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Technical Note

Project:	Better Queensway		
Our reference:	358222		
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Subject:	Reopening The Deeping – Model Assessment		

1 Introduction

This technical note follows on from a report entitled "Southend Queensway Traffic Modelling" dated 12 May 2017 and should be read in conjunction with this technical note. The original work reported the assessment of six different proposed scheme options.

Following the Better Queensway consultation events in November 2017, Southend-on-Sea Borough Council (SBC) requested an assessment of scheme options to reopen The Deeping one-way access in the southbound direction. Following the development of five options for the Better Queensway study, the following two options are now to be considered:

Option 7 – Add a new access to the Deeping integrated directly into the current signalised layout. This involves adding a right turn from the west and a left turn from the east just west of the current central pedestrian crossing. A screenshot from the LinSig model with the new Deeping access is shown below in Figure 1.

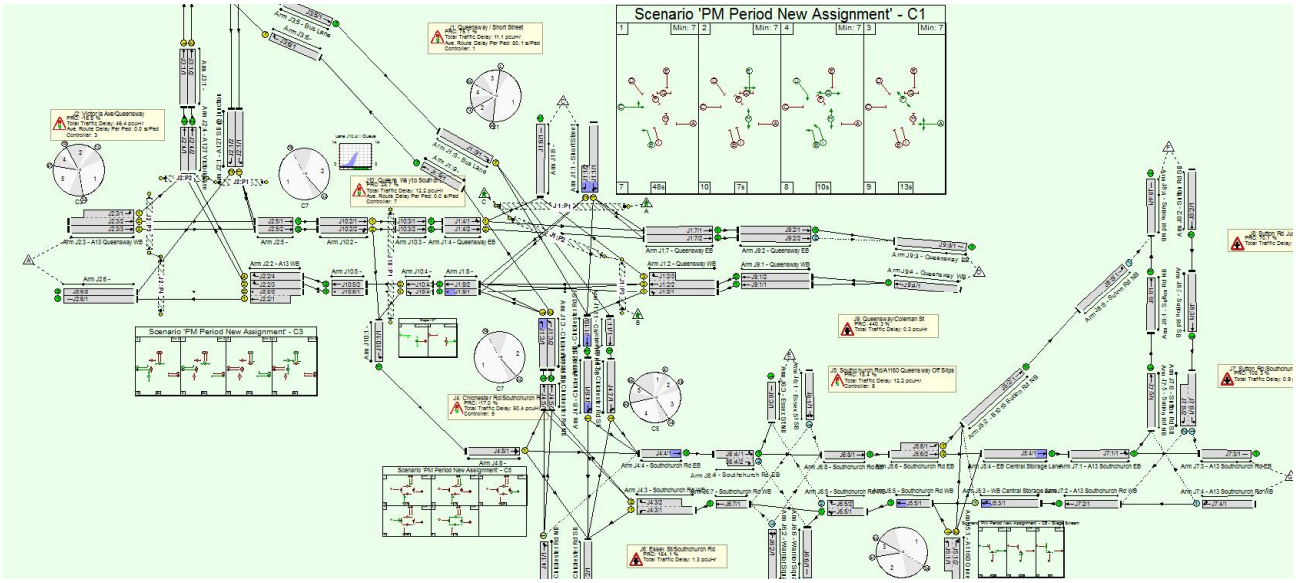

Figure 1 - Option 7 LinSig Model

Option 8 - Revert back to the old roundabout layout with the old access to Deeping reinstated and a new access to the bus interchange area added in front of the station. A screenshot from the model of the Option 8 layout is shown below in Figure 2.

Figure 2 - Option 8 Layout

The following sections summarise the assessment of the new options 7 and 8 which has been undertaken for the base year of 2016 only.

2 Option 7 Assessment

The Option 7 model has been developed within LinSig only. The previous preferred Option 5 LinSig model was used as the starting point with the new access to the Deeping added. The traffic flows were manually reassigned so that any traffic that currently turned right to Chichester Road was reassigned to turn right to the Deeping. The staging at the Chichester Road/Southchurch Road junction was amended to incorporate a new stage for The Deeping traffic.

A comparison of the overall Practical Reserve Capacity (PRC) and overall delay are shown in Table 2.1 below for the previous preferred Option 5 and the new Option 7.

