Port Expansion Project EIS

Appendix Q6

Intersection 3: Boundary Street / Benwell Road / Southern Access / Townsville Port Access Road SIDRA Summaries

AECOM BMT WBM

MOVEMENT SUMMARY

Site: 2014 AM peak WOD

Boundary Street / Benwell Road
2014 Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	513	10.0	0.653	17.3	LOS B	14.1	107.0	0.85	0.75	38.5
Approach		513	10.0	0.653	17.3	LOS B	14.1	107.0	0.85	0.75	38.5
North: Benwell Road (North)											
8	T	109	17.6	0.104	6.4	LOS A	1.6	12.7	0.45	0.36	49.2
9	R	24	17.4	0.171	43.1	LOS D	0.8	6.6	0.96	0.71	27.6
Approach		134	17.6	0.171	13.0	LOS B	1.6	12.7	0.54	0.43	43.1
West: Boundary Street (West)											
10	L	157	11.4	0.091	7.8	X	X	X	X	0.60	49.8
Approach		157	11.4	0.091	7.8	NA	0.0	0.0	0.00	0.60	49.8
All Vehicles		803	11.5	0.653	14.7	LOS B	14.1	107.0	0.63	0.67	41.1

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	13.8	LOS B	0.1	0.1	0.63	0.63
All Pedestrians		106	21.5	LOS C			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

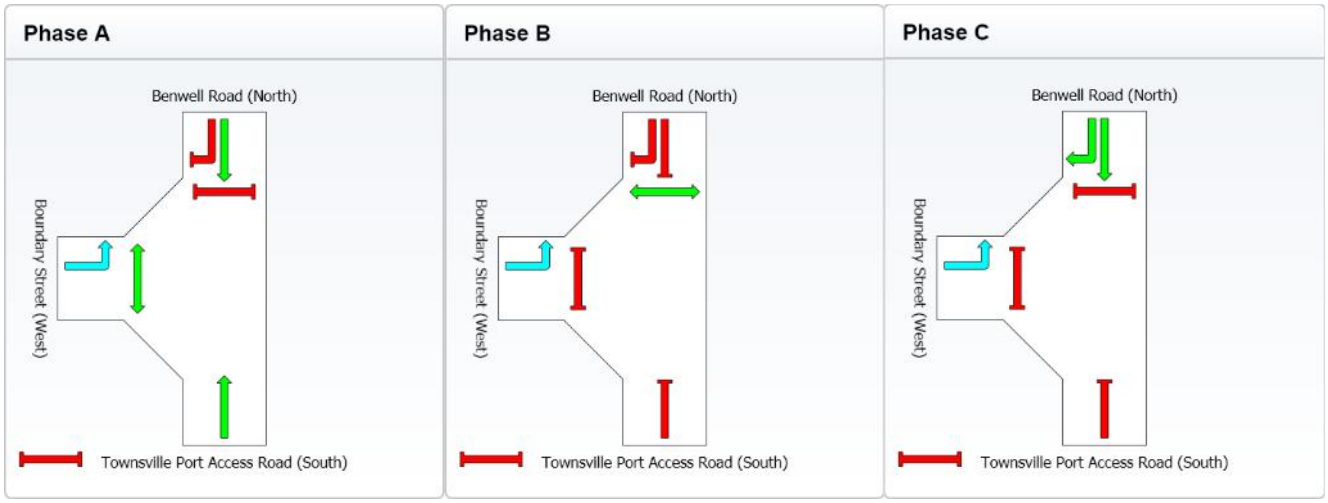
Site: 2014 AM peak WOD

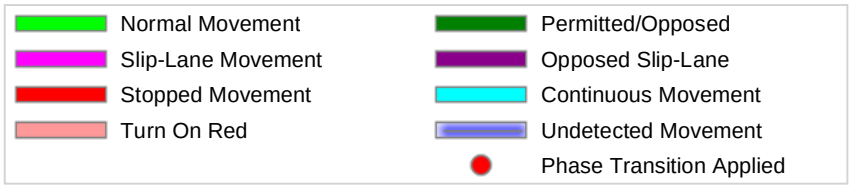
Boundary Street / Benwell Road
2014 Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (User-Given Cycle Time)

Phase times determined by the program
Sequence: Three Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	30	16	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	36	22	12
Phase Split	51 %	31 %	17 %





MOVEMENT SUMMARY

Site: 2014 AM peak WD

Boundary Street / Benwell Road
2014 With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	531	13.0	0.688	17.7	LOS B	14.9	115.9	0.87	0.77	38.2
Approach		531	13.0	0.688	17.7	LOS B	14.9	115.9	0.87	0.77	38.2
North: Benwell Road (North)											
8	T	117	33.3	0.122	6.5	LOS A	1.7	15.4	0.46	0.37	49.1
9	R	36	11.8	0.244	43.3	LOS D	1.2	9.5	0.97	0.73	27.5
Approach		153	28.3	0.244	15.1	LOS B	1.7	15.4	0.58	0.45	41.5
West: Boundary Street (West)											
10	L	285	2.5	0.156	7.6	X	X	X	X	0.60	49.8
Approach		285	2.5	0.156	7.6	NA	0.0	0.0	0.00	0.60	49.8
All Vehicles		968	12.3	0.688	14.3	LOS B	14.9	115.9	0.57	0.67	41.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	13.8	LOS B	0.1	0.1	0.63	0.63
All Pedestrians		106	21.5	LOS C			0.77	0.77

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

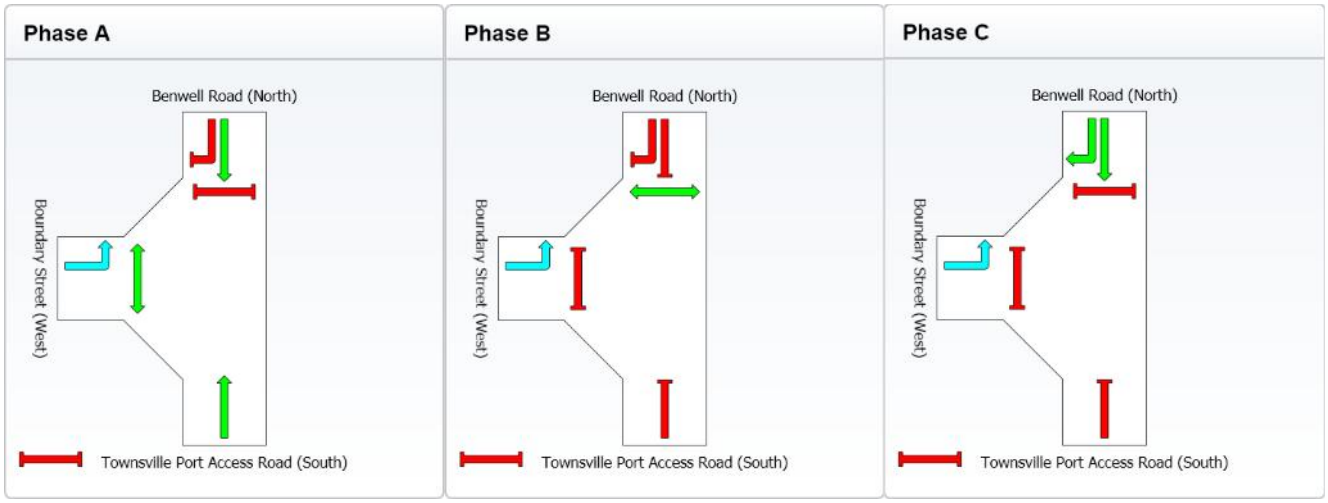
PHASING SUMMARY

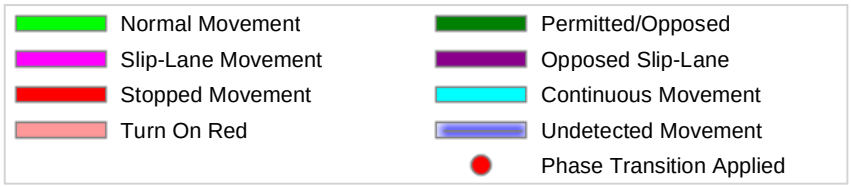
Boundary Street / Benwell Road
2014 With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Three Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	30	16	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	36	22	12
Phase Split	51 %	31 %	17 %





MOVEMENT SUMMARY

Site: 2014 PM peak WOD

Boundary Street / Benwell Road
2014 Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	139	21.7	0.244	16.0	LOS B	3.0	25.1	0.76	0.62	39.6
Approach		139	21.7	0.244	16.0	LOS B	3.0	25.1	0.76	0.62	39.6
North: Benwell Road (North)											
8	T	487	10.5	0.501	9.7	LOS A	9.2	70.0	0.68	0.60	45.0
9	R	39	16.2	0.234	37.7	LOS D	1.1	9.1	0.96	0.73	29.6
Approach		526	10.9	0.501	11.8	LOS B	9.2	70.0	0.70	0.61	43.4
West: Boundary Street (West)											
10	L	56	20.8	0.035	8.0	X	X	X	X	0.59	49.8
Approach		56	20.8	0.035	8.0	NA	0.0	0.0	0.00	0.59	49.8
All Vehicles		721	13.8	0.501	12.3	LOS B	9.2	70.0	0.66	0.61	43.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	16.1	LOS B	0.1	0.1	0.73	0.73
All Pedestrians		106	20.2	LOS C			0.82	0.82

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

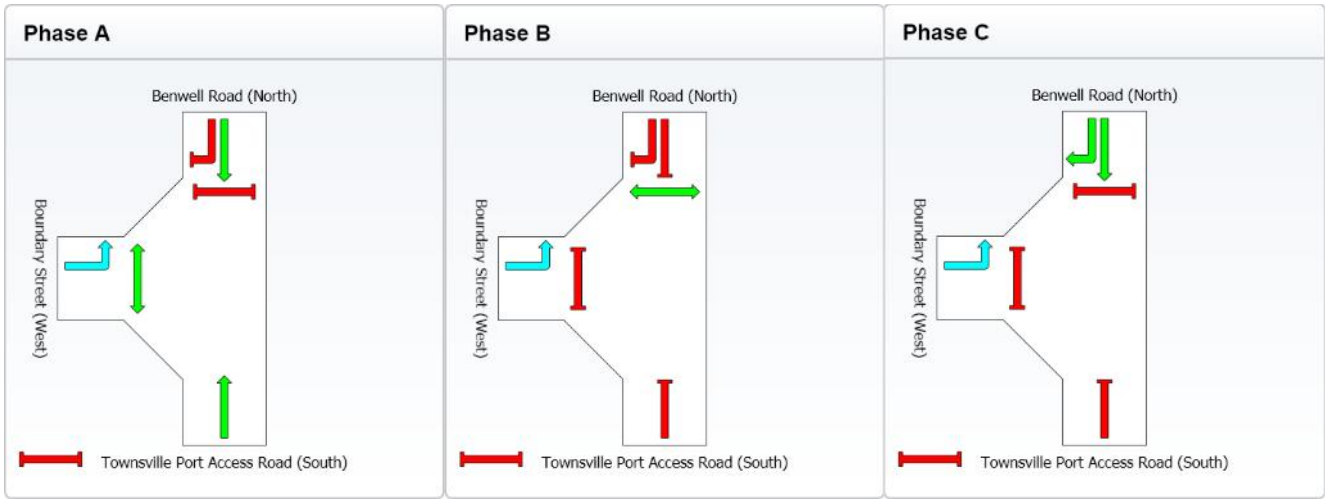
Site: 2014 PM peak WOD

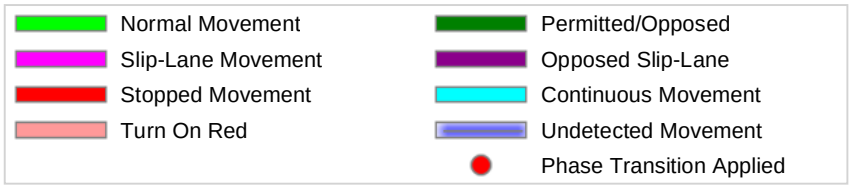
Boundary Street / Benwell Road
2014 Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Three Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	20	16	6
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	26	22	12
Phase Split	43 %	37 %	20 %





