

Appendix A

ST HELENS CORE STRATEGY PLAN REVIEW



APPENDIX A – ST HELENS CORE STRATEGY PLAN REVIEW

The following comment has been received:

“No direct reference is made within the TA to the relevant elements of the St Helens Core Strategy Local Plan.”

St Helens Core Strategy Plan – Summary

St Helens' Local Plan Core Strategy was adopted in October 2012, and presents St Helens' key strategy to develop the borough through to 2027.

The Core Strategy has identified some headline issues as follows:

- Deliver Sustainable Communities;
- Reduce Impact of Climate Change;
- Maximise Accessibility and Social Inclusion;
- Sustaining Population Recovery;
- Tackle Social Deprivation;
- Reduce Poor Health;
- Meet Local Housing Needs;
- Reduce Crime;
- Management of the Rural Economy;
- Enhance the Town Centre;
- Deliver Sustainable Development;
- Reduce the Need to Travel;
- Deliver the St Helens Plan and City Growth Strategy;
- Reduce Worklessness and Develop Entrepreneurial Culture;
- Reduce Vacant and Derelict Land;
- Protect and Enhance the Environment; and
- Minimise Pollution.

The plan presents a vision of regeneration for St Helens. This vision is to be achieved through the following Strategic Aims:

- Creating an Accessible St Helens;
- Meeting Resource and Infrastructure Needs;
- Safeguarding and Enhancing Quality of Life;
- Ensuring a Strong and Sustainable Economy;
- Providing Quality Housing; and
- Ensuring Quality Development.

Transport policy is central to creating an accessible St Helens. The Core Strategy does not identify the Omega Site, but Policy CP 2, “Creating an Accessible St Helens”, is of note as it details the principle of locating development sites where there is access to active travel networks and/or provision of these networks within the site.

The Core Strategy is also supported by the third Merseyside Local Transport Plan (LTP), the vision of which is to have a low carbon future, with a mobility network that promotes a thriving economy where low carbon travel is the primary transport option. The LTP has the following goals:

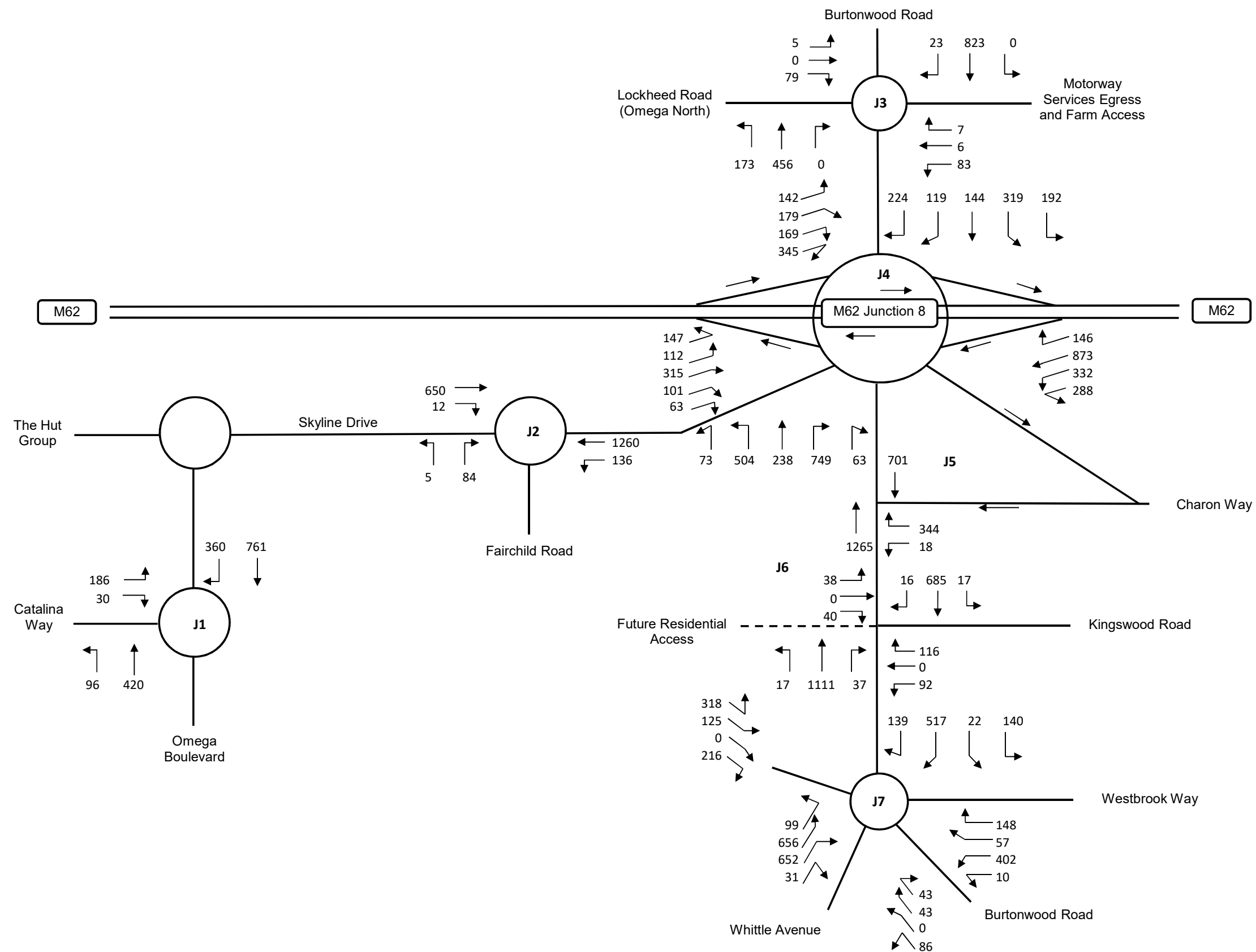
Goal 1:	Help create the right conditions for sustainable economic growth by supporting the priorities of the Liverpool City Region, the Local Enterprise Partnership and the Local Strategic Partnerships
Goal 2:	Provide and promote a clean, low emission transport system which is resilient to changes to climate and oil availability;
Goal 3:	Ensure the transport system promotes and enables improved health and wellbeing and road safety
Goal 4:	Ensure equality of travel opportunity for all, through a transport system that allows people to connect easily with employment, education, healthcare, other essential services and leisure and recreational opportunities
Goal 5:	Ensure the transport network supports the economic success of the City Region by the efficient movement of people and goods
Goal 6:	Maintain our assets to a high standard

In addition, the Core Strategy aims to focus development in the main urban settlements and includes local pedestrian and cycling strategies to deliver active travel facilities. Central to the aims of these strategies, trip generating sites are expected to maximise the choice of travel modes and minimise impacts by locating close to the public transport or freight networks, in addition to demonstrating a suitable level of active travel infrastructure.

Appendix B

2029 SENSITIVITY TEST MODEL

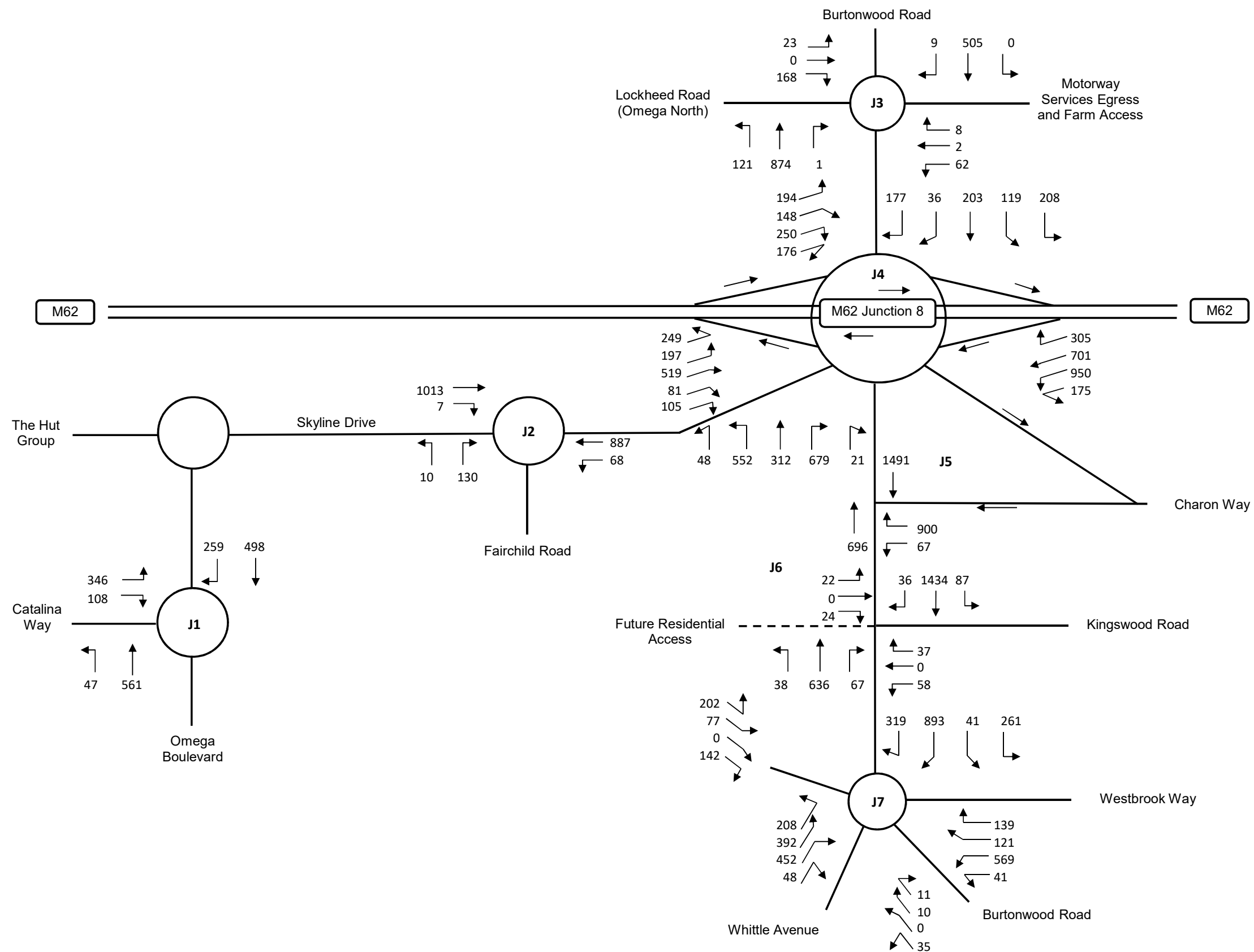




TITLE
OMEGA WEST
TRANSPORT ASSESSMENT

SCENARIO
2029 BASE + PHASE 4-7 + OMEGA WEST
AM PEAK HOUR

FIGURE
66



TITLE
OMEGA WEST
TRANSPORT ASSESSMENT

SCENARIO
2029 BASE + PHASE 4-7 + OMEGA WEST
PM PEAK HOUR

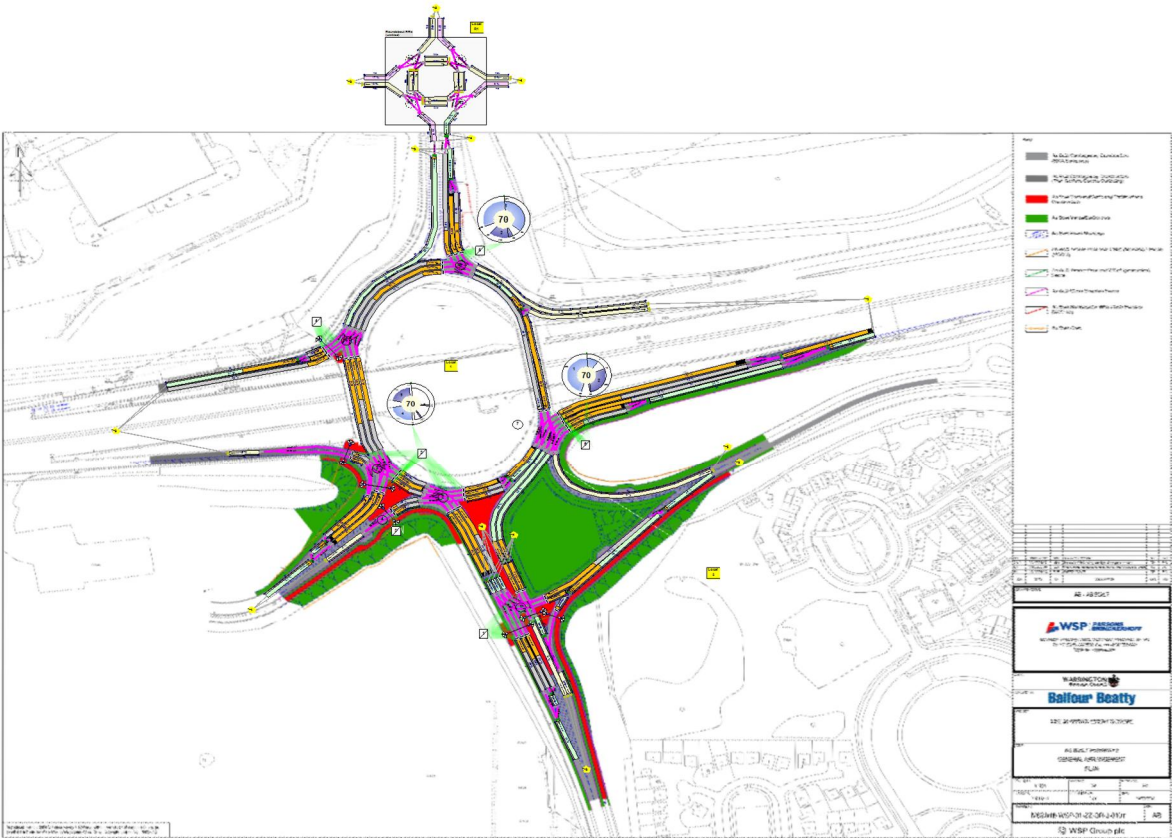
FIGURE
67

TRANSYT 15
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Path: M:\50400134 - Omega, Warrington\Omega, Warrington\ANALYSIS\Zone 8 Directory\TRANSYT
Report generation date: 07/05/2020 16:05:29

»A9 - 2029 AM Scenario 5 : D9 - 2029 AM Scenario 5* :
»A10 - 2029 PM Scenario 5 : D10 - 2029 PM Scenario 5* :

Network Diagrams



A9 - 2029 AM Scenario 5

D9 - 2029 AM Scenario 5*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To						
		A	B	C	D	E	F
From	A			6		0	
	B			5	5		
	C	6	6				6
	D		11				
	E	8					
	F			5			

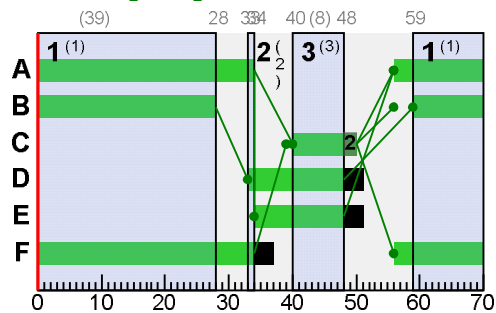
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	59	28	39	1	7
	2	Ü	2	A,D,F	33	34	1	1	1
	3	Ü	3	C,D,E	40	48	8	1	5

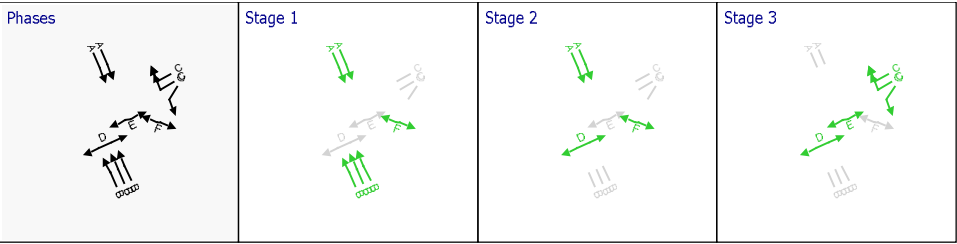
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1	1	1	B	59	28	39
3	2	1	1	B	59	28	39
4	1	1	1	B	59	28	39
5	1	1	1	C	40	50	10
6	1	1	1	C	40	50	10
7	1	1	1	C	40	50	10
54	1	1	1	A	56	34	48
54	2	1	1	A	56	34	48

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Intergreen Matrix for Controller Stream 2

	To									
		C	D	E	F	G	H	I	J	
From	C		5							
	D	5								
	E				5	5				
	F			5			5			
	G			5			5			
	H				13	13				
	I								6	
	J							9		

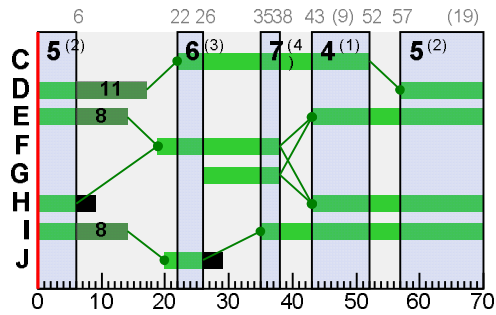
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	43	52	9	1	1
	2	Ü	5	D,E,H,I	57	6	19	1	1
	3	Ü	6	C,F,J	22	26	4	1	4
	4	Ü	7	C,F,G,I	35	38	3	1	1

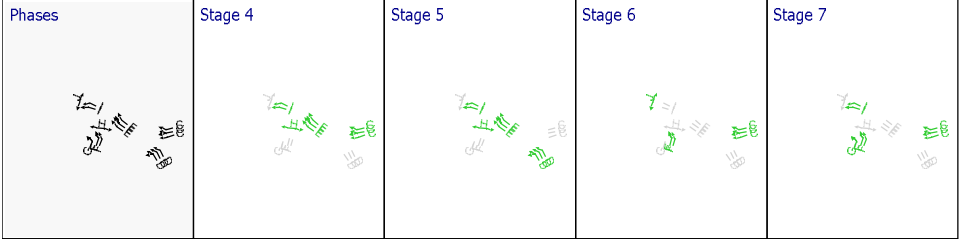
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	57	17	30
16	2	2	2	D	57	17	30
16	3	2	2	D	57	17	30
17	1	2	2	C	22	52	30
19	1	2	2	C	22	52	30
19	2	2	2	C	22	52	30
20	1	3	2	E	43	14	41
20	2	3	2	E	43	14	41
20	3	3	2	E	43	14	41
23	1	3	2	F	19	38	19
24	1	3	2	G	26	38	12
25	1	3	2	F	19	38	19
28	1	3	2	I	35	14	49
28	2	3	2	I	35	14	49

Phase Timings Diagram for Controller Stream 2



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

		To	
From		K	L
	K		6
	L	8	

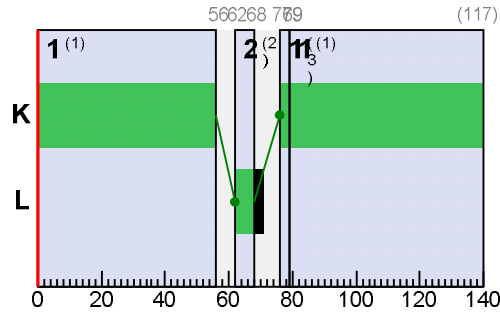
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	79	56	117	1	1
	2	Ü	2	L	62	68	6	1	6
	3	Ü	1	K	76	79	3	1	1

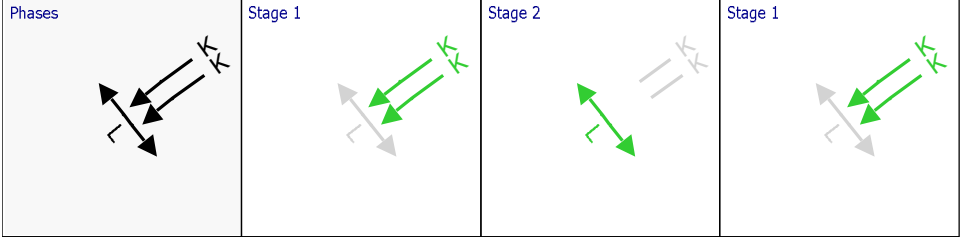
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	76	56	120
21	2	4	3	K	76	56	120

Phase Timings Diagram for Controller Stream 3



Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

	To		
	A	B	E
From	A	5	
	B	6	5
	E	12	

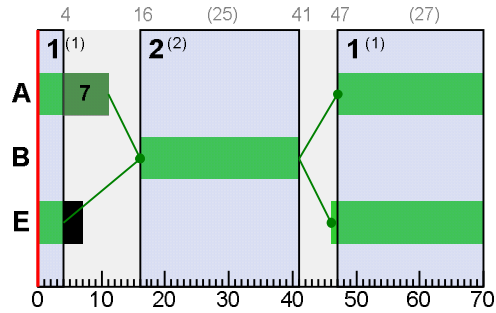
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	47	4	27	1	6
	2	Ü	2	B	16	41	25	1	7

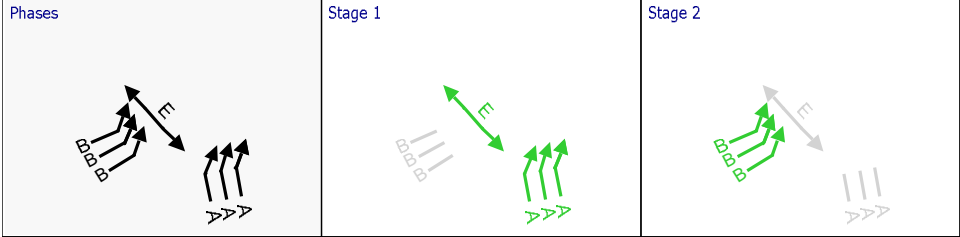
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	47	11	34
30	2	5	4	A	47	11	34
30	3	5	4	A	47	11	34
31	1	5	4	B	16	41	25
32	1	5	4	B	16	41	25
34	1	5	4	B	16	41	25

Phase Timings Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 4



Intergreen Matrix for Controller Stream 5

From	To		
	C	D	
	D		

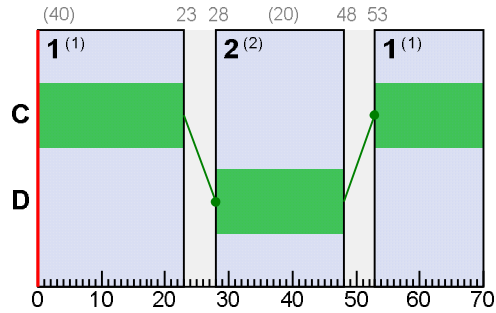
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	53	23	40	1	7
	2	Ü	2	D	28	48	20	1	7

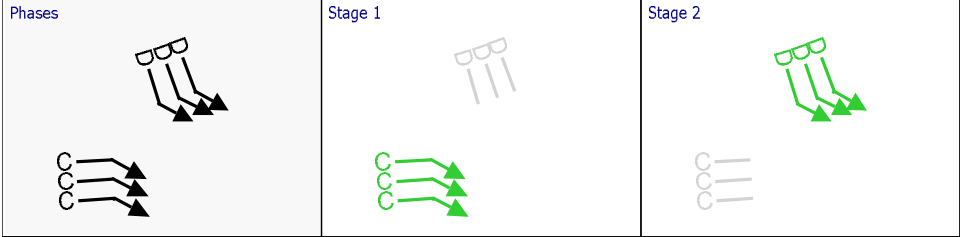
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	53	23	40
36	2	6	5	C	53	23	40
36	3	6	5	C	53	23	40
37	1	6	5	D	28	48	20
38	1	6	5	D	28	48	20
39	1	6	5	D	28	48	20

Phase Timings Diagram for Controller Stream 5



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

From	To	
	A	B
	A	6
From	To	
	A	B
	B	5

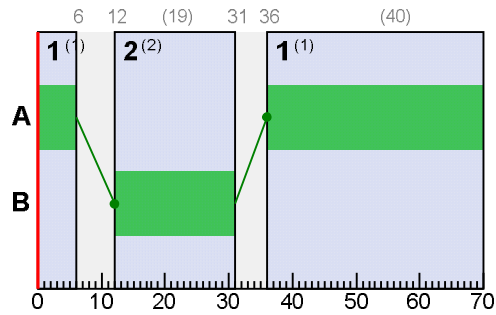
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	Ü	1	A	36	6	40	1	7
	2	Ü	2	B	12	31	19	1	7

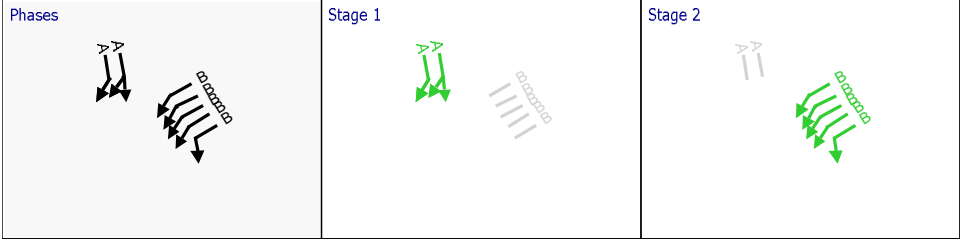
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	36	6	40
45	2	7	6	A	36	6	40
48	1	7	6	B	12	31	19
49	1	7	6	B	12	31	19
49	2	7	6	B	12	31	19
51	1	7	6	B	12	31	19
51	2	7	6	B	12	31	19

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	WEIGHTS		PENALTIES	P.I.
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle))	Wasted time total (s per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			615	2298	70	17.00	27	236	12.29	0.29	0.00	0.05	100	100	0.00	0.69
RAc	1		R3			36	Unrestricted	70	70.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RAx	1					985	1800	70	0.00	55	64	13.21	1.21	0.00	0.33	100	100	0.00	4.69
RB	1		R4			84	1383	70	0.00	6	1382	12.08	0.08	0.00	0.00	100	100	0.00	0.03
RBc	1		R4			453	Unrestricted	70	17.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RBx	1					198	Unrestricted	70	17.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			846	1674	70	0.00	51	78	13.10	1.10	0.00	0.26	100	100	0.00	3.66
RCc	1		R1			79	Unrestricted	70	0.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RCx	1					458	Unrestricted	70	17.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			96	721	70	0.00	13	576	12.38	0.38	0.00	0.01	100	100	0.00	0.15
RDc	1		R2			925	Unrestricted	70	0.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RDx	1					0	Unrestricted	70	70.00	0	Unrestricted	0.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwood Road South	1	1	B	412	1980	39	0.73	37	143	17.74	9.29	49.93	4.00	100	100	0.00	17.68
2	1	Burtonwood Road South	1			1264	1980	70	0.00	64	41	5.64	1.60	0.00	0.56	100	100	0.00	7.97
3	2	Burtonwood Road South	1	1	B	441	2120	39	1.36	38	139	15.43	9.45	52.74	4.52	100	100	0.00	19.35
4	1	Burtonwood Road South	1	1	B	411	1975	39	0.71	37	143	15.44	9.29	52.76	4.22	100	100	0.00	17.78
5	1	Charon Way Left	1	1	C	18	1995	10	10.00	6	1468	27.66	25.64	83.10	0.30	100	100	0.00	2.01
6	1	Charon Way Right	1	1	C	173 <	1842	10	0.14	61	49	38.96	36.90	98.83	3.34 +	100	100	0.00	27.32

7	1	Charon Way Right	1	1	C	170	1819	10	0.00	59	51	49.53	36.51	101.84	3.41	100	100	0.00	26.66
8	1	Charon Way	1			191	1653	70	4.52	12	629	11.44	0.26	4.16	1.46	100	100	0.00	0.30
10	1	Charon Way	1			361	1962	70	0.00	18	389	5.29	0.21	0.00	0.02	100	100	0.00	0.29
11	1	Burtonwood Road South	1			852	2120	70	0.00	40	124	3.14	0.57	0.00	0.13	100	100	0.00	1.92
12	1	Burtonwood Road South	1			351	1980	70	27.00	18	407	4.92	0.20	0.00	0.02	100	100	0.00	0.27
13	1		1			351	Unrestricted	70	27.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					369	Unrestricted	70	26.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			355	1934	70	10.00	18	390	15.53	0.21	0.00	0.02	100	100	0.00	0.29
	2	Burtonwood Road North	1			355	1937	70	10.00	18	391	15.93	0.21	0.00	0.02	100	100	0.00	0.29
16	1		2	2	D	578	1900	30	0.00	69	31	27.10	20.49	78.53	8.86	100	100	0.00	52.41
	2		2	2	D	762 <	1900	30	1.47	95	-5	56.87	50.20	98.82	15.33 +	100	100	0.00	160.31
	3		2	2	D	288	1900	30	0.37	35	160	20.82	14.09	63.04	3.53	100	100	0.00	18.28
17	1		2	2	C	244	1900	30	8.21	29	209	19.40	15.60	47.25	2.24	100	100	0.00	16.43
18	1		2			692	1900	70	26.69	40	127	11.04	3.53	49.70	9.00	100	100	15.89	29.83
	2		2			915	1900	70	22.26	63	43	14.83	7.31	55.11	10.34	100	100	60.04	92.75
19	1		2	2	C	692 <	1900	30	1.00	82	9	18.66	14.24	43.45	5.91 +	100	100	9.47	52.09
	2		2	2	C	672 <	1900	30	0.00	80	13	22.00	17.87	44.79	5.89 +	100	100	20.74	71.86
20	1		3	2	E	616	1900	41	13.32	54	65	13.52	7.47	31.64	3.79	100	100	0.00	20.58
	2		3	2	E	1006 <	1900	41	3.00	88	2	26.56	20.55	59.63	11.56 +	100	100	183.24	272.25
	3		3	2	E	288	1900	41	18.05	25	256	9.79	3.66	13.62	1.49	100	100	0.00	4.65
21	1		4	3	K	729	1900	120	25.01	56	61	13.19	7.51	20.89	6.36	100	100	21.75	45.25
	2		4	3	K	596	1900	120	19.47	43	108	10.85	4.81	17.87	4.56	100	100	0.97	13.61
22	1					1325	Unrestricted	140	19.00	0	Unrestricted	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	297	1900	19	0.47	56	61	34.55	25.69	85.98	4.99	100	100	0.00	33.29
24	1		3	2	G	148	1900	12	0.00	42	115	34.61	28.85	89.45	2.58	100	100	0.00	18.50
25	1		3	2	F	295	1900	19	0.00	54	66	31.65	25.16	85.52	4.91	100	100	0.00	32.44
26	1		3			443	1900	70	0.00	23	286	2.62	0.29	0.00	0.04	100	100	0.00	0.50
27	1		3			740	1900	70	0.00	39	131	5.49	0.60	0.00	0.12	100	100	0.00	1.76
28	1		3	2	I	690	1900	49	19.96	54	67	7.59	3.24	16.41	2.24	100	100	0.00	10.24
	2		3	2	I	186	1900	49	38.63	14	522	6.82	2.13	35.58	1.48	100	100	0.00	2.39
29	1					876	Unrestricted	70	31.00	0	Unrestricted	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	482	1900	34	6.47	51	75	26.24	13.37	51.16	4.79	100	100	0.00	28.49
	2		5	4	A	707	1900	34	6.16	77	17	39.17	26.40	91.04	12.57	100	100	0.00	81.69
	3		5	4	A	585	1900	34	12.79	63	43	29.21	16.51	74.16	8.43	100	100	0.00	43.53
31	1		5	4	B	346	1900	25	0.53	50	80	33.46	19.72	75.37	5.08	100	100	0.00	30.19
32	1		5	4	B	349 <	1900	25	0.37	50	79	19.06	16.56	49.92	3.25 +	100	100	0.00	24.98
33	1		5			491	1900	70	19.00	35	154	15.18	4.12	32.73	3.22	100	100	0.00	9.99
34	1		5	4	B	142	1900	25	2.11	20	345	16.20	13.81	45.09	1.25	100	100	0.00	8.54
35	1		6			624	1900	70	17.00	33	174	22.91	0.46	0.00	0.08	100	100	0.00	1.14
36	1		6	5	C	707	1900	40	11.00	64	42	17.06	3.53	6.46	0.89	100	100	0.00	10.41
	2		6	5	C	934 <	1900	40	5.53	87	3	35.81	22.87	89.50	18.84 +	100	100	51.40	146.14
	3		6	5	C	346	1900	40	27.68	32	185	36.79	24.37	103.31	6.80	100	100	0.00	37.74
37	1		6	5	D	343	1900	20	0.58	62	45	38.00	26.41	86.22	5.76	100	100	0.00	39.44
38	1		6	5	D	463 <	1900	20	0.79	84	7	46.79	39.55	108.24	9.87 +	100	100	0.00	78.50
39	1		6	5	D	192	1900	20	3.26	34	164	28.03	20.86	78.06	2.91	100	100	0.00	17.68
40	1		6			655	1900	70	4.47	37	144	4.95	0.73	4.92	1.56	100	100	0.00	2.30
41	1					899	Unrestricted	70	22.00	0	Unrestricted	18.23	0.00	0.00	0.00	100	100	0.00	0.00
42	1		7			1397	1900	70	14.58	81	11	13.07	5.07	14.63	6.14	100	100	0.00	30.52
43	1					357	Unrestricted	70	46.00	0	Unrestricted	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	1040 <	1900	40	0.00	93	-4	40.17	30.29	83.87	18.22 +	100	100	80.88	216.07
45	2		7	6	A	689	1900	40	6.00	62	45	27.08	9.57	29.07	3.90	100	100	0.00	28.51
46	1		7			918 <	1900	70	34.68	106	-15	174.91	167.08	190.49	48.61 +	100	100	0.00	627.03

47	1		7			620	1900	70	0.00	33	176	4.39	0.46	0.00	0.08	100	100	0.00	1.12
48	1		7	6	B	166	1900	19	0.26	31	190	44.40	21.18	76.42	2.47	100	100	0.00	15.46
49	1		7	6	B	288	1900	19	0.47	54	66	32.43	25.28	84.96	4.81	100	100	0.00	31.79
	2		7	6	B	166	1900	19	0.26	31	190	28.41	21.18	76.42	2.47	100	100	0.00	15.46
50	1		7			454	1900	70	0.00	24	277	16.18	0.30	0.00	0.04	100	100	0.00	0.53
51	1		7	6	B	460	1900	19	1.90	89	2	54.07	34.73	118.17	11.03	100	100	0.00	69.76
	2		7	6	B	459 <	1900	19	3.10	100	-10	256.72	237.24	386.23	37.77 +	100	100	0.00	451.37
52	1					950	Unrestricted	70	9.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			585	1900	70	19.00	31	192	1.42	0.42	0.00	0.07	100	100	0.00	0.97
	2		1			526	1900	70	19.00	28	225	1.36	0.36	0.00	0.05	100	100	0.00	0.75
	3		1			496	1900	70	19.00	26	245	1.33	0.33	0.00	0.05	100	100	0.00	0.65
54	1		1	1	A	351 <	1980	48	6.18	25	254	3.04	2.04	15.57	1.25 +	100	100	0.00	3.31
	2		1	1	A	351 <	1980	48	6.18	25	254	3.04	2.04	15.57	1.25 +	100	100	0.00	3.31

Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	3183.43	281.79	11.30	175.57	2493.09	200.68	444.37	3138.13
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	3183.43	281.79	11.30	175.57	2493.09	200.68	444.37	3138.13

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A10 - 2029 PM Scenario 5

D10 - 2029 PM Scenario 5*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To						
		A	B	C	D	E	F
From	A			6		0	
	B			5	5		
	C	6	6				6
	D		11				
	E	8					
	F			5			

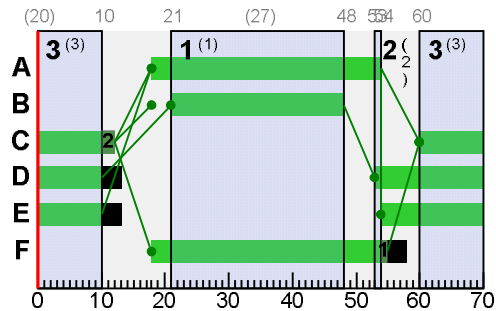
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	21	48	27	1	7
	2	Ü	2	A,D,F	53	54	1	1	1
	3	Ü	3	C,D,E	60	10	20	1	5

