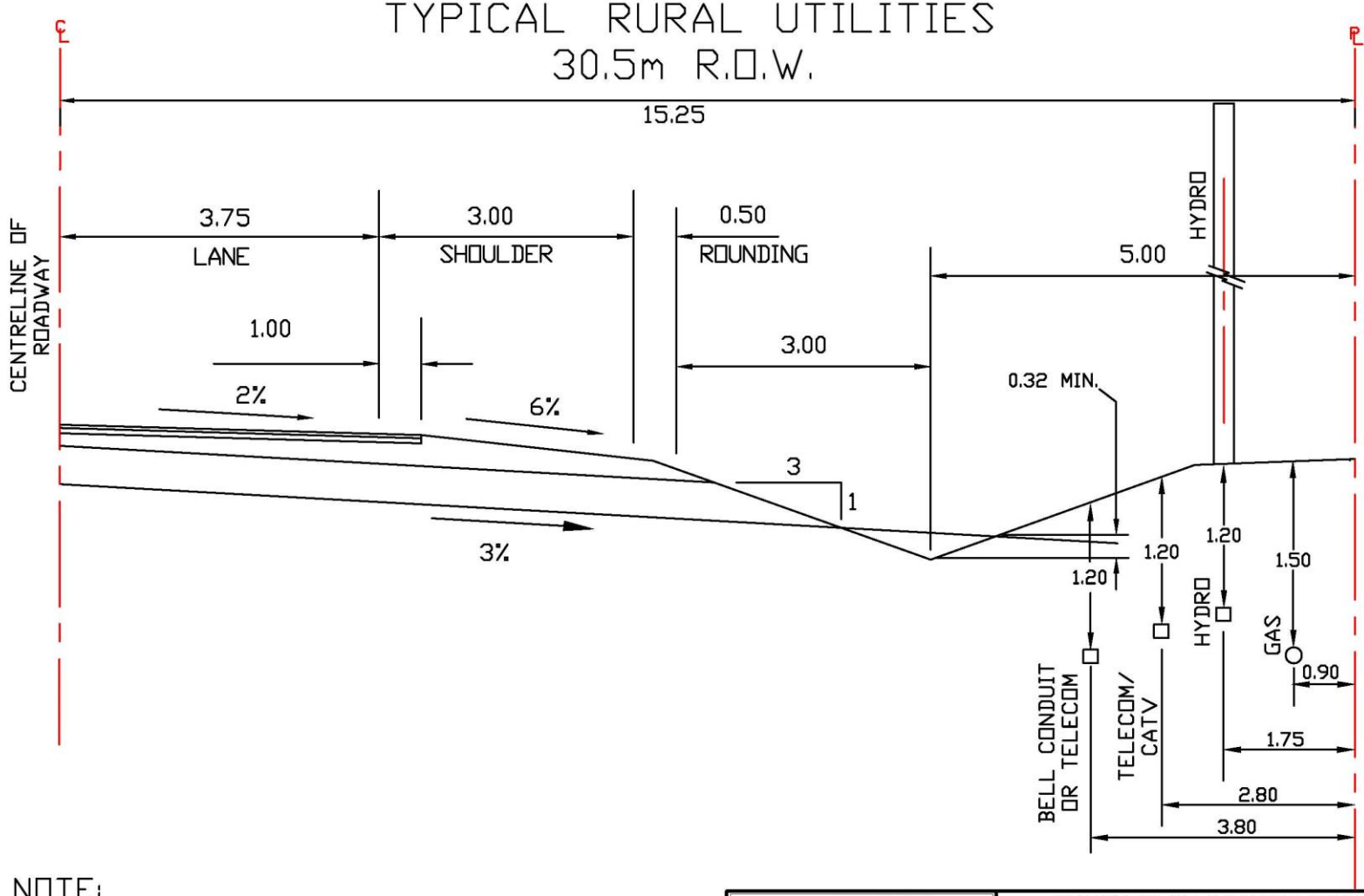


Appendix A: Typical Cross Sections

TYPICAL RURAL UTILITIES
30.5m R.O.W.



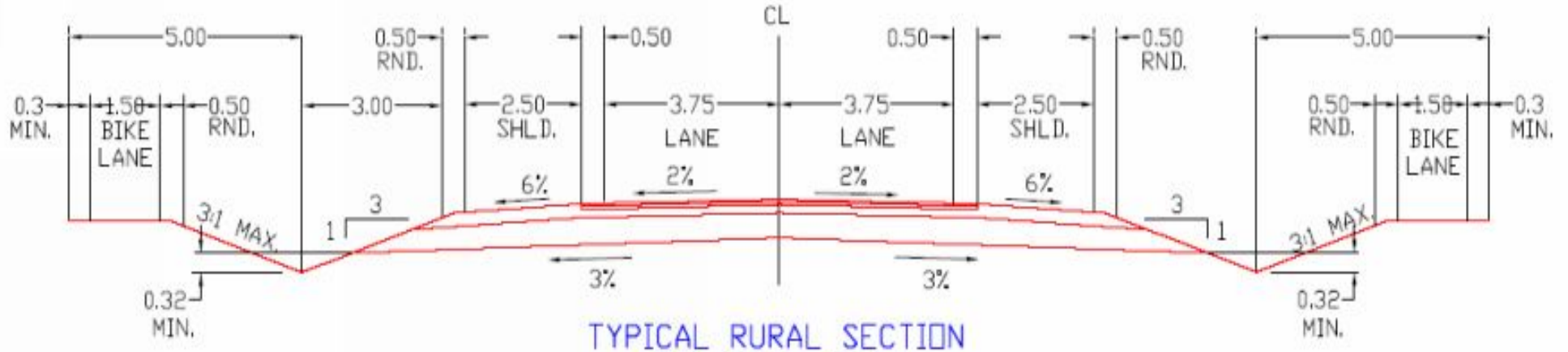
NOTE:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. DEPTH OF COVER INDICATED ARE MINIMUM REQUIRED.
3. UNDERGROUND HYDRO SERVICE OR HYDRO POLES IN SAME LOCATION

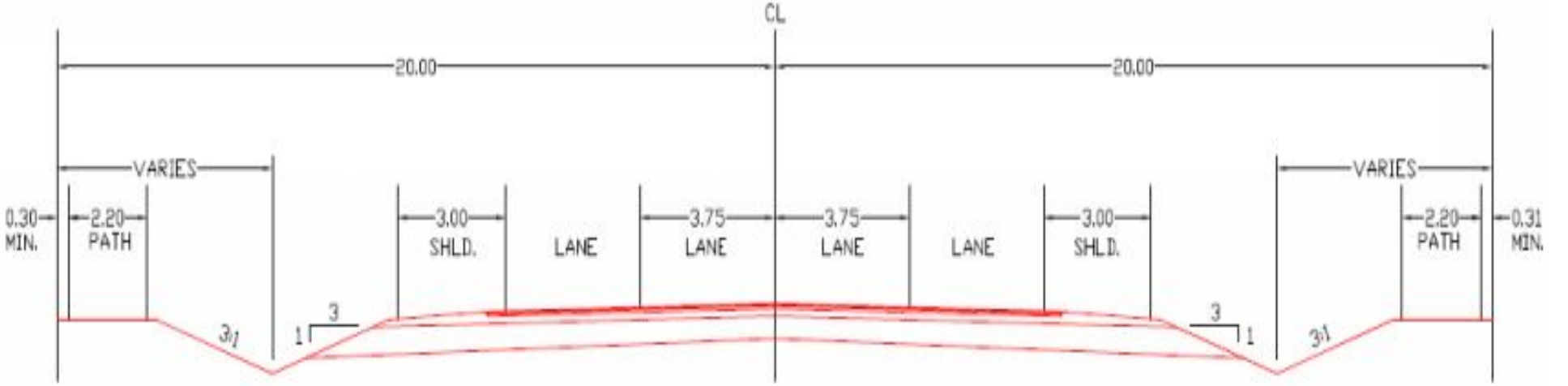
COUNTY OF SIMCOE
For the Greater Good

COUNTY OF SIMCOE STANDARD
Typical Rural Utilities 30.5m R.O.W.

SCALE:	DATE:	DRAWING No.:
N.T.S.	February 3, 2009	ST - 003
DIRECTOR, TRANSPORTATION CONSTRUCTION: James E. Hunter	DRAWN: J.P.M.	



TYPICAL RURAL SECTION
FOR 30.5m R.O.W
TYPE-2



TYPICAL RURAL SECTION
FOR 40.0m R.O.W

Appendix B: Counts and Timings

Corridor 1

County Road 93

Turning Movement Counts

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

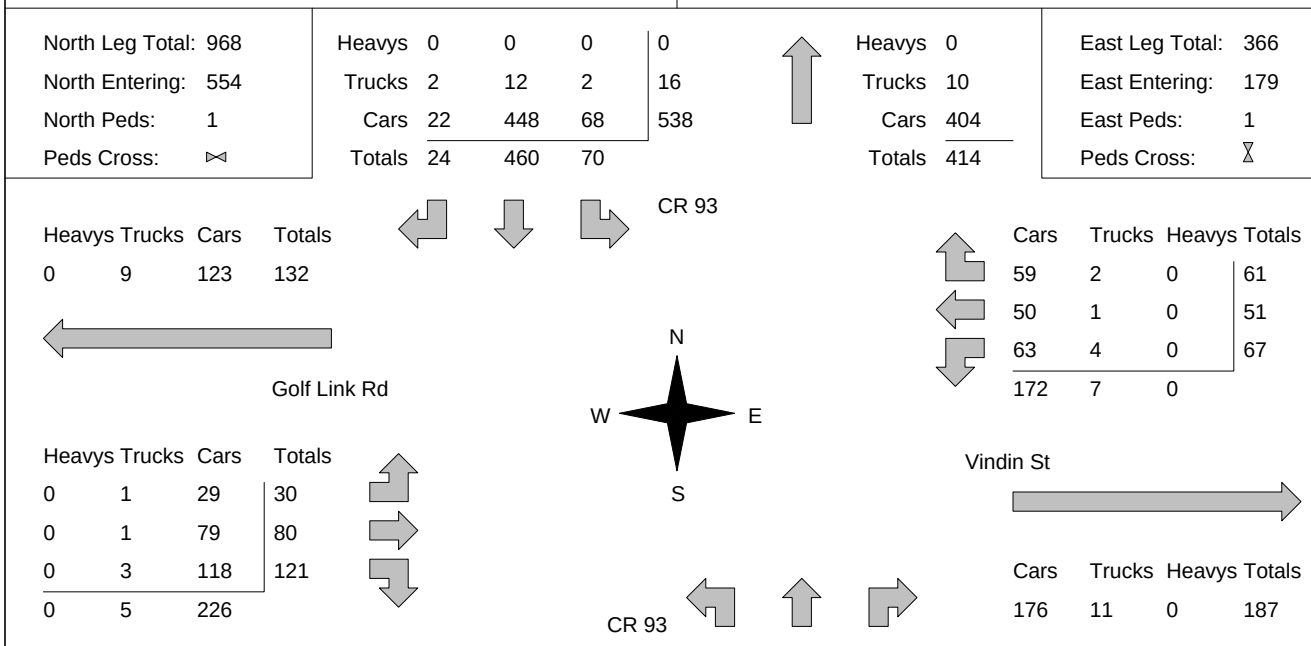
Municipality: Midland
Site #: 1301800046
Intersection: CR 93 & Vindin St/Golf Link Rd
TFR File #: 4
Count date: 28-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S



Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Midland
Site #: 1301800046
Intersection: CR 93 & Vindin St/Golf Link Rd
TFR File #: 4
Count date: 28-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S

North Leg Total: 1536
North Entering: 739
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	1	9	3	13
Cars	39	579	108	726
Totals	40	588	111	

Heavys	0
Trucks	13
Cars	784
Totals	797

East Leg Total: 480
East Entering: 212
East Peds: 0
Peds Cross: ⧖

CR 93

Heavys	Trucks	Cars	Totals
0	3	292	295

	Cars	Trucks	Heavys	Totals
	74	3	0	77
	84	0	0	84
	49	2	0	51
	207	5	0	

Golf Link Rd

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Vindin St

Heavys	Trucks	Cars	Totals
0	0	42	42
0	1	89	90
0	2	132	134
0	3	263	

	Cars	Trucks	Heavys	Totals
	263	5	0	268

CR 93

Peds Cross: ⧖
West Peds: 1
West Entering: 266
West Leg Total: 561

Cars	760
Trucks	13
Heavys	0
Totals	773

Cars	169	668	66	903
Trucks	2	10	1	13
Heavys	0	0	0	0
Totals	171	678	67	

Peds Cross: ⋈
South Peds: 0
South Entering: 916
South Leg Total: 1689

Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Midland
Site #: 1301800045
Intersection: CR 93 & Zehrs/Canadian Tire
TFR File #: 3
Count date: 27-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S

North Leg Total:	1115			
North Entering:	602			
North Peds:	2			
Peds Cross:	⋈			
Heavys	0	0	0	0
Trucks	1	17	0	18
Cars	45	484	55	584
Totals	46	501	55	
Heavys	0			
Trucks	29			
Cars	484			
Totals	513			
East Leg Total:	236			
East Entering:	102			
East Peds:	1			
Peds Cross:	⧖			

CR 93

Heavys	Trucks	Cars	Totals
0	5	138	143

Zehrs/Canadian Tire

Cars	Trucks	Heavys	Totals
26	0	0	26
7	1	0	8
68	0	0	68
101	1	0	

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Heavys	Trucks	Cars	Totals
0	1	31	32
0	1	7	8
0	1	15	16
0	3	53	

Zehrs/Canadian Tire

Cars	Trucks	Heavys	Totals
133	1	0	134

CR 93

Peds Cross:	⧖			
West Peds:	0			
West Entering:	56			
West Leg Total:	199			
Cars	567			
Trucks	18			
Heavys	0			
Totals	585			
Cars	86	427	71	584
Trucks	3	28	0	31
Heavys	0	0	0	0
Totals	89	455	71	
Peds Cross:	⋈			
South Peds:	0			
South Entering:	615			
South Leg Total:	1200			

Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Midland
Site #: 1301800045
Intersection: CR 93 & Zehrs/Canadian Tire
TFR File #: 3
Count date: 27-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S

North Leg Total:	1838			
North Entering:	920			
North Peds:	2			
Peds Cross:	⋈			
Heavys	0	0	0	0
Trucks	0	20	0	20
Cars	108	731	61	900
Totals	108	751	61	
Heavys	0			
Trucks	13			
Cars	905			
Totals	918			
East Leg Total:	478			
East Entering:	259			
East Peds:	4			
Peds Cross:	⧖			

CR 93

Heavys	Trucks	Cars	Totals
0	1	358	359

Zehrs/Canadian Tire

Heavys	Trucks	Cars	Totals
0	0	133	133
0	0	20	20
0	1	34	35
0	1	187	

Cars	Trucks	Heavys	Totals
97	0	0	97
18	0	0	18
144	0	0	144
259	0	0	

N
W E
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Zehrs/Canadian Tire

Cars	Trucks	Heavys	Totals
219	0	0	219

CR 93

Peds Cross:	⧖			
West Peds:	0			
West Entering:	188			
West Leg Total:	547			
Cars	909			
Trucks	21			
Heavys	0			
Totals	930			
Cars	232	675	138	1045
Trucks	1	13	0	14
Heavys	0	0	0	0
Totals	233	688	138	
Peds Cross:	⋈			
South Peds:	2			
South Entering:	1059			
South Leg Total:	1989			

Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

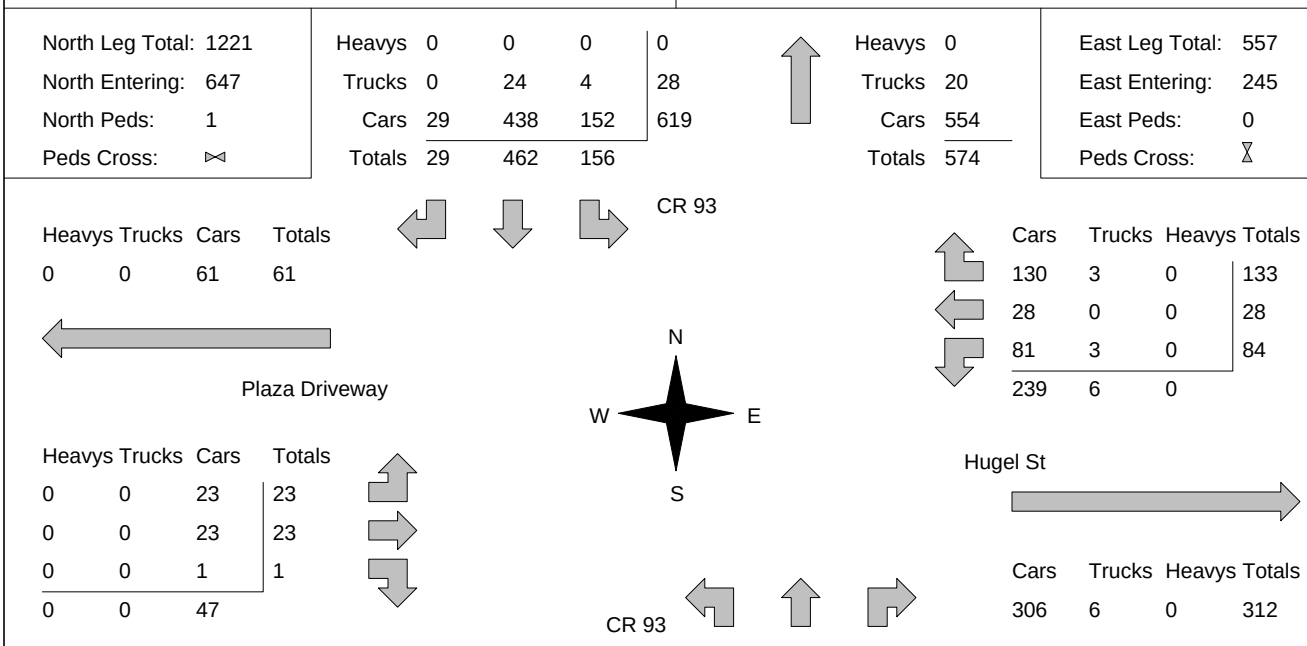
Municipality: Midland
Site #: 1301800044
Intersection: CR 93 & Hugel St
TFR File #: 2
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S



Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

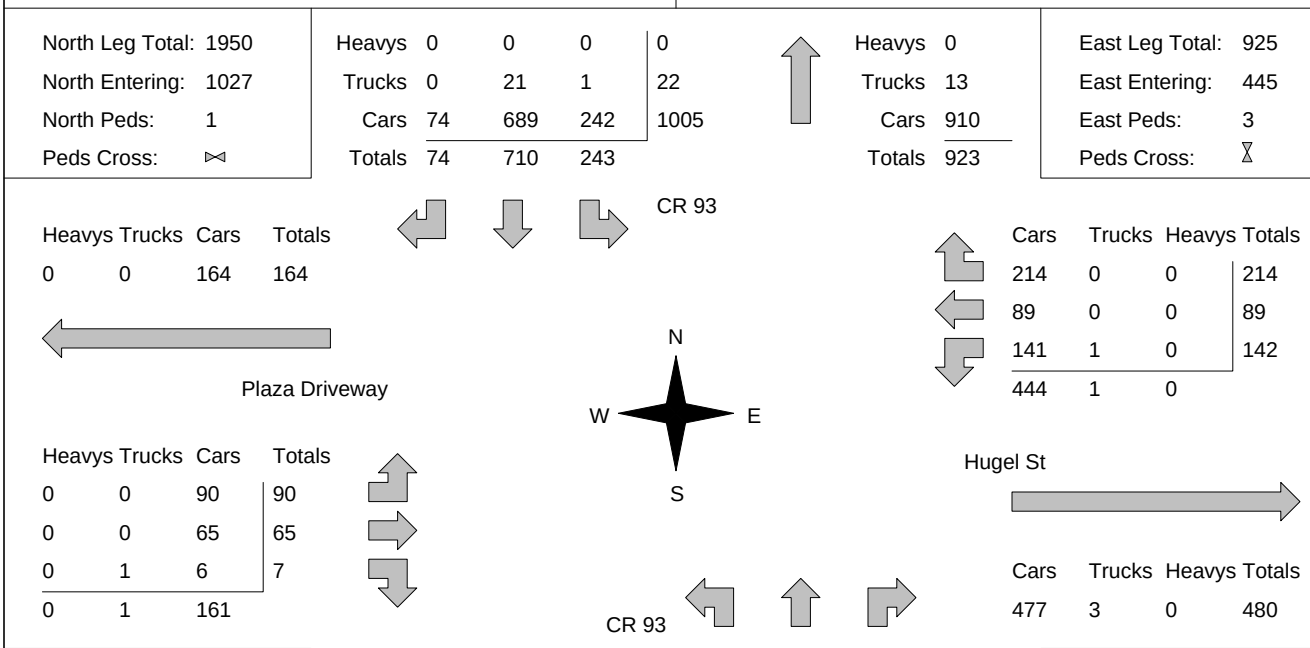
Municipality: Midland
Site #: 1301800044
Intersection: CR 93 & Hugel St
TFR File #: 2
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S



Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Midland
Site #: 1301800043
Intersection: CR 93 & Huronia Mall Entrance
TFR File #: 1
Count date: 25-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S

North Leg Total: 1109
North Entering: 544
North Peds: 5
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	1	33	4	38
Cars	9	431	66	506
Totals	10	464	70	

Heavys	0
Trucks	37
Cars	528
Totals	565

East Leg Total: 234
East Entering: 108
East Peds: 0
Peds Cross: ⧖

CR 93

Heavys	Trucks	Cars	Totals
0	4	59	63

Huronia Mall Entrance

Heavys	Trucks	Cars	Totals
0	1	14	15
0	0	19	19
0	1	22	23
0	2	55	

Cars	Trucks	Heavys	Totals
51	1	0	52
19	1	0	20
36	0	0	36
106	2	0	

N
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Huronia Mall Entrance

Cars	Trucks	Heavys	Totals
120	6	0	126

CR 93

Peds Cross: ⧖
West Peds: 0
West Entering: 57
West Leg Total: 120

Cars	489
Trucks	34
Heavys	0
Totals	523

Cars	31	463	35	529
Trucks	2	35	2	39
Heavys	0	0	0	0
Totals	33	498	37	

Peds Cross: ⋈
South Peds: 3
South Entering: 568
South Leg Total: 1091

Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:00:00
To: 17:00:00

Municipality: Midland
Site #: 1301800043
Intersection: CR 93 & Huronia Mall Entrance
TFR File #: 1
Count date: 25-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

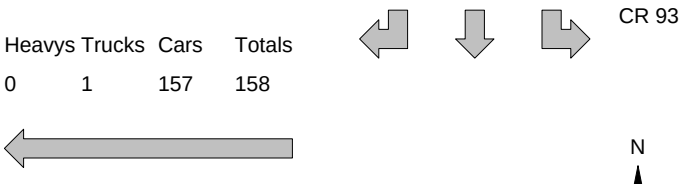
Major Road: CR 93 runs N/S

North Leg Total:	1726			
North Entering:	910			
North Peds:	9			
Peds Cross:	⋈			

Heavys	0	0	0	0
Trucks	0	28	0	28
Cars	31	778	73	882
Totals	31	806	73	

Heavys	0			
Trucks	15			
Cars	801			
Totals	816			

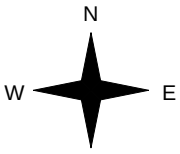
East Leg Total:	359			
East Entering:	184			
East Peds:	4			
Peds Cross:	⧖			



Heavys	Trucks	Cars	Totals
0	1	157	158

Huronia Mall Entrance

Heavys	Trucks	Cars	Totals
0	0	42	42
0	0	36	36
0	1	89	90
0	1	167	



Cars	Trucks	Heavys	Totals
65	0	0	65
24	0	0	24
93	2	0	95
182	2	0	

Huronia Mall Entrance

Cars	Trucks	Heavys	Totals
175	0	0	175

CR 93

Peds Cross:	⧖			
West Peds:	1			
West Entering:	168			
West Leg Total:	326			

Cars	960			
Trucks	31			
Heavys	0			
Totals	991			

Cars	102	694	66	862
Trucks	1	15	0	16
Heavys	0	0	0	0
Totals	103	709	66	

Peds Cross:	⋈			
South Peds:	13			
South Entering:	878			
South Leg Total:	1869			

Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

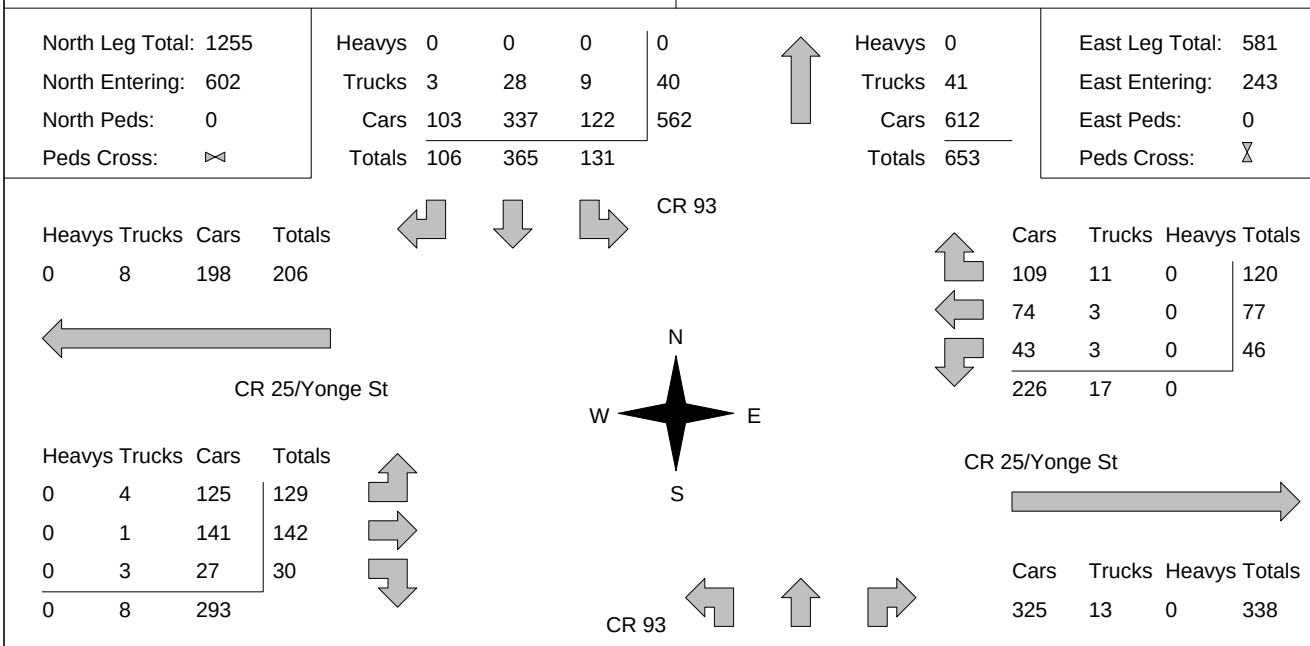
Municipality: Midland
Site #: 1301800042
Intersection: CR 93 & CR 25/Yonge St
TFR File #: 17
Count date: 24-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S



Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:45:00
To: 16:45:00

Municipality: Midland
Site #: 1301800042
Intersection: CR 93 & CR 25/Yonge St
TFR File #: 17
Count date: 24-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 93 runs N/S

North Leg Total:	1769			
North Entering:	1013			
North Peds:	2			
Peds Cross:	⋈			

Heavys	0	0	0	0
Trucks	1	15	11	27
Cars	218	525	243	986
Totals	219	540	254	

Heavys	0	
Trucks	18	
Cars	738	
Totals	756	

East Leg Total:	835		
East Entering:	398		
East Peds:	0		
Peds Cross:	⧖		

CR 93

Heavys	Trucks	Cars	Totals
0	3	434	437

Cars	Trucks	Heavys	Totals
150	6	0	156
164	1	0	165
73	4	0	77
387	11	0	

CR 25/Yonge St

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Heavys	Trucks	Cars	Totals
0	1	145	146
0	0	140	140
0	0	53	53
0	1	338	

CR 25/Yonge St

Cars	Trucks	Heavys	Totals
422	15	0	437

CR 93

Peds Cross:	⧖		
West Peds:	1		
West Entering:	339		
West Leg Total:	776		

Cars	651			
Trucks	19			
Heavys	0			
Totals	670			

Cars	52	443	39	534
Trucks	1	11	4	16
Heavys	0	0	0	0
Totals	53	454	43	

Peds Cross:	⋈		
South Peds:	0		
South Entering:	550		
South Leg Total:	1220		

Comments

Corridor 2

County Road 44

Turning Movement Counts

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

Municipality: Simcoe [Rama]
Site #: 1301800028
Intersection: CR 44 & Casino Rama Entrance
TFR File #: 1
Count date: 2-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 44 runs N/S

North Leg Total: 423
North Entering: 190
North Peds: 0
Peds Cross: ⋈

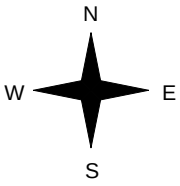
Heavys	0	0	0
Trucks	10	0	10
Cars	173	7	180
Totals	183	7	

Heavys	0
Trucks	12
Cars	221
Totals	233

East Leg Total: 44
East Entering: 19
East Peds: 0
Peds Cross: ⋈

CR 44

Cars	Trucks	Heavys	Totals
8	1	0	9
9	1	0	10
17	2	0	



Casino Rama Entrance

Cars	Trucks	Heavys	Totals
25	0	0	25

CR 44

Cars	182		
Trucks	11		
Heavys	0		
Totals	193		

Cars	213	18	231
Trucks	11	0	11
Heavys	0	0	0
Totals	224	18	

Peds Cross: ⋈
South Peds: 0
South Entering: 242
South Leg Total: 435

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:45:00
To: 16:45:00

Municipality: Simcoe [Rama]
Site #: 1301800028
Intersection: CR 44 & Casino Rama Entrance
TFR File #: 1
Count date: 2-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 44 runs N/S

North Leg Total: 531
North Entering: 302
North Peds: 0
Peds Cross: ⋈

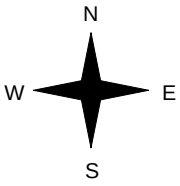
Heavys	0	0	0
Trucks	14	0	14
Cars	270	18	288
Totals	284	18	