MOVEMENT SUMMARY

Site: 2014 PM peak WD

Boundary Street / Benwell Road
2014 With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	144	32.1	0.413	22.8	LOS C	3.8	34.0	0.90	0.73	35.0
Approach		144	32.1	0.413	22.8	LOS C	3.8	34.0	0.90	0.73	35.0
North: Benwell Road (North)											
8	T	505	13.5	0.529	9.9	LOS A	9.7	75.9	0.70	0.61	44.8
9	R	166	3.8	0.425	31.1	LOS C	4.4	31.7	0.91	0.80	32.3
Approach		672	11.1	0.529	15.2	LOS B	9.7	75.9	0.75	0.66	40.9
West: Boundary Street (West)											
10	L	67	14.3	0.040	7.9	X	X	X	X	0.60	49.8
Approach		67	14.3	0.040	7.9	NA	0.0	0.0	0.00	0.60	49.8
All Vehicles		883	14.8	0.529	15.9	LOS B	9.7	75.9	0.72	0.67	40.3

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P5	Across N approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	21.7	LOS C	0.1	0.1	0.85	0.85
All Pedestrians		106	23.0	LOS C			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

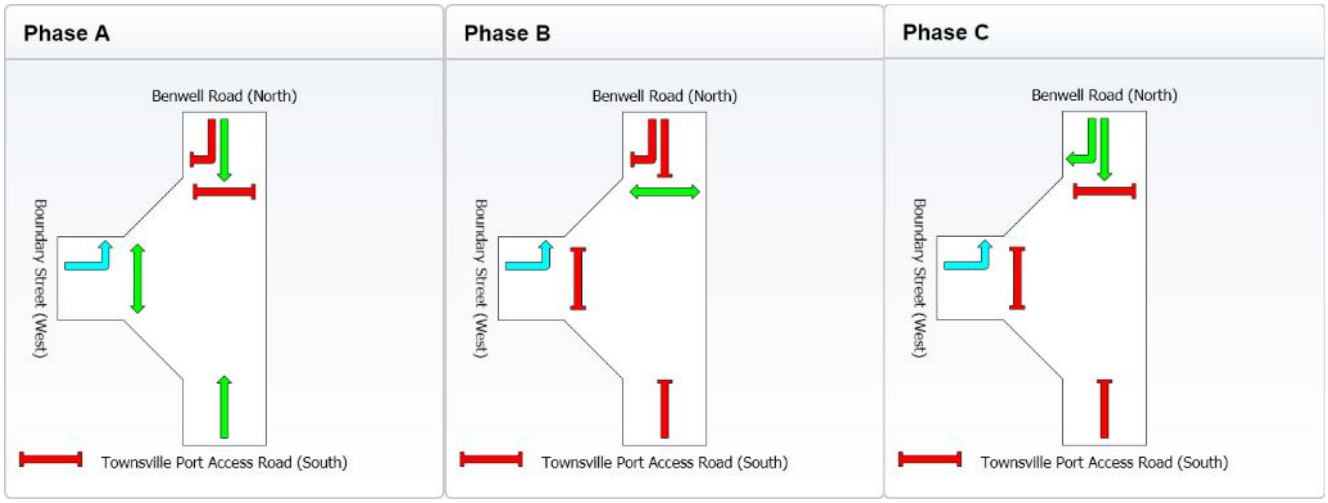
PHASING SUMMARY

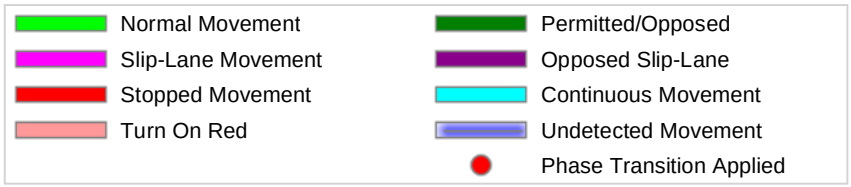
Boundary Street / Benwell Road
2014 With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Phase times determined by the program
Sequence: Three Phase
Input Sequence: A, B, C
Output Sequence: A, B, C

Phase Timing Results

Phase	A	B	C
Green Time (sec)	13	16	13
Yellow Time (sec)	4	4	4
All-Red Time (sec)	2	2	2
Phase Time (sec)	19	22	19
Phase Split	32 %	37 %	32 %





MOVEMENT SUMMARY

Site: 2035 AM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2035 Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	86	9.8	0.181	42.9	LOS D	1.9	14.6	0.93	0.69	26.4
3	R	449	8.2	0.674	36.2	LOS D	18.4	137.6	0.89	0.85	30.1
Approach		536	8.4	0.674	37.3	LOS D	18.4	137.6	0.90	0.83	29.5
East: Southern Acces (East)											
4	L	88	14.3	0.088	8.3	LOS A	0.3	2.3	0.13	0.62	49.0
5	T	24	17.4	0.073	36.1	LOS D	1.0	7.9	0.85	0.62	28.9
6	R	6	16.7	0.063	58.9	LOS E	0.3	2.5	0.97	0.66	23.0
Approach		119	15.0	0.088	16.6	LOS B	1.0	7.9	0.32	0.62	40.9
North: Benwell Road (North)											
7	L	28	7.4	0.070	13.5	LOS B	0.4	3.3	0.40	0.66	44.0
8	T	29	17.9	0.065	41.9	LOS D	0.6	5.2	0.91	0.64	26.8
9	R	25	16.7	0.040	29.3	LOS C	0.8	6.1	0.65	0.71	33.4
Approach		83	13.9	0.070	28.4	LOS C	0.8	6.1	0.66	0.67	33.3
West: Boundary Street (West)											
10	L	39	10.8	0.035	8.3	LOS A	0.2	1.2	0.15	0.62	49.0
11	T	120	7.9	0.341	38.5	LOS D	5.2	38.6	0.91	0.73	28.0
Approach		159	8.6	0.341	31.1	LOS C	5.2	38.6	0.72	0.70	31.3
All Vehicles		897	9.9	0.674	32.6	LOS C	18.4	137.6	0.77	0.76	31.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	43.2	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	43.9	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

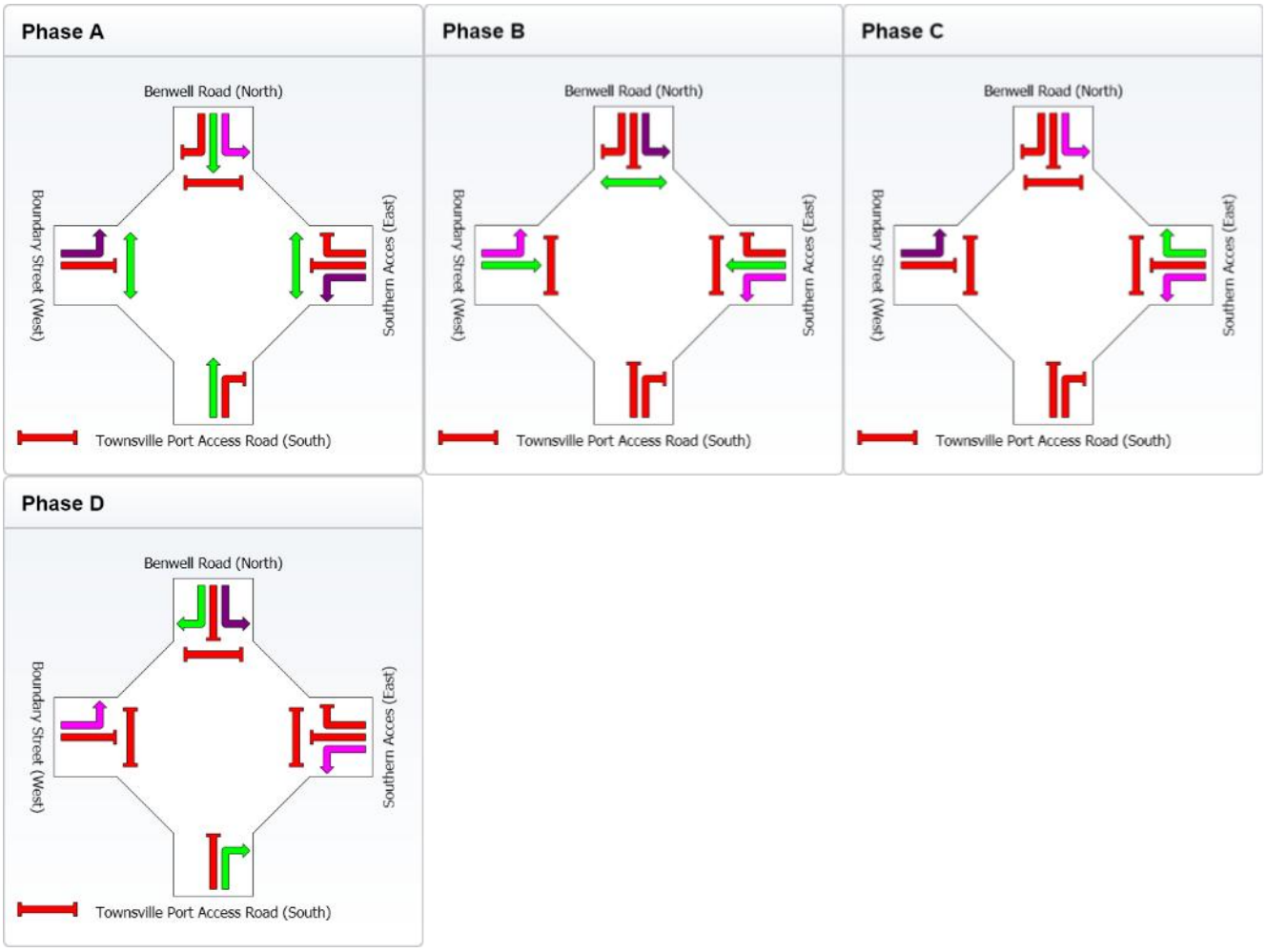
PHASING SUMMARY

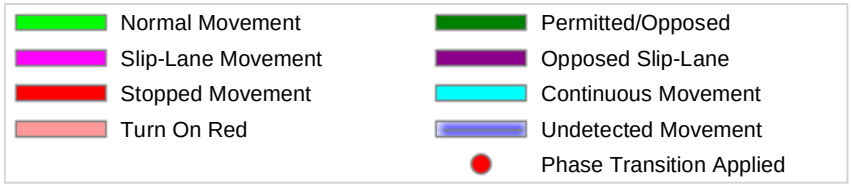
Boundary Street / Benwell Road
2035 Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	38
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	44
Phase Split	19 %	25 %	12 %	44 %