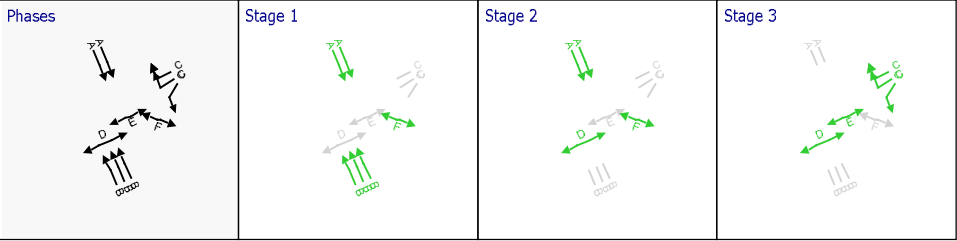
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1	1	1	B	21	48	27
3	2	1	1	B	21	48	27
4	1	1	1	B	21	48	27
5	1	1	1	C	60	12	22
6	1	1	1	C	60	12	22
7	1	1	1	C	60	12	22
54	1	1	1	A	18	54	36
54	2	1	1	A	18	54	36

Phase Timings Diagram for Controller Stream 1



Stage Sequence Diagram for Controller Stream 1



Intergreen Matrix for Controller Stream 2

		To							
From		C	D	E	F	G	H	I	J
	C		5						
	D	5							
	E				5	5			
	F			5			5		
	G			5			5		
	H				13	13			
	I								6
	J							9	

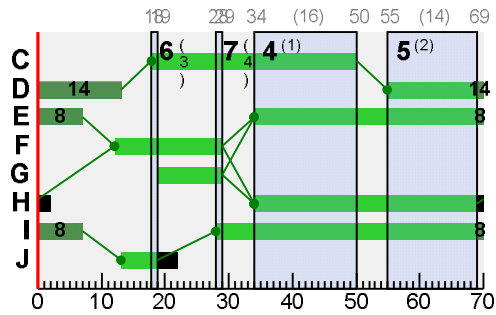
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	34	50	16	1	1
	2	Ü	5	D,E,H,I	55	69	14	1	1
	3	Ü	6	C,F,J	18	19	1	1	1
	4	Ü	7	C,F,G,I	28	29	1	1	1

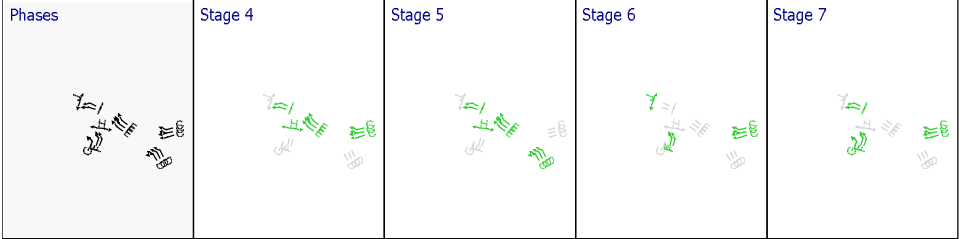
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	55	13	28
16	2	2	2	D	55	13	28
16	3	2	2	D	55	13	28
17	1	2	2	C	18	50	32
19	1	2	2	C	18	50	32
19	2	2	2	C	18	50	32
20	1	3	2	E	34	7	43
20	2	3	2	E	34	7	43
20	3	3	2	E	34	7	43
23	1	3	2	F	12	29	17
24	1	3	2	G	19	29	10
25	1	3	2	F	12	29	17
28	1	3	2	I	28	7	49
28	2	3	2	I	28	7	49

Phase Timings Diagram for Controller Stream 2



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

		To	
		K	L
From	K		6
	L	8	

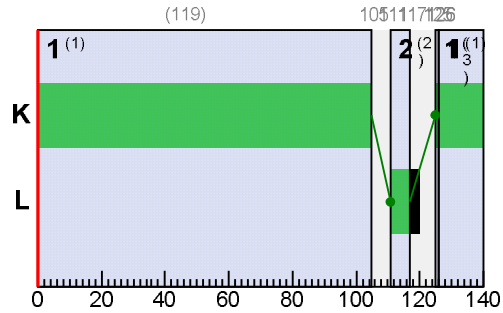
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	126	105	119	1	1
	2	Ü	2	L	111	117	6	1	6
	3	Ü	1	K	125	126	1	1	1

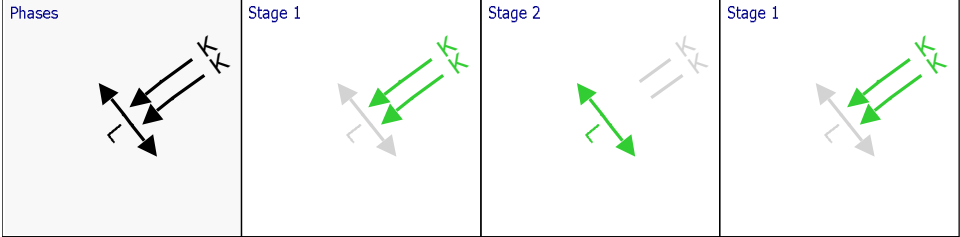
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	125	105	120
21	2	4	3	K	125	105	120

Phase Timings Diagram for Controller Stream 3



Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

From	To		
	A	B	E
	A	5	
	B	6	5

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	53	16	33	1	6
	2	Ü	2	B	28	47	19	1	7

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	53	23	40
30	2	5	4	A	53	23	40
30	3	5	4	A	53	23	40
31	1	5	4	B	28	47	19
32	1	5	4	B	28	47	19
34	1	5	4	B	28	47	19

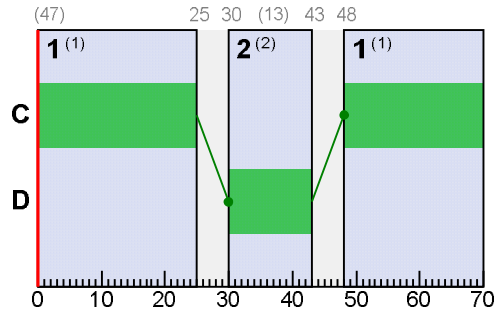
The diagram illustrates the two-stage process of the proposed algorithm. Stage 1 shows a network of nodes (represented by arrows) with a central node labeled 'E' and a cluster of nodes labeled 'B'. Stage 2 shows the same network, but with a dashed line indicating a boundary or separation between the two clusters.

	To		
From		C	D
	C		5
	D	5	

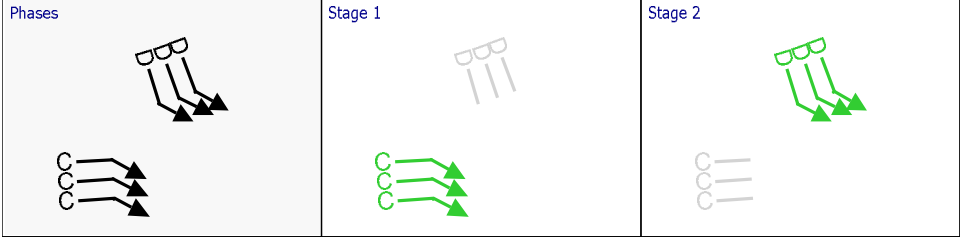
Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	48	25	47	1	7
	2	Ü	2	D	30	43	13	1	7

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	48	25	47
36	2	6	5	C	48	25	47
36	3	6	5	C	48	25	47
37	1	6	5	D	30	43	13
38	1	6	5	D	30	43	13
39	1	6	5	D	30	43	13

Phase Timings Diagram for Controller Stream 5



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

From	To		
	A	B	
	A	6	
B	5		

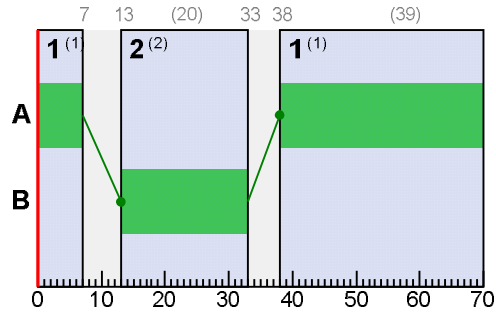
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	Ü	1	A	38	7	39	1	7
	2	Ü	2	B	13	33	20	1	7

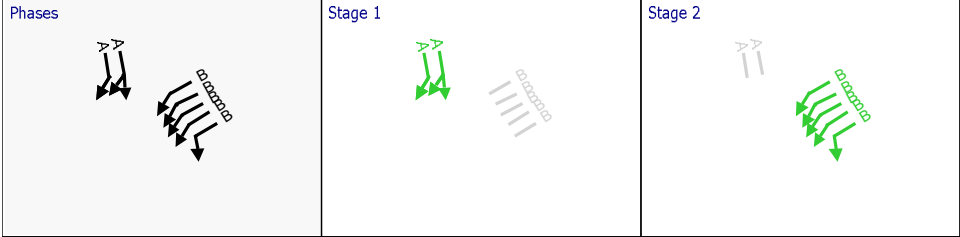
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	38	7	39
45	2	7	6	A	38	7	39
48	1	7	6	B	13	33	20
49	1	7	6	B	13	33	20
49	2	7	6	B	13	33	20
51	1	7	6	B	13	33	20
51	2	7	6	B	13	33	20

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUES	WEIGHTS		PENALTIES	P.I.
Arm	Traffic Stream	Name	Traffic node	Controller stream	Phase	Calculated flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s (per cycle))	Wasted time total (s (per cycle))	Degree of saturation (%)	Practical reserve capacity (%)	JourneyTime (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weighting multiplier (%)	Stop weighting multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			948	2311	70	15.00	41	119	12.54	0.54	0.00	0.14	100	100	0.00	2.02
RAc	1		R3			19	Unrestricted	70	70.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RAx	1					735	1800	70	0.00	41	120	12.69	0.69	0.00	0.14	100	100	0.00	2.00
RB	1		R4			191	1140	70	0.00	17	437	12.32	0.32	0.00	0.02	100	100	0.00	0.24
RBc	1		R4			840	Unrestricted	70	15.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RBx	1					126	Unrestricted	70	17.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			514	1616	70	0.00	32	183	12.52	0.52	0.00	0.07	100	100	0.00	1.05
RCc	1		R1			169	Unrestricted	70	0.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RCx	1					863	Unrestricted	70	15.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			72	851	70	0.00	8	964	12.20	0.20	0.00	0.00	100	100	0.00	0.06
RDc	1		R2			682	Unrestricted	70	0.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RDx	1					1	Unrestricted	70	70.00	0	Unrestricted	12.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwood Road South	1	1	B	227	1980	27	0.55	29	208	23.83	15.38	64.92	2.99	100	100	0.00	15.62
2	1	Burtonwood Road South	1			696	1980	70	0.00	35	156	4.54	0.49	0.00	0.10	100	100	0.00	1.35
3	2	Burtonwood Road South	1	1	B	243	2120	27	0.91	30	204	21.48	15.50	67.03	3.17	100	100	0.00	16.90
4	1	Burtonwood Road South	1	1	B	226	1975	27	0.53	29	209	21.52	15.37	67.07	2.95	100	100	0.00	15.60
5	1	Charon Way Left	1	1	C	67	1995	22	4.00	10	781	14.36	12.34	34.18	0.45	100	100	0.00	3.55
6	1	Charon Way Right	1	1	C	453 <	1842	22	0.18	75	19	23.74	21.68	45.34	4.03 +	100	100	0.00	41.32

7	1	Charon Way Right	1	1	C	448	1819	22	0.00	75	20	42.78	29.76	92.33	8.38	100	100	0.00	57.78
8	1	Charon Way	1			520	1653	70	29.74	55	65	22.24	11.06	53.44	5.42	100	100	0.00	26.17
10	1	Charon Way	1			968	1962	70	0.00	49	82	5.98	0.89	0.00	0.24	100	100	0.00	3.41
11	1	Burtonwood Road South	1			469	2120	70	0.00	22	307	2.81	0.24	0.00	0.03	100	100	0.00	0.45
12	1	Burtonwood Road South	1			746	1980	70	38.00	38	139	5.27	0.55	0.00	0.11	100	100	0.00	1.62
13	1		1			746	Unrestricted	70	38.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					813	Unrestricted	70	19.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			755	1934	70	27.61	58	56	19.87	4.54	24.33	3.61	100	100	0.00	15.82
	2	Burtonwood Road North	1			755	1937	70	27.62	58	56	20.26	4.53	24.32	3.61	100	100	0.00	15.80
16	1		2	2	D	600 <	1900	28	0.00	76	18	31.64	25.02	83.54	9.78 +	100	100	0.00	65.51
	2		2	2	D	692 <	1900	28	1.32	92	-2	49.76	43.08	95.61	13.23 +	100	100	0.00	125.89
	3		2	2	D	320	1900	28	0.42	41	118	22.97	16.23	66.59	4.14	100	100	0.00	23.16
17	1		2	2	C	345 <	1900	32	20.31	100	-10	130.02	126.22	216.43	13.15 +	100	100	120.19	301.06
18	1		2			531	1900	70	33.00	28	222	7.88	0.37	0.00	0.05	100	100	0.00	0.77
	2		2			702 <	1900	70	41.95	92	-2	40.40	32.88	112.08	14.32 +	100	100	129.85	230.88
19	1		2	2	C	531	1900	32	11.00	59	52	9.99	5.57	24.08	2.49	100	100	0.00	13.26
	2		2	2	C	362	1900	32	6.00	40	123	17.34	13.21	40.01	2.81	100	100	0.00	20.66
20	1		3	2	E	641	1900	43	17.50	58	54	16.01	9.96	45.09	4.95	100	100	9.85	38.63
	2		3	2	E	1037 <	1900	43	3.00	87	4	25.50	19.49	56.57	11.42 +	100	100	225.52	312.54
	3		3	2	E	320	1900	43	24.11	27	235	10.30	4.17	17.93	1.50	100	100	0.00	5.98
21	1		4	3	K	555	1900	120	6.50	36	152	9.05	3.37	17.31	3.75	100	100	0.00	8.58
	2		4	3	K	296	1900	120	4.74	19	380	8.23	2.19	15.09	1.75	100	100	0.00	3.11
22	1					851	Unrestricted	140	19.00	0	Unrestricted	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	452 <	1900	17	0.89	97	-8	94.58	85.71	159.94	15.47 +	100	100	0.00	161.88
24	1		3	2	G	250	1900	10	0.00	84	7	62.32	56.56	127.42	6.37	100	100	0.00	59.77
25	1		3	2	F	451 <	1900	17	0.00	92	-3	66.64	60.15	133.31	12.18 +	100	100	0.00	114.53
26	1		3			701	1900	70	2.79	38	134	2.99	0.66	2.40	1.57	100	100	0.00	2.03
27	1		3			1153	1900	70	0.00	61	48	6.34	1.46	0.00	0.47	100	100	0.00	6.63
28	1		3	2	I	766	1900	49	19.76	64	41	12.18	7.83	39.44	5.56	100	100	0.00	27.43
	2		3	2	I	214	1900	49	38.74	17	418	8.00	3.31	43.39	1.99	100	100	0.00	3.95
29	1					979	Unrestricted	70	28.00	0	Unrestricted	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	765	1900	40	5.21	71	27	27.67	14.80	78.06	12.54	100	100	0.00	52.15
	2		5	4	A	634	1900	40	8.79	58	55	28.47	15.69	65.71	8.08	100	100	0.00	44.47
	3		5	4	A	772	1900	40	5.00	71	27	35.46	22.76	75.46	12.46	100	100	0.00	76.62
31	1		5	4	B	176	1900	19	0.26	33	174	35.19	21.45	76.62	2.62	100	100	0.00	16.58
32	1		5	4	B	398 <	1900	19	0.37	75	20	27.72	25.22	53.66	4.07 +	100	100	0.00	42.27
33	1		5			592	1900	70	37.00	54	66	21.92	10.86	56.57	6.60	100	100	0.00	29.56
34	1		5	4	B	194	1900	19	2.11	36	151	19.12	16.72	41.31	1.56	100	100	0.00	13.80
35	1		6			959	1900	70	15.00	50	78	23.41	0.96	0.00	0.26	100	100	0.00	3.65
36	1		6	5	C	634	1900	47	18.16	49	84	18.04	4.51	17.77	2.19	100	100	0.00	12.68
	2		6	5	C	1170	1900	47	0.84	91	-2	29.73	16.80	53.21	12.65	100	100	0.00	85.32
	3		6	5	C	176	1900	47	36.32	14	562	19.48	7.06	91.63	3.06	100	100	0.00	6.92
37	1		6	5	D	213	1900	13	0.37	58	56	43.52	31.94	94.81	3.94	100	100	0.00	29.37
38	1		6	5	D	322 <	1900	13	0.63	89	1	67.45	60.22	136.20	8.85 +	100	100	0.00	81.98
39	1		6	5	D	208	1900	13	0.37	56	60	38.69	31.51	97.19	3.94	100	100	0.00	28.39
40	1		6			530	1900	70	0.00	28	223	4.58	0.37	0.00	0.05	100	100	0.00	0.77
41	1					842	Unrestricted	70	26.00	0	Unrestricted	18.23	0.00	0.00	0.00	100	100	0.00	0.00
42	1		7			1492	1900	70	8.17	79	14	11.48	3.48	5.03	2.89	100	100	0.00	21.40
43	1					564	Unrestricted	70	37.00	0	Unrestricted	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	928	1900	39	3.00	85	5	27.31	17.43	54.46	14.24	100	100	4.78	74.91
45	2		7	6	A	389	1900	39	14.00	36	151	18.44	0.92	0.00	0.10	100	100	0.00	1.42
46	1		7			850 <	1900	70	37.35	114	-21	302.09	294.26	251.18	75.29 +	100	100	0.00	1013.31

47	1		7			1125	1900	70	0.00	59	52	5.31	1.37	0.00	0.43	100	100	0.00	6.09
48	1		7	6	B	475	1900	20	0.89	87	3	66.67	43.45	112.86	10.62	100	100	0.00	88.13
49	1		7	6	B	175	1900	20	0.26	31	189	27.60	20.45	74.90	2.55	100	100	0.00	15.76
	2		7	6	B	475 <	1900	20	0.89	87	3	50.68	43.45	112.86	10.62 +	100	100	0.00	88.13
50	1		7			650	1900	70	0.00	34	163	16.38	0.49	0.00	0.09	100	100	0.00	1.26
51	1		7	6	B	425	1900	20	4.84	78	16	41.79	22.45	107.19	9.14	100	100	0.00	43.34
	2		7	6	B	425 <	1900	20	5.55	101	-11	290.91	271.42	414.87	38.83 +	100	100	0.00	476.82
52	1					544	Unrestricted	70	12.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			680	1900	70	19.00	36	151	1.53	0.53	0.00	0.10	100	100	0.00	1.42
	2		1			467	1900	70	19.00	25	266	1.31	0.31	0.00	0.04	100	100	0.00	0.57
	3		1			450	1900	70	19.00	24	280	1.29	0.29	0.00	0.04	100	100	0.00	0.52
54	1		1	1	A	746 <	1980	36	5.91	73	23	8.25	7.25	14.97	2.19 +	100	100	0.00	22.34
	2		1	1	A	746 <	1980	36	5.91	73	23	8.25	7.25	14.97	2.19 +	100	100	0.00	22.34

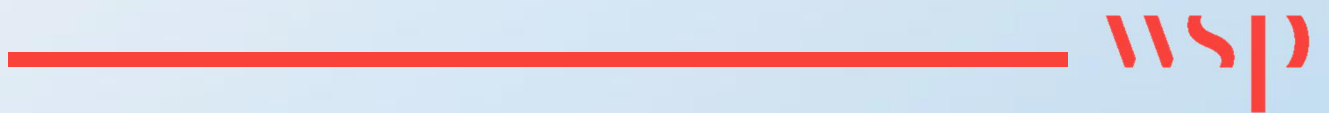
Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	3483.11	357.65	9.74	241.41	3427.96	231.11	490.19	4149.27
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	3483.11	357.65	9.74	241.41	3427.96	231.11	490.19	4149.27

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

Appendix C

SUSTAINABLE TRIP GENERATION



APPENDIX C – SUSTAINIBLE TRIP GENERATION

The following comment has been received:

“No sustainable mode trip generation / distribution information has been provided in the TA. This information is required in order to understand the sustainable mode provisions and needs.”

Mode Share

We do not hold information on the sustainable travel characteristics of existing occupiers of the Omega site. Warrington Borough Council, who are the travel plan co-ordinator for many of the existing occupiers, have provided the following mode share (data from the most recent travel survey data from Royal Mail, Amazon, The Hut Group, ASDA and Travis Perkins).

Table 1 – Omega Mode Share

Mode	Percentage
Walk	1%
Cycle	7%
Bus (mostly B52)	8%
Rail	1%
Car alone	47%
Car share	34%
Taxi	1%
Motorcycle	1%
Total	100%

Trip Generation

The trip generation by mode for the proposed development at Zone 8 has been identified by using the above mode share and the vehicle trip rate (PCU) which was calculated from the surveys that were carried out at Omega. Table 2 below indicates the anticipated trip generation by mode (Note for the purposes of this assessment, it has been assumed that the surveyed vehicle trip generation comprises the car alone, taxi, motorcycle and half of car share mode share).

Table 2 – Trip Generation by Mode

Mode	Mode Share	AM Arrivals	AM Departures	AM Total	PM Arrivals	PM Departures	PM Total
Walk	1%	3	1	4	2	4	6
Cycle	7%	24	6	30	14	27	41
Bus	8%	28	6	34	16	30	47
Rail	1%	3	1	4	2	4	6
Car Share	47%	164	37	201	94	179	273
Car Alone	34%	119	27	146	68	129	198



Mode	Mode Share	AM Arrivals	AM Departures	AM Total	PM Arrivals	PM Departures	PM Total
Other	2%	7	2	9	4	8	12
Total	100%	349	79	428	200	381	581

Table 2 above indicates that the proposed development will generate a total of 72 and 100 two-way trips by sustainable modes in the AM and PM peak periods respectively.

Appendix D

INTERNAL NETWORK ASSESSMENT





Traffic has therefore been assigned as follows:

- Southern Arm - Unit 1 general vehicles and Plots 2-4 all traffic; and
- Eastern Arm – Unit 1 HGVs.

Network diagrams indicating the proposed flows at the roundabout are attached to this note.

Junction Assessment

The proposed roundabout has been assessed using the industry standard Junctions 9 program. Junctions 9 provides an indication of the performance of a junction in terms of the Ratio of Flow to Capacity (RFC) and queue length on the approaches to the junction. An RFC value of 0.85 (85%) is considered to indicate a junction which is operating within capacity.

As this is an internal roundabout, only the proposed development flows have been applied to the junction. The results of the assessment are indicated below in Table 1 (The junction modelling output files are attached to this note).

Table 1 – Internal Zone 8 Roundabout – Junctions 9 (ARCADY)

	Development Scenario			
	AM Peak		PM Peak	
	RFC	Queue	RFC	Queue
Northern Arm	0.00	0	0.00	0
Catalina Approach	0.22	0	0.17	0
Southern Arm	0.09	0	0.26	0
Western Arm	0.03	0	0.03	0

Table 1 indicates that the junction will operate well within capacity with the addition of development traffic.



Internal Layout

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Schedule of Accommodation		
Distribution Centre	879,775 sq.ft.	77,084 m ²
Three Storey Offices / Staff Facilities Goods In / Transport Office	40,287 sq.ft.	4,486 m ²
Overall Total	920,062 sq.ft.	81,570 m²
Car Parking	576 spaces	
Inc. Disabled Parking	35 spaces	
Inc. Future Bicycle Vehicle	30 spaces	
Cycle Parking	156 spaces	
Motorcycle Parking	48 spaces	
Site Area	50.98 acres	20.63 ha.
Furum Expansion Limit	13.47 acres	5.45 ha.
Overall Site Area (Red Line)	64.45 acres	26.08 ha.
T.M. Ownership Boundary (Blue Line)	76.47 acres	30.96 ha.

dra date: scale: by:



aja architects ltd
1170 Elliott Court
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W: www.aja-architects.com
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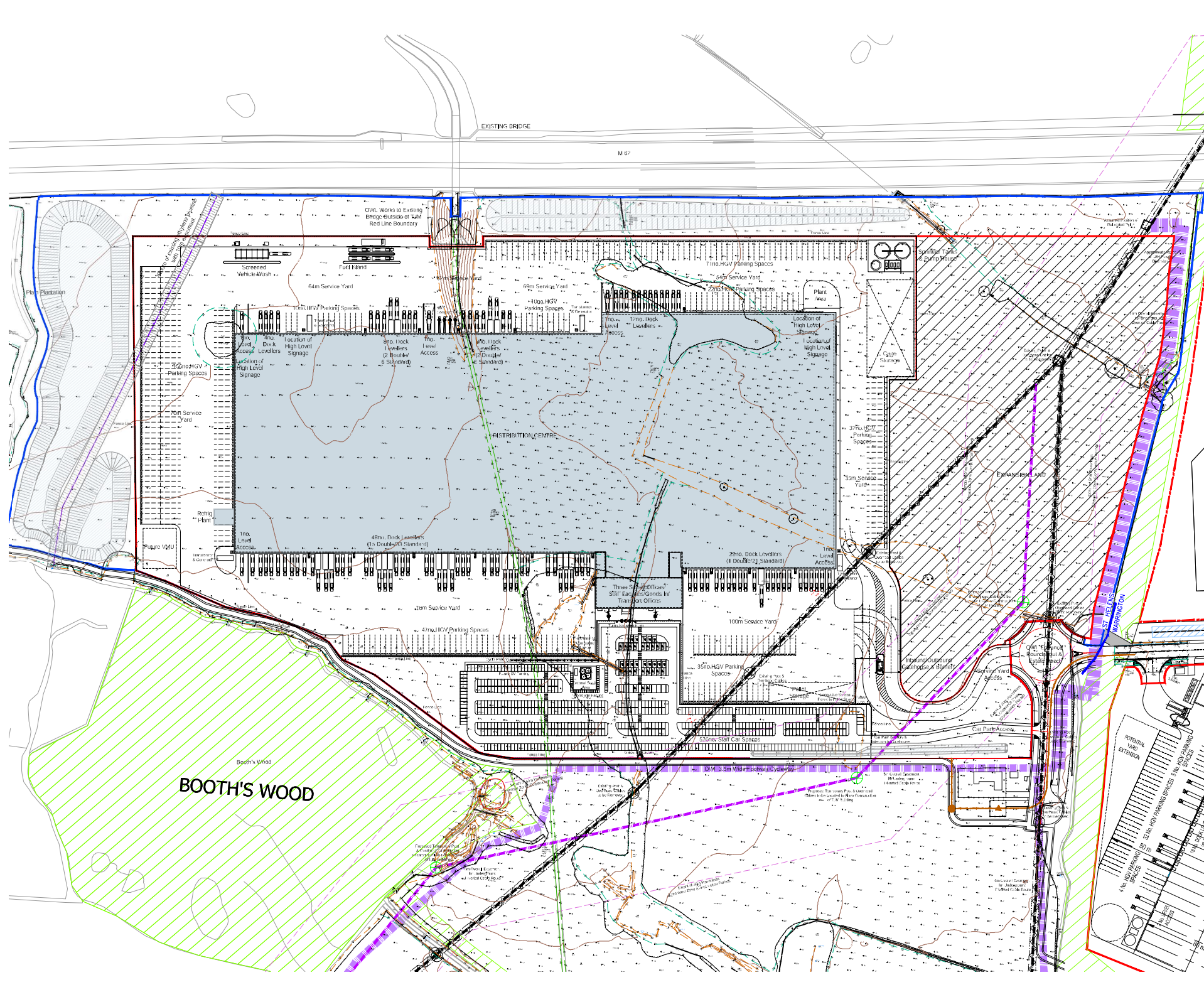
T J Morris

Unit 1
Omega Zone 8
St. Helens

Proposed Site Layout Plan
UNIT 1 DWG.1

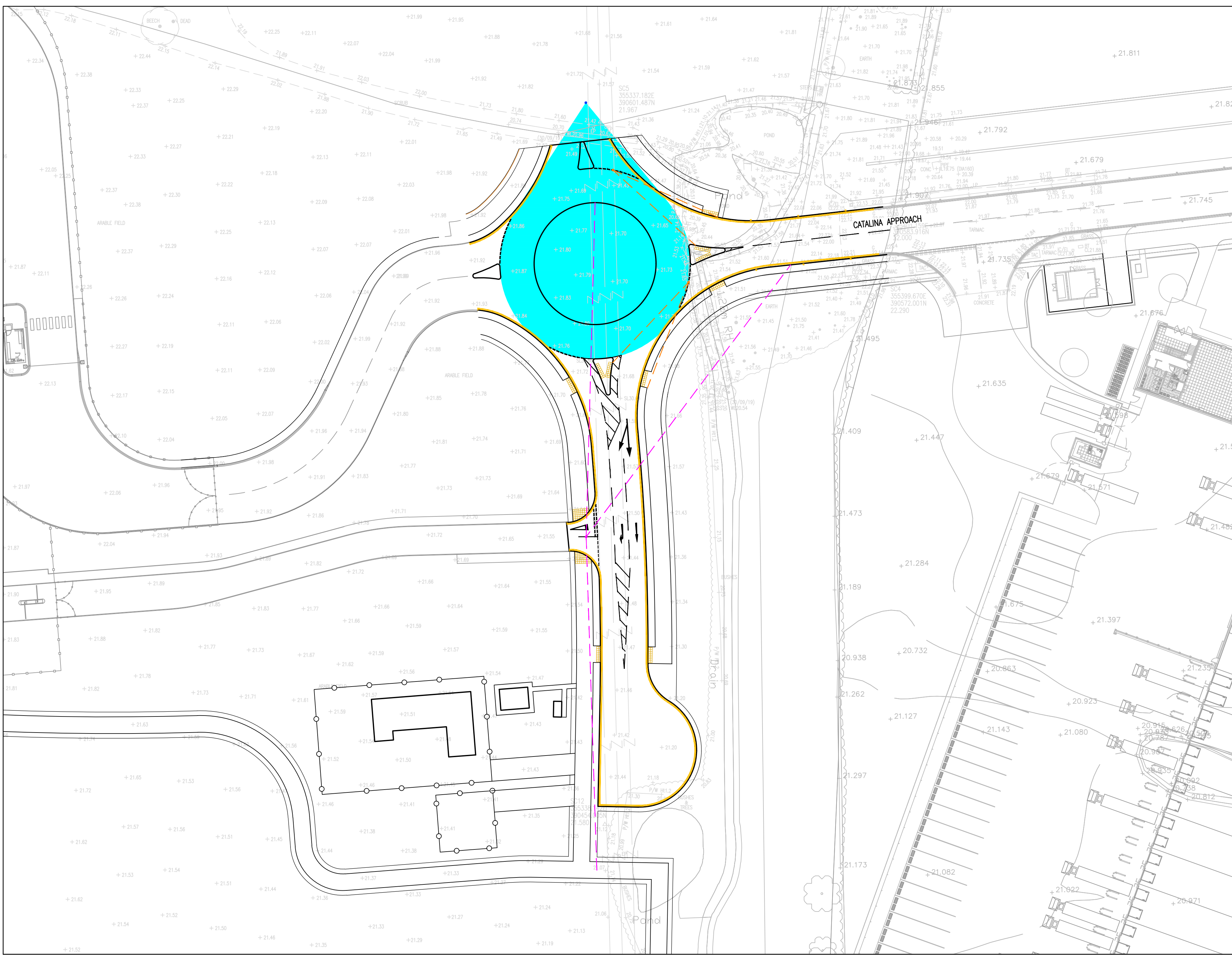
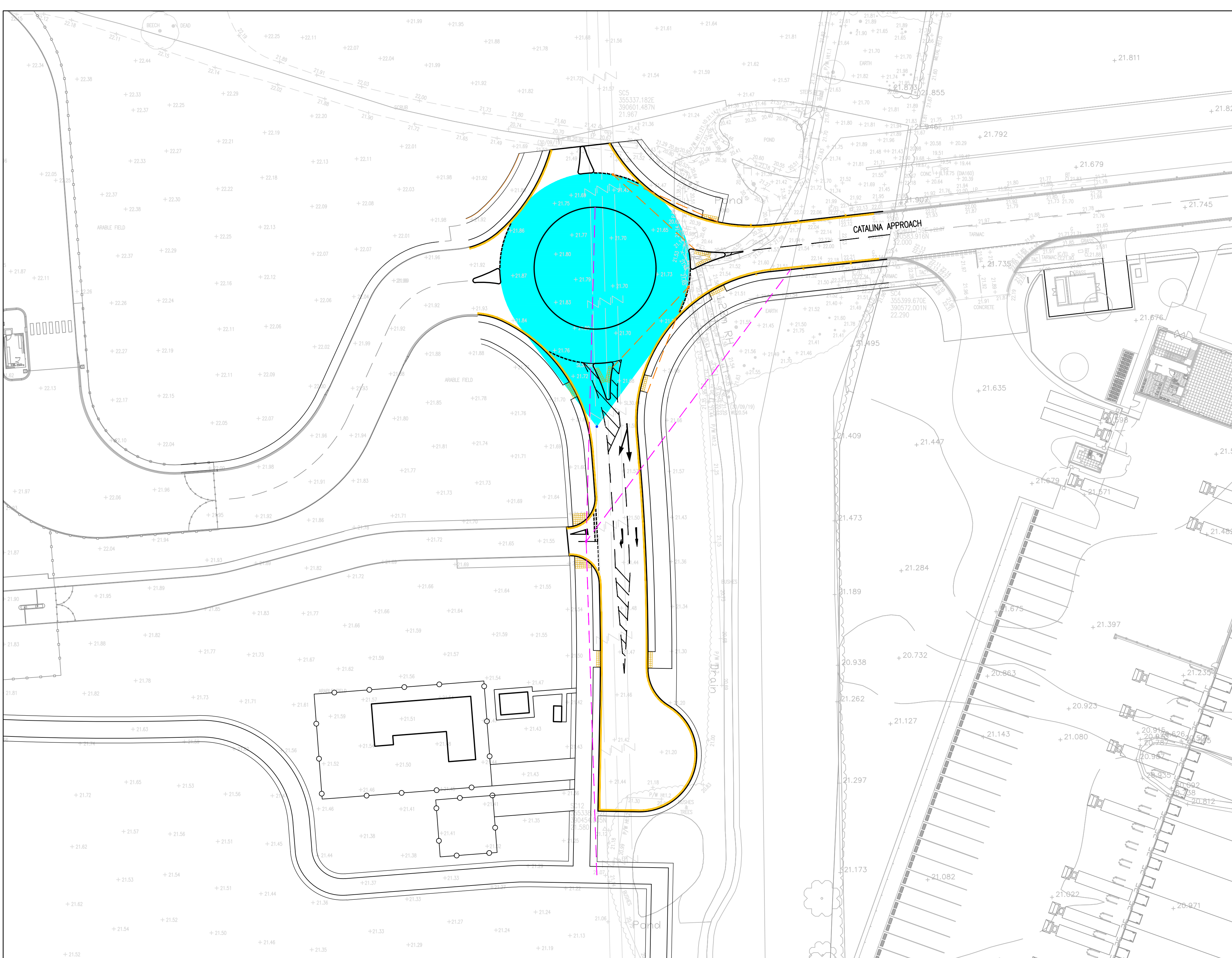
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6385 - 174





Visibility Splays



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5. ROUNDABOUT VISIBILITY SPLAYS ARE TO DMRB CD 116 "GEOMETRIC DESIGN OF ROUNDABOUTS" (FORMERLY TO 16/07)

KEY

2.4 x 70m (50 kph) JUNCTION VISIBILITY SPLAY IN ACCORDANCE WITH CD 123 PARA 3.4 (FORMERLY TO 16/07 PARA 7.3)

ROUNDABOUT VISIBILITY SPLAY IN ACCORDANCE WITH CD 116 PARA 3.43 (FORMERLY TO 16/07 PARA 8.4)

PEDESTRIAN CROSSING VISIBILITY SPLAY IN ACCORDANCE WITH CD 116 PARA 3.53 (FORMERLY TO 16/07 PARA 8.12)

A	07/05/2020	TS	FIRST ISSUE	W	W
REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS

FOR INFORMATION

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ARCHITECT: N/A

PROJECT: OMEGA ZONE 8 ST HELENS

TITLE: INFRASTRUCTURE WORKS VISIBILITY ASSESSMENT

SCALE: A3

1:500

CHECKER: SG

APPROVED: SG

DESIGNED: TS

DRAWN: TS

DATE: May 20

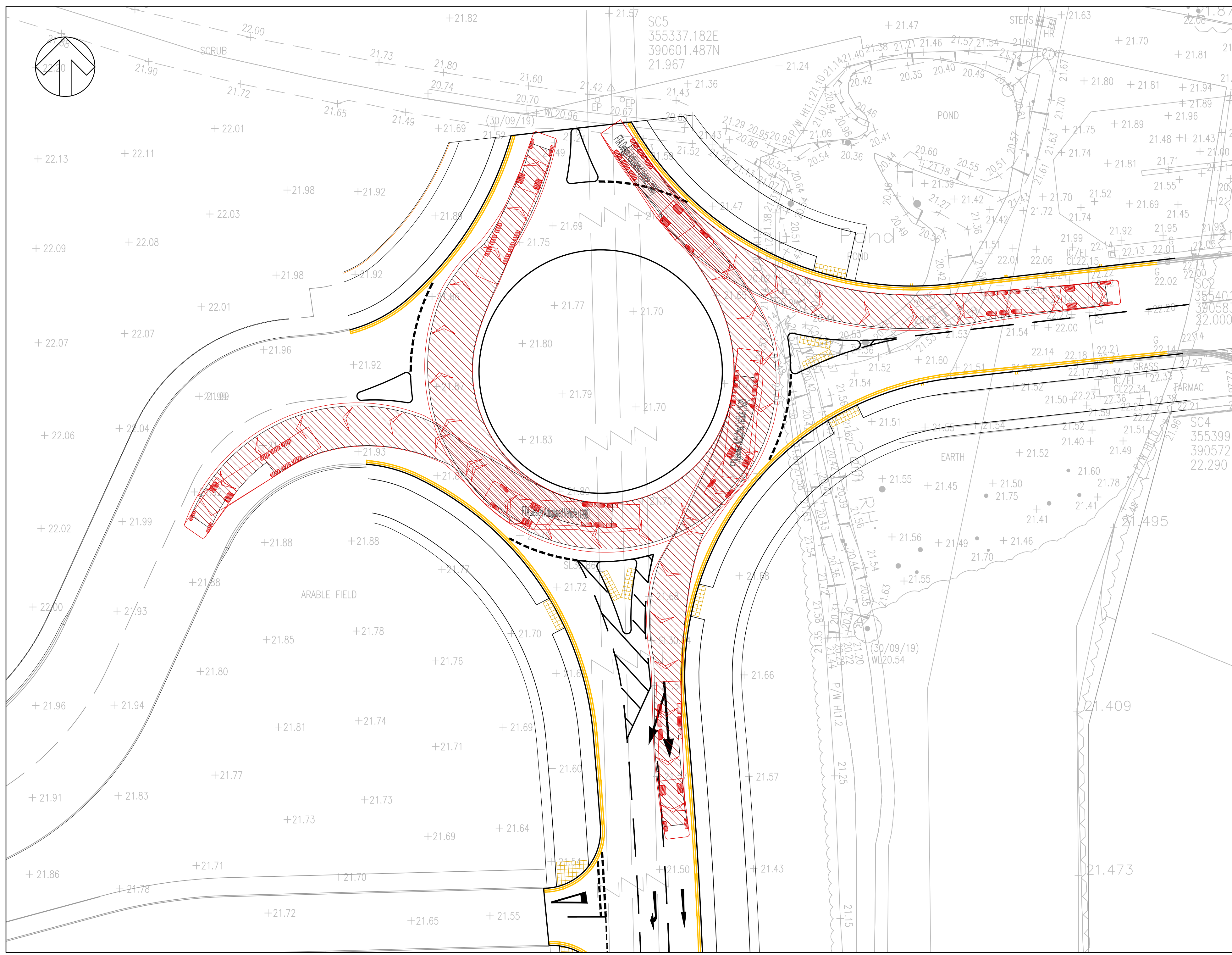
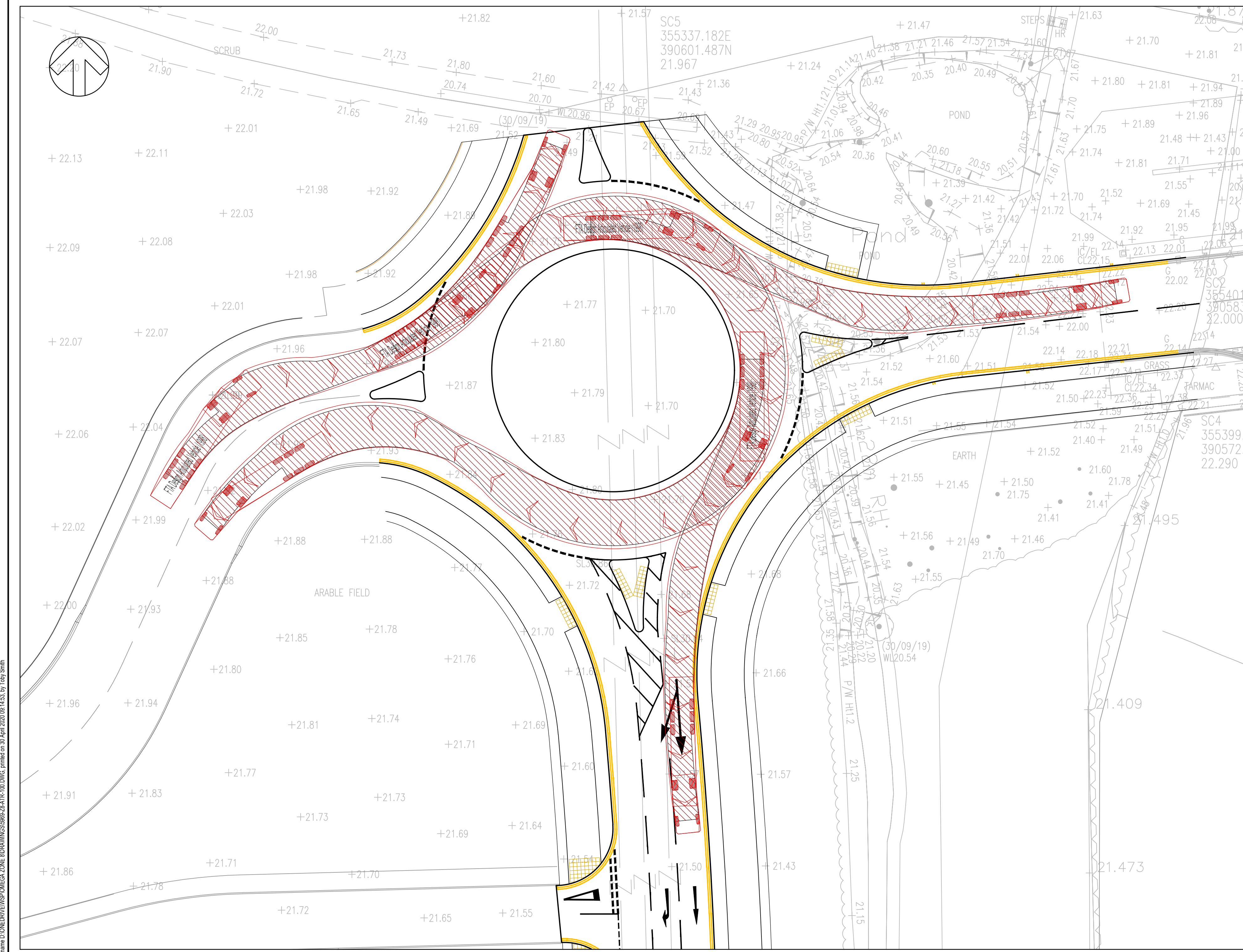
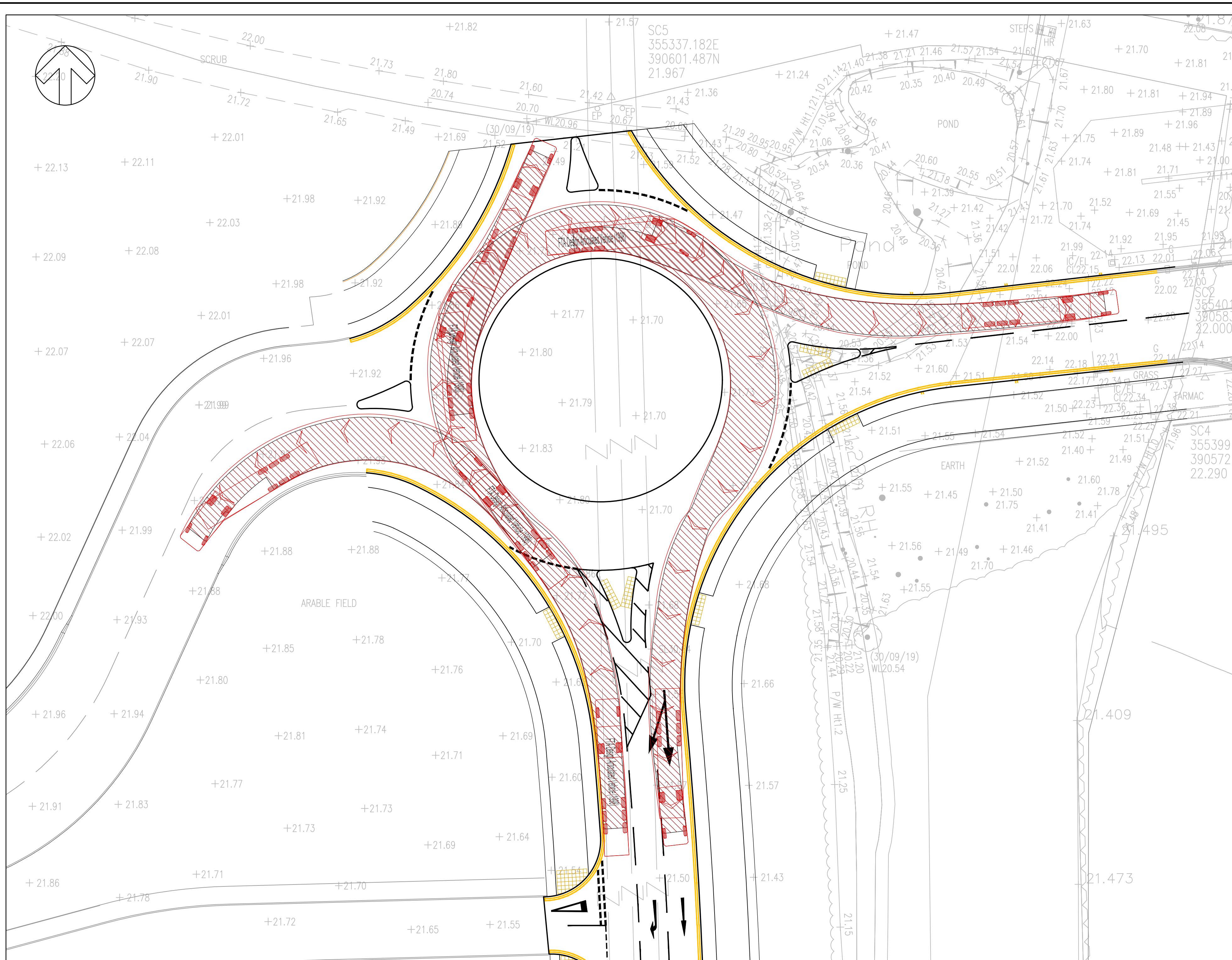
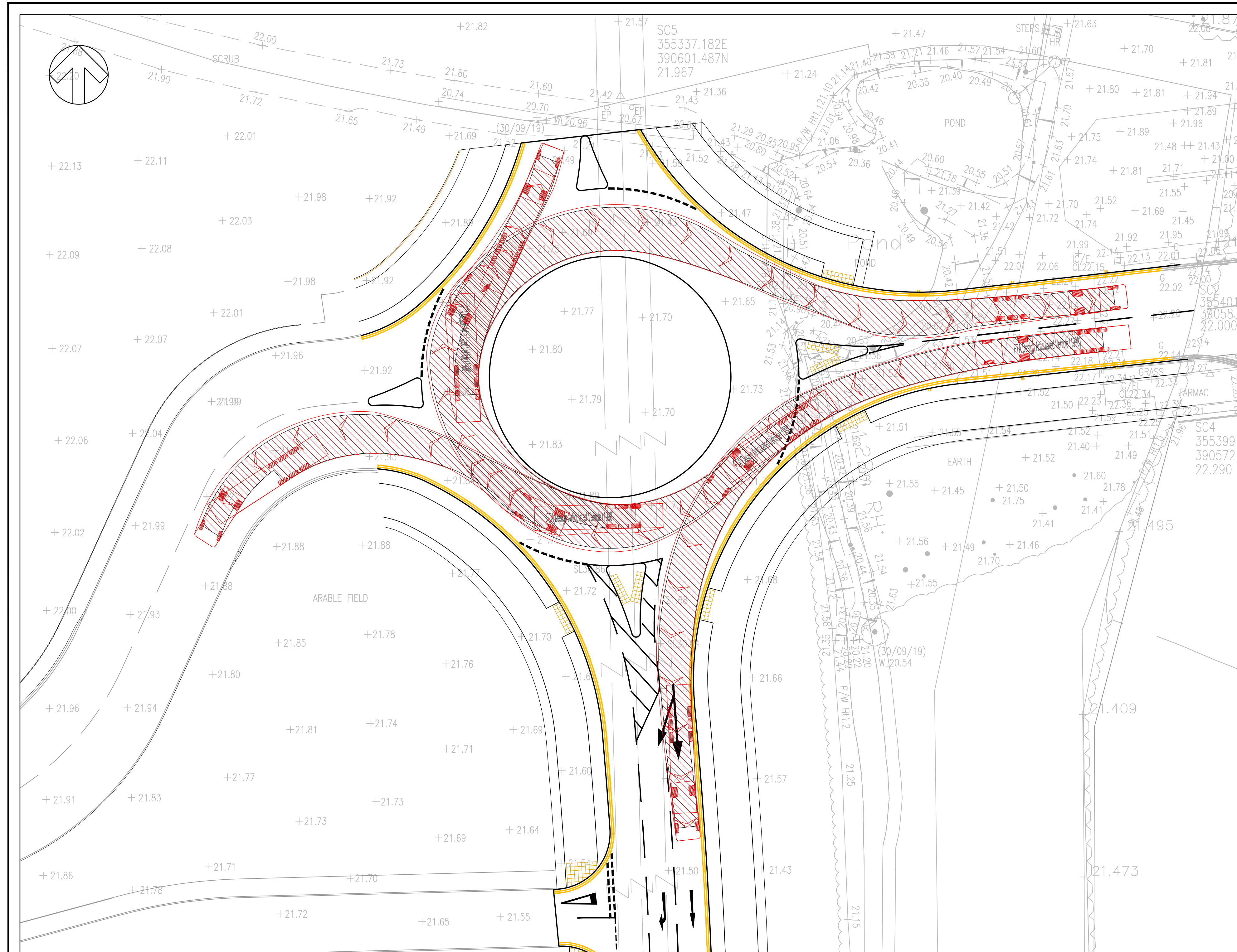
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Vehicle Tracking

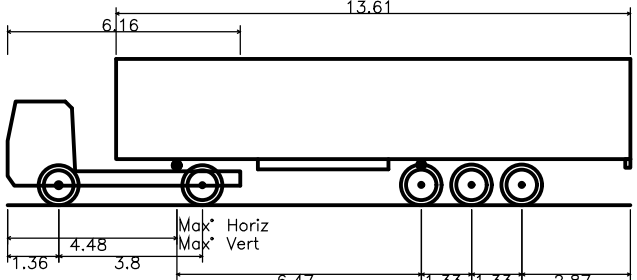


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5. UNDERGROUND SERVICES MAY BE PRESENT. CONTRACTOR TO CONFIRM THE PRECISE LINE AND DEPTH OF ANY UNDERGROUND SERVICES PRIOR TO ANY EXCAVATION WORK.

VEHICLE DETAILS



FTA Design Articulated Vehicle (1998)
Overall Length 16.480m
Overall Width 2.50m
Min Body Ground Clearance 0.51m
Max Track Width 2.47m
Lock to lock time 2.00s
Kerb to Kerb Turning Radius 8.550m

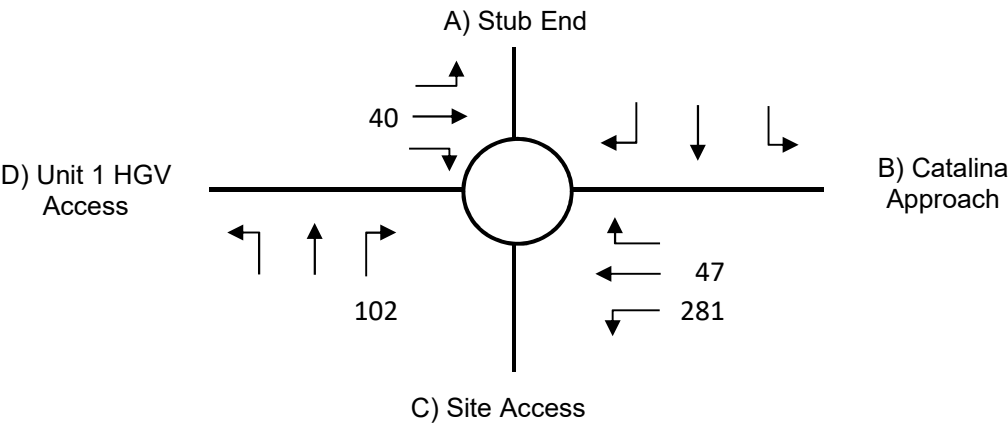
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ARCHITECT:					N/A				
PROJECT:					OMEGA ZONE 8 ST HELENS				
TITLE:					INFRASTRUCTURE WORKS SWEEP PATH ANALYSIS				
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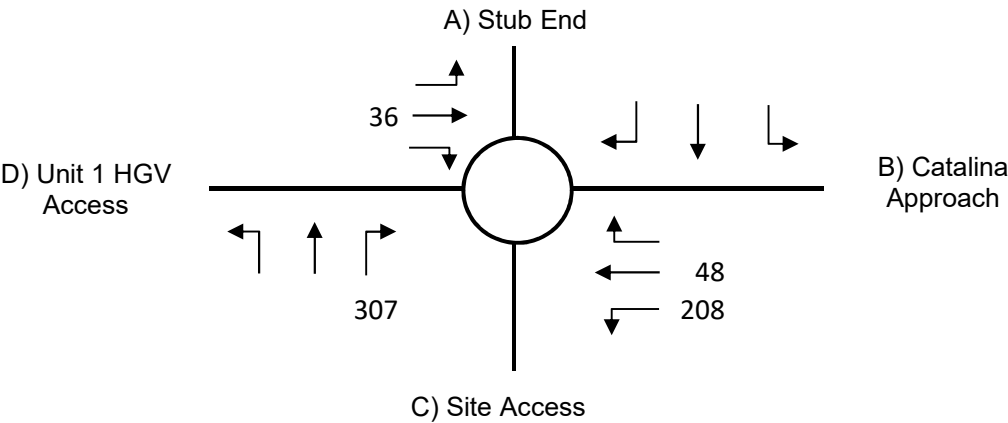
Network Diagrams

Internal Omega Roundabout - Development Traffic

AM



PM





Junction Modelling Output

Junctions 9				
ARCADY 9 - Roundabout Module				
Version: 9.5.0.6896 © Copyright TRL Limited, 2018				
For sales and distribution information, program advice and maintenance, contact TRL: +44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk				
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution				

Filename: (new file)

Path:

Report generation date: 07/05/2020 11:53:19

»Development, AM

»Development, PM

Summary of junction performance

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
Development								
1 - Northern Arm	0.0	0.00	0.00	A	0.0	0.00	0.00	A
2 - Catalina Way	0.3	2.81	0.22	A	0.2	2.65	0.17	A
3 - Southern Arm	0.1	3.05	0.09	A	0.4	3.77	0.26	A
4 - Western Arm	0.0	2.77	0.03	A	0.0	3.07	0.03	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	07/05/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	CORP\UKMJO002
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	Development	AM	ONE HOUR	08:00	09:30	15
D2	Development	PM	ONE HOUR	17:00	18:30	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Development, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Internal Omega Roundabout	Standard Roundabout		1, 2, 3, 4	2.86	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Northern Arm	
2	Catalina Way	
3	Southern Arm	
4	Western Arm	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Northern Arm	3.75	5.90	7.6	34.0	40.0	42.0	
2 - Catalina Way	5.00	6.10	4.4	31.5	40.0	45.0	
3 - Southern Arm	3.50	4.60	7.3	33.0	40.0	27.0	
4 - Western Arm	3.65	6.00	7.5	36.0	40.0	47.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Northern Arm	0.585	1446
2 - Catalina Way	0.620	1642
3 - Southern Arm	0.576	1324
4 - Western Arm	0.572	1407

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	Development	AM	ONE HOUR	08:00	09:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Northern Arm		✓	0	100.000
2 - Catalina Way		✓	328	100.000
3 - Southern Arm		✓	102	100.000
4 - Western Arm		✓	40	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - Northern Arm	2 - Catalina Way	3 - Southern Arm	4 - Western Arm
From	1 - Northern Arm	0	0	0	0
	2 - Catalina Way	0	0	281	47
	3 - Southern Arm	0	102	0	0
	4 - Western Arm	0	40	0	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - Northern Arm	2 - Catalina Way	3 - Southern Arm	4 - Western Arm
From	1 - Northern Arm	0	0	0	0
	2 - Catalina Way	0	0	0	0
	3 - Southern Arm	0	0	0	0
	4 - Western Arm	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Northern Arm	0.00	0.00	0.0	A
2 - Catalina Way	0.22	2.81	0.3	A
3 - Southern Arm	0.09	3.05	0.1	A
4 - Western Arm	0.03	2.77	0.0	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	107	1384	0.000	0	0.0	0.000	A
2 - Catalina Way	247	0	1642	0.150	246	0.2	2.577	A
3 - Southern Arm	77	35	1303	0.059	77	0.1	2.934	A
4 - Western Arm	30	77	1363	0.022	30	0.0	2.699	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	128	1372	0.000	0	0.0	0.000	A
2 - Catalina Way	295	0	1642	0.180	295	0.2	2.671	A
3 - Southern Arm	92	42	1299	0.071	92	0.1	2.980	A
4 - Western Arm	36	92	1355	0.027	36	0.0	2.729	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	156	1355	0.000	0	0.0	0.000	A
2 - Catalina Way	361	0	1642	0.220	361	0.3	2.809	A
3 - Southern Arm	112	52	1294	0.087	112	0.1	3.046	A
4 - Western Arm	44	112	1343	0.033	44	0.0	2.771	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	156	1355	0.000	0	0.0	0.000	A
2 - Catalina Way	361	0	1642	0.220	361	0.3	2.809	A
3 - Southern Arm	112	52	1294	0.087	112	0.1	3.046	A
4 - Western Arm	44	112	1343	0.033	44	0.0	2.771	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	128	1372	0.000	0	0.0	0.000	A
2 - Catalina Way	295	0	1642	0.180	295	0.2	2.674	A
3 - Southern Arm	92	42	1299	0.071	92	0.1	2.983	A
4 - Western Arm	36	92	1355	0.027	36	0.0	2.731	A

09:15 - 09:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	107	1384	0.000	0	0.0	0.000	A
2 - Catalina Way	247	0	1642	0.150	247	0.2	2.580	A
3 - Southern Arm	77	35	1303	0.059	77	0.1	2.935	A
4 - Western Arm	30	77	1363	0.022	30	0.0	2.700	A

Development, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Internal Omega Roundabout	Standard Roundabout		1, 2, 3, 4	3.25	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	Development	PM	ONE HOUR	17:00	18:30	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Northern Arm		✓	0	100.000
2 - Catalina Way		✓	256	100.000
3 - Southern Arm		✓	307	100.000
4 - Western Arm		✓	36	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Northern Arm	2 - Catalina Way	3 - Southern Arm	4 - Western Arm
	1 - Northern Arm	0	0	0	0
	2 - Catalina Way	0	0	208	48
	3 - Southern Arm	0	307	0	0
	4 - Western Arm	0	36	0	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Northern Arm	2 - Catalina Way	3 - Southern Arm	4 - Western Arm
	1 - Northern Arm	0	0	0	0
	2 - Catalina Way	0	0	0	0
	3 - Southern Arm	0	0	0	0
	4 - Western Arm	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Northern Arm	0.00	0.00	0.0	A
2 - Catalina Way	0.17	2.65	0.2	A
3 - Southern Arm	0.26	3.77	0.4	A
4 - Western Arm	0.03	3.07	0.0	A

Main Results for each time segment

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	257	1296	0.000	0	0.0	0.000	A
2 - Catalina Way	193	0	1642	0.117	192	0.1	2.483	A
3 - Southern Arm	231	36	1303	0.177	230	0.2	3.353	A
4 - Western Arm	27	230	1275	0.021	27	0.0	2.883	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	308	1266	0.000	0	0.0	0.000	A
2 - Catalina Way	230	0	1642	0.140	230	0.2	2.549	A
3 - Southern Arm	276	43	1299	0.213	276	0.3	3.519	A
4 - Western Arm	32	276	1249	0.026	32	0.0	2.957	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	377	1226	0.000	0	0.0	0.000	A
2 - Catalina Way	282	0	1642	0.172	282	0.2	2.646	A
3 - Southern Arm	338	53	1293	0.261	338	0.4	3.768	A
4 - Western Arm	40	338	1214	0.033	40	0.0	3.065	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	378	1226	0.000	0	0.0	0.000	A
2 - Catalina Way	282	0	1642	0.172	282	0.2	2.646	A
3 - Southern Arm	338	53	1293	0.261	338	0.4	3.768	A
4 - Western Arm	40	338	1214	0.033	40	0.0	3.065	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	309	1266	0.000	0	0.0	0.000	A
2 - Catalina Way	230	0	1642	0.140	230	0.2	2.551	A
3 - Southern Arm	276	43	1299	0.213	276	0.3	3.521	A
4 - Western Arm	32	276	1249	0.026	32	0.0	2.958	A

18:15 - 18:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Northern Arm	0	258	1295	0.000	0	0.0	0.000	A
2 - Catalina Way	193	0	1642	0.117	193	0.1	2.483	A
3 - Southern Arm	231	36	1303	0.177	231	0.2	3.360	A
4 - Western Arm	27	231	1275	0.021	27	0.0	2.885	A

Appendix E

HIGHWAYS ENGLAND TECHNICAL
NOTES





Omega Warrington Limited

OMEGA ZONE 8

Technical Note





Omega Warrington Limited

OMEGA ZONE 8

Technical Note

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

PROJECT NO. 11191042

DATE: MARCH 2020

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QUALITY CONTROL

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APPENDICES

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1 INTRODUCTION

1.1 GENERAL

- 1.1.1. WSP UK Limited (WSP) has been commissioned by Omega Warrington Limited (OWL), to provide transportation advice in support of a hybrid planning application for c. 205,500sqm (c.2,210,500sqft) B2/B8 industrial uses on Omega Zone 8, located in the Borough of St Helens.
- 1.1.2. The application will comprise a detailed planning application for an c.880,000sqft B8 industrial use to the north of the site and an outline planning application for the remaining B2/B8 industrial uses to the south of the site.
- 1.1.3. This Technical Note has been prepared in response to comments raised by Highways England upon their review of the Transport Assessment which was submitted 13th December 2019. The primary comments are as follows:
1. *"The majority of the proposed development site falls within the boundary of "Site 1EA – Omega South Western Extension – Land North of Finches Plantation," which has a site area of around 31 hectares, proposing B2/B8 land use. However, WSP also note that the St Helens Local Plan which includes this site allocation has not yet been adopted, and as such the planning application remains on unallocated greenbelt land. The consultant should review paragraph 22 of the circular and seek to directly demonstrate that their assessment is consistent with this.*
 2. *Two additional developments (referred to as Mountpark 2 & Zone 1-2 B2/B8 Development) are included in the assessment scenarios, but have not been referenced in the TA, WSP request further information regarding the Mountpark 2 & Zone 1-2 B2/B8 developments, including trip generation & distribution assumptions.*
 3. *The development trips generation and background traffic should be presented over a longer period to take into account shift change times at B2/B8 units and how this will change flow volumes in the context of background traffic.*
 4. *Background TEMPro growth factors are not included in the report for the 2029 scenario. The growth factors should be provided to allow a review.*
 5. *How traffic associated with the committed Burtonwood Road services development has been accounted for should be clarified.*
 6. *Mountpark 2 and Zone 1-2 B8 Developments are included in the traffic assumptions, but these are not referenced within the TA report. More information should be provided regarding the trip generation and distribution assumed for these sites within the TA.*
 7. *The build-up of development traffic is complex and there is some variation on terminology between committed developments and development consideration. We therefore request a clear explanation of the exact make up of each scenario.*
 8. *WSP have reviewed the proposed trip rate calculations undertaken based on the surveys, and established an error in regard to the B8 trip rates. On review, it appears that the B8 trip rates have been calculated using the weighting which should have been applied for the B2 units instead of the B8. WSP request that the developer's consultant revisits the calculations undertaken to derive the B8 trip rates.*
 9. *A 2019 survey TRANSYT scenario should be modelled and DOS and/or queue values compared with observed conditions to establish the model appropriately reflects reality.*
 10. *The source of intergreens, signal timings and cycle time in the TRANSYT model should be clarified.*

11. *Modifications to the distribution of traffic between lanes in the TRANSYT model have been made manually and these should be explained.*
12. *Differences are present between the with and without mitigation models that do not appear to be connected to the mitigation, such as an additional phase delay. we would suggest model changes from the existing are noted for information and to ensure a fair / appropriate comparison.*
13. *There appears to be a minor flow discrepancy between the flows provided in the report and within the model in Scenario 5 at M62 J8.*
14. *The proposed mitigation scenario promotes using the two lanes available on the Skyline Drive exit. The exit merges from two lanes to one approximately 100m from the junction. Research has shown the presence of exit merges can influence upstream lane choice. We therefore suggest a sensitivity test should be undertaken with a 75/25% nearside / offside split in traffic to the Skyline Drive exit.*
15. *The TA includes a chapter outlining a Framework Travel Plan (FTP) for the proposed development, which seeks to provide a basis for how a full Travel Plan (TP) might operate upon full occupation of the development. WSP suggest that the consultant could have sought to use data from the existing operational units on the wider Omega site, which would indicate the existing mode share in the area. This would therefore allow the occupier to derive some robust SMART targets for mode shift based on existing local data and implement the appropriate measures to encourage positive travel behaviours early in the new developments operation."*

1.1.4. The following chapters seek to address the comments from Highways England, providing clarification and updated analysis where required.

2 COMMENT RESPONSES

2.1 COMMENT 1

2.1.1. Comment 1 from Highways England is as follows:

- i *“The majority of the proposed development site falls within the boundary of “Site 1EA – Omega South Western Extension – Land North of Finches Plantation,” which has a site area of around 31 hectares, proposing B2/B8 land use. However, WSP also note that the St Helens Local Plan which includes this site allocation has not yet been adopted, and as such the planning application remains on unallocated greenbelt land. The consultant should review paragraph 22 of the circular and seek to directly demonstrate that their assessment is consistent with this.”*

2.1.2. The Transport Assessment for Omega Zone 8 has been prepared in accordance with a scope agreed with St Helens Metropolitan Borough Council, Warrington Borough Council and Highways England, taking due consideration of relevant committed developments as agreed with the relevant highway authorities.

2.2 COMMENTS 2 AND 6

2.2.1. Comments 2 and 6 from Highways England are as follows:

- i **Comment 2** – *“Two additional developments (referred to as Mountpark 2 & Zone 1-2 B2/B8 Development) are included in the assessment scenarios, but have not been referenced in the TA, WSP request further information regarding the Mountpark 2 & Zone 1-2 B2/B8 developments, including trip generation & distribution assumptions.”*
- i **Comment 6** – *“Mountpark 2 and Zone 1-2 B8 Developments are included in the traffic assumptions, but these are not referenced within the TA report. More information should be provided regarding the trip generation and distribution assumed for these sites within the TA.”*

2.2.2. These two comments are essentially requesting the same information, which is the trip generation and distribution assumptions for the site located within Omega South previously known as Zones 1-2 (now known as Mountpark 2).

2.2.3. The site was previously consented for the following:

- i B1 Land Use – 59,458m² GFA;
- i B2 Land Use – 20,903m² GFA; and
- i B8 Land Use – 48,774m² GFA.

2.2.4. The recent reserved matters application for the Zone 1-2 Site (Planning No. 2019/35646) has been approved (November 2019), which reduces the B2/B8 land uses to 20,567m² and 47,990m² respectively, and removes the B1 land uses proposals in order to free up the land for residential use (Phase 4-7).

2.2.5. The trip generation rates for the B2/B8 land uses associated with Zones 1 & 2 have been extracted from the Omega South - Zones 1 & 2 TA (WSP, May 2017). As agreed at the scoping stage, the same trip rates have been applied to the revised Mountpark 2 proposals. The trip rates and resultant trips for the Zones 1-2 B2/B8 and Mountpark 2 developments are indicated in Table 2-1.

Table 2-1 – Zone 1-2 and Mountpark 2 Development Vehicle Trip Rates and Resultant Trips

Scenario	AM Peak Hour (08:00-09:00)		PM Peak Hour (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
B2 Car Trip Rate (per 100m ² GFA)	0.442	0.203	0.111	0.385
B8 Car Trip Rate (per 100m ² GFA)	0.033	0.009	0.009	0.031
B2 HGV Trip Rate (per 100m ² GFA)	0.017	0.009	0.007	0.010
B8 HGV Trip Rate (per 100m ² GFA)	0.015	0.018	0.015	0.013
Zone 1-2 B2 Total PCU (20,903m ²)	101	52	27	85
Zone 1-2 B8 Total PCU (48,774m ²)	33	20	21	30
Zone 1-2 B2/ B8 Total PCU	133	77	48	115
Mountpark 2 B2 Total PCU (20,567m ²)	99	51	26	84
Mountpark 2 B8 Total PCU (47,990m ²)	32	24	21	29
Mountpark 2 B2/ B8 Total PCU	131	75	47	113

2.2.6. Table 2-1 indicates that due to the slight reduction in GFA, the trips associated with the site have decreased slightly with the most recent planning consent.

2.2.7. The distribution and assignment have been undertaken using the process outlined in Chapter 7 of the TA (2017 Postcode Distribution for general vehicles and turning proportions for HGV's). This has been done to ensure consistency in distribution for similar developments within Omega South.

2.3 COMMENT 3

2.3.1. Comment 3 from Highways England is as follows:

“The development trips generation and background traffic should be presented over a longer period to take into account shift change times at B2/B8 units and how this will change flow.”

2.3.2. In order to understand whether we have truly captured the peak periods with both the development and background traffic taken into consideration, we have undertaken an exercise where we have combined the 2019 surveyed flows at the M62 J8 with the Zone 8 development flows. This has been done for the hours that we have survey data for (05:00 to 10:00 and 16:00 to 19:00), to determine if the identified peaks are correct. Committed development flows have not been included as we do not have trip generation values outside the peaks. Table 2-2 below indicates the result of this test.

Table 2-2 – Peak Hour Check

Hour	M62 J8 2019 Total Flows	Zone 8 Total Development Flows	Total
0500-0600	1685	861	2547
0600-0700	2487	864	3351
0700-0800	3563	455	4019
0745-0845	3895	498	4393
0900-1000	2614	506	3120
1600-1700	3903	561	4464
1645-1745	4379	599	4978
1800-1900	3462	449	3910

- 2.3.3. Table 2-2 indicates that the peak hours that have been used in the assessment contained within the TA represent the worst-case time periods and therefore confirm that our assessment is robust.

2.4 COMMENT 4

- 2.4.1. Comment 4 from Highways England is as follows:

“Background TEMPro growth factors are not included in the report for the 2029 scenario. The growth factors should be provided to allow a review. “

- 2.4.2. The Department for Transport's TempPro V7.2 has been used identify a factor which can be used to growth the surveyed flows to the sensitivity year (2029). In terms of settings, the area type was set to rural, the road type was set to principal / motorway and the areas shown in Table 2-3 were selected, as they surround and include Omega South. Average growth factors were then extracted for the two road types.