Table 2.1 - Comparison of LinSig Results (Option 5 vs Option 7)

Junction	AM Peak				PM Peak				Saturday Peak (1-2)			
	PRC		Overall Delay (PCU hours)		PRC		Overall Delay (PCU hours)		PRC		Overall Delay (PCU hours)	
	Opt 5	Opt 7	Opt 5	Opt 7	Opt 5	Opt 7	Opt 5	Opt 7	Opt 5	Opt 7	Opt 5	Opt 7
A13 WB Right	52.5%	59.9%	15.48	12.33	54.0%	75.1%	13.19	10.71	20.7%	27.5%	23.48	14.22
A127 SB Ahead Left	29.2%	-1.2%	19.05	25.90	-0.7%	-16.0%	25.53	45.99	-16.0%	-32.0%	54.28	129.5
Chichester Rd SB Ahead Left	117.0%	117.0%	3.48	3.60	188.0%	71.6%	3.34	3.94	83.7%	81.2%	5.25	5.37
A1160 Queensway On Slip	21.7%	10.8%	8.32	12.89	-0.6%	-17.0%	16.17	50.20	0.7%	-9.3%	15.50	35.11
A1160 Queensway On Slip Ahead	16.7%	18.9%	11.12	11.26	28.5%	18.4%	11.10	11.71	-16.0%	-17.0%	63.31	54.01
Queensway/Southchurch Ped Crossing	-	59.8%	-	9.90	-	28.7%	-	12.22	-	15.2%	-	16.06

The results indicate that the following:

- Victoria Gateway junction is predicted to be over capacity in the AM peak with -1.2% PRC (compared to well within with the previous Option 5 assessment with 29.2% PRC);
- Similarly in the PM peak the Victoria Gateway junction is predicted to be over capacity with -16.0% PRC (compared to -0.7% PRC with the previous Option 5);
- In the PM peak the Chichester Road / Southchurch Road junction is predicted to operate over capacity with -17.0% PRC (compared to -0.6% with the previous Option 5);
- Similarly in the Saturday peak the Victoria Gateway junction is predicted to be over capacity with -32.0% PRC (compared to -16.0% PRC with the previous Option 5); and,
- Similarly in the Saturday peak the Chichester Road / Southchurch Road junction is predicted to operate over capacity with -9.3% PRC (compared to +0.7% with the previous Option 5).

In summary the provision of reinstating the right turn into the Deeping is predicted to lead in a loss of capacity at both the Victoria Gateway junction (through blocking back) and the Chichester Road / Southchurch Road junction through the need for an additional stage for the Deeping traffic.

Given that Option 7 was predicted to operate so poorly within LinSig, it was not assessed further within VISSIM.

3 Option 8 Assessment

As Option 8 reverts back to give-way control, the roundabout layout from the original Town Centre model was imported and adapted to fit into the previous preferred Option 5 VISSIM model including the new signalised layout at the Chichester Road junction. The layout is shown in Figure 2. The signal timings for the revised 4 arm Chichester Road layout were derived from the Option 7 LinSig model. The right turn from Queensway to Chichester Road was removed and the dynamic model was converged using the same methodology and parameters as the other VISSIM models. The results comparing back to the preferred Option 5 are presented below.

3.1 AM Peak

The comparison of network performance between Option 5 and 8 are shown below in Table 3.1. Cells highlighted in blue indicate the optimal performing option for each measure.

Table 3.1 - Network Performance Comparison AM Peak

Measure	DS5	DS8
Remaining Vehicles in Network	***528***	1391
Processed Vehicles	***33989***	30848
Total Distance Travelled (mi)	***17984.7***	15480.3
Total Travel Time (h)	***1325.2***	2088.3
Total Network Delay (h)	***627.5***	1480.8
Average Travel Time (mins)	***2.30***	3.89
Average Delay Time (mins)	***1.09***	2.76
Total Stopped Delay (h)	***428.5***	1213.3
Average Stopped Delay (s)	***44.7***	135.9
Number of Stops	***56153.7***	76359.0
Average Number of Stops	***1.63***	2.37
Average Network Speed (mph)	***13.6***	7.5
Latent Demand	***39***	1560
Latent Delay (h)	***25.8***	902.0
Latent Delay per vehicle (s)	2389.3	***2081.1***

The network performance is significantly worse in Option 8 compared to Option 5 with higher travel times, delays and slower speeds. The latent demand is also significantly higher in Option 8.

A comparison of the junction performance is shown in Table 3.2 below. Table 3.2 shows that the vast majority of junctions operate worse in Option 8 than in Option 5 with higher queues and delays, particularly in the last hour and a half of the simulation.