MOVEMENT SUMMARY

Site: 2035 AM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2035 With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	113	15.0	0.232	40.6	LOS D	2.4	19.0	0.93	0.71	27.2
3	R	449	8.2	0.738	38.9	LOS D	18.9	141.5	0.94	0.88	29.1
Approach		562	9.6	0.738	39.2	LOS D	18.9	141.5	0.94	0.84	28.7
East: Southern Access (East)											
4	L	92	17.2	0.097	8.4	LOS A	0.3	2.8	0.15	0.62	48.9
5	T	24	17.4	0.069	33.5	LOS C	0.9	7.4	0.84	0.61	30.0
6	R	6	16.7	0.060	56.1	LOS E	0.3	2.3	0.96	0.66	23.7
Approach		122	17.2	0.097	15.9	LOS B	0.9	7.4	0.33	0.62	41.5
North: Benwell Road (North)											
7	L	28	7.4	0.069	13.8	LOS B	0.4	3.3	0.42	0.66	43.7
8	T	40	36.8	0.093	39.7	LOS D	0.8	7.7	0.90	0.65	27.5
9	R	47	33.3	0.091	31.5	LOS C	1.5	13.3	0.70	0.74	32.6
Approach		116	28.2	0.093	30.0	LOS C	1.5	13.3	0.70	0.69	32.6
West: Boundary Street (West)											
10	L	212	7.5	0.186	8.4	LOS A	0.9	6.9	0.18	0.64	48.8
11	T	120	7.9	0.323	35.7	LOS D	4.9	36.2	0.90	0.72	29.0
Approach		332	7.6	0.323	18.2	LOS B	4.9	36.2	0.44	0.67	39.2
All Vehicles		1132	11.7	0.738	29.6	LOS C	18.9	141.5	0.70	0.75	32.8

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	41.7	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	41.7	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	40.8	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	41.4	LOS E			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

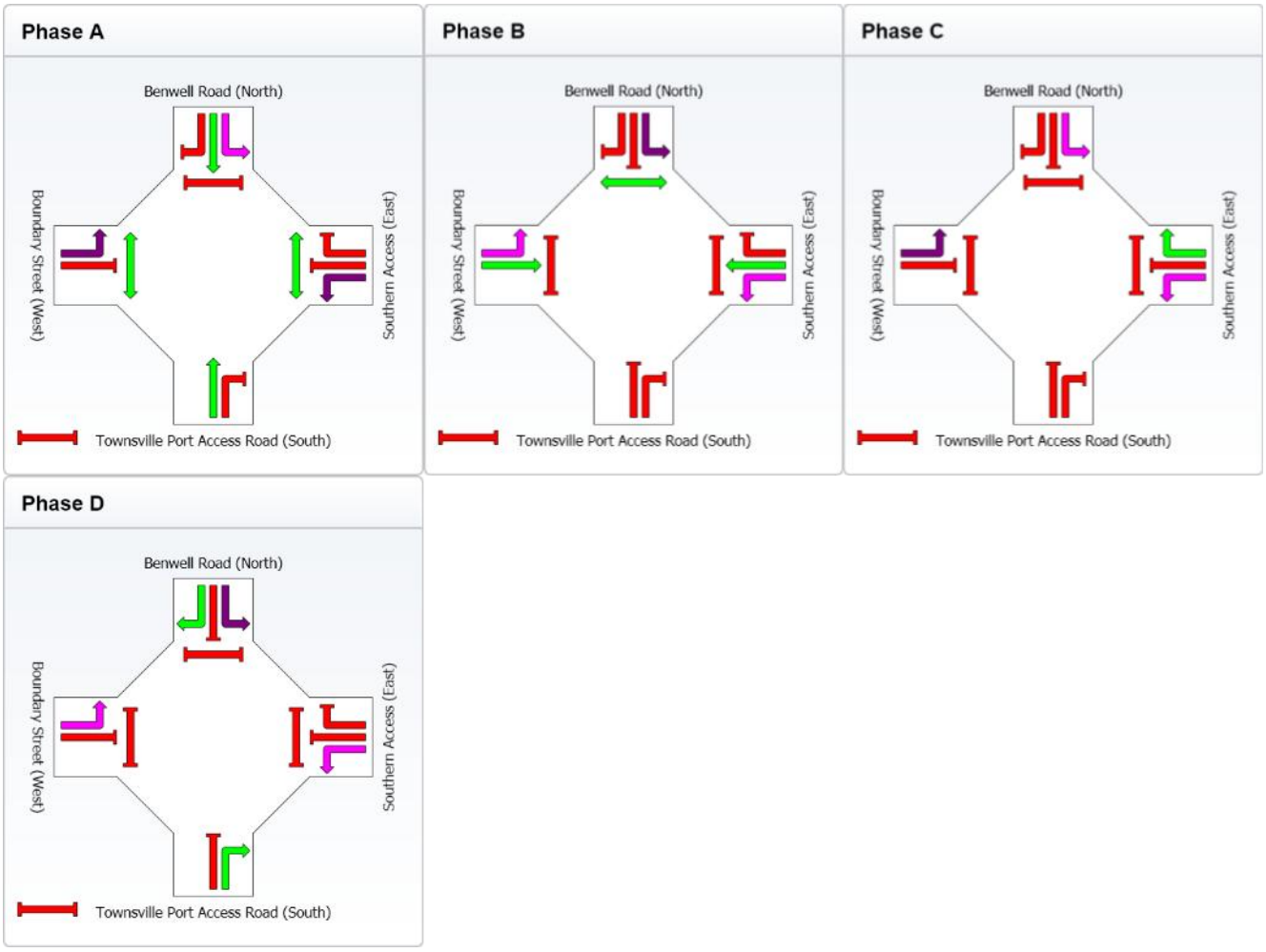
PHASING SUMMARY

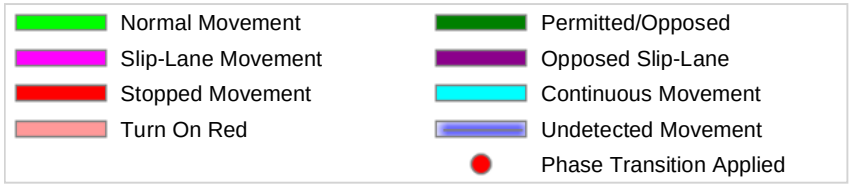
Boundary Street / Benwell Road
2035 With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	33
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	39
Phase Split	20 %	26 %	13 %	41 %





MOVEMENT SUMMARY

Site: 2035 PM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2035 Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	38	22.2	0.060	25.9	LOS C	0.5	4.6	0.85	0.61	33.4
3	R	115	18.3	0.611	43.3	LOS D	4.1	33.0	1.00	0.82	27.6
Approach		153	19.3	0.611	39.0	LOS D	4.1	33.0	0.96	0.77	28.8
East: Southern Acces (East)											
4	L	427	8.6	0.429	8.6	LOS A	2.1	15.6	0.26	0.66	48.4
5	T	114	8.3	0.226	21.7	LOS C	3.1	23.0	0.82	0.65	35.8
6	R	28	7.4	0.188	42.5	LOS D	1.0	7.2	0.96	0.72	27.7
Approach		569	8.5	0.429	12.9	LOS B	3.1	23.0	0.41	0.66	43.7
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.24	0.61	48.5
8	T	81	11.7	0.120	26.3	LOS C	1.2	9.1	0.87	0.64	33.2
9	R	39	16.2	0.205	40.7	LOS D	1.3	10.2	0.94	0.73	28.5
Approach		126	13.3	0.205	29.9	LOS C	1.3	10.2	0.86	0.67	32.1
West: Boundary Street (West)											
10	L	27	23.1	0.026	8.7	LOS A	0.1	0.8	0.20	0.62	48.7
11	T	31	17.2	0.064	20.6	LOS C	0.8	6.3	0.77	0.57	36.6
Approach		58	20.0	0.064	14.9	LOS B	0.8	6.3	0.50	0.59	41.5
All Vehicles		906	11.7	0.611	19.8	LOS B	4.1	33.0	0.57	0.68	38.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	28.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	29.0	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