Table 2-3 – Growth Factor (2019 to 2029)

Level	Area	Principal Local Growth Factor	Motorway Local Growth Factor
E02002592	Warrington 003	1.093	1.114
E02002595	Warrington 006	1.108	1.129
E02002598	Warrington 009	1.080	1.100
E02002599	Warrington 010	1.079	1.099
E02002602	Warrington 013	1.114	1.135
E02002604	Warrington 015	1.079	1.099
E02002605	Warrington 016	1.075	1.096
E02002607	Warrington 018	1.103	1.124
E02002608	Warrington 019	1.092	1.113
E02001427	St. Helens 022	1.085	1.106
Average		1.091	1.111

- 2.4.3. Growth factors of 1.091 (All roads except motorway) and 1.111 (motorway only) have been applied to the 2019 AM and PM surveyed flows to produce AM and PM 2029 Base traffic flows.

2.5 COMMENT 5

- 2.5.1. Comment 5 from Highways England is as follows:

“How traffic associated with the committed Burtonwood Road services development has been accounted for should be clarified.”

TRIP RATES

- 2.5.2. Figure 2-1 below is an excerpt from the 2007 Transport Assessment, produced by Scott Wilson, which indicates the trip generation characteristics of the Burtonwood Road Services Development.

Figure 2-1 - Burtonwood Road 2007 TA Trip Generation

Table 3: TRICS Interrogation

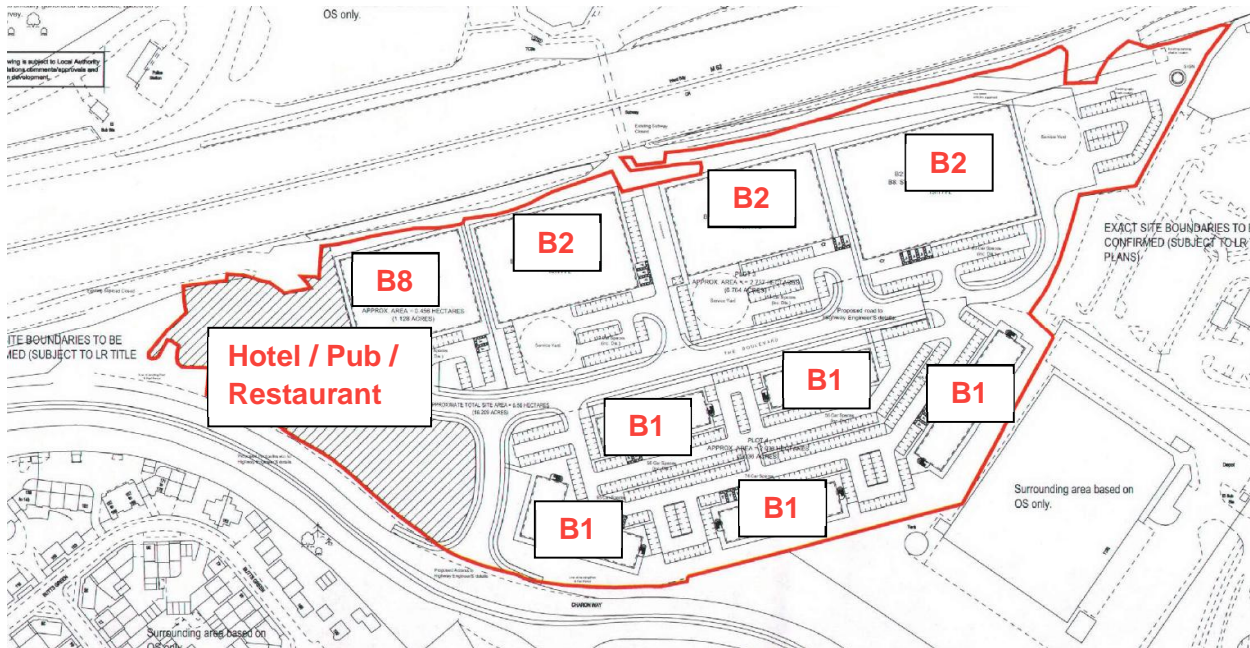
Land use	Site area (m ²)	GFA (m ²)	Weekday trip rates (85th percentile)				Number of weekday trips			
			AM PEAK		PM PEAK		AM PEAK		PM PEAK	
			IN	OUT	IN	OUT	IN	OUT	IN	OUT
B1 business offices	20,355	10,917	1.88	0.17	0.15	1.43	205	19	16	156
C1 hotel	7,689	7,689	0.54	0.70	0.79	0.40	42	54	61	31
B2 General industry	27,114	10,127	0.92	0.19	0.18	0.74	93	19	18	75
B8 Storage distribution	27,114	10,127	0.23	0.23	0.22	0.45	23	23	22	46
B8 Self storage	4,532	2,323	0.16	0.07	0.08	0.16	4	2	2	4
TOTAL	86,804	41,183					367	117	119	311

Trip Rates for B1, C1 and A3 are per 100 metres²

Assume a 50/50 mix of B2 General industry and B8 Storage distribution

- 2.5.3. Figure 2-2 below indicates the plan of the consented site (as of 2007) and the associated consented land uses.

Figure 2-2 - Burtonwood Road Services Plan



2.5.4. Our assessment has used the trip rates as set out in Figure 2-1 above, as instructed by Warrington Borough Council, and we have assumed that that only the hotel / pub / restaurant has been constructed. We believe that this is a robust assessment as a number of restaurants and a health facility have been built on land allocated for B1 uses, with limited land available for the previously consented land uses. Table 2-4 below indicates the trip generation figures used in our analysis, while Figure 2-3 highlights the current build out of the site.

Table 2-4 – Burtonwood Services Vehicle Trip Rates and Resultant Trips

Scenario	AM Peak Hour (08:00-09:00)		PM Peak Hour (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
B1 Business Trip Rate	1.88	0.17	0.15	1.43
B2 General Industry Trip Rate	0.92	0.19	0.18	0.74
B8 Self Storage Trip Rate	0.16	0.07	0.08	0.16
B8 Storage Distribution Trip Rate	0.23	0.23	0.22	0.45
B1 Business Trips (10,917m ²)	205	19	16	156
B2 Gen. Industry Trips (10,127m ²)	93	19	18	75
B8 Self Storage Trips (2,323m ²)	4	2	2	4
B8 Storage Dist. Trips (10,127m ²)	23	23	22	46
Total Trips	325	63	59	280

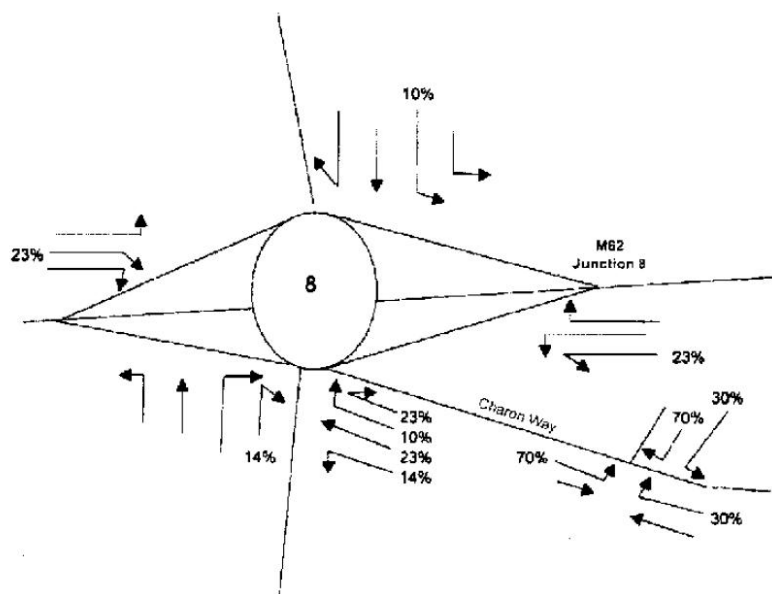
Figure 2-3 - Burtonwood Road Services Current Build Out



TRIP DISTRIBUTION

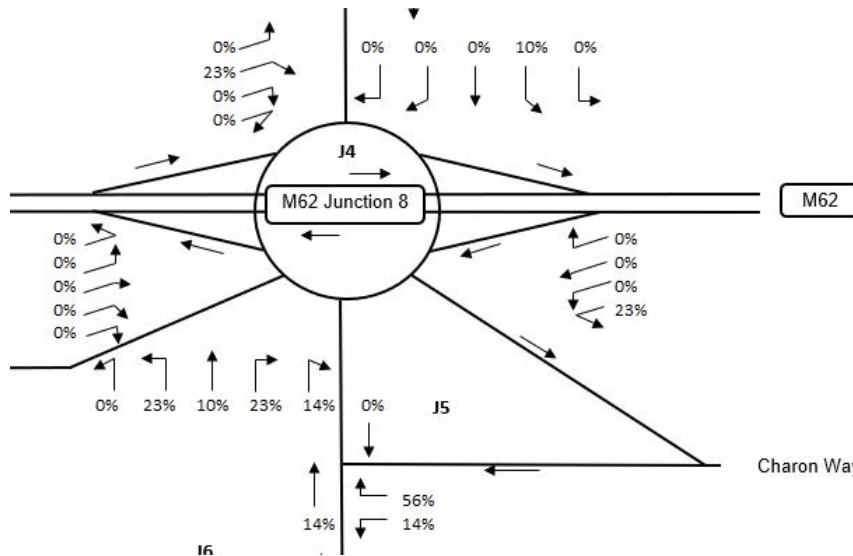
- 2.5.5. Figure 2-4 below is an excerpt from the 2007 Transport Assessment, produced by Scott Wilson, which indicates the trip distribution characteristics of the Burtonwood Road Services Development.

Figure 2-4 - Burtonwood Road 2007 TA Trip Distribution



2.5.6. Figure 2-5 below is the distribution that has been used in our analysis.

Figure 2-5 - Burtonwood Road Services Distribution from TA Analysis



2.5.7. With the exception of a change in road layout for Charon Way since the 2007 TA was produced, the distributions are identical

2.6 COMMENT 7

2.6.1. Comment 7 from Highways England is as follows:

“The build-up of development traffic is complex and there is some variation on terminology between committed developments and development consideration. We therefore request a clear explanation of the exact make up of each scenario.”

2.6.2. The Omega Zone 8 TA includes the assessment of two primary scenarios known as Scenario 2 and Scenario 5.

SCENARIO 2 – 2021 BASE + COMMITTED

2.6.3. Scenario 2 comprises the following:

- 2021 Base traffic flows (factored from 2019 surveys using TEMPRO growth factors);
- Currently Committed – Mountpark B2/B8 Land Uses;
- Currently Committed – Zone 1-2 B1/B2/B8 Land Uses;
- Currently Committed – Zone 3-6 Residential / Discount Foodstore / Hotel Pub and Restaurant and Care Home Land Uses;
- Currently Committed – Lingley Mere Business Park Residential; and
- Currently Committed – Burtonwood Services Land Uses.

SCENARIO 5 – 2021 BASE + COMMITTED + DEVELOPMENT

2.6.4. Scenario 5 comprises the following:

- 2021 Base traffic flows (factored from 2019 surveys using TEMPRO growth factors);
- Currently Committed – Mountpark B2/B8 Land Uses;
- Currently Committed – Zone 3-6 Residential / Discount Foodstore / Hotel Pub and Restaurant and Care Home Land Uses;
- Currently Committed – Lingley Mere Business Park Residential;
- Currently Committed – Burtonwood Services Land Uses;
- Replacement Development – Mountpark 2 B2 / B8 Land Uses (Replaces Zone 1-2 B2/B8 Development);
- Replacement Development – Phase 4-7 Residential Land Use (300-unit net increase over already consented residential units and replaces the Zone 1-2 B1 Land Use); and
- Proposed Development – Omega Zone 8 B2/B8 Land Uses.

2.7 COMMENT 8

2.7.1. Comment 8 from Highways England is as follows:

- “WSP have reviewed the proposed trip rate calculations undertaken based on the surveys and established an error in regard to the B8 trip rates. On review, it appears that the B8 trip rates have been calculated using the weighting which should have been applied for the B2 units instead of the B8. WSP request that the developer’s consultant revisits the calculations undertaken to derive the B8 trip rates.”*

2.7.2. We acknowledge that there an error in the formulas as set out above and we have therefore updated the spreadsheet, correcting this error. Table 2-5 below indicates the impact of the error correction.

Table 2-5 – Correction Comparison

Type	AM Peak Hour (08:00-09:00)		PM Peak Hour (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Pre-Correction				
B2+B8 General Vehicle Trips (PCU)	198	42	120	219
B2+B8 HGV Vehicle Trips (PCU)	92	123	123	86
B2+B8 Total Vehicle Trips (PCU)	290	165	243	305
Post-Correction				
B2+B8 General Vehicle Trips (PCU)	230	52	132	251
B2+B8 HGV Vehicle Trips (PCU)	106	109	123	92
B2+B8 Total Vehicle Trips (PCU)	337	161	256	343

Type	AM Peak Hour (08:00-09:00)		PM Peak Hour (17:00-18:00)	
	Arrivals	Departures	Arrivals	Departures
Difference (Post – Pre)				
B2+B8 General Vehicle Trips (PCU)	33	10	12	32
B2+B8 HGV Vehicle Trips (PCU)	14	-14	0	6
B2+B8 Total Vehicle Trips (PCU)	47	-4	12	38

- 2.7.3. Table 2-5 above indicates that there will be a net increase of 43 and 50 PCU's in the AM and PM Peak periods respectively. Given the level of this increase, we have re-run the analysis of the M62 J8 Model. This is included in Chapter 3 and takes into consideration all changes as a result of the Highways England comments.

2.8 COMMENT 9

- 2.8.1. Comment 9 from Highways England is as follows:

“A 2019 survey TRANSYT scenario should be modelled and DOS and/or queue values compared with observed conditions to establish the model appropriately reflects reality.

- 2.8.2. Queue surveys, which recorded the maximum queue over 5-minute intervals on each lane, were undertaken during the junction turning count survey on Tuesday 11 June 2019. As stated in the TA, the AM and PM peak hours of network operations were:

- 07:45 to 08:45; and
- 16:45 to 17:45.

- 2.8.3. A '2019 Existing Scenario' model was developed at the beginning of this study, which in turn was used as a foundation for the development of the 2021 Base Model and subsequent Scenarios. Average 5-minute max queuing on the approaches were referred to during the development of the '2019 Existing Scenario' model to ensure that these broadly matched. It should be noted that, as Junction 8 currently operates under MOVA control, reflecting the queues accurately in a fixed time scenario is challenging and should be approached with the appropriate level of caution.

- 2.8.4. Nevertheless, WSP has undertaken a comparison of the AM and PM hour average 5-minute max queuing collected during the survey versus the MMQ predicted within the model. The results are shown in Table 2-6.

Table 2-6: 2019 Existing Scenario: Modelled Queueing vs Observed Queueing

Approach	Direction	Movement	AM PEAK			PM PEAK		
			Modelled Queue	Surveyed Queue	Diff (Modelled - Survey)	Modelled Queue	Surveyed Queue	Diff (Modelled - Survey)
Burtonwood Rd N (SB)	Left	2a	3	4	-1	3	3	0
	Left Ahead	2b	8	8	0	5	6	-1
	Right	2c	5	6	-1	3	4	-1
East Circulatory	Ahead	2d	11	9	2	7	7	0
	Right	2e	2	7	-5	3	5	-2
M62 WB Off Slip	Left	2f	3	3	0	2	2	0
	Ahead	2g	2	2	0	5	5	0
	Ahead	2h	2	2	0	5	4	1
	Ahead	2i	11	7	4	7	5	2
	Ahead	2j	2	4	-2	4	4	0
South Circulatory	Ahead	2k	11	8	3	1	6	-5
	Ahead	2l	1	2	-1	7	1	6
	Ahead	2m	0	4	-4	2	5	-3
Burtonwood Rd S (NB)	Ahead Left	2n	7	7	0	6	10	-4
	Ahead	2o	7	6	1	6	8	-2
	Ahead	2p	7	6	1	6	8	-2
South West Circulatory	Ahead	2q	5	3	2	5	2	3
	Ahead	2r	3	4	-1	7	5	2
	Right	2s	0	1	-1	2	1	1
Skyline Dr Exit	Ahead	2t	3	0	3	2	0	2
	Ahead	2u	3	0	3	2	0	2
Skyline Dr	Left	2v	1	2	-1	2	2	0
	Ahead	2w	2	4	-2	3	4	-1
	Ahead	2x	2	4	-2	4	4	0
West Circulatory	Ahead	2y	4	4	0	11	7	4
	Ahead	2z	1	5	-4	2	4	-2
	Right	2aa	2	5	-3	7	5	2
M62 WB On-Slip	Ahead	2ab	2	0	2	5	0	5
	Ahead	2ac	1	0	1	2	0	2
M62 EB Off-Slip	Left	2ad	2	2	0	2	3	-1
	Ahead	2ae	3	6	-3	5	6	-1
	Ahead	2af	3	3	0	1	3	-2
North Circulatory	Ahead	2ag	2	3	-1	0	4	-4
	Ahead	2ah	7	6	1	6	7	-1
	Right	2ai	3	4	-1	2	3	-1

2.8.5. As shown in Table 2.6, the majority of queuing between the observed dataset and the modelled dataset is within a tolerance of 3 PCUs on most lanes on the approaches of the roundabout. The following observations have been noted in each peak period:

2.8.6. AM Peak

- Where queueing discrepancies greater than 3PCUs have been noted, these occur on the circulatory carriageway. Only three lanes are shown to have lower queues than those observed. 2 of these are 4PCUS below what was observed and 1 is 5 below what was observed.
- The southern circulatory queueing discrepancy is a result of 3 more PCUs being allocated to the offside lane than the nearside. As these lanes are fed from the same upstream link and subject to the same green phase. As such, it is not considered necessary to adjust the circulatory flows.
- The remaining two queue discrepancies occur on the east and west circulatory lanes over the M62. The queue discrepancy is not considered to have an impact on the operation of the junction and could be a result of lane weaving on these long links, which is not permitted within the model.

2.8.7. PM Peak

- Where queueing discrepancies greater than 3PCUs have been noted, these occur on the circulatory carriageway. Only three lanes are shown to have lower queues than those observed.
- The southern circulatory queueing discrepancy is a result of 5 more PCUs being allocated to the offside lane than the nearside. As these lanes are fed from the same upstream link and subject to the same green phase. With the same combined queueing over the two links as that observed, it is not considered necessary to adjust the circulatory flows.
- The Burtonwood Rd S (NB) approach shows a discrepancy of 4PCUs on the offside lane (Movement 2n).

2.9 COMMENT 10

2.9.1. Comment 10 from Highways England is as follows:

- *"The source of intergreens, signal timings and cycle time in the TRANSYT model should be clarified."*

2.9.2. Traffic signal detailed design drawings and signal specification forms for the existing signalised junctions have been provided by WBC and have been input into the modelling to reflect the existing scenario, where available.

2.9.3. Stage timings have been derived using TRANSYT, with the resultant queuing on each approach observed to ensure the level of queuing, and ergo the signal timings, reflected on-site conditions. This was considered the best approach due to the variable green times each cycle that can result as part of the MOVA signal control.

2.9.4. Outside the proposed works, the general configuration, phasing and staging of each junction has been assumed to remain largely unchanged. Therefore, we have used the existing signal specification data and have utilised, where applicable, existing phasing, staging and intergreen data to inform the proposed layout model and these have been revised as necessary.

2.10 COMMENT 11

2.10.1. Comment 11 from Highways England is as follows:

i *“Modifications to the distribution of traffic between lanes in the TRANSYT model have been made manually and these should be explained.”*

2.10.2. Routing of traffic within the network is initially decided based on the ‘lane balancing’ allocation mode within TRANSYT. This mode allocates traffic flow to TRANSYT paths, for a given OD pair, in such a way as to ‘balance’ the flow-to-saturation-flow ratio (Y values) on the first downstream signalled part of each path that connects that OD pair. However, after reviewing the allocation of flows, some adjustments to flows were undertaken based on logical routing and lane occupancy within the model at downstream links. Much of the adjustments made were to account for no internal weaving on the circulatory carriageway within the models.

2.11 COMMENT 12

2.11.1. Comment 12 from Highways England is as follows:

i *“Differences are present between the with and without mitigation models that do not appear to be connected to the mitigation, such as an additional phase delay. we would suggest model changes from the existing are noted for information and to ensure a fair / appropriate comparison.”*

2.11.2. The phase delay relates to controller stream 2 at the Southwest portion of the junction. However, the discrepancies related to Scenario 2 AM and PM in the proposed mitigation model vs the without mitigation model. This scenario is not relevant to our assessment as the mitigation only relates to Scenario 5 and is what the without mitigation option should be compared to.

2.12 COMMENT 13

2.12.1. Comment 13 from Highways England is as follows:

i *“There appears to be a minor flow discrepancy between the flows provided in the report and within the model in Scenario 5 at M62 J8.”*

2.12.2. In response to the spreadsheet error which was addressed in Comment 8, we have updated the M62 Junction 8 modelling. In addressing this error, we also noticed that the HGV flows for the Mountpark and Zones 1-2 (original consent) developments had not been converted to PCUs. This has also been included within the revised modelling. This updated modelling also means that any flow discrepancies have been addressed.

2.12.3. The operation of the existing M62 Junction 8 signalised gyratory has been assessed using TRANSYT and the results of the assessment are shown in Tables 2-7 to 2-8. Where a traffic stream is indicated to operate over capacity (greater than 90% DoS for signalised junction and 85% for priority junctions), this is highlighted in red.

Table 2-7 – M62 Junction 8 (Existing Layout) TRANSYT results

Arm	Traffic Stream	Scenario 2 2021 AM (Base)		Scenario 2 2021 PM (Base)		Scenario 5 2021 AM + Phase 4-7 + Omega Zone 8		Scenario 5 2021 PM + Phase 4-7 + Omega Zone 8	
		DoS (%)	MMQ (PCU)	DoS (%)	MMQ (PCU)	DoS (%)	MMQ (PCU)	DoS (%)	MMQ (PCU)
J62 Junction 8									
15	1	17	0	57	13	17	0	47	4
	2	17	0	57	13	17	0	66	4
16	1	84	11	68	9	65	8	58	3
	2	87	11	86	11	90	12	78	10
	3	42	5	28	3	33	3	26	1
17	1	4	0	31	2	7	0	29	3
18	1	78	13	45	10	87	14	29	3
19	1	65	4	40	2	48	4	93	12
	2	54	4	60	4	72	5	80	6
20	1	79	9	64	4	61	5	89	11
	2	85	9	90	11	69	4	35	0
	3	40	2	22	1	24	1	58	0
21	1	47	5	24	2	29	3	66	6
	2	26	2	24	2	29	3	10	2
22	1	0	0	0	0	0	0	0	0
23	1	21	2	89	13	53	5	68	14
24	1	26	2	60	4	40	2	54	8
25	1	43	5	89	11	52	5	66	12
26	1	27	0	65	4	22	0	32	3
27	1	36	0	103	72	37	0	71	4
28	1	65	5	71	5	59	2	48	5
	2	9	1	12	2	6	1	33	2
29	1	0	0	0	0	0	0	49	0
30	1	32	2	64	7	40	4	47	5
	2	59	5	65	11	70	6	88	15
	3	44	2	70	15	58	9	13	0
31	1	81	9	28	2	48	5	54	4
32	1	60	3	75	4	48	3	84	8
33	1	35	3	48	5	33	3	52	4
34	1	24	1	37	2	19	1	26	0
35	1	26	0	49	0	28	0	0	0
36	1	59	10	57	4	63	11	75	1
	2	73	11	89	20	83	16	0	0

	3	37	4	10	2	30	3	90	15
37	1	74	7	57	4	58	5	38	5
38	1	88	10	88	8	80	9	100	24
39	1	35	3	56	4	32	3	56	0
40	1	33	2	26	0	32	0	68	7
41	1	0	0	0	0	0	0	24	2
42	1	66	2	75	10	70	1	68	7
43	1	0	0	0	0	0	0	32	0
44	1	92	17	87	14	89	15	100	40
45	2	74	7	30	4	59	4	41	3
46	1	387	445	104	35	231	281	0	0
47	1	30	0	53	0	31	0	56	0
48	1	26	2	82	9	29	2	86	10
49	1	49	4	30	2	51	4	30	2
	2	26	2	82	9	29	2	86	10
50	1	22	0	31	0	23	0	32	0
51	1	100	35	100	38	100	37	76	8
	2	6	1	50	4	11	1	76	8
52	1	0	0	0	0	0	0	0	0

2.12.4. The operation of the proposed M62 Junction 8 signalised gyratory has been assessed using TRANSYT and the results of the assessment are shown in Table 2-8.

Table 2-8 – M62 Junction 8 (Proposed) TRANSYT results

Arm	Traffic Stream	Scenario 5 2021 AM + Phase 4-7 + Omega Zone 8		Scenario 5 2021 PM + Phase 4-7 + Omega Zone 8	
		DoS (%)	MMQ (PCU)	DoS (%)	MMQ (PCU)
J62 Junction 8					
15	1	18	1	52	3
	2	18	1	52	3
16	1	65	8	72	9
	2	90	12	87	11
	3	33	3	39	4
17	1	29	2	46	2
18	1	48	9	30	0
	2	63	11	39	0
19	1	84	6	64	4
	2	80	6	42	4
20	1	51	3	53	4
	2	85	9	86	11
	3	24	1	26	1
21	1	58	7	39	5
	2	44	5	20	2
22	1	0	0	0	0
23	1	53	5	93	12
24	1	40	2	80	6
25	1	52	5	89	11
26	1	22	0	35	0
27	1	37	0	58	0
28	1	51	2	62	5
	2	14	1	17	2
29	1	0	0	0	0
30	1	49	7	69	11
	2	72	13	54	4
	3	58	5	65	5
31	1	48	5	32	3
32	1	48	3	71	4
33	1	33	3	48	5
34	1	19	1	33	2
35	1	32	0	50	0
36	1	63	16	47	6

	2	83	15	88	16
	3	30	2	13	0
37	1	58	5	54	4
38	1	80	9	84	8
39	1	32	3	52	4
40	1	32	0	26	0
41	1	0	0	0	0
42	1	79	7	75	1
43	1	0	0	0	0
44	1	89	16	81	10
45	2	68	8	34	4
46	1	51	0	50	0
47	1	31	0	56	0
48	1	29	2	82	9
49	1	51	4	29	2
	2	29	2	82	9
50	1	23	0	32	0
51	1	94	13	87	11
	2	94	13	87	11
52	1	0	0	0	0

- 2.12.5. While the results indicate a DOS increase to above 90% (M62 EB off-slip in the AM / Skyline Drive in the PM), the actual increase in queuing on these arms is 3 PCUs or less, therefore representing a very small change in performance. It is also worth noting that in the AM, Scenario 5 (proposed development and mitigation) provides a substantial reduction in queuing on the M62 EB off-slip arm in comparison to Scenario 2 (currently committed).
- 2.12.6. In addition to this, our assessment of Scenario 5 assumes that the Burtonwood Road Services site still has the majority of its B1 / B2 / B8 development to be constructed. As is discussed in response to Comment 6, a large amount of the site has already been built on, with far lower trip generators in the AM peak than the original consent, meaning that we have likely overestimated the future impact of this committed development on the road network. The true level of trip generation from this site is likely to represent a reduction in vehicles on the M62 Junction 8 roundabout, enabling the junction to operate within capacity in 2021 with the addition of development traffic.

2.13 COMMENT 14

2.13.1. Comment 14 from Highways England is as follows:

- i *“The proposed mitigation scenario promotes using the two lanes available on the Skyline Drive exit. The exit merges from two lanes to one approximately 100m from the junction. Research has shown the presence of exit merges can influence upstream lane choice. We therefore suggest a sensitivity test should be undertaken with a 75/25% nearside / offside split in traffic to the Skyline Drive exit.”*

2.13.2. The proposed mitigation scenario models peak conditions experienced by the roundabout. As a result, it is considered appropriate that all available lanes will be fully utilised by traffic. Furthermore, observed operation of the existing roundabout show that HGVs exiting the roundabout onto Skyline Drive stick to the nearside lane whilst the majority of cars stick to the offside lane in order to pass the slower moving vehicles. It is therefore considered that the current split of traffic appropriately reflects anticipated operation.

2.14 COMMENT 15

2.14.1. Comment 15 from Highways England is as follows:

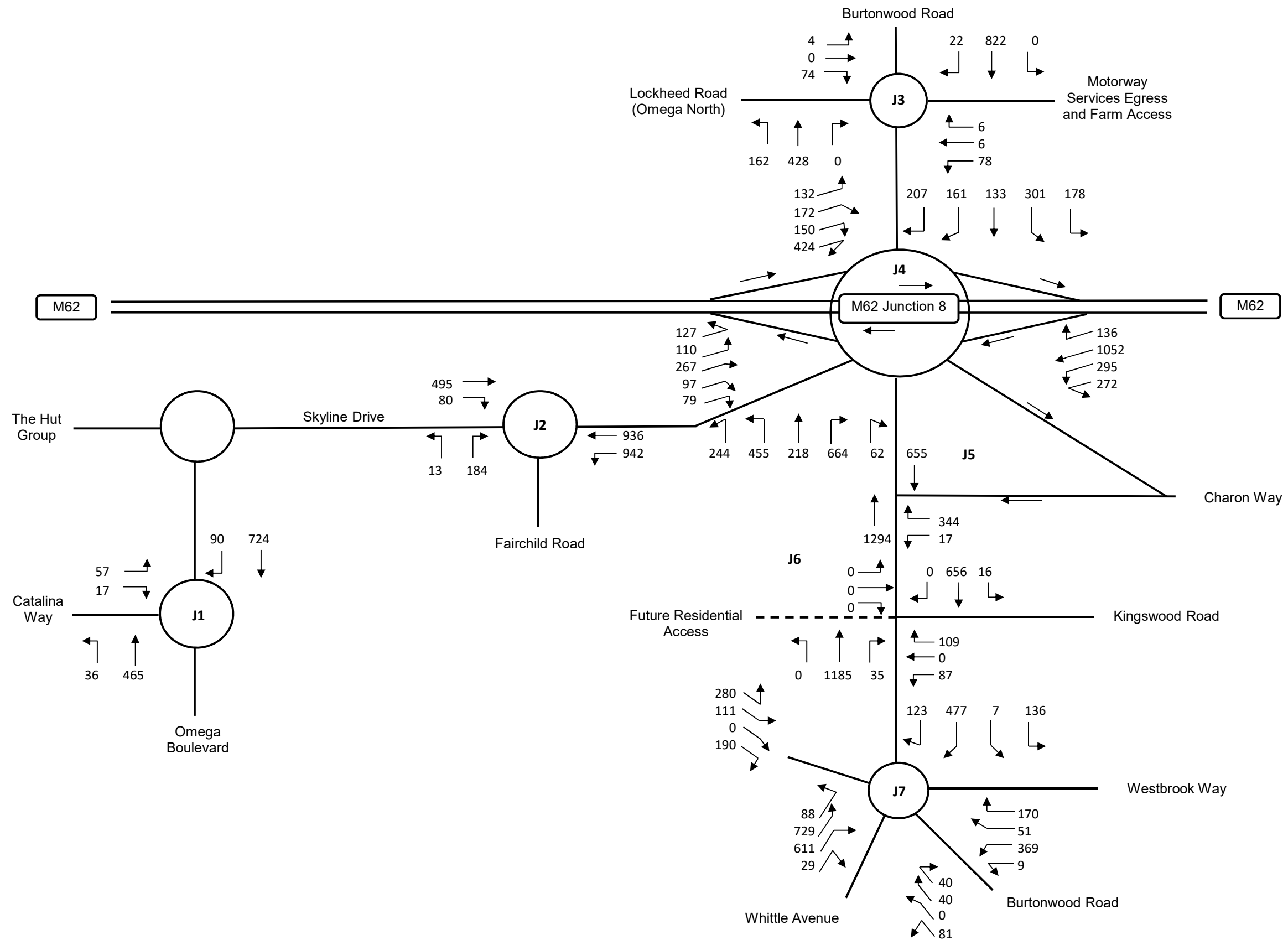
- i *“The TA includes a chapter outlining a Framework Travel Plan (FTP) for the proposed development, which seeks to provide a basis for how a full Travel Plan (TP) might operate upon full occupation of the development. WSP suggest that the consultant could have sought to use data from the existing operational units on the wider Omega site, which would indicate the existing mode share in the area. This would therefore allow the occupier to derive some robust SMART targets for mode shift based on existing local data and implement the appropriate measures to encourage positive travel behaviours early in the new developments operation”*

2.14.2. The FTP sets out a range of measures and incentives which will be adopted at the developments to promote accessibility by sustainable modes. It is considered that the development of the site will build on the excellent sustainable travel initiative, including the bespoke Omega bus service and comprehensive pedestrian and cycle networks that are currently provided within Omega.