Heavys	0
Trucks	8
Cars	221
Totals	229

East Leg Total: 133
East Entering: 75
East Peds: 0
Peds Cross: ⋈

CR 44

Cars	Trucks	Heavys	Totals
16	0	0	16
56	3	0	59
72	3	0	



Casino Rama Entrance

Cars	Trucks	Heavys	Totals
55	3	0	58

CR 44

Cars	326		
Trucks	17		
Heavys	0		
Totals	343		

Cars	205	37	242
Trucks	8	3	11
Heavys	0	0	0
Totals	213	40	

Peds Cross: ⋈
South Peds: 0
South Entering: 253
South Leg Total: 596

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

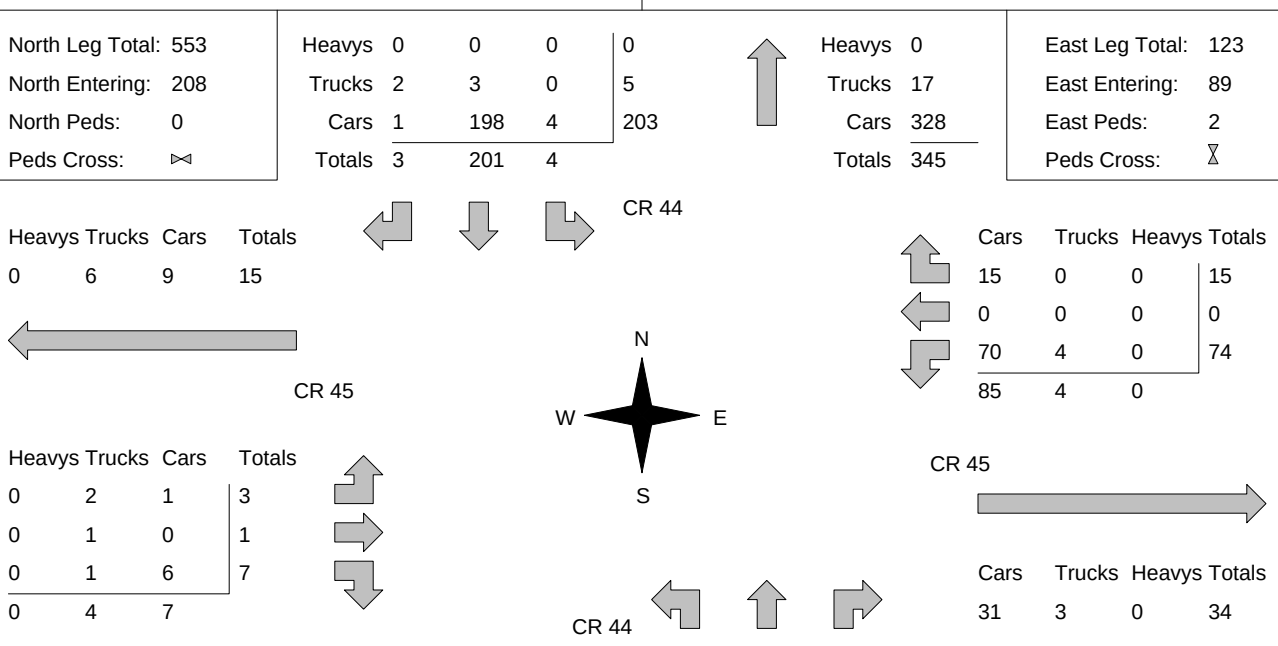
Municipality: Simcoe [Rama]
Site #: 1301800029
Intersection: CR 44 & CR 45
TFR File #: 2
Count date: 3-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 44 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 17:00:00
To: 18:00:00

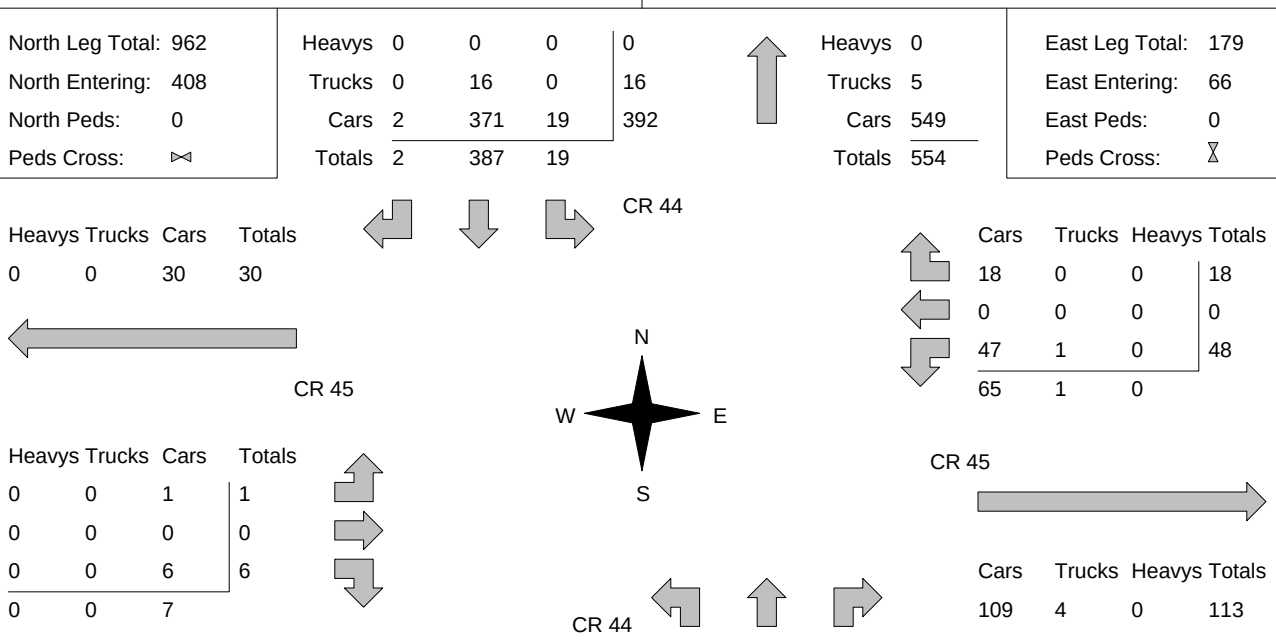
Municipality: Simcoe [Rama]
Site #: 1301800029
Intersection: CR 44 & CR 45
TFR File #: 2
Count date: 3-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 44 runs N/S



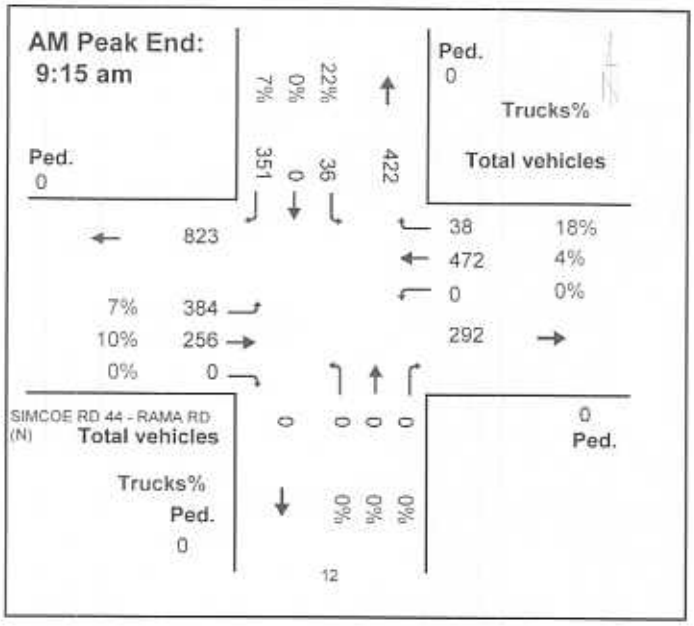
Comments

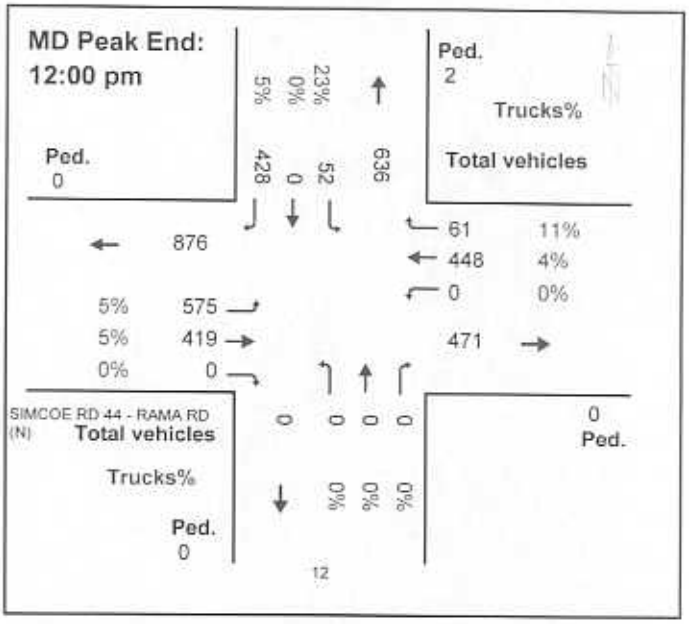
Ontario

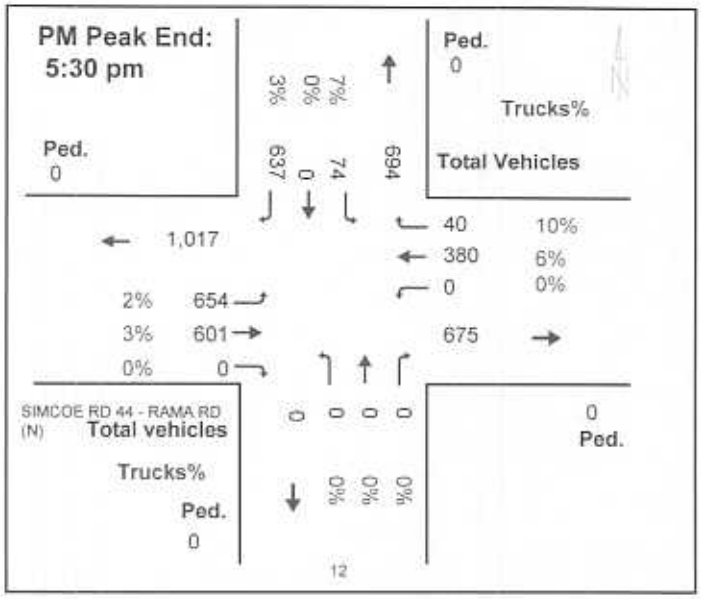
HWY 12 @ SIMCOE RD 44 - RAMA RD (N)

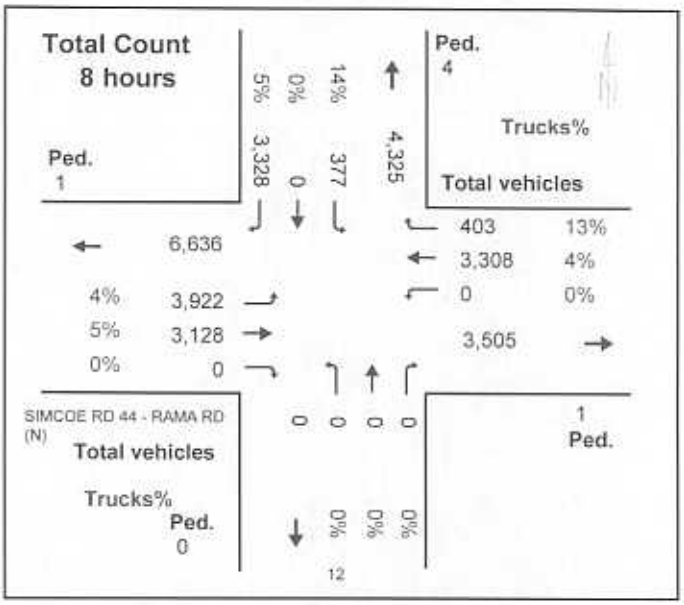
Central

Intersection ID:194201481 | Count Day: Tuesday | Count Date: 17-Jul-2012









Corridor 3

County Road 124

Turning Movement Counts

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Simcoe
Site #: 1310100001
Intersection: Poplar Sideroad & High Street
TFR File #: 0
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E

North Leg Total:	455			
North Entering:	240			
North Peds:	0			
Peds Cross:	⋈			

Cyclists	1	0	0	1
Trucks	0	0	10	10
Cars	29	0	200	229
Totals	30	0	210	

Cyclists	0
Trucks	15
Cars	200
Totals	215

East Leg Total:	601
East Entering:	291
East Peds:	0
Peds Cross:	⧖

High Street

Cyclists	Trucks	Cars	Totals
1	10	114	125

Cars	Trucks	Cyclists	Totals
181	15	0	196
85	10	0	95
0	0	0	0
266	25	0	

Poplar Sideroad

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Cyclists	Trucks	Cars	Totals
0	0	19	19
1	7	92	100
0	0	0	0
1	7	111	

Poplar Sideroad

Cars	Trucks	Cyclists	Totals
292	17	1	310

Driveway

Peds Cross:	⧖			
West Peds:	0			
West Entering:	119			
West Leg Total:	244			

Cars	0			
Trucks	0			
Cyclists	0			
Totals	0			

Cars	0	0	0	0
Trucks	0	0	0	0
Cyclists	0	0	0	0
Totals	0	0	0	

Peds Cross:	⋈		
South Peds:	0		
South Entering:	0		
South Leg Total:	0		

Comments

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

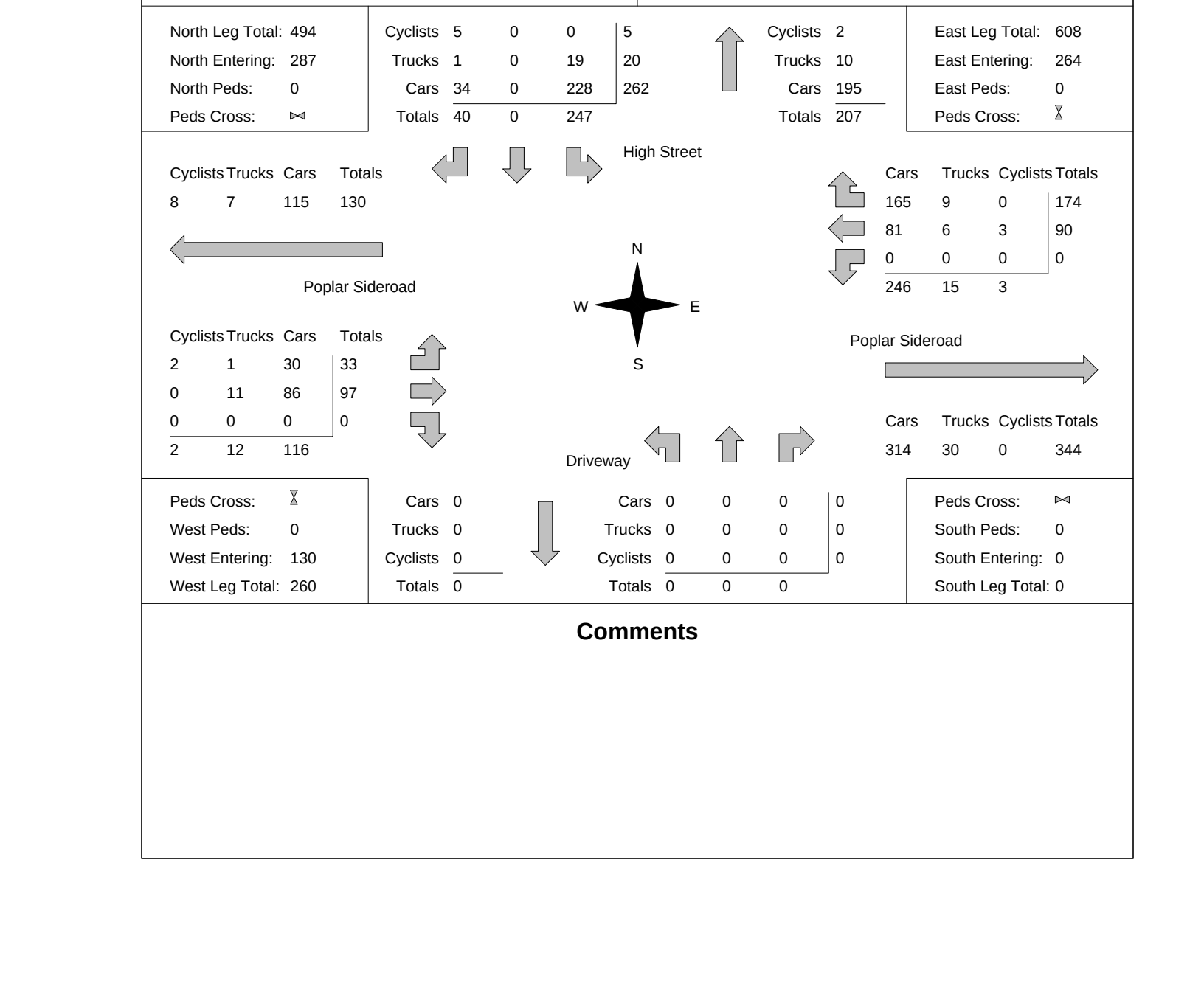
Municipality: Simcoe
Site #: 1310100001
Intersection: Poplar Sideroad & High Street
TFR File #: 0
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Poplar Sideroad runs W/E



