

Prepared by: [REDACTED]
Client: Momentum Transport Planning

Reviewed by: [REDACTED]
Date: 02/08/18

Olympia – No CS9 Proposal Testing Summary

1. INTRODUCTION

This technical note (TN) details the VISSIM modelling undertaken for Momentum Transport Consultancy for the proposed Olympia Exhibition Centre development in Hammersmith, London.

The VISSIM modelling has been based on Transport for London's (TfL's) model of Hammersmith, which has been used to test the Cycle Superhighways proposals (CS9) in the area.

The model extents are shown in **Figure 1**.



Figure 1 – VISSIM Modelling Extents

This TN builds upon TN1, which detailed initial VISSIM assessment for the Olympia development. However, since that testing, some of the flow assumptions and scenarios required have changed, which are detailed as part of this TN. The main difference with this assessment is that modelling **does not include** the proposed CS9 improvements.

2. NEW SCENARIOS MODELLED

Following agreement between Momentum and TfL, the following scenarios have been tested as part of this VISSIM modelling exercise.

Table 1 – Modelled VISSIM Scenarios

Scenario		VISSIM Scenario No.
No.	Name	
1	Future Baseline (Existing TfL VISSIM model, excluding CS9 proposals)	16, 17
2a	Future Baseline + Proposed Blythe Road Signalisation	37, 38
3a	Future Baseline + Proposed Olympia Development	39, 40
4a	Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation	41, 42
5a	Future Baseline + Proposed Olympia Development + Proposed D-Gate Signalisation	43, 44
6a	Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation + Proposed D-Gate Signalisation	45, 46

It should be noted that, for the purposes of this TN, the following scenario has not been compared and analysed following agreement with Momentum:

- Scenario 2a – Future Baseline + Proposed Blythe Road Signalisation.

Traffic Flows

In order to model the various scenarios above, an additional traffic flow-set has been added to the VISSIM model, which is the Proposed Olympia Development.

As well as the above, an 'Adjusted Proposed' AM and PM flow-set has been produced. For scenarios which include the proposed Olympia development traffic, this flow-set reassigns traffic that travels to Olympia Way to Blythe Rd (as part of proposals to pedestrianise Olympia Way).

An adjusted flow-set has also been created for the scenarios which feature the Blythe Road signalisation. As this proposal makes Munden Street an 'IN' only, traffic which previously exited Munden Street has been reassigned to North End Road.

The calculations for creating the vehicle inputs and static routes for these flow-sets can be found in **Appendix A**.

3. CHANGES TO MODEL

To create the various scenarios as detailed in **Table 1**, a number of modification files have been created or revised from the initial testing. These modification files have then been added to the relevant VISSIM scenarios, depending on the elements required.

Table 2 details the main changes within the newly created modification files. If further, more detailed information is required on the model changes, please refer to the appropriate modification files within the model folder.

Table 2 – New VISSIM Modification File Details

Modification		
No.	Name	Description
62	MM Data Req – Base	Data collection points added and data measurements configured to collect flow and speed information for Momentum for a variety of links within the network.
65	Momentum D-Gate Access	New link and connector structure to create the D-Gate access to Olympia. This has been based on Momentum Drawing <i>M000293-HW-001</i> (see Appendix B for more details).

Modification		
No.	Name	Description
		<p>A 20mph speed has been modelled into and out of the access, with 'High Braking' reduced speed areas for the turns.</p> <p>Additional priority rules have been coded in to account for the CS9 scheme across the mouth of the junction and a new node has been created.</p>
68, 69	Momentum – Olympia Dev – AM, Momentum – Olympia Dev – PM	<p>New vehicle types, classes, compositions for 'OlymDev' traffic, along with new vehicle inputs and static routes.</p> <p>The routing has been determined based on the Momentum flow tables provided, with traffic from the east and the west assumed to travel to/from Hammersmith Rd and Kensington High Street (see Appendix A for more details).</p> <p>Lane closures, desired speeds, RSAs and priority rules were all checked and updated to include the new vehicle types/classes as necessary.</p> <p>The taxi ranks on Hammersmith Rd for Olympia have been coded into the model using the PT Lines tool. An eastbound and westbound stop has been added, along with an associated PT line. The departure times have been based on randomly generated numbers within the AM and PM peak hours for the frequency specified. The dwell time distribution has been based on the default No. 1 distribution (Normal distribution with a mean value of 20s and a standard deviation of 2).</p>
73	Momentum – No Signals Layout	<p>This modification includes Momentum's changes from the proposed CS9 layout as shown in Drawing <i>M000293-HW-026-A</i> and <i>M000293-HW-027-A</i> (see Appendix B for more details).</p> <p>The main changes are as follows:</p> <ul style="list-style-type: none"> - Two lane approach at Blythe Rd, with updated link/connector structure, desired speeds, RSAs, priority rules and conflict areas. - Conversion of North End Road approach from two narrow lanes to one wide single lane on the approach. This involved an update of the link/connector structure, RSAs and priority rules. - Minor kerb realignment along Hammersmith Road
66	Momentum – Blythe Rd signalised	<p>This modification includes Momentum's proposed signalisation of the Hammersmith Rd/Blythe Rd junction as shown in Drawing <i>M000293-HW-022-A</i> and <i>M000293-HW-023-A</i> (see Appendix B for more details).</p> <p>The main changes from the 'No Signals' layout are as follows:</p> <ul style="list-style-type: none"> - Creation of a new Signal Controller (No. 100) under VAP control. The configuration of the phases and stages have been based on information provided by Momentum (see Appendix C for more details). Timings have been adjusted from the LINSIG to manually balance queuing between all modes. - New signal heads and detectors have been added to suit the Signal Controller configuration. - RSAs have been added at each of the stop-lines for saturation flow purposes. Proposed saturation flows were calculated using RR67 and then Multimodal's Saturation Flow study note was used to assign an appropriate speed distribution. Further information can be found in Appendix D. - Priority rules have been reviewed and updated to ensure stop marker and conflict marker locations were appropriate. - Closure of Munden Street to traffic entering the network, which has instead been reassigned to North End Road.
72	Momentum – Blythe Rd + D-Gate signalised	<p>This modification includes Momentum's proposed signalisation of the Hammersmith Rd/Blythe Rd junction and the Hammersmith Rd / D-Gate junction, as shown in Drawing <i>M000293-HW-020-A</i> and <i>M000293-HW-021-A</i> (see Appendix B for more details).</p> <p>The main changes from the 'Blythe Rd signalised' layout are as follows:</p> <ul style="list-style-type: none"> - Creation of a new Signal Controller (No. 101) under VAP control. The configuration of the phases and stages have been based on information provided by Momentum (see Appendix C for more details). Timings have been adjusted from the LINSIG to manually balance queuing between all modes.

Modification		
No.	Name	Description
		<ul style="list-style-type: none"> - New signal heads and detectors have been added to suit the Signal Controller configuration. - RSAs have been added at each of the stop-lines for saturation flow purposes. Proposed saturation flows were calculated using RR67 and then Multimodal's Saturation Flow study note was used to assign an appropriate speed distribution. Further information can be found in Appendix D. - Priority rules have been reviewed and updated to ensure stop marker and conflict marker locations were appropriate.
67	Momentum – D-Gate signalised	<p>This modification includes Momentum's proposed signalisation of the Hammersmith Rd/ D-Gate junction, as shown in Drawing <i>M000293-HW-16-B</i> and <i>M000293-HW-17-B</i> (see Appendix B for more details).</p> <p>The main changes from the 'Blythe Rd + D-Gate signalised' layout are as follows:</p> <ul style="list-style-type: none"> - Deletion of Signal Controller 101, including all associated signal heads and detectors. - Deletion of signalised pedestrian crossings at the Blythe Rd junction linked to the signalisation scheme. - Removal of RSAs used previously for saturation flows at the Blythe Rd junction. - Realignment of the informal pedestrian crossing and CS9 route across the Blythe Rd junction, updating links/connectors and all priority rules and conflict area. - Reinstating the Munden Street approach so that traffic can enter the network from this location. This involved link/connector, desired speed, RSA and priority rule updates.
97, 101-108	MM SC2a-6a AM/PM – Routing Updates & Running Edits	<p>These modification files contain static routing updates to all of the scenarios, taking into account the associated network and network layout required. This allows each of the scenarios to play and collect results.</p> <p>There are also updates to desired speeds, RSAs, priority rules and link/connector closures to ensure all vehicle types and classes have been considered for each associated scenario.</p> <p>SC8 and 9 also features changes to priority rules 153, 153, 155 and 156. The red markers have not been set to apply to any vehicle types to allow more realistic behaviour for vehicles exiting D-Gate.</p>
90, 91	Momentum – Adjusted Proposed AM/PM V2 Flows	These files accompany the scenarios which contain the proposed Olympia development flows and adjust the static routes to reassign traffic that previously used Olympia Way to Blythe Rd.
98, 99	Momentum - Adjusted Future Baseline AM/PM Flows - BlytheRdSigs	These files accompany the scenarios which contain the proposed Blythe Road signalisation and adjust the static routes to reassign traffic that previously used Munden Street to North End Road.
95, 96	SC1a AM/PM – Running Edits	These files were automatically generated in Scenario Management and contain edits to the Simulation Parameters and Evaluation files when running for results.

4. RESULTS

To compare the effects in the network of the various scenarios, the following outputs have been obtained as agreed with TfL:

- Journey Times (for General Traffic, Buses, Cyclists)
- Queue Lengths (Average Queues at each junction in the network)
- Saturation Flows (for each approach at each signalised junction in the network)
- Overall Network Performance

In line with previous CS9 modelling, the following random seeds have been run:

Table 3 – Random Seed Runs

Peak	AM	PM
Starting Seed	42	42
Increment	1	19
No. of Runs	20	20

Journey Times

Journey times 9000-9056 have been obtained for the same sections used in the CS9 assessment, as agreed with TfL. Numbers 200-202 have also been obtained following correspondence with TfL. For reference, the journey time sections are listed in **Table 4** and shown in **Figure 3**.

Table 4 – Journey Time Sections

No.	Journey Time	No.	Journey Time
9001	Sect 16 West to Holland Road	9049	North End Rd to Sect 16 West
9002	Holland Rd to Sect 16 West	9050	Sect 16 West to North End Rd Cyclists
9003	Sect 16 West to Holland Road Cyclists	9051	North End Rd to Sect 16 West Cyclists
9004	Holland Rd to Sect 16 West Cyclists	9055	EB_Olympia_Holland Road
9017	Sect 16 West to Olympia	9056	WB_Holland Road_Olympia
9018	Olympia to Sect 16 West	200	MM - NorthEndRd to HammRdEast
9019	Sect 16 West to Olympia Cyclists	201	MM - NorthEndRd to HammRdWest
9020	Olympia to Sect 16 West Cyclists	202	MM - NorthEndRd to HammRdWest (Cycles)
9048	Sect 16 West to North End Rd		

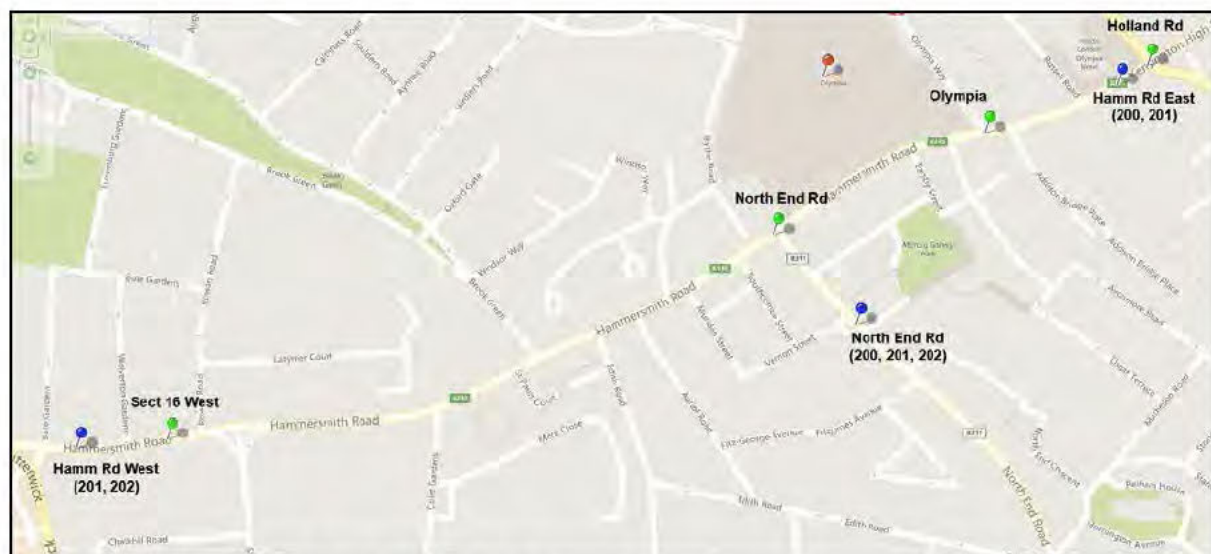


Figure 3 – Journey Time Marker Locations

The full set of AM and PM results are shown in **Tables 5 and 6**.

AM Results

In the AM peak, **Table 5** shows that when comparing against SC1, SC3a has the least impact on journey times (adding Olympia development, no signalisation schemes) for all modes (general traffic, buses and cyclists). This seems to indicate that by reassigning traffic from using Olympia Way to Blythe Rd, the network journey times are affected, but not to the same degree as the other scenarios. The

maximum increases are around 2.5 minutes for traffic and buses and 25 seconds for cyclists. There are also a number of improvements in journey times, with 46 seconds being the highest time saving.

The introduction of signals at Blythe Rd (SC4a), D-Gate (SC5a) or both junctions (SC6a) tends to have more of an impact on the journey times for all modes of travel. This is particularly noticeable for SC4a and SC6a for westbound journey times on Hammersmith Rd (no's 9002, 9018), where increases of 3-6 minutes were experienced for traffic and buses and 2.5-3.5 minutes for cyclists. In an eastbound direction, SC4a, SC5a and SC6a all have increased times, varying between 1 and 3 minutes for all modes of travel.

Across all the scenarios, there are some slight improvements, with the eastbound movement from Olympia to Holland Road (No. 9055) seeing reductions of 16-43 seconds across all modes of travel.

PM Results

In the PM peak, **Table 6** shows that Hammersmith Road westbound journey times are most affected (No. 9002) for SC4a and SC6a, where the increases range from 4-10 minutes across all modes of travel. For the other westbound journey time sections (No's 9018, 9048), SC4a and SC6a have bigger journey time increases compared to SC3a and SC5a. In the eastbound direction (No's 9001 & 9017), SC4a and SC6a again have the bigger increases in journey times across all modes of travel (90 seconds to 3 minutes), but these are not as high as the westbound direction.

Comparing the different scenarios, SC3a and SC5a appear to have the least impact on all modes of travel.

As in the AM peak, there are some slight improvements (up to 15 seconds for SC4a) to general traffic, bus and cyclist journey times for traffic travelling from Olympia to Holland Rd (no's 9055).

Table 5 – Journey Time Results – AM

AM PEAK (0745-0845)		Traffic					Traffic - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	499	540	706	691	690	41	208	192	192
9002	Holland Rd to Sect 16 West	187	239	562	301	566	51	374	113	379
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	415	470	653	642	640	55	238	226	225
9018	Olympia to Sect 16 West	144	193	363	224	364	50	220	81	221
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	378	422	619	603	603	44	241	225	225
9049	North End Rd to Sect 16 West	-	-	144	-	145	-	-	-	-
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	94	78	65	64	64	-16	-29	-30	-30
9056	WB_Holland Road_Olympia	44	46	210	81	211	2	166	37	168
200	MM - NorthEndRd to HammRdEast	256	372	311	311	321	116	55	55	65
201	MM - NorthEndRd to HammRdWest	-	-	256	-	262	-	-	-	-
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

AM PEAK (0745-0845)		Buses					Buses - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	613	567	757	725	735	-46	144	112	122
9002	Holland Rd to Sect 16 West	281	290	504	365	516	8	222	84	234
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	514	493	693	660	671	-22	179	146	157
9018	Olympia to Sect 16 West	214	244	327	275	331	31	113	62	117
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	452	432	642	603	612	-20	190	151	160
9049	North End Rd to Sect 16 West	145	155	191	176	202	10	45	31	57
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	112	79	75	76	76	-32	-37	-36	-36
9056	WB_Holland Road_Olympia	68	46	191	91	191	-22	124	24	124
200	MM - NorthEndRd to HammRdEast	316	383	328	362	337	67	12	45	21
201	MM - NorthEndRd to HammRdWest	249	385	315	306	338	136	66	56	89
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

AM PEAK (0745-0845)		Cyclists					Cyclists - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	558	558	664	633	653	0	106	75	94
9002	Holland Rd to Sect 16 West	233	258	416	285	426	25	183	52	193
9003	Sect 16 West to Holland Road Cyclists	-	319	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	263	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	430	447	575	549	562	17	146	119	132
9018	Olympia to Sect 16 West	182	200	221	208	227	17	39	26	45
9019	Sect 16 West to Olympia Cyclists	-	262	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	224	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	371	385	514	489	501	14	144	118	130
9049	North End Rd to Sect 16 West	109	117	136	120	135	8	27	11	26
9050	Sect 16 West to North End Rd Cyclists	-	207	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	181	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	142	125	99	99	100	-17	-43	-43	-42
9056	WB_Holland Road_Olympia	51	49	195	81	192	-2	144	30	141
200	MM - NorthEndRd to HammRdEast	323	286	329	322	343	-36	6	-1	21
201	MM - NorthEndRd to HammRdWest	178	193	231	205	260	15	54	27	82
202	MM - NorthEndRd to HammRdWest (Cycles)	-	354	-	-	-	-	-	-	-

Table 6 – Journey Time Results – PM

PM PEAK (1745-1845)		Traffic					Traffic - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	366	432	594	436	608	66	229	71	242
9002	Holland Rd to Sect 16 West	217	288	779	305	803	72	563	88	586
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	303	370	550	378	565	67	247	76	262
9018	Olympia to Sect 16 West	160	211	475	225	481	51	315	65	321
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	263	333	522	337	530	70	259	74	268
9049	North End Rd to Sect 16 West	-	-	163	-	160	-	-	-	-
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	65	65	55	61	57	0	-11	-4	-9
9056	WB_Holland Road_Olympia	57	81	299	85	317	24	242	28	260
200	MM - NorthEndRd to HammRdEast	220	282	401	334	381	62	181	114	161
201	MM - NorthEndRd to HammRdWest	-	-	350	-	334	-	-	-	-
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

PM PEAK (1745-1845)		Buses					Buses - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	500	516	663	518	675	17	163	18	175
9002	Holland Rd to Sect 16 West	327	331	618	360	636	4	291	34	309
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	429	441	616	450	635	12	187	21	206
9018	Olympia to Sect 16 West	244	264	373	273	379	20	129	29	135
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	359	375	551	380	561	16	192	21	203
9049	North End Rd to Sect 16 West	168	177	212	175	227	9	44	7	60
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	74	77	59	71	60	3	-15	-3	-14
9056	WB_Holland Road_Olympia	84	71	240	89	249	-12	156	6	165
200	MM - NorthEndRd to HammRdEast	277	320	398	370	369	43	121	93	92
201	MM - NorthEndRd to HammRdWest	267	312	421	327	412	45	154	61	145
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

PM PEAK (1745-1845)		Cyclists					Cyclists - Impact of Scenarios against FY Base			
Journey Time Measurement		Average Journey Time (s)					Average Journey Time (s)			
No.	Name	SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
9001	Sect 16 West to Holland Road	471	496	563	502	560	25	92	32	90
9002	Holland Rd to Sect 16 West	254	275	488	280	540	21	234	26	286
9003	Sect 16 West to Holland Road Cyclists	-	-	-	-	-	-	-	-	-
9004	Holland Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9017	Sect 16 West to Olympia	380	410	492	418	487	30	112	38	107
9018	Olympia to Sect 16 West	186	191	241	193	288	5	55	7	102
9019	Sect 16 West to Olympia Cyclists	-	-	-	-	-	-	-	-	-
9020	Olympia to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9048	Sect 16 West to North End Rd	333	359	442	362	445	26	109	29	112
9049	North End Rd to Sect 16 West	146	141	154	143	155	-5	8	-3	9
9050	Sect 16 West to North End Rd Cyclists	-	-	-	-	-	-	-	-	-
9051	North End Rd to Sect 16 West Cyclists	-	-	-	-	-	-	-	-	-
9055	EB_Olympia_Holland Road	90	90	75	85	78	0	-15	-5	-12
9056	WB_Holland Road_Olympia	69	86	242	89	250	17	173	20	182
200	MM - NorthEndRd to HammRdEast	249	284	353	304	342	35	104	55	93
201	MM - NorthEndRd to HammRdWest	230	236	271	246	271	6	41	16	42
202	MM - NorthEndRd to HammRdWest (Cycles)	-	-	-	-	-	-	-	-	-

Queue Lengths

Average queue lengths have been obtained for the junctions listed below and shown in **Figure 4**:

- J1 – Hammersmith Rd / Avonmore Rd;
- J2 – Hammersmith Rd / North End Rd;
- J3 – Hammersmith Rd / Blythe Rd;
- J4 – Hammersmith Rd / Edith Rd;
- J5 – Hammersmith Rd / Brook Green;
- J6 – Hammersmith Rd / Shortlands;
- J7 – Hammersmith Rd / D-Gate;
- J8 – Kensington High St / Warwick Rd.