Appendix A

NETWORK DIAGRAMS

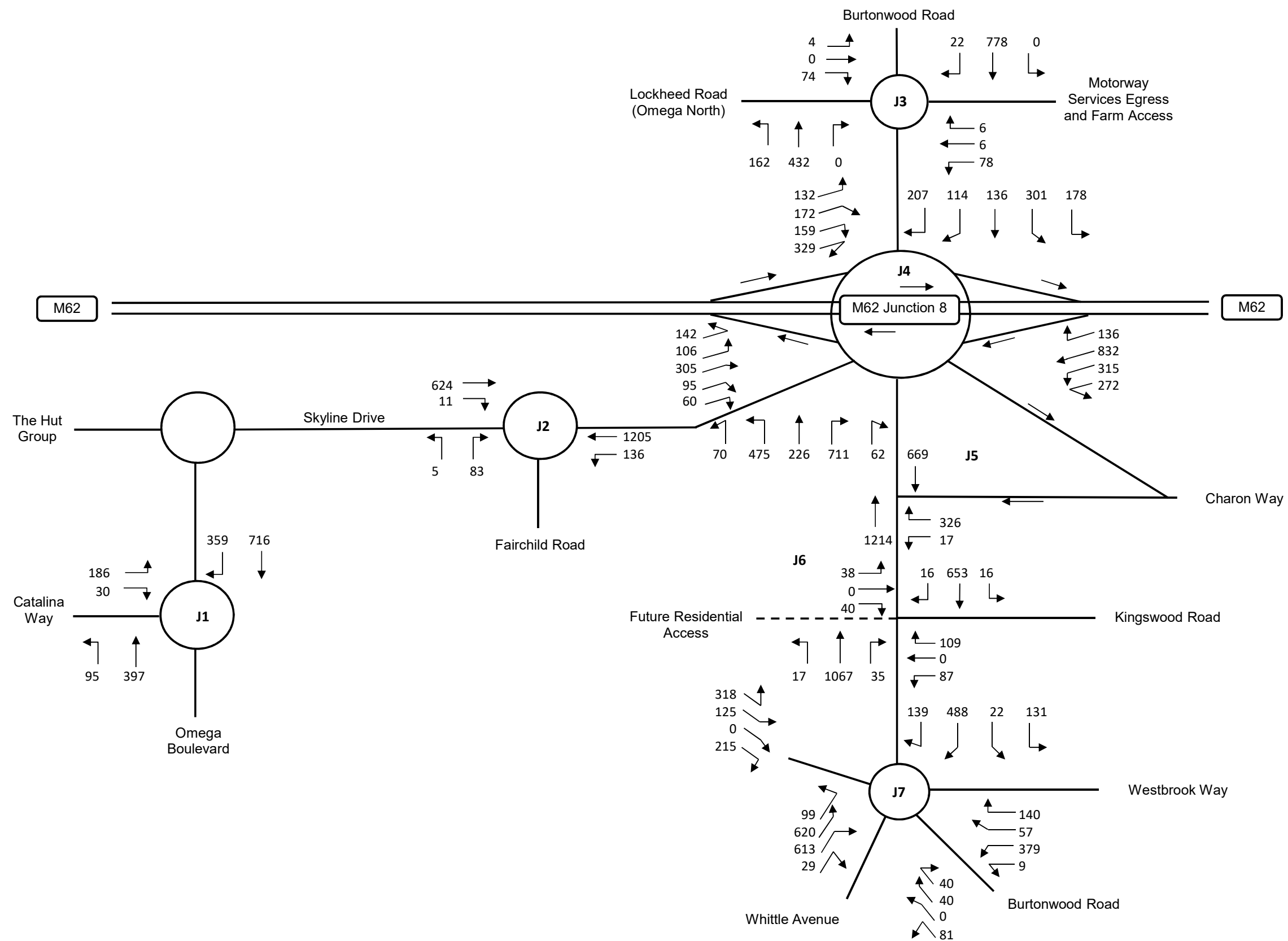




TITLE
ZONE 8 OMEGA
TRANSPORT ASSESSMENT

SCENARIO
2021 Scenario 2
AM PEAK HOUR

FIGURE
58



TITLE
OMEGA WEST
TRANSPORT ASSESSMENT

SI SCENARIO
2021 Scenario 5
AM PEAK HOUR

FIGURE
64

Appendix B

JUNCTION MODELLING OUTPUT
FILES



TRANSYT 15

Version: 15.5.2.7994
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Filename: Junction 8 M62_HE Response FOR ISSUE.t15

Path: M:\50400134 - Omega, Warrington\Omega, Warrington\ANALYSIS\Zone 8 Directory\TRANSYT

Report generation date: 13/03/2020 15:57:13

»A1 - 2019 AM Surveyed : D1 - 2019 AM Surveyed* :
»A2 - 2019 PM Surveyed : D2 - 2019 PM Surveyed* :
»A3 - 2021 AM Scenario 2 : D3 - 2021 AM Scenario 2* :
»A4 - 2021 PM Scenario 2 : D4 - 2021 PM Scenario 2* :
»A7 - 2021 AM Scenario 5 : D7 - 2021 AM Scenario 5* :
»A8 - 2021 PM Scenario 5 : D8 - 2021 PM Scenario 5* :

A1 - 2019 AM Surveyed D1 - 2019 AM Surveyed*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To					
	A	B	C	D	E	F
From	A			6		0
	B			5	5	
	C	6	6			6
	D		11			
	E	8				
	F			5		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	43	9	36	1	7
	2	Ü	2	A,D,F	14	15	1	1	1
	3	Ü	3	C,D,E	21	32	11	1	7

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1	1	1	B	43	9	36
3	2	1	1	B	43	9	36
4	1	1	1	B	43	9	36
5	1	1	1	C	21	32	11
6	1	1	1	C	21	32	11
7	1	1	1	C	21	32	11

	H			13	13			
	I							6
	J						9	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	24	25	1	1	1
	2	Ü	5	D,E,H,I	30	48	18	1	7
	3	Ü	6	C,F,J	62	9	17	1	6
	4	Ü	7	C,F,G,I	18	19	1	1	1

Traffic Stream Green Times

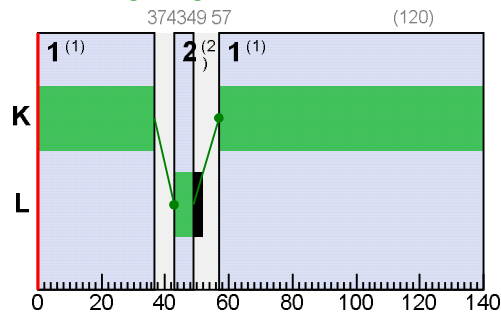
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	30	48	18
16	2	2	2	D	30	48	18
16	3	2	2	D	30	48	18
17	1	2	2	C	53	25	42
19	1	2	2	C	53	25	42
19	2	2	2	C	53	25	42
20	1	3	2	E	24	56	32
20	2	3	2	E	24	56	32
20	3	3	2	E	24	56	32
23	1	3	2	F	61	19	28
24	1	3	2	G	9	19	10
25	1	3	2	F	61	19	28
28	1	3	2	I	18	56	38
28	2	3	2	I	18	56	38

Phase Timings Diagram for Controller Stream 2

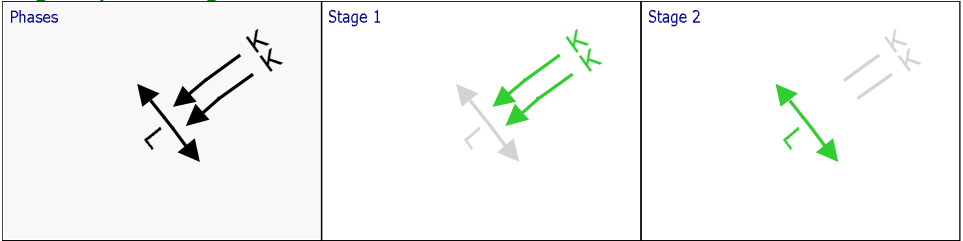
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	57	37	120
21	2	4	3	K	57	37	120

Phase Timings Diagram for Controller Stream 3

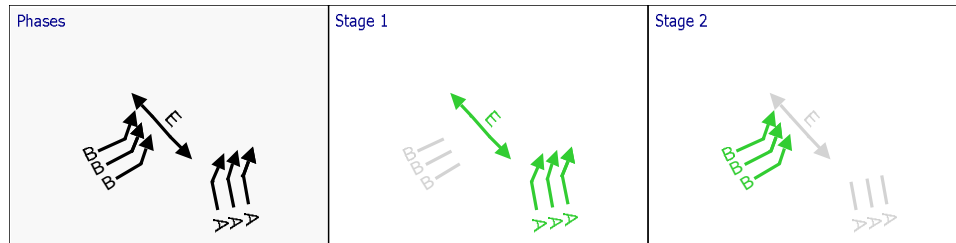


Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

From	To		
	A	B	E
	A	5	
B	5		5



Intergreen Matrix for Controller Stream 5

From	To		
	C	D	
C		5	
D	5		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	31	4	43	1	7
	2	Ü	2	D	9	26	17	1	7

Traffic Stream Green Times

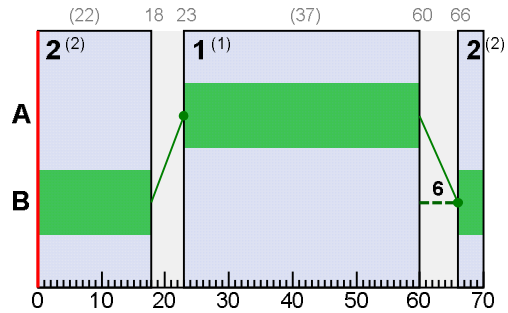
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	31	4	43
36	2	6	5	C	31	4	43
36	3	6	5	C	31	4	43
37	1	6	5	D	9	26	17
38	1	6	5	D	9	26	17
39	1	6	5	D	9	26	17

Phase Timings Diagram for Controller Stream 5

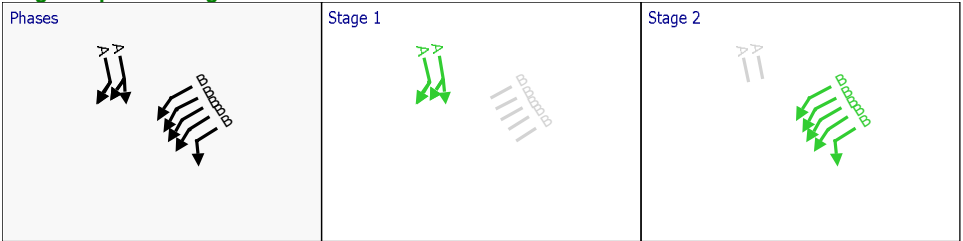
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	23	60	37
45	2	7	6	A	23	60	37
48	1	7	6	B	66	18	22
49	1	7	6	B	66	18	22
49	2	7	6	B	66	18	22
51	1	7	6	B	66	18	22
51	2	7	6	B	66	18	22

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



5	1	Charon Way Left	1	1	C	8	1995	11	11.00	2	3748	26.59	24.57	81.35	0.13	100	100	0.00	0.86
6	1	Charon Way Right	1	1	C	138	1842	11	0.09	44	104	32.58	30.53	92.02	2.47	100	100	0.00	18.21
7	1	Charon Way Right	1	1	C	136	1819	11	0.00	44	106	43.44	30.42	91.95	2.43	100	100	0.00	17.89
8	1	Charon Way	1			146	1653	70	0.00	9	919	11.28	0.11	0.00	0.00	100	100	0.00	0.06
10	1	Charon Way	1			282	1962	70	0.00	14	526	5.24	0.15	0.00	0.01	100	100	0.00	0.17
11	1	Burtonwood Road South	1			523	2120	70	0.00	25	265	2.85	0.28	0.00	0.04	100	100	0.00	0.57
12	1	Burtonwood Road South	1			248	1980	70	38.00	13	620	4.85	0.13	0.00	0.01	100	100	0.00	0.13
13	1		1			248	Unrestricted	70	38.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					256	Unrestricted	70	37.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			248	1934	70	18.00	13	603	15.46	0.14	0.00	0.01	100	100	0.00	0.13
	2	Burtonwood Road North	1			248	1937	70	18.00	13	604	15.83	0.14	0.00	0.01	100	100	0.00	0.13
16	1		2	2	D	350	1900	18	0.00	68	33	36.77	30.15	92.27	6.53	100	100	0.00	45.68
	2		2	2	D	350	1900	18	0.63	70	28	38.08	31.40	93.83	6.64	100	100	0.00	47.47
	3		2	2	D	350	1900	18	0.63	70	28	38.14	31.40	93.83	6.64	100	100	0.00	47.47
17	1		2	2	C	132	1900	42	23.00	11	696	12.89	1.65	5.99	0.15	100	100	0.00	0.96
18	1		2			1006	1900	70	25.59	68	32	12.81	4.65	27.45	6.57	100	100	0.27	22.18
19	1		2	2	C	403	1900	42	8.00	34	161	7.19	3.35	15.23	1.26	100	100	0.00	6.08
	2		2	2	C	604	1900	42	5.00	52	74	10.77	7.16	34.19	4.01	100	100	0.00	19.62
20	1		3	2	E	511	1900	32	6.37	58	56	21.88	15.82	43.62	4.74	100	100	8.45	43.14
	2		3	2	E	482	1900	32	6.21	54	66	11.45	5.43	28.49	2.67	100	100	0.00	12.04
	3		3	2	E	350	1900	32	14.00	39	130	7.42	1.29	0.00	0.13	100	100	0.00	1.78

42	1		7			1113	1900	70	13.00	59	54	9.34	1.34	0.00	0.41	100	100	0.00	5.87
43	1					370	Unrestricted	70	47.00	0	Unrestricted	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	743	1900	37	4.00	72	25	17.02	7.14	26.10	11.07	100	100	0.00	23.37
45	2		7	6	A	494	1900	37	5.05	48	88	20.64	3.12	7.70	1.67	100	100	0.00	6.56
46	1		7			644	1900	70	0.00	34	166	8.32	0.49	0.00	0.09	100	100	0.00	1.23
47	1		7			406	1900	70	0.00	21	321	4.19	0.26	0.00	0.03	100	100	0.00	0.41
48	1		7	6	B	107	1900	22	0.11	17	423	40.60	17.38	68.91	1.49	100	100	0.00	8.26
49	1		7	6	B	192	1900	22	0.26	31	189	26.14	18.99	71.87	2.68	100	100	0.00	16.11
	2		7	6	B	107	1900	22	0.11	17	423	24.61	17.38	68.91	1.49	100	100	0.00	8.26
50	1		7			299	1900	70	0.00	16	472	16.06	0.18	0.00	0.01	100	100	0.00	0.21
51	1		7	6	B	512	1900	22	0.95	86	5	57.96	38.61	105.91	11.07	100	100	0.00	84.78
	2		7	6	B	132	1900	22	0.16	21	323	37.32	17.83	71.12	1.83	100	100	0.00	10.46
52	1					654	Unrestricted	70	13.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			391	1900	70	21.00	21	337	1.25	0.25	0.00	0.03	100	100	0.00	0.38
	2		1			339	1900	70	21.00	18	404	1.21	0.21	0.00	0.02	100	100	0.00	0.28
	3		1			320	1900	70	21.00	17	434	1.19	0.19	0.00	0.02	100	100	0.00	0.24
54	1		1	1	A	248 <	1980	45	14.09	19	372	3.17	2.17	12.82	1.23 +	100	100	0.00	2.39
	2		1	1	A	248 <	1980	45	14.09	19	372	3.17	2.17	12.82	1.23 +	100	100	0.00	2.39

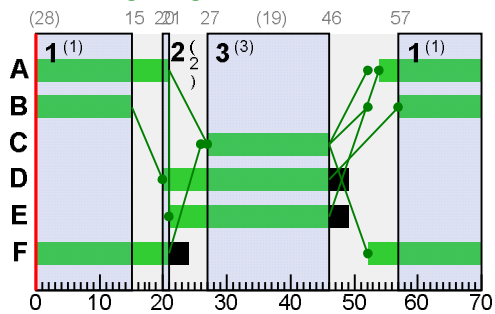
Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2278.78	124.46	18.31	48.43	687.77	79.63	8.72	776.12
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	2278.78	124.46	18.31	48.43	687.77	79.63	8.72	776.12

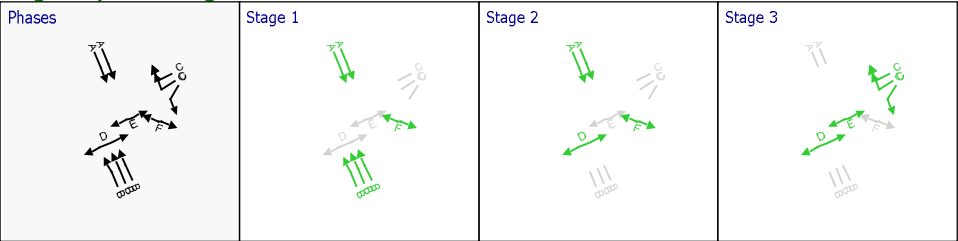
- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0

5	1	1	1	C	27	46	19
6	1	1	1	C	27	46	19
7	1	1	1	C	27	46	19
54	1	1	1	A	54	21	37
54	2	1	1	A	54	21	37

Phase Timings Diagram for Controller Stream 1

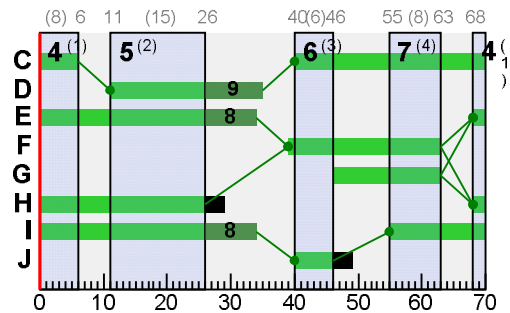


Stage Sequence Diagram for Controller Stream 1

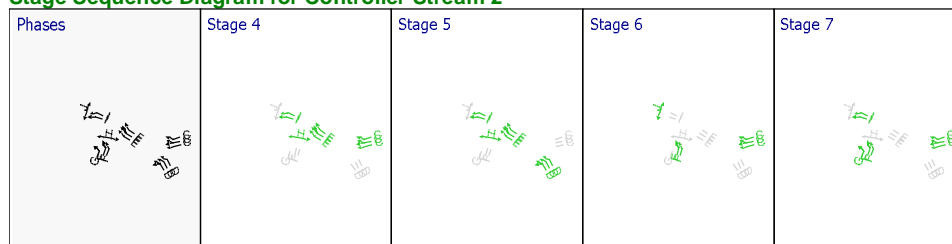


Intergreen Matrix for Controller Stream 2

	To									
		C	D	E	F	G	H	I	J	
From	C		5							
	D	5								



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

From	To	
	K	L
	6	8

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	45	25	120	1	7
	2	Ü	2	L	31	37	6	1	6

	E		12	
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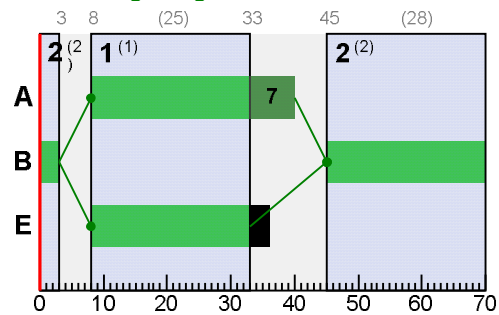
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	8	33	25	1	7
	2	Ü	2	B	45	3	28	1	7

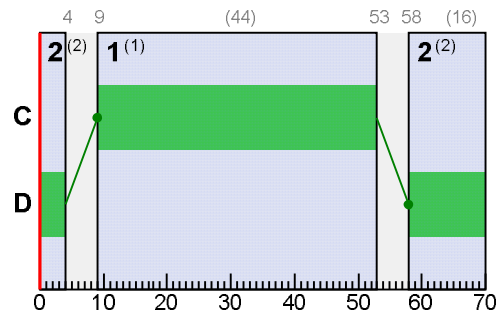
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	8	40	32
30	2	5	4	A	8	40	32
30	3	5	4	A	8	40	32
31	1	5	4	B	45	3	28
32	1	5	4	B	45	3	28
34	1	5	4	B	45	3	28

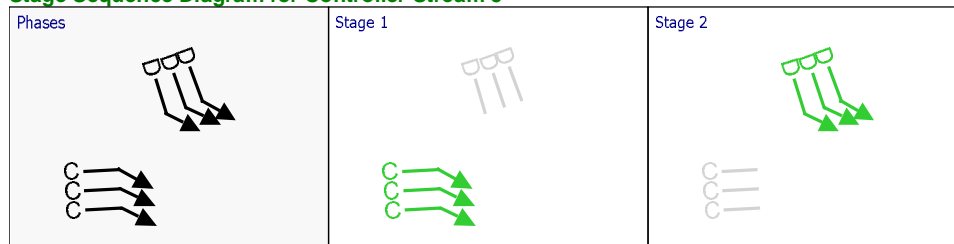
Phase Timings Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

	To	
	A	B
From	A	6
	B	5

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	Ü	1	A	14	47	33	1	7
	2	Ü	2	B	53	9	26	1	7

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUE S	WEIGHTS		PENALTIE S	P.I.
Arm	Traffic Stream	Name	Traffic node	Controlle r stream	Phase	Calculate d flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actual green (s per cycle)	Waste d time total (s (per cycle))	Degree of saturatio n (%)	Practical reserve capacity (%)	JourneyTim e (s)	Mean Delay per Veh (s)	Mean stop s per Veh (%)	Mean max queue (PCU)	Delay weightin g multiplier (%)	Stop weightin g multiplier (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			969	2312	70	8.00	42	115	12.56	0.56	0.00	0.15	100	100	0.00	2.14
RA c	1		R3			17	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RA x	1					682	1800	70	0.00	38	138	12.61	0.61	0.00	0.12	100	100	0.00	1.64
RB	1		R4			179	1126	70	0.00	16	466	12.30	0.30	0.00	0.02	100	100	0.00	0.21
RB c	1		R4			862	Unrestrict ed	70	8.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RB x	1					124	Unrestrict ed	70	30.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			475	1623	70	0.00	29	207	12.46	0.46	0.00	0.06	100	100	0.00	0.86
RC c	1		R1			158	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC x	1					883	Unrestrict ed	70	8.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			67	878	70	0.00	8	1080	12.17	0.17	0.00	0.00	100	100	0.00	0.04
RD c	1		R2			632	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD x	1					1	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwoo d Road South	1	1	B	141	1980	28	0.27	17	419	21.96	13.51	62.07	1.70	100	100	0.00	8.61
2	1	Burtonwoo d Road South	1			433	1980	70	0.00	22	312	4.30	0.25	0.00	0.03	100	100	0.00	0.43
3	2	Burtonwoo d Road South	1	1	B	151	2120	28	0.45	17	415	19.54	13.56	62.06	1.82	100	100	0.00	9.25
4	1	Burtonwoo d Road South	1	1	B	141	1975	28	0.27	17	417	19.67	13.52	62.09	1.70	100	100	0.00	8.61

21	1		4	3	K	286	1900	120	4.21	18	399	7.83	2.14	15.02	1.69	100	100	0.00	2.95
	2		4	3	K	286	1900	120	4.21	18	399	8.18	2.14	15.02	1.69	100	100	0.00	2.95
22	1					572	Unrestricted	140	19.00	0	Unrestricted	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	250	1900	24	0.37	37	141	27.27	18.41	72.27	3.51	100	100	0.00	20.42
24	1		3	2	G	118	1900	17	0.00	24	273	27.55	21.79	78.81	1.81	100	100	0.00	11.31
25	1		3	2	F	248	1900	24	0.00	37	146	24.69	18.20	72.17	3.48	100	100	0.00	20.05
26	1		3			366	1900	70	0.00	19	367	2.56	0.23	0.00	0.02	100	100	0.00	0.33
27	1		3			616	1900	70	0.00	32	178	5.34	0.45	0.00	0.08	100	100	0.00	1.10
28	1		3	2	I	553	1900	49	27.86	45	99	7.08	2.73	22.63	4.54	100	100	0.00	7.53
	2		3	2	I	111	1900	49	33.11	9	954	7.66	2.97	46.14	1.45	100	100	0.00	1.94
29	1					664	Unrestricted	70	35.00	0	Unrestricted	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	669	1900	32	2.95	77	17	28.22	15.35	67.01	11.46	100	100	0.00	46.13
	2		5	4	A	171	1900	32	16.21	19	368	26.84	14.06	59.44	1.96	100	100	0.00	10.76
	3		5	4	A	620	1900	32	8.63	71	28	30.46	17.76	59.56	7.10	100	100	0.00	48.06
31	1		5	4	B	84	1900	28	0.11	11	740	26.61	12.87	58.96	1.46	100	100	0.00	4.89
32	1		5	4	B	261 <	1900	28	0.32	34	168	17.47	14.97	62.60	3.04 +	100	100	0.00	17.46
33	1		5			435	1900	70	5.84	25	260	11.68	0.61	8.09	1.49	100	100	0.00	1.49
34	1		5	4	B	174	1900	28	1.16	22	305	16.23	13.83	59.45	2.00	100	100	0.00	10.79
35	1		6			843	1900	70	12.40	47	90	22.27	1.72	11.33	11.81	100	100	0.00	6.91
36	1		6	5	C	171	1900	44	28.00	14	543	13.78	0.24	0.00	0.01	100	100	0.00	0.16
	2		6	5	C	881	1900	44	9.53	73	23	22.55	9.62	34.82	5.98	100	100	0.00	37.26
	3		6	5	C	84	1900	44	38.16	7	1204	29.69	17.26	92.74	1.52	100	100	0.00	6.70
37	1		6	5	D	179	1900	16	0.26	39	128	35.11	24.85	82.20	2.86	100	100	0.00	19.39
38	1		6	5	D	258	1900	16	0.42	57	57	35.99	28.75	91.75	4.61	100	100	0.00	32.22
39	1		6	5	D	187	1900	16	0.32	41	118	32.35	25.18	85.37	3.11	100	100	0.00	20.58
40	1		6			445	1900	70	0.00	23	284	3.15	0.29	0.00	0.04	100	100	0.00	0.51

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A3 - 2021 AM Scenario 2

D3 - 2021 AM Scenario 2*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To					
	A	B	C	D	E	F
From	A		6		0	
	B		5	5		
	C	6	6			6
	D		11			
	E	8				
	F		5			

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	25	61	36	1	7
	2	Ü	2	A,D,F	66	67	1	1	1
	3	Ü	3	C,D,E	3	14	11	1	7

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1
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		To								
From		C	D	E	F	G	H	I	J	
	C		5							
	D	5								
	E				5	5				
	F			5			5			
	G			5			5			
	H				13	13				
	I								6	
	J							9		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	2	7	5	1	1
	2	Ü	5	D,E,H,I	12	23	11	1	1
	3	Ü	6	C,F,J	45	50	5	1	1
	4	Ü	7	C,F,G,I	59	67	8	1	1

Traffic Stream Green Times

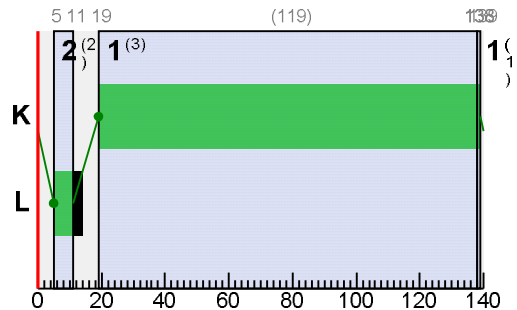
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	12	40	28
16	2	2	2	D	12	40	28
16	3	2	2	D	12	40	28
17	1	2	2	C	45	7	32
19	1	2	2	C	45	7	32
19	2	2	2	C	45	7	32
20	1	3	2	E	2	31	29
20	2	3	2	E	2	31	29
20	3	3	2	E	2	31	29
23	1	3	2	F	36	67	31
24	1	3	2	G	50	67	17
25	1	3	2	F	36	67	31
28	1	3	2	I	59	31	42
28	2	3	2	I	59	31	42

	3	Ü	1	K	19	138	119	1	1
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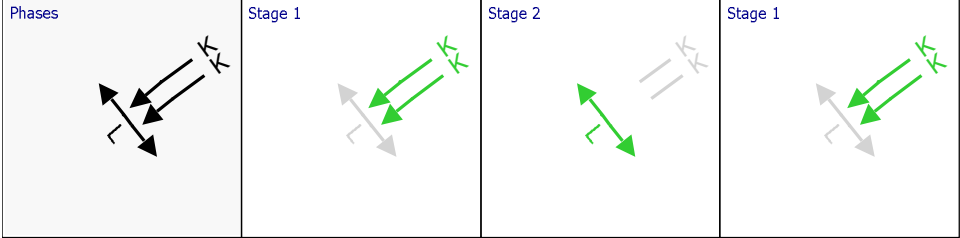
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	19	139	120
21	2	4	3	K	19	139	120

Phase Timings Diagram for Controller Stream 3

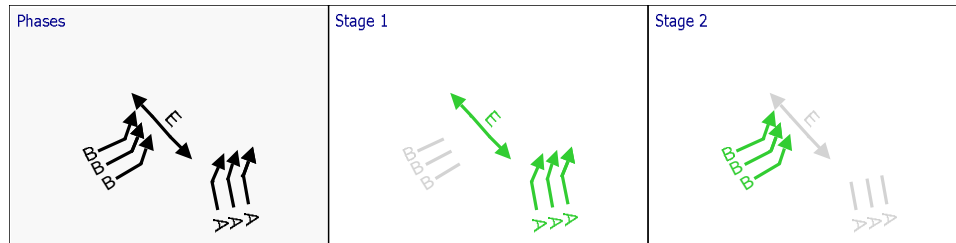


Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

	To
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Intergreen Matrix for Controller Stream 5

From	To		
	C	D	
	5		
To	C	D	
	5		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	34	6	42	1	7
	2	Ü	2	D	11	29	18	1	7

Traffic Stream Green Times

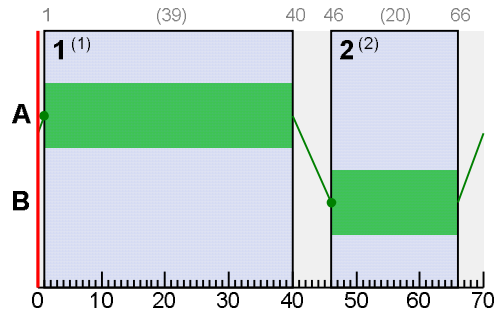
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	34	6	42
36	2	6	5	C	34	6	42
36	3	6	5	C	34	6	42
37	1	6	5	D	11	29	18
38	1	6	5	D	11	29	18
39	1	6	5	D	11	29	18

Phase Timings Diagram for Controller Stream 5

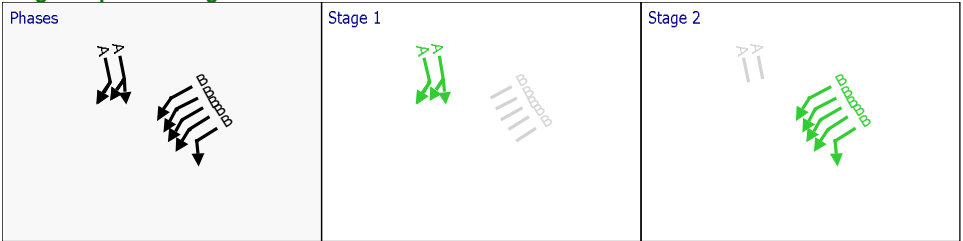
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	1	40	39
45	2	7	6	A	1	40	39
48	1	7	6	B	46	66	20
49	1	7	6	B	46	66	20
49	2	7	6	B	46	66	20
51	1	7	6	B	46	66	20
51	2	7	6	B	46	66	20

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



4	1	Burtonwood Road South	1	1	B	421	1975	36	0.89	41	118	17.55	11.40	57.48	4.71	100	100	0.00	21.96
5	1	Charon Way Left	1	1	C	17	1995	11	11.00	5	1711	26.74	24.72	81.56	0.28	100	100	0.00	1.83
6	1	Charon Way Right	1	1	C	173 <	1842	11	0.14	55	62	35.68	33.63	95.13	3.21 +	100	100	0.00	25.01
7	1	Charon Way Right	1	1	C	170	1819	11	0.00	55	65	46.36	33.34	96.57	3.27	100	100	0.00	24.42
8	1	Charon Way	1			190	1653	70	2.86	12	651	11.38	0.20	2.82	1.46	100	100	0.00	0.22
10	1	Charon Way	1			360	1962	70	0.00	18	391	5.29	0.21	0.00	0.02	100	100	0.00	0.29
11	1	Burtonwood Road South	1			873	2120	70	0.00	41	119	3.16	0.59	0.00	0.14	100	100	0.00	2.05
12	1	Burtonwood Road South	1			328	1980	70	32.00	17	442	4.91	0.18	0.00	0.02	100	100	0.00	0.23
13	1		1			328	Unrestricted	70	32.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					345	Unrestricted	70	31.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			330	1934	70	12.00	17	428	15.52	0.19	0.00	0.02	100	100	0.00	0.25
	2	Burtonwood Road North	1			330	1937	70	12.00	17	429	15.88	0.19	0.00	0.02	100	100	0.00	0.25
16	1		2	2	D	658 <	1900	28	0.00	84	8	36.51	29.90	83.23	10.73 +	100	100	0.00	84.47
	2		2	2	D	657 <	1900	28	1.21	87	3	40.59	33.92	88.33	11.43 +	100	100	0.00	95.17
	3		2	2	D	328	1900	28	0.47	42	112	23.12	16.39	66.84	4.51	100	100	0.00	23.95
17	1		2	2	C	35	1900	32	28.00	4	2196	11.32	0.08	0.00	0.00	100	100	0.00	0.01
18	1		2			1064 <	1900	70	28.07	78	15	21.49	13.32	64.84	12.92 +	100	100	145.07	209.60
19	1		2	2	C	580	1900	32	0.00	65	39	16.16	12.31	36.27	4.10	100	100	0.00	30.81
	2		2	2	C	483	1900	32	9.00	54	67	16.83	13.22	42.12	3.96	100	100	0.00	27.76
20	1		3	2	E	621 <	1900	29	1.01	79	14	31.33	25.28	75.52	9.07 +	100	100	108.59	176.39
	2		3	2	E	692 <	1900	29	3.00	85	6	35.85	29.84	65.36	8.74 +	100	100	169.66	256.78
	3		3	2	E	328	1900	29	13.11	40	123	14.90	8.77	23.56	1.59	100	100	0.00	12.31
21	1		4	3	K	703	1900	120	11.58	47	90	10.66	4.98	19.68	5.44	100	100	10.54	26.08
	2		4	3	K	398	1900	120	7.89	26	247	8.76	2.72	15.29	2.37	100	100	0.00	5.04

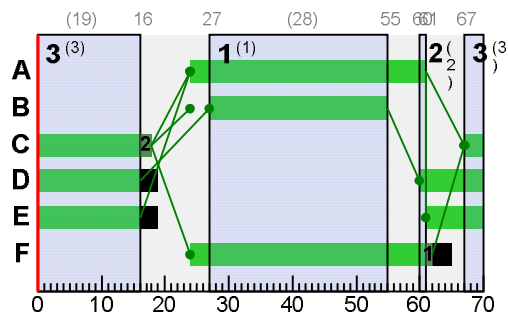
48	1		7	6	B	148	1900	20	0.21	26	243	43.06	19.84	74.47	2.14	100	100	0.00	12.96
49	1		7	6	B	272	1900	20	0.42	49	85	30.40	23.25	80.02	4.23	100	100	0.00	27.68
	2		7	6	B	148	1900	20	0.21	26	243	27.07	19.84	74.47	2.14	100	100	0.00	12.96
50	1		7			420	1900	70	0.00	22	307	16.16	0.27	0.00	0.03	100	100	0.00	0.45
51	1		7	6	B	272 <	1900	20	10.99	100	-10	432.23	412.88	509.31	35.31 +	100	100	0.00	459.68
	2		7	6	B	35	1900	20	16.05	6	1357	27.54	8.05	71.02	1.45	100	100	0.00	1.43
52	1					904	Unrestricted	70	10.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			595	1900	70	21.00	31	187	1.43	0.43	0.00	0.07	100	100	0.00	1.01
	2		1			537	1900	70	21.00	28	218	1.37	0.37	0.00	0.06	100	100	0.00	0.79
	3		1			506	1900	70	21.00	27	238	1.34	0.34	0.00	0.05	100	100	0.00	0.69
54	1		1	1	A	328 <	1980	45	8.18	25	255	3.43	2.43	16.82	1.25 +	100	100	0.00	3.64
	2		1	1	A	328 <	1980	45	8.18	25	255	3.43	2.43	16.82	1.25 +	100	100	0.00	3.64

Network Results

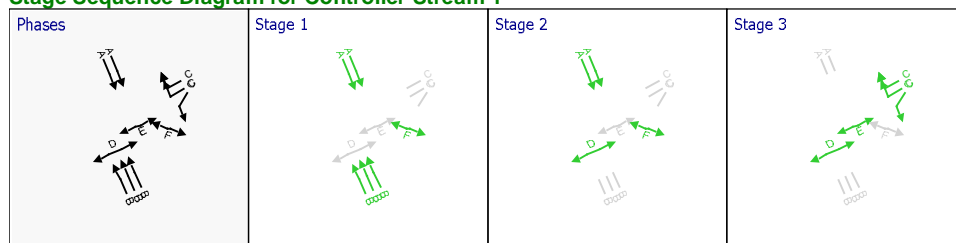
	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2788.03	654.17	4.26	561.13	7968.12	180.72	456.45	8605.28
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	2788.03	654.17	4.26	561.13	7968.12	180.72	456.45	8605.28

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A4 - 2021 PM Scenario 2
D4 - 2021 PM Scenario 2*

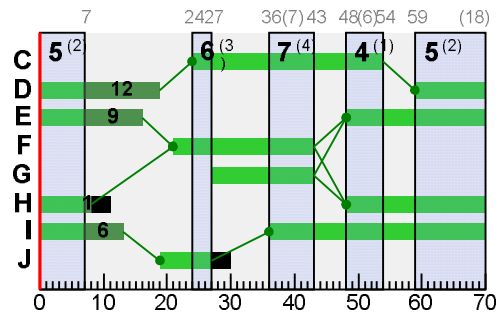


Stage Sequence Diagram for Controller Stream 1

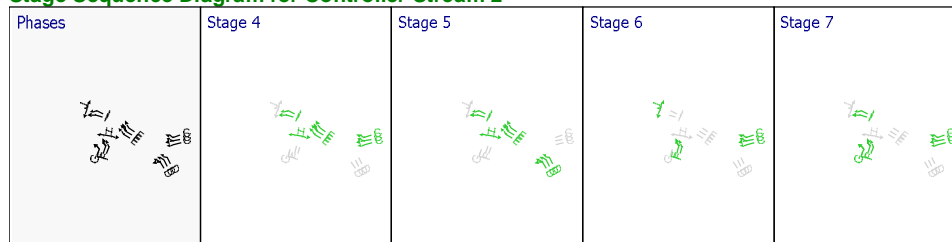


Intergreen Matrix for Controller Stream 2

	To									
	C	D	E	F	G	H	I	J		
From	C	5								
	D	5								
	E			5	5					
	F			5		5				
	G			5		5				
	H			13	13					
	I							6		
	J						9			



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

	To		
		K	L
	From	K	L
	K		6
	L	8	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	83	84	1	1	1
	2	Ü	2	L	90	96	6	1	6
	3	Ü	1	K	104	83	119	1	1