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

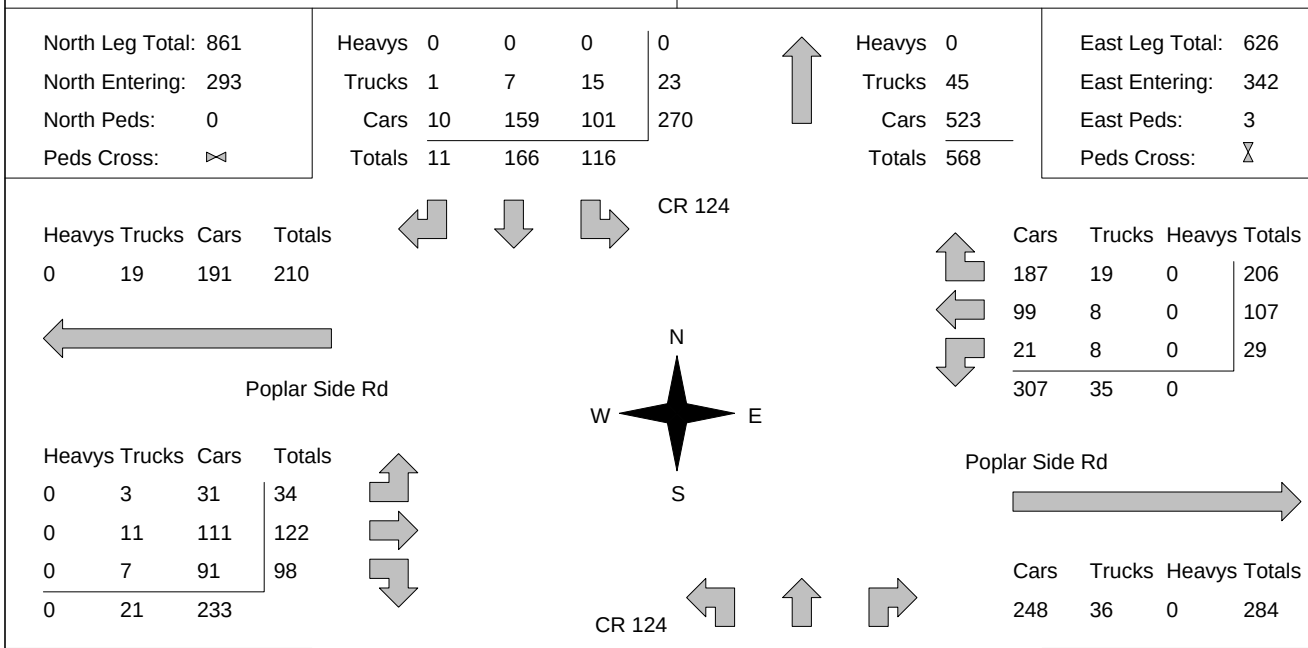
Municipality: Collingwood
Site #: 1301800048
Intersection: CR 124 & Poplar Side Rd
TFR File #: 9
Count date: 31-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 124 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

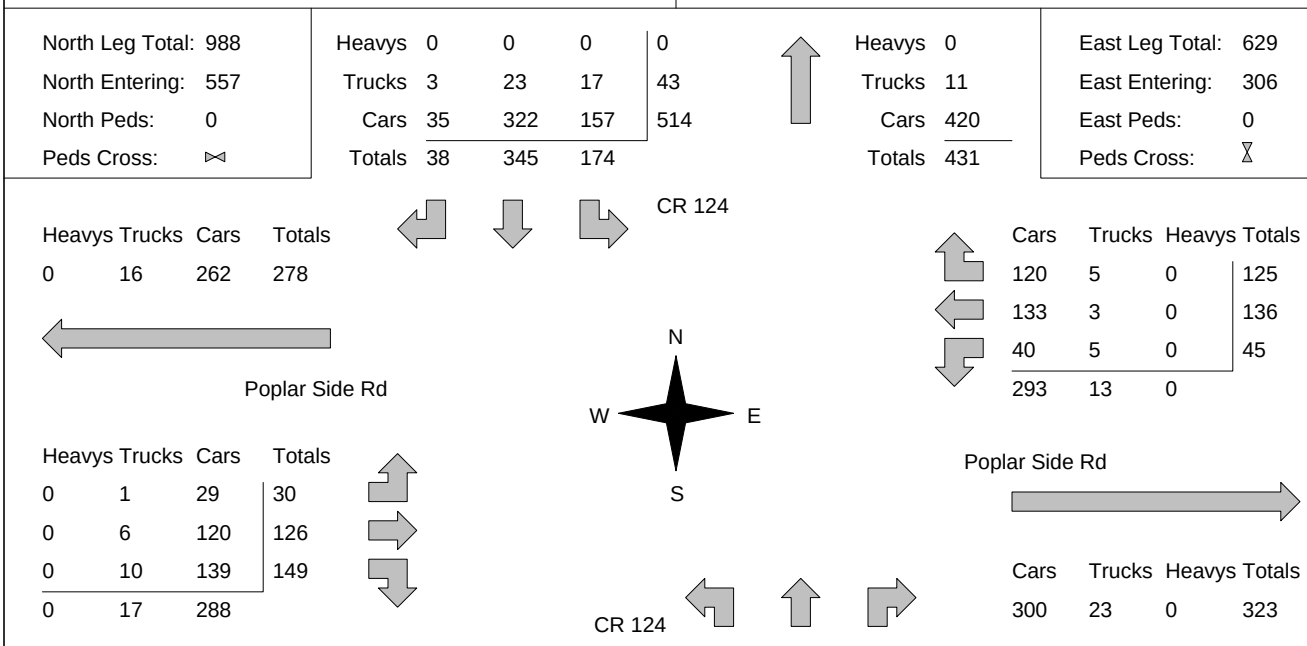
Municipality: Collingwood
Site #: 1301800048
Intersection: CR 124 & Poplar Side Rd
TFR File #: 9
Count date: 31-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 124 runs N/S



Comments

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Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

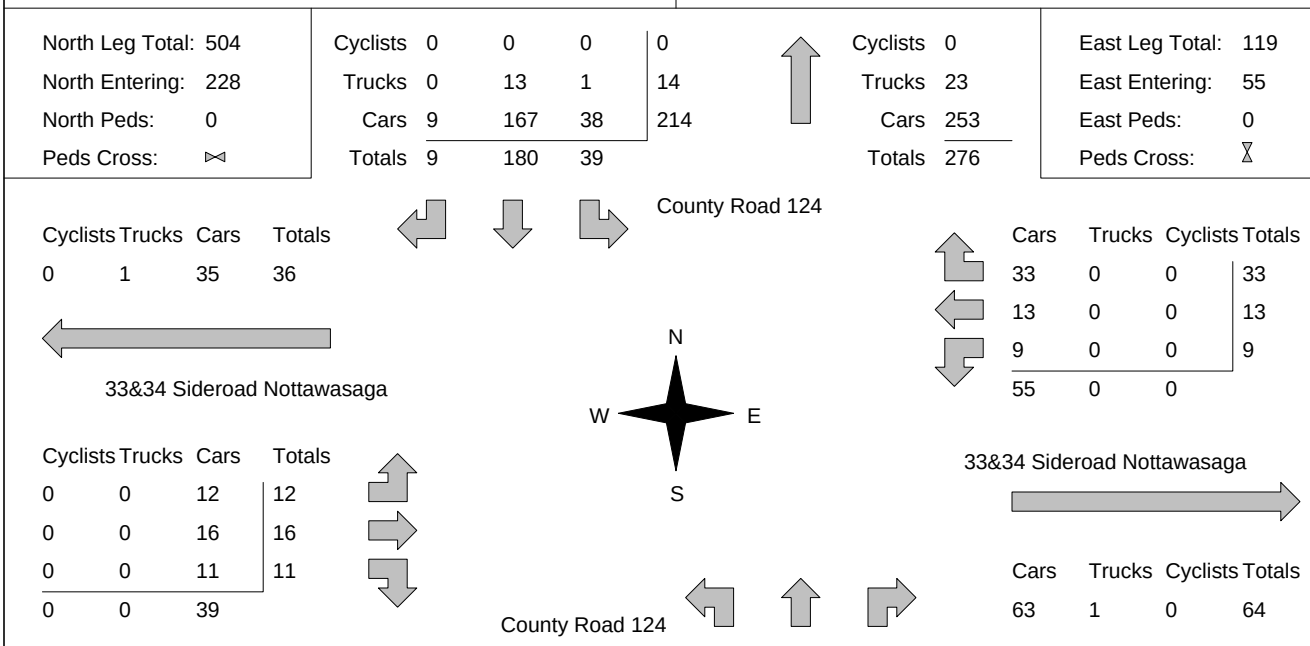
Municipality: Simcoe
Site #: 1310100002
Intersection: County Road 124 & 33&34 Sideroad
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: County Road 124 runs N/S



Comments

Accu-Traffic Inc.
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Fax: 1-888-711-3125

Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

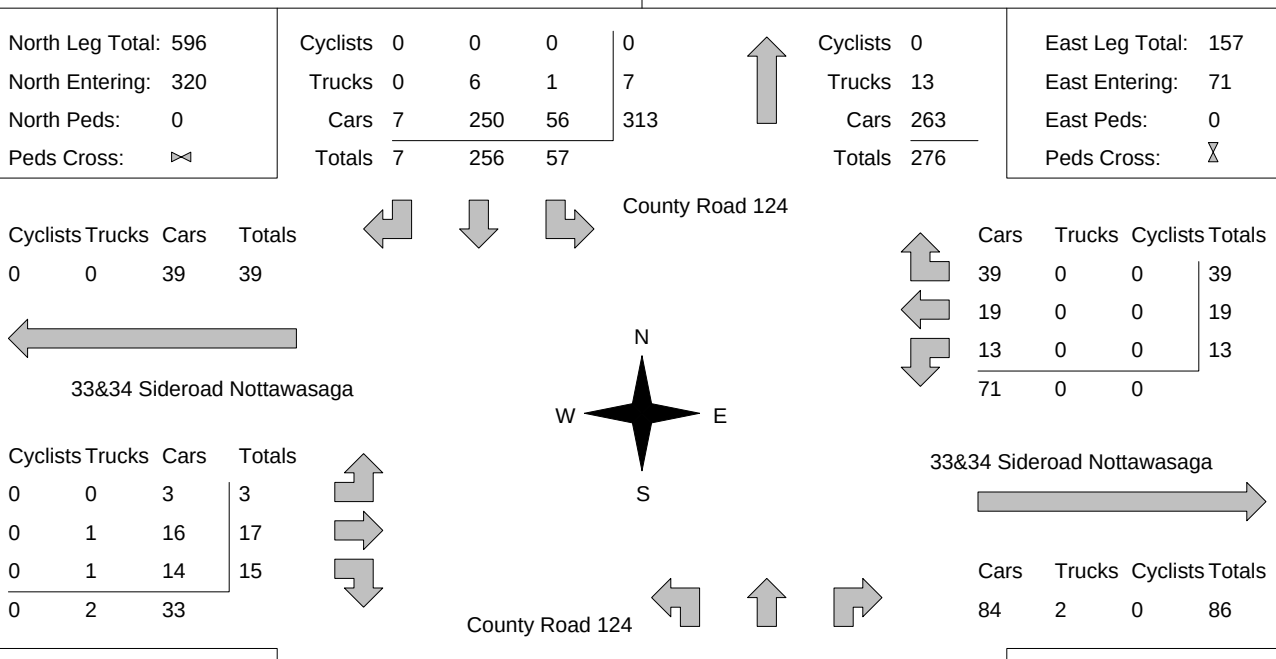
Municipality: Simcoe
Site #: 1310100002
Intersection: County Road 124 & 33&34 Sideroad
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: County Road 124 runs N/S



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

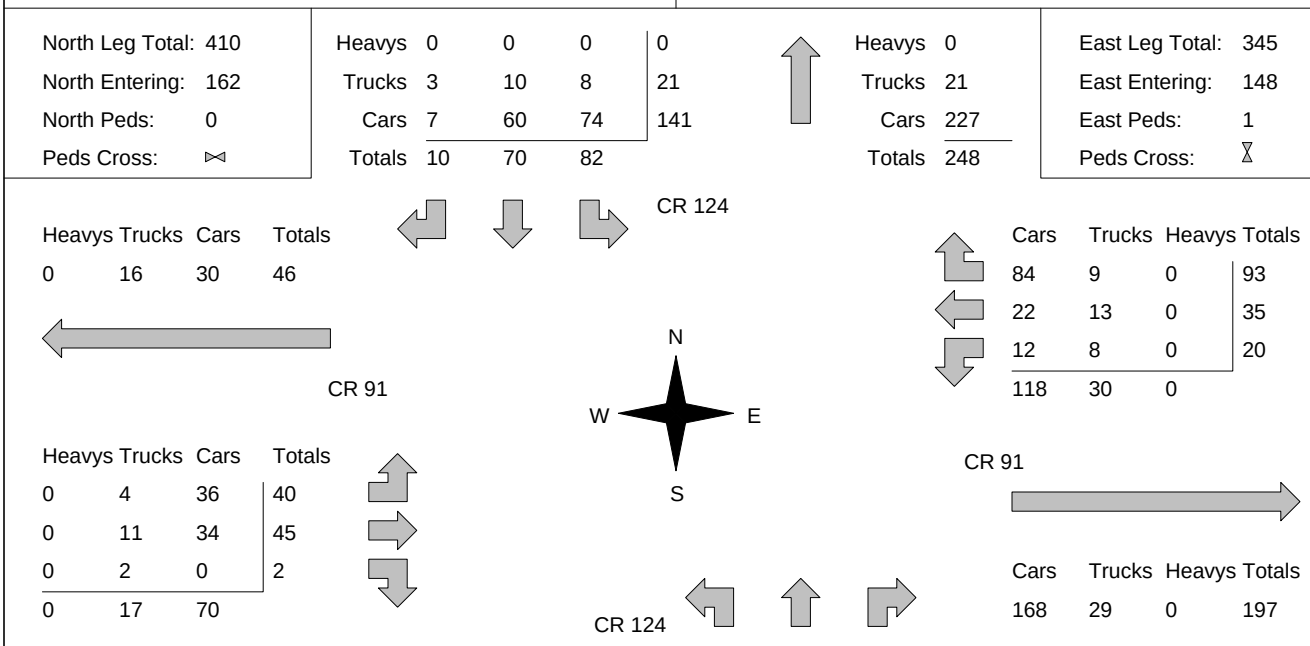
Municipality: Duntroon
Site #: 1301800047
Intersection: CR 91 & CR 124
TFR File #: 24
Count date: 31-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 91 runs W/E



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:30:00
To: 16:30:00

Municipality: Duntroon
Site #: 1301800047
Intersection: CR 91 & CR 124
TFR File #: 24
Count date: 31-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 91 runs W/E

North Leg Total:	550
North Entering:	283
North Peds:	1
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	0	12	11	23
Cars	44	110	106	260
Totals	44	122	117	