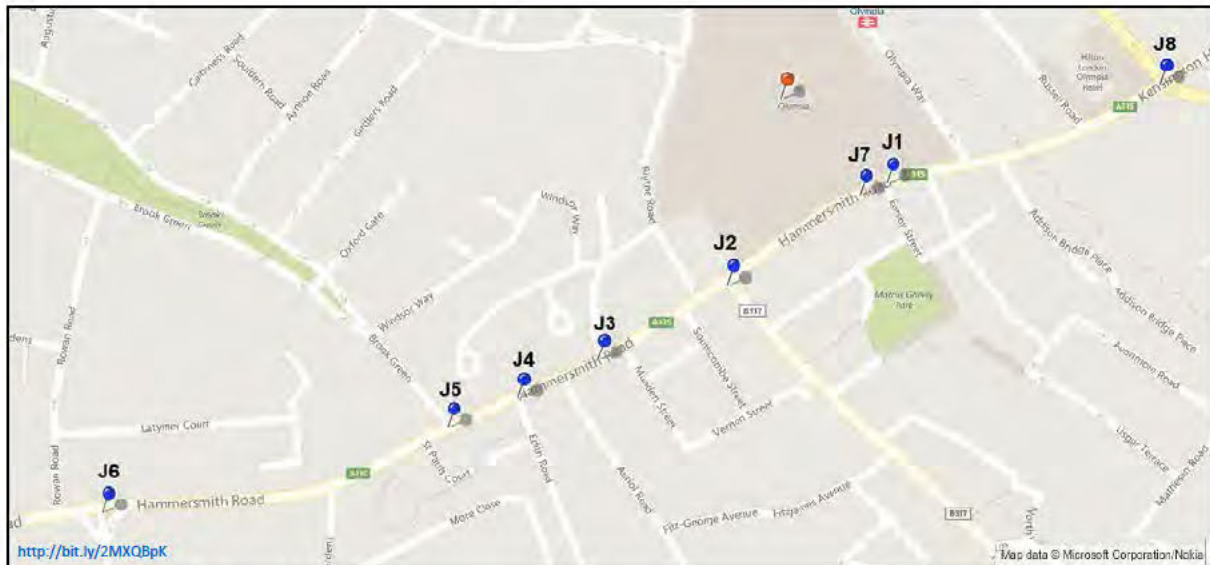


Figure 4 – Junctions Assessed

The comparisons for each junction are shown in **Figures 5-12** under the related sections.

J1 – Hammersmith Rd / Avonmore Rd

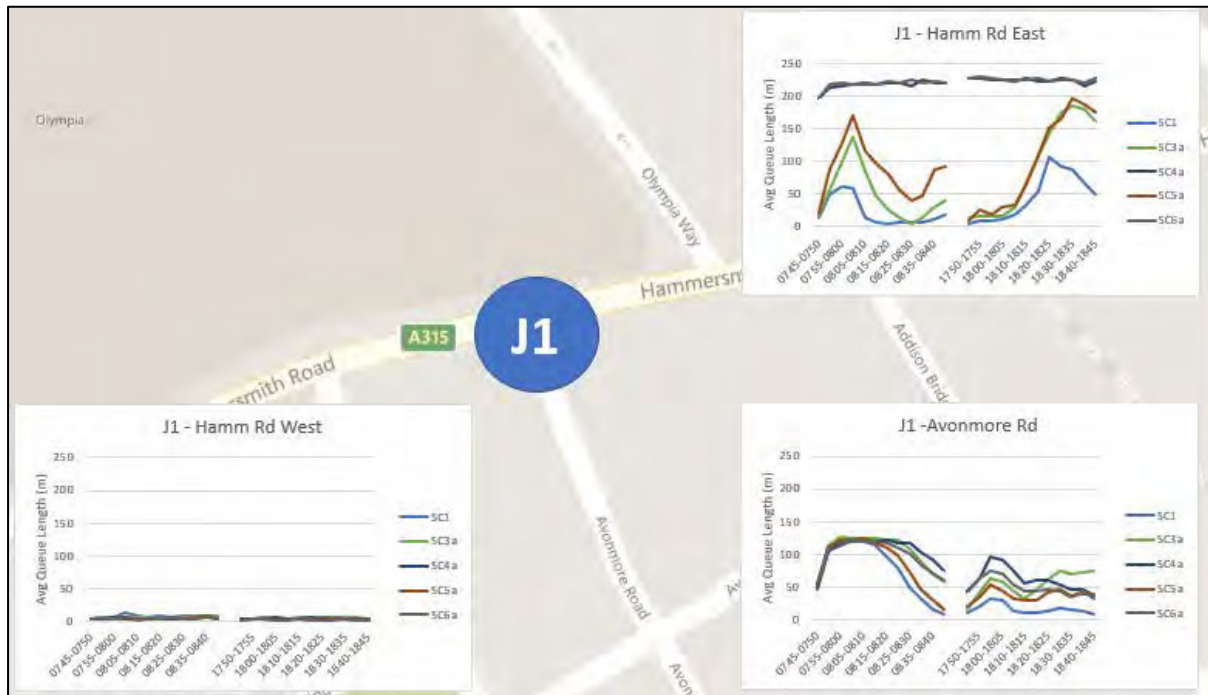


Figure 5 – Hammersmith Rd / Avonmore Rd Queue Comparisons

In the AM peak, the longest queues are on the Hammersmith Rd East approach, with SC4a and 6a (Blythe Rd signalisation, D-Gate signalisation and both sets of signals) queues maintaining a constant length of ~240m throughout the peak period. This plateau of queuing suggests that the queues are reaching back as far as the Kensington High Street / Warwick Road junction. SC5a, SC3a have queues which reach ~150m in length, which is again higher than the 50m average queue length for SC1.

On the Avonmore Road approach, queues for all scenarios reach a maximum of ~145m before decreasing in length as the peak progresses. This suggest that the queues reach back to the end of the link for a period of time, but then reduce towards the end of the peak period.

For Hammersmith Road West, the queue lengths are all minimal and similar between the scenarios, indicating the signals proposed have more of an effect in the busier westbound direction.

In the PM peak, SC4a and SC6a are again the scenarios with the longest queues on the Hammersmith Rd East approach. As in the AM peak, the levels are maintained at around 240m in length, suggesting blocking back to the Kensington High Street junction. SC3a and SC5a have average queue lengths which build as the peak progresses but reaches up to 240m before reducing again.

For Avonmore Road, all of the scenarios have longer queues than SC1, with SC4a having the largest queues.

On the Hammersmith Rd West approach, the queue lengths and profiles are similar between all of the scenarios.

J2 – Hammersmith Rd / North End Rd


Figure 6 – Hammersmith Rd / North End Rd Queue Comparisons

In the AM peak, SC4a and SC6a have mixed effects on the two Hammersmith Road approaches. On the East approach, the queue lengths are around 100m, compared to 60-70m for SC3a and SC5a and 20m for SC1. However, on the West approach, SC4a and SC6a have shorter queues than SC1, SC3a and SC5a (which all have similar lengths of around 80m). This suggests that the proposed signalisation of Blythe Road and D-Gate will have mixed impacts on this junction in the AM peak.

For the North End Road approach, all of the scenarios have longer queue lengths than SC1, with SC3a having the lowest queues when compared to SC4a, SC5a and SC6a.

In the PM peak, the same effects are apparent as in the AM peak. On the Hammersmith Road East approach, the queue lengths are similar for the associated scenarios, with SC4a and SC6a producing the longest queues. For the West approach, SC4a and SC6a are slightly lower than the other scenarios, but not by such a large margin as in the AM peak.

For North End Road, the queue lengths are highest for SC4a and SC6a (up to ~110m), followed by SC5a (~105m) and SC3a (~90m). All of these scenarios have significantly longer queues than SC1, which reaches a maximum of 40m.

J3 – Hammersmith Rd / Blythe Rd



Figure 7 – Hammersmith Rd / Blythe Rd Queue Comparisons

In the AM peak, the Hammersmith Road East approach queue lengths are highest for SC4a and SC6a, with levels fluctuating around 100m in length. SC5a has queue lengths of ~40m and SC3a has average queue lengths of around 20m. These are all higher than the future baseline, where queuing on this approach was minimal.

On the Hammersmith Road West approach, the queue lengths between the scenarios were more comparable (60-75m max). This indicates that the signalisation of Blythe Road (SC4a, SC6a) has less of an impact on this approach in comparison to the East approach.

On Blythe Road, SC5a has the longest queues, with all the other scenarios having similar queue length profiles.

For Munden Street, SC3a and SC5a have the longest queues (~20m). There are no queue lengths from SC4a and SC6a as a result of Munden Street being closed and traffic reassigned.

In the PM peak, the effects on Hammersmith Road East are similar to the AM peak. SC4a and SC6a have the longest queues (~100m), followed by SC5a, SC3a and then SC1.

On the Hammersmith Road West approach, SC4a and SC6a have longer queues than the other scenarios, with average queue lengths of up to 70m. This is in comparison to SC5a, SC3a and SC1, which have queues up to ~15, ~10 and ~5m respectively. With signals proposed in these scenarios, this indicates that this is the likely cause for the increases.

For the Blythe Road and Munden Street approaches, the average queue lengths for all scenarios are approximately 20m, with SC5a having the highest lengths on both approaches.

J4 – Hammersmith Rd / Edith Rd



Figure 8 – Hammersmith Rd / Edith Rd Queue Comparisons

In the AM peak, the queue lengths on the Hammersmith Rd East approach are highest for SC4a and SC6a, building to around 40m towards the end of the peak. SC3a and SC5a have queue lengths which peak at around 20m. All of these queues are higher than SC1, which has a maximum average queue of ~5m.

For the Hammersmith Road West approach, SC4a, SC5a and SC6a all have queue lengths which build up to ~80m in length and remain around this level for the peak period. SC3a and SC1 queue lengths are lower and take longer to build up to a maximum of ~75m at their peak.

On Edith Rd, the queue lengths for all scenarios are minimal, at ~5m throughout the AM peak period.

In the PM peak, the Hammersmith Road East queue profiles are similar to the AM peak for SC3a, SC4a, SC5a and SC6a. The only difference is SC1 has longer queues, which are more similar in length to the other scenarios.

On Hammersmith Road West, SC4a and SC6a have noticeably longer queues than the other scenarios, reaching up to 70m at their highest. SC3a and SC5a have average queues around 10-15m, with SC1 queues averaging at ~5m.

For Edith Rd, the average queue lengths are again minimal for all scenarios, averaging out at around 5m.

J5 – Hammersmith Rd / Brook Green


Figure 9 – Hammersmith Rd / Brook Green Queue Comparisons

In the AM peak, the queues on Hammersmith Road West are the longest, with SC3a, SC4a, SC5a and SC6a all reaching ~260m in length. These queue lengths are maintained for SC4a, SC5a and SC6a, suggesting blocking back to the Shortlands junction. SC3a and SC1 queues build as the peak progresses but fall just short of affecting the Shortlands junction for long periods of time.

The Brook Green approach has the longest queues in SC5a (peaking at ~100m). The consistent lengths suggest queues reach back to the start of the link, which will lead to latent demand on this approach as a result. SC4a and SC6a have queues which reach ~75m and SC3a queues extent to ~50m. SC1 has the lowest queue lengths, reaching up to around 35m in length.

On the Hammersmith Road East approach, queue lengths for all the scenarios are similar, reaching up to 35-40m at their highest.

In the PM peak, the queues on Hammersmith Road West reach back to approximately 260m in length for SC4a and SC6a, although this is not for such a consistent time as in the AM peak. The other scenarios all have shorter queues, with SC3a and SC5a having lengths up to 130m and SC1 reaching 90m at most.

For the Brook Green approach, queues for SC4a and SC6a are the longest, reaching 75m at most. SC3a, SC5a and SC1 have shorter queues, with consistent profiles of up to 25m in length.

As in the AM peak, the queues on the Hammersmith Road East approach are similar between all the scenarios.

J6 – Hammersmith Rd / Shortlands


Figure 10 – Hammersmith Rd / Shortlands Queue Comparisons

In the AM peak, the Hammersmith Rd East approach has minimal queuing (up to 5m) for all scenarios.

For Hammersmith Rd West, the queues for SC4a, SC5a and SC6a scenarios reach back as far as the end of the link (~200m). This occurs earlier in the peak for SC4a and SC6a, with latent demand likely as a result. Queues for SC3a increase as the peak progresses, but do not reach as far (~190m).

For the Shortlands approach, the queues are consistent for all scenarios, reaching approximately 20m at their longest.

In the PM peak, the Hammersmith Rd East approach experiences the same levels of queuing, with all scenarios having minimal queue lengths.

For the Hammersmith Road West approach, the queue lengths for SC4a and SC6a are again the highest, reaching up to 100m in length. Queues for SC3a, SC5a and SC1 are much lower and more consistent, averaging at around 10m in length.

The average queues on the Shortlands approach are minimal, averaging out at around 5m for all scenarios.

J7 – Hammersmith Rd / D-Gate


Figure 11 – Hammersmith Rd / D-Gate Queue Comparisons

In the AM peak, queues on the D-Gate approach are minimal, with very little traffic exiting this approach.

On the Hammersmith Rd East approach, the introduction of signals at Blythe Rd, D-Gate or both (SC4a, SC5a, SC6a) increases the queue lengths on this approach. SC4a and SC6a provide the biggest increase with queues averaging 50-60m. Queues for SC3a and SC5a reach up to 30m and SC1 has no queueing as a result of this junction not being included in the future baseline.

On the Hammersmith Road West approach, SC5a and SC6a have slightly longer queues than SC3a and SC4a (20-30m against 10-15m). This indicates that the introduction of signals at D-Gate does have an effect. SC1 has no queue lengths as this junction was not included.

In the PM peak, the D-Gate queues are minimal, with SC4a having the highest queues lengths (up to 5m).

For Hammersmith Rd, the East approach has higher average queue lengths with SC4a and SC6a the longest (~60-70m). SC5a and SC3a have average queues up to 30-40m in length, whilst SC1 has no queues (junction not included in scenario). For the West approach, the profiles are similar to the AM peak, with SC5a and SC6a having slightly longer queues than SC3a and SC4a (20-30m against 10-15m).

J8 – Kensington High St / Warwick Rd



Figure 12 – Kensington High St / Warwick Rd Queue Comparisons

In the AM peak, there are big differences in queuing on the Kensington High Street East approach. SC4a and SC6a have queues which build back to the start of the link (~340m) and are then maintained for the rest of the peak period. This is likely due to queuing back from the Avonmore Road junction (see **Figure 5**) and will likely lead to latent demand on this approach in these scenarios. SC3a, SC5a and SC1 all have smaller queues, averaging 20-50m.

For Kensington High St West, SC1 is the worst performing, with average queues reaching ~120m at their peak. The scenarios with the proposed signals (SC4a, SC5a and SC6a) produce the lower queue lengths, likely due to traffic being held up further downstream in the network.

On Warwick Rd, the queue profiles for all scenarios show a queue that reduces and then builds back up at the end of peak period. SC4a and SC6a have the longest average queues, with SC3a, SC5a and SC1 showing a greater reduction in length before building up again. The differences in queue lengths could be attributed to the blocking back from the Avonmore Road junction, which disrupts westbound traffic.

In the PM peak, the queues on Kensington High Street East are the same for SC4a and SC6a as in the AM peak, with sustained queues back to the start of the link (~340m). This again is likely due to upstream queuing from the Avonmore Road junction (see **Figure 5**). SC3a and SC5a queues build up to higher levels than in the AM peak (up to 250m), but do not reach as far back as the end of the link. SC1 has the smallest queues, with lengths averaging around 50m.

For the West approach of Kensington High St, the queuing profiles are more consistent with all queues averaging around 50m.

The Warwick Rd approach has longer queues for SC4a and SC6a, which reach up to 600m at the end of the peak period. The other scenarios have lower queue lengths but build up to around 500m by the end of the peak period. The effects are likely due to the queuing back from the Avonmore Road junction, which has a more significant impact for SC4a and SC6a.

Saturation Flows

Saturation flows have been obtained at the following signalised junctions as listed below and shown in **Figure 4**:

- J2 – Hammersmith Rd / North End Rd;
- J3 – Hammersmith Rd / Blythe Rd;
- J4 – Hammersmith Rd / Edith Rd;
- J5 – Hammersmith Rd / Brook Green;
- J7 – Hammersmith Rd / D-Gate;
- J8 – Kensington High St / Warwick Rd.

The results of the AM and PM comparisons are shown in **Tables 7 and 8**, which have been based on the following Saturation Flow criteria from TfL's 'VISSIM Saturation Flow Tool (see **Figure 13**). The criteria has been based on the TfL Guidance Notes, with adjustments made to the 'General Parameters' section to obtain as many readings as possible from the VISSIM results.

Tool Settings for Saturation Flow Measurement	
<u>General Parameters:</u>	
Number of vehicles across stopline to ignore at start of green	<input type="text" value="2"/>
Minimum number of vehicles required in a single measurement	<input type="text" value="6"/>
Minimum number of measurements for average sat flow calculation	<input type="text" value="5"/>
Global PCU Factor (adjust for specific links on survey/results sheets)	<input type="text" value="1.00"/>
<input type="button" value="Test these settings on an individual Axx/Dis file"/> (Select Axx file) <input type="button" value="Run with these settings on multiple Axx/Dis files"/> (Select VISSIM model file)	
<u>Time Parameters:</u>	
Include measurements from time	<input type="text" value="0"/> s
Disregard measurements after time	<input type="text" value="7200"/> s
<input type="button" value="Clear Survey Data"/> <input type="button" value="Clear Results Data"/>	
<u>End of Saturation:</u>	
End of saturation is assumed when any of the following occur (tick as appropriate):	
<input checked="" type="checkbox"/> Headway is greater than	<input type="text" value="3.5"/> s
<input checked="" type="checkbox"/> Increase between successive headways exceeds	<input type="text" value="175"/> %
<input checked="" type="checkbox"/> (Max headway + min headway) greater than	<input type="text" value="3.50"/>
Do not assume the above values are 'standard' values which are correct in all cases. They must be tested for suitability on a variety of links in the network concerned, and adjusted as necessary.	