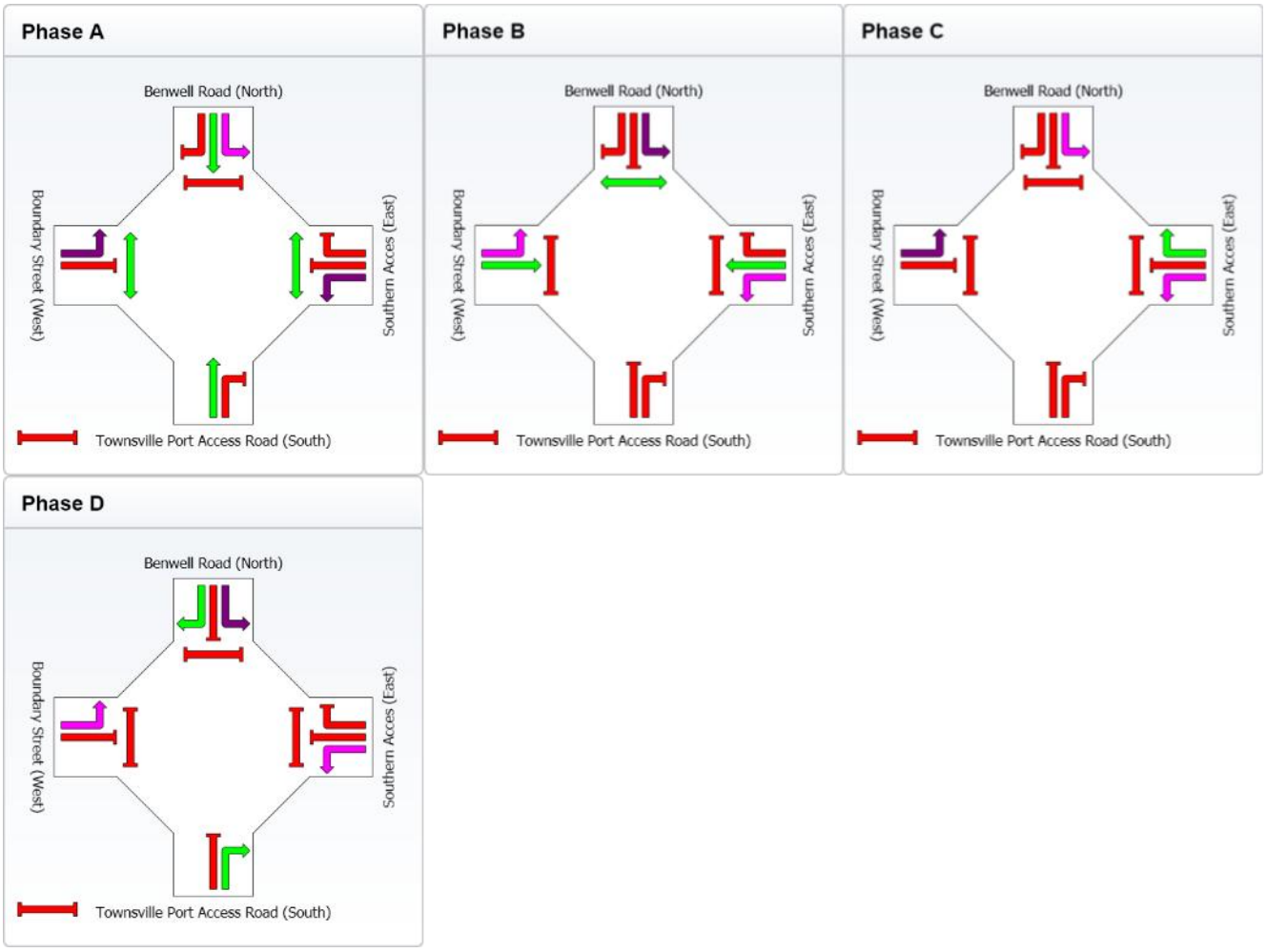
PHASING SUMMARY

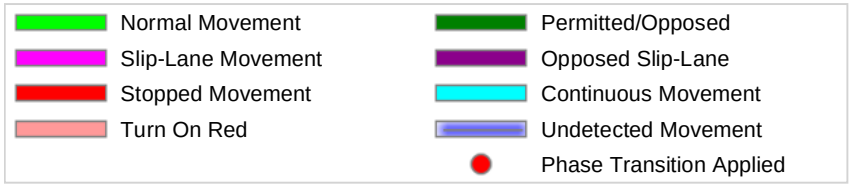
Boundary Street / Benwell Road
2035 Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	8
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	14
Phase Split	27 %	36 %	17 %	20 %





MOVEMENT SUMMARY

Site: 2035 PM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2035 With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	47	35.6	0.086	28.9	LOS C	0.8	6.9	0.87	0.63	31.9
3	R	115	18.3	0.403	39.6	LOS D	3.9	31.6	0.93	0.79	28.9
Approach		162	23.4	0.403	36.5	LOS D	3.9	31.6	0.91	0.74	29.7
East: Southern Access (East)											
4	L	427	8.6	0.446	8.6	LOS A	2.1	16.0	0.25	0.66	48.4
5	T	114	8.3	0.243	24.4	LOS C	3.4	25.3	0.84	0.67	34.2
6	R	28	7.4	0.201	45.4	LOS D	1.0	7.8	0.97	0.72	26.8
Approach		569	8.5	0.446	13.6	LOS B	3.4	25.3	0.40	0.66	43.2
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.22	0.61	48.6
8	T	108	16.5	0.178	29.4	LOS C	1.7	14.0	0.89	0.67	31.7
9	R	212	8.0	0.695	42.4	LOS D	7.8	58.7	0.99	0.86	27.8
Approach		326	11.0	0.695	37.4	LOS D	7.8	58.7	0.94	0.80	29.2
West: Boundary Street (West)											
10	L	49	34.0	0.051	8.9	LOS A	0.2	1.6	0.19	0.62	48.8
11	T	31	17.2	0.069	23.1	LOS C	0.9	6.9	0.79	0.58	35.0
Approach		80	27.6	0.069	14.3	LOS B	0.9	6.9	0.42	0.61	42.5
All Vehicles		1138	12.7	0.695	23.7	LOS C	7.8	58.7	0.63	0.71	35.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	31.7	LOS D	0.1	0.1	0.92	0.92
P5	Across N approach	53	31.7	LOS D	0.1	0.1	0.92	0.92
P7	Across W approach	53	30.8	LOS D	0.1	0.1	0.91	0.91
All Pedestrians		159	31.4	LOS D			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

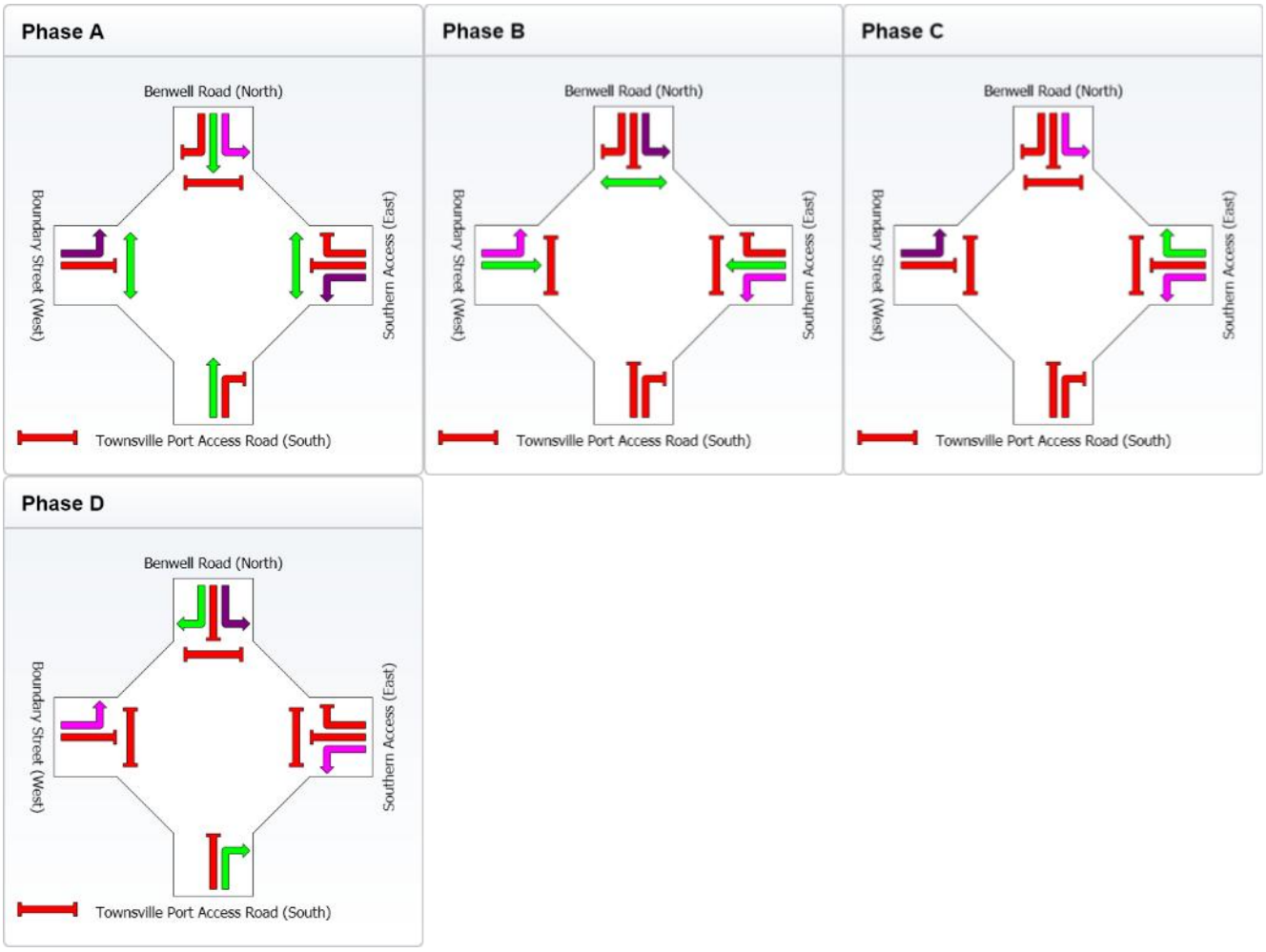
PHASING SUMMARY

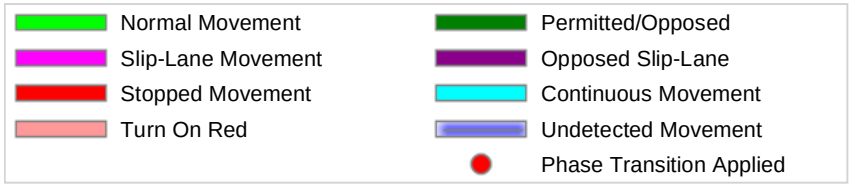
Boundary Street / Benwell Road
2035 With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	13
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	19
Phase Split	25 %	33 %	16 %	25 %





MOVEMENT SUMMARY

Site: 2036 AM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2036 (Opening Year) Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	87	9.6	0.183	42.9	LOS D	2.0	14.8	0.93	0.69	26.4
3	R	449	8.2	0.674	36.2	LOS D	18.4	137.6	0.89	0.85	30.1
Approach		537	8.4	0.674	37.3	LOS D	18.4	137.6	0.90	0.83	29.5
East: Southern Access (East)											
4	L	92	17.2	0.094	8.3	LOS A	0.3	2.4	0.13	0.62	49.0
5	T	24	17.4	0.073	36.1	LOS D	1.0	7.9	0.85	0.62	28.9
6	R	6	16.7	0.063	58.9	LOS E	0.3	2.5	0.97	0.66	23.0
Approach		122	17.2	0.094	16.4	LOS B	1.0	7.9	0.32	0.62	41.1
North: Benwell Road (North)											
7	L	28	7.4	0.070	13.5	LOS B	0.4	3.3	0.40	0.66	44.0
8	T	29	17.9	0.065	41.9	LOS D	0.6	5.2	0.91	0.64	26.8
9	R	25	16.7	0.040	29.3	LOS C	0.8	6.1	0.65	0.71	33.4
Approach		83	13.9	0.070	28.4	LOS C	0.8	6.1	0.66	0.67	33.3
West: Boundary Street (West)											
10	L	39	10.8	0.035	8.3	LOS A	0.2	1.2	0.15	0.62	49.0
11	T	120	7.9	0.341	38.5	LOS D	5.2	38.6	0.91	0.73	28.0
Approach		159	8.6	0.341	31.1	LOS C	5.2	38.6	0.72	0.70	31.3
All Vehicles		901	10.2	0.674	32.6	LOS C	18.4	137.6	0.77	0.76	31.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	43.2	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	43.9	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