Heavys	0
Trucks	13
Cars	254
Totals	267

East Leg Total:	484
East Entering:	234
East Peds:	0
Peds Cross:	⧖

CR 124

Heavys	Trucks	Cars	Totals
0	3	97	100

Cars	Trucks	Heavys	Totals
96	2	0	98
52	2	0	54
69	13	0	82
217	17	0	

CR 91

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Heavys	Trucks	Cars	Totals
0	2	32	34
0	4	48	52
0	1	3	4
0	7	83	

CR 91

Cars	Trucks	Heavys	Totals
221	29	0	250

CR 124

Peds Cross:	⧖
West Peds:	0
West Entering:	90
West Leg Total:	190

Cars	182			
Trucks	26			
Heavys	0			
Totals	208			

Cars	1	126	67	194
Trucks	1	9	14	24
Heavys	0	0	0	0
Totals	2	135	81	

Peds Cross:	⋈
South Peds:	0
South Entering:	218
South Leg Total:	426

Comments

Corridor 4

County Road 27

Turning Movement Counts

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Angus
Site #: 1301800019
Intersection: CR 90 & CR 27
TFR File #: 25
Count date: 3-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 90 runs W/E

North Leg Total:	40
North Entering:	11
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0	0
Trucks	3	0	0	3
Cars	2	2	4	8
Totals	5	2	4	

Heavys	0
Trucks	3
Cars	26
Totals	29

East Leg Total:	1334
East Entering:	564
East Peds:	0
Peds Cross:	⧖

CR 27

Heavys	Trucks	Cars	Totals
0	71	559	630

Cars	Trucks	Heavys	Totals
17	1	0	18
374	44	0	418
117	11	0	128
508	56	0	

CR 90

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Heavys	Trucks	Cars	Totals
0	0	4	4
0	29	606	635
0	11	305	316
0	40	915	

CR 90

Cars	Trucks	Heavys	Totals
734	36	0	770

CR 27

Peds Cross:	⧖
West Peds:	0
West Entering:	955
West Leg Total:	1585

Cars	424			
Trucks	22			
Heavys	0			
Totals	446			

Cars	183	5	124	312
Trucks	24	2	7	33
Heavys	0	0	0	0
Totals	207	7	131	

Peds Cross:	⋈
South Peds:	0
South Entering:	345
South Leg Total:	791

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

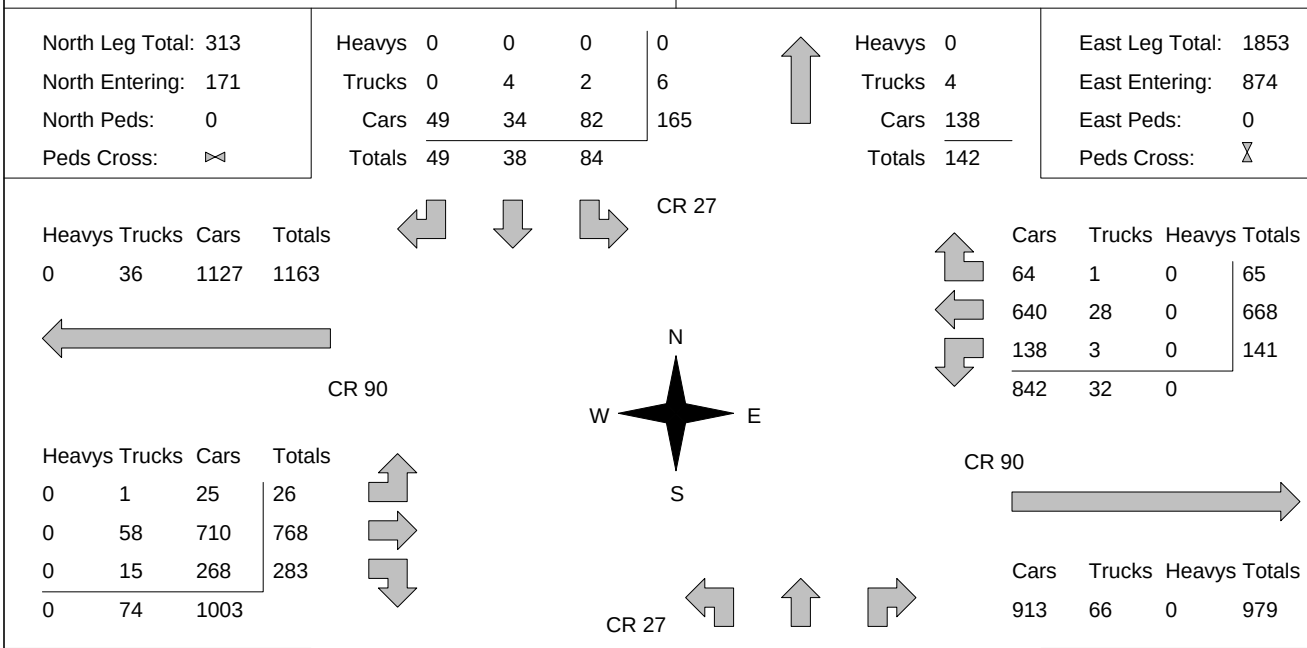
Municipality: Angus
Site #: 1301800019
Intersection: CR 90 & CR 27
TFR File #: 25
Count date: 3-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 90 runs W/E



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

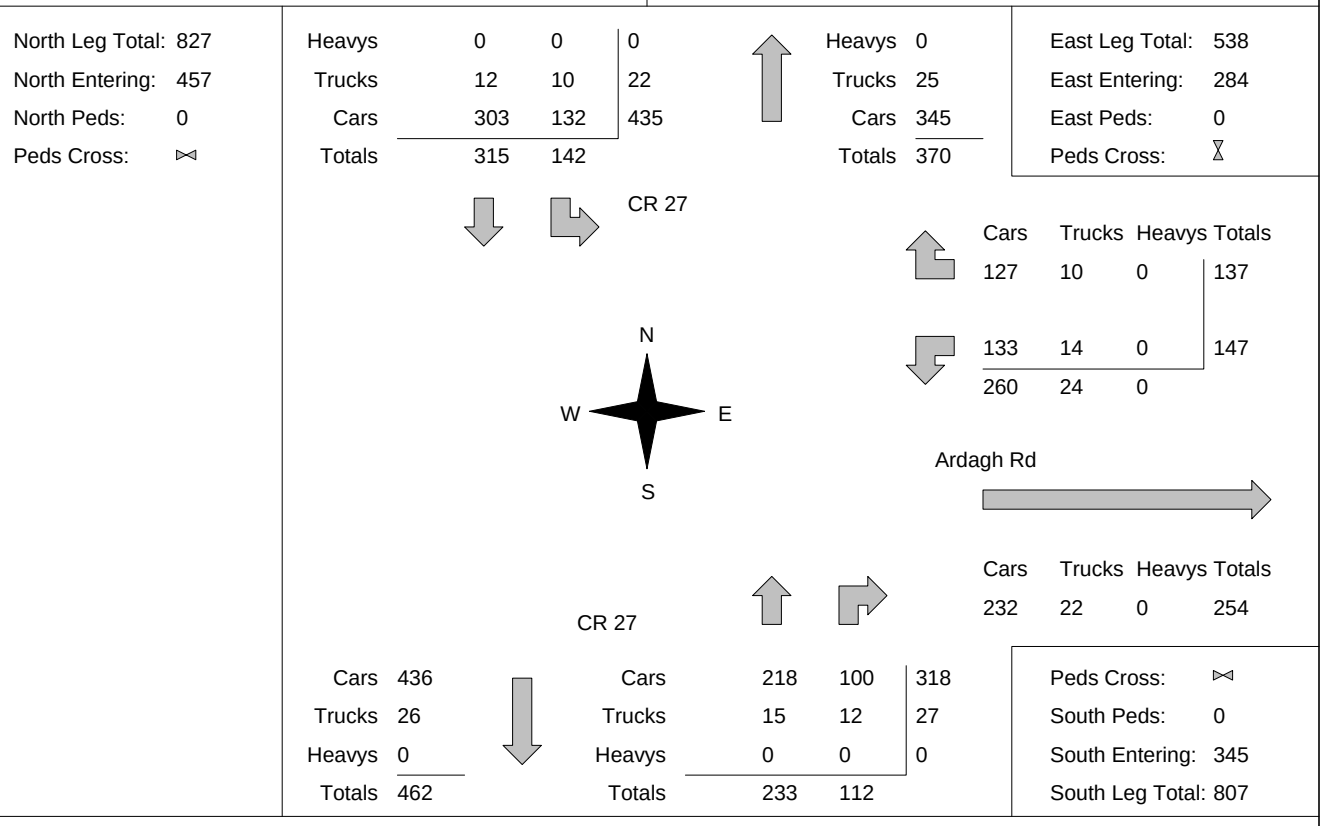
Municipality: Barrie
Site #: 1301800018
Intersection: CR 27 & Ardagh Rd
TFR File #: 6
Count date: 26-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:45:00
To: 16:45:00

Municipality: Barrie
Site #: 1301800018
Intersection: CR 27 & Ardagh Rd
TFR File #: 6
Count date: 26-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S

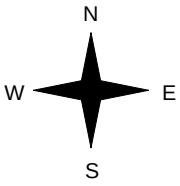
North Leg Total: 1114
North Entering: 482
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	37	6	43
Cars	275	164	439
Totals	312	170	

Heavys	0
Trucks	18
Cars	614
Totals	632

East Leg Total: 537
East Entering: 240
East Peds: 1
Peds Cross: ⋈

	Cars	Trucks	Heavys	Totals
	162	2	0	164
	70	6	0	76
	232	8	0	



Ardagh Rd

Cars	Trucks	Heavys	Totals
287	10	0	297

Cars	345		
Trucks	43		
Heavys	0		
Totals	388		

Cars	452	123	575
Trucks	16	4	20
Heavys	0	0	0
Totals	468	127	

Peds Cross: ⋈
South Peds: 0
South Entering: 595
South Leg Total: 983

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Barrie
Site #: 1301800017
Intersection: CR 27 & Bear Creek High School
TFR File #: 7
Count date: 10-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S

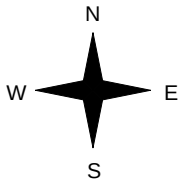
North Leg Total: 713
North Entering: 416
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	15	7	22
Cars	286	108	394
Totals	301	115	

Heavys	0
Trucks	24
Cars	273
Totals	297

East Leg Total: 324
East Entering: 111
East Peds: 0
Peds Cross: ⋈

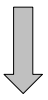
Cars	Trucks	Heavys	Totals
61	10	0	71
31	9	0	40
92	19	0	



Bear Creek High School

Cars	Trucks	Heavys	Totals
195	18	0	213

Cars	317
Trucks	24
Heavys	0
Totals	341



Cars	212	87	299
Trucks	14	11	25
Heavys	0	0	0
Totals	226	98	

Peds Cross: ⋈
South Peds: 1
South Entering: 324
South Leg Total: 665

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Barrie
Site #: 1301800017
Intersection: CR 27 & Bear Creek High School
TFR File #: 7
Count date: 10-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S

North Leg Total: 904
North Entering: 376
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	14	0	14
Cars	355	7	362
Totals	369	7	

Heavys	0
Trucks	8
Cars	520
Totals	528

East Leg Total: 24
East Entering: 16
East Peds: 0
Peds Cross: ⋈

CR 27

	Cars	Trucks	Heavys	Totals
	7	1	0	8
	8	0	0	8
	15	1	0	

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Bear Creek High School

	Cars	Trucks	Heavys	Totals
	8	0	0	8

CR 27

Cars	363		
Trucks	14		
Heavys	0		
Totals	377		

Cars	513	1	514
Trucks	7	0	7
Heavys	0	0	0
Totals	520	1	

Peds Cross: ⋈
South Peds: 0
South Entering: 521
South Leg Total: 898

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Thornton
Site #: 1301800022
Intersection: CR 27 & CR 21 (Robert St)
TFR File #: 5
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S

North Leg Total: 605
North Entering: 367
North Peds: 0
Peds Cross: ⋈

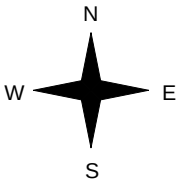
Heavys	0	0	0
Trucks	16	11	27
Cars	181	159	340
Totals	197	170	

Heavys	0
Trucks	26
Cars	212
Totals	238

East Leg Total: 484
East Entering: 151
East Peds: 1
Peds Cross: ⋈

CR 27

Cars	Trucks	Heavys	Totals
33	11	0	44
96	11	0	107
129	22	0	



CR 21 (Robert St)

Cars	Trucks	Heavys	Totals
313	20	0	333

CR 27

Cars	277
Trucks	27
Heavys	0
Totals	304

Cars	179	154	333
Trucks	15	9	24
Heavys	0	0	0
Totals	194	163	

Peds Cross: ⋈
South Peds: 0
South Entering: 357
South Leg Total: 661

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:00:00
To: 17:00:00

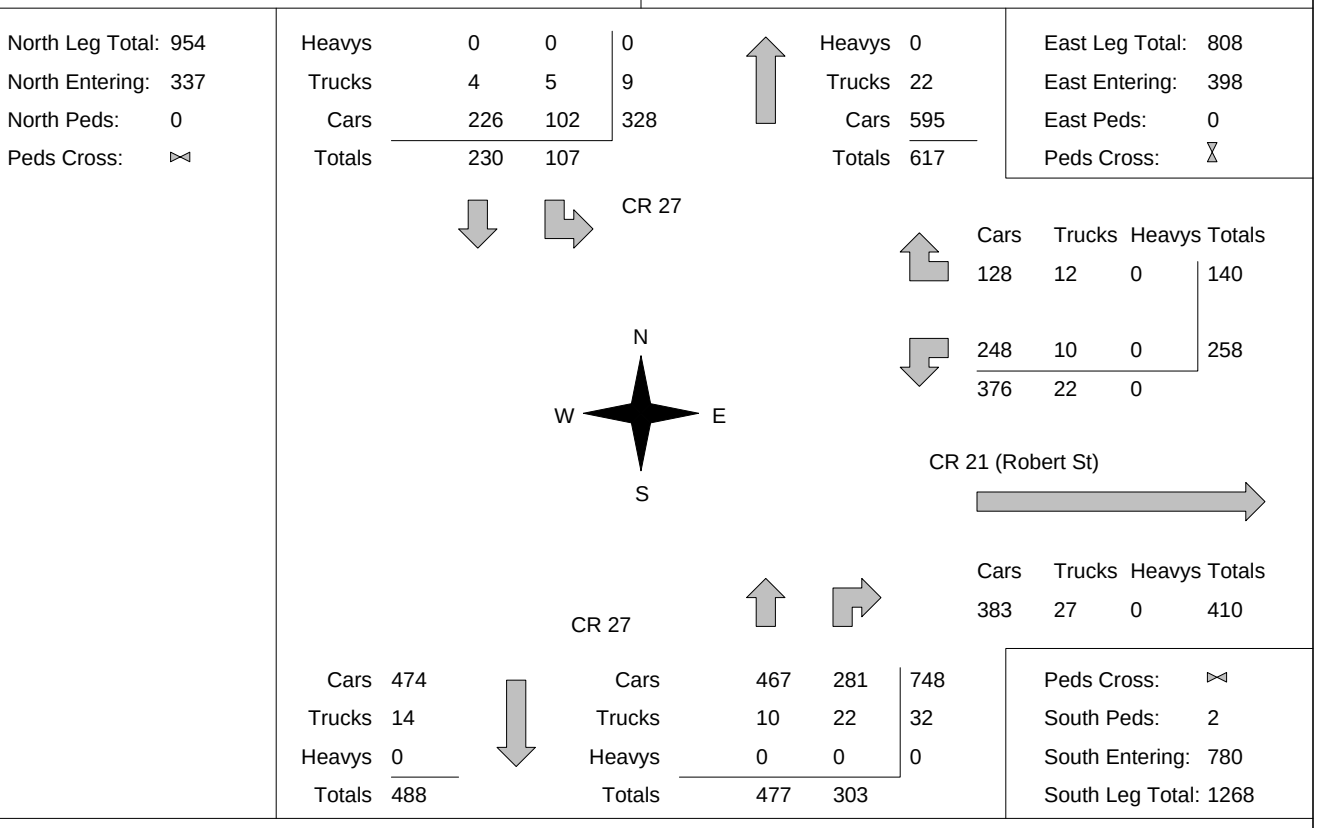
Municipality: Thornton
Site #: 1301800022
Intersection: CR 27 & CR 21 (Robert St)
TFR File #: 5
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