Figure 13 – Saturation Flow Criteria for TfL's VISSIM Saturation Flow Tool

Table 7 – Saturation Flow Comparisons – AM Peak

AM PEAK (0745-0845)											
Junction		From	Saturation Flows (pcu/hr)					% Difference to SC1			
No.	Name		SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
2	Hamm Rd / North End Rd	Hamm Rd East - Ahead	1743	1766	1730	1762	1722	1%	-1%	1%	-1%
		Hamm Rd East - Left	-	-	-	-	-	-	-	-	-
		North End Rd	-	1481	-	-	-	-	-	-	-
		Hamm Rd West - Ahead	1788	1763	1734	1664	1728	-1%	-3%	-7%	-3%
		Hamm Rd West - Right	-	-	-	-	-	-	-	-	-
3	Blythe Rd / Hamm Rd	Blythe Rd - LT	-	-	-	-	-	-	-	-	-
		Blythe Rd - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East	-	-	1660	-	1658	-	-	-	-
		Munden St	-	-	-	-	-	-	-	-	-
		Hamm Rd West	-	-	1907	-	1920	-	-	-	-
4	Hamm Rd / Edith Rd	Hamm Rd East	1948	1908	1876	1901	1890	-2%	-4%	-2%	-3%
		Edith Rd	-	-	-	-	-	-	-	-	-
		Hamm Rd West - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Ahead	1748	1791	1739	1753	1731	2%	-1%	0%	-1%
5	Brook Green / Hamm Rd	Brook Green - LT	-	-	-	-	-	-	-	-	-
		Brook Green - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Left/Ahead	1716	1769	1657	-	1726	3%	-3%	-	1%
7	D-Gate / Hamm Rd	Hamm Rd West - Ahead	1529	-	-	-	-	-	-	-	-
		D-Gate	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	1734	1682	-	-	-	-
		Hamm Rd East - Ahead (Bus Lane)	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Left/Ahead	-	-	-	2260	2288	-	-	-	-
8	Holland Rd / Kensington High St / Warwick Rd	Hamm Rd West - Ahead	-	-	-	1708	1752	-	-	-	-
		Kens. High St East - Ahead	1801	-	1680	1731	1809	-	-7%	-4%	0%
		Kens. High St East - Ahead	1688	1815	-	1754	1671	8%	-	4%	-1%
		Kens. High St East - Right	-	-	-	-	-	-	-	-	-
		Warwick Rd - Ahead	1746	1747	1748	1752	1751	0%	0%	0%	0%
		Warwick Rd - Ahead	1771	1764	1782	1771	1769	0%	1%	0%	0%
		Warwick Rd - LT	1708	1675	-	1749	-	-2%	-	2%	-
		Kens. High St West - Ahead	-	-	-	-	-	-	-	-	-
		Kens. High St West - Ahead	1862	1854	1835	1838	1820	0%	-1%	-1%	-2%
8	Holland Rd / Kensington High St / Warwick Rd	Kens. High St West - LT	-	-	-	-	-	-	-	-	-

From **Table 7**, the main junction affected in a negative way by the proposals is the North End Road junction, with the Hammersmith Road West approach experiencing decreases in saturation flows of 1-7%.

The other junction of note is the Edith Road junction, where the Hammersmith Road East approach has reductions in saturation flows of 2-4%.

Comparing the different scenarios, SC6a has the least variance in saturation flows, with percentages ranging +1% to -3%. SC3a, SC4a and SC5a all have much more varied impacts on the saturation flows, both in a positive and negative way.

There were a large number of stop-lines where saturation flows could not be obtained. This was due to the outputs from VISSIM not satisfying the criteria as shown in **Figure 13**.

Table 8 – Saturation Flow Comparisons – PM Peak

PM PEAK (1745-1845)											
Junction		From	Saturation Flows (pcu/hr)					% Difference to SC1			
No.	Name		SC1	SC3a	SC4a	SC5a	SC6a	SC3a	SC4a	SC5a	SC6a
2	Hamm Rd / North End Rd	Hamm Rd East - Ahead	1757	1782	1735	1780	1720	1%	-1%	1%	-2%
		Hamm Rd East - Left	-	-	-	-	-	-	-	-	-
		North End Rd	-	1456	1435	-	1481	-	-	-	-
		Hamm Rd West - Ahead	1670	1656	1603	1452	1604	-1%	-4%	-13%	-4%
		Hamm Rd West - Right	-	-	-	-	-	-	-	-	-
3	Blythe Rd / Hamm Rd	Blythe Rd - LT	-	-	-	-	-	-	-	-	-
		Blythe Rd - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East	-	-	1693	-	1674	-	-	-	-
		Munden St	-	-	-	-	-	-	-	-	-
		Hamm Rd West	-	-	1941	-	1934	-	-	-	-
4	Hamm Rd / Edith Rd	Hamm Rd East	1914	1883	1882	1901	1878	-2%	-2%	-1%	-2%
		Edith Rd	-	-	-	-	-	-	-	-	-
		Hamm Rd West - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Ahead	1872	1920	1783	1884	1794	3%	-5%	1%	-4%
5	Brook Green / Hamm Rd	Brook Green - LT	1487	1485	1442	1491	1443	0%	-3%	0%	-3%
		Brook Green - RT	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead	1981	2038	-	2028	-	3%	-	2%	-
		Hamm Rd West - Left/Ahead	-	1835	-	1851	-	-	-	-	-
7	D-Gate / Hamm Rd	Hamm Rd West - Ahead	-	-	-	-	-	-	-	-	-
		D-Gate	-	-	-	-	-	-	-	-	-
		Hamm Rd East - Ahead/Right	-	-	-	1744	1640	-	-	-	-
		Hamm Rd East - Ahead (Bus Lane)	-	-	-	-	-	-	-	-	-
		Hamm Rd West - Left/Ahead	-	-	-	-	-	-	-	-	-
8	Holland Rd / Kensington High St / Warwick Rd	Hamm Rd West - Ahead	-	-	-	1718	1767	-	-	-	-
		Kens. High St East - Ahead	1803	2009	2210	1790	-	11%	23%	-1%	-
		Kens. High St East - Ahead	1788	1839	-	1829	-	3%	-	2%	-
		Kens. High St East - Right	-	-	-	-	-	-	-	-	-
		Warwick Rd - Ahead	1854	1852	1852	1853	1852	0%	0%	0%	0%
		Warwick Rd - Ahead	1868	1858	1866	1863	1858	-1%	0%	0%	-1%
		Warwick Rd - LT	-	1726	-	-	-	-	-	-	-
		Kens. High St West - Ahead	-	1741	-	-	-	-	-	-	-
		Kens. High St West - Ahead	1840	1847	1848	1843	1848	0%	0%	0%	0%
		Kens. High St West - LT	-	-	-	-	-	-	-	-	-

From **Table 8**, there is much more variance in the saturation flow percentage difference than in the AM peak.

The Hammersmith Rd West approach at the North End Road junction is most affected, particularly in SC5a where there is a 13% reduction in saturation flow. Looking at the positive impacts, the Kensington High Street East approach in SC4a has a saturation flows that has increased by 23%.

When comparing the different scenarios, SC6a shows the least variance (+11% to -2%), All of the other scenarios have much more varied impacts on the saturation flows, with SC4a and SC3a having the highest benefits and SC5a having the biggest negative impact.

There were a large number of stop-lines where saturation flows could not be obtained, similar to the AM peak. This was due to the outputs from VISSIM not satisfying the criteria as shown in **Figure 13**.

Overall Network Performance

The overall network performance of the scenarios has been compared, to give an overall picture of how the different networks perform in terms of average delay, average speed and latent demand and delay.

The AM and PM results are shown in **Tables 9 and 10**.

Table 9 – Network Performance Comparisons – AM Peak

NETWORK PERFORMANCE								
AM Peak (0745-0845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
1	181	241	304	8	6	6	0	30
3a	216	270	331	7	6	5	1	75
4a	404	549	435	4	3	4	4	314
5a	258	332	369	6	5	5	2	135
6a	403	548	430	4	3	4	4	313

NETWORK PERFORMANCE - comparison vs. SC1								
AM Peak (0745-0845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
3a	36	29	27	-1	0	0	1	46
4a	223	308	130	-4	-3	-1	4	284
5a	77	91	65	-2	-1	-1	1	106
6a	223	307	125	-4	-3	-1	4	283

**Some values different due to rounding in Excel*

In the AM peak, it can be seen that in terms of average delay, SC4a and 6a appear to have the biggest impact compared to SC1. SC3a has minimal impact and SC5a is the better performing of the three mitigation scenarios (SC4a, SC5a and SC6a). General traffic and buses are most affected, which may be due to the changes made in introducing signals at Blythe Rd and a combination of Blythe Rd and D- Gate signals.

This trend is repeated for the average speed comparisons, where the network speeds are lower for SC4a and 6a. This is particularly of note for general traffic, which are affected by additional signals holding them within the network.

In terms of latent demand and associated latent delay, all of the scenarios show an increase over SC1. SC3a performs the best, whilst SC4a and SC6a show the greatest impact. As with the other results, SC5a (D- Gate signals only) is the better performing of the three mitigation options and has just over 100 unreleased vehicles within the network during the peak period (compared to nearly 300 unreleased vehicles in SC4a and SC6a).

Table 10 – Network Performance Comparisons – PM Peak

NETWORK PERFORMANCE								
PM Peak (1745-1845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
1	116	211	160	10	7	9	0	0
3a	153	261	197	8	6	7	0	19
4a	346	598	581	4	3	3	12	650
5a	165	272	205	8	6	7	0	43
6a	347	611	613	4	3	3	13	699

NETWORK PERFORMANCE - comparison vs. SC1								
PM Peak (1745-1845)								
Scenario	Average Delay (s)			Average Speed (mph)			Latent Delay (hrs)	Latent Demand
No.	Traffic	Buses	Cyclists	Traffic	Buses	Cyclists	All Vehs	All Vehs
3a	36	50	37	-2	-1	-1	0	19
4a	230	387	422	-6	-4	-6	12	649
5a	48	61	46	-2	-1	-1	0	43
6a	230	400	453	-6	-4	-6	13	699

**Some values different due to rounding in Excel*

In the PM peak, the increases in average delays for all scenarios are generally higher than in the AM peak. Comparing the scenarios to SC1, SC3a is again the scenario with the least impact and SC5a gives the more favourable results out of the mitigation scenarios. Scenarios 4a and 6a has the greatest impact, with both adding over 6 minutes of delay to Buses and Cyclists within the peak hour.

For the comparison of average speeds, SC3a and SC5a and SC4a and SC6a have the same differences. SC3a and SC5a provide the least impact, with SC4a and SC6a the most.

In terms of latent demand and associated latent delay, SC3a and SC5a do not show a significant increase in comparison to SC1. SC3a performs slightly better than SC5a, only due to a lower number of latent vehicles. Conversely, SC4a and SC6a have a much bigger impact, with over 600 unreleased vehicles during the peak period.

5. SUMMARY & CONCLUSIONS

This technical note (TN) details the VISSIM modelling undertaken for Momentum Transport Consultancy for the proposed Olympia Exhibition Centre development in Hammersmith, London.

The VISSIM modelling has been based on Transport for London's (TfL's) model of Hammersmith, which has been used to test the Cycle Superhighways proposals (CS9) in the area.

This TN builds upon TN1, which detailed initial VISSIM assessment for the Olympia development. However, since that testing, some of the flow assumptions and scenarios required have changed, which are detailed as part of this TN. The main difference with this assessment is that modelling **does not include** the proposed CS9 improvements.

The modelling scenarios tested and analysed in this TN were as follows:

- Scenario 1 – Future Baseline
- Scenario 3a – Future Baseline + Proposed Olympia Development
- Scenario 4a – Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation
- Scenario 5a – Future Baseline + Proposed Olympia Development + Proposed D-Gate Signalisation
- Scenario 6a – Future Baseline + Proposed Olympia Development + Proposed Blythe Road Signalisation + Proposed D-Gate Signalisation

To compare the effects in the network of the various scenarios, the following outputs have been obtained as agreed with TfL:

- Journey Times (for General Traffic, Buses, Cyclists)
- Queue Lengths (Average Queues at each junction in the network)
- Saturation Flows (for each approach at each signalised junction in the network)
- Overall Network Performance

From the results collected, in terms of traffic related performance and impact, there was no scenario which clearly and conclusively showed comparability with SC1 across all of the results collected.

From a network performance and journey time perspective, SC3a and SC5a appear to perform better than SC4a and SC6a, but these still result in a worsened level of performance against SC1 (particularly in the AM peak). For queue lengths and saturation flows, the results are much more varied. The different scenarios have advantages and disadvantages over SC1 and each other, depending on the junction and approach considered. This makes it difficult to draw suitable conclusions as to which scenario gives the better performance overall.

Appendix A – Vehicle Input & Static Routing Calculations

AM Peak

Taxis (Hammersmith Road)

	In	Out
Total	21	14

Blythe Road

	In					Out				
	Cars	Vans	MGV	HGV (rigids)	HGV (ar)	Cars	Vans	MGV	HGV (rigids)	HGV (artics)
From/To left	8	1	0	1	0	8	1	0	1	0
From/To right	8	2	0	1	0	8	2	0	1	0

D-Gate

	In					Out				
	Cars	Vans	MGV	HGV (rigids)	HGV (ar)	Cars	Vans	MGV	HGV (rigids)	HGV (artics)
From/To left	0	0	0	0	0	0	0	0	0	0
From/To right	0	0	0	0	0	0	0	0	0	0

PM Peak

Taxis (Hammersmith Road)

	In	Out
Total	15	20

Blythe Road

	In					Out				
	Cars	Vans	MGV	HGV (rigids)	HGV (ar)	Cars	Vans	MGV	HGV (rigids)	HGV (artics)
From/To left	8	1	0	1	0	8	1	0	1	0
From/To right	8	2	0	1	0	8	2	0	1	0

D-Gate

	In					Out				
	Cars	Vans	MGV	HGV (rigids)	HGV (ar)	Cars	Vans	MGV	HGV (rigids)	HGV (artics)
From/To left	0	0	0	0	0	3	0	0	0	0
From/To right	0	0	0	0	0	3	0	0	0	0

Multimodal Assumptions

- Traffic travelling to D-Gate and Blythe Road assumed to come from Hammersmith Road East and Hammersmith Road West
- Traffic travelling from D-Gate and Blythe Road assumed to travel to Hammersmith Road East and Hammersmith Road West
- Taxis travelling from Hammersmith Road West to East and vice versa

Blythe Rd

In			Out		
Cars	HGV	LGV	Cars	HGV	LGV
8	1	1	8	1	1
8	1	2	8	1	2

D-Gate

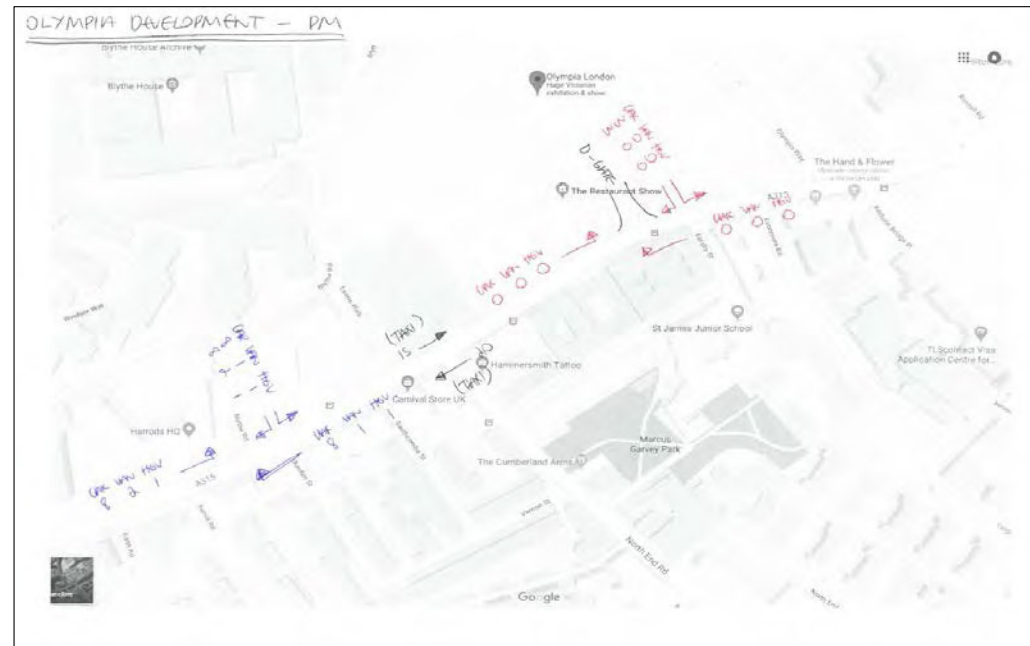
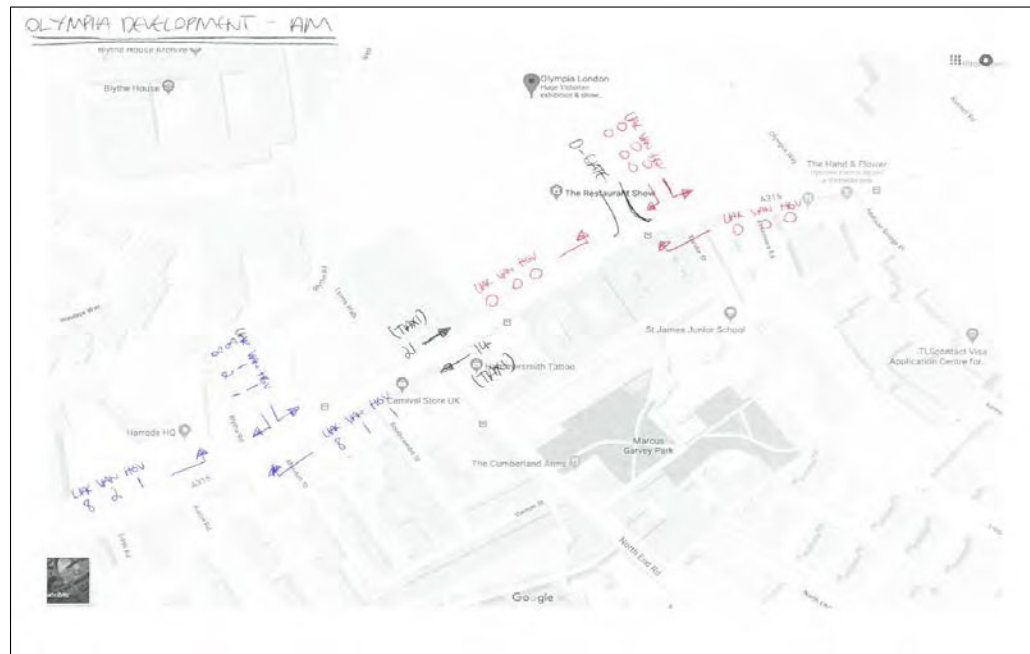
In			Out		
Cars	HGV	LGV	Cars	HGV	LGV
0	0	0	0	0	0
0	0	0	0	0	0

