

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj Napoca
Anexa 2 - nod 6 - an 2045

Intersection									
Intersection Delay, s/veh	20.4								
Intersection LOS	C								
Approach	EB		WB		NB		SB		NE
Entry Lanes	2		1		2		2		0
Conflicting Circle Lanes	3		3		3		3		3
Adj Approach Flow, veh/h	150		207		248		1203		0
Demand Flow Rate, veh/h	153		211		253		1228		0
Vehicles Circulating, veh/h	1387		555		590		322		590
Vehicles Exiting, veh/h	162		288		0		516		950
Follow-Up Headway, s	3.186		3.186		3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000		1.000
Approach Delay, s/veh	20.2		10.0		9.5		26.7		0.0
Approach LOS	C		A		A		D		-
Lane	Left	Right	Left	Left	Right	Left	Right	Left	Left
Designated Moves	LT	R	LTR	L	TR	L	TR	L	L
Assumed Moves	LT	R	LTR	L	TR	L	TR	L	L
RT Channelized									
Lane Util	0.667	0.333	1.000	0.202	0.798	0.397	0.603	0.000	0.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	102	51	211	51	202	488	740	0	0
Cap Entry Lane, veh/h	282	282	649	626	626	819	819	866	866
Entry HV Adj Factor	0.980	0.980	0.981	0.980	0.980	0.980	0.980	1.000	1.000
Flow Entry, veh/h	100	50	207	50	198	478	725	0	0
Cap Entry, veh/h	277	277	636	614	614	802	802	866	866
V/C Ratio	0.361	0.181	0.325	0.081	0.322	0.596	0.904	0.000	0.000
Control Delay, s/veh	22.0	16.8	10.0	6.8	10.2	13.9	35.2	4.2	4.2
LOS	C	C	A	A	B	B	E	A	A
95th %tile Queue, veh	2	1	1	0	1	4	12	0	0

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	SW
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Entry Lanes	2
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Conflicting Circle Lanes	3
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Adj Approach Flow, veh/h	561
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Demand Flow Rate, veh/h	572
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Vehicles Circulating, veh/h	266
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Vehicles Exiting, veh/h	500
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Follow-Up Headway, s	3.186
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Ped Vol Crossing Leg, #/h	0
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Ped Cap Adj	1.000
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Approach Delay, s/veh	15.4
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Approach LOS	C
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Lane	Right
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Designated Moves	TR
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Assumed Moves	TR
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RT Channelized

Lane Util	1.000
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Critical Headway, s	5.193
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Entry Flow, veh/h	572
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Cap Entry Lane, veh/h	866
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Entry HV Adj Factor	0.981
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Flow Entry, veh/h	561
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Cap Entry, veh/h	849
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V/C Ratio	0.660
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Control Delay, s/veh	15.4
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LOS	C
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95th %tile Queue, veh	5
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Intersection					
Intersection Delay, s/veh	4.1				
Intersection LOS	A				
Approach	EB	WB	NB		
Entry Lanes	1	2	2		
Conflicting Circle Lanes	2	2	2		
Adj Approach Flow, veh/h	5	159	145		
Demand Flow Rate, veh/h	5	162	148		
Vehicles Circulating, veh/h	153	0	5		
Vehicles Exiting, veh/h	9	153	153		
Follow-Up Headway, s	3.186	3.186	3.186		
Ped Vol Crossing Leg, #/h	0	0	0		
Ped Cap Adj	1.000	1.000	1.000		
Approach Delay, s/veh	3.7	3.9	4.4		
Approach LOS	A	A	A		
Lane	Left	Left	Right	Left	Right
Designated Moves	TR	L	LTR	L	TR
Assumed Moves	TR	L	LTR	L	TR
RT Channelized					
Lane Util	1.000	0.531	0.469	0.000	1.000
Critical Headway, s	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	5	86	76	0	148
Cap Entry Lane, veh/h	1015	1130	1130	1126	1126
Entry HV Adj Factor	0.980	0.979	0.982	1.000	0.980
Flow Entry, veh/h	5	84	75	0	145
Cap Entry, veh/h	995	1106	1110	1126	1103
V/C Ratio	0.005	0.076	0.067	0.000	0.131
Control Delay, s/veh	3.7	3.9	3.8	3.2	4.4
LOS	A	A	A	A	A
95th %tile Queue, veh	0	0	0	0	0

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 6 - an 2025

Intersection									
Intersection Delay, s/veh	12.1								
Intersection LOS	B								
Approach	EB		WB		NB		SB		NE
Entry Lanes	2		1		2		2		0
Conflicting Circle Lanes	3		3		3		3		3
Adj Approach Flow, veh/h	150		160		237		977		0
Demand Flow Rate, veh/h	153		163		241		996		0
Vehicles Circulating, veh/h	1016		638		728		182		728
Vehicles Exiting, veh/h	162		331		0		585		441
Follow-Up Headway, s	3.186		3.186		3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000		1.000
Approach Delay, s/veh	12.4		9.8		11.1		12.3		0.0
Approach LOS	B		A		B		B		-
Lane	Left	Right	Left	Left	Right	Left	Right	Left	
Designated Moves	LT	R	LTR	L	TR	L	TR	L	
Assumed Moves	LT	R	LTR	L	TR	L	TR	L	
RT Channelized									
Lane Util	0.667	0.333	1.000	0.212	0.788	0.629	0.371	0.000	
Critical Headway, s	5.193	5.193	5.193	5.193	5.193	5.193	5.193	5.193	
Entry Flow, veh/h	102	51	163	51	190	626	370	0	
Cap Entry Lane, veh/h	409	409	597	546	546	942	942	901	
Entry HV Adj Factor	0.980	0.980	0.982	0.980	0.983	0.980	0.981	1.000	
Flow Entry, veh/h	100	50	160	50	187	614	363	0	
Cap Entry, veh/h	401	401	586	535	536	923	924	901	
V/C Ratio	0.249	0.125	0.273	0.093	0.348	0.665	0.393	0.000	
Control Delay, s/veh	13.2	10.9	9.8	7.9	12.0	14.6	8.4	4.0	
LOS	B	B	A	A	B	B	A	A	
95th %tile Queue, veh	1	0	1	0	2	5	2	0	