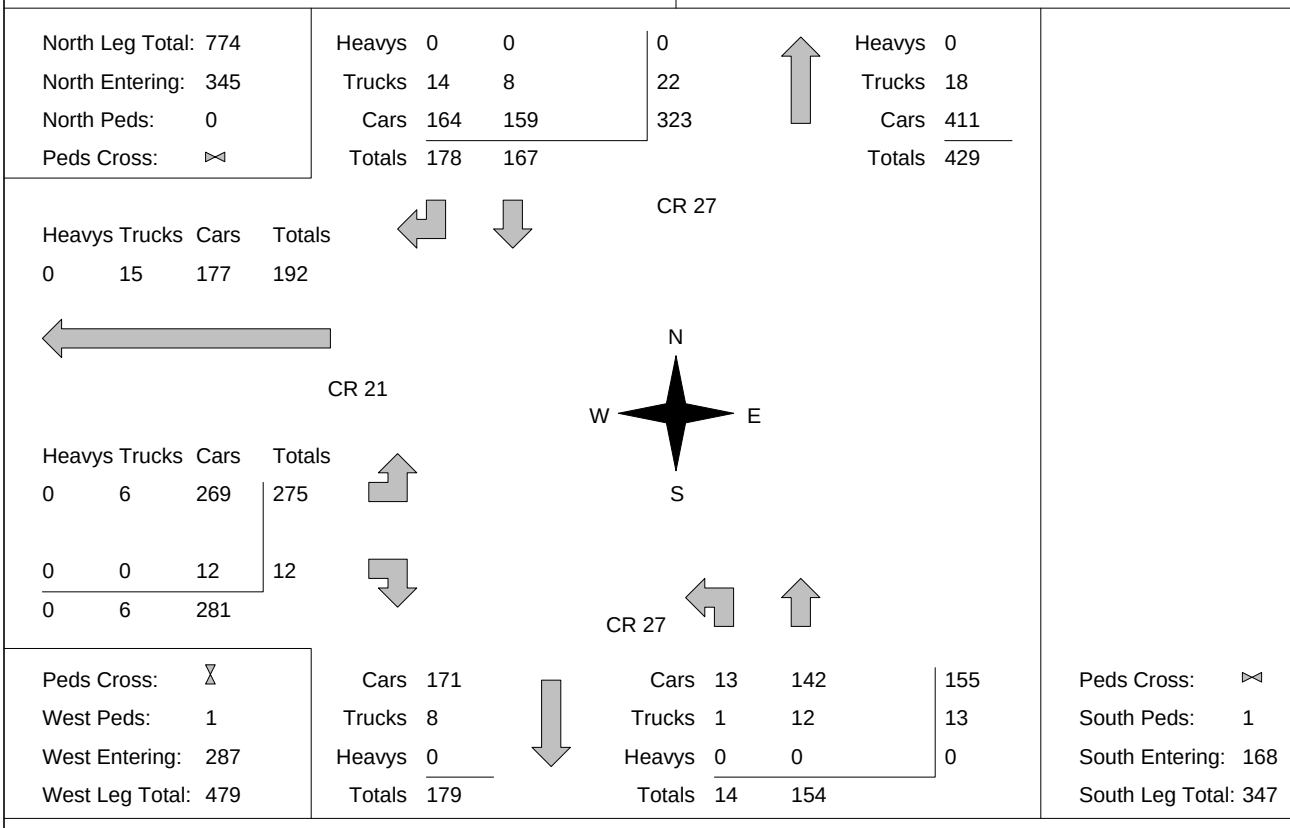
Municipality: Thornton
Site #: 1301800023
Intersection: CR 27 & CR 21
TFR File #: 10
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

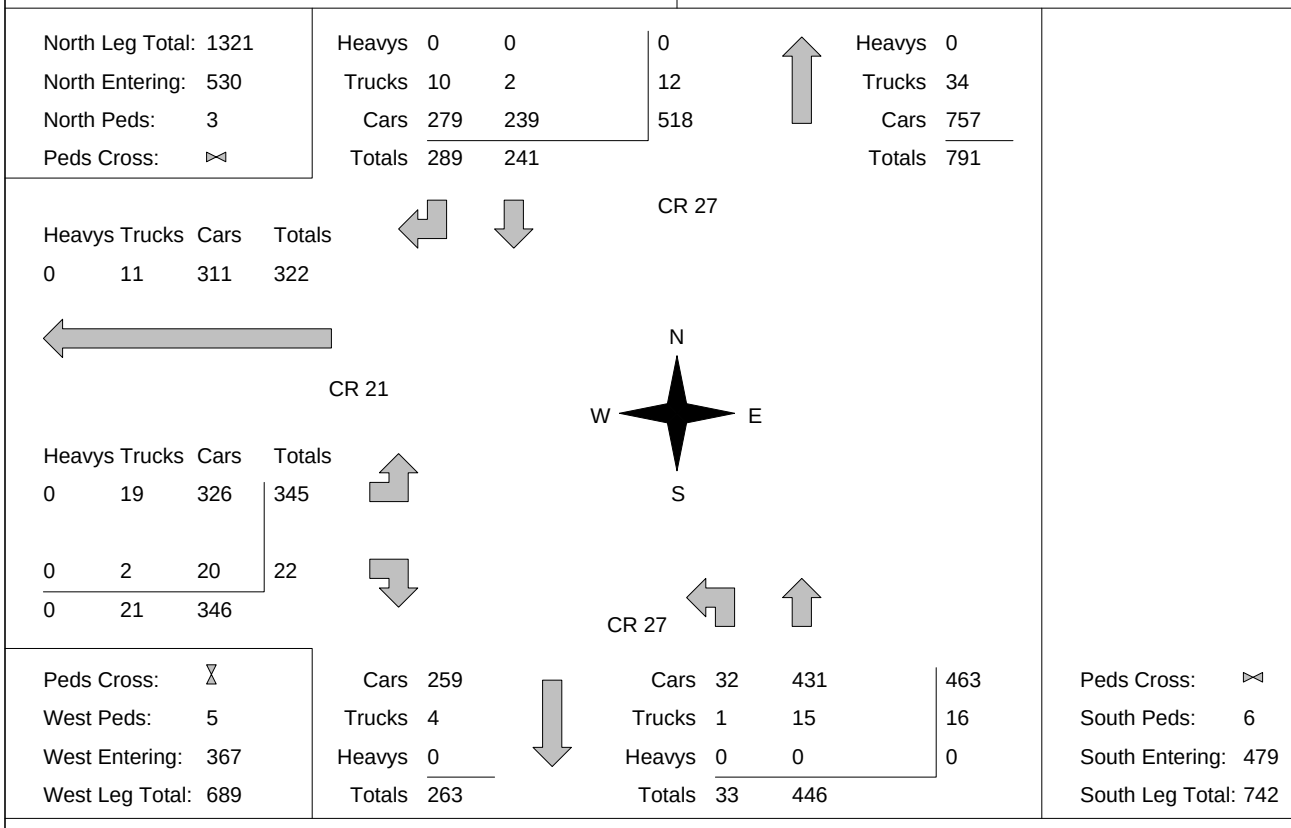
Municipality: Thornton
Site #: 1301800023
Intersection: CR 27 & CR 21
TFR File #: 10
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:00:00
To: 8:00:00

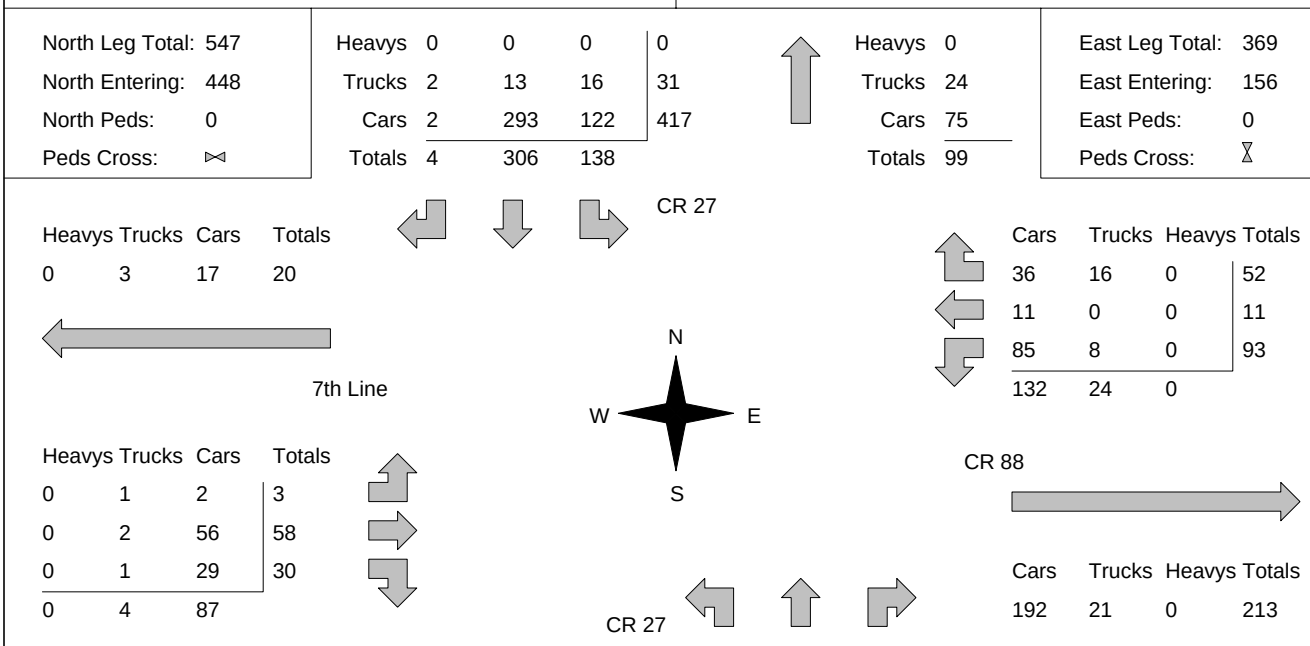
Municipality: Bond Head
Site #: 1301800016
Intersection: CR 27 & CR 88
TFR File #: 3
Count date: 23-Jan-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

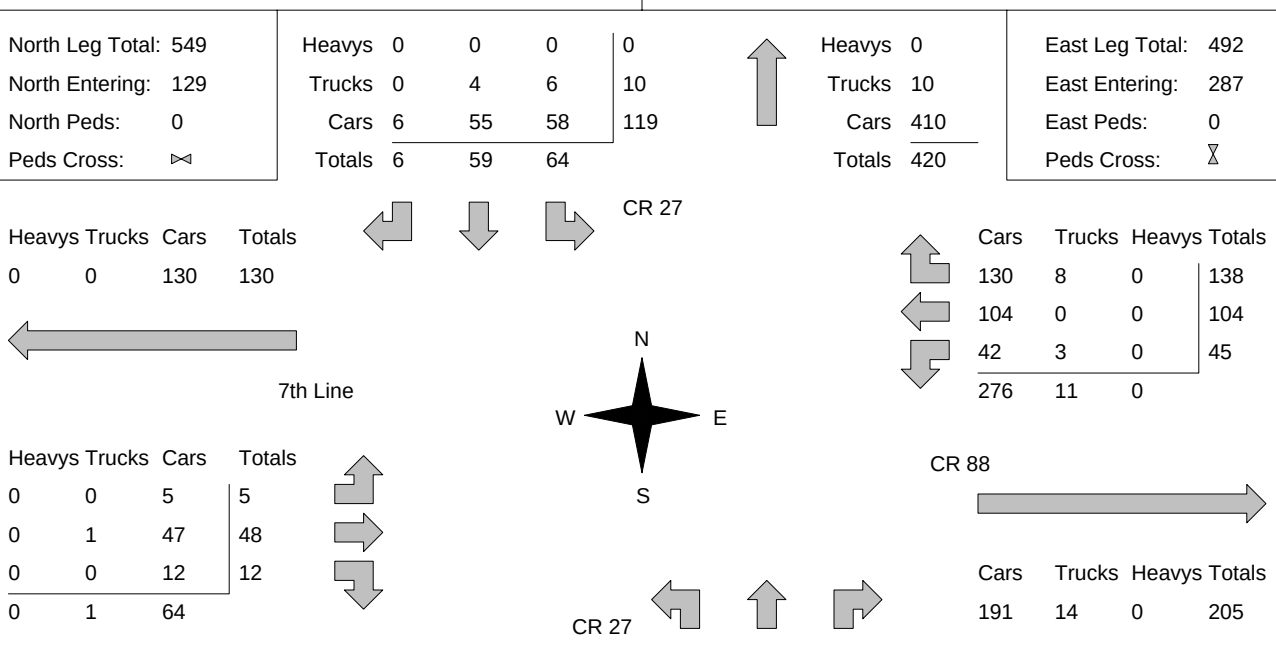
Municipality: Bond Head
Site #: 1301800016
Intersection: CR 27 & CR 88
TFR File #: 3
Count date: 23-Jan-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:00:00
To: 8:00:00

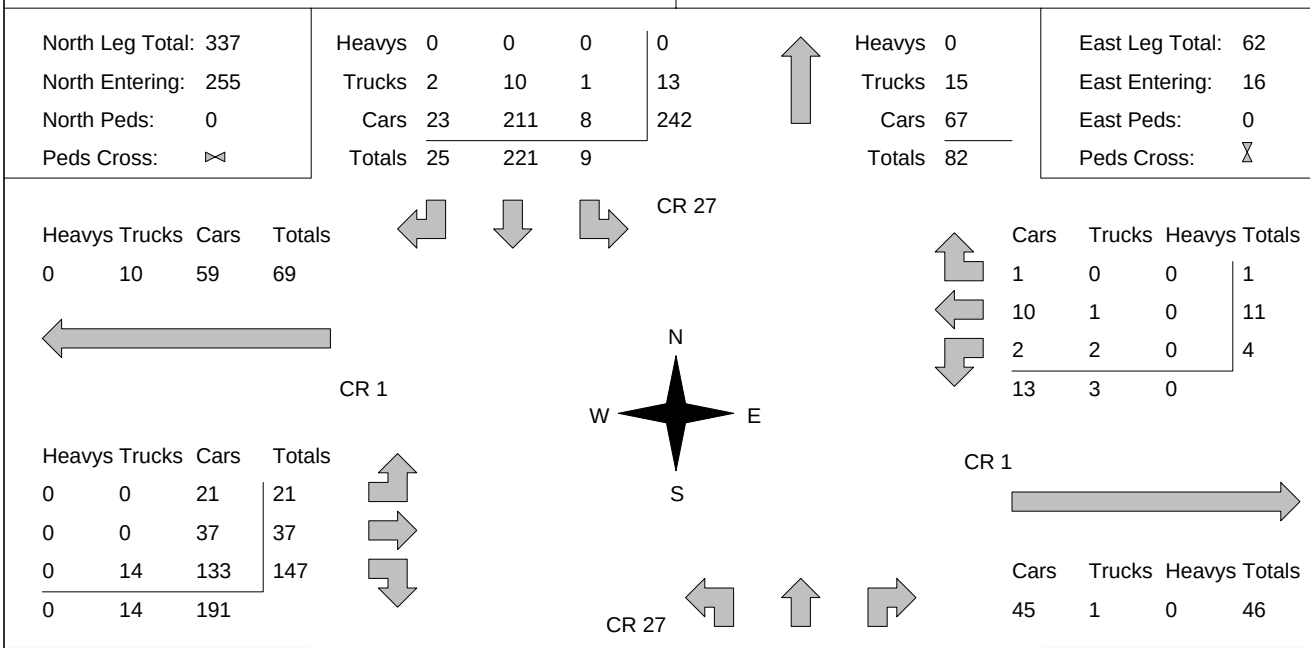
Municipality: Bond Head
Site #: 1301800021
Intersection: CR 27 & CR 1
TFR File #: 4
Count date: 24-Jan-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 27 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