	E		12	
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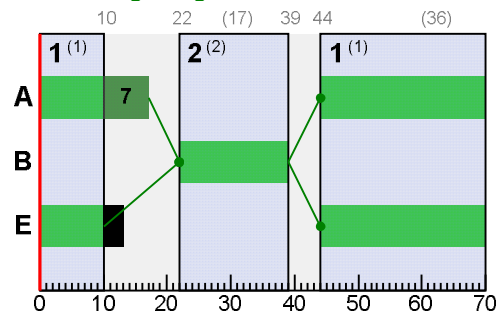
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	44	10	36	1	7
	2	Ü	2	B	22	39	17	1	7

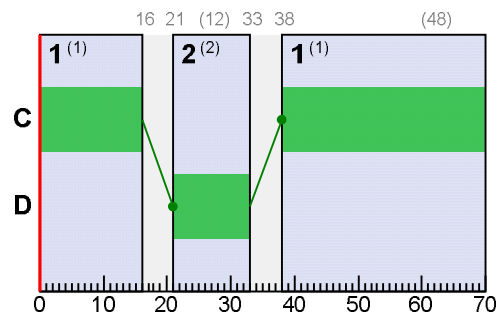
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	44	17	43
30	2	5	4	A	44	17	43
30	3	5	4	A	44	17	43
31	1	5	4	B	22	39	17
32	1	5	4	B	22	39	17
34	1	5	4	B	22	39	17

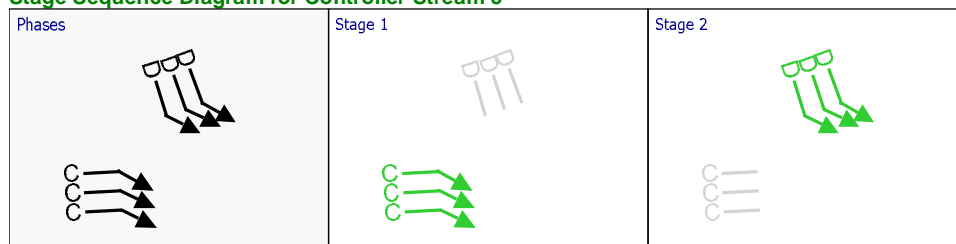
Phase Timings Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

From	To	
	A	B
	A	6
B	5	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	Ü	1	A	40	10	40	1	7
	2	Ü	2	B	16	35	19	1	7

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUE S	WEIGHTS		PENALTIE S	P.I.
Ar m	Traffic Strea m	Name	Traffi c node	Controlle r stream	Phas e	Calculate d flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actua l green (s (per cycle))	Waste d time total (s (per cycle))	Degree of saturatio n (%)	Practical reserve capacity (%)	JourneyTim e (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weightin g multiplie r (%)	Stop weightin g multiplie r (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			933	2312	70	15.00	40	123	12.53	0.53	0.00	0.14	100	100	0.00	1.94
RA c	1		R3			17	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RA x	1					682	1800	70	0.00	38	138	12.61	0.61	0.00	0.12	100	100	0.00	1.64
RB	1		R4			179	1146	70	0.00	16	476	12.29	0.29	0.00	0.01	100	100	0.00	0.21
RB c	1		R4			830	Unrestrict ed	70	15.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RB x	1					120	Unrestrict ed	70	17.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			475	1623	70	0.00	29	207	12.46	0.46	0.00	0.06	100	100	0.00	0.86
RC c	1		R1			158	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC x	1					852	Unrestrict ed	70	15.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			67	878	70	0.00	8	1080	12.17	0.17	0.00	0.00	100	100	0.00	0.04
RD c	1		R2			632	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD x	1					1	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwoo d Road South	1	1	B	208	1980	28	0.45	26	249	22.81	14.36	62.53	2.53	100	100	0.00	13.41
2	1	Burtonwoo d Road South	1			639	1980	70	0.00	32	179	4.48	0.43	0.00	0.08	100	100	0.00	1.09
3	2	Burtonwoo d Road South	1	1	B	223	2120	28	0.75	26	245	20.44	14.45	65.32	2.83	100	100	0.00	14.54

22	1					742	Unrestricte d	140	19.00	0	Unrestricte d	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	529	1900	22	1.00	89	2	59.34	50.48	119.8 2	12.54	100	100	0.00	113.2 5
24	1		3	2	G	275	1900	16	0.00	60	51	38.60	32.84	80.16	4.30	100	100	0.00	38.41
25	1		3	2	F	558 <	1900	22	0.00	89	1	54.19	47.69	102.5 4	11.36 +	100	100	0.00	112.0 9
26	1		3			833 <	1900	70	22.91	65	38	8.62	6.29	21.61	3.50 +	100	100	0.00	22.91
27	1		3			1362 <	1900	70	17.38	103	-12	178.68	173.8 0	109.7 0	71.94 +	100	100	0.00	952.2 3
28	1		3	2	I	810	1900	47	13.80	71	27	12.55	8.20	30.04	4.74	100	100	0.00	29.24
	2		3	2	I	138	1900	47	41.26	12	659	9.26	4.57	63.56	1.89	100	100	0.00	3.57
29	1					947	Unrestricte d	70	30.00	0	Unrestricte d	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	759	1900	43	5.63	64	40	21.61	8.74	42.71	6.54	100	100	0.00	30.23
	2		5	4	A	753	1900	43	11.16	65	39	27.37	14.59	76.74	11.27	100	100	0.00	50.60
	3		5	4	A	766	1900	43	10.57	70	29	26.84	14.14	91.70	15.29	100	100	1.63	53.15
31	1		5	4	B	134	1900	17	0.21	28	224	36.05	22.31	79.17	2.06	100	100	0.00	13.12
32	1		5	4	B	358 <	1900	17	0.32	75	21	30.63	28.13	59.42	4.06 +	100	100	0.00	42.39
33	1		5			537	1900	70	37.00	48	88	20.46	9.39	51.38	5.37	100	100	0.00	23.36
34	1		5	4	B	179	1900	17	2.11	37	144	21.28	18.88	46.06	1.60	100	100	0.00	14.36
35	1		6			938	1900	70	15.00	49	82	21.48	0.92	0.00	0.24	100	100	0.00	3.41
36	1		6	5	C	753	1900	48	19.32	57	58	18.74	5.21	24.77	3.63	100	100	0.00	17.81
	2		6	5	C	1124 <	1900	48	7.28	89	2	30.25	17.31	71.68	19.60 +	100	100	102.44	189.2 7
	3		6	5	C	134	1900	48	35.21	10	789	15.92	3.50	80.08	2.19	100	100	0.00	3.19
37	1		6	5	D	196	1900	12	0.32	57	58	43.12	32.87	96.65	3.69	100	100	0.00	27.79
38	1		6	5	D	297 <	1900	12	0.58	88	2	68.49	61.25	135.6 3	8.30 +	100	100	0.00	76.80
39	1		6	5	D	193	1900	12	0.32	56	61	39.76	32.59	97.28	3.74	100	100	0.00	27.17
40	1		6			490	1900	70	0.00	26	249	3.19	0.33	0.00	0.04	100	100	0.00	0.64
41	1					946	Unrestricte d	70	27.00	0	Unrestricte d	18.23	0.00	0.00	0.00	100	100	0.00	0.00
42	1		7			1421	1900	70	13.28	75	20	10.85	2.85	4.13	9.82	100	100	15.35	32.06
43	1					452	Unrestricte d	70	39.00	0	Unrestricte d	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	969 <	1900	40	0.00	87	3	29.65	19.77	70.01	14.40 +	100	100	11.38	95.44
45	2		7	6	A	330	1900	40	16.37	30	201	19.32	1.81	37.05	4.47	100	100	0.00	3.88

A7 - 2021 AM Scenario 5

D7 - 2021 AM Scenario 5*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To					
	A	B	C	D	E	F
From	A		6		0	
	B		5	5		
	C	6	6			6
	D		11			
	E	8				
	F		5			

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	60	27	37	1	7
	2	Ü	2	A,D,F	32	33	1	1	1
	3	Ü	3	C,D,E	39	49	10	1	7

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1	1	1	B	60	27	37
3	2	1	1	B	60	27	37
4	1	1	1	B	60	27	37
5	1	1	1	C	39	49	10
6	1	1	1	C	39	49	10
7	1	1	1	C	39	49	10

	H			13	13			
	I							6
	J						9	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	25	34	9	1	1
	2	Ü	5	D,E,H,I	39	58	19	1	1
	3	Ü	6	C,F,J	4	8	4	1	4
	4	Ü	7	C,F,G,I	17	20	3	1	1

Traffic Stream Green Times

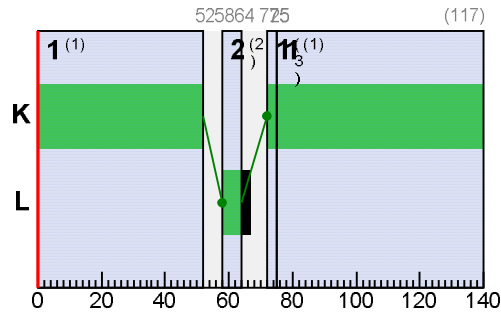
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	39	69	30
16	2	2	2	D	39	69	30
16	3	2	2	D	39	69	30
17	1	2	2	C	4	34	30
19	1	2	2	C	4	34	30
19	2	2	2	C	4	34	30
20	1	3	2	E	25	66	41
20	2	3	2	E	25	66	41
20	3	3	2	E	25	66	41
23	1	3	2	F	1	20	19
24	1	3	2	G	8	20	12
25	1	3	2	F	1	20	19
28	1	3	2	I	17	66	49
28	2	3	2	I	17	66	49

Phase Timings Diagram for Controller Stream 2

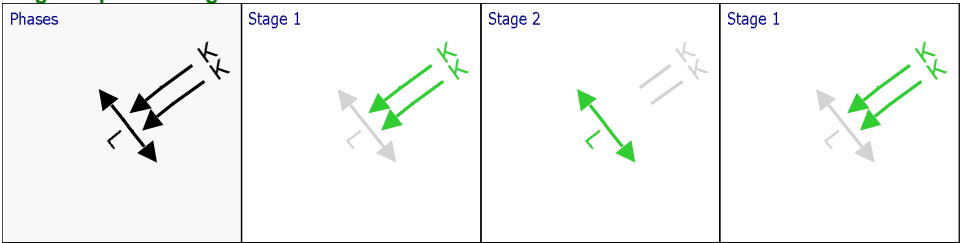
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	72	52	120
21	2	4	3	K	72	52	120

Phase Timings Diagram for Controller Stream 3

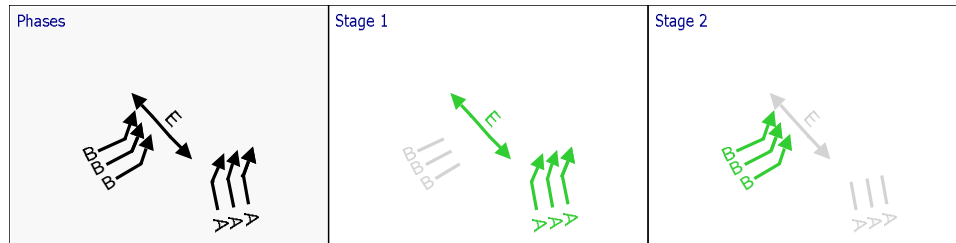


Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

From	To		
	A	B	E
	A	5	
B	5		5



Intergreen Matrix for Controller Stream 5

From	To		
	C	D	
	5		
From	C		5
	D	5	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	68	38	40	1	7
	2	Ü	2	D	43	63	20	1	7

Traffic Stream Green Times

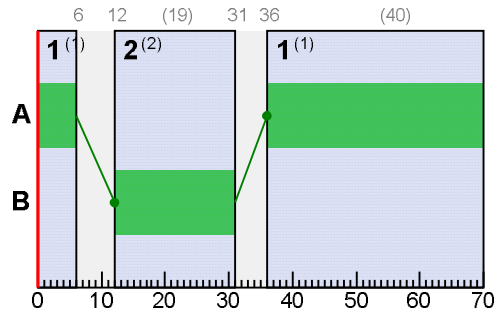
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	68	38	40
36	2	6	5	C	68	38	40
36	3	6	5	C	68	38	40
37	1	6	5	D	43	63	20
38	1	6	5	D	43	63	20
39	1	6	5	D	43	63	20

Phase Timings Diagram for Controller Stream 5

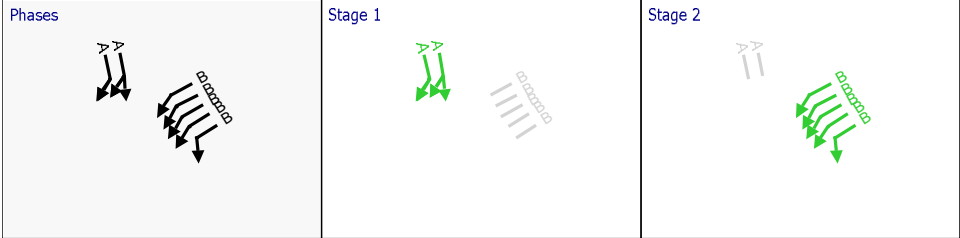
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	36	6	40
45	2	7	6	A	36	6	40
48	1	7	6	B	12	31	19
49	1	7	6	B	12	31	19
49	2	7	6	B	12	31	19
51	1	7	6	B	12	31	19
51	2	7	6	B	12	31	19

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



4	1	Burtonwood Road South	1	1	B	395	1975	37	0.71	38	140	16.55	10.40	55.73	4.28	100	100	0.00	18.96
5	1	Charon Way Left	1	1	C	17	1995	10	10.00	5	1560	27.63	25.61	83.07	0.28	100	100	0.00	1.89
6	1	Charon Way Right	1	1	C	164 <	1842	10	0.11	57	57	37.71	35.65	98.64	3.16 +	100	100	0.00	25.09
7	1	Charon Way Right	1	1	C	162	1819	10	0.00	57	59	48.44	35.42	98.41	3.11	100	100	0.00	24.63
8	1	Charon Way	1			181	1653	70	0.91	11	711	11.32	0.14	0.40	1.46	100	100	0.00	0.11
10	1	Charon Way	1			343	1962	70	0.00	17	415	5.28	0.19	0.00	0.02	100	100	0.00	0.26
11	1	Burtonwood Road South	1			819	2120	70	0.00	39	133	3.10	0.53	0.00	0.12	100	100	0.00	1.73
12	1	Burtonwood Road South	1			335	1980	70	31.00	17	431	4.91	0.19	0.00	0.02	100	100	0.00	0.25
13	1		1			335	Unrestricted	70	31.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					352	Unrestricted	70	30.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			336	1934	70	12.00	17	418	15.52	0.20	0.00	0.02	100	100	0.00	0.26
	2	Burtonwood Road North	1			336	1937	70	12.00	17	419	15.89	0.19	0.00	0.02	100	100	0.00	0.26
16	1		2	2	D	545	1900	30	0.00	65	39	25.95	19.33	76.58	8.23	100	100	0.00	46.80
	2		2	2	D	724 <	1900	30	1.37	90	0	42.98	36.31	86.05	12.34 +	100	100	0.00	111.50
	3		2	2	D	275	1900	30	0.37	33	172	20.63	13.89	62.90	3.37	100	100	0.00	17.24
17	1		2	2	C	59	1900	30	21.00	7	1187	12.30	1.06	2.68	0.03	100	100	0.00	0.27
18	1		2			1011 <	1900	70	31.01	87	4	26.98	18.82	70.73	13.90 +	100	100	209.88	293.87
19	1		2	2	C	402	1900	30	0.00	48	88	20.84	16.99	47.65	3.73	100	100	0.00	29.34
	2		2	2	C	609 <	1900	30	0.00	72	24	19.73	16.11	39.31	4.67 +	100	100	3.67	45.38
20	1		3	2	E	682	1900	41	9.53	61	49	11.66	5.60	28.91	4.88	100	100	2.23	19.78
	2		3	2	E	783	1900	41	7.00	69	31	15.14	9.13	28.49	4.29	100	100	0.42	31.40
	3		3	2	E	275	1900	41	18.05	24	273	9.76	3.62	13.57	1.49	100	100	0.00	4.40
21	1		4	3	K	437	1900	120	8.95	29	213	8.67	2.98	15.35	2.96	100	100	0.00	5.98
	2		4	3	K	437	1900	120	8.95	29	213	9.02	2.98	15.35	2.96	100	100	0.00	5.98

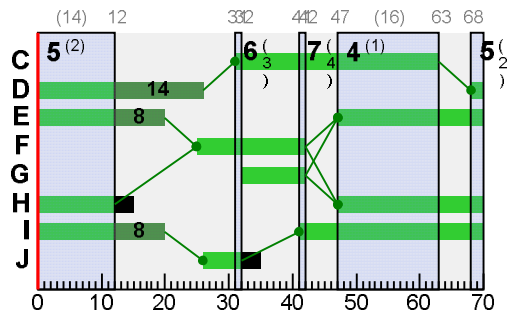
48	1		7	6	B	158	1900	19	0.21	29	206	44.20	20.98	76.27	2.34	100	100	0.00	14.59
49	1		7	6	B	272	1900	19	0.42	51	76	31.71	24.57	82.12	4.35	100	100	0.00	29.16
	2		7	6	B	158	1900	19	0.21	29	206	28.21	20.98	76.27	2.34	100	100	0.00	14.59
50	1		7			430	1900	70	0.00	23	298	16.16	0.28	0.00	0.03	100	100	0.00	0.47
51	1		7	6	B	360 <	1900	19	6.74	100	-10	329.87	310.52	426.17	36.55 +	100	100	0.00	460.01
	2		7	6	B	59	1900	19	11.05	11	728	26.45	6.96	67.92	1.46	100	100	0.00	2.12
52	1					902	Unrestricted	70	10.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			560	1900	70	21.00	29	205	1.40	0.40	0.00	0.06	100	100	0.00	0.87
	2		1			505	1900	70	21.00	27	239	1.34	0.34	0.00	0.05	100	100	0.00	0.68
	3		1			476	1900	70	21.00	25	259	1.32	0.32	0.00	0.04	100	100	0.00	0.59
54	1		1	1	A	335 <	1980	46	8.18	25	255	3.38	2.38	18.04	1.25 +	100	100	0.00	3.69
	2		1	1	A	335 <	1980	46	8.18	25	255	3.38	2.38	18.04	1.25 +	100	100	0.00	3.69

Network Results

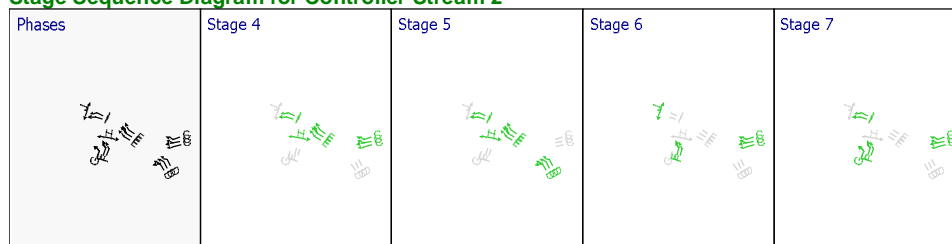
	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	2772.65	478.58	5.79	386.06	5482.12	170.41	230.55	5883.08
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	2772.65	478.58	5.79	386.06	5482.12	170.41	230.55	5883.08

- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

A8 - 2021 PM Scenario 5
D8 - 2021 PM Scenario 5*



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

	To	
	K	L
	From	
	K	6
	L	8

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	93	94	1	1	1
	2	Ü	2	L	100	106	6	1	6
	3	Ü	1	K	114	93	119	1	1

	E		12	
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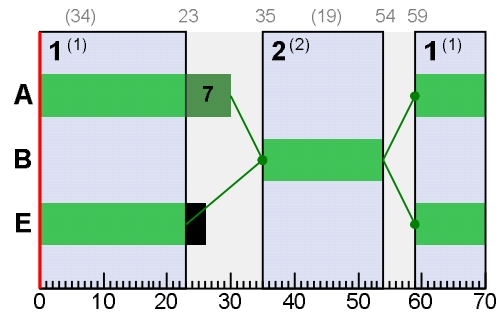
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	59	23	34	1	7
	2	Ü	2	B	35	54	19	1	7

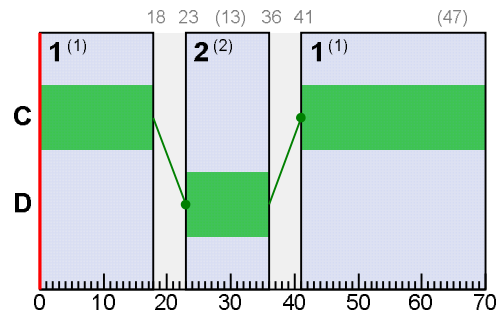
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	59	30	41
30	2	5	4	A	59	30	41
30	3	5	4	A	59	30	41
31	1	5	4	B	35	54	19
32	1	5	4	B	35	54	19
34	1	5	4	B	35	54	19

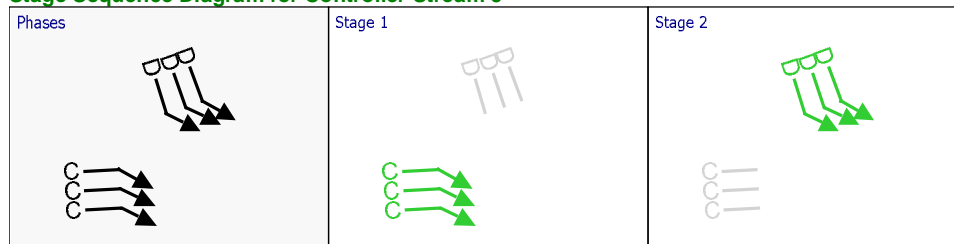
Phase Timings Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

	To	
	A	B
From	A	6
	B	5

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	Ü	1	A	45	10	35	1	7
	2	Ü	2	B	16	40	24	1	7

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUE S	WEIGHTS		PENALTIE S	P.I.
Ar m	Traffic Strea m	Name	Traffi c node	Controlle r stream	Phas e	Calculate d flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actua l green (s (per cycle))	Waste d time total (s (per cycle))	Degree of saturatio n (%)	Practical reserve capacity (%)	JourneyTim e (s)	Mean Delay per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weightin g multiplie r (%)	Stop weightin g multiplie r (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			931	2312	70	14.00	40	124	12.52	0.52	0.00	0.14	100	100	0.00	1.93
RA c	1		R3			17	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RA x	1					693	1800	70	0.00	39	134	12.63	0.63	0.00	0.12	100	100	0.00	1.71
RB	1		R4			179	1149	70	0.00	16	478	12.29	0.29	0.00	0.01	100	100	0.00	0.20
RB c	1		R4			825	Unrestrict ed	70	14.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RB x	1					123	Unrestrict ed	70	18.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			486	1623	70	0.00	30	200	12.47	0.47	0.00	0.06	100	100	0.00	0.91
RC c	1		R1			158	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC x	1					846	Unrestrict ed	70	14.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			67	872	70	0.00	8	1072	12.17	0.17	0.00	0.00	100	100	0.00	0.05
RD c	1		R2			643	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD x	1					1	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwoo d Road South	1	1	B	217	1980	25	0.55	30	199	25.25	16.80	67.86	2.99	100	100	0.00	16.23
2	1	Burtonwoo d Road South	1			667	1980	70	0.00	34	167	4.51	0.46	0.00	0.09	100	100	0.00	1.21
3	2	Burtonwoo d Road South	1	1	B	233	2120	25	0.91	31	194	22.92	16.94	70.06	3.17	100	100	0.00	17.62

22	1					892	Unrestricte d	140	19.00	0	Unrestricte d	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	434	1900	17	0.84	93	-3	73.36	64.49	138.3 3	12.34	100	100	0.00	117.9 3
24	1		3	2	G	240	1900	10	0.00	80	12	57.21	51.45	123.0 1	5.86	100	100	0.00	52.40
25	1		3	2	F	433 <	1900	17	0.00	89	2	56.94	50.45	122.4 4	10.57 +	100	100	0.00	92.81
26	1		3			673	1900	70	0.00	35	154	2.86	0.52	0.00	0.10	100	100	0.00	1.38
27	1		3			1107	1900	70	0.00	58	54	6.20	1.32	0.00	0.41	100	100	0.00	5.76
28	1		3	2	I	804	1900	49	16.32	66	36	11.87	7.52	37.24	5.50	100	100	0.00	27.59
	2		3	2	I	120	1900	49	44.74	10	821	9.97	5.28	75.57	1.96	100	100	0.00	3.63
29	1					924	Unrestricte d	70	31.00	0	Unrestricte d	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	755	1900	41	5.16	68	32	23.75	10.88	65.04	13.77	100	100	1.32	39.88
	2		5	4	A	608	1900	41	11.79	54	66	25.72	12.94	67.59	8.05	100	100	0.00	36.19
	3		5	4	A	738	1900	41	8.00	66	36	30.53	17.83	75.03	12.24	100	100	0.00	58.84
31	1		5	4	B	170	1900	19	0.26	32	184	35.03	21.29	76.50	2.53	100	100	0.00	15.91
32	1		5	4	B	376 <	1900	19	0.37	71	28	26.36	23.85	53.69	3.83 +	100	100	0.00	37.91
33	1		5			555	1900	70	33.00	48	86	20.00	8.94	49.97	5.40	100	100	0.00	23.04
34	1		5	4	B	179	1900	19	2.11	33	172	19.27	16.88	43.32	1.51	100	100	0.00	12.89
35	1		6			934	1900	70	14.00	49	83	21.47	0.91	0.00	0.24	100	100	0.00	3.37
36	1		6	5	C	608	1900	47	23.42	47	91	17.78	4.25	36.73	4.58	100	100	0.00	12.98
	2		6	5	C	1114	1900	47	5.32	88	2	27.69	14.75	55.10	14.69	100	100	3.32	75.84
	3		6	5	C	170	1900	47	28.00	13	590	12.63	0.21	0.00	0.01	100	100	0.00	0.14
37	1		6	5	D	199	1900	13	0.32	54	68	40.98	30.73	93.46	3.62	100	100	0.00	26.45
38	1		6	5	D	305	1900	13	0.58	84	7	57.44	50.21	123.1 7	7.56	100	100	0.00	65.11
39	1		6	5	D	193	1900	13	0.32	52	73	37.47	30.30	93.00	3.50	100	100	0.00	25.32
40	1		6			498	1900	70	0.00	26	243	3.19	0.34	0.00	0.05	100	100	0.00	0.66
41	1					801	Unrestricte d	70	31.00	0	Unrestricte d	18.23	0.00	0.00	0.00	100	100	0.00	0.00
42	1		7			1419	1900	70	12.00	75	21	10.77	2.77	0.00	1.09	100	100	0.00	15.52
43	1					540	Unrestricte d	70	40.00	0	Unrestricte d	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	879 <	1900	35	0.00	90	0	36.06	26.18	81.51	15.29 +	100	100	13.21	112.9 6
45	2		7	6	A	369	1900	35	10.37	38	136	21.99	4.48	53.24	4.57	100	100	0.00	8.98

TRANSYT 15

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Filename: Junction 8 M62 _ Proposed Mitigation SC5- HE Response FOR ISSUE.t15

Path: M:\50400134 - Omega, Warrington\Omega, Warrington\ANALYSIS\Zone 8 Directory\TRANSYT

Report generation date: 13/03/2020 16:34:03

»A7 - 2021 AM Scenario 5 : D7 - 2021 AM Scenario 5* :

»A8 - 2021 PM Scenario 5 : D8 - 2021 PM Scenario 5* :

A7 - 2021 AM Scenario 5

D7 - 2021 AM Scenario 5*

Signal Timings

Network Default: 70s cycle time; 70 steps

Intergreen Matrix for Controller Stream 1

	To					
	A	B	C	D	E	F
From	A			6		0
	B			5	5	
	C	6	6			6
	D		11			
	E	8				
	F			5		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
1	1	Ü	1	B,F,A	26	64	38	1	7
	2	Ü	2	A,D,F	69	0	1	1	1
	3	Ü	3	C,D,E	6	15	9	1	5

Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
1	1	1	1	B	26	64	38
3	2	1	1	B	26	64	38
4	1	1	1	B	26	64	38
5	1	1	1	C	6	17	11
6	1	1	1	C	6	17	11
7	1	1	1	C	6	17	11

	H			13	13			
	I							6
	J						9	

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
2	1	Ü	4	C,E,H,I	69	8	9	1	1
	2	Ü	5	D,E,H,I	13	32	19	1	1
	3	Ü	6	C,F,J	48	52	4	1	4
	4	Ü	7	C,F,G,I	61	64	3	1	1

Traffic Stream Green Times

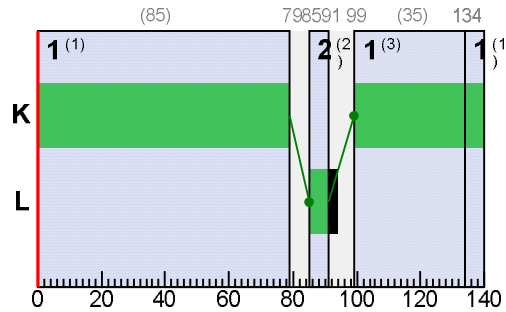
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
16	1	2	2	D	13	43	30
16	2	2	2	D	13	43	30
16	3	2	2	D	13	43	30
17	1	2	2	C	48	8	30
19	1	2	2	C	48	8	30
19	2	2	2	C	48	8	30
20	1	3	2	E	69	40	41
20	2	3	2	E	69	40	41
20	3	3	2	E	69	40	41
23	1	3	2	F	45	64	19
24	1	3	2	G	52	64	12
25	1	3	2	F	45	64	19
28	1	3	2	I	61	40	49
28	2	3	2	I	61	40	49

Phase Timings Diagram for Controller Stream 2

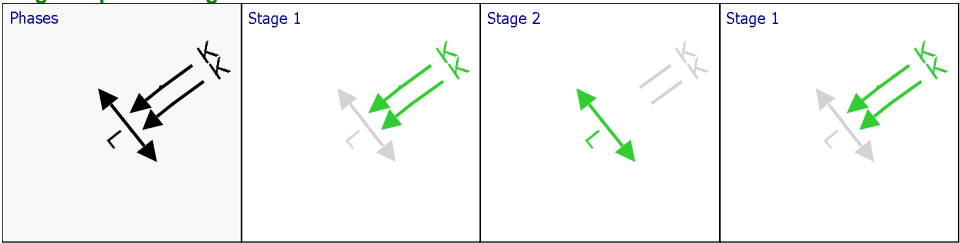
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
21	1	4	3	K	99	79	120
21	2	4	3	K	99	79	120

Phase Timings Diagram for Controller Stream 3

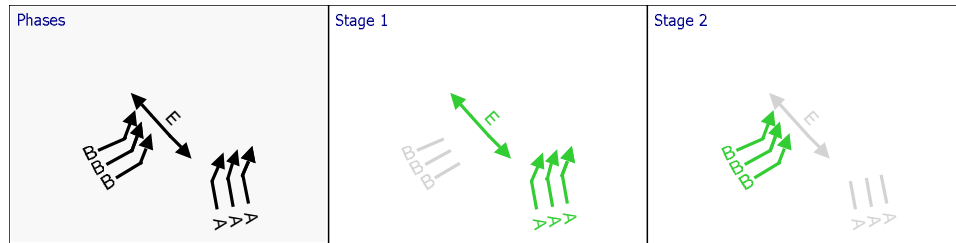


Stage Sequence Diagram for Controller Stream 3



Intergreen Matrix for Controller Stream 4

From	To		
	A	B	E
	A	5	
B	5		5



Intergreen Matrix for Controller Stream 5

From	To		
	C	D	
	5		

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
5	1	Ü	1	C	67	37	40	1	7
	2	Ü	2	D	42	62	20	1	7

Traffic Stream Green Times

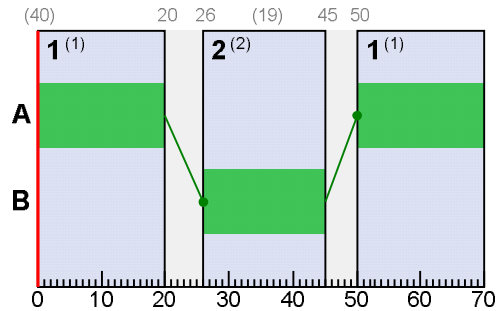
Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
36	1	6	5	C	67	37	40
36	2	6	5	C	67	37	40
36	3	6	5	C	67	37	40
37	1	6	5	D	42	62	20
38	1	6	5	D	42	62	20
39	1	6	5	D	42	62	20

Phase Timings Diagram for Controller Stream 5

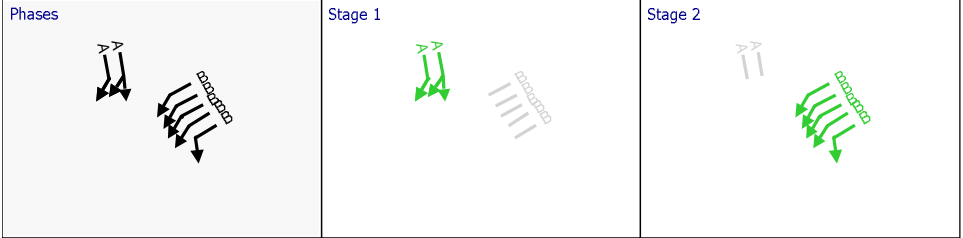
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
44	1	7	6	A	50	20	40
45	2	7	6	A	50	20	40
48	1	7	6	B	26	45	19
49	1	7	6	B	26	45	19
49	2	7	6	B	26	45	19
51	1	7	6	B	26	45	19
51	2	7	6	B	26	45	19

Phase Timings Diagram for Controller Stream 6



Stage Sequence Diagram for Controller Stream 6



4	1	Burtonwood Road South	1	1	B	395	1975	38	0.71	37	146	15.91	9.76	54.18	4.17	100	100	0.00	17.89
5	1	Charon Way Left	1	1	C	17	1995	11	11.00	5	1711	26.74	24.72	81.56	0.28	100	100	0.00	1.83
6	1	Charon Way Right	1	1	C	164 <	1842	11	0.11	52	72	34.78	32.72	94.48	3.02 +	100	100	0.00	23.11
7	1	Charon Way Right	1	1	C	162	1819	11	0.00	52	73	45.59	32.57	94.34	2.98	100	100	0.00	22.73
8	1	Charon Way	1			181	1653	70	0.00	11	722	11.31	0.13	0.00	0.01	100	100	0.00	0.10
10	1	Charon Way	1			343	1962	70	0.00	17	415	5.28	0.19	0.00	0.02	100	100	0.00	0.26
11	1	Burtonwood Road South	1			819	2120	70	0.00	39	133	3.10	0.53	0.00	0.12	100	100	0.00	1.73
12	1	Burtonwood Road South	1			335	1980	70	35.00	17	431	4.91	0.19	0.00	0.02	100	100	0.00	0.25
13	1		1			335	Unrestricted	70	35.00	0	Unrestricted	10.75	0.00	0.00	0.00	100	100	0.00	0.00
14	1					352	Unrestricted	70	34.00	0	Unrestricted	7.24	0.00	0.00	0.00	100	100	0.00	0.00
15	1	Omega Road North	1			336	1934	70	15.96	18	396	15.60	0.28	3.53	1.47	100	100	0.00	0.51
	2	Burtonwood Road North	1			336	1937	70	15.96	18	397	16.00	0.28	3.53	1.47	100	100	0.00	0.51
16	1		2	2	D	545	1900	30	0.00	65	39	25.95	19.33	76.58	8.23	100	100	0.00	46.80
	2		2	2	D	724 <	1900	30	1.37	90	0	42.98	36.31	86.05	12.34 +	100	100	0.00	111.50
	3		2	2	D	275	1900	30	0.37	33	172	20.63	13.89	62.90	3.37	100	100	0.00	17.24
17	1		2	2	C	239	1900	30	6.16	29	215	16.19	12.39	38.44	1.79	100	100	0.00	12.86
18	1		2			706	1900	70	30.42	48	89	17.22	9.70	69.42	9.37	100	100	39.84	73.01
	2		2			913	1900	70	28.41	63	43	18.07	10.55	60.93	10.53	100	100	87.69	132.65
19	1		2	2	C	706 <	1900	30	0.00	84	7	21.21	16.79	44.34	6.16 +	100	100	23.96	74.64
	2		2	2	C	673 <	1900	30	0.00	80	12	22.44	18.31	45.04	5.92 +	100	100	19.80	72.25
20	1		3	2	E	579	1900	41	11.26	51	76	12.55	6.50	26.40	3.16	100	100	0.00	16.74
	2		3	2	E	963 <	1900	41	4.00	85	6	22.18	16.16	49.74	9.25 +	100	100	107.05	174.49