Blythe Rd

In			Out		
Cars	HGV	LGV	Cars	HGV	LGV
8	1	1	8	1	1
8	1	2	8	1	2

D-Gate

In			Out		
Cars	HGV	LGV	Cars	HGV	LGV
0	0	0	3	0	0
0	0	0	3	0	0



PM PEAK																									
STATIC ROUTES																									
2000													2000												
Veh Type	OlymDev - Cars												Veh Type	OlymDev - Cars											
	No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300		No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300
		30000: ORIGIN 1000007 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	3	50 201.2484	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	3	47 132.8158	0	0	0	0	0	0	0	
From		30000: ORIGIN 1000007 - OlymDev	4	6 156.1139	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	4	50 201.2484	0	0	0	0	0	0	0	
Hamm. Rd		30000: ORIGIN 1000007 - OlymDev	5	Blythe Rd	21	143.846	8	8	8	8	8	8		From	30004: ORIGIN 1000006 - OlymDev	5	6 156.1139	0	0	0	0	0	0	0	
West		30000: ORIGIN 1000007 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	0		Hamm. Rd	30004: ORIGIN 1000006 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	7	266 105	0	0	0	0	0	0	0	0		East	30004: ORIGIN 1000006 - OlymDev	7	87 44.10761	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	9	D-Gate	277	89.80403	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	9	93 52.71993	0	0	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	10	D-Gate	277	90	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	11	Blythe Rd	21	113.3322	8	8	8	8	8	
2001													2001												
Veh Type	OlymDev - HGVs												Veh Type	OlymDev - HGVs											
	No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300		No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300
		30000: ORIGIN 1000007 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	3	50 201.2484	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	3	47 132.8158	0	0	0	0	0	0	0	
From		30000: ORIGIN 1000007 - OlymDev	4	6 156.1139	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	4	50 201.2484	0	0	0	0	0	0	0	
Hamm. Rd		30000: ORIGIN 1000007 - OlymDev	5	Blythe Rd	21	143.846	1	1	1	1	1	1		From	30004: ORIGIN 1000006 - OlymDev	5	6 156.1139	0	0	0	0	0	0	0	
West		30000: ORIGIN 1000007 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	0		Hamm. Rd	30004: ORIGIN 1000006 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	7	266 105	0	0	0	0	0	0	0	0		East	30004: ORIGIN 1000006 - OlymDev	7	87 44.10761	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	9	D-Gate	277	89.80403	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	9	93 52.71993	0	0	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	10	D-Gate	277	90	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	11	Blythe Rd	21	113.3322	1	1	1	1	1	
2002													2002												
Veh Type	OlymDev - Taxis												Veh Type	OlymDev - Taxis											
	No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300		No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300
		30000: ORIGIN 1000007 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	3	50 201.2484	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	3	47 132.8158	0	0	0	0	0	0	0	
From		30000: ORIGIN 1000007 - OlymDev	4	6 156.1139	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	4	50 201.2484	0	0	0	0	0	0	0	
Hamm. Rd		30000: ORIGIN 1000007 - OlymDev	5	Blythe Rd	21	143.846	0	0	0	0	0	0		From	30004: ORIGIN 1000006 - OlymDev	5	6 156.1139	0	0	0	0	0	0	0	
West		30000: ORIGIN 1000007 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	0		Hamm. Rd	30004: ORIGIN 1000006 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	7	266 105	0	0	0	0	0	0	0	0		East	30004: ORIGIN 1000006 - OlymDev	7	87 44.10761	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	9	D-Gate	277	89.80403	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	9	93 52.71993	0	0	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	10	D-Gate	277	90	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	11	Blythe Rd	21	113.3322	1	1	1	1	1	
2003													2003												
Veh Type	OlymDev - LGVs												Veh Type	OlymDev - LGVs											
	No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300		No.	Name	DestLink	DestPos	0	900	1800	Rel Flow		4500	5400	6300
		30000: ORIGIN 1000007 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	1	45 44.07453	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	2	89 66.17183	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	3	50 201.2484	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	3	47 132.8158	0	0	0	0	0	0	0	
From		30000: ORIGIN 1000007 - OlymDev	4	6 156.1139	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	4	50 201.2484	0	0	0	0	0	0	0	
Hamm. Rd		30000: ORIGIN 1000007 - OlymDev	5	Blythe Rd	21	143.846	2	2	2	2	2	2		From	30004: ORIGIN 1000006 - OlymDev	5	6 156.1139	0	0	0	0	0	0	0	
West		30000: ORIGIN 1000007 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	0		Hamm. Rd	30004: ORIGIN 1000006 - OlymDev	6	43 80.37753	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	7	266 105	0	0	0	0	0	0	0	0		East	30004: ORIGIN 1000006 - OlymDev	7	87 44.10761	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	8	32 39.61434	0	0	0	0	0	0	0	
		30000: ORIGIN 1000007 - OlymDev	9	D-Gate	277	89.80403	0	0	0	0	0	0			30004: ORIGIN 1000006 - OlymDev	9	93 52.71993	0	0	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	10	D-Gate	277	90	0	0	0	0	0	
															30004: ORIGIN 1000006 - OlymDev	11	Blythe Rd	21	113.3322	1	1	1	1	1	
VEHICLE INPUTS													VEHICLE INPUTS												
No.	Name	Link	0	900	1800	Volume		3600	4500	5400	6300	Veh Comp	No.	Name	Link	0	900	1800	Volume		3600	4500	5400	6300	Veh Comp
20008	Hammersmith Road West - Cars-OlymDev	1	8	8	8	8	8	8	8	8	8	8 201: Cars-OlymDev - 30mph	20000	Kensington High St East - Cars-OlymDev	103	8	8	8	8	8	8				

Olympia Development - TAXI Inputs

Demand	AM	PM
Hammersmith Rd EB	21	15
Hammersmith Rd WB	14	14

PT Line (Taxi) Departure Times		
Direction	AM	PM
Hammersmith Rd EB*	1917	2238
	2009	2626
	2107	2684
	2159	3220
	2181	3297
	2595	3317
	2604	3334
	3247	3829
	3350	4081
	3363	4198
	3468	4511
	3701	4515
	3931	4648
	3941	4949
	4590	5128
	4825	
	4955	
	5017	
	5025	
	5120	
	5388	
	21	15
Hammersmith Rd WB*	2496	2472
	3137	2784
	3095	2884
	4573	3127
	4563	3661
	1996	3678
	5147	3756
	3789	3765
	2150	3813
	2327	3882
	4170	3956
	2084	4486
	3357	4559
	3234	4731
	14	14

*Demand created by randomly generated numbers to feed into 'Taxi' public transport routes

AM Peak
Static Routes - Proposed AM V2 Flow Adjustments

CAR

Avonmore Road										
102: ORIGIN 1000000	1	6	156.11392	2	2	2	2	2	2	2
102: ORIGIN 1000000	2	21	143.84599	1	1	1	1	1	1	1
102: ORIGIN 1000000	3	266	105	109	109	109	109	109	109	109
102: ORIGIN 1000000	4	32	39.614336	5	5	5	5	5	5	5
102: ORIGIN 1000000	5	93	52.719925	0	0	0	0	0	0	0
North End Rd										
103: ORIGIN 1000001	1	45	44.074528	0	0	0	0	0	0	0
103: ORIGIN 1000001	2	6	156.11392	10	10	10	10	10	10	10
103: ORIGIN 1000001	3	21	143.84599	25	25	25	25	25	25	25
103: ORIGIN 1000001	4	266	105	196	196	196	196	196	196	196
103: ORIGIN 1000001	5	32	39.614336	1	1	1	1	1	1	1
103: ORIGIN 1000001	6	93	52.719925	0	0	0	0	0	0	0

Brook Green										
104: ORIGIN 1000002	1	45	44.074528	10	10	10	10	10	10	10
104: ORIGIN 1000002	2	89	66.171827	45	45	45	45	45	45	45
104: ORIGIN 1000002	3	50	201.2484	35	35	35	35	35	35	35
104: ORIGIN 1000002	4	21	143.84599	6	6	6	6	6	6	6
104: ORIGIN 1000002	5	43	80.377531	20	20	20	20	20	20	20
104: ORIGIN 1000002	6	266	105	36	36	36	36	36	36	36
104: ORIGIN 1000002	7	87	44.107605	16	16	16	16	16	16	16
104: ORIGIN 1000002	8	32	39.614336	7	7	7	7	7	7	7
104: ORIGIN 1000002	9	93	52.719925	6	6	6	6	6	6	6

Blythe Rd										
105: ORIGIN 1000003	1	45	44.074528	15	15	15	15	15	15	8%
105: ORIGIN 1000003	2	89	66.171827	24	24	24	24	24	24	12%
105: ORIGIN 1000003	3	47	132.81577	0	0	0	0	0	0	0%
105: ORIGIN 1000003	4	50	201.2484	20	20	20	20	20	20	10%
105: ORIGIN 1000003	5	6	156.11392	7	7	7	7	7	7	4%
105: ORIGIN 1000003	6	43	80.377531	42	42	42	42	42	42	21%
105: ORIGIN 1000003	7	266	105	56	56	56	56	56	56	28%
105: ORIGIN 1000003	8	87	44.107605	23	23	23	23	23	23	12%
105: ORIGIN 1000003	9	32	39.614336	7	7	7	7	7	7	3%
105: ORIGIN 1000003	10	93	52.719925	6	6	6	6	6	6	3%

Hamm Rd East										
107: ORIGIN 1000006	1	45	44.074528	3	3	3	3	3	3	3
107: ORIGIN 1000006	2	89	66.171827	10	10	10	10	10	10	10
107: ORIGIN 1000006	3	47	132.81577	193	193	193	193	193	193	193
107: ORIGIN 1000006	4	50	201.2484	5	5	5	5	5	5	5
107: ORIGIN 1000006	5	6	156.11392	2	2	2	2	2	2	2
107: ORIGIN 1000006	6	43	80.377531	75	75	75	75	75	75	75
107: ORIGIN 1000006	7	87	44.107605	201	201	201	201	201	201	201
107: ORIGIN 1000006	8	32	39.614336	93	93	93	93	93	93	93
107: ORIGIN 1000006	9	93	52.719925	11	11	11	11	11	11	11
21										

Hamm Rd West										
108: ORIGIN 1000007	1	45	44.074528	0	0	0	0	0	0	0
108: ORIGIN 1000007	2	89	66.171827	6	6	6	6	6	6	6
108: ORIGIN 1000007	3	47	132.81577	0	0	0	0	0	0	0
108: ORIGIN 1000007	4	50	201.2484	12	12	12	12	12	12	12
108: ORIGIN 1000007	5	6	156.11392	13	13	13	13	13	13	13
108: ORIGIN 1000007	6	21	143.84599	5	5	5	5	5	5	5
108: ORIGIN 1000007	7	43	80.377531	8	8	8	8	8	8	8
108: ORIGIN 1000007	8	266	105	377	377	377	377	377	377	377
108: ORIGIN 1000007	9	32	39.614336	5	5	5	5	5	5	5

HGV

Hamm Rd East										
207: ORIGIN 1000006	1	45	44.074528	0	0	0	0	0	0	0
207: ORIGIN 1000006	2	89	66.171827	0	0	0	0	0	0	0
207: ORIGIN 1000006	3	47	132.81577	17	17	17	17	17	17	17
207: ORIGIN 1000006	4	50	201.2484	0	0	0	0	0	0	0
207: ORIGIN 1000006	5	6	156.11392	0	0	0	0	0	0	0
207: ORIGIN 1000006	6	43	80.377531	1	1	1	1	1	1	1
207: ORIGIN 1000006	7	87	44.107605	4	4	4	4	4	4	4
207: ORIGIN 1000006	8	32	39.614336	4	4	4	4	4	4	4
207: ORIGIN 1000006	9	93	52.719925	0	0	0	0	0	0	0
21										

TAXI

Hamm Rd East										
307: ORIGIN 1000006	1	45	44.074528	0	0	0	0	0	0	0
307: ORIGIN 1000006	2	89	66.171827	0	0	0	0	0	0	0
307: ORIGIN 1000006	3	47	132.81577	16	16	16	16	16	16	16
307: ORIGIN 1000006	4	50	201.2484	0	0	0	0	0	0	0
307: ORIGIN 1000006	5	6	156.11392	0	0	0	0	0	0	0
307: ORIGIN 1000006	6	43	80.377531	0	0	0	0	0	0	0
307: ORIGIN 1000006	7	87	44.107605	1	1	1	1	1	1	1
307: ORIGIN 1000006	8	32	39.614336	3	3	3	3	3	3	3
307: ORIGIN 1000006	9	93	52.719925	1	1	1	1	1	1	1
21										

Hamm Rd West										
308: ORIGIN 1000007	1	45	44.074528	1	1	1	1	1	1	1
308: ORIGIN 1000007	2	89	66.171827	0	0	0	0	0	0	0
308: ORIGIN 1000007	3	50	201.2484	1	1	1	1	1	1	1
308: ORIGIN 1000007	4	6	156.11392	1	1	1	1	1	1	1
308: ORIGIN 1000007	5	43	80.377531	0	0	0	0	0	0	0
308: ORIGIN 1000007	6	266	105	36	36	36	36	36	36	36
308: ORIGIN 1000007	7	32	39.614336	1	1	1	1	1	1	1
21										

Vehicle Inputs - Proposed AM V2 Flow Adjustments

36 Blythe Roa	22	100	131	169	230	177	188	146	192	11: Cars - 30mph
37 Blythe Roa	22	0	3	5	8	3	0	5	3	21: HGV - 30mph
38 Blythe Roa	22	0	5	5	5	32	16	21	27	50: Cyclists
39 Blythe Roa	22	0	0	0	0	0	0	0	0	0: LGV
40 Blythe Roa	22	0	0	0	0	0	0	0	0	0: Coach
41 Blythe Roa	22	8	0	3	0	0	11	6	17	80: Taxi
42 Blythe Roa	22	0	0	0	0	0	0	0	0	31: Motorbikes - 30mph

CAR

Avonmore Road										
102: ORIGIN 1000000	1	6	156.1139	2	2	2	2	2	2	2
102: ORIGIN 1000000	2	21	143.844	6	6	6	6	6	6	6
102: ORIGIN 1000000	3	266	105	109	109	109	109	109	109	109
102: ORIGIN 1000000	4	32	39.61434	0	0	0	0	0	0	0
102: ORIGIN 1000000	5	93	52.71993	0	0	0	0	0	0	0
North End Rd										
103: ORIGIN 1000001	1	45	44.07453	0	0	0	0	0	0	0
103: ORIGIN 1000001	2	6	156.1139	10	10	10	10	10	10	10
103: ORIGIN 1000001	3	21	143.844	26	26	26	26	26	26	26
103: ORIGIN 1000001	4	266	105	196	196	196	196	196	196	196
103: ORIGIN 1000001	5	32	39.61434	0	0	0	0	0	0	0
103: ORIGIN 1000001	6	93	52.71993	0	0	0	0	0	0	0

Brook Green										
104: ORIGIN 1000002	1	45	44.07453	10	10	10	10	10	10	10
104: ORIGIN 1000002	2	89	66.17183	45	45	45	45	45	45	45
104: ORIGIN 1000002	3	50	201.2484	35	35	35	35	35	35	35
104: ORIGIN 1000002	4	21	143.844	13	13	13	13	13	13	13
104: ORIGIN 1000002	5	43	80.37753	20	20	20	20	20	20	20
104: ORIGIN 1000002	6	266	105	36	36	36	36	36	36	36
104: ORIGIN 1000002	7	87	44.10761	16	16	16	16	16	16	16
104: ORIGIN 1000002	8	32	39.61434	0	0	0	0	0	0	0
104: ORIGIN 1000002	9	93	52.71993	6	6	6	6	6	6	6

Blythe Rd										
105: ORIGIN 1000003	1	45	44.07453	15	15	15	15	15	15	8%
105: ORIGIN 1000003	2	89	66.17183	24	24	24	24	24	24	12%
105: ORIGIN 1000003	3	47	132.8158	0	0	0	0	0	0	0%
105: ORIGIN 1000003	4	50	201.2484	20	20	20	20	20	20	10%
105: ORIGIN 1000003	5	6	156.1139	7	7	7	7	7	7	7%
105: ORIGIN 1000003	6	43	80.37753	42	42	42	42	42	42	22%
105: ORIGIN 1000003	7	266	105	56	56	56	56	56	56	29%
105: ORIGIN 1000003	8	87	44.10761	23	23	23	23	23	23	12%
105: ORIGIN 1000003	9	32	39.61434	0	0	0	0	0	0	0%
105: ORIGIN 1000003	10	93	52.71993	6	6	6	6	6	6	3%

PM Peak
Static Routes - Proposed PM V2 Flow Adjustments

[illegible][illegible]

North End Rd										
103: ORIGIN 1000001	1	21	143.84399	24	24	24	24	24	24	24
103: ORIGIN 1000001	2	266	105	233	233	233	233	233	233	233
103: ORIGIN 1000001	3	32	39.614336	3	3	3	3	3	3	3

[illegible][illegible][illegible]

Hamm Rd West									
10E: ORIGIN 1000007	1	45	44.074528	4	4	4	4	4	4
10E: ORIGIN 1000007	2	89	66.171827	13	13	13	13	13	13
10E: ORIGIN 1000007	3	30	201.2484	1	1	1	1	1	1
10E: ORIGIN 1000007	4	6	136.11392	15	15	15	15	15	15
10E: ORIGIN 1000007	5	21	143.84599	6	6	6	6	6	6
10E: ORIGIN 1000007	6	43	80.37791	15	15	15	15	15	15
10E: ORIGIN 1000007	7	206	199.13	175	175	175	175	175	175
10E: ORIGIN 1000007	8	31	38.614336	13	13	13	13	13	13

Name Red East									
207: ORIGIN 1000006	1	43	44.074528	0	0	0	0	0	0
207: ORIGIN 1000006	2	89	46.171627	0	0	0	0	0	0
207: ORIGIN 1000006	3	47	132.81577	3	3	3	3	3	3
207: ORIGIN 1000006	4	50	201.2484	0	0	0	0	0	0
207: ORIGIN 1000006	5	6	156.11392	0	0	0	0	0	0
207: ORIGIN 1000006	6	43	80.377331	1	1	1	1	1	1
207: ORIGIN 1000006	7	87	44.107603	3	3	3	3	3	3
207: ORIGIN 1000006	8	31	39.614336	2	2	2	2	2	2
207: ORIGIN 1000006	9	93	52.719923	0	0	0	0	0	0

TAXI

[illegible][illegible]

Vehicle Inputs - Proposed PM V2 Flow Adjustments

36	Blythe Roa	22	189	145	195	172	185	192	205	205 11: Cars - 30mph
37	Blythe Roa	22	0	5	10	5	5	0	10	5 21: HGV - 30mph
38	Blythe Roa	22	5	11	21	11	21	21	21	21 50: Cyclists
39	Blythe Roa	22	0	0	0	0	0	0	0	0 60: LGV
40	Blythe Roa	22	0	0	0	0	0	0	0	0 70: Coach
41	Blythe Roa	22	43	55	36	49	43	36	55	55 80: Taxi
42	Blythe Roa	22	0	0	0	0	0	0	0	0 31: Motorbikes - 30mph

CAR

[illegible]

Avonmore Road										
102: ORIGIN 1000000	1		6 156.1139	30	30	30	30	30	30	30
102: ORIGIN 1000000	2		21 143.846	16	16	16	16	16	16	16
102: ORIGIN 1000000	3		266 105	113	113	113	113	113	113	113
102: ORIGIN 1000000	4		87 44.10761	3	3	3	3	3	3	3
102: ORIGIN 1000000	5		32 39.61434	0	0	0	0	0	0	0
102: ORIGIN 1000000			93 52.71993	0	0	0	0	0	0	0

North End Rd									
103: ORIGIN 10000001	1	21	143.846	27	27	27	27	27	27
103: ORIGIN 10000001	2	266	105	233	233	233	233	233	233
103: ORIGIN 10000001	3	32	39.61434	0	0	0	0	0	0

[illegible][illegible][illegible][illegible][illegible]