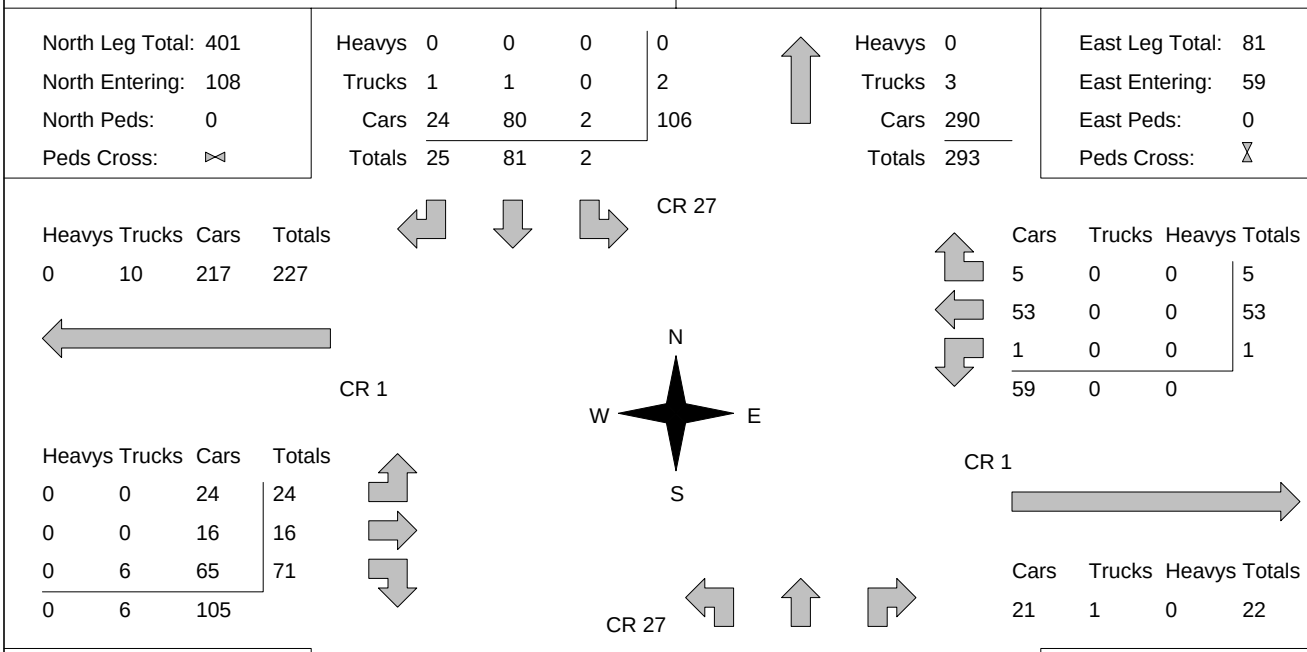
Municipality: Bond Head
Site #: 1301800021
Intersection: CR 27 & CR 1
TFR File #: 4
Count date: 24-Jan-13

Weather conditions:

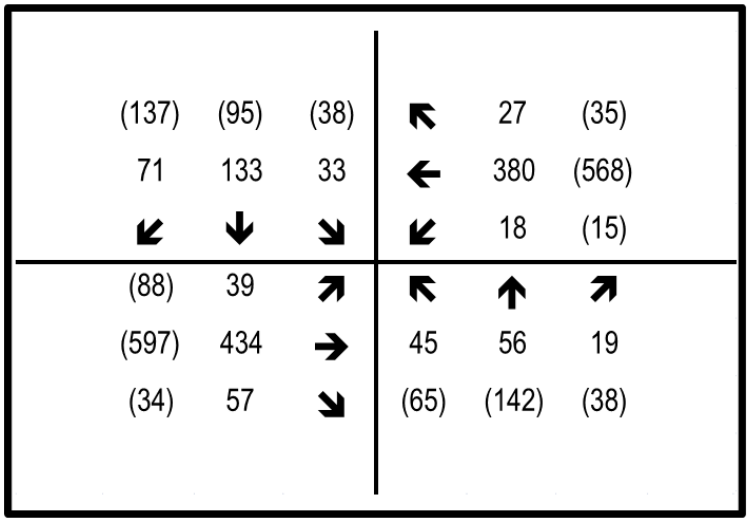
Person(s) who counted:

**** Signalized Intersection ****

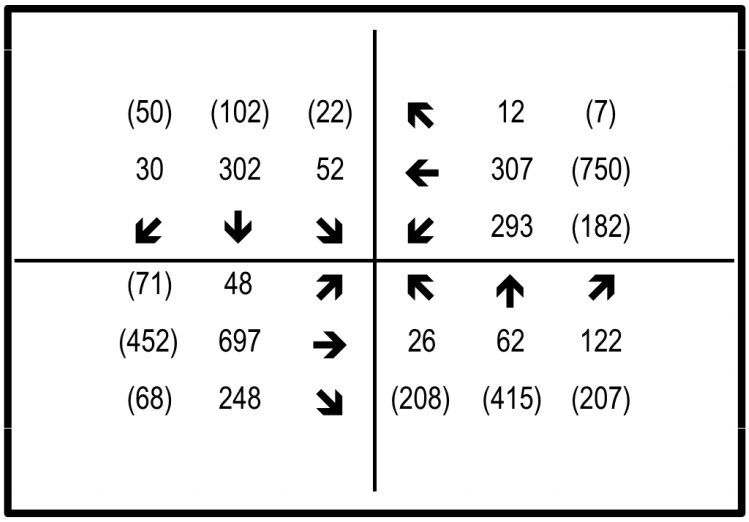
Major Road: CR 27 runs N/S



Comments



4 – Queen Street (Highway 89) and King Street (County Road 27)



31 – Highway 9 and County Road 27

Peak hour volumes for (1) Queen Street (Highway 89) and King Street (County Road 27) and (2) Highway 9 and County Road 27 obtained from the *Tottenham Bypass Study & South Simcoe Transportation Master Plan, 2012*. Counts were conducted in April and May 2012

Corridor 5

County Road 10

Turning Movement Counts

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
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Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 6:00:00
To: 7:00:00

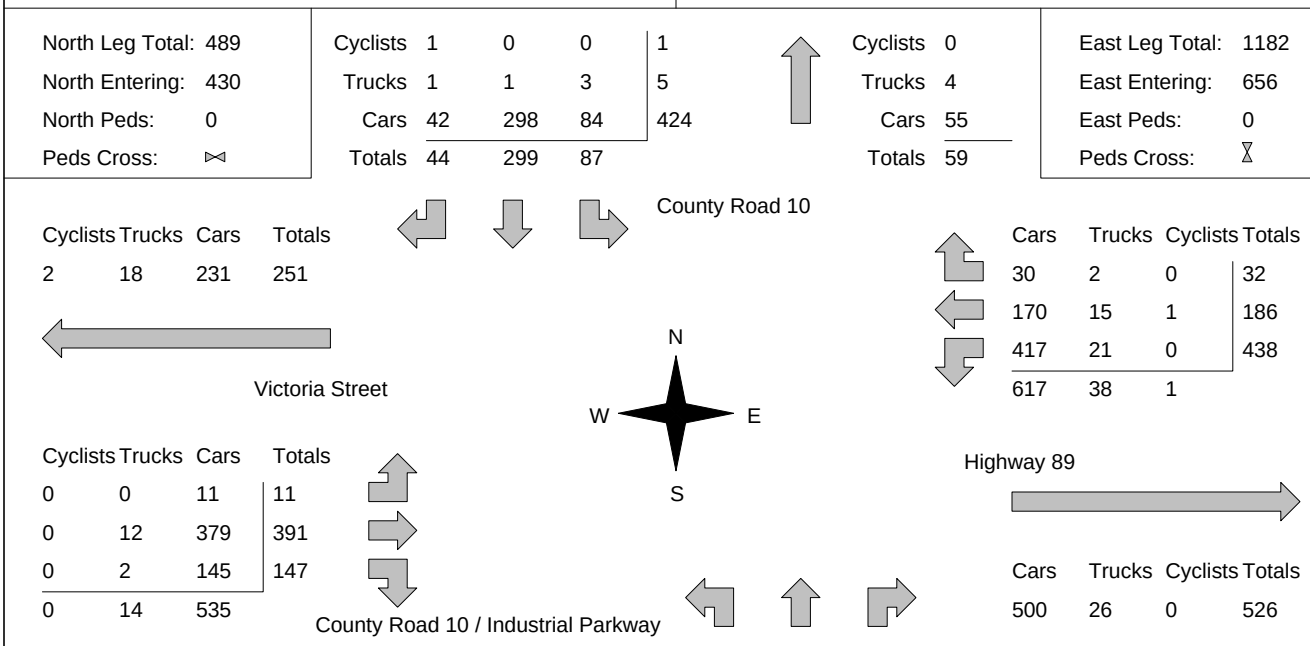
Municipality: Simcoe
Site #: 1310100003
Intersection: Highway 89 & County Road 10
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 89 runs W/E



Comments

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Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

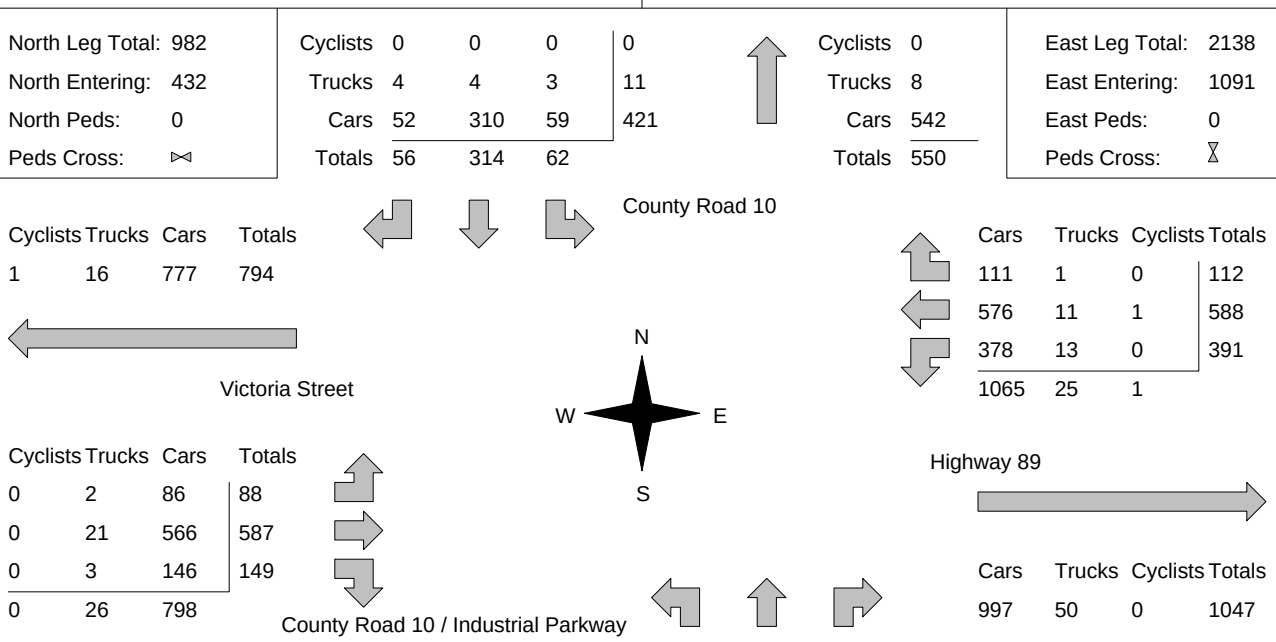
Municipality: Simcoe
Site #: 1310100003
Intersection: Highway 89 & County Road 10
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 89 runs W/E



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 6:00:00
To: 7:00:00

Municipality: Alliston
Site #: 1301800011
Intersection: CR 10 & Mackenzie Pioneer/Walma
TFR File #: 11
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

North Leg Total: 851
North Entering: 771
North Peds: 0
Peds Cross: ⋈

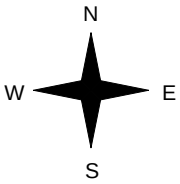
Heavys	0	0	0
Trucks	20	0	20
Cars	746	5	751
Totals	766	5	

Heavys	0
Trucks	13
Cars	67
Totals	80

East Leg Total: 93
East Entering: 55
East Peds: 1
Peds Cross: ⋈

CR 10

Cars	Trucks	Heavys	Totals
1	0	0	1
53	1	0	54
54	1	0	



Mackenzie Pioneer/Walmart Entrance

Cars	Trucks	Heavys	Totals
36	2	0	38

CR 10

Cars	799
Trucks	21
Heavys	0
Totals	820

Cars	66	31	97
Trucks	13	2	15
Heavys	0	0	0
Totals	79	33	

Peds Cross: ⋈
South Peds: 0
South Entering: 112
South Leg Total: 932

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Alliston
Site #: 1301800011
Intersection: CR 10 & Mackenzie Pioneer/Walma
TFR File #: 11
Count date: 24-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

North Leg Total: 1122
North Entering: 222
North Peds: 0
Peds Cross: ⋈

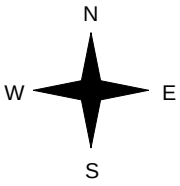
Heavys	0	0	0
Trucks	28	0	28
Cars	180	14	194
Totals	208	14	