45	2		7	6	A	651	1900	40	12.86	68	32	25.21	7.70	70.26	7.99	100	100	0.00	25.51
46	1		7			968	1900	70	0.00	51	77	8.81	0.98	0.00	0.26	100	100	0.00	3.75
47	1		7			588	1900	70	0.00	31	191	4.36	0.42	0.00	0.07	100	100	0.00	0.98
48	1		7	6	B	158	1900	19	0.21	29	206	44.20	20.98	76.27	2.34	100	100	0.00	14.59
49	1		7	6	B	272	1900	19	0.42	51	76	31.71	24.57	82.12	4.35	100	100	0.00	29.16
	2		7	6	B	158	1900	19	0.21	29	206	28.21	20.98	76.27	2.34	100	100	0.00	14.59
50	1		7			430	1900	70	0.00	23	298	16.16	0.28	0.00	0.03	100	100	0.00	0.47
51	1		7	6	B	484	1900	19	0.95	94	-4	81.17	61.82	134.48	13.27	100	100	0.00	126.19
	2		7	6	B	484	1900	19	0.97	94	-4	81.70	62.22	135.02	13.33	100	100	0.00	126.97
52	1					902	Unrestricted	70	9.00	0	Unrestricted	19.45	0.00	0.00	0.00	100	100	0.00	0.00
53	1		1			560	1900	70	19.00	29	205	1.40	0.40	0.00	0.06	100	100	0.00	0.87
	2		1			505	1900	70	19.00	27	239	1.34	0.34	0.00	0.05	100	100	0.00	0.68
	3		1			476	1900	70	19.00	25	259	1.32	0.32	0.00	0.04	100	100	0.00	0.59
54	1		1	1	A	335 <	1980	47	13.36	25	261	4.68	3.68	19.14	1.25 +	100	100	0.00	5.44
	2		1	1	A	335 <	1980	47	13.36	25	261	4.68	3.68	19.14	1.25 +	100	100	0.00	5.44

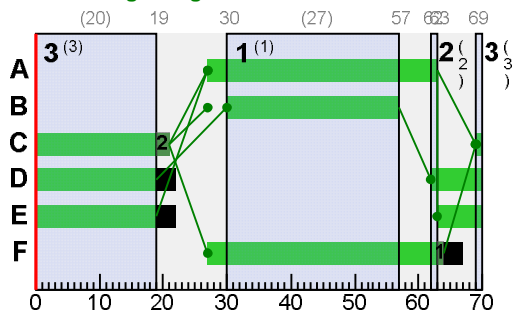
Network Results

	Distance travelled (PCU-km/hr)	Time spent (PCU-hr/hr)	Mean journey speed (kph)	Total delay (PCU-hr/hr)	Weighted cost of delay (£ per hr)	Weighted cost of stops (£ per hr)	Excess queue penalty (£ per hr)	Performance Index (£ per hr)
Normal traffic	3068.27	204.01	15.04	101.64	1443.30	164.88	364.10	1972.28
Bus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pedestrians	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	3068.27	204.01	15.04	101.64	1443.30	164.88	364.10	1972.28

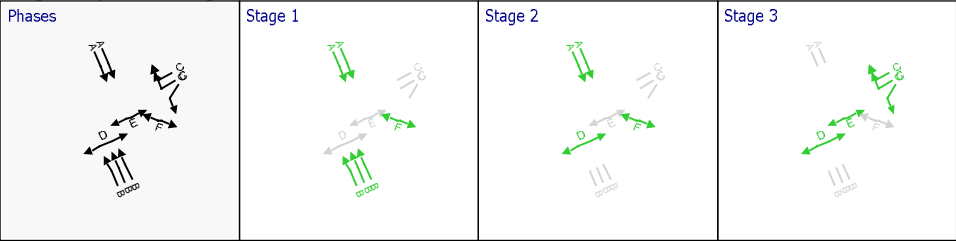
- < = adjusted flow warning (upstream links/traffic streams are over-saturated)
- * = Traffic Stream - Normal, Bus or Tram Stop or Delay weighting has been set to a value other than 100%
- ^ = Traffic Stream - Normal, Bus or Tram Stop or Delay Path weighting has been set to a value other than 100%
- + = average link/traffic stream excess queue is greater than 0
- P.I. = PERFORMANCE INDEX

54	1	1	1	A	27	63	36
54	2	1	1	A	27	63	36

Phase Timings Diagram for Controller Stream 1

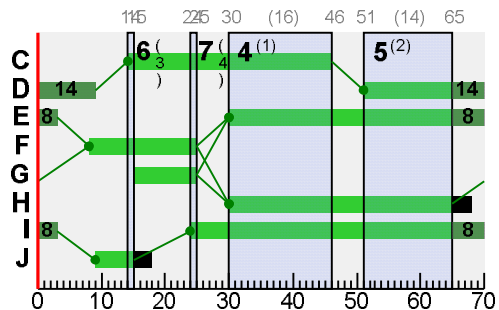


Stage Sequence Diagram for Controller Stream 1

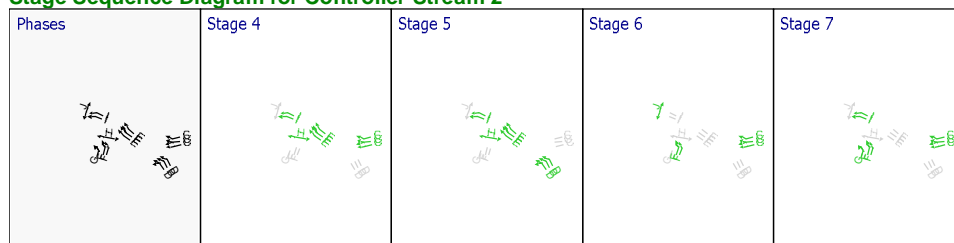


Intergreen Matrix for Controller Stream 2

		To								
From		C	D	E	F	G	H	I	J	
	C		5							
	D	5								
	E				5	5				
	F			5			5			
	G			5			5			



Stage Sequence Diagram for Controller Stream 2



Intergreen Matrix for Controller Stream 3

	To	
	K	L
From	K	6
	L	8

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
3	1	Ü	1	K	78	79	1	1	1
	2	Ü	2	L	85	91	6	1	6
	3	Ü	1	K	99	78	119	1	1

	E		12	
--	---	--	----	--

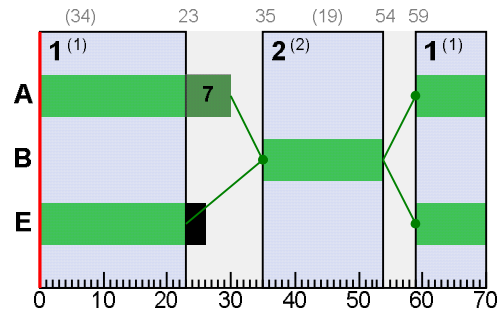
Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
4	1	Ü	1	A,E	59	23	34	1	7
	2	Ü	2	B	35	54	19	1	7

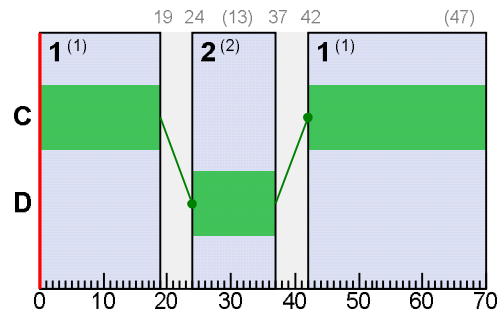
Traffic Stream Green Times

Arm	Traffic Stream	Traffic Node	Controller Stream	Phase	Green Period 1		
					Start	End	Duration
30	1	5	4	A	59	30	41
30	2	5	4	A	59	30	41
30	3	5	4	A	59	30	41
31	1	5	4	B	35	54	19
32	1	5	4	B	35	54	19
34	1	5	4	B	35	54	19

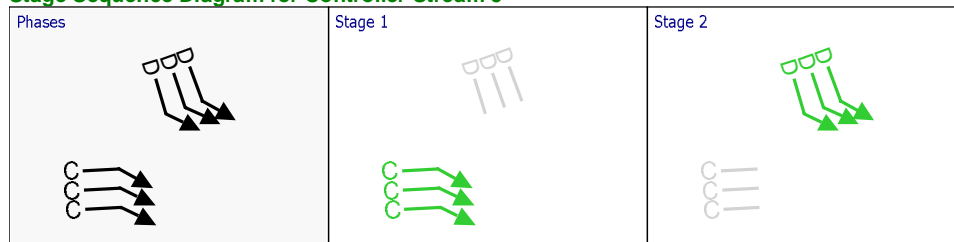
Phase Timings Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 4



Stage Sequence Diagram for Controller Stream 5



Intergreen Matrix for Controller Stream 6

	To	
	A	B
From	A	6
	B	5

Resultant Stages

Controller Stream	Resultant Stage	Is base stage	Library Stage ID	Phases in this stage	Stage start (s)	Stage end (s)	Stage duration (s)	User stage minimum (s)	Stage minimum (s)
6	1	ü	1	A	45	14	39	1	7
	2	ü	2	B	20	40	20	1	7

Final Prediction Table

Traffic Stream Results

				SIGNALS		FLOWS		PERFORMANCE				PER PCU			QUEUE S	WEIGHTS		PENALTIE S	P.I.
Ar m	Traffic Strea m	Name	Traffi c node	Controlle r stream	Phas e	Calculate d flow entering (PCU/hr)	Calculated sat flow (PCU/hr)	Actua l green (s (per cycle))	Waste d time total (s (per cycle))	Degree of saturatio n (%)	Practical reserve capacity (%)	JourneyTim e (s)	Mean Dela y per Veh (s)	Mean stops per Veh (%)	Mean max queue (PCU)	Delay weightin g multiplie r (%)	Stop weightin g multiplie r (%)	Cost of traffic penalties (£ per hr)	P.I.
RA	1		R3			941	2312	70	14.00	41	121	12.53	0.53	0.00	0.14	100	100	0.00	1.98
RA c	1		R3			17	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RA x	1					693	1800	70	0.00	39	134	12.63	0.63	0.00	0.12	100	100	0.00	1.71
RB	1		R4			179	1144	70	0.00	16	475	12.29	0.29	0.00	0.01	100	100	0.00	0.21
RB c	1		R4			834	Unrestrict ed	70	14.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RB x	1					124	Unrestrict ed	70	18.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC	1		R1			486	1623	70	0.00	30	200	12.47	0.47	0.00	0.06	100	100	0.00	0.91
RC c	1		R1			158	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RC x	1					855	Unrestrict ed	70	14.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD	1		R2			67	872	70	0.00	8	1072	12.17	0.17	0.00	0.00	100	100	0.00	0.05
RD c	1		R2			643	Unrestrict ed	70	0.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
RD x	1					1	Unrestrict ed	70	70.00	0	Unrestrict ed	12.00	0.00	0.00	0.00	100	100	0.00	0.00
1	1	Burtonwoo d Road South	1	1	B	217	1980	27	0.45	28	223	23.68	15.23	64.13	2.71	100	100	0.00	14.78
2	1	Burtonwoo d Road South	1			667	1980	70	0.00	34	167	4.51	0.46	0.00	0.09	100	100	0.00	1.21
3	2	Burtonwoo d Road South	1	1	B	233	2120	27	0.91	28	217	21.33	15.35	66.95	3.03	100	100	0.00	16.06

	2		4	3	K	317	1900	120	5.26	20	346	8.32	2.28	15.17	1.88	100	100	0.00	3.46
22	1					917	Unrestricte d	140	19.00	0	Unrestricte d	7.28	0.00	0.00	0.00	100	100	0.00	0.00
23	1		3	2	F	434	1900	17	0.84	93	-3	73.36	64.49	138.3 3	12.34	100	100	0.00	117.9 3
24	1		3	2	G	240	1900	10	0.00	80	12	57.21	51.45	123.0 1	5.86	100	100	0.00	52.40
25	1		3	2	F	433 <	1900	17	0.00	89	2	56.94	50.45	122.4 4	10.57 +	100	100	0.00	92.81
26	1		3			673	1900	70	0.00	35	154	2.86	0.52	0.00	0.10	100	100	0.00	1.38
27	1		3			1107	1900	70	0.00	58	54	6.20	1.32	0.00	0.41	100	100	0.00	5.76
28	1		3	2	I	722	1900	49	21.09	62	45	12.25	7.90	43.74	5.47	100	100	0.00	26.46
	2		3	2	I	202	1900	49	40.56	17	425	8.41	3.72	60.83	1.97	100	100	0.00	4.50
29	1					924	Unrestricte d	70	33.00	0	Unrestricte d	10.40	0.00	0.00	0.00	100	100	0.00	0.00
30	1		5	4	A	765	1900	41	5.21	69	30	26.03	13.16	73.45	11.09	100	100	0.00	46.77
	2		5	4	A	608	1900	41	6.37	54	67	21.94	9.17	36.44	4.28	100	100	0.00	24.76
	3		5	4	A	738	1900	41	6.37	65	38	23.02	10.32	33.17	4.99	100	100	0.00	33.11
31	1		5	4	B	170	1900	19	0.26	32	184	35.03	21.29	76.50	2.53	100	100	0.00	15.91
32	1		5	4	B	376 <	1900	19	0.37	71	28	26.36	23.85	53.69	3.83 +	100	100	0.00	37.91
33	1		5			555	1900	70	33.00	48	86	20.00	8.94	49.97	5.40	100	100	0.00	23.04
34	1		5	4	B	179	1900	19	2.11	33	172	19.27	16.88	43.32	1.51	100	100	0.00	12.89
35	1		6			944	1900	70	14.00	50	81	23.38	0.93	0.00	0.24	100	100	0.00	3.48
36	1		6	5	C	608	1900	47	20.58	47	91	22.12	8.58	50.38	6.08	100	100	0.00	24.43
	2		6	5	C	1114	1900	47	5.37	88	2	28.48	15.54	68.81	16.26	100	100	18.74	96.65
	3		6	5	C	170	1900	47	28.00	13	590	12.63	0.21	0.00	0.01	100	100	0.00	0.14
37	1		6	5	D	199	1900	13	0.32	54	68	42.31	30.73	93.46	3.62	100	100	0.00	26.45
38	1		6	5	D	305	1900	13	0.58	84	7	57.44	50.21	123.1 8	7.56	100	100	0.00	65.11
39	1		6	5	D	193	1900	13	0.32	52	73	37.47	30.30	93.00	3.50	100	100	0.00	25.32
40	1		6			498	1900	70	0.00	26	243	4.55	0.34	0.00	0.05	100	100	0.00	0.66
41	1					801	Unrestricte d	70	28.00	0	Unrestricte d	18.23	0.00	0.00	0.00	100	100	0.00	0.00
42	1		7			1419	1900	70	12.00	75	21	10.77	2.77	0.00	1.09	100	100	0.00	15.52
43	1					540	Unrestricte d	70	40.00	0	Unrestricte d	10.74	0.00	0.00	0.00	100	100	0.00	0.00
44	1		7	6	A	879	1900	39	0.00	81	11	21.71	11.83	52.98	10.41	100	100	0.00	46.86
45	2		7	6	A	369	1900	39	10.00	34	165	20.30	2.79	47.21	4.49	100	100	0.00	6.24



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PROJECT:	11191042	AUTHOR:	Adam Stone
CHECKED:	Douglas Bisset	APPROVED:	Douglas Bisset

INTRODUCTION

WSP UK Limited (WSP) has been commissioned by Omega Warrington Limited (OWL), to provide transportation advice in support of a hybrid planning application for c. 205,500sqm (c.2,210,500sqft) B2/B8 industrial uses on Omega Zone 8, located in the Borough of St Helens.

The application will comprise a detailed planning application for an c.880,000sqft B8 industrial use to the north of the site and an outline planning application for the remaining B2/B8 industrial uses to the south of the site.

This Technical Note has been prepared in response to comments raised by Highways England upon their review of the Transport Assessment and subsequent Technical Note, which were submitted 13th December 2019 and 13th March 2020, respectively.

Specifically, this note seeks to address the subsequent follow up points raised by Highways England in their Technical Note Review dated 28 March 2020.

RESPONSES TO HIGHWAYS ENGLAND COMMENTS

Highways England Point 10 – TRANSYT model setup data

Highways England Comment as per Technical Note Review

Thank you for providing the signal controller information to allow this to be reviewed. All appears ok except the B-A intergreen on stream 4 is set to 5 seconds in the model when the controller specification indicates 6. Please note, a scenario 4 model has not been provided for review therefore we are assuming the same issue will be present. If the model is to be re-run to address any other comments we would suggest this is adjusted.

WSP Comments

We acknowledge the discrepancy in the intergreen for B-A and will include this on any subsequent model runs, should it be required.

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Highways England Point 11 – TRANSYT model, manual lane balancing

Highways England Comment as per Technical Note Review

Below is a quote from the TRANSYT user guide regarding lane balancing traffic assignment as applied in the model.

“... This mode is useful for modelling single junctions (e.g. crossroads, staggers and roundabouts). It takes account of the saturation flow of each traffic stream (max flow for give-ways), while it is NOT influenced by the travel time through the junction – which reflects reasonably well the nature of decision making required by drivers who are travelling through a single junction and choosing the most appropriate path through it.”

This therefore suggests drivers choose their lane through the junction based on the first stop line they reach and this is why lane balancing traffic distribution is applied. It continues:

“The flow allocation modes provided simply ‘aid’ the process of establishing suitable traffic flows throughout the network. Inevitably there will be some situations where the allocation of flows by these methods will not be suitable and in such situations users have the freedom to specify flows in a more direct manner.”

We would therefore suggest that should the developer’s consultant wish to retain adjustments to routing it should be justified through, for example, observations of the existing traffic distribution between lanes on the Burtonwood S approach, appropriate sections of the circulatory or exits if survey videos are available. Or other amendments to the model if appropriate.

WSP Comments

As previously stated in our previous Technical Note, routing of traffic within the network is initially decided based on the ‘lane balancing’ allocation mode within TRANSYT. Any subsequent adjustments to routing have been carried out to account for no internal weaving on the circulatory carriageway within the models.

To clarify the extent of adjustments to the initial entry lane balancing, this has been summarised as follows:

Table 1– Adjustments to TRANSYT model routing

Path	From	To	Adjustment
Proposed Mitigation Scenario 5 – AM Peak			
37/38	Burtonwood Road South (6)	M62 Eastbound (4)	Adjust 50%/50% split (37/38) to 70%/30% distribution. This results in redistribution of 142PCUs from offside lane to middle lane (Less than 3 PCUs per cycle).
Proposed Mitigation Scenario 5 – PM Peak			
37/38	Burtonwood Road South (6)	M62 Eastbound (4)	Adjust 50%/50% split (37/38) to 56%/44% distribution. This results in redistribution of 39 PCUs from offside lane to middle lane (Less than 1 PCU per cycle).

As shown in Table 1, only one routing adjustment has been made to the Scenario 5 Proposed Mitigation model. The adjustment results in less than 3 PCUs per cycle being redistributed from the offside lane to the

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middle lane on the Burtonwood Road (S) approach. This has been done to account for no internal weaving in the model that could occur on the longer straight sections on the roundabout, above the motorway. It is considered that this approach provides a more robust result compared to modelling weaving on the links over the M62, where TRANSYT would re-assign the flows accordingly.

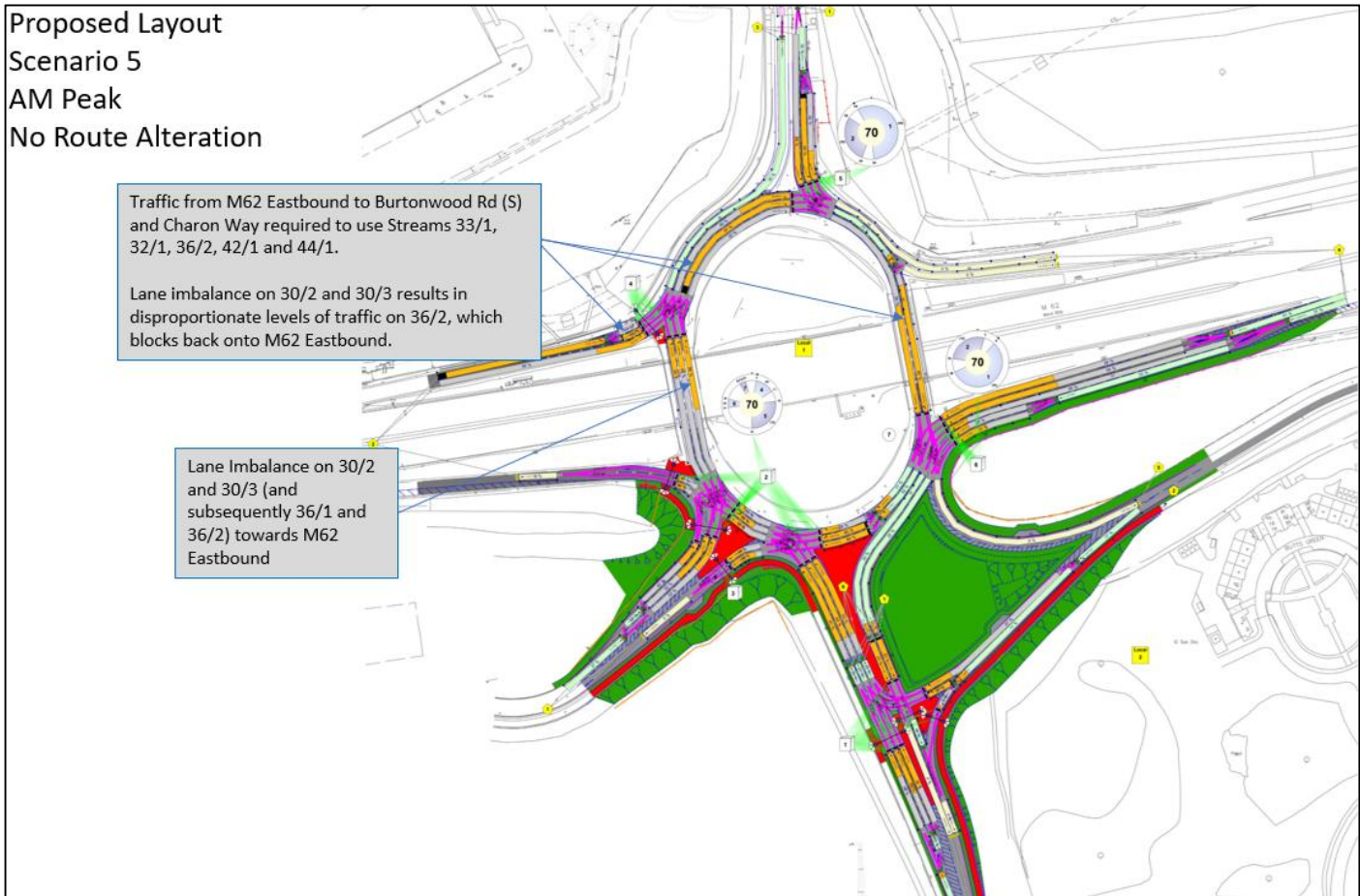
The junction operation would also be supported by the current operational efficiencies achieved through MOVA control, which is expected to improve journey time reliability as well as aid in queue management. This cannot be replicated within the TRANSYT modelling and we would expect the junction results to be better than what is shown within the modelling as part of this assessment.

Notwithstanding the above, we have investigated the Scenario 5 Proposed Mitigation model and undertaken comparisons with and without the exclusive use of the TRANSYT's entry lane balancing function. Figures 1 and 2 show the Scenario 5 Proposed Mitigation model with the exclusive use of the TRANSYT's entry lane balancing function in the AM and PM peak, respectively. Please note, these have also been included within Appendix A.

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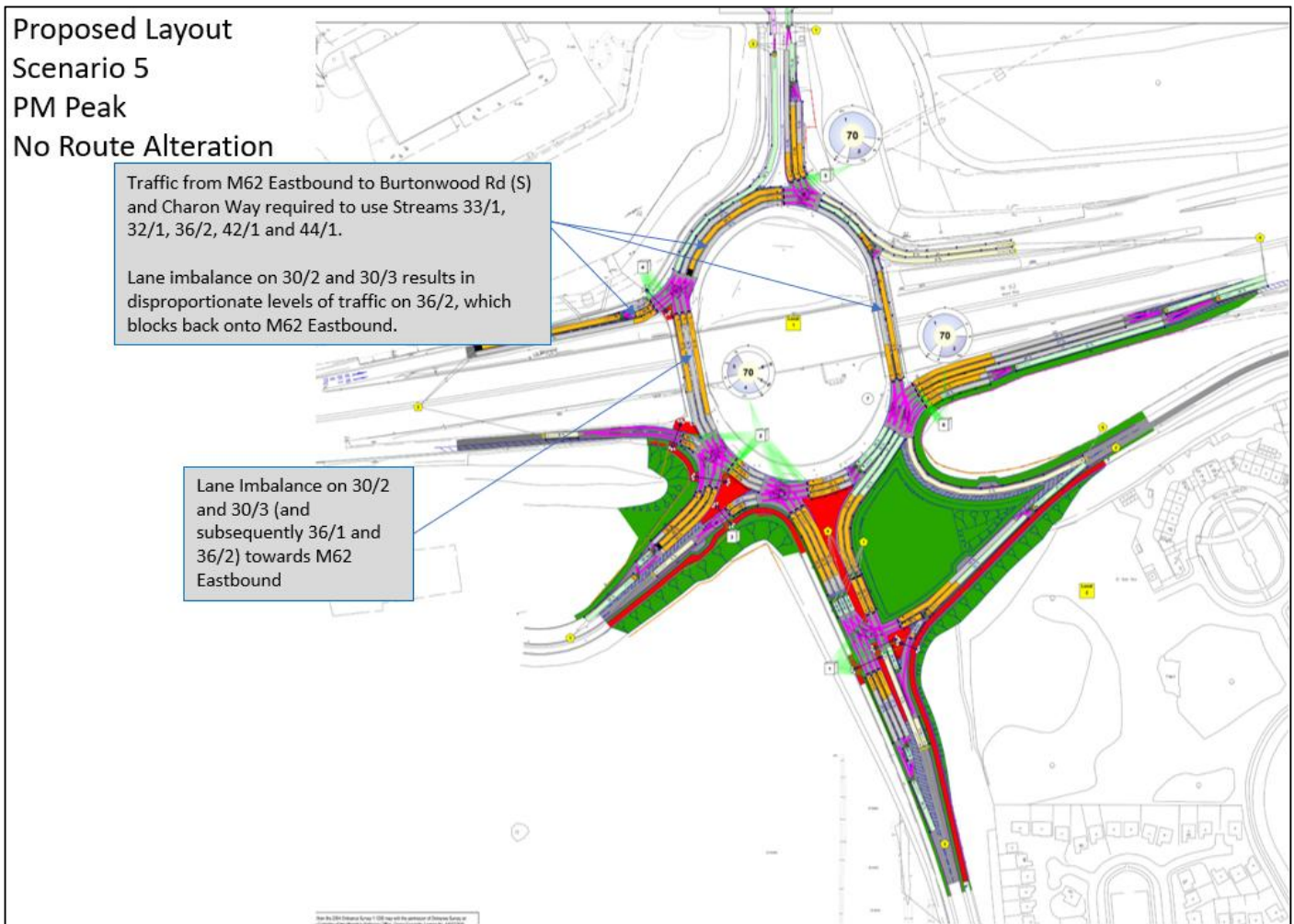
Figure 1 – Scenario 5 Proposed Mitigation with No Route Alteration (AM PEAK)



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Figure 2 – Scenario 5 Proposed Mitigation with No Route Alteration (PM PEAK)



Figures 1 and 2 demonstrate the extent to which the circulatory carriageway is imbalanced by exclusively utilising entry lane balancing. Not only does this create imbalances on the links over the M62 (Streams 16/2 and 16/3), but this also results in further imbalances on the immediate upstream circulatory links (Streams 36/1 and 36/2) for traffic heading towards the M62 Eastbound.

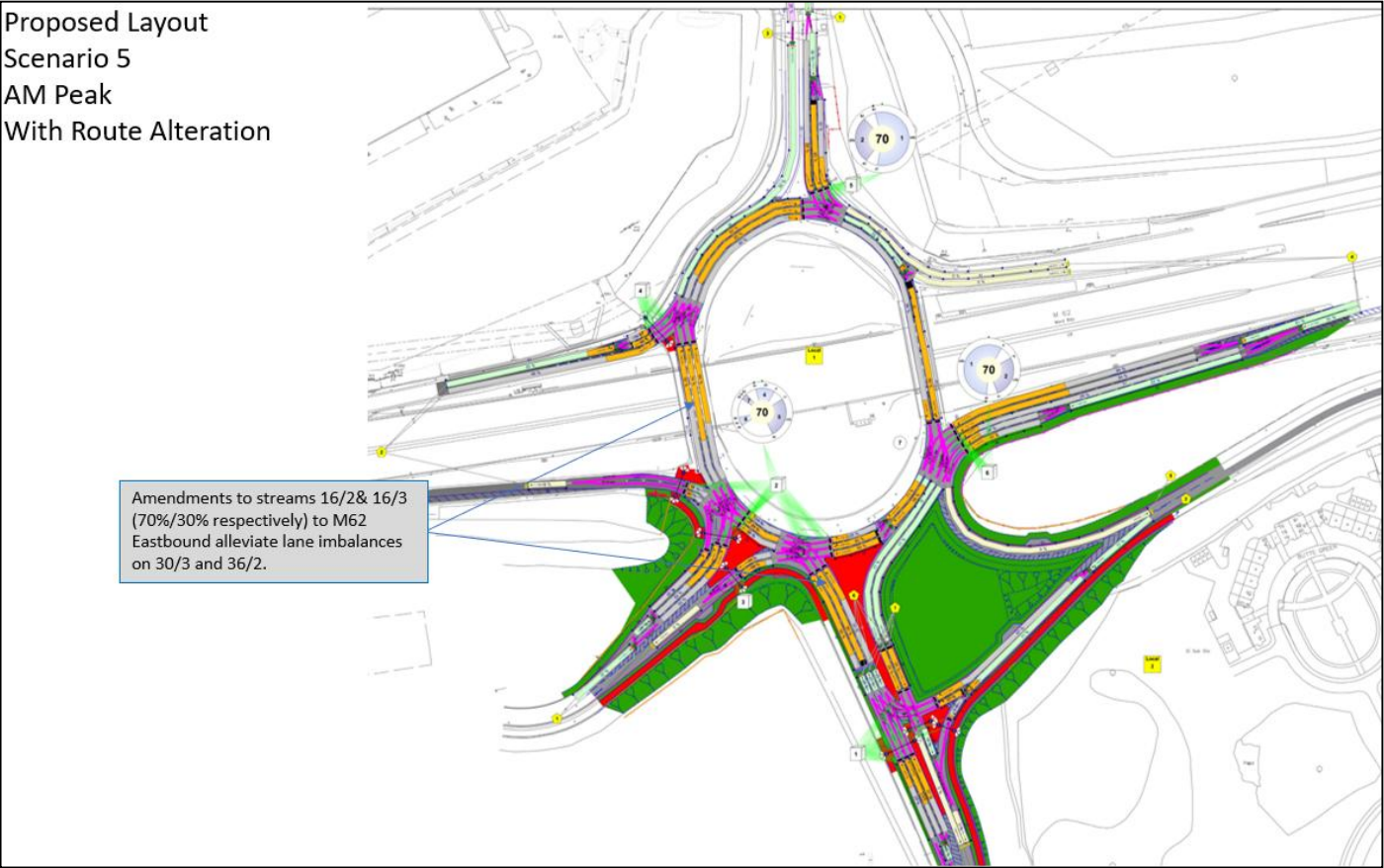
The imbalance on lanes 36/1 and 36/2 have further implications on the operation of the roundabout. Due to the reduction of circulatory lanes on the east side of the circulatory carriageway over the M62 (two lanes as opposed to three for the rest of the circulatory carriageway), Traffic travelling from the M62 Eastbound and Skyline Drive to either Burtonwood Road (S) and Charon Way are required to utilise Stream 36/2. Therefore, any excessive imbalance from traffic travelling to the M62 Eastbound On-Slip may result in abnormally high levels of queuing on the M62 Eastbound Off-Slip.

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Figures 3 and 4 show the Scenario 5 Proposed Mitigation model with route alteration as described in Table 1 in the AM and PM peak, respectively. Please note, these have also been included within Appendix A.

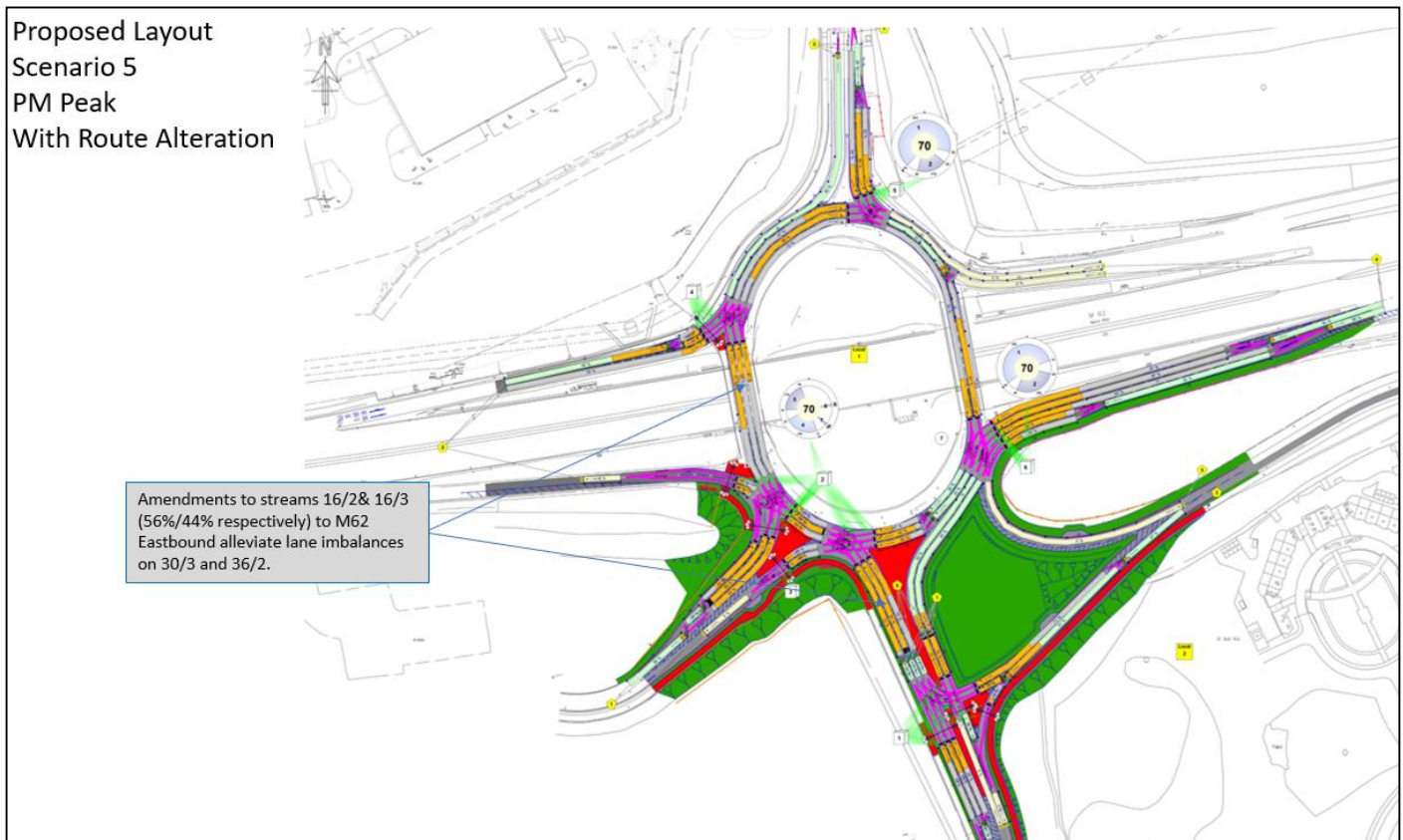
Figure 3 – Scenario 5 Proposed Mitigation with Route Alteration (AM PEAK)



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Figure 4 – Scenario 5 Proposed Mitigation with Route Alteration (PM PEAK)



Figures 3 and 4 demonstrate the amendments to lane usage proportions on streams 16/2 and 16/3 for traffic travelling to the M62 Eastbound alleviate the lane imbalances on the circulatory carriageway. This more closely reflects the anticipated operation of the roundabout in both peak hours and is considered to be reflective of how drivers will behave in reality.