TAXI

Hamm Rd East										
307: ORIGIN 1000006	1	45	44.07453	2	2	2	2	2	2	2
307: ORIGIN 1000006	2	89	66.17283	1	1	1	1	1	1	1
307: ORIGIN 1000006	3	47	132.8150	19	19	19	19	19	19	19
307: ORIGIN 1000006	4	50	201.2464	3	2	2	2	2	2	2
307: ORIGIN 1000006	5	45	135.1139	0	0	0	0	0	0	0
307: ORIGIN 1000006	6	43	80.87753	3	3	3	3	3	3	3
307: ORIGIN 1000006	7	47	44.10761	6	6	6	6	6	6	6
307: ORIGIN 1000006	8	32	39.61434	0	0	0	0	0	0	0
307: ORIGIN 1000006	9	37	74.2457	0	0	0	0	0	0	0

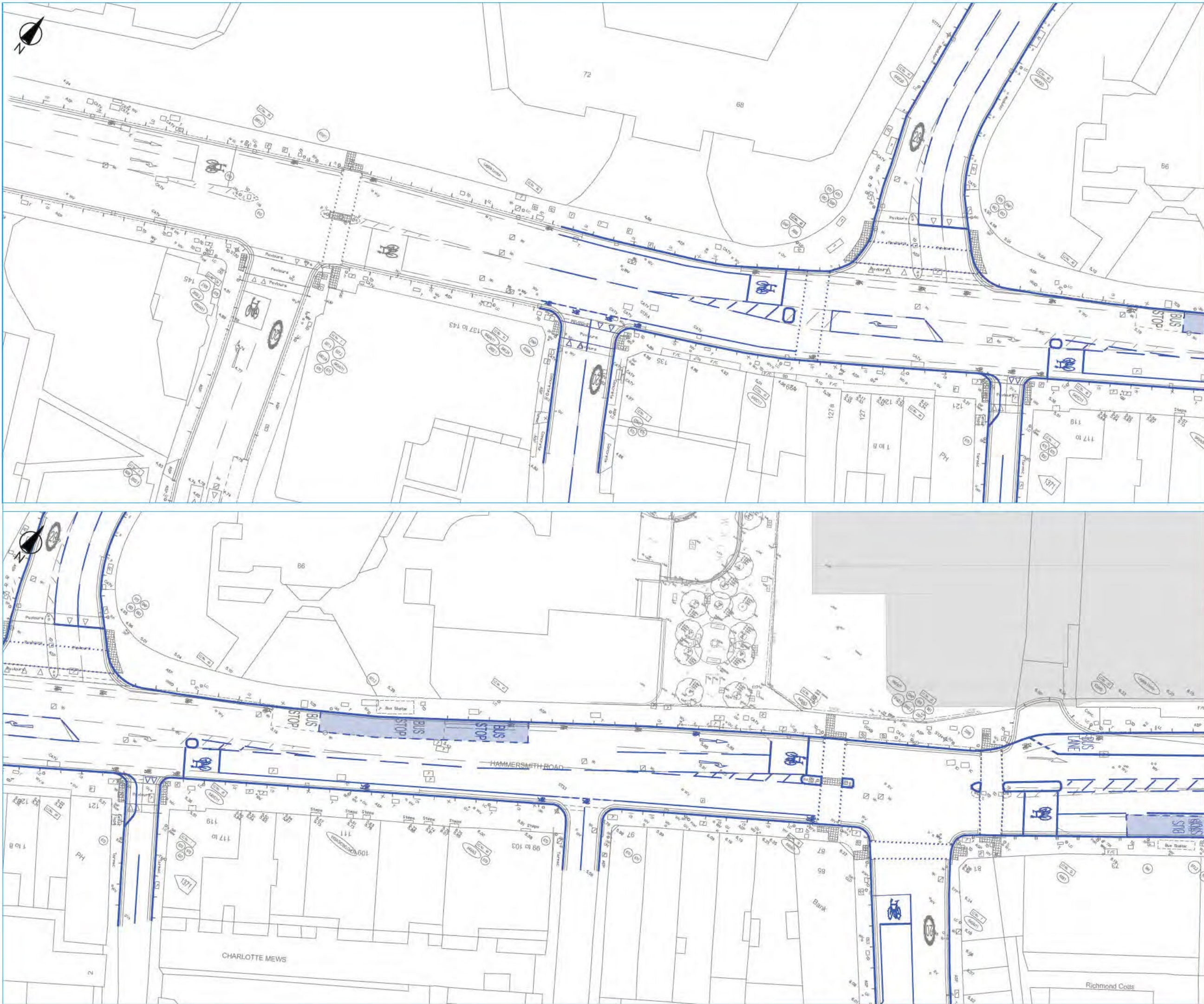
Hamm Rd West									
308: ORIGIN 1000007	1	43	44.07453	1	1	1	1	1	1
308: ORIGIN 1000007	2	89	66.17183	1	1	1	1	1	1
308: ORIGIN 1000007	3	50	201.2484	0	0	0	0	0	0
308: ORIGIN 1000007	4	6	136.1139	2	2	2	2	2	2
308: ORIGIN 1000007	5	1	143.846	0	0	0	0	0	0
308: ORIGIN 1000007	6	43	80.37793	1	1	1	1	1	1
308: ORIGIN 1000007	7	266	105	37	37	37	37	37	37
308: ORIGIN 1000007	8	32	39.61434	0	0	0	0	0	0

36	Blythe Rose	22	189	145	195	172	185	152	205	205	11: Cars - 30mph
37	Blythe Rose	22	0	5	10	5	5	0	10	5	21: HGV - 30mph
38	Blythe Rose	22	5	11	21	11	21	21	21	21	50: Cyclists
39	Blythe Rose	22	0	0	0	0	0	0	0	0	60: LGV
40	Blythe Rose	22	0	0	0	0	0	0	0	0	70: Coach
41	Blythe Rose	22	43	55	36	49	43	36	55	55	80: Taxi
42	Blythe Rose	22	0	0	0	0	0	0	0	0	31: Motorbikes - 30mph

Multimodal acknowledge that the Blythe Road inputs should be reduced slightly as a result of removing proportions of traffic that were previously travelling to Olympia Way (assuming this uses another route outside of the network extents).

However, to model a worst case and assume that this traffic still travels into the VISSIM network and onto Hammersmith Road, have used the existing turning proportions to assign the traffic and kept the vehicle inputs the same.

Appendix B – Network Layout Drawings



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	19/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title
OLYMPIA

Drawing Title
OLYMPIA PROPOSALS WITHOUT CS9
LAYOUT 4
BLYTHE ROAD SIGNALISED
D-GATE SIGNALISED

Drawing Status

SKETCH

Scale at A3

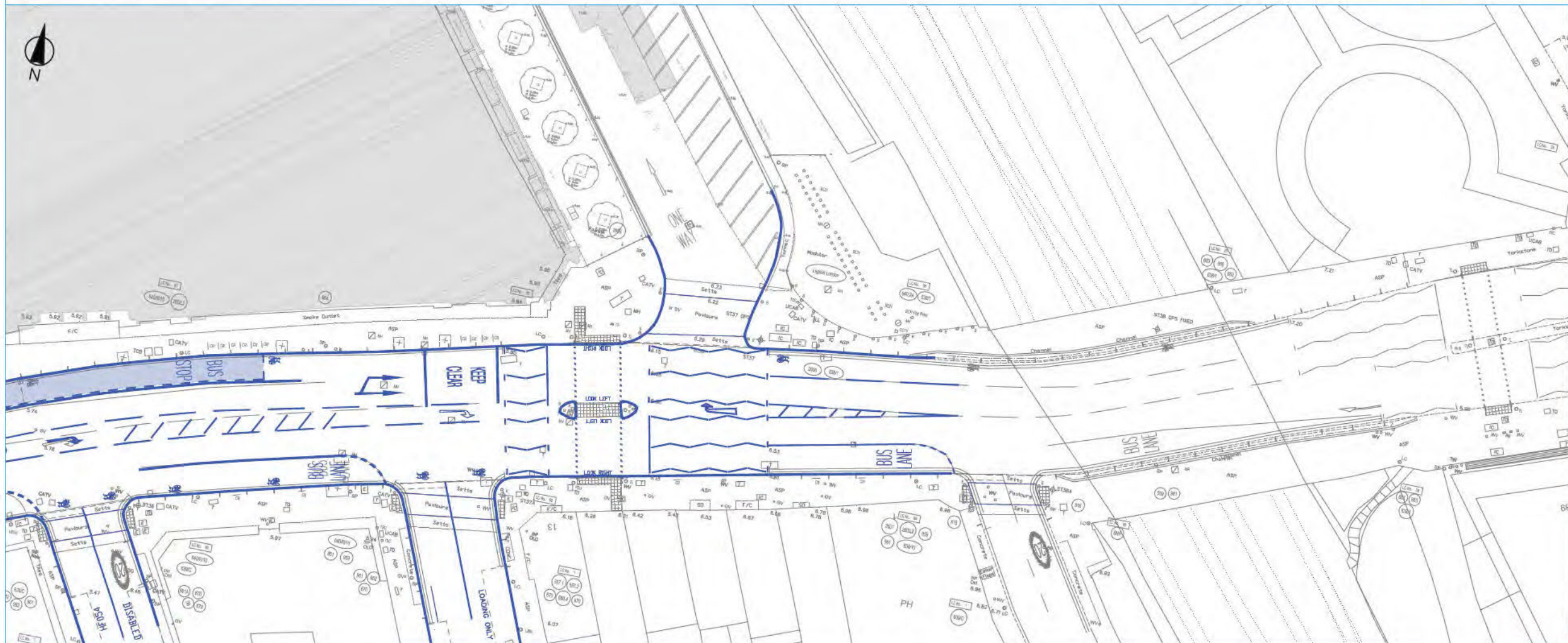
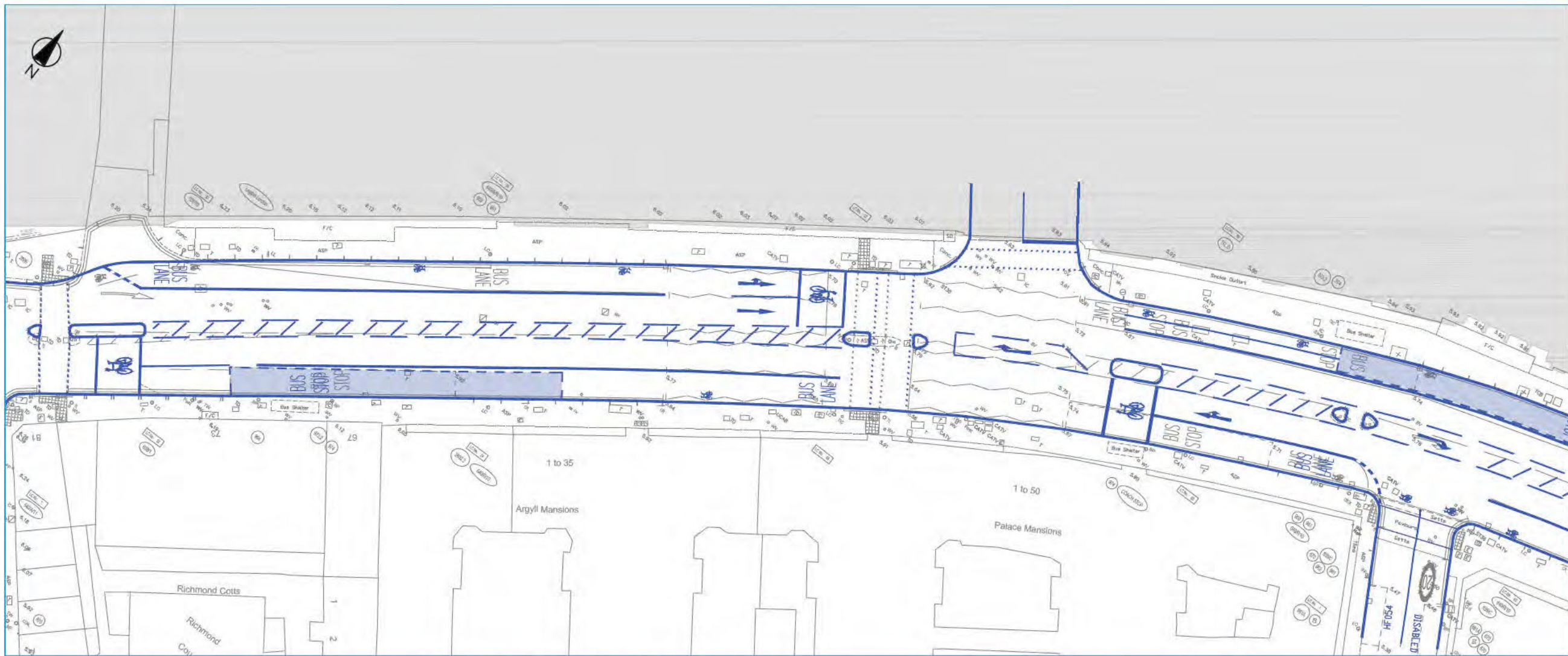
1:500

Drawing No

M000293-HW-020

Issue

A



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	19/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title

OLYMPIA

Drawing Title

**OLYMPIA PROPOSALS WITHOUT CS9
LAYOUT 4
BLYTHE ROAD SIGNALISED
D-GATE SIGNALISED**

Drawing Status



Scale at A3

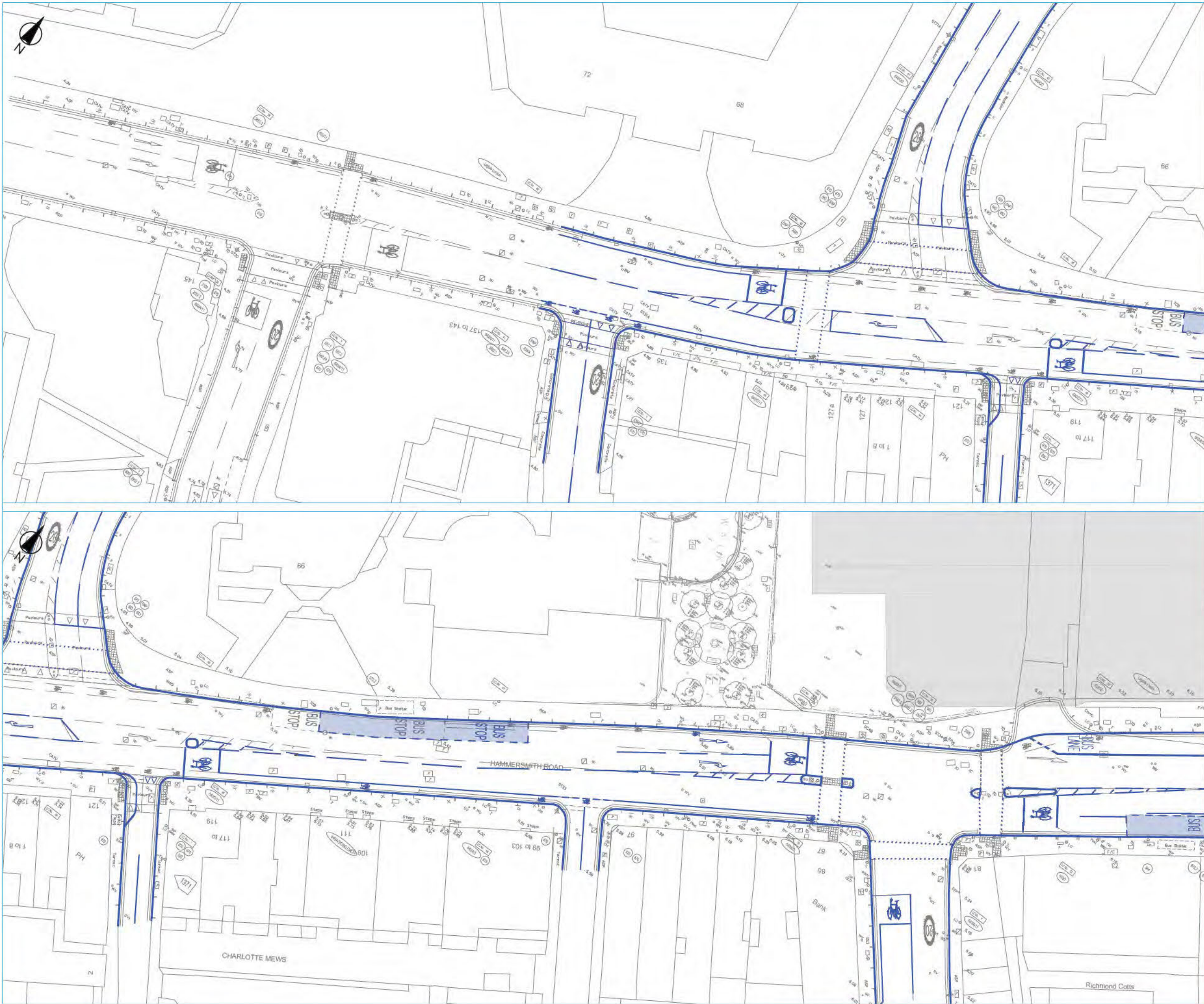
1:500

Drawing No

M000293-HW-021

Issue

A



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	19/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING
LIMITED

Job Title
OLYMPIA

Drawing Title
OLYMPIA PROPOSALS WITHOUT CS9
LAYOUT 2
BLYTHE ROAD SIGNALISED
D-GATE PRIORITY

Drawing Status

SKETCH

Scale at A3

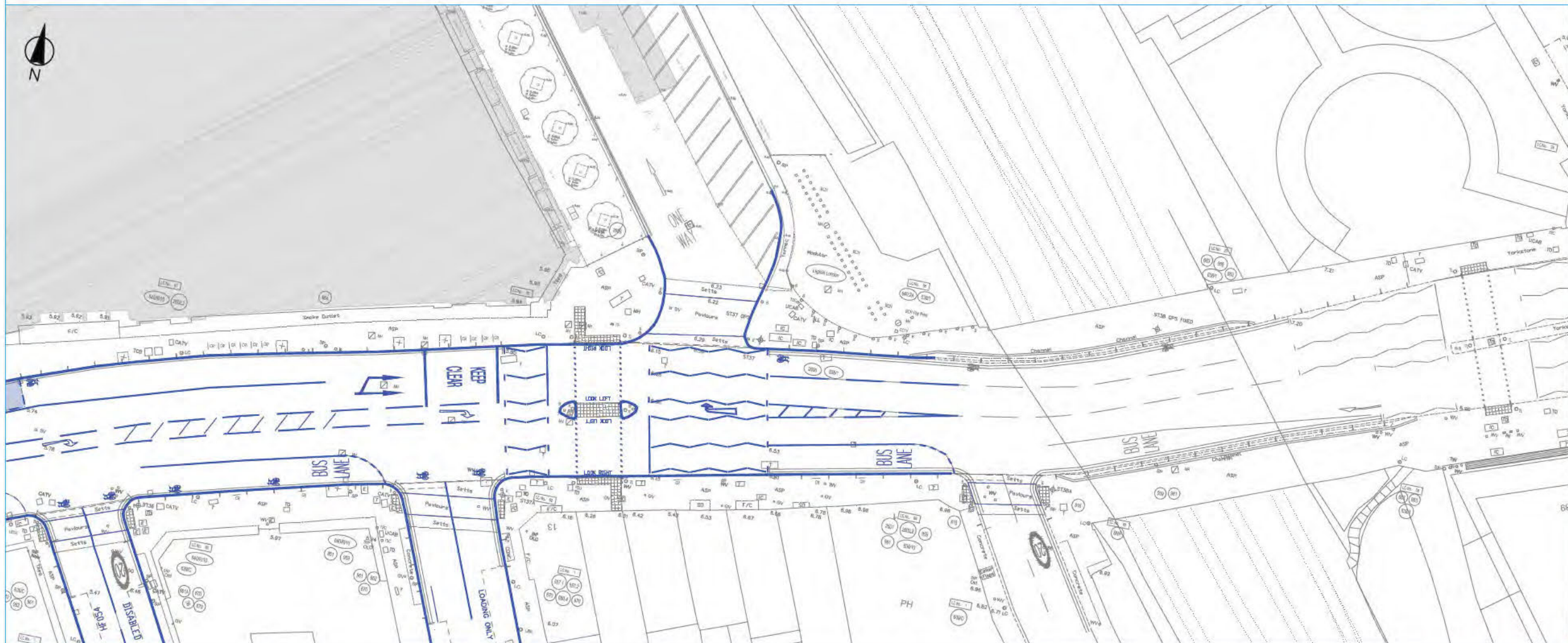
1:500

Drawing No

M000293-HW-022

Issue

A



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	19/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title