Table 3.2 - Junction Performance Comparison AM Peak

Time	Junction		Volume		Avg Q (m)		Delay (s)		LOS	
	Node	Description	DS5	DS8	DS5	DS8	DS5	DS8	DS5	DS8
0700 - 0730	2105	Queensway/Victoria Avenue	588	631	3	1	29.5	6.9	C	A
	2081	Queensway/Chichester Road	520	439	9	11	30.9	58.8	C	E
	2083	Chichester/Southchurch	258	326	6	9	28.0	33.2	C	C
	2093	Southchurch Rd / Warrior Square / Dev	281	303	0	0	1.2	1.5	A	A
	2094	Queensway/Sutton Rd	514	520	4	4	9.2	9.8	A	A
	1102	Southchurch/Sutton Rd	248	277	0	0	1.4	1.0	A	A
	OVERALL NETWORK TOTALS		**5469**	**5413**	**2**	**2**	**9.3**	**9.7**	**A**	**A**
0730 - 0800	2105	Queensway/Victoria Avenue	773	842	5	2	31.3	10.5	C	B
	2081	Queensway/Chichester Road	657	553	10	12	28.0	54.8	C	D
	2083	Chichester/Southchurch	318	430	9	13	36.2	35.3	D	D
	2093	Southchurch Rd / Warrior Square / Dev	356	383	0	0	2.2	3.1	A	A
	2094	Queensway/Sutton Rd	673	682	6	6	11.1	11.5	B	B
	1102	Southchurch/Sutton Rd	336	366	1	0	3.4	2.0	A	A
	OVERALL NETWORK TOTALS		**7924**	**7869**	**3**	**4**	**10.8**	**12.2**	**B**	**B**
0800 - 0830	2105	Queensway/Victoria Avenue	861	906	6	7	32.0	19.3	C	B
	2081	Queensway/Chichester Road	747	592	14	17	30.3	69.4	C	E
	2083	Chichester/Southchurch	384	505	12	33	43.0	61.7	D	E
	2093	Southchurch Rd / Warrior Square / Dev	452	462	0	1	4.7	10.0	A	A
	2094	Queensway/Sutton Rd	863	820	10	12	13.9	16.5	B	C
	1102	Southchurch/Sutton Rd	416	416	1	5	6.3	5.9	A	A
	OVERALL NETWORK TOTALS		**10130**	**9792**	**5**	**9**	**13.4**	**19.4**	**B**	**C**
0830 - 0900	2105	Queensway/Victoria Avenue	1059	961	11	20	37.3	35.1	D	D
	2081	Queensway/Chichester Road	864	570	22	28	36.0	88.2	D	F
	2083	Chichester/Southchurch	422	501	15	56	46.6	88.8	D	F
	2093	Southchurch Rd / Warrior Square / Dev	507	475	1	4	6.5	21.5	A	C
	2094	Queensway/Sutton Rd	962	848	15	24	16.8	29.0	C	D
	1102	Southchurch/Sutton Rd	480	440	20	28	30.1	40.7	D	E
	OVERALL NETWORK TOTALS		**11850**	**10644**	**9**	**20**	**17.5**	**32.0**	**C**	**D**
0900 - 0930	2105	Queensway/Victoria Avenue	1100	852	15	62	40.0	102.6	D	F
	2081	Queensway/Chichester Road	918	507	32	44	44.6	180.5	D	F
	2083	Chichester/Southchurch	370	343	12	109	45.0	207.8	D	F
	2093	Southchurch Rd / Warrior Square / Dev	530	265	0	19	4.6	126.7	A	F
	2094	Queensway/Sutton Rd	1025	586	15	71	17.1	104.1	C	F
	1102	Southchurch/Sutton Rd	493	225	17	118	27.0	214.7	D	F
	OVERALL NETWORK TOTALS		**11365**	**9040**	**8**	**32**	**17.5**	**54.4**	**C**	**F**
0930 - 1000	2105	Queensway/Victoria Avenue	1078	632	17	69	39.7	170.0	D	F
	2081	Queensway/Chichester Road	891	334	34	42	46.4	200.0	D	F
	2083	Chichester/Southchurch	405	274	13	122	45.0	196.0	D	F
	2093	Southchurch Rd / Warrior Square / Dev	563	207	0	28	3.6	137.0	A	F
	2094	Queensway/Sutton Rd	1057	447	16	135	17.2	202.5	C	F
	1102	Southchurch/Sutton Rd	514	174	9	156	15.8	229.5	C	F
	OVERALL NETWORK TOTALS		**10962**	**7272**	**7**	**41**	**16.0**	**68.6**	**C**	**F**

3.2 PM Peak

The comparison of network performance between Option 5 and 8 are shown below in Table 3.3.