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach SW

Entry Lanes 2

Conflicting Circle Lanes 3

Adj Approach Flow, veh/h 531

Demand Flow Rate, veh/h 541

Vehicles Circulating, veh/h 226

Vehicles Exiting, veh/h 575

Follow-Up Headway, s 3.186

Ped Vol Crossing Leg, #/h 0

Ped Cap Adj 1.000

Approach Delay, s/veh 13.0

Approach LOS B

Lane Right

Designated Moves TR

Assumed Moves TR

RT Channelized

Lane Util 1.000

Critical Headway, s 5.193

Entry Flow, veh/h 541

Cap Entry Lane, veh/h 901

Entry HV Adj Factor 0.981

Flow Entry, veh/h 531

Cap Entry, veh/h 884

V/C Ratio 0.600

Control Delay, s/veh 13.0

LOS B

95th %tile Queue, veh 4

HCM 2010 Roundabout
Intersectia 4:

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 6 - an 2025

Intersection					
Intersection Delay, s/veh	4.1				
Intersection LOS	A				
Approach	EB	WB	NB		
Entry Lanes	1	2	2		
Conflicting Circle Lanes	2	2	2		
Adj Approach Flow, veh/h	5	159	145		
Demand Flow Rate, veh/h	5	162	148		
Vehicles Circulating, veh/h	153	0	5		
Vehicles Exiting, veh/h	9	153	153		
Follow-Up Headway, s	3.186	3.186	3.186		
Ped Vol Crossing Leg, #/h	0	0	0		
Ped Cap Adj	1.000	1.000	1.000		
Approach Delay, s/veh	3.7	3.9	4.4		
Approach LOS	A	A	A		
Lane	Left	Left	Right	Left	Right
Designated Moves	TR	L	LTR	L	TR
Assumed Moves	TR	L	LTR	L	TR
RT Channelized					
Lane Util	1.000	0.531	0.469	0.000	1.000
Critical Headway, s	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	5	86	76	0	148
Cap Entry Lane, veh/h	1015	1130	1130	1126	1126
Entry HV Adj Factor	0.980	0.979	0.982	1.000	0.980
Flow Entry, veh/h	5	84	75	0	145
Cap Entry, veh/h	995	1106	1110	1126	1103
V/C Ratio	0.005	0.076	0.067	0.000	0.131
Control Delay, s/veh	3.7	3.9	3.8	3.2	4.4
LOS	A	A	A	A	A
95th %tile Queue, veh	0	0	0	0	0

1: Performance by approach

Approach	EB	WB	NB	SB	SW	All
Denied Del/Veh (s)	0.0	0.5	0.0	0.0	0.3	0.1
Total Del/Veh (s)	11.0	4.9	4.6	7.4	4.0	6.3
Stop Del/Veh (s)	9.2	1.2	2.5	4.7	0.1	3.4
Stop/Veh	0.68	0.18	0.36	0.44	0.06	0.33
Avg Speed (kph)	14	35	19	18	37	24
HC Emissions (g)	0	1	1	6	4	11
CO Emissions (g)	12	31	13	192	121	370
NOx Emissions (g)	1	2	2	24	12	42

2: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	0.7	0.0	0.0	0.4
Total Del/Veh (s)	3.0	0.6	5.0	3.0
Stop Del/Veh (s)	0.0	0.0	2.9	0.7
Stop/Veh	0.02	0.00	0.37	0.09
Avg Speed (kph)	41	47	23	39
HC Emissions (g)	14	1	1	16
CO Emissions (g)	456	25	16	496
NOx Emissions (g)	46	3	2	51

3: Performance by approach

Approach	NB	SB	SE	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	0.2	1.0	0.0	0.3
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00	0.00
Avg Speed (kph)	48	49	49	49
HC Emissions (g)	2	2	0	4
CO Emissions (g)	41	27	13	81
NOx Emissions (g)	5	6	1	11

4: Performance by approach

Approach	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	3.3	2.6	3.0
Stop Del/Veh (s)	0.7	0.0	0.4
Stop/Veh	0.12	0.00	0.07
Avg Speed (kph)	27	32	28
HC Emissions (g)	1	0	1
CO Emissions (g)	36	9	45
NOx Emissions (g)	5	1	6

9: Performance by approach

Approach	NB	SB	NW	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.1
Total Del/Veh (s)	0.1	0.1	0.7	0.2
Stop Del/Veh (s)	0.0	0.0	0.1	0.0
Stop/Veh	0.00	0.00	0.20	0.02
Avg Speed (kph)	48	23	20	44
HC Emissions (g)	2	0	0	2
CO Emissions (g)	33	16	0	49
NOx Emissions (g)	6	1	0	7

22: Performance by approach

Approach	NB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.3	0.0	0.3
Stop Del/Veh (s)	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00
Avg Speed (kph)	38	23	33
HC Emissions (g)	0	0	0
CO Emissions (g)	5	2	7
NOx Emissions (g)	1	0	1

23: Performance by approach

Approach	SB	All
Denied Del/Veh (s)	0.0	0.0
Total Del/Veh (s)	0.6	0.6
Stop Del/Veh (s)	0.2	0.2
Stop/Veh	0.00	0.00
Avg Speed (kph)	29	29
HC Emissions (g)	1	1
CO Emissions (g)	72	72
NOx Emissions (g)	6	6

26: Performance by approach

Approach	NB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.3	0.6	0.5
Stop Del/Veh (s)	0.1	0.0	0.0
Stop/Veh	0.01	0.00	0.00
Avg Speed (kph)	37	27	32
HC Emissions (g)	5	1	5
CO Emissions (g)	238	17	255
NOx Emissions (g)	16	1	17

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	8.6
Stop Del/Veh (s)	2.9
Stop/Veh	0.30
Avg Speed (kph)	37
HC Emissions (g)	104
CO Emissions (g)	3330
NOx Emissions (g)	340

Queuing and Blocking Report Baseline

Centura metropolitana Cluj Napoca
Anexa 1 - nod 6 - an 2025

Intersection: 1:

Movement	EB	EB	WB	NB	NB	SB	SB	SW
Directions Served	LT	>	LTR	<L	TR>	<L	R>	TR>
Maximum Queue (m)	22.3	15.6	15.8	15.7	14.0	58.3	21.8	13.4
Average Queue (m)	12.4	8.7	8.5	8.6	4.6	27.8	11.0	6.1
95th Queue (m)	24.9	16.9	16.8	16.9	14.2	53.8	23.3	14.8
Link Distance (m)	47.6	47.6	168.2	37.2	37.2	85.2	85.2	204.4
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2:

Movement	EB	SW
Directions Served	TR	R
Maximum Queue (m)	15.3	28.1
Average Queue (m)	4.8	20.4
95th Queue (m)	15.1	32.4
Link Distance (m)	337.3	80.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 4:

Movement

WB

Directions Served

L

Maximum Queue (m)

8.6

Average Queue (m)

1.7

95th Queue (m)

7.4

Link Distance (m)

47.6

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Queuing and Blocking Report Baseline