OLYMPIA

Drawing Title

**OLYMPIA PROPOSALS WITHOUT CS9 LAYOUT 2
BLTYHE ROAD SIGNALISED
D-GATE PRIORITY**

Drawing Status

SKETCH

Scale at A3

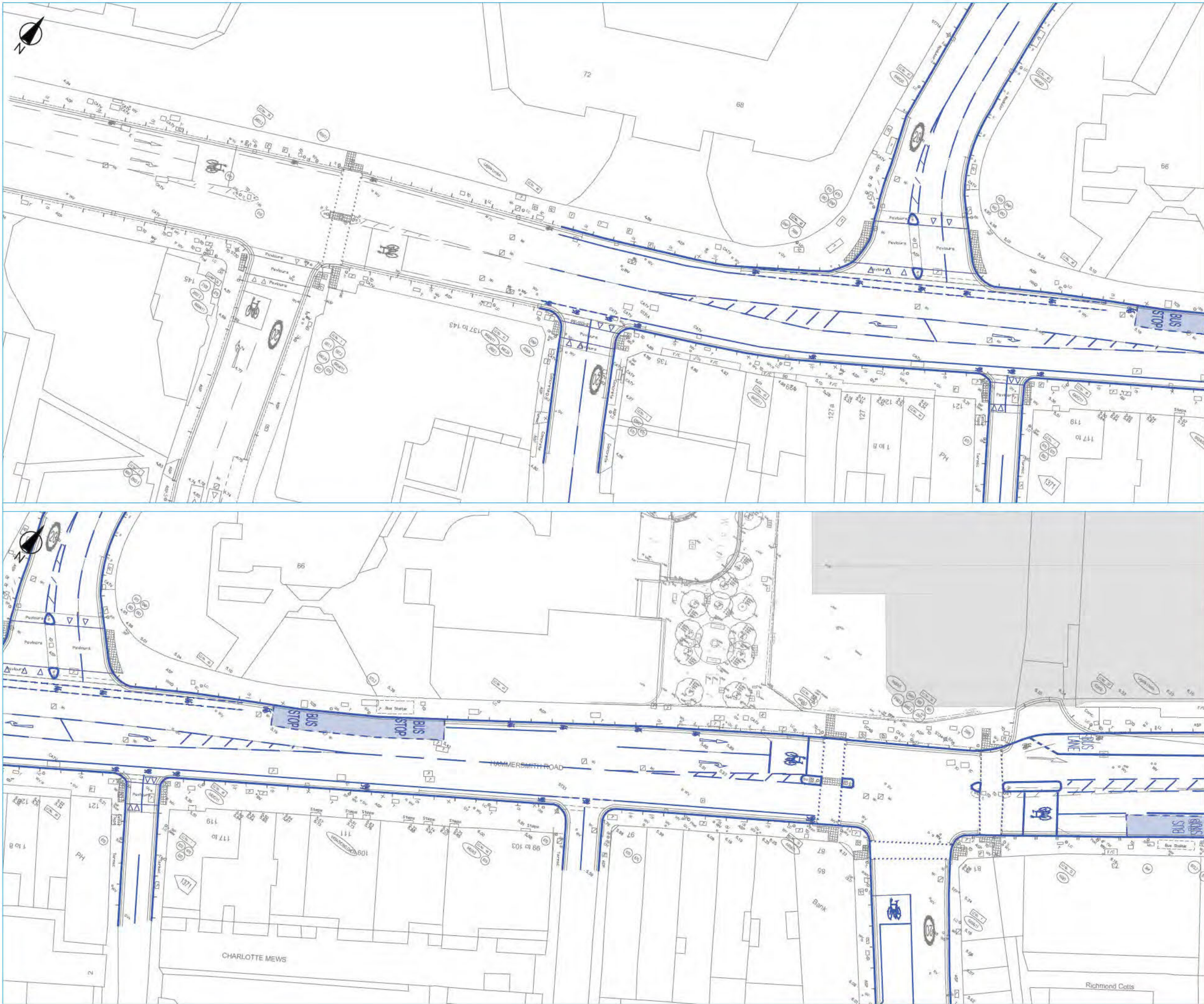
1:500

Drawing No

M000293-HW-023

Issue

A



- NOTES
1. Do not scale from this drawing, work to figured dimensions only.
 2. Dimensions are in metres unless stated otherwise.
 3. This drawing is for discussion purposes only.

A	17/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title
OLYMPIA

Drawing Title
OLYMPIA PROPOSALS WITHOUT CS9
LAYOUT 3
BLYTHE ROAD PRIORITY
D-GATE SIGNALISED

Drawing Status

SKETCH

Scale at A3

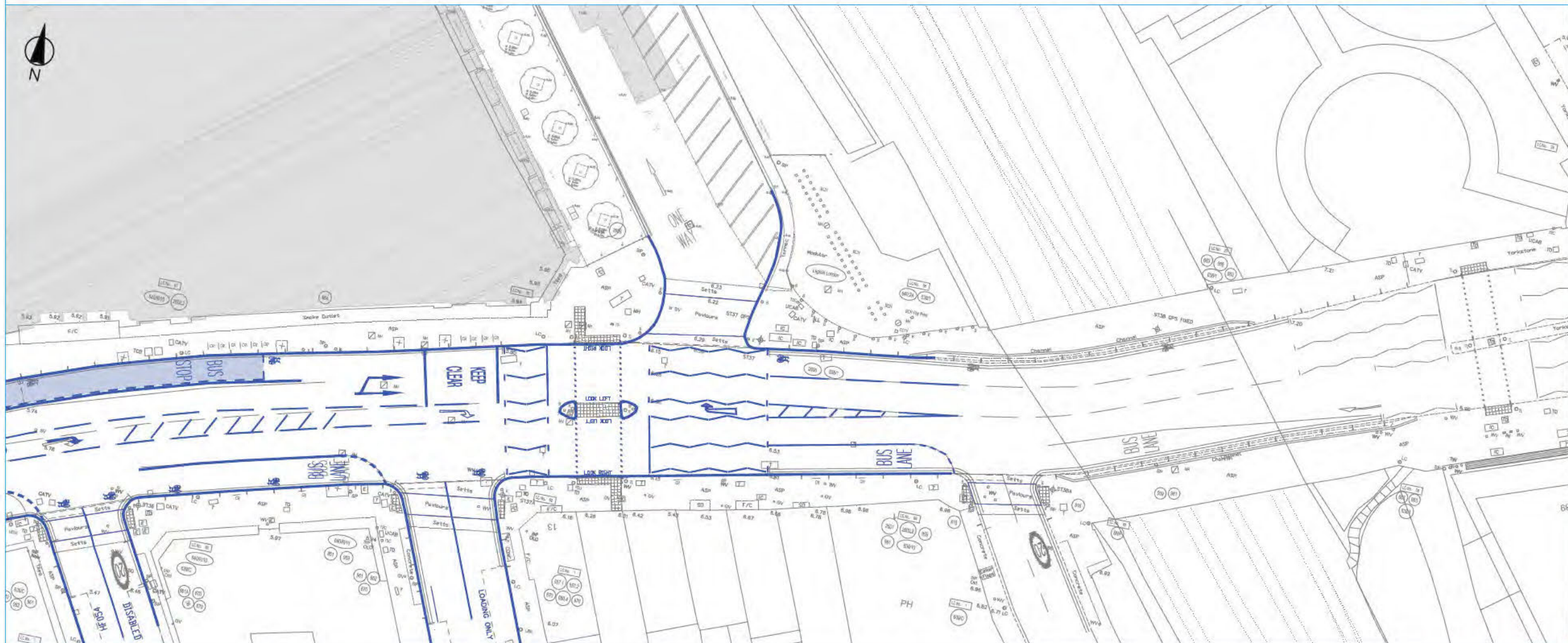
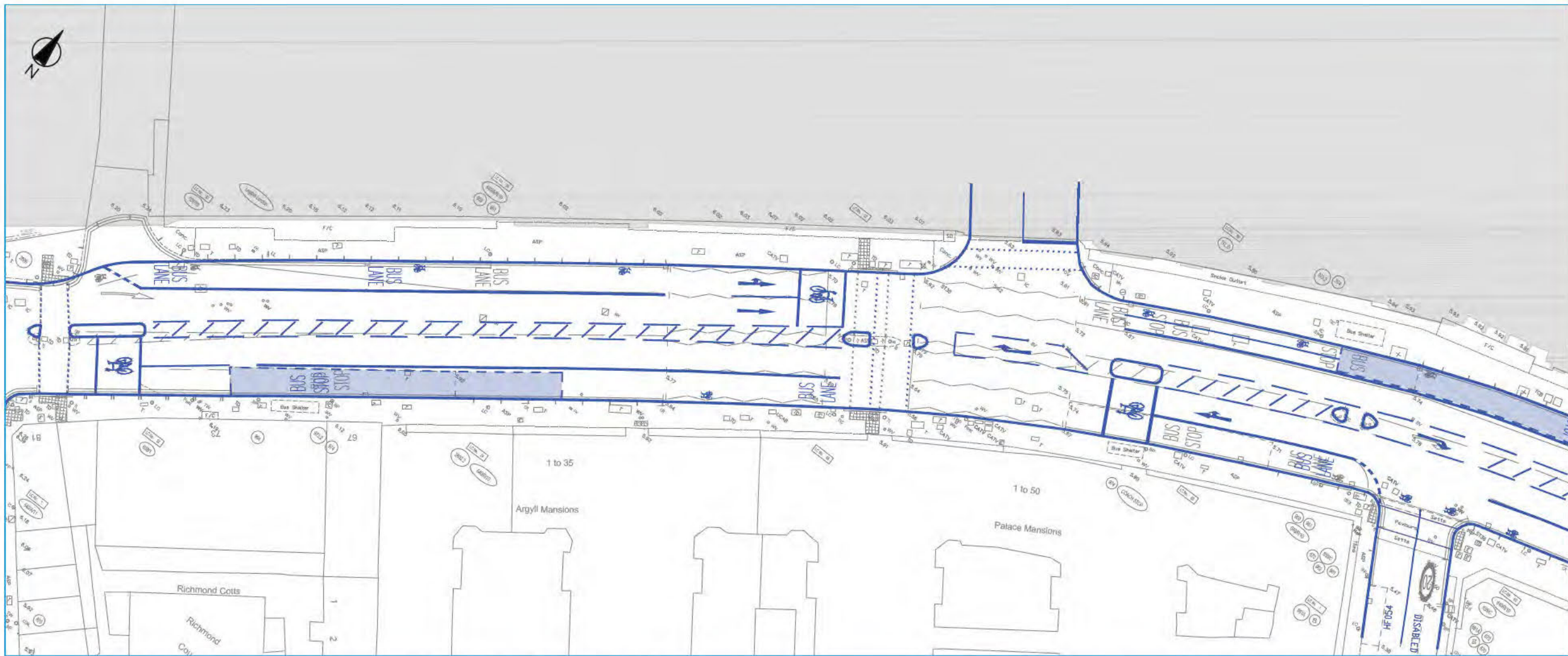
1:500

Drawing No

M000293-HW-024

Issue

A



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	17/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title

OLYMPIA

Drawing Title

**OLYMPIA PROPOSALS WITHOUT CS9 LAYOUT 3
BLYTHE ROAD PRIORITY
D-GATE SIGNALISED**

Drawing Status

SKETCH

Scale at A3

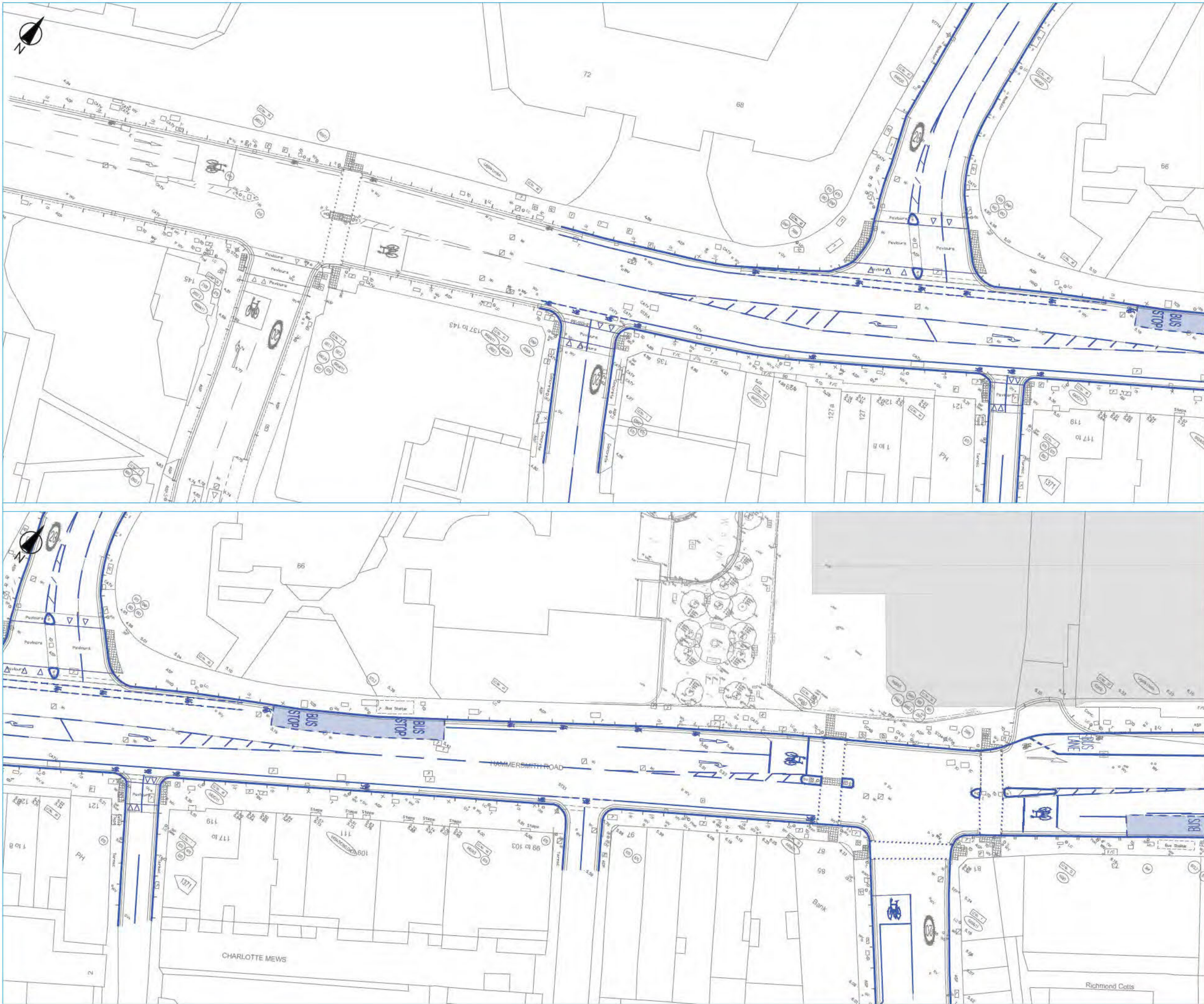
1:500

Drawing No

M000293-HW-025

Issue

A



- NOTES
1. Do not scale from this drawing, work to figured dimensions only.
 2. Dimensions are in metres unless stated otherwise.
 3. This drawing is for discussion purposes only.

A	18/07/18		First Issue		
Rev	Date	By	Remarks	Chkd	Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title

OLYMPIA

Drawing Title

OLYMPIA PROPOSALS WITHOUT CS9 LAYOUT 1
BLYTHE ROAD PRIORITY
D-GATE PRIORITY

Drawing Status

SKETCH

Scale at A3

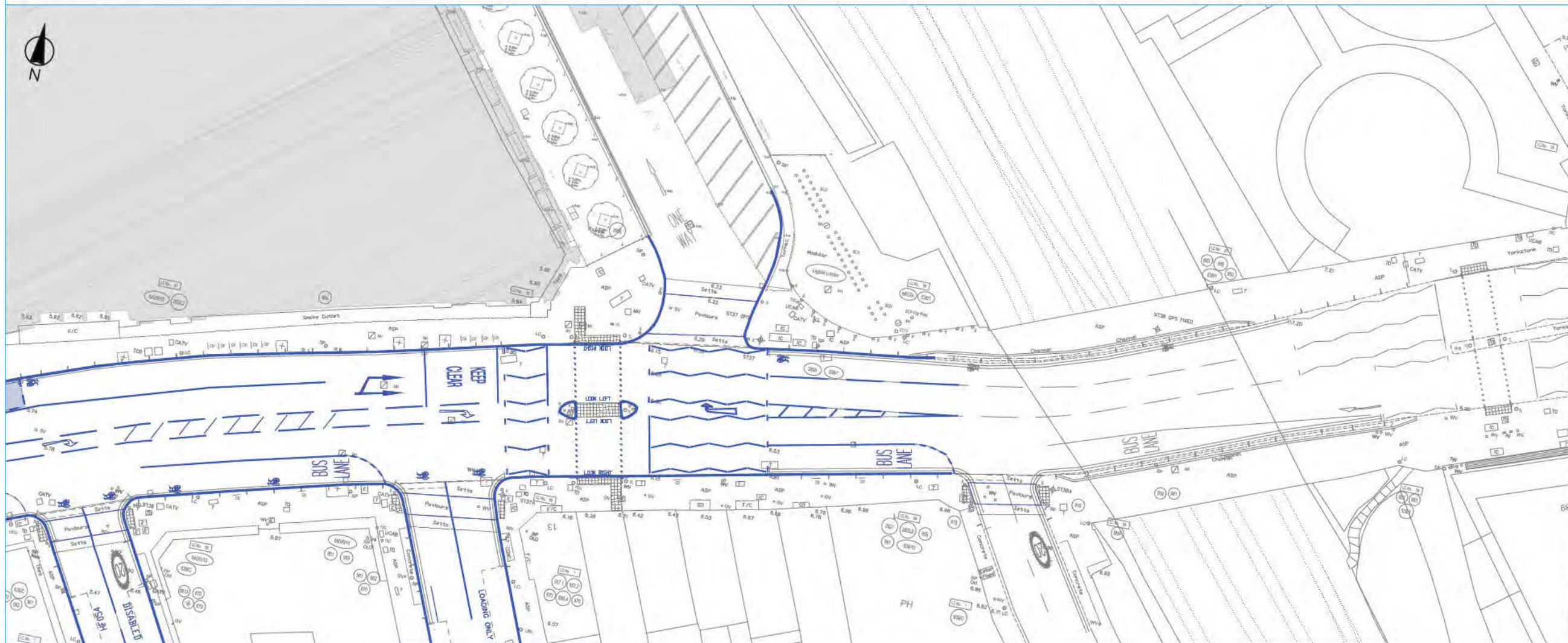
1:500

Drawing No

M000293-HW-026

Issue

A



NOTES

1. Do not scale from this drawing, work to figured dimensions only.
2. Dimensions are in metres unless stated otherwise.
3. This drawing is for discussion purposes only.