The figures demonstrate that TRANSYT cannot appropriately anticipate driver behaviour beyond the entry stop line, particularly when the circulatory carriageway is not consistent throughout the junction. In conclusion, it is considered that the approach applied is entirely reasonable and accords with advice in the TRANSYT User Guide.

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Highways England Point 13 – Scenario 5 flow discrepancy & reassessment

Highways England Comment as per Technical Note Review

A revised assessment has been undertaken including the amended B8 traffic flows (as outlined above in point 8), as well as amended HGV trips for the Mountpark and Zones 1-2 B2/B8 developments, which had not previously been converted into PCUs.

The Technical Note provided only appears to contain AM peak traffic flows in Appendix A. Please could the PM peak flows also be provided.

The results of the scenario 5 assessment (with mitigation) indicate that generally the junction will operate over practical capacity but within absolute capacity. Three lanes (M62 Eastbound off slip in the AM and Skyline Drive in the PM) exceed a DoS value of 90%. The analysis also indicates that the increase in queueing on these arms is predicted to be three PCUs or less. However, we consider that points 11 and 14 still need to be addressed regarding the manual intervention in traffic assignment between lanes and potential unequal lane usage due to exit merging. As such, the results may be revised.

WSP Comments

Updated Scenario 2 and Scenario 5 traffic flows relating to the PM peak period have been included within Appendix B.

TECHNICAL NOTE 2

DATE:	27 April 2020	CONFIDENTIALITY:	Public
SUBJECT:	Omega Zone 8: Response to Highways England (March 2020 Comments)		
PROJECT:	11191042	AUTHOR:	Adam Stone
CHECKED:	Douglas Bisset	APPROVED:	Douglas Bisset

Highways England Point 14 – Lane utilisation sensitivity test

Highways England Comment as per Technical Note Review

This was requested to inform Highways England on the potential range of outcomes that may result from variation in lane utilisation. We would therefore recommend that these sensitivity tests are completed.

WSP Comments

As part of further highway improvement works on Skyline Drive, it is proposed to widen the carriageway to support two lanes of traffic in either direction between the Skyline Drive / Fairchild Road roundabout and M62 Junction 8. We have included a drawing of the associated works below, which has also been included within Appendix C.

Figure 5– Proposed widening works on Skyline Drive



The continuation of two lanes westbound on Skyline Drive is considered to alleviate the concerns of unequal lane utilisation at the upstream stopline on Junction 8.



TECHNICAL NOTE 2

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PROJECT:	11191042	AUTHOR:	Adam Stone
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CONCLUSION

It is concluded, through the provision of additional / updated information within this Technical Note, that Highways England’s remaining points have been clarified and addressed, demonstrating that the impacts of the proposed development can be fully mitigated.

Appendix A

TRANSYT FIGURES

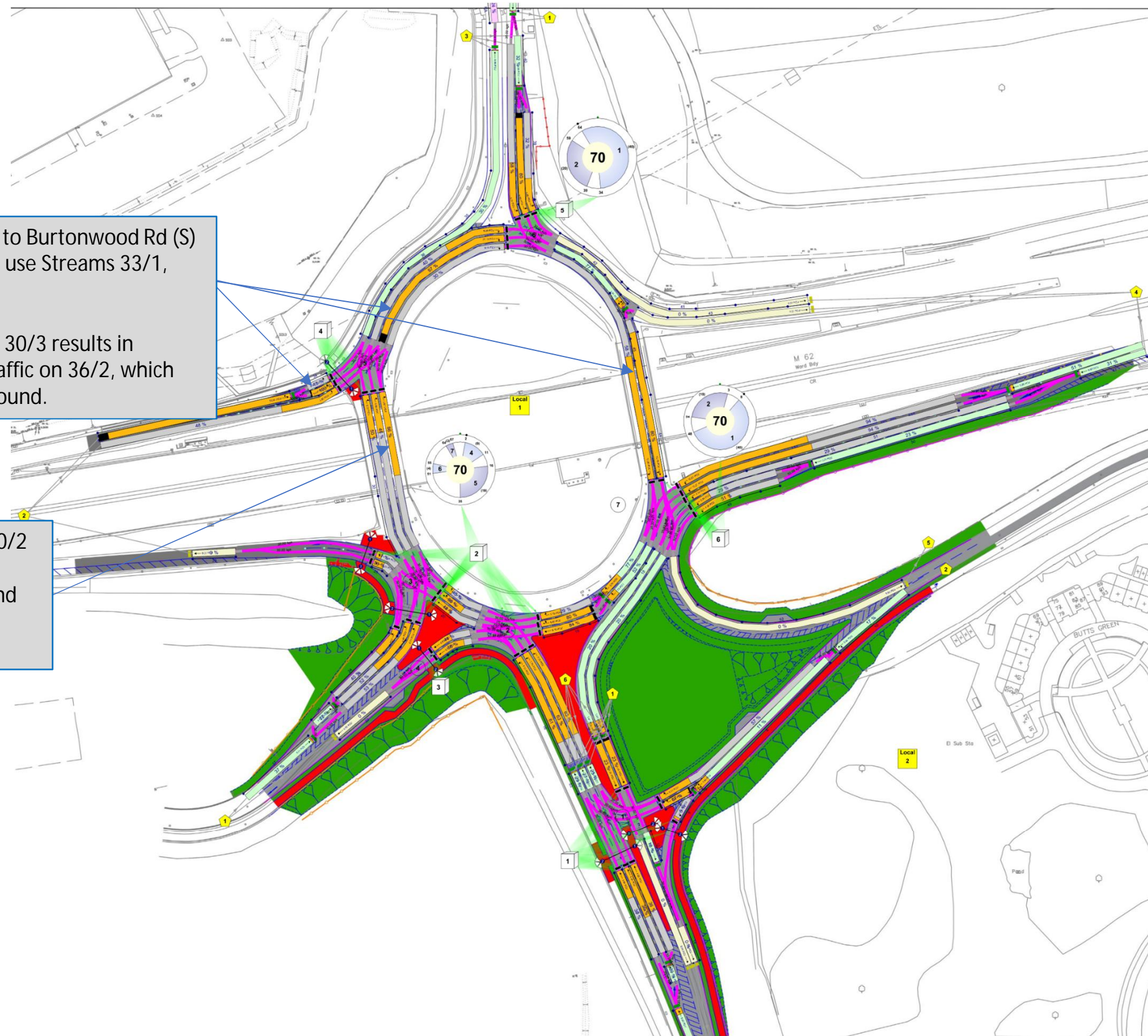


Proposed Layout
Scenario 5
AM Peak
No Route Alteration

Traffic from M62 Eastbound to Burtonwood Rd (S) and Charon Way required to use Streams 33/1, 32/1, 36/2, 42/1 and 44/1.

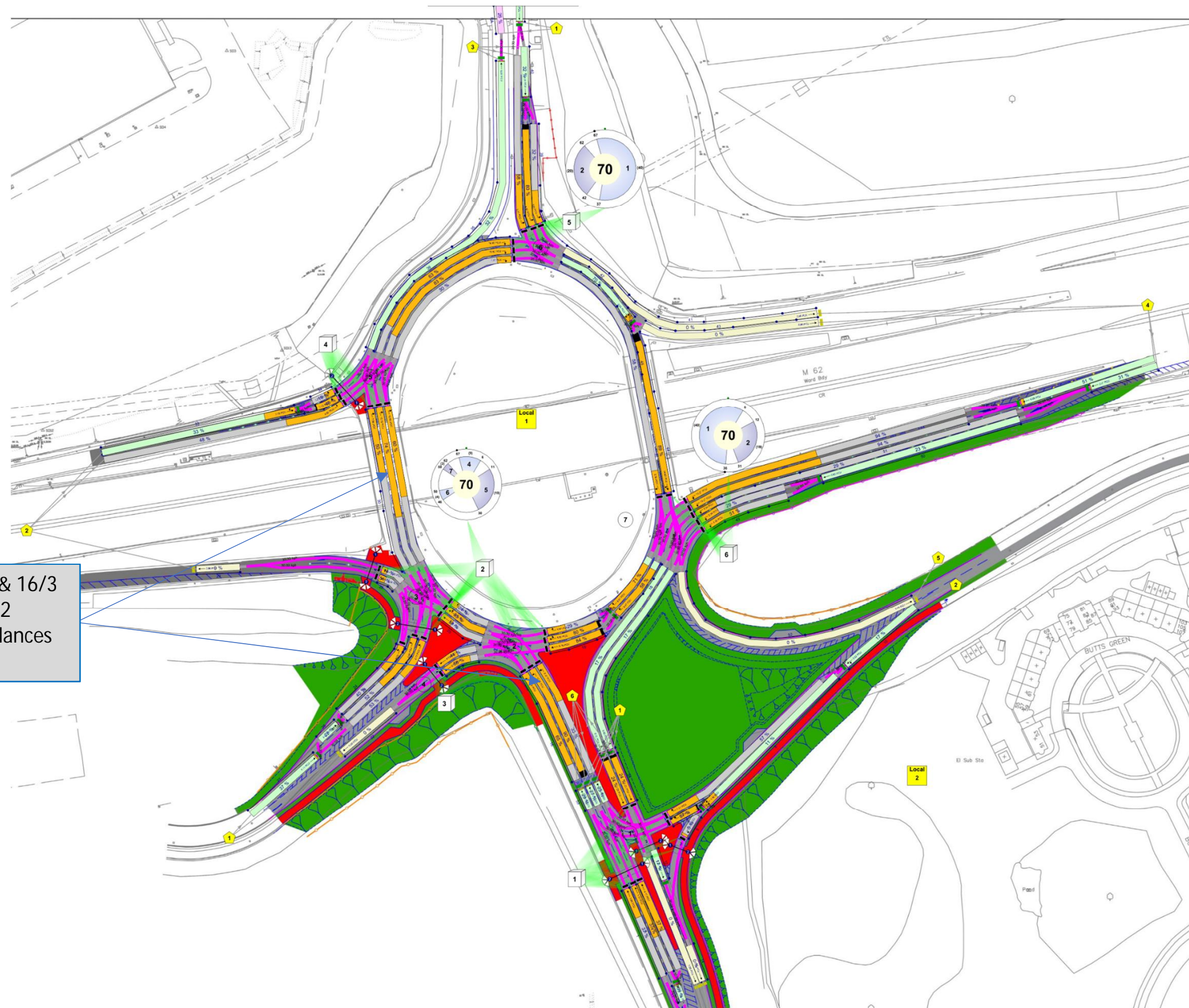
Lane imbalance on 30/2 and 30/3 results in disproportionate levels of traffic on 36/2, which blocks back onto M62 Eastbound.

Lane Imbalance on 30/2 and 30/3 (and subsequently 36/1 and 36/2) towards M62 Eastbound



Proposed Layout
Scenario 5
AM Peak
With Route Alteration

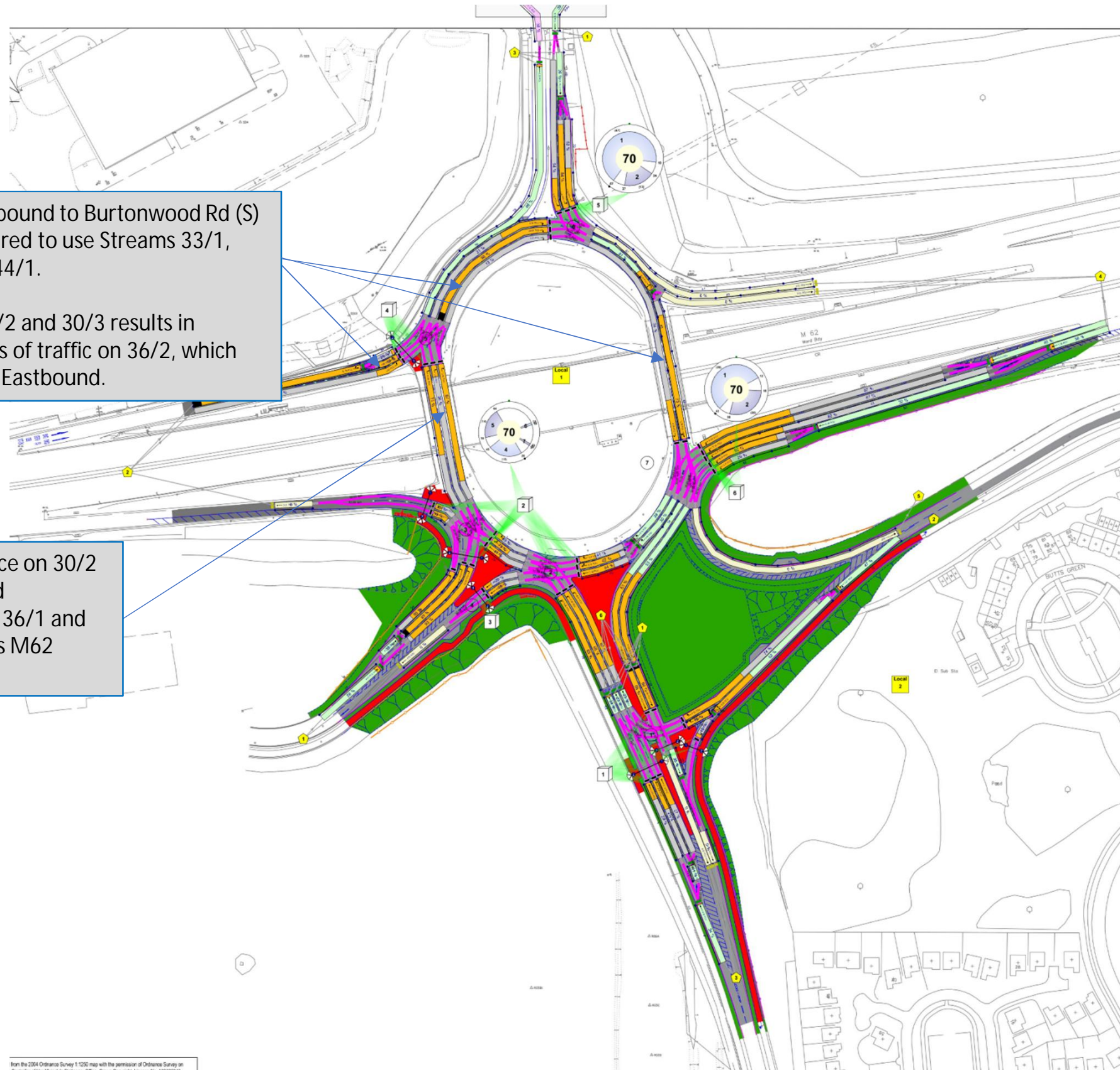
Amendments to streams 16/2& 16/3
(70%/30% respectively) to M62
Eastbound alleviate lane imbalances
on 30/3 and 36/2.



No Route Alteration

Lane imbalance on 30/2 and 30/3 results in disproportionate levels of traffic on 36/2, which blocks back onto M62 Eastbound.

Lane Imbalance on 30/2 and 30/3 (and subsequently 36/1 and 36/2) towards M62 Eastbound



Proposed Layout
Scenario 5
PM Peak
With Route Alteration

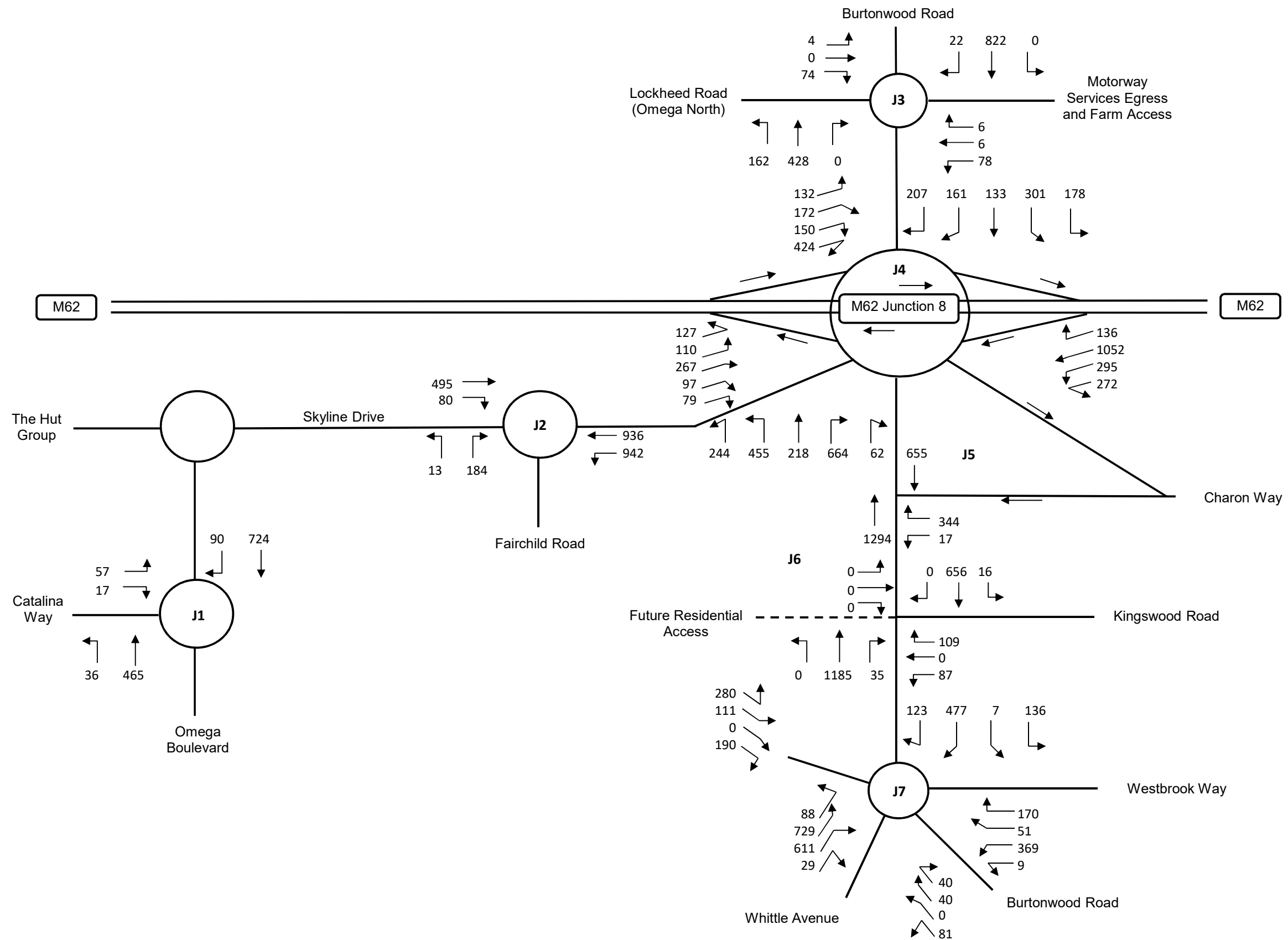
Amendments to streams 16/2& 16/3
(56%/44% respectively) to M62
Eastbound alleviate lane imbalances
on 30/3 and 36/2.



Appendix B

NETWORK DIAGRAMS

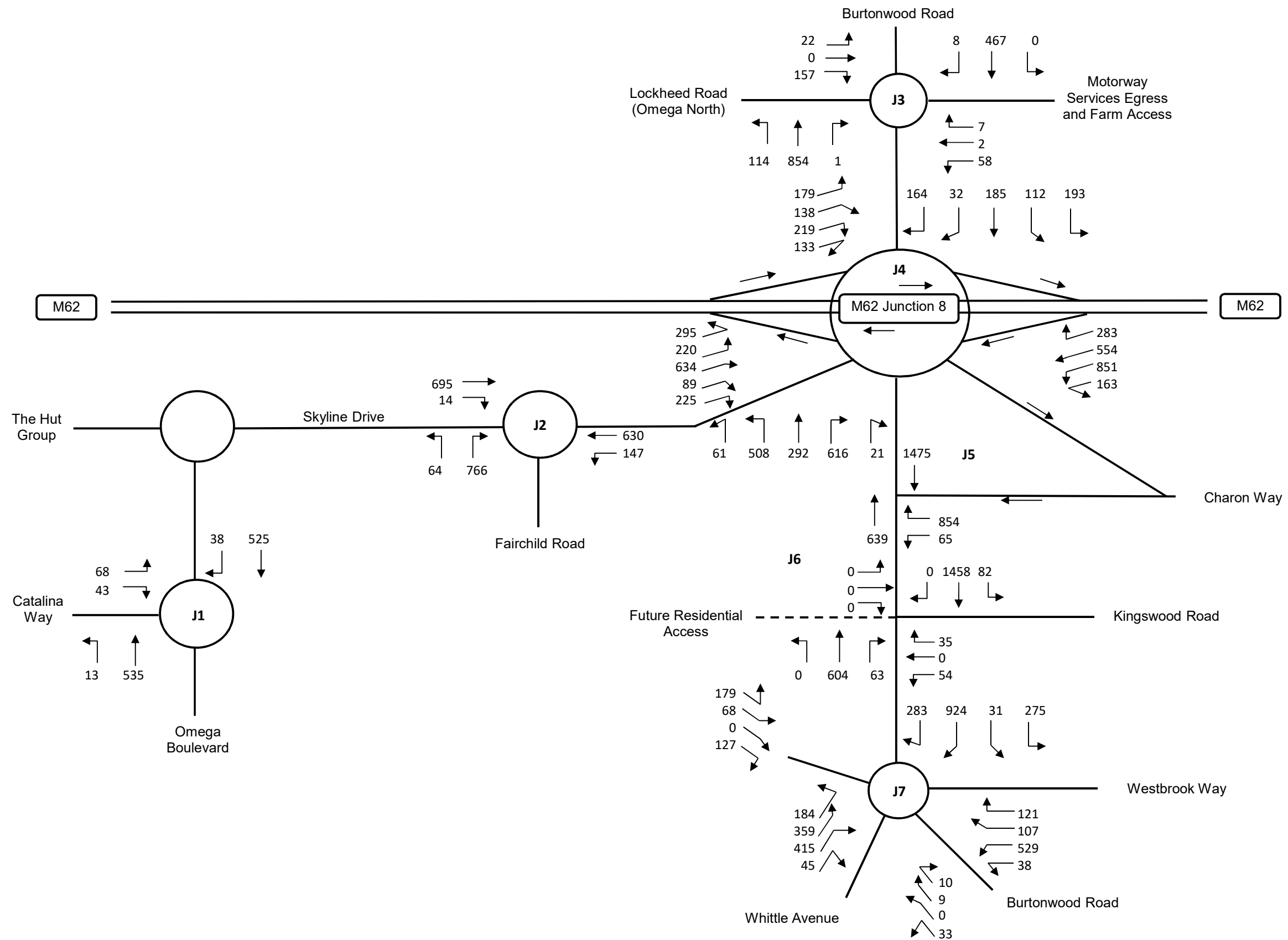




TITLE
ZONE 8 OMEGA
TRANSPORT ASSESSMENT

SCENARIO
2021 Scenario 2
AM PEAK HOUR

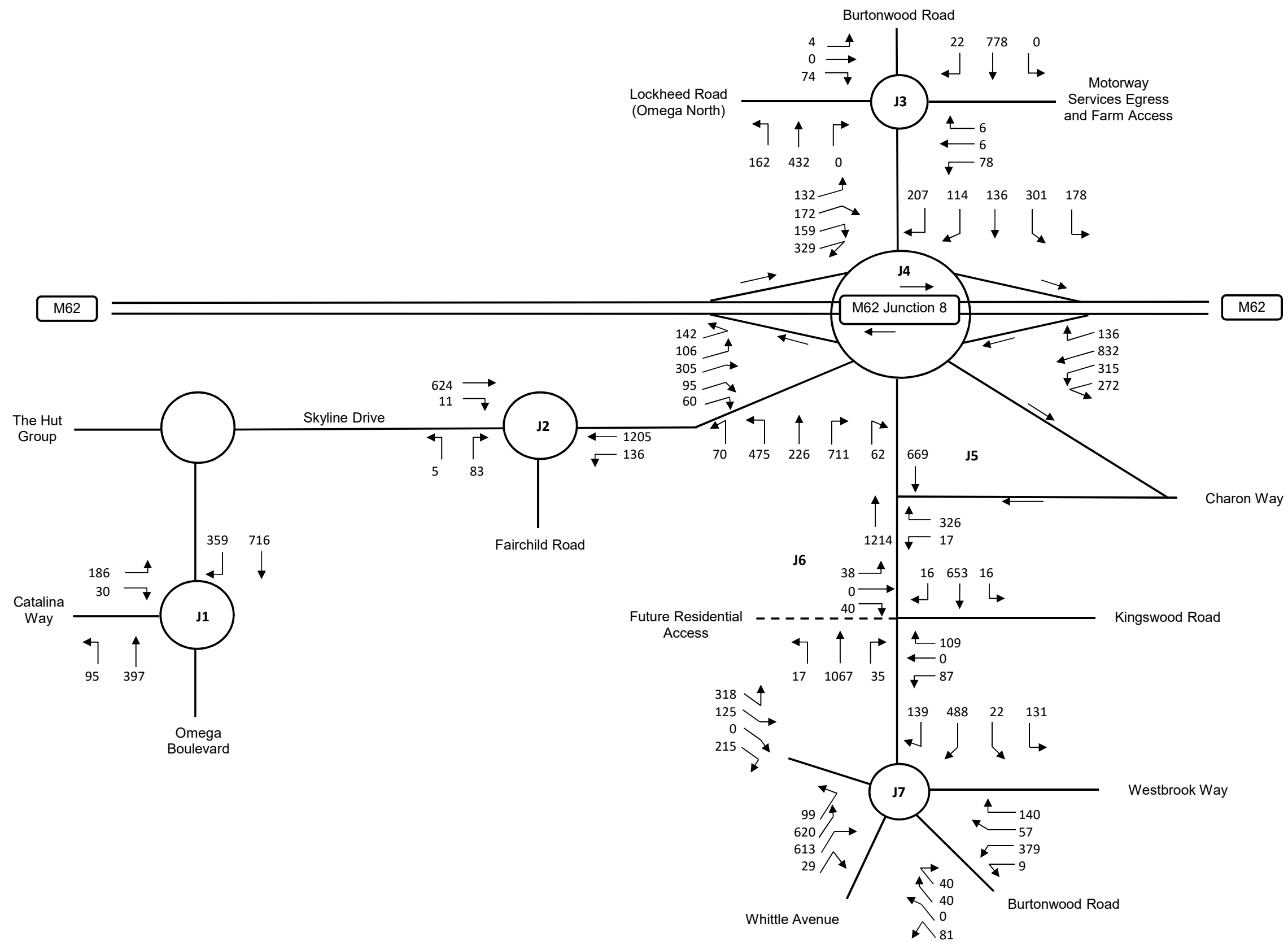
FIGURE
58



TITLE
ZONE 8 OMEGA
TRANSPORT ASSESSMENT

SCENARIO
2021 Scenario 2
PM PEAK HOUR

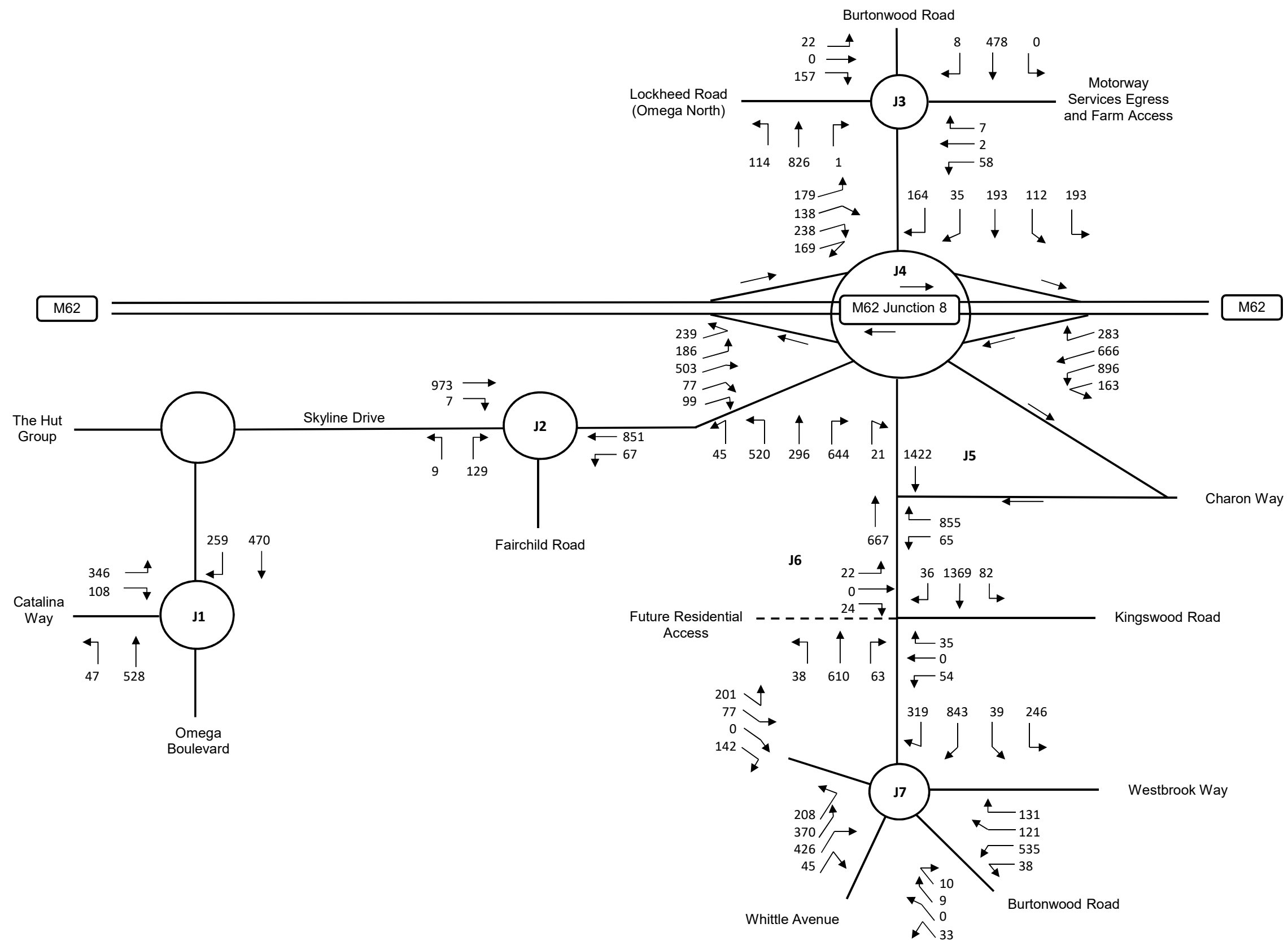
FIGURE
59



TITLE
OMEGA WEST
TRANSPORT ASSESSMENT

SCENARIO
2021 Scenario 5
AM PEAK HOUR

FIGURE
64



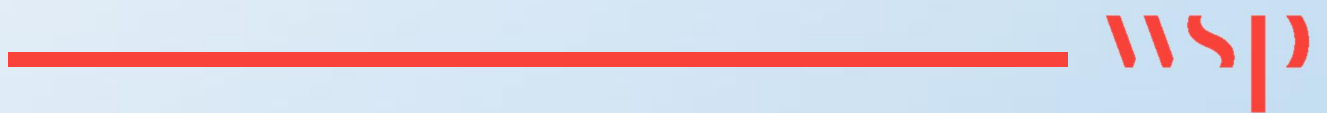
TITLE
OMEGA WEST
TRANSPORT ASSESSMENT

SCENARIO
2021 Scenario 5
PM PEAK HOUR

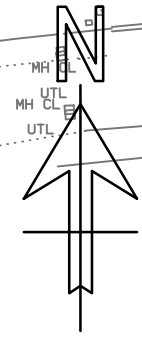
FIGURE
65

Appendix C

PROPOSED WIDENING ON SKYLINE
DRIVE



DO NOT SCALE



PROPOSED LAYOUT

ADDITIONAL LAND REQUIREMENTS

A	09/04/2020	AS	FIRST ISSUE	XXX	XXX
REV	DATE	BY	DESCRIPTION	CHK	APP

DRAWING STATUS: S2 - FOR INFORMATION



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CLIENT: OMEGA WARRINGTON LIMITED

ARCHITECT:

SITE/PROJECT: OMEGA ,WARRINGTON

TITLE: PROPOSED WIDENING ON SKYLINE DRIVE

SCALE @ A1: 1:500	CHECKED: DB	APPROVED: DB
PROJECT NO: 11191042	DESIGNED: AS	DRAWN: AS
		DATE: April 20

DRAWING No:	11191042_SK329	REV:	A
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File name C:\USERS\JUKAPS02\DESKTOP\OMEGA\SKYLINE DRIVE\SK239_PROPOSED WIDENING ON SKYLINE DRIVE.DWG, printed on 09 April 2020 17:24:15, by Stone, Adam

Appendix F

TEMPRO



APPENDIX F – TEMPRO GROWTH

Comments

The following comment has been received:

“Clarification as to why the same TEMPro growth factors have been used for the AM and PM peak periods is required. Factors should also be provided for the future year (+10) assessments.”

Future Year (+10) Growth Factor

A +10 year future assessment sensitivity test was undertaken for the M62 Junction 8 as was requested by Highways England at Scoping Stage.

The Department for Transport’s TempPro V7.2 has been used identify a factor which can be used to growth the surveyed flows to the sensitivity year (2029). In terms of settings, the area type was set to rural, the road type was set to principal / motorway and the areas shown in Table 1 were selected, as they surround and include Omega South. Average growth factors were then extracted for the two road types.

Table 1 – Growth Factor (2019 to 2029)

Level	Area	Principal Local Growth Factor	Motorway Local Growth Factor
E02002592	Warrington 003	1.093	1.114
E02002595	Warrington 006	1.108	1.129
E02002598	Warrington 009	1.080	1.100
E02002599	Warrington 010	1.079	1.099
E02002602	Warrington 013	1.114	1.135
E02002604	Warrington 015	1.079	1.099
E02002605	Warrington 016	1.075	1.096
E02002607	Warrington 018	1.103	1.124
E02002608	Warrington 019	1.092	1.113
E02001427	St. Helens 022	1.085	1.106
Average		1.091	1.111

Growth factors of 1.091 (All roads except motorway) and 1.111 (motorway only) have been applied to the 2019 AM and PM surveyed flows to produce AM and PM 2029 Base traffic flows.

TEMPRO Factor Query

The comments received, as detailed above, request clarification regarding the use of the same factor for both the AM and PM peak periods. We have used the AM peak period TEMPRO factor as a blanket factor in order to provide a robust assessment. The TEMPRO factors for PM are indicated below in Table 2.

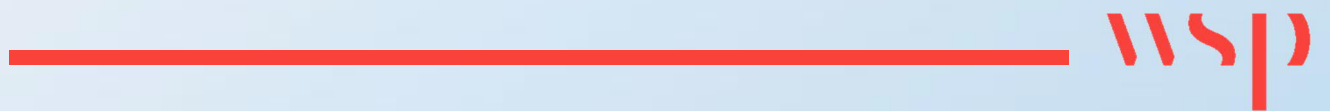
Table 2 – Growth Factor PM Peak (2019 to 2029)

Level	Area	Principal Local Growth Factor	Motorway Local Growth Factor
E02002592	Warrington 003	1.091	1.112
E02002595	Warrington 006	1.103	1.124
E02002598	Warrington 009	1.077	1.097
E02002599	Warrington 010	1.075	1.095
E02002602	Warrington 013	1.109	1.130
E02002604	Warrington 015	1.072	1.092
E02002605	Warrington 016	1.071	1.091
E02002607	Warrington 018	1.098	1.119
E02002608	Warrington 019	1.090	1.111
E02001427	St. Helens 022	1.079	1.099
Average		1.086	1.107

As is indicated in Table 2, the PM peak growth factors are lower than those that have been applied in our assessment and therefore no changes are required to the robust assessment which has been carried out.

Appendix G

SPREADSHEET MODEL (ATTACHED
AS A FILE)





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