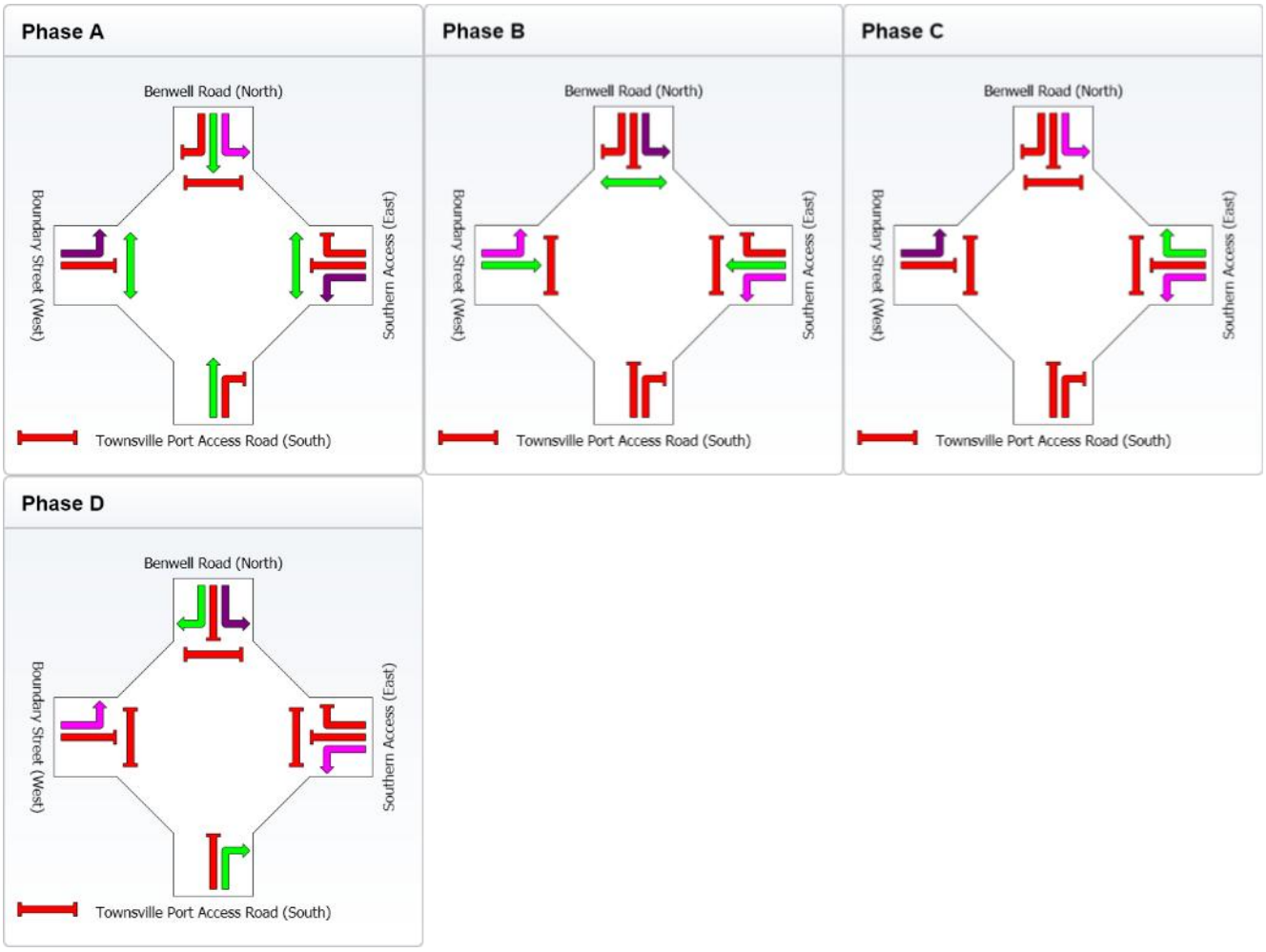
PHASING SUMMARY

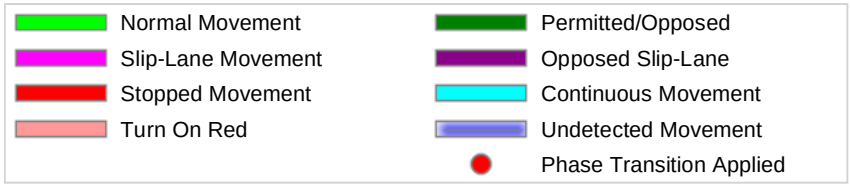
Boundary Street / Benwell Road
2036 (Opening Year) Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	38
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	44
Phase Split	19 %	25 %	12 %	44 %





MOVEMENT SUMMARY

Site: 2036 AM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2036 (Opening Year) With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	105	16.0	0.229	43.4	LOS D	2.4	18.9	0.93	0.71	26.3
3	R	449	8.2	0.674	36.2	LOS D	18.4	137.6	0.89	0.85	30.1
Approach		555	9.7	0.674	37.6	LOS D	18.4	137.6	0.90	0.83	29.3
East: Southern Access (East)											
4	L	92	17.2	0.097	8.4	LOS A	0.3	2.8	0.14	0.62	49.0
5	T	24	17.4	0.073	36.1	LOS D	1.0	7.9	0.85	0.62	28.9
6	R	6	16.7	0.063	58.9	LOS E	0.3	2.5	0.97	0.66	23.0
Approach		122	17.2	0.097	16.5	LOS B	1.0	7.9	0.33	0.62	41.0
North: Benwell Road (North)											
7	L	28	7.4	0.070	13.5	LOS B	0.4	3.3	0.40	0.66	44.0
8	T	38	36.1	0.092	42.4	LOS D	0.8	7.7	0.91	0.65	26.6
9	R	38	44.4	0.071	30.5	LOS C	1.2	11.3	0.67	0.73	33.2
Approach		104	31.3	0.092	30.2	LOS C	1.2	11.3	0.68	0.68	32.5
West: Boundary Street (West)											
10	L	138	13.0	0.126	8.4	LOS A	0.6	4.5	0.16	0.63	48.9
11	T	120	7.9	0.341	38.5	LOS D	5.2	38.6	0.91	0.73	28.0
Approach		258	10.6	0.341	22.4	LOS C	5.2	38.6	0.51	0.68	36.3
All Vehicles		1039	13.0	0.674	30.6	LOS C	18.4	137.6	0.71	0.75	32.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	43.2	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	43.9	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

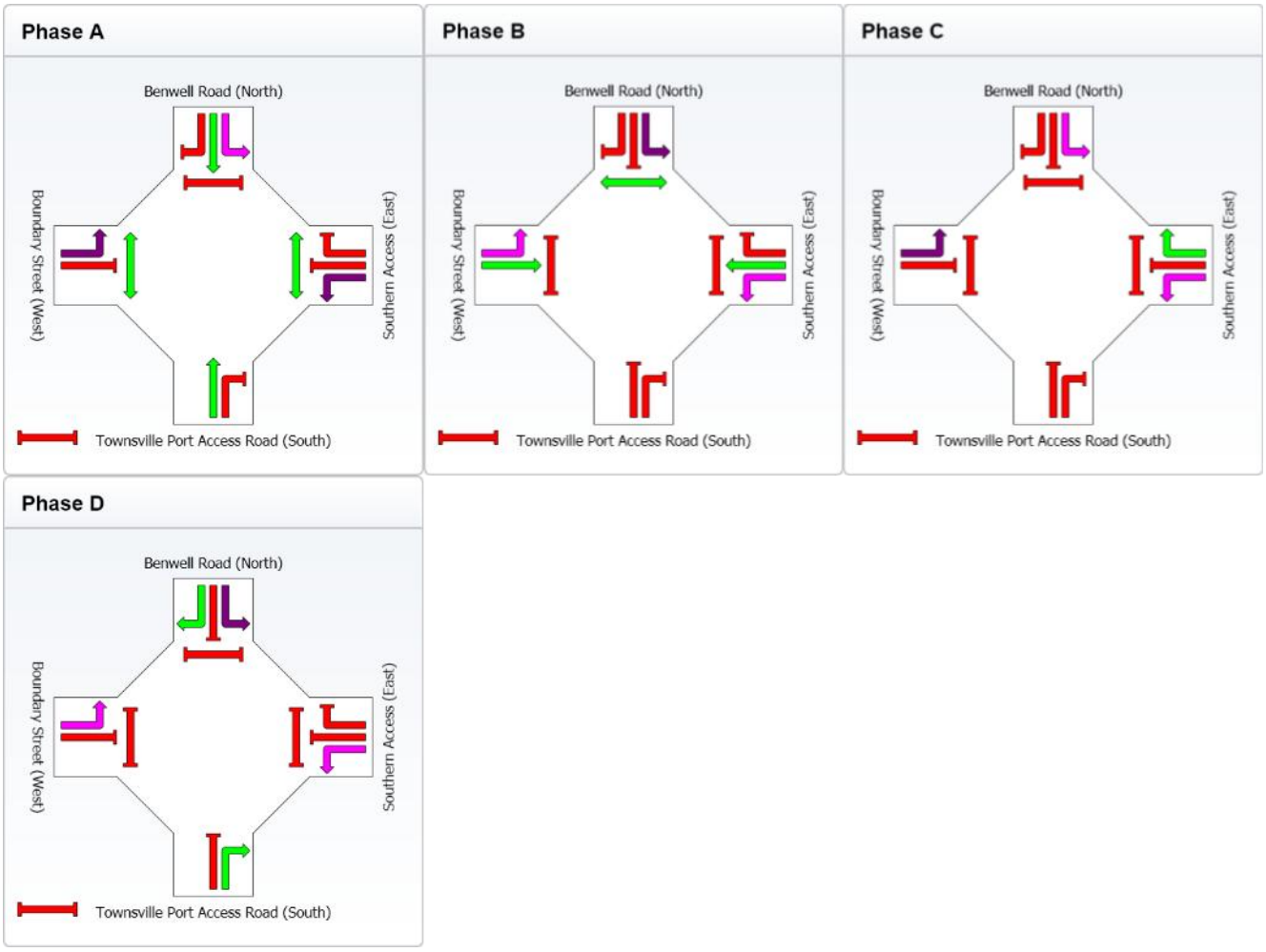
PHASING SUMMARY

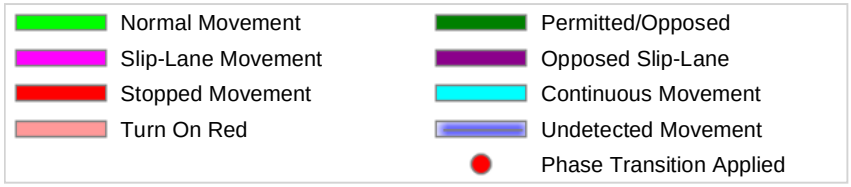
Boundary Street / Benwell Road
2036 (Opening Year) With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	38
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	44
Phase Split	19 %	25 %	12 %	44 %