A	18/07/18		First Issue	
Rev	Date	By	Remarks	Chkd Appd



Client

OLYMPUS PROPERTY HOLDING LIMITED

Job Title

OLYMPIA

Drawing Title

**OLYMPIA PROPOSALS WITHOUT CS9
LAYOUT 1
BLYTHE ROAD PRIORITY
D-GATE PRIORITY**

Drawing Status

SKETCH

Scale at A3

1:500

Drawing No

M000293-HW-027

Issue

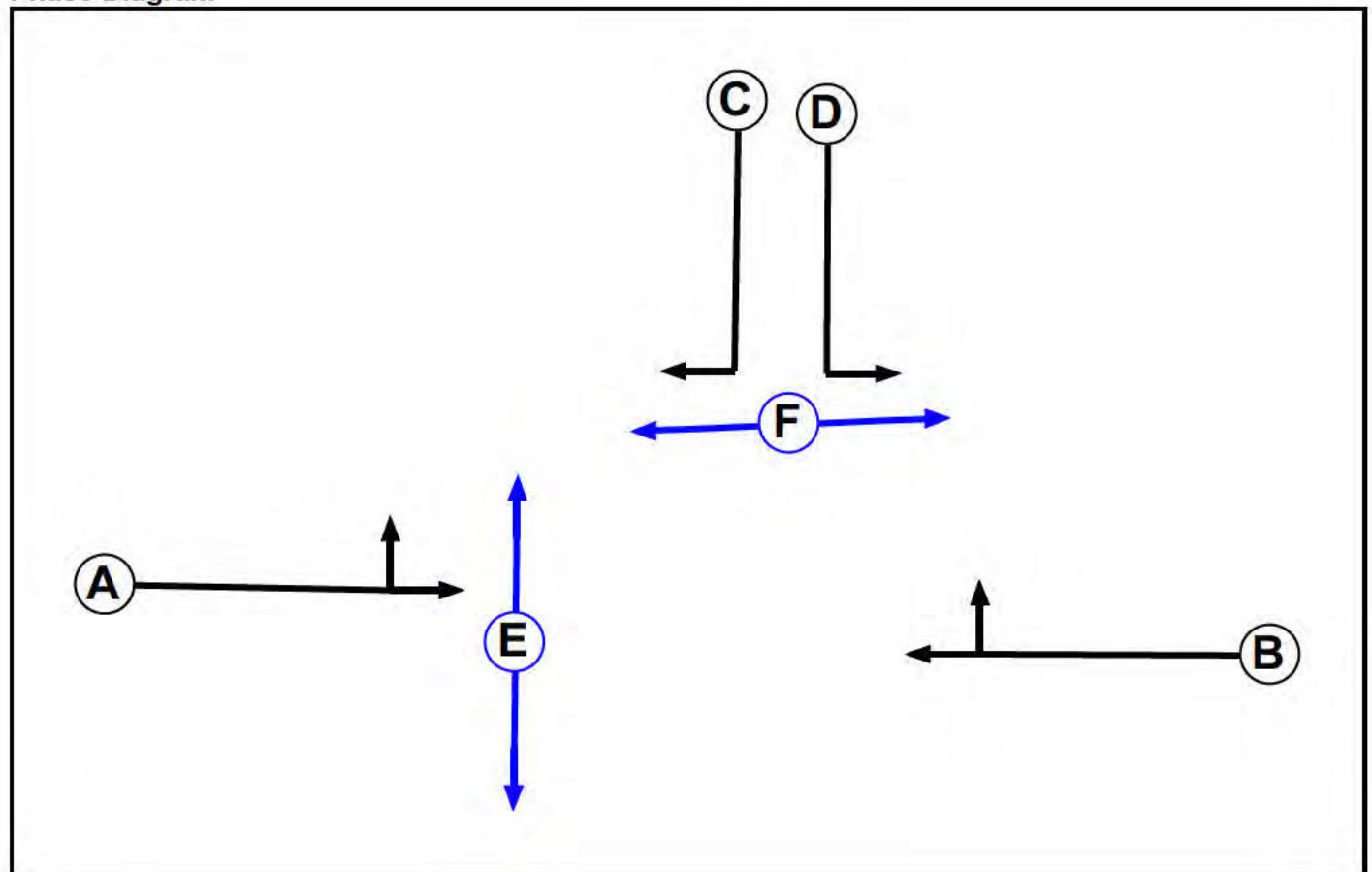
A

Appendix C – Proposed Blythe Road and D-Gate Signalisation Details

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Momentum Blythe Rd Sc100 MMEditedTimes NoCS9.lsg3x
Author:	
Company:	
Address:	

Phase Diagram



Phase Input Data

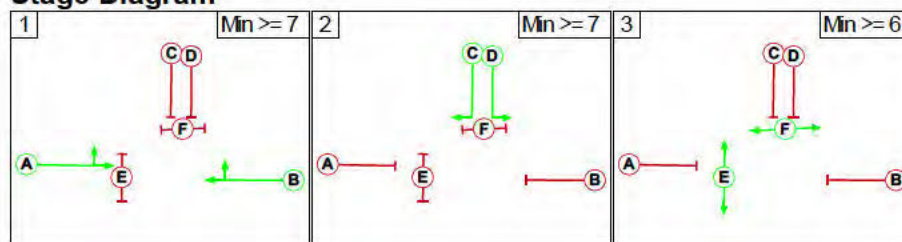
Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		6	6
F	Pedestrian		6	6

Phase Intergreens Matrix

Terminating Phase	Starting Phase						
		A	B	C	D	E	F
	A		-	5	6	5	7
	B	-		6	-	8	10
	C	5	5		-	9	5
	D	5	-	-		-	5
	E	12	12	12	-		-
	F	15	15	15	15	-	

Phases in Stage

Stage No.	Phases in Stage
1	A B
2	C D
3	E F

Stage Diagram**Phase Delays**

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

From Stage	To Stage		
	1	2	3
	1	6	10
	2	5	9
	3	15	15

Signal Timings

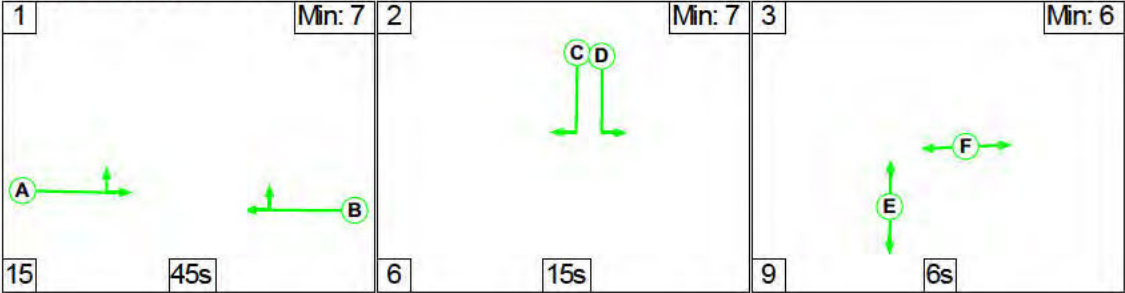
Signal Timings

User and Project Details

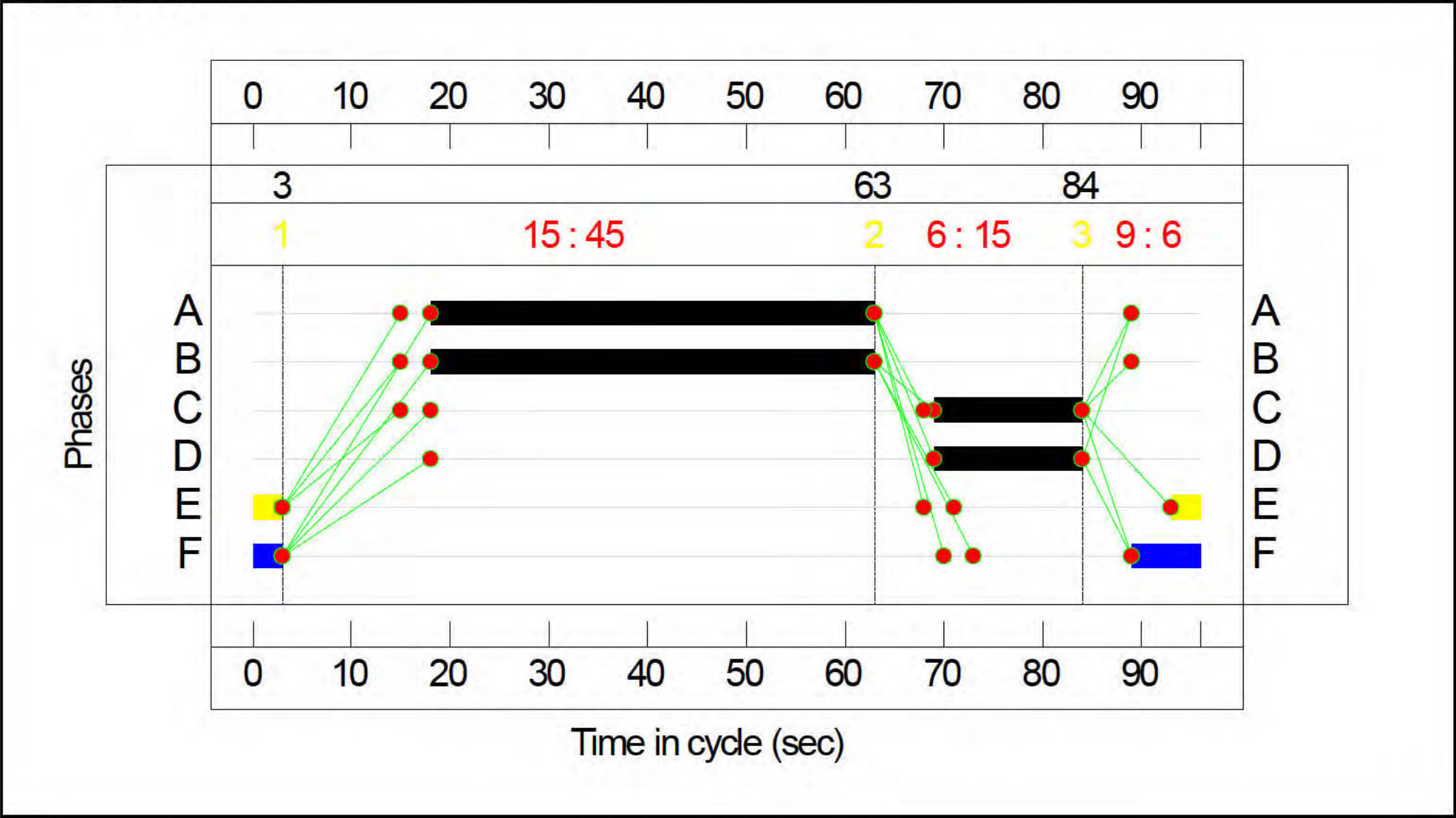
Project:	
Title:	
Location:	
Additional detail:	
File name:	Momentum Blythe Rd Sc100 MMEditedTimes NoCS9.lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'AM' (FG1: 'Flow Group 1', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



Signal Timings
Signal Timings Diagram



Signal Timings
Phase Timings

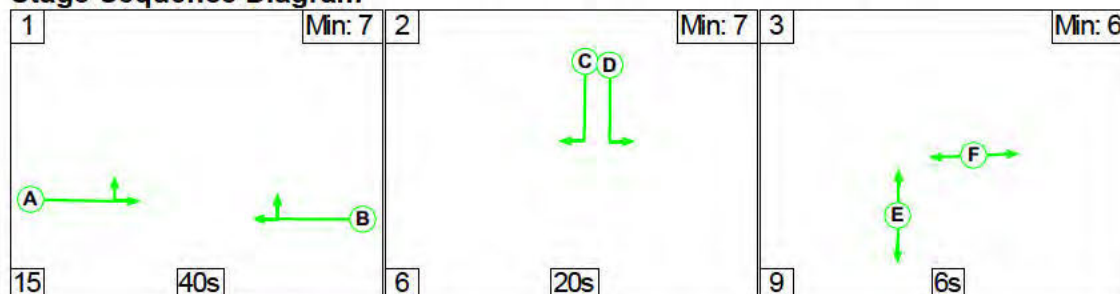
Phase Name	Description	Phase	Green Period 1		
			Total Green	Start Time	End Time
A	Ahead Left	Traffic	45	18	63
B	Ahead Right	Traffic	45	18	63
C	Right	Traffic	15	69	84
D	Left	Traffic	15	69	84
E	Pedestrians across	Pedestrian	6	93	3
F	Pedestrians across	Pedestrian	10	89	3

Lane Green Times

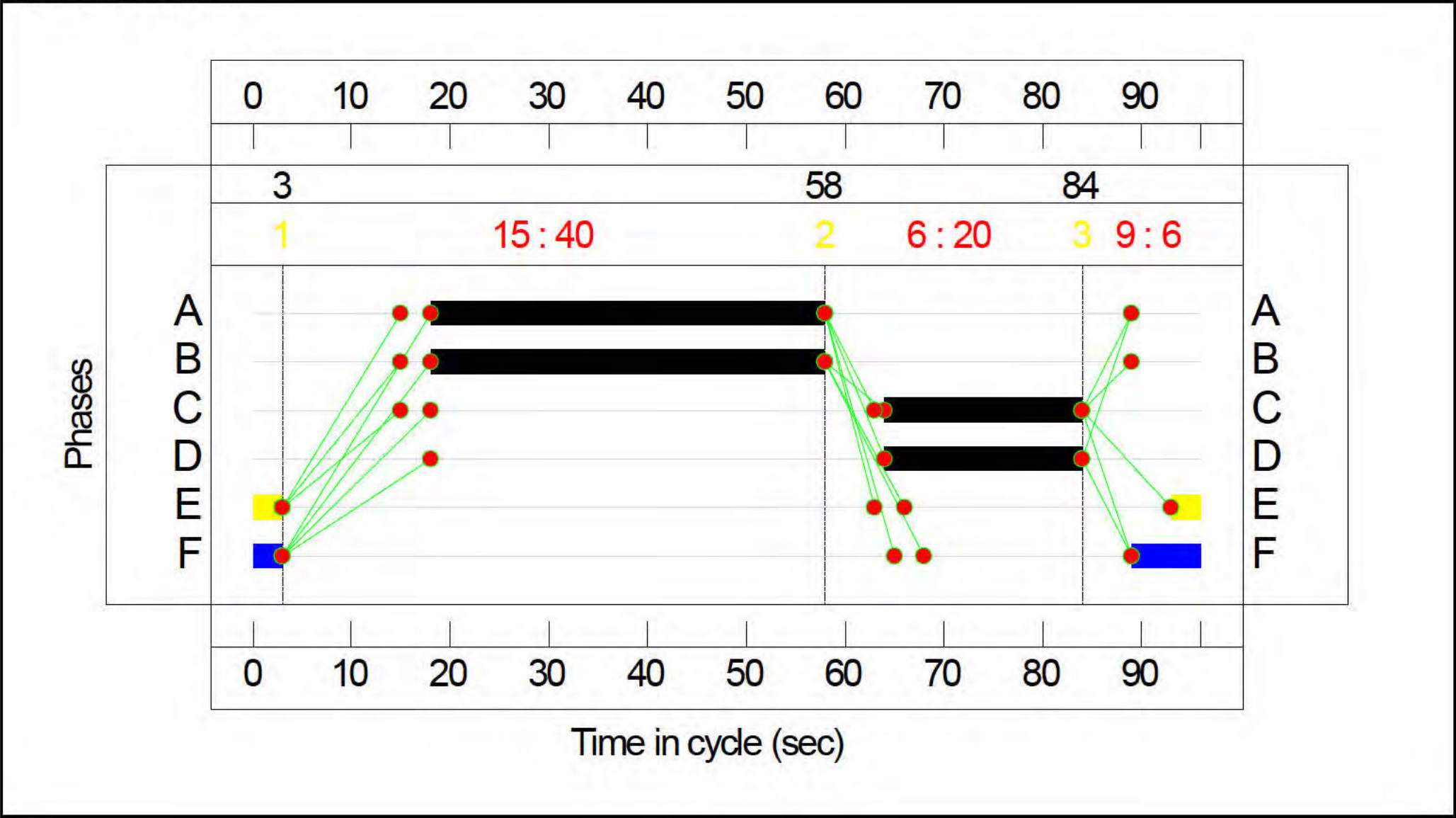
Junction: Unnamed Junction					
Lane	Description	Type	Phases	Start Green	End Green
1/1	Ahead Left	U	A	18	63
3/1	Ahead Right	O	B	18	63
4/1	Right	U	C	69	84
5/1	Left	U	D	69	84

Scenario 2: 'PM' (FG1: 'Flow Group 1', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



Signal Timings
Signal Timings Diagram



Signal Timings

Phase Timings

Phase Name	Description	Phase	Green Period 1		
			Total Green	Start Time	End Time
A	Ahead Left	Traffic	40	18	58
B	Ahead Right	Traffic	40	18	58
C	Right	Traffic	20	64	84
D	Left	Traffic	20	64	84
E	Pedestrians across	Pedestrian	6	93	3
F	Pedestrians across	Pedestrian	10	89	3

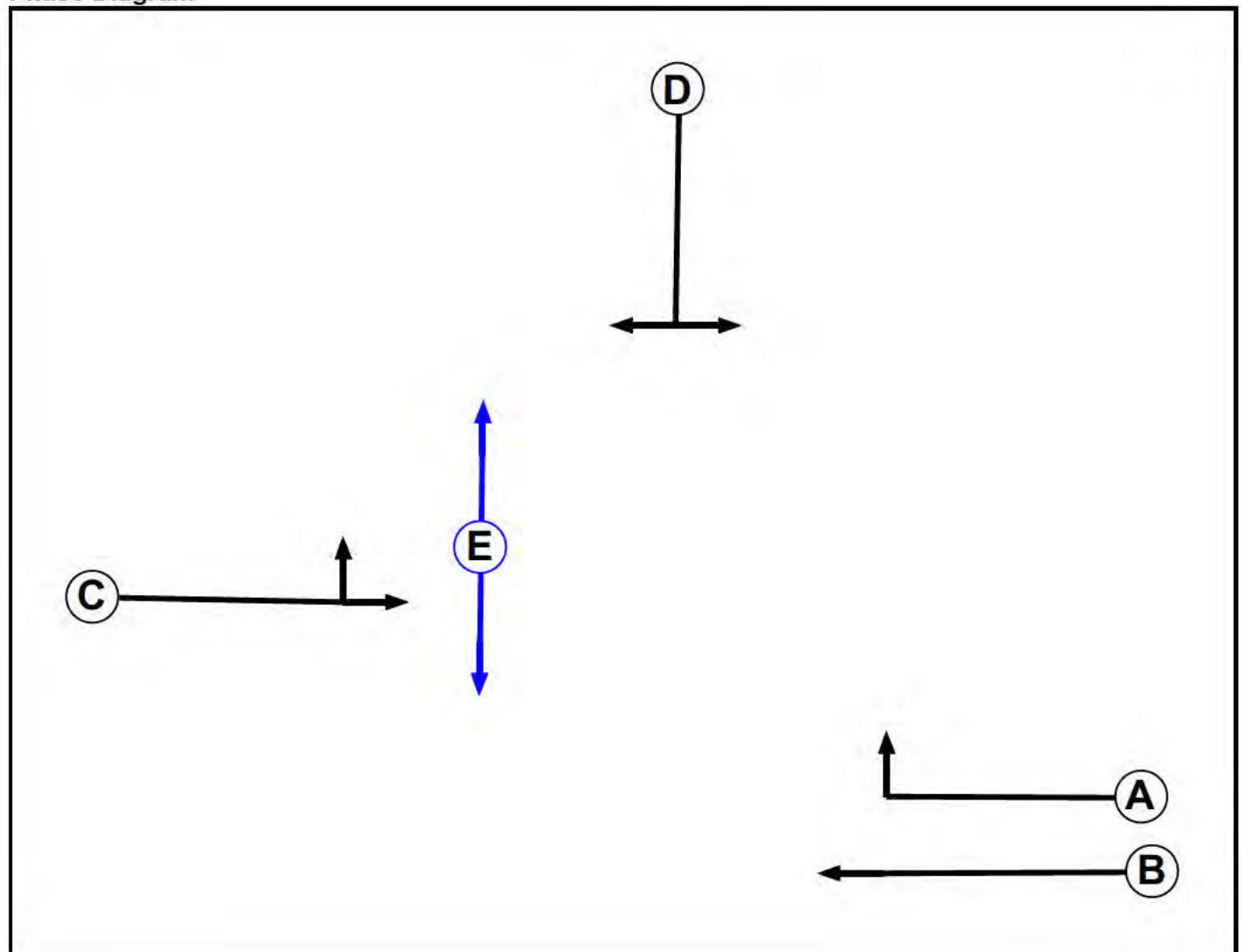
Lane Green Times

Junction: Unnamed Junction					
Lane	Description	Type	Phases	Start Green	End Green
1/1	Ahead Left	U	A	18	58
3/1	Ahead Right	O	B	18	58
4/1	Right	U	C	64	84
5/1	Left	U	D	64	84

