18	9	27	17:15	46	9	55
17:30	12	1	13	17:30	17	7	24	17:30	38	17	55
17:45	19	6	25	17:45	24	12	36	17:45	40	13	53
18:00	22	13	35	18:00	17	11	28	18:00	28	6	34
18:15	25	2	27	18:15	10	3	13	18:15	15	13	28
18:30	16	4	20	18:30	19	14	33	18:30	32	15	47
17:00_18:00	Sum		65		Sum		101		Sum		200

Table 2 Pedestrian Flow_ Waitrose Junction_ PM peak

Saturday	a	b			c	d			e	f	
11:15			0	11:15	3	24	27	11:15	17	26	43
11:30			0	11:30	6	20	26	11:30	24	23	47
11:45			0	11:45	5	11	16	11:45	26	24	50
12:00			0	12:00	9	14	23	12:00	23	32	55
12:15			0	12:15	6	8	14	12:15	19	23	42
12:30			0	12:30	16	9	25	12:30	19	14	33
12:45			0	12:45	18	10	28	12:45	24	31	55
13:00			0	13:00	8	8	16	13:00	33	18	51
13:15			0	13:15	12	5	17	13:15	16	25	41
11:45_12:45	Sum		0		Sum		78		Sum		180

Table 3 Pedestrian Flow_ Waitrose Junction_ Saturday Model

Note that the readings for Movements A and B could not be calculated for the Saturday model due to a camera malfunction and caused a loss of footage in the area. Both readings have been replaced by the data of C & D of the same day; those readings have been considered representative of the crossing.

Arcadis (UK) Limited

Manning House, 22 Carlisle Place
London
SW1P 1JA
United Kingdom
T: +44 20 3014 9000

[arcadis.com](https://www.arcadis.com)