MOVEMENT SUMMARY

Site: 2036 PM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2036 (Opening Year) Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Access Road (South)											
2	T	39	21.6	0.061	25.9	LOS C	0.6	4.7	0.85	0.61	33.4
3	R	115	18.3	0.611	43.3	LOS D	4.1	33.0	1.00	0.82	27.6
Approach		154	19.2	0.611	38.9	LOS D	4.1	33.0	0.96	0.77	28.8
East: Southern Access (East)											
4	L	427	8.6	0.430	8.6	LOS A	2.1	15.6	0.26	0.66	48.4
5	T	114	8.3	0.226	21.7	LOS C	3.1	23.0	0.82	0.65	35.8
6	R	28	7.4	0.188	42.5	LOS D	1.0	7.2	0.96	0.72	27.7
Approach		569	8.5	0.430	12.9	LOS B	3.1	23.0	0.41	0.66	43.7
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.24	0.61	48.5
8	T	82	11.5	0.122	26.3	LOS C	1.2	9.2	0.87	0.64	33.2
9	R	40	15.8	0.210	40.7	LOS D	1.3	10.5	0.94	0.73	28.5
Approach		128	13.1	0.210	29.9	LOS C	1.3	10.5	0.86	0.67	32.0
West: Boundary Street (West)											
10	L	28	22.2	0.027	8.7	LOS A	0.1	0.8	0.20	0.62	48.7
11	T	31	17.2	0.064	20.6	LOS C	0.8	6.3	0.77	0.57	36.6
Approach		59	19.6	0.064	14.8	LOS B	0.8	6.3	0.49	0.59	41.6
All Vehicles		911	11.7	0.611	19.8	LOS B	4.1	33.0	0.57	0.68	38.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	28.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	29.0	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

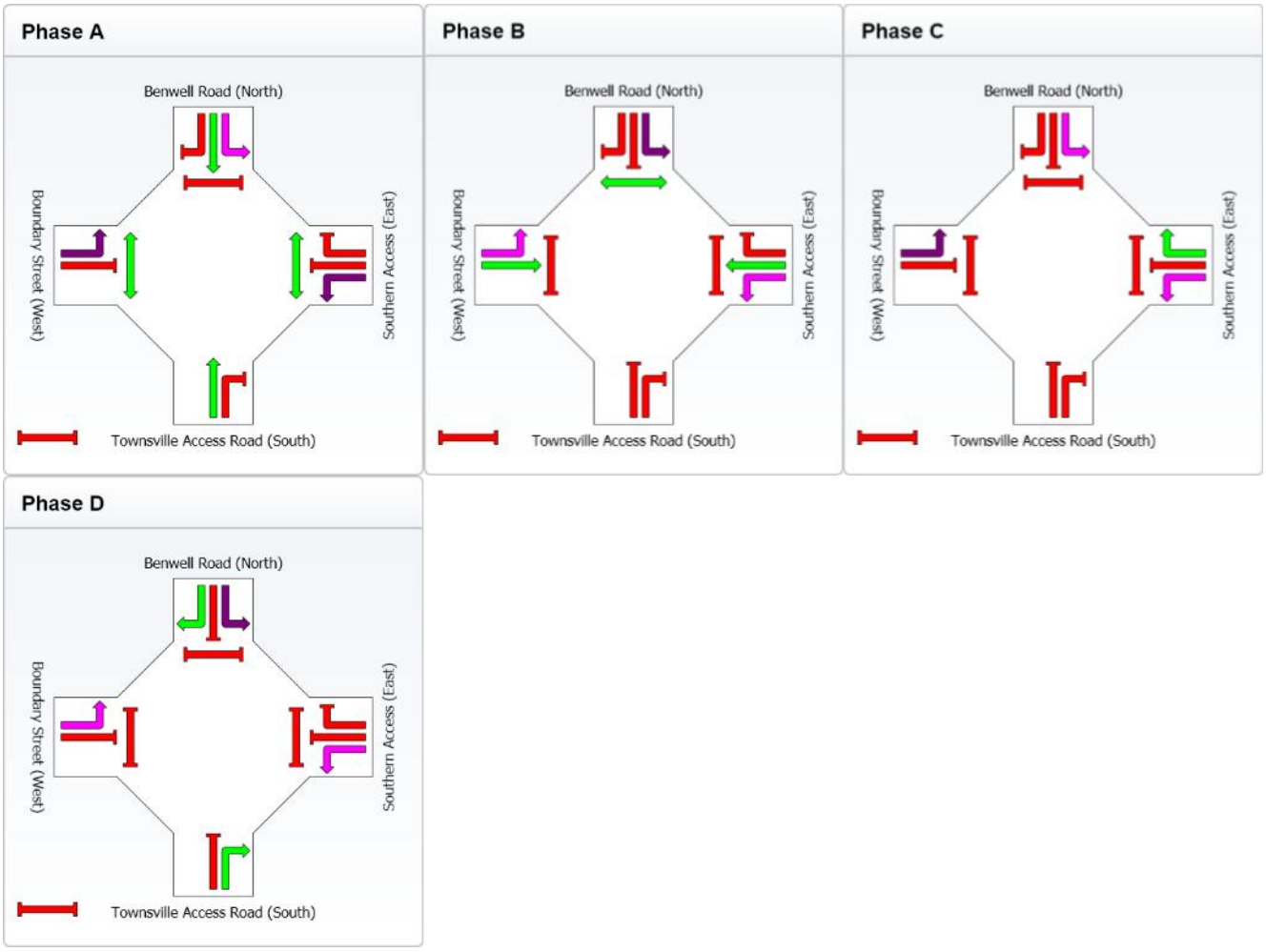
PHASING SUMMARY

Boundary Street / Benwell Road
2036 (Opening Year) Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	8
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	14
Phase Split	27 %	36 %	17 %	20 %



MOVEMENT SUMMARY

Site: 2036 PM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2036 (Opening Year) With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	47	35.6	0.081	26.1	LOS C	0.7	6.3	0.86	0.62	33.3
3	R	115	18.3	0.611	43.3	LOS D	4.1	33.0	1.00	0.82	27.6
Approach		162	23.4	0.611	38.3	LOS D	4.1	33.0	0.96	0.76	29.0
East: Southern Access (East)											
4	L	427	8.6	0.440	8.7	LOS A	2.1	15.9	0.27	0.67	48.3
5	T	114	8.3	0.226	21.7	LOS C	3.1	23.0	0.82	0.65	35.8
6	R	28	7.4	0.188	42.5	LOS D	1.0	7.2	0.96	0.72	27.7
Approach		569	8.5	0.440	12.9	LOS B	3.1	23.0	0.41	0.66	43.7
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.24	0.61	48.5
8	T	101	18.8	0.157	26.6	LOS C	1.5	12.1	0.87	0.66	33.0
9	R	138	13.7	0.713	44.7	LOS D	5.1	39.6	1.00	0.88	27.0
Approach		245	15.9	0.713	36.3	LOS D	5.1	39.6	0.93	0.78	29.6
West: Boundary Street (West)											
10	L	41	46.2	0.046	9.1	LOS A	0.1	1.4	0.20	0.62	48.7
11	T	31	17.2	0.064	20.6	LOS C	0.8	6.3	0.77	0.57	36.6
Approach		72	33.8	0.064	14.0	LOS B	0.8	6.3	0.44	0.60	42.7
All Vehicles		1048	14.3	0.713	22.4	LOS C	5.1	39.6	0.62	0.70	36.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	28.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	29.0	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

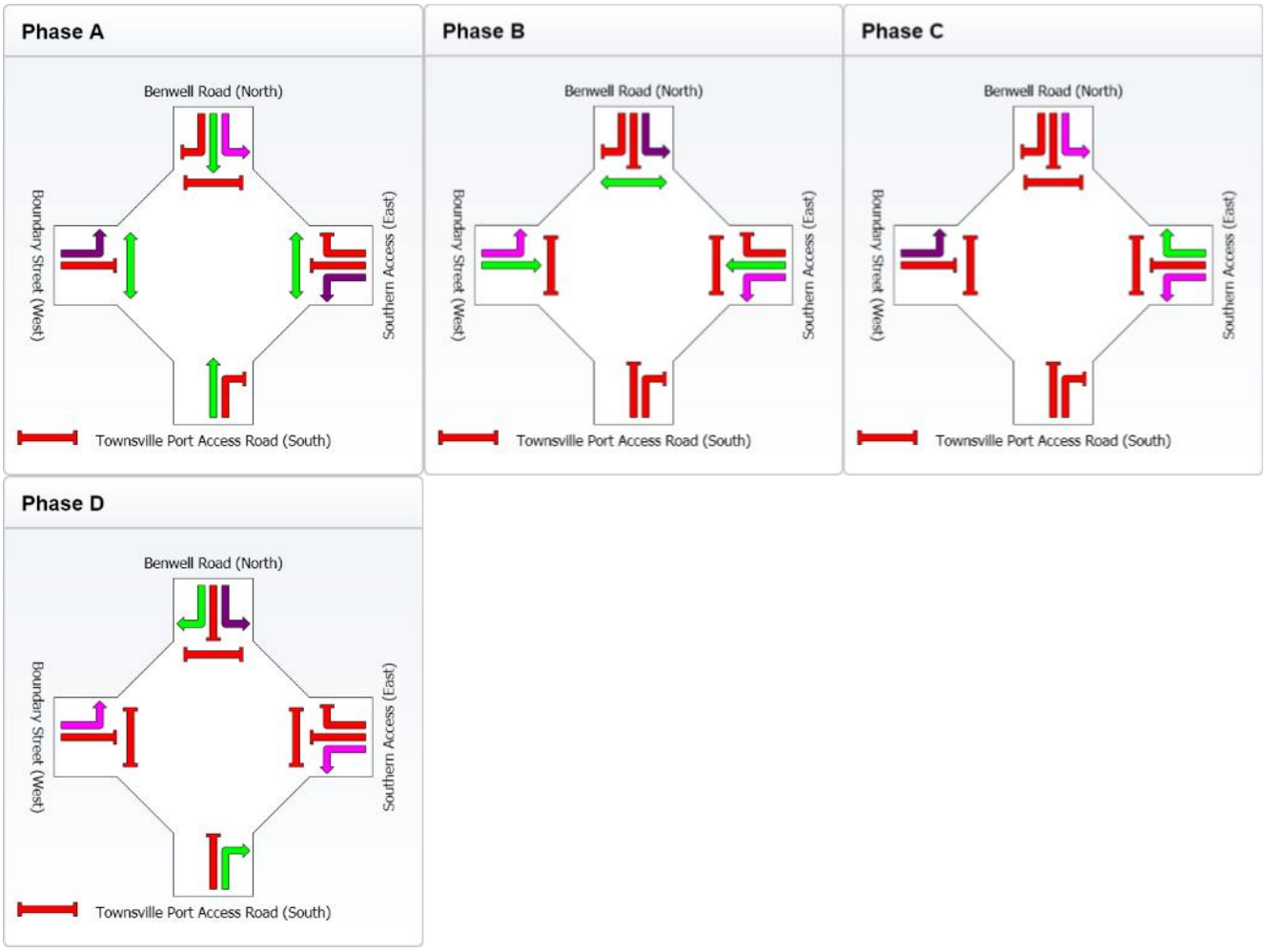
PHASING SUMMARY

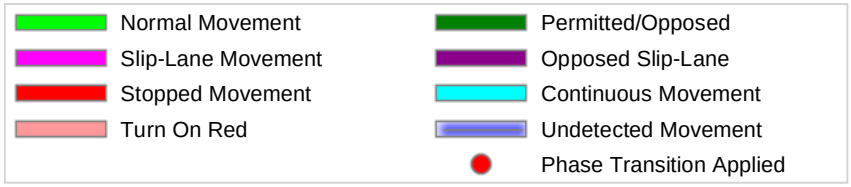
Boundary Street / Benwell Road
2036 (Opening Year) With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	8
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	14
Phase Split	27 %	36 %	17 %	20 %