Centura metropolitana Cluj Napoca
Anexa 1 - nod 6 - an 2025

Intersection: 9:

Movement	NW
Directions Served	R
Maximum Queue (m)	9.3
Average Queue (m)	1.9
95th Queue (m)	8.0
Link Distance (m)	14.0
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 23:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 26:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

1: Performance by approach

Approach	EB	WB	NB	SB	SW	All
Denied Del/Veh (s)	0.0	0.3	0.0	0.0	0.4	0.1
Total Del/Veh (s)	24.5	3.9	2.5	6.5	11.0	8.0
Stop Del/Veh (s)	23.0	0.5	0.3	4.0	5.4	4.8
Stop/Veh	0.81	0.13	0.09	0.44	0.46	0.40
Avg Speed (kph)	8	35	25	17	27	21
HC Emissions (g)	0	3	1	3	3	9
CO Emissions (g)	12	80	17	118	119	346
NOx Emissions (g)	1	8	3	17	10	39

2: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	1.1	0.0	0.0	0.6
Total Del/Veh (s)	7.0	0.9	10.7	6.3
Stop Del/Veh (s)	0.2	0.0	7.8	1.4
Stop/Veh	0.07	0.00	0.76	0.17
Avg Speed (kph)	36	46	17	34
HC Emissions (g)	15	3	1	18
CO Emissions (g)	673	47	22	743
NOx Emissions (g)	67	7	2	77

3: Performance by approach

Approach	NB	SB	SE	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Del/Veh (s)	0.3	2.0	6.3	2.7
Stop Del/Veh (s)	0.0	0.0	5.0	1.5
Stop/Veh	0.00	0.00	0.65	0.19
Avg Speed (kph)	48	47	12	41
HC Emissions (g)	2	8	0	10
CO Emissions (g)	65	153	10	228
NOx Emissions (g)	7	24	1	32

4: Performance by approach

Approach	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	2.9	2.4	2.7
Stop Del/Veh (s)	0.3	0.0	0.2
Stop/Veh	0.00	0.00	0.00
Avg Speed (kph)	28	33	29
HC Emissions (g)	0	0	1
CO Emissions (g)	24	8	32
NOx Emissions (g)	3	1	4

9: Performance by approach

Approach	NB	SB	NW	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.4	0.1	0.4	0.2
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00	0.00
Avg Speed (kph)	49	23	21	42
HC Emissions (g)	3	1	0	4
CO Emissions (g)	60	48	0	108
NOx Emissions (g)	8	4	0	12

22: Performance by approach

Approach	NB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.0	0.3
Stop Del/Veh (s)	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00
Avg Speed (kph)	40	23	31
HC Emissions (g)	0	0	0
CO Emissions (g)	6	7	13
NOx Emissions (g)	1	1	1

23: Performance by approach

Approach	SB	All
Denied Del/Veh (s)	0.0	0.0
Total Del/Veh (s)	1.1	1.1
Stop Del/Veh (s)	0.3	0.3
Stop/Veh	0.00	0.00
Avg Speed (kph)	28	28
HC Emissions (g)	2	2
CO Emissions (g)	147	147
NOx Emissions (g)	14	14

26: Performance by approach

Approach	NB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	0.9	1.3	1.2
Stop Del/Veh (s)	0.3	0.0	0.1
Stop/Veh	0.03	0.00	0.01
Avg Speed (kph)	33	29	30
HC Emissions (g)	7	0	7
CO Emissions (g)	272	15	287
NOx Emissions (g)	22	1	23

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	13.4
Stop Del/Veh (s)	4.7
Stop/Veh	0.44
Avg Speed (kph)	35
HC Emissions (g)	116
CO Emissions (g)	4375
NOx Emissions (g)	428

Queuing and Blocking Report Baseline

Centura metropolitana Cluj Napoca
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Intersection: 1:

Movement	EB	EB	WB	NB	NB	SB	SB	SW
Directions Served	LT	>	LTR	<L	TR>	<L	R>	TR>
Maximum Queue (m)	20.8	9.2	9.1	9.2	8.9	48.1	42.5	71.9
Average Queue (m)	16.2	8.9	3.6	5.5	1.8	29.5	23.5	30.1
95th Queue (m)	23.2	9.3	11.0	12.9	7.6	47.6	41.0	73.9
Link Distance (m)	47.6	47.6	168.2	37.2	37.2	66.1	66.1	204.4
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 2:

Movement	EB	EB	SW
Directions Served	TR	R	R
Maximum Queue (m)	8.6	25.9	38.9
Average Queue (m)	1.7	13.0	30.3
95th Queue (m)	7.4	31.2	48.3
Link Distance (m)	337.3		80.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		200.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report Baseline

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Intersection: 3:

Movement	SE
Directions Served	R
Maximum Queue (m)	40.3
Average Queue (m)	34.0
95th Queue (m)	47.5
Link Distance (m)	29.5
Upstream Blk Time (%)	9
Queuing Penalty (veh)	59
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 9:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 22:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 23:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 26:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 59

1: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.3	0.2	0.0	0.0	0.2
Total Del/Veh (s)	4.4	8.4	3.1	6.9	5.2
Stop Del/Veh (s)	0.4	4.4	0.5	4.8	1.7
Stop/Veh	0.11	0.51	0.19	0.57	0.27
Avg Speed (kph)	34	31	25	15	30
HC Emissions (g)	5	2	1	0	8
CO Emissions (g)	154	96	26	7	284
NOx Emissions (g)	15	7	4	1	27

2: Performance by approach

Approach	NB	SB	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.1	0.3	0.3	0.2
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00	0.00
Avg Speed (kph)	48	42	20	42
HC Emissions (g)	0	1	0	1
CO Emissions (g)	6	19	2	27
NOx Emissions (g)	1	4	0	5

3: Performance by approach

Approach	NB	SB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.4	0.5	0.6
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.00	0.00
Avg Speed (kph)	33	48	19	37
HC Emissions (g)	1	2	0	4
CO Emissions (g)	19	38	9	66
NOx Emissions (g)	2	7	1	10

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	6.5
Stop Del/Veh (s)	1.2
Stop/Veh	0.16
Avg Speed (kph)	40
HC Emissions (g)	97
CO Emissions (g)	3048
NOx Emissions (g)	308

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 7 - an 2025

Intersection: 1:

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	>	LT	>	L	L	>	L	>
Maximum Queue (m)	15.6	16.5	29.9	16.1	14.8	8.6	9.4	30.2	6.1
Average Queue (m)	10.3	10.8	22.9	8.7	10.3	1.7	3.2	14.5	1.2
95th Queue (m)	14.7	20.0	35.0	17.2	14.1	7.4	9.9	27.9	5.2
Link Distance (m)	156.4	156.4	201.8	201.8	38.6	38.6		31.0	
Upstream Blk Time (%)								2	
Queuing Penalty (veh)								1	
Storage Bay Dist (m)							1.0		1.0
Storage Blk Time (%)						0	0		
Queuing Penalty (veh)						0	0		

Intersection: 2:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 3:

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 7 - an 2025

Intersection					
Intersection Delay, s/veh	9.8				
Intersection LOS	A				
Approach	EB		WB		NE
Entry Lanes	2		2		0
Conflicting Circle Lanes	2		2		2
Adj Approach Flow, veh/h	666		439		0
Demand Flow Rate, veh/h	680		448		0
Vehicles Circulating, veh/h	279		677		296
Vehicles Exiting, veh/h	756		283		663
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	9.8		9.8		0.0
Approach LOS	A		A		-
Lane	Left	Right	Left	Right	
Designated Moves	LT	R	LT	R	
Assumed Moves	LT	R	LT	R	
RT Channelized					
Lane Util	0.263	0.737	0.594	0.406	
Critical Headway, s	4.293	4.113	4.293	4.113	
Entry Flow, veh/h	179	501	266	182	
Cap Entry Lane, veh/h	917	929	680	703	
Entry HV Adj Factor	0.979	0.980	0.981	0.978	
Flow Entry, veh/h	175	491	261	178	
Cap Entry, veh/h	897	911	667	688	
V/C Ratio	0.195	0.539	0.391	0.259	
Control Delay, s/veh	6.0	11.2	10.8	8.3	
LOS	A	B	B	A	
95th %tile Queue, veh	1	3	2	1	

Intersection	
Intersection Delay, s/veh	
Intersection LOS	
Approach	SW
Entry Lanes	0
Conflicting Circle Lanes	2
Adj Approach Flow, veh/h	0
Demand Flow Rate, veh/h	0
Vehicles Circulating, veh/h	907
Vehicles Exiting, veh/h	218
Follow-Up Headway, s	3.186
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	0.0
Approach LOS	-
Lane	
Designated Moves	
Assumed Moves	
RT Channelized	
Lane Util	
Critical Headway, s	
Entry Flow, veh/h	
Cap Entry Lane, veh/h	
Entry HV Adj Factor	
Flow Entry, veh/h	
Cap Entry, veh/h	
V/C Ratio	
Control Delay, s/veh	
LOS	
95th %tile Queue, veh	

1: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.5	0.2	0.0	0.0	0.2
Total Del/Veh (s)	6.7	15.5	5.3	14.9	10.0
Stop Del/Veh (s)	2.3	11.7	2.5	12.1	6.5
Stop/Veh	0.40	0.73	0.54	0.73	0.58
Avg Speed (kph)	30	23	17	11	22
HC Emissions (g)	3	5	2	0	10
CO Emissions (g)	144	192	43	16	395
NOx Emissions (g)	12	16	6	2	36

2: Performance by approach

Approach	NB	SB	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	0.8	0.8	0.7
Stop Del/Veh (s)	0.0	0.0	0.5	0.1
Stop/Veh	0.00	0.00	0.12	0.02
Avg Speed (kph)	48	34	17	37
HC Emissions (g)	1	1	0	2
CO Emissions (g)	12	16	5	33
NOx Emissions (g)	2	2	1	5

3: Performance by approach

Approach	NB	SB	SE	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.5	0.5	1.0	1.2
Stop Del/Veh (s)	0.0	0.0	0.6	0.2
Stop/Veh	0.00	0.00	0.14	0.04
Avg Speed (kph)	28	49	16	34
HC Emissions (g)	2	2	0	4
CO Emissions (g)	32	51	4	88
NOx Emissions (g)	4	8	1	12

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	11.6
Stop Del/Veh (s)	4.9
Stop/Veh	0.44
Avg Speed (kph)	37
HC Emissions (g)	121
CO Emissions (g)	4103
NOx Emissions (g)	405

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 7 - an 2045

Intersection: 1:

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	>	LT	>	L	L	>	L	L	>
Maximum Queue (m)	16.9	22.4	60.8	23.9	46.2	34.2	9.1	34.2	23.7	7.6
Average Queue (m)	13.6	17.6	35.8	17.1	19.1	23.8	6.7	21.6	15.8	3.0
95th Queue (m)	19.5	23.1	60.2	31.8	42.0	35.1	12.5	32.9	23.6	9.2
Link Distance (m)	156.4	156.4	201.8	201.8	28.1	28.1		49.0	49.0	
Upstream Blk Time (%)					2	1				
Queuing Penalty (veh)					6	4				
Storage Bay Dist (m)							1.0			1.0
Storage Blk Time (%)						5	2		9	0
Queuing Penalty (veh)						3	6		1	0

Intersection: 2:

Movement	NW
Directions Served	R
Maximum Queue (m)	23.0
Average Queue (m)	11.6
95th Queue (m)	27.9
Link Distance (m)	8.2
Upstream Blk Time (%)	4
Queuing Penalty (veh)	17
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 7 - an 2045

Intersection: 3:

Movement	SE	B17
Directions Served	R	T
Maximum Queue (m)	22.8	8.4
Average Queue (m)	12.0	1.7
95th Queue (m)	26.7	7.2
Link Distance (m)	8.3	176.3
Upstream Blk Time (%)	6	
Queuing Penalty (veh)	40	
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 78

Intersection							
Intersection Delay, s/veh	16.1						
Intersection LOS	C						
Approach	EB		WB		NB	SB	NE
Entry Lanes	2		2		3	3	0
Conflicting Circle Lanes	2		2		2	2	2
Adj Approach Flow, veh/h	783		785		0	0	0
Demand Flow Rate, veh/h	799		801		0	0	0
Vehicles Circulating, veh/h	559		719		666	1097	666
Vehicles Exiting, veh/h	960		708		0	0	692
Follow-Up Headway, s	3.186		3.186		3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0		0		0	0	0
Ped Cap Adj	1.000		1.000		1.000	1.000	1.000
Approach Delay, s/veh	15.9		16.3		0.0	0.0	0.0
Approach LOS	C		C		-	-	-
Lane	Left	Right	Left	Right			
Designated Moves	LT	R	LT	R			
Assumed Moves	LT	R	LT	R			
RT Channelized							
Lane Util	0.323	0.677	0.501	0.499			
Critical Headway, s	4.293	4.113	4.293	4.113			
Entry Flow, veh/h	258	541	401	400			
Cap Entry Lane, veh/h	743	764	659	683			
Entry HV Adj Factor	0.982	0.980	0.980	0.980			
Flow Entry, veh/h	253	530	393	392			
Cap Entry, veh/h	730	749	646	669			
V/C Ratio	0.347	0.708	0.609	0.586			
Control Delay, s/veh	9.3	19.1	16.9	15.6			
LOS	A	C	C	C			
95th %tile Queue, veh	2	6	4	4			