User and Project Details

Project:	
Title:	
Location:	
Additional detail:	
File name:	Momentum D-Gate Sc101 MMEditedTimes NoCS9.lsg3x
Author:	
Company:	
Address:	

Phase Diagram



Phase Input Data

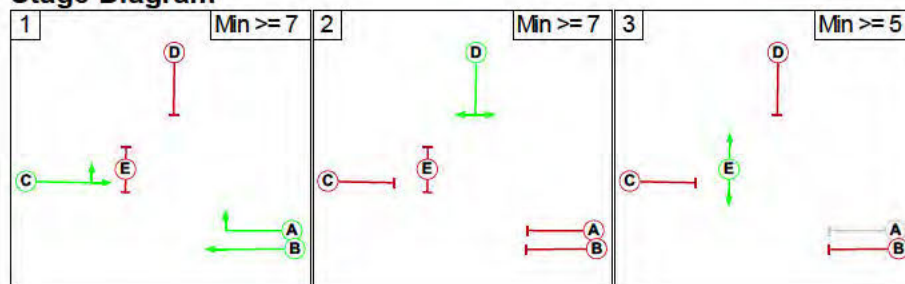
Phase Name	Phase Type	Assoc. Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Pedestrian		5	5

Phase Intergreens Matrix

	Starting Phase					
		A	B	C	D	E
	A		-	-	5	-
	B	-		-	5	7
	C	-	-		6	5
	D	5	5	5		9
	E	-	16	16	16	

Phases in Stage

Stage No.	Phases in Stage
1	A B C
2	D
3	E

Stage Diagram**Phase Delays**

Term. Stage	Start Stage	Phase	Type	Value	Cont value
There are no Phase Delays defined					

Prohibited Stage Change

	To Stage			
		1	2	3
	1		6	7
	2	5		9

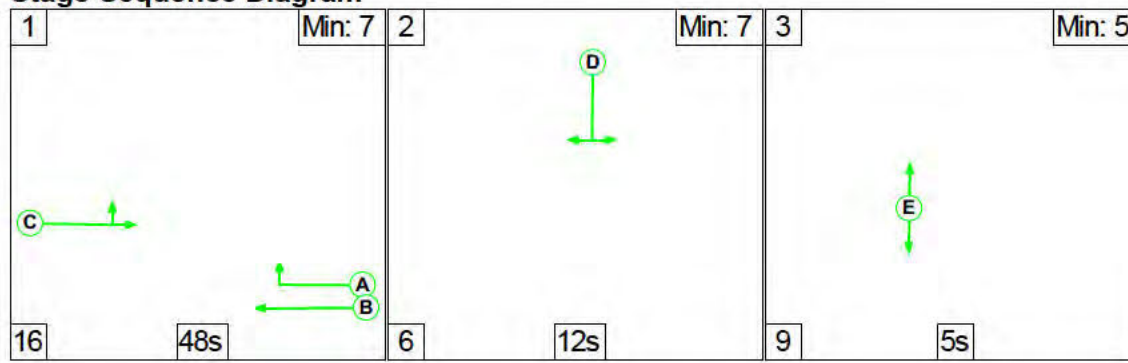
Signal Timings
Signal Timings

User and Project Details

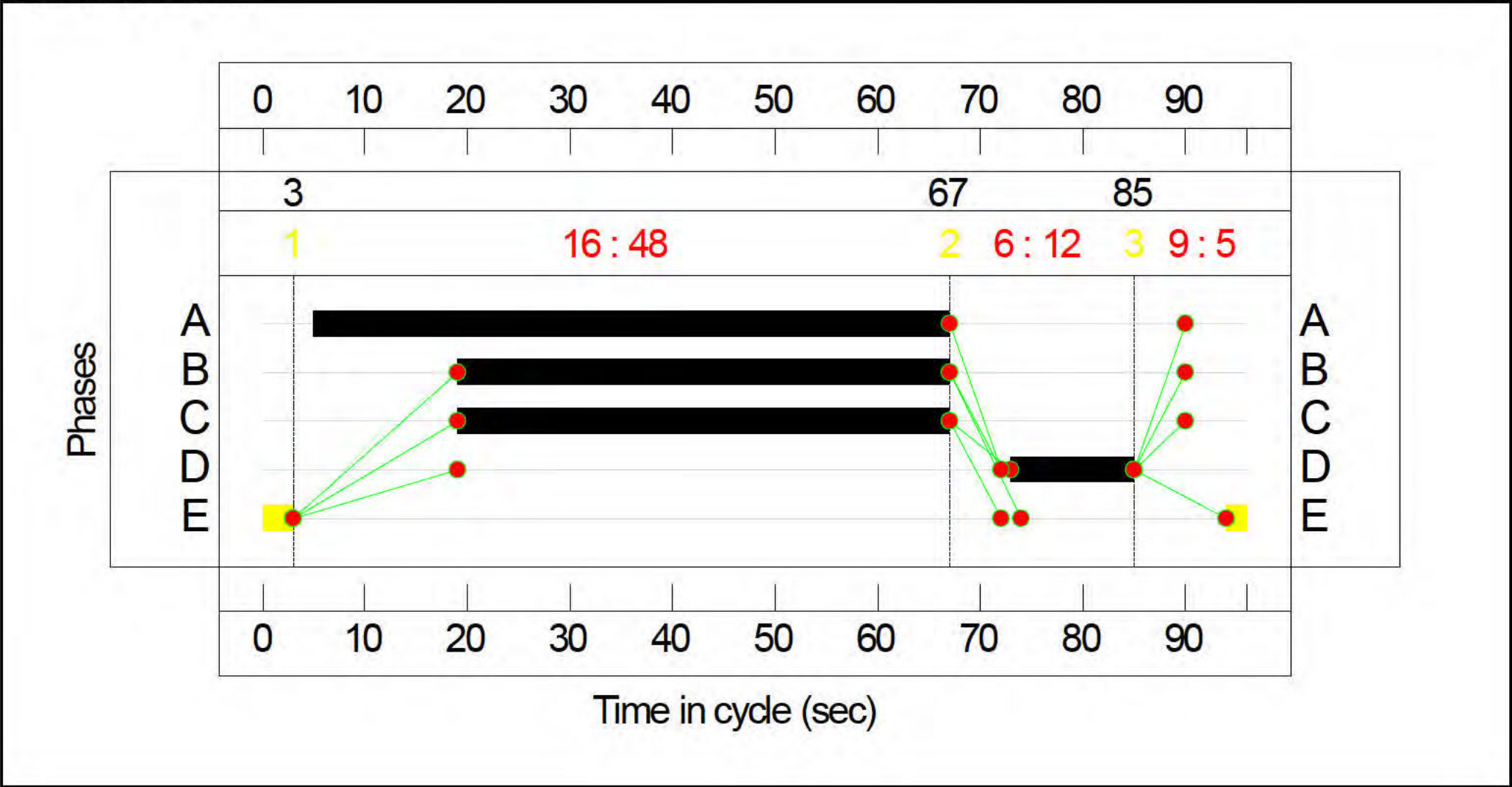
Project:	
Title:	
Location:	
Additional detail:	
File name:	Momentum D-Gate Sc101 MMEditedTimes NoCS9.lsg3x
Author:	
Company:	
Address:	

Scenario 1: 'AM' (FG1: 'Flow Group 1', Plan 1: 'Network Control Plan 1')

Stage Sequence Diagram



Signal Timings
Signal Timings Diagram



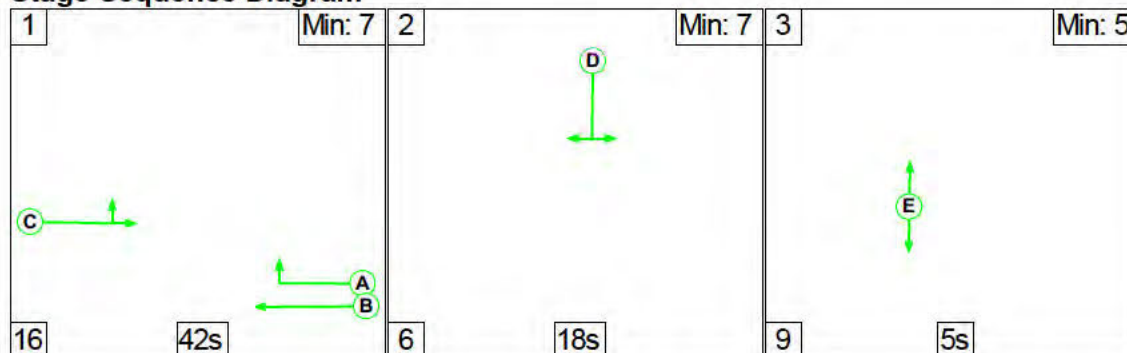
Signal Timings
Phase Timings

Phase Name	Description	Phase	Green Period 1		
			Total Green	Start Time	End Time
A	Right	Traffic	62	5	67
B	Ahead	Traffic	48	19	67
C	Ahead Left	Traffic	48	19	67
D	Right Left	Traffic	12	73	85
E	Pedestrians across	Pedestrian	5	94	3

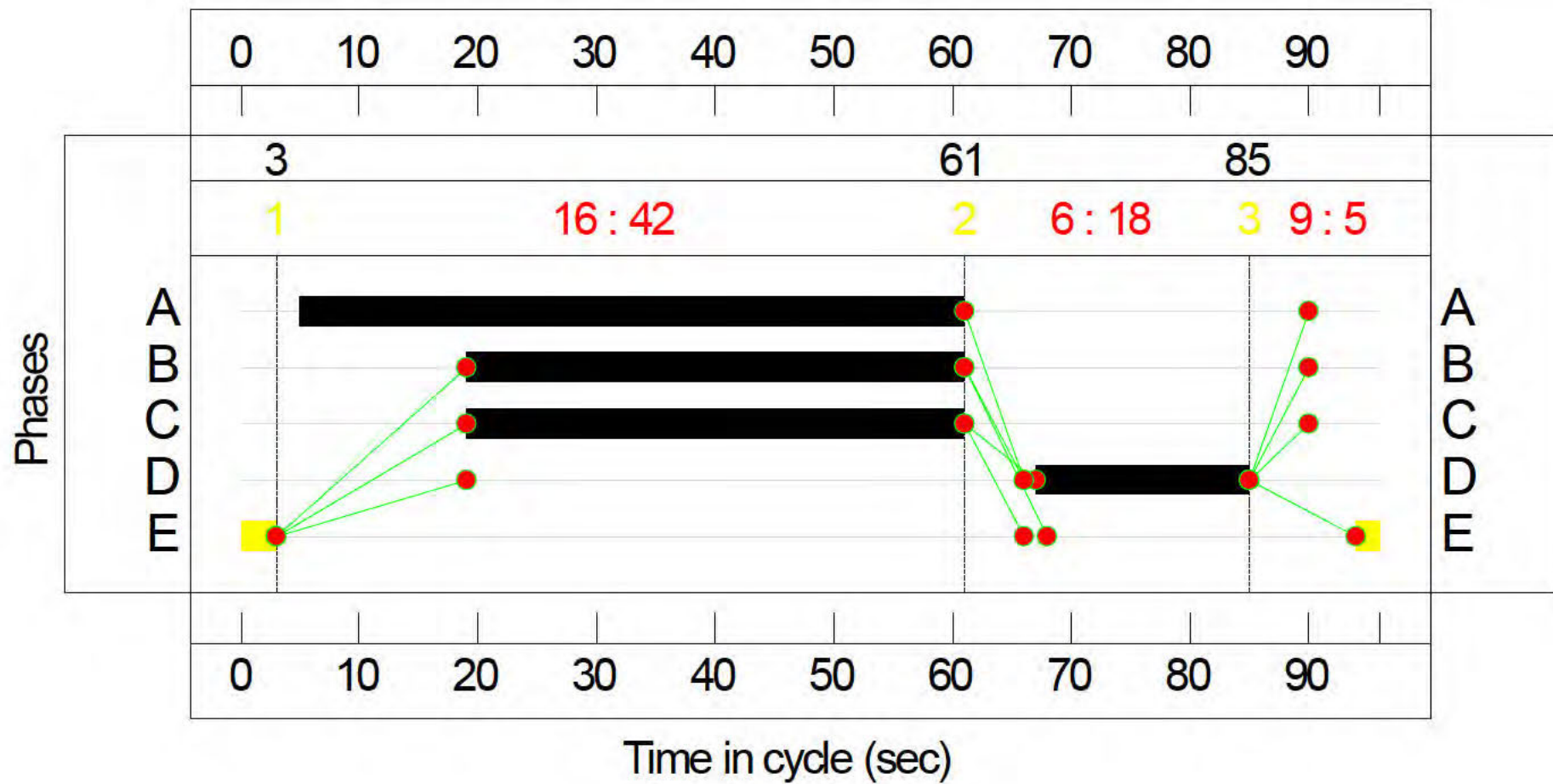
Lane Green Times

Junction: Unnamed Junction					
Lane	Description	Type	Phases	Start Green	End Green
1/1	Ahead Left	U	C	19	67
3/1	Ahead	U	B	19	67
3/2	Right	O	A	5	67
4/1	Right Left	U	D	73	85

Scenario 2: 'PM' (FG1: 'Flow Group 1', Plan 1: 'Network Control Plan 1')
Stage Sequence Diagram



Signal Timings
Signal Timings Diagram



Signal Timings

Phase Timings

Phase Name	Description	Phase	Green Period 1		
			Total Green	Start Time	End Time
A	Right	Traffic	56	5	61
B	Ahead	Traffic	42	19	61
C	Ahead Left	Traffic	42	19	61
D	Right Left	Traffic	18	67	85
E	Pedestrians across	Pedestrian	5	94	3

Lane Green Times

Junction: Unnamed Junction					
Lane	Description	Type	Phases	Start Green	End Green
1/1	Ahead Left	U	C	19	61
3/1	Ahead	U	B	19	61
3/2	Right	O	A	5	61
4/1	Right Left	U	D	67	85

Appendix D – Proposed Blythe Road and D-Gate Signalisation – Saturation Flow Calculations

	RR67 SAT FLOW	RSA SPEED DIST
Blythe Rd - Blythe Rd - Left Turn	1985	20
Blythe Rd - Blythe Rd - Right Turn	2089	35
Blythe Rd - Hamm Rd East	1945	19
Blythe Rd - Hamm Rd West	2000	25
D-Gate - D-Gate	2210	60
D-Gate - Hamm Rd East	2072	25
D-Gate - Hamm Rd East - Bus Lane	1934	19
D-Gate - Hamm Rd West - N/S	1934	19
D-Gate - Hamm Rd West - O/S	1934	19

Saturation Flow Estimation									
Link No.	Name	Is this a Nearside Lane (y/n)?	Lane width(m)	Gradient	Turn radius (m)	turn flow*	total flow*	User Input	Final Sat Flow
1	Blythe Rd - Blythe Rd - Left	y	3.7					0.000	1985
2	Blythe Rd - Blythe Rd - Right	n	3.34					0.000	2089
3	Blythe Rd - Hamm Rd East	y	3.3					0.000	1945
4	Blythe Rd - Hamm Rd West	y	3.85					0.000	2000
5	D-Gate - D-Gate	y	5.95					0.000	2210
6	D-Gate - Hamm Rd East	n	3.17					0.000	2072
7	D-Gate - Hamm Rd East - B	y	3.15					0.000	1934
8	D-Gate - Hamm Rd West - N	y	3.15					0.000	1934
9	D-Gate - Hamm Rd West - O	n	3.15					0.000	2074
10								0.000	1755
11								0.000	1755
12								0.000	1755
13								0.000	1755
14								0.000	1755
15								0.000	1755
16								0.000	1755
17								0.000	1755
18								0.000	1755
19								0.000	1755
20								0.000	1755
21								0.000	1755
22								0.000	1755
23								0.000	1755
24								0.000	1755
25								0.000	1755
26								0.000	1755
27								0.000	1755
28								0.000	1755
29								0.000	1755
30								0.000	1755
31								0.000	1755
32								0.000	1755
33								0.000	1755
34								0.000	1755
35								0.000	1755
36								0.000	1755
37								0.000	1755
38								0.000	1755

Formula (From TRL report RR67)

$$S_r = (S_o - 140d_o) / (1 + 1.5dr)$$

where

$$S_o = 2000 - 42d_o + 100(w - 3.25)$$

d_o is gradient, r is radius, w is width, f is proportion of turning traffic
 dr is coefficient for nearside/offside lane

To use:

Enter data in shaded area only

Yellow shaded items are compulsory

Blue shaded items are optional

For turn proportion enter

EITHER Turn & Total flows (Cols G & H)

OR Turn proportion (Col I)

Then use Final Sat Flow (red figures)

* Units for turn flow & total flow are unimportant but must be the same

Saturation Flows & RSAs

						Length of Reduced Speed Area in m (located 0.55m before stopline)		
						2m		
		linear range (km/hr)		linear range (m/hr)		VISSIM Sat Flow Average (PCU/hr)	VISSIM Sat Flow St Dev (PCU/hr)	
		Min	Max		Min	Max		
Reduced Speed Area Distribution	10	9	11	6	5.6	6.8	1197	35
	11	10	12	7	6.2	7.5	1280	35
	12	11	13	7.5	6.8	8.1	1377	33
	13	12	14	8	7.5	8.7	1469	35
	14	13	15	8.5	8.1	9.3	1568	35
	15	14	16	9	8.7	9.9	1635	28
	16	15	17	10	9.3	10.6	1685	33
	17	16	18	11	9.9	11.2	1792	81
	18	17	19	11	10.6	11.8	1916	55
	19	18	20	12	11.2	12.4	1946	51
	20	19	21	13	11.8	13	1968	55
	25	24	26	15	14.9	16.2	2035	58
	30	29	31	19	18	19.3	2081	67
	35	34	36	22	21.1	22.4	2115	77
	40	39	41	25	24.2	25.5	2157	89
	45	44	46	28	27.3	28.6	2168	89
	50	49	51	31	30.4	31.7	2178	103
	55	54	56	34	33.6	34.8	2181	91
	60	59	61	37	36.7	37.9	2175	101

TABLE 1: REDUCED SPEED AREA VS SATURATION FLOW (30 MPH)