Heavys	0
Trucks	29
Cars	871
Totals	900

East Leg Total: 331
East Entering: 89
East Peds: 0
Peds Cross: ⋈

CR 10

Cars	Trucks	Heavys	Totals
8	1	0	9
76	4	0	80
84	5	0	



Mackenzie Pioneer/Walmart Entrance

Cars	Trucks	Heavys	Totals
241	1	0	242

CR 10

Cars	256		
Trucks	32		
Heavys	0		
Totals	288		

Cars	863	227	1090
Trucks	28	1	29
Heavys	0	0	0
Totals	891	228	

Peds Cross: ⋈
South Peds: 0
South Entering: 1119
South Leg Total: 1407

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 6:00:00
To: 7:00:00

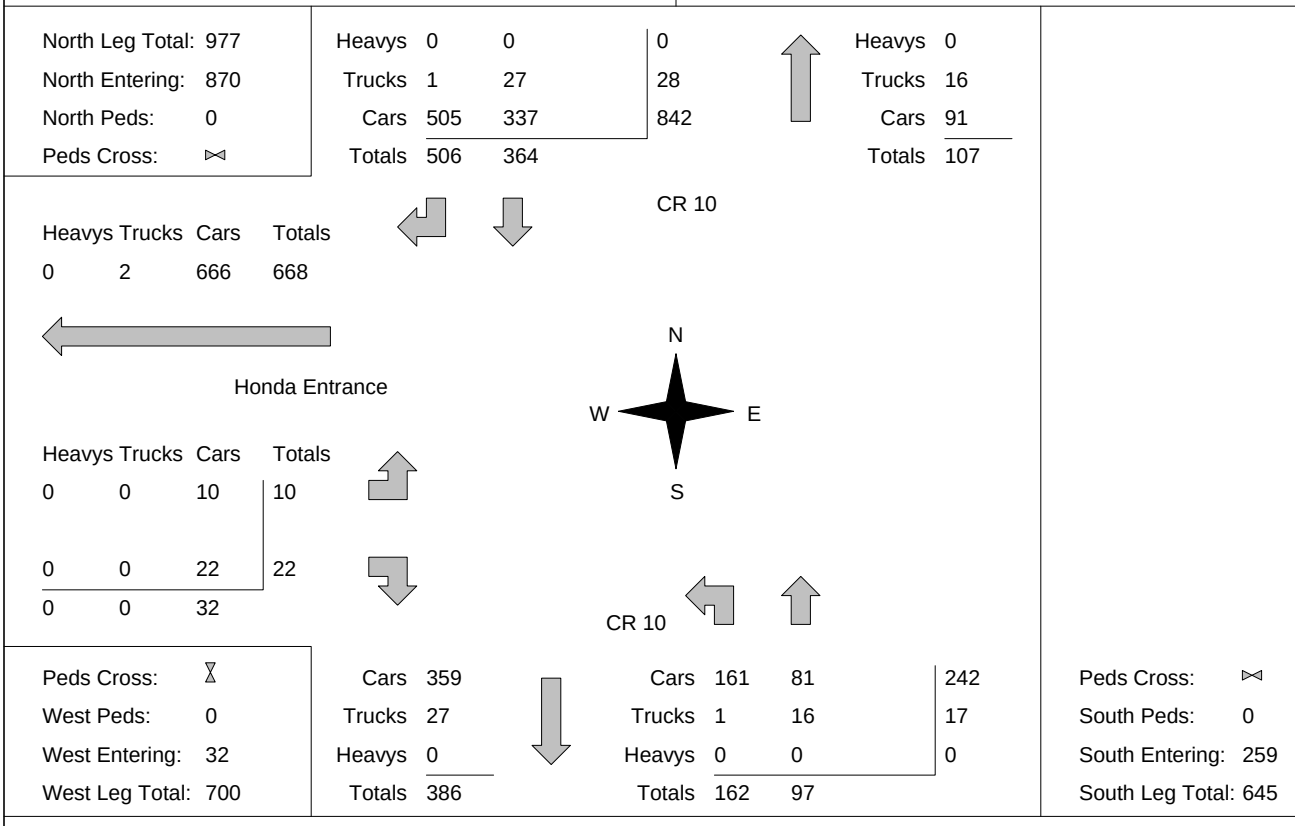
Municipality: Alliston
Site #: 1301800010
Intersection: CR 10 & Honda Entrance
TFR File #: 15
Count date: 10-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

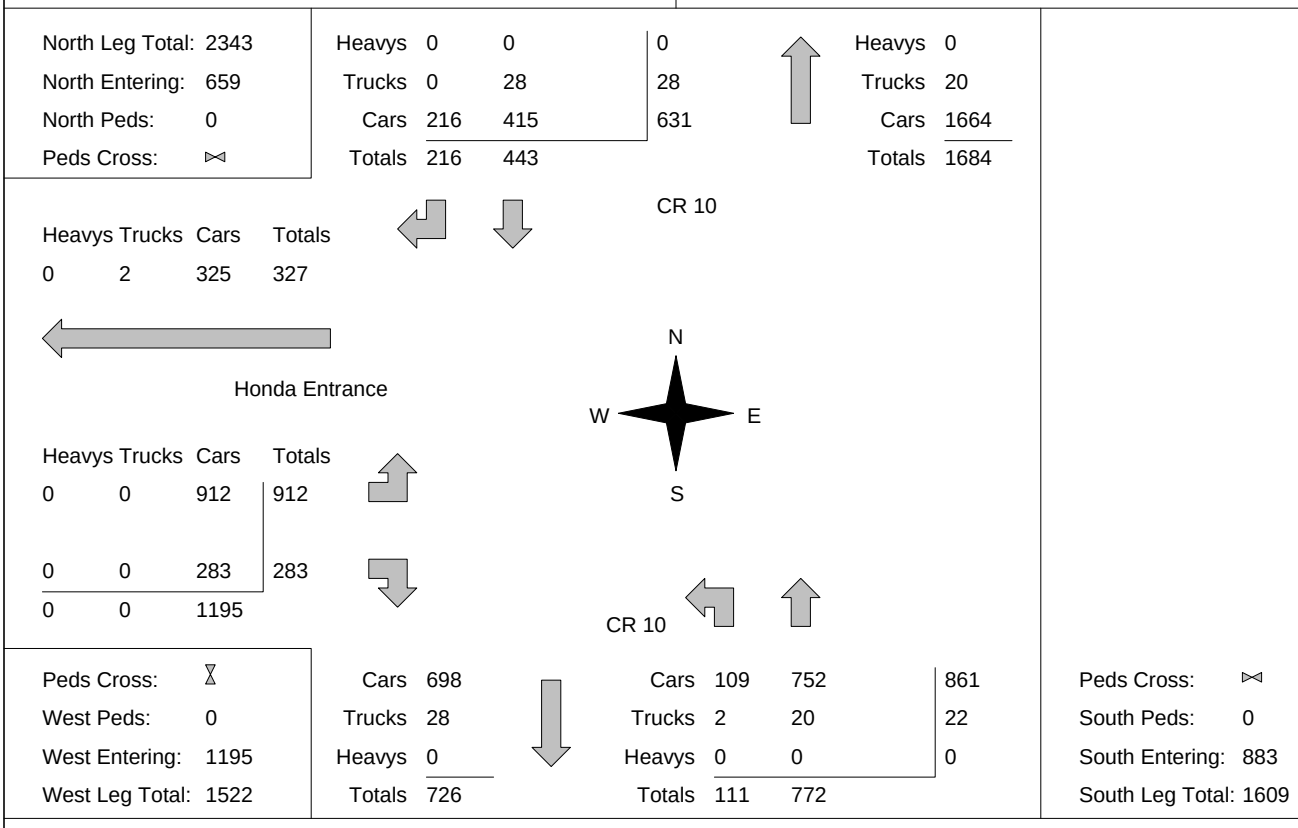
Municipality: Alliston
Site #: 1301800010
Intersection: CR 10 & Honda Entrance
TFR File #: 15
Count date: 10-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S



Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 6:00:00
To: 7:00:00

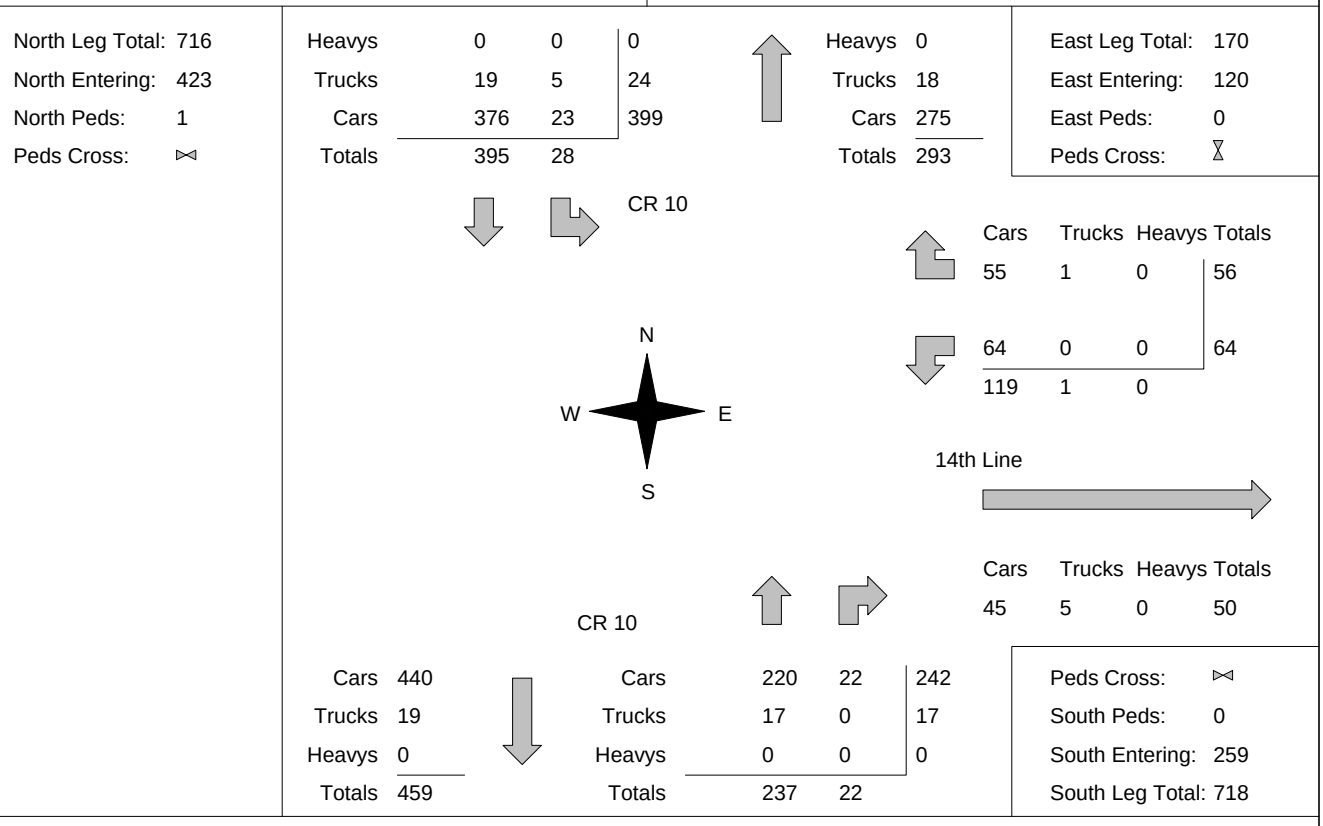
Municipality: Alliston
Site #: 1301800009
Intersection: CR 10 & 14th Line
TFR File #: 7
Count date: 3-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

Municipality: Alliston
Site #: 1301800009
Intersection: CR 10 & 14th Line
TFR File #: 7
Count date: 3-May-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

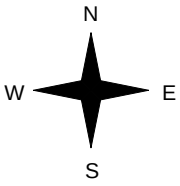
North Leg Total: 1432
North Entering: 660
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	40	1	41
Cars	525	94	619
Totals	565	95	

Heavys	0
Trucks	21
Cars	751
Totals	772

East Leg Total: 333
East Entering: 151
East Peds: 1
Peds Cross: ⋈

Cars	Trucks	Heavys	Totals
60	6	0	66
82	3	0	85
142	9	0	



Cars	Trucks	Heavys	Totals
181	1	0	182

Cars	607		
Trucks	43		
Heavys	0		
Totals	650		

Cars	691	87	778
Trucks	15	0	15
Heavys	0	0	0
Totals	706	87	

Peds Cross: ⋈
South Peds: 0
South Entering: 793
South Leg Total: 1443

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period	One Hour Peak
From: 6:00:00	**From:** 6:00:00
To: 9:00:00	**To:** 7:00:00

Municipality: Alliston
Site #: 1301800008
Intersection: CR 10 & Industrial Pkwy
TFR File #: 8
Count date: 26-Apr-13

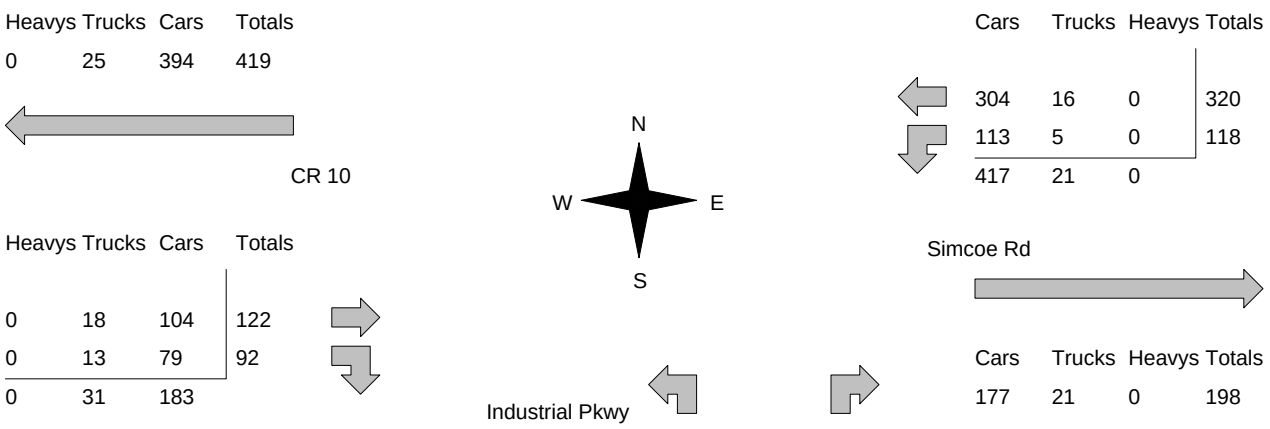
Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs W/E

East Leg Total: 636
East Entering: 438
East Peds: 2
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 214
West Leg Total: 633

Cars 192
Trucks 18
Heavys 0
Totals 210

Cars 90 73 163
Trucks 9 3 12
Heavys 0 0 0
Totals 99 76

Peds Cross: ⋈
South Peds: 1
South Entering: 175
South Leg Total: 385

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

Municipality: Alliston
Site #: 1301800008
Intersection: CR 10 & Industrial Pkwy
TFR File #: 8
Count date: 26-Apr-13

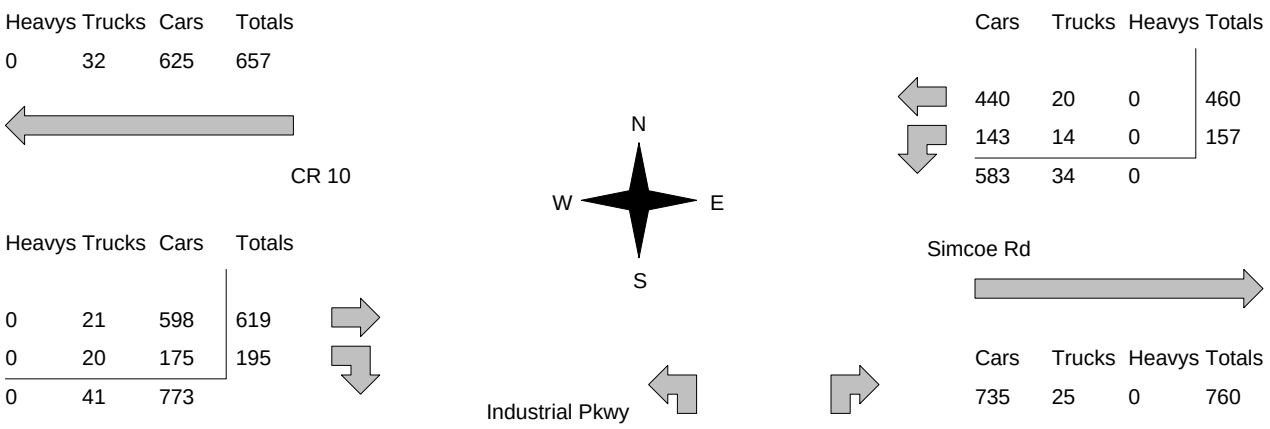
Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs W/E

East Leg Total: 1377
East Entering: 617
East Peds: 0
Peds Cross:



Peds Cross:
West Peds: 0
West Entering: 814
West Leg Total: 1471

Cars 318
Trucks 34
Heavys 0
Totals 352

Cars 185 137 322
Trucks 12 4 16
Heavys 0 0 0
Totals 197 141

Peds Cross:
South Peds: 0
South Entering: 338
South Leg Total: 690

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Beeton
Site #: 1301800006
Intersection: CR 10 & CR 1
TFR File #: 12
Count date: 26-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

North Leg Total: 399
North Entering: 214