Table 3.3 - Network Performance Comparison PM Peak

Measure	DS5	DS8
Remaining Vehicles in Network	***421***	1882
Processed Vehicles	***34343***	30430
Total Distance Travelled (mi)	***17168.1***	14581.5
Total Travel Time (h)	***1334.3***	3144.7
Total Network Delay (h)	***663.1***	2561.0
Average Travel Time (mins)	***2.30***	5.96
Average Delay Time (mins)	***1.14***	4.88
Total Stopped Delay (h)	***458.3***	2235.7
Average Stopped Delay (s)	***47.5***	256.9
Number of Stops	***57670.2***	94400.5
Average Number of Stops	***1.66***	2.92
Average Network Speed (mph)	***12.9***	5.2
Latent Demand	***247***	2766
Latent Delay (h)	***486.3***	2472.3
Latent Delay per vehicle (s)	7092.0	***3218.2***

The network performance is significantly worse in Option 8 compared to Option 5 with higher travel times, delays and slower speeds. The latent demand is also significantly higher in Option 8.

A comparison of the junction performance is shown in Table 3.4 below. Table 3.4 shows that the vast majority of junctions operate worse in Option 8 than in Option 5 with higher queues and delays in all periods.

Table 3.4 - Junction Performance Comparison PM peak

Time	Junction		Volume		Avg Q (m)		Delay (s)		LOS	
	Node	Description	DS5	DS8	DS5	DS8	DS5	DS8	DS5	DS8
1600 - 1630	2105	Queensway/Victoria Avenue	1048	1022	27	17	44.9	37.5	D	D
	2081	Queensway/Chichester Road	915	529	19	29	29.3	81.8	C	F
	2083	Chichester/Southchurch	501	568	12	43	27.6	69.2	C	E
	2093	Southchurch Rd / Warrior Square / Dev	517	573	0	1	3.5	6.9	A	A
	2094	Queensway/Sutton Rd	921	980	10	14	13.6	18.8	B	C
	1102	Southchurch/Sutton Rd	457	543	1	2	2.5	5.3	A	A
	OVERALL NETWORK TOTALS		**10499**	**10924**	**5**	**11**	**13.4**	**18.1**	**B**	**C**
1630 - 1700	2105	Queensway/Victoria Avenue	1021	916	28	50	46.2	72.3	D	E
	2081	Queensway/Chichester Road	889	473	16	35	25.6	124.5	C	F
	2083	Chichester/Southchurch	496	542	14	76	29.9	98.8	C	F
	2093	Southchurch Rd / Warrior Square / Dev	524	539	0	6	4.8	21.1	A	C
	2094	Queensway/Sutton Rd	921	917	9	29	13.1	32.7	B	D
	1102	Southchurch/Sutton Rd	461	499	1	26	3.8	32.7	A	D
	OVERALL NETWORK TOTALS		**10057**	**10041**	**5**	**20**	**15.2**	**31.5**	**C**	**D**
1700 - 1730	2105	Queensway/Victoria Avenue	1074	883	29	76	48.9	105.4	D	F
	2081	Queensway/Chichester Road	920	469	19	41	27.0	187.3	C	F
	2083	Chichester/Southchurch	516	457	17	106	34.3	155.6	C	F
	2093	Southchurch Rd / Warrior Square / Dev	523	418	1	13	7.2	51.2	A	D
	2094	Queensway/Sutton Rd	914	758	11	79	15.8	105.7	C	F
	1102	Southchurch/Sutton Rd	413	350	1	79	3.4	114.7	A	F
	OVERALL NETWORK TOTALS		**10687**	**9588**	**6**	**30**	**16.2**	**47.9**	**C**	**E**
1730 - 1800	2105	Queensway/Victoria Avenue	1081	762	30	76	57.3	130.5	E	F
	2081	Queensway/Chichester Road	969	413	27	41	30.5	175.6	C	F
	2083	Chichester/Southchurch	541	415	15	98	31.3	140.9	C	F
	2093	Southchurch Rd / Warrior Square / Dev	579	398	0	13	5.5	43.9	A	D
	2094	Queensway/Sutton Rd	970	697	11	94	14.7	120.7	B	F
	1102	Southchurch/Sutton Rd	479	340	1	92	4.2	128.2	A	F
	OVERALL NETWORK TOTALS		**10505**	**8108**	**7**	**40**	**17.1**	**62.9**	**C**	**F**
1800 - 1830	2105	Queensway/Victoria Avenue	995	616	28	78	50.8	371.5	D	F
	2081	Queensway/Chichester Road	869	313	17	43	25.2	154.0	C	F
	2083	Chichester/Southchurch	510	327	10	110	26.1	109.8	C	F
	2093	Southchurch Rd / Warrior Square / Dev	533	318	0	17	3.1	30.8	A	C
	2094	Queensway/Sutton Rd	832	542	7	95	10.8	301.4	B	F
	1102	Southchurch/Sutton Rd	439	274	1	115	3.6	94.9	A	F
	OVERALL NETWORK TOTALS		**9237**	**6154**	**5**	**54**	**16.1**	**146.4**	**C**	**F**
1830 - 1900	2105	Queensway/Victoria Avenue	936	430	27	75	51.2	769.4	D	F
	2081	Queensway/Chichester Road	831	206	22	44	31.1	246.5	C	F
	2083	Chichester/Southchurch	479	206	9	128	24.3	87.1	C	F
	2093	Southchurch Rd / Warrior Square / Dev	497	194	0	22	2.7	22.9	A	C
	2094	Queensway/Sutton Rd	781	334	6	90	9.8	679.7	A	F
	1102	Southchurch/Sutton Rd	389	161	1	139	3.0	49.2	A	E
	OVERALL NETWORK TOTALS		**8431**	**4213**	**5**	**68**	**15.8**	**309.8**	**C**	**F**