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	SW
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Entry Lanes	0
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Conflicting Circle Lanes	2
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Adj Approach Flow, veh/h	0
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Demand Flow Rate, veh/h	0
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Vehicles Circulating, veh/h	1097
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Vehicles Exiting, veh/h	423
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Follow-Up Headway, s	3.186
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Ped Vol Crossing Leg, #/h	0
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Ped Cap Adj	1.000
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Approach Delay, s/veh	0.0
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Approach LOS	-
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Lane

Designated Moves

Assumed Moves

RT Channelized

Lane Util

Critical Headway, s

Entry Flow, veh/h

Cap Entry Lane, veh/h

Entry HV Adj Factor

Flow Entry, veh/h

Cap Entry, veh/h

V/C Ratio

Control Delay, s/veh

LOS

95th %tile Queue, veh

1: Performance by approach

Approach	EB	WB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.5	0.3
Total Del/Veh (s)	1.7	2.1	3.1	2.7
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.08	0.05
Avg Speed (kph)	25	28	33	32
HC Emissions (g)	0	0	0	1
CO Emissions (g)	0	8	24	32
NOx Emissions (g)	0	1	2	3

5: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.7	14.9	0.5
Stop Del/Veh (s)	0.0	0.0	15.0	0.1
Stop/Veh	0.00	0.00	1.00	0.01
Avg Speed (kph)	48	47	5	47
HC Emissions (g)	6	5	0	11
CO Emissions (g)	139	90	0	230
NOx Emissions (g)	17	15	0	31

11: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.2	0.0	0.1
Total Del/Veh (s)	0.4	1.1	5.3	1.1
Stop Del/Veh (s)	0.0	0.0	5.0	0.4
Stop/Veh	0.00	0.00	0.67	0.05
Avg Speed (kph)	45	45	10	43
HC Emissions (g)	3	9	0	12
CO Emissions (g)	53	223	2	278
NOx Emissions (g)	9	26	0	35

Total Network Performance

Denied Del/Veh (s)	0.2
Total Del/Veh (s)	3.9
Stop Del/Veh (s)	0.5
Stop/Veh	0.06
Avg Speed (kph)	45
HC Emissions (g)	83
CO Emissions (g)	1926
NOx Emissions (g)	241

Intersection: 1:

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 5:

Movement

SW

Directions Served

R

Maximum Queue (m)

7.9

Average Queue (m)

3.0

95th Queue (m)

9.2

Link Distance (m)

14.2

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)

Queuing and Blocking Report Baseline

Centura metropolitana Cluj Napoca
Anexa 1 - Nod 8 - an 2025

Intersection: 11:

Movement	NE
Directions Served	R
Maximum Queue (m)	21.3
Average Queue (m)	13.5
95th Queue (m)	21.5
Link Distance (m)	14.4
Upstream Blk Time (%)	5
Queuing Penalty (veh)	9
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 9

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 8 - an 2025

Intersection					
Intersection Delay, s/veh	4.8				
Intersection LOS	A				
Approach	EB	WB	SB	SE	NW
Entry Lanes	1	1	2	0	0
Conflicting Circle Lanes	2	2	2	2	2
Adj Approach Flow, veh/h	7	193	217	0	0
Demand Flow Rate, veh/h	7	197	221	0	0
Vehicles Circulating, veh/h	214	7	0	214	7
Vehicles Exiting, veh/h	0	0	204	7	214
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.8	4.8	4.9	0.0	0.0
Approach LOS	A	A	A	-	-
Lane	Left	Left	Left	Right	
Designated Moves	L	R	L	TR	
Assumed Moves	L	R	L	TR	
RT Channelized					
Lane Util	1.000	1.000	0.968	0.032	
Critical Headway, s	4.113	4.113	4.293	4.113	
Entry Flow, veh/h	7	197	214	7	
Cap Entry Lane, veh/h	973	1124	1130	1130	
Entry HV Adj Factor	1.000	0.980	0.981	1.000	
Flow Entry, veh/h	7	193	210	7	
Cap Entry, veh/h	973	1102	1109	1130	
V/C Ratio	0.007	0.175	0.189	0.006	
Control Delay, s/veh	3.8	4.8	5.0	3.2	
LOS	A	A	A	A	
95th %tile Queue, veh	0	1	1	0	

1: Performance by approach

Approach	EB	WB	SB	All
Denied Del/Veh (s)	0.0	0.0	1.3	0.6
Total Del/Veh (s)	1.8	2.3	3.7	3.0
Stop Del/Veh (s)	0.0	0.0	0.0	0.0
Stop/Veh	0.00	0.00	0.17	0.09
Avg Speed (kph)	24	27	32	30
HC Emissions (g)	0	0	1	2
CO Emissions (g)	8	18	56	82
NOx Emissions (g)	1	2	6	9

5: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	0.6	2.9	0.5
Stop Del/Veh (s)	0.0	0.0	2.6	0.1
Stop/Veh	0.00	0.00	0.35	0.02
Avg Speed (kph)	47	47	13	46
HC Emissions (g)	6	3	0	9
CO Emissions (g)	143	49	3	196
NOx Emissions (g)	17	8	0	26

11: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.4	0.0	0.2
Total Del/Veh (s)	0.5	1.9	10.4	2.1
Stop Del/Veh (s)	0.0	0.0	10.3	1.1
Stop/Veh	0.00	0.00	0.59	0.06
Avg Speed (kph)	44	42	6	38
HC Emissions (g)	3	5	0	8
CO Emissions (g)	55	178	4	237
NOx Emissions (g)	8	16	0	25

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	5.3
Stop Del/Veh (s)	1.3
Stop/Veh	0.10
Avg Speed (kph)	43
HC Emissions (g)	82
CO Emissions (g)	2226
NOx Emissions (g)	246

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - nod 9 - an 2045

Intersection: 1:

Movement	SB
Directions Served	>
Maximum Queue (m)	12.4
Average Queue (m)	4.8
95th Queue (m)	14.4
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	10.0
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 5:

Movement	SW
Directions Served	R
Maximum Queue (m)	13.6
Average Queue (m)	8.1
95th Queue (m)	13.4
Link Distance (m)	14.2
Upstream Blk Time (%)	3
Queuing Penalty (veh)	3
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - nod 9 - an 2045

Intersection: 11:

Movement	NE	B15
Directions Served	R	T
Maximum Queue (m)	29.5	33.1
Average Queue (m)	20.5	9.6
95th Queue (m)	34.0	31.1
Link Distance (m)	14.4	211.2
Upstream Blk Time (%)	20	
Queuing Penalty (veh)	56	
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 59

Intersection					
Intersection Delay, s/veh	6.0				
Intersection LOS	A				
Approach	EB	WB	SB	SE	NW
Entry Lanes	1	1	2	0	0
Conflicting Circle Lanes	2	2	2	2	2
Adj Approach Flow, veh/h	29	384	428	0	0
Demand Flow Rate, veh/h	30	392	437	0	0
Vehicles Circulating, veh/h	309	30	0	309	30
Vehicles Exiting, veh/h	0	0	422	127	309
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.4	6.9	5.4	0.0	0.0
Approach LOS	A	A	A	-	-
Lane	Left	Left	Left	Right	
Designated Moves	L	R	L	TR	
Assumed Moves	L	R	L	TR	
RT Channelized					
Lane Util	1.000	1.000	0.707	0.293	
Critical Headway, s	4.113	4.113	4.293	4.113	
Entry Flow, veh/h	30	392	309	128	
Cap Entry Lane, veh/h	910	1106	1130	1130	
Entry HV Adj Factor	0.967	0.980	0.981	0.977	
Flow Entry, veh/h	29	384	303	125	
Cap Entry, veh/h	880	1084	1108	1103	
V/C Ratio	0.033	0.354	0.273	0.113	
Control Delay, s/veh	4.4	6.9	5.8	4.2	
LOS	A	A	A	A	
95th %tile Queue, veh	0	2	1	0	

1: Performance by approach

Approach	EB	WB	SB	All
Denied Del/Veh (s)	0.0	0.0	1.8	0.7
Total Del/Veh (s)	2.4	2.5	2.8	2.6
Stop Del/Veh (s)	0.0	0.2	0.0	0.1
Stop/Veh	0.00	0.08	0.00	0.03
Avg Speed (kph)	33	32	33	33
HC Emissions (g)	0	0	0	0
CO Emissions (g)	3	5	7	15
NOx Emissions (g)	0	1	1	2

2: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.1
Total Del/Veh (s)	0.5	0.8	6.8	0.7
Stop Del/Veh (s)	0.0	0.0	6.0	0.1
Stop/Veh	0.00	0.00	0.50	0.01
Avg Speed (kph)	44	47	14	45
HC Emissions (g)	6	5	0	11
CO Emissions (g)	209	82	0	291
NOx Emissions (g)	19	13	0	32

3: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.2	0.0	0.1
Total Del/Veh (s)	1.8	0.6	13.4	1.5
Stop Del/Veh (s)	0.0	0.0	12.4	0.3
Stop/Veh	0.00	0.00	0.60	0.01
Avg Speed (kph)	46	46	11	45
HC Emissions (g)	18	5	0	23
CO Emissions (g)	324	153	1	478
NOx Emissions (g)	50	16	0	66

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	4.6
Stop Del/Veh (s)	0.3
Stop/Veh	0.02
Avg Speed (kph)	46
HC Emissions (g)	101
CO Emissions (g)	2279
NOx Emissions (g)	293

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 9 - an 2025

Intersection: 1:

Movement	WB
Directions Served	>
Maximum Queue (m)	14.7
Average Queue (m)	2.9
95th Queue (m)	12.6
Link Distance (m)	71.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2:

Movement	SW
Directions Served	R
Maximum Queue (m)	9.1
Average Queue (m)	5.2
95th Queue (m)	12.2
Link Distance (m)	36.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 9 - an 2025

Intersection: 3:

Movement	NE
Directions Served	R
Maximum Queue (m)	22.0
Average Queue (m)	10.8
95th Queue (m)	20.1
Link Distance (m)	55.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Intersection					
Intersection Delay, s/veh	3.8				
Intersection LOS	A				
Approach	EB	WB	SB	SE	NW
Entry Lanes	1	1	2	0	0
Conflicting Circle Lanes	1	1	1	1	1
Adj Approach Flow, veh/h	34	86	83	0	0
Demand Flow Rate, veh/h	35	88	85	0	0
Vehicles Circulating, veh/h	50	35	0	50	35
Vehicles Exiting, veh/h	0	0	123	35	50
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.7	4.1	3.6	0.0	0.0
Approach LOS	A	A	A	-	-
Lane	Left	Left	Left	Right	
Designated Moves	L	R	L	TR	
Assumed Moves	L	R	L	TR	
RT Channelized					
Lane Util	1.000	1.000	0.588	0.412	
Critical Headway, s	5.193	5.193	5.193	5.193	
Entry Flow, veh/h	35	88	50	35	
Cap Entry Lane, veh/h	1075	1091	1130	1130	
Entry HV Adj Factor	0.971	0.977	0.980	0.971	
Flow Entry, veh/h	34	86	49	34	
Cap Entry, veh/h	1044	1066	1107	1098	
V/C Ratio	0.033	0.081	0.044	0.031	
Control Delay, s/veh	3.7	4.1	3.6	3.5	
LOS	A	A	A	A	
95th %tile Queue, veh	0	0	0	0	

1: Performance by approach

Approach	EB	WB	SB	All
Denied Del/Veh (s)	0.0	0.0	1.6	0.6
Total Del/Veh (s)	3.0	2.5	3.0	2.7
Stop Del/Veh (s)	0.4	0.0	0.0	0.0
Stop/Veh	0.29	0.00	0.00	0.03
Avg Speed (kph)	31	32	33	32
HC Emissions (g)	0	1	0	1
CO Emissions (g)	2	26	10	38
NOx Emissions (g)	0	4	1	5

2: Performance by approach

Approach	EB	WB	SW	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	0.9	47.1	1.3
Stop Del/Veh (s)	0.0	0.0	46.6	0.7
Stop/Veh	0.00	0.00	1.00	0.01
Avg Speed (kph)	46	46	4	42
HC Emissions (g)	4	7	0	11
CO Emissions (g)	184	115	2	300
NOx Emissions (g)	13	18	0	31

3: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.3	0.0	0.1
Total Del/Veh (s)	2.1	1.1	23.7	2.1
Stop Del/Veh (s)	0.0	0.0	22.9	0.6
Stop/Veh	0.01	0.00	0.77	0.02
Avg Speed (kph)	46	42	8	43
HC Emissions (g)	9	7	0	16
CO Emissions (g)	205	196	2	404
NOx Emissions (g)	31	20	0	52