MOVEMENT SUMMARY

Site: 2046 AM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2046 (Opening Year + 10 years) Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	105	9.0	0.220	43.2	LOS D	2.4	17.9	0.93	0.70	26.3
3	R	449	8.2	0.674	36.2	LOS D	18.4	137.6	0.89	0.85	30.1
Approach		555	8.3	0.674	37.5	LOS D	18.4	137.6	0.90	0.83	29.3
East: Southern Access (East)											
4	L	92	17.2	0.095	8.3	LOS A	0.3	2.4	0.13	0.62	49.0
5	T	24	17.4	0.073	36.1	LOS D	1.0	7.9	0.85	0.62	28.9
6	R	6	16.7	0.063	58.9	LOS E	0.3	2.5	0.97	0.66	23.0
Approach		122	17.2	0.095	16.4	LOS B	1.0	7.9	0.32	0.62	41.1
North: Benwell Road (North)											
7	L	28	7.4	0.070	13.5	LOS B	0.4	3.3	0.40	0.66	44.0
8	T	33	19.4	0.072	42.0	LOS D	0.7	5.8	0.91	0.64	26.7
9	R	28	18.5	0.046	29.4	LOS C	0.9	7.0	0.66	0.72	33.4
Approach		89	15.3	0.072	29.0	LOS C	0.9	7.0	0.67	0.67	33.0
West: Boundary Street (West)											
10	L	48	10.9	0.043	8.3	LOS A	0.2	1.5	0.15	0.62	49.0
11	T	120	7.9	0.341	38.5	LOS D	5.2	38.6	0.91	0.73	28.0
Approach		168	8.8	0.341	29.8	LOS C	5.2	38.6	0.69	0.70	31.9
All Vehicles		935	10.2	0.674	32.6	LOS C	18.4	137.6	0.76	0.76	31.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	43.2	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	43.9	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

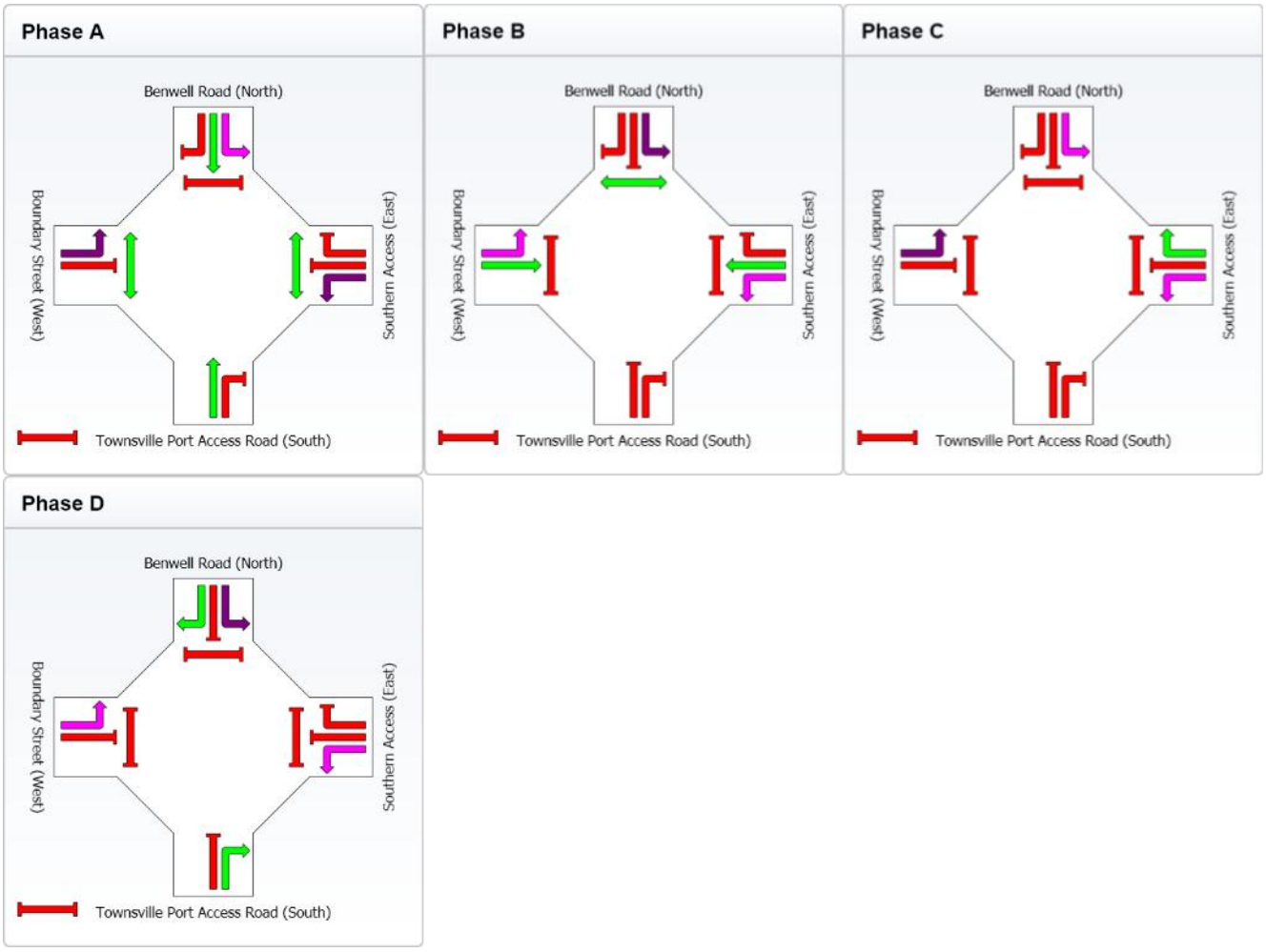
PHASING SUMMARY

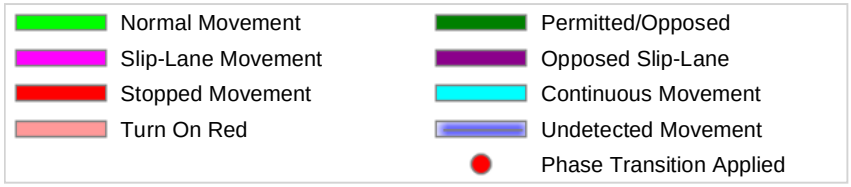
Boundary Street / Benwell Road
2046 (Opening Year + 10 years) Without Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	38
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	44
Phase Split	19 %	25 %	12 %	44 %





MOVEMENT SUMMARY

Site: 2046 AM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2046 (Opening Year + 10 years) With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	123	14.5	0.266	43.6	LOS D	2.8	22.0	0.94	0.72	26.2
3	R	449	8.2	0.674	36.2	LOS D	18.4	137.6	0.89	0.85	30.1
Approach		573	9.6	0.674	37.8	LOS D	18.4	137.6	0.90	0.83	29.2
East: Southern Access (East)											
4	L	92	17.2	0.097	8.4	LOS A	0.3	2.8	0.14	0.62	49.0
5	T	24	17.4	0.073	36.1	LOS D	1.0	7.9	0.85	0.62	28.9
6	R	6	16.7	0.063	58.9	LOS E	0.3	2.5	0.97	0.66	23.0
Approach		122	17.2	0.097	16.5	LOS B	1.0	7.9	0.33	0.62	41.0
North: Benwell Road (North)											
7	L	28	7.4	0.070	13.5	LOS B	0.4	3.3	0.40	0.66	44.0
8	T	41	35.9	0.100	42.5	LOS D	0.9	8.3	0.91	0.66	26.6
9	R	41	43.6	0.076	30.6	LOS C	1.3	12.3	0.67	0.73	33.2
Approach		111	31.4	0.100	30.6	LOS C	1.3	12.3	0.69	0.68	32.3
West: Boundary Street (West)											
10	L	147	12.9	0.139	8.5	LOS A	0.7	5.4	0.17	0.63	48.8
11	T	120	7.9	0.341	38.5	LOS D	5.2	38.6	0.91	0.73	28.0
Approach		267	10.6	0.341	22.0	LOS C	5.2	38.6	0.50	0.68	36.6
All Vehicles		1073	13.0	0.674	30.7	LOS C	18.4	137.6	0.72	0.75	32.2

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	53	44.2	LOS E	0.1	0.1	0.94	0.94
P7	Across W approach	53	43.2	LOS E	0.1	0.1	0.93	0.93
All Pedestrians		159	43.9	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