It is immediately apparent in the PM peak that the Chichester Road/Southchurch Road junction operates over capacity and the congestion blocks back to the Victoria Gateway junction as shown in Figure 3 below.

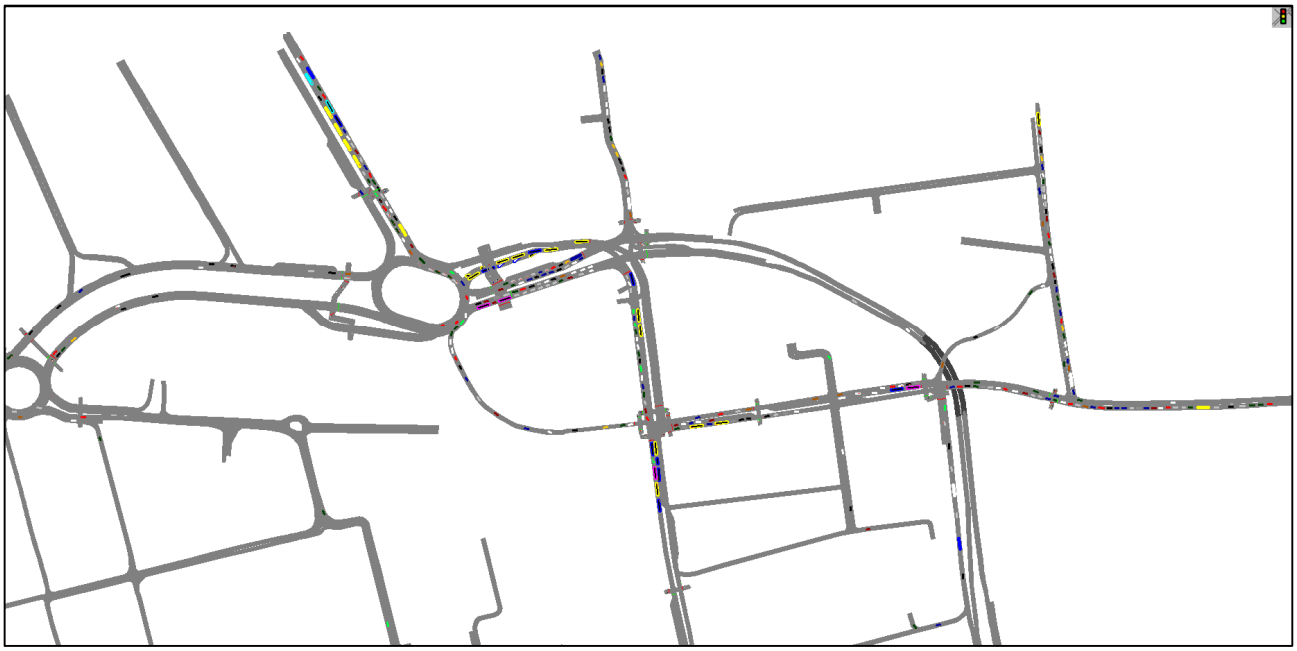

Figure 3 - PM Peak Congestion in The Deeping

4 Summary and Conclusion

In summary the provision of reinstating the right turn into the Deeping is predicted to lead in a loss of capacity at both the Victoria Gateway junction (through blocking back) and the Chichester Road / Southchurch Road junction through the need for an additional stage for the Deeping traffic.

The analysis of both the LinSig and VISSIM models shows that the network and junction performance is deteriorated with the opening of The Deeping.