Total Network Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	5.9
Stop Del/Veh (s)	1.1
Stop/Veh	0.03
Avg Speed (kph)	45
HC Emissions (g)	101
CO Emissions (g)	2506
NOx Emissions (g)	301

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 9 - an 2045

Intersection: 1:

Movement	EB
Directions Served	L
Maximum Queue (m)	10.0
Average Queue (m)	3.8
95th Queue (m)	11.6
Link Distance (m)	73.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2:

Movement	SW
Directions Served	R
Maximum Queue (m)	29.3
Average Queue (m)	12.1
95th Queue (m)	31.6
Link Distance (m)	36.2
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 9 - an 2045

Intersection: 3:

Movement	EB	NE
Directions Served	T	R
Maximum Queue (m)	9.3	27.3
Average Queue (m)	1.9	16.2
95th Queue (m)	8.0	28.4
Link Distance (m)	347.0	55.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 9 - an 2045

Intersection					
Intersection Delay, s/veh	4.2				
Intersection LOS	A				
Approach	EB	WB	SB	SE	NW
Entry Lanes	1	1	2	0	0
Conflicting Circle Lanes	1	1	1	1	1
Adj Approach Flow, veh/h	46	160	125	0	0
Demand Flow Rate, veh/h	47	163	127	0	0
Vehicles Circulating, veh/h	74	47	0	74	47
Vehicles Exiting, veh/h	0	0	210	53	74
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.9	4.8	3.7	0.0	0.0
Approach LOS	A	A	A	-	-
Lane	Left	Left	Left	Right	
Designated Moves	L	R	L	TR	
Assumed Moves	L	R	L	TR	
RT Channelized					
Lane Util	1.000	1.000	0.583	0.417	
Critical Headway, s	5.193	5.193	5.193	5.193	
Entry Flow, veh/h	47	163	74	53	
Cap Entry Lane, veh/h	1049	1078	1130	1130	
Entry HV Adj Factor	0.979	0.982	0.986	0.981	
Flow Entry, veh/h	46	160	73	52	
Cap Entry, veh/h	1027	1058	1115	1109	
V/C Ratio	0.045	0.151	0.065	0.047	
Control Delay, s/veh	3.9	4.8	3.8	3.6	
LOS	A	A	A	A	
95th %tile Queue, veh	0	1	0	0	

1: Performance by approach

Approach	NB	SB	NE	SW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.9	5.8	8.6	6.4	6.1
Stop Del/Veh (s)	1.0	1.6	6.4	3.8	2.6
Stop/Veh	0.35	0.47	0.69	0.59	0.50
Avg Speed (kph)	29	25	13	17	23
HC Emissions (g)	2	2	0	1	5
CO Emissions (g)	52	52	12	20	136
NOx Emissions (g)	7	7	1	2	17

5: Performance by approach

Approach	SB	NE	SW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	1.1	0.8	1.8
Stop Del/Veh (s)	5.9	0.0	0.0	0.9
Stop/Veh	0.50	0.00	0.00	0.08
Avg Speed (kph)	8	38	45	35
HC Emissions (g)	0	2	2	4
CO Emissions (g)	9	51	50	110
NOx Emissions (g)	1	6	6	14

8: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.8	1.5	1.0	1.2
Stop Del/Veh (s)	0.0	0.1	0.0	0.0
Stop/Veh	0.00	0.02	0.03	0.01
Avg Speed (kph)	47	35	22	41
HC Emissions (g)	5	2	0	7
CO Emissions (g)	87	43	4	135
NOx Emissions (g)	15	5	1	21

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	8.2
Stop Del/Veh (s)	2.3
Stop/Veh	0.37
Avg Speed (kph)	38
HC Emissions (g)	128
CO Emissions (g)	4127
NOx Emissions (g)	418

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 10 - an 2025

Intersection: 1:

Movement	NB	NB	SB	SB	SB	NE	NE	SW	SW
Directions Served	L	>	L	T	>	L	>	L	>
Maximum Queue (m)	16.8	9.2	21.3	23.4	14.6	21.3	23.6	26.3	22.7
Average Queue (m)	14.4	7.9	14.1	11.7	9.5	16.5	14.5	18.0	16.1
95th Queue (m)	19.1	9.3	22.0	24.9	13.9	20.5	23.1	27.4	25.0
Link Distance (m)	92.2		74.3	74.3		32.3	32.3	35.9	35.9
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)		1.0			1.0				
Storage Blk Time (%)		1		4	1				
Queuing Penalty (veh)		3		7	3				

Intersection: 5:

Movement	SB	B15
Directions Served	R	T
Maximum Queue (m)	25.1	9.5
Average Queue (m)	23.8	4.3
95th Queue (m)	27.6	11.1
Link Distance (m)	1.0	105.7
Upstream Blk Time (%)	28	
Queuing Penalty (veh)	119	
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 1 - Nod 10 - an 2025

Intersection: 8:

Movement	WB	NE
Directions Served	TR	R
Maximum Queue (m)	20.8	9.3
Average Queue (m)	4.2	3.7
95th Queue (m)	17.9	11.2
Link Distance (m)	70.3	18.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 132

HCM 2010 Roundabout
Intersectia 1:

Centura metropolitana Cluj - Napoca
Anexa 1 - nod 10 - an 2025

Intersection						
Intersection Delay, s/veh	14.9					
Intersection LOS	B					
Approach	EB	WB	NB	SB	NE	
Entry Lanes	0	0	3	3	2	
Conflicting Circle Lanes	2	2	2	2	2	
Adj Approach Flow, veh/h	0	0	0	0	374	
Demand Flow Rate, veh/h	0	0	0	0	381	
Vehicles Circulating, veh/h	969	859	359	513	969	
Vehicles Exiting, veh/h	469	485	991	977	0	
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186	
Ped Vol Crossing Leg, #/h	0	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	0.0	0.0	0.0	0.0	12.6	
Approach LOS	-	-	-	-	B	
Lane				Left	Right	Left
Designated Moves				L	TR	L
Assumed Moves				L	TR	L
RT Channelized						
Lane Util				0.310	0.690	0.380
Critical Headway, s				4.293	4.113	4.293
Entry Flow, veh/h				118	263	240
Cap Entry Lane, veh/h				546	573	593
Entry HV Adj Factor				0.983	0.981	0.979
Flow Entry, veh/h				116	258	235
Cap Entry, veh/h				537	563	581
V/C Ratio				0.216	0.459	0.405
Control Delay, s/veh				9.6	14.0	12.4
LOS				A	B	B
95th %tile Queue, veh				1	2	2