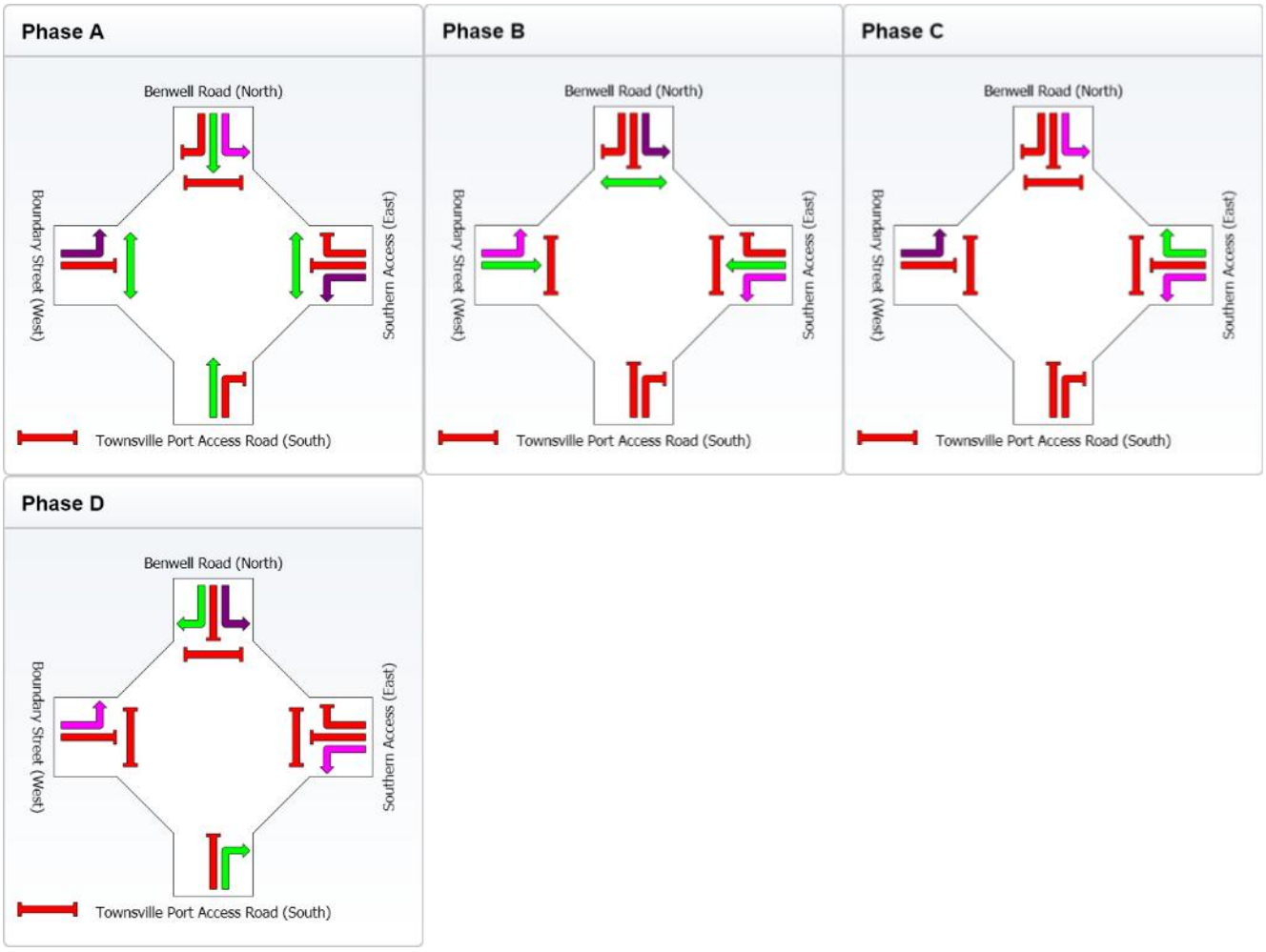
PHASING SUMMARY

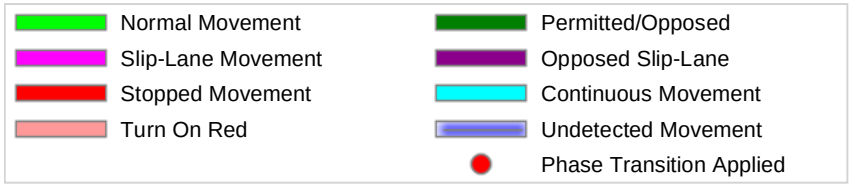
Boundary Street / Benwell Road
2046 (Opening Year + 10 years) With Development
AM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	38
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	44
Phase Split	19 %	25 %	12 %	44 %





MOVEMENT SUMMARY

Site: 2046 PM peak WOD (Optimised Signals)

Boundary Street / Benwell Road
2046 (Opening Year + 10 years) Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	45	20.9	0.071	26.0	LOS C	0.7	5.4	0.85	0.62	33.4
3	R	115	18.3	0.611	43.3	LOS D	4.1	33.0	1.00	0.82	27.6
Approach		160	19.1	0.611	38.4	LOS D	4.1	33.0	0.96	0.76	29.0
East: Southern Access (East)											
4	L	427	8.6	0.432	8.6	LOS A	2.1	15.7	0.26	0.66	48.3
5	T	114	8.3	0.226	21.7	LOS C	3.1	23.0	0.82	0.65	35.8
6	R	28	7.4	0.188	42.5	LOS D	1.0	7.2	0.96	0.72	27.7
Approach		569	8.5	0.432	12.9	LOS B	3.1	23.0	0.41	0.66	43.7
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.24	0.61	48.5
8	T	87	10.8	0.129	26.3	LOS C	1.3	9.8	0.87	0.65	33.2
9	R	44	14.3	0.230	40.8	LOS D	1.5	11.5	0.94	0.74	28.4
Approach		138	12.2	0.230	30.2	LOS C	1.5	11.5	0.86	0.68	31.9
West: Boundary Street (West)											
10	L	36	20.6	0.034	8.6	LOS A	0.1	1.0	0.20	0.62	48.7
11	T	31	17.2	0.064	20.6	LOS C	0.8	6.3	0.77	0.57	36.6
Approach		66	19.0	0.064	14.1	LOS B	0.8	6.3	0.46	0.60	42.3
All Vehicles		934	11.6	0.611	19.9	LOS B	4.1	33.0	0.57	0.68	38.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	28.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	29.0	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

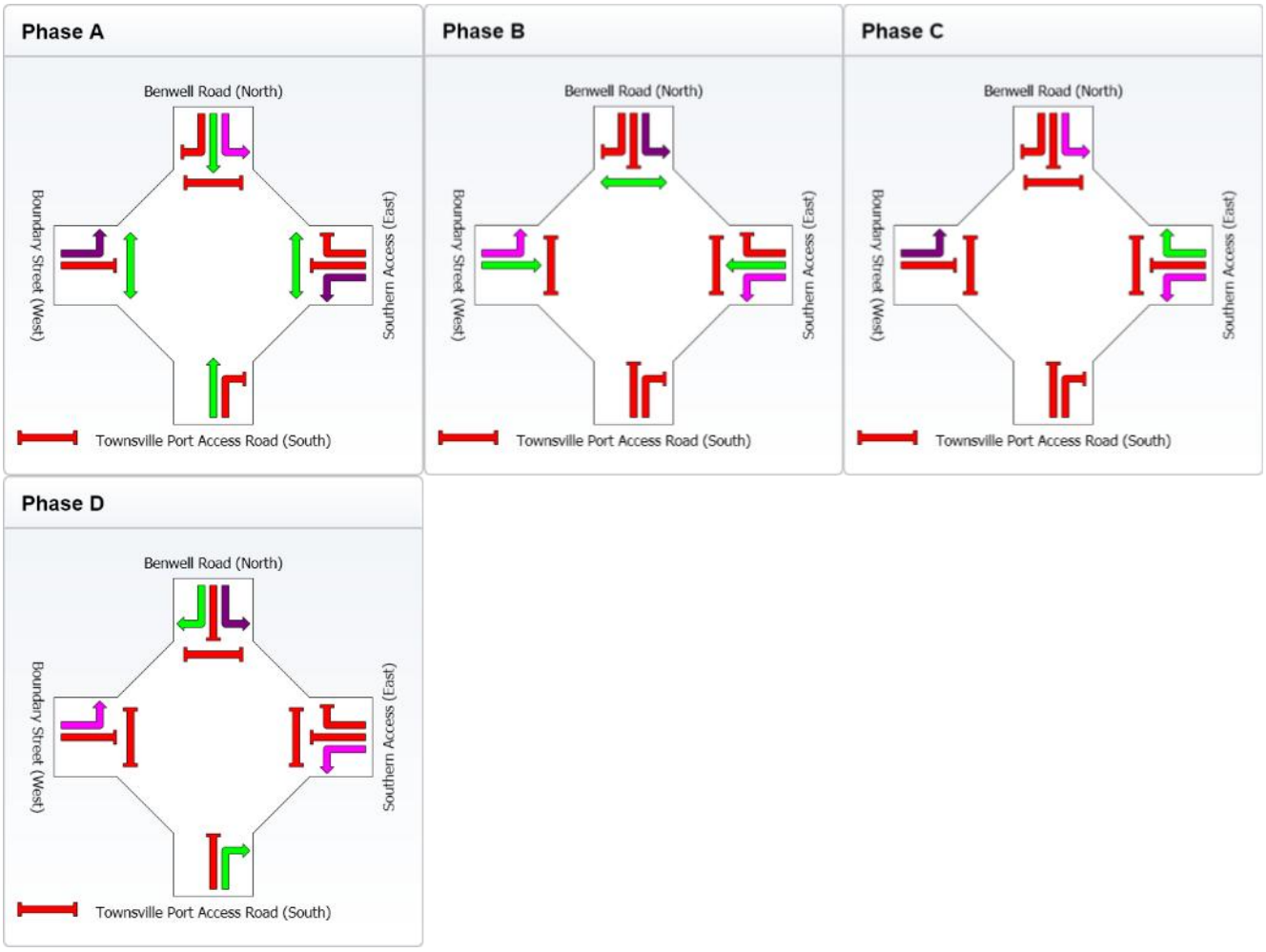
PHASING SUMMARY

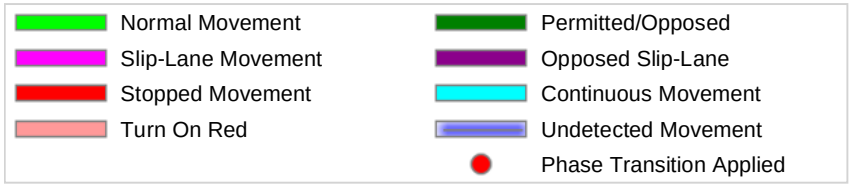
Boundary Street / Benwell Road
2046 (Opening Year + 10 years) Without Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	8
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	14
Phase Split	27 %	36 %	17 %	20 %





MOVEMENT SUMMARY

Site: 2046 PM peak WD (Optimised Signals)

Boundary Street / Benwell Road
2046 (Opening Year + 10 years) With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Townsville Port Access Road (South)											
2	T	54	33.3	0.090	26.2	LOS C	0.8	7.0	0.86	0.63	33.3
3	R	115	18.3	0.611	43.3	LOS D	4.1	33.0	1.00	0.82	27.6
Approach		168	23.1	0.611	37.8	LOS D	4.1	33.0	0.95	0.76	29.2
East: Southern Access (East)											
4	L	427	8.6	0.442	8.7	LOS A	2.1	15.9	0.27	0.67	48.3
5	T	114	8.3	0.226	21.7	LOS C	3.1	23.0	0.82	0.65	35.8
6	R	28	7.4	0.188	42.5	LOS D	1.0	7.2	0.96	0.72	27.7
Approach		569	8.5	0.442	12.9	LOS B	3.1	23.0	0.41	0.66	43.7
North: Benwell Road (North)											
7	L	6	16.7	0.008	8.9	LOS A	0.0	0.2	0.24	0.61	48.5
8	T	105	17.0	0.161	26.6	LOS C	1.6	12.5	0.87	0.66	33.0
9	R	143	14.0	0.742	45.3	LOS D	5.3	41.7	1.00	0.90	26.8
Approach		255	15.3	0.742	36.7	LOS D	5.3	41.7	0.93	0.79	29.4
West: Boundary Street (West)											
10	L	48	41.3	0.053	9.0	LOS A	0.2	1.6	0.20	0.62	48.7
11	T	31	17.2	0.064	20.6	LOS C	0.8	6.3	0.77	0.57	36.6
Approach		79	32.0	0.064	13.5	LOS B	0.8	6.3	0.42	0.60	43.2
All Vehicles		1072	14.1	0.742	22.5	LOS C	5.3	41.7	0.62	0.71	36.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	Across E approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P5	Across N approach	53	29.3	LOS C	0.1	0.1	0.91	0.91
P7	Across W approach	53	28.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		159	29.0	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Boundary Street / Benwell Road
2046 (Opening Year + 10 years) With Development
PM peak
(Optimised Signal Cycle Time)
Signals - Fixed Time Cycle Time = 70 seconds (Optimum Cycle Time - Minimum Delay)

Phase times determined by the program
Sequence: Four-phase
Input Sequence: A, B, C, D
Output Sequence: A, B, C, D

Phase Timing Results

Phase	A	B	C	D
Green Time (sec)	13	19	6	8
Yellow Time (sec)	4	4	4	4
All-Red Time (sec)	2	2	2	2
Phase Time (sec)	19	25	12	14
Phase Split	27 %	36 %	17 %	20 %