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	SW
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Entry Lanes	2
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Conflicting Circle Lanes	2
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Adj Approach Flow, veh/h	618
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Demand Flow Rate, veh/h	631
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Vehicles Circulating, veh/h	859
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Vehicles Exiting, veh/h	0
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Follow-Up Headway, s	3.186
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Ped Vol Crossing Leg, #/h	0
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Ped Cap Adj	1.000
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Approach Delay, s/veh	16.3
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Approach LOS	C
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Lane	Right
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Designated Moves	TR
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Assumed Moves	TR
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RT Channelized

Lane Util	0.620
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Critical Headway, s	4.113
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Entry Flow, veh/h	391
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Cap Entry Lane, veh/h	619
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Entry HV Adj Factor	0.980
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Flow Entry, veh/h	383
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Cap Entry, veh/h	607
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V/C Ratio	0.631
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Control Delay, s/veh	18.7
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LOS	C
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95th %tile Queue, veh	4
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1: Performance by approach

Approach	NB	SB	NE	SW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.6	6.0	6.7	8.0	7.1
Stop Del/Veh (s)	3.5	1.9	4.3	5.4	3.5
Stop/Veh	0.57	0.34	0.60	0.70	0.53
Avg Speed (kph)	24	25	16	15	22
HC Emissions (g)	2	1	0	1	5
CO Emissions (g)	59	51	10	29	150
NOx Emissions (g)	7	7	1	4	19

2: Performance by approach

Approach	SB	NE	SW	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	1.1	0.8	2.0
Stop Del/Veh (s)	5.4	0.0	0.0	0.9
Stop/Veh	0.38	0.00	0.00	0.07
Avg Speed (kph)	13	36	45	34
HC Emissions (g)	0	2	3	5
CO Emissions (g)	8	43	76	128
NOx Emissions (g)	1	6	8	15

8: Performance by approach

Approach	EB	WB	NE	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.5	2.7	11.2	3.7
Stop Del/Veh (s)	0.0	0.8	10.4	2.1
Stop/Veh	0.00	0.13	0.39	0.13
Avg Speed (kph)	46	28	9	33
HC Emissions (g)	7	2	0	9
CO Emissions (g)	148	49	10	207
NOx Emissions (g)	21	6	1	28

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	11.4
Stop Del/Veh (s)	4.0
Stop/Veh	0.45
Avg Speed (kph)	36
HC Emissions (g)	146
CO Emissions (g)	4805
NOx Emissions (g)	493

Queuing and Blocking Report Baseline

Centura metropolitana Cluj - Napoca
Anexa 2 - Nod 10 - an 2045

Intersection: 1:

Movement	NB	NB	NB	SB	SB	SB	NE	NE	SW	SW
Directions Served	L	T	>	L	T	>	L	>	L	>
Maximum Queue (m)	35.1	16.2	9.1	16.4	16.8	9.0	15.6	29.3	21.3	24.6
Average Queue (m)	24.9	7.3	8.4	14.5	9.8	7.4	12.4	16.4	12.3	21.6
95th Queue (m)	42.2	17.9	9.7	19.1	23.1	10.2	17.0	27.5	24.4	26.9
Link Distance (m)	92.2	92.2		74.3	74.3		32.3	32.3	35.9	35.9
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								1		
Storage Bay Dist (m)			1.0			1.0				
Storage Blk Time (%)		1	2		1	2				
Queuing Penalty (veh)		2	10		1	10				

Intersection: 2:

Movement	SB
Directions Served	R
Maximum Queue (m)	47.2
Average Queue (m)	27.7
95th Queue (m)	55.4
Link Distance (m)	26.2
Upstream Blk Time (%)	13
Queuing Penalty (veh)	65
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

Baseline

Centura metropolitana Cluj - Napoca

Anexa 2 - Nod 10 - an 2045

Intersection: 8:

Movement	WB	WB	NE	B17
Directions Served	T	TR	R	T
Maximum Queue (m)	22.2	49.6	46.1	28.2
Average Queue (m)	4.4	17.4	32.6	5.6
95th Queue (m)	19.1	45.5	52.3	24.2
Link Distance (m)	52.4	52.4	21.9	261.0
Upstream Blk Time (%)		0	27	
Queuing Penalty (veh)		0	147	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Bend

Movement	EB
Directions Served	T
Maximum Queue (m)	5.7
Average Queue (m)	1.1
95th Queue (m)	4.9
Link Distance (m)	52.4
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 236

Intersection					
Intersection Delay, s/veh	30.2				
Intersection LOS	D				
Approach	EB	WB	NB	SB	NE
Entry Lanes	0	0	3	3	2
Conflicting Circle Lanes	2	2	2	2	2
Adj Approach Flow, veh/h	0	0	0	0	502
Demand Flow Rate, veh/h	0	0	0	0	512
Vehicles Circulating, veh/h	1108	1068	457	628	1108
Vehicles Exiting, veh/h	566	601	1163	1110	0
Follow-Up Headway, s	3.186	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000	1.000
Approach Delay, s/veh	0.0	0.0	0.0	0.0	20.9
Approach LOS	-	-	-	-	C
Lane	Left		Right		Left
Designated Moves	L		TR		L
Assumed Moves	L		TR		L
RT Channelized					
Lane Util	0.303		0.697		0.279
Critical Headway, s	4.293		4.113		4.293
Entry Flow, veh/h	155		357		187
Cap Entry Lane, veh/h	492		520		507
Entry HV Adj Factor	0.981		0.980		0.979
Flow Entry, veh/h	152		350		183
Cap Entry, veh/h	483		510		496
V/C Ratio	0.315		0.686		0.369
Control Delay, s/veh	12.4		24.5		13.3
LOS	B		C		B
95th %tile Queue, veh	1		5		2

Intersection

Intersection Delay, s/veh

Intersection LOS

Approach	SW
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Entry Lanes	2
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Conflicting Circle Lanes	2
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Adj Approach Flow, veh/h	657
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Demand Flow Rate, veh/h	670
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Vehicles Circulating, veh/h	1068
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Vehicles Exiting, veh/h	0
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Follow-Up Headway, s	3.186
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Ped Vol Crossing Leg, #/h	0
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Ped Cap Adj	1.000
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Approach Delay, s/veh	37.3
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Approach LOS	E
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Lane	Right
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Designated Moves	TR
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Assumed Moves	TR
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RT Channelized

Lane Util	0.721
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Critical Headway, s	4.113
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Entry Flow, veh/h	483
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Cap Entry Lane, veh/h	535
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Entry HV Adj Factor	0.981
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Flow Entry, veh/h	474
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Cap Entry, veh/h	525
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V/C Ratio	0.903
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Control Delay, s/veh	46.6
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LOS	E
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95th %tile Queue, veh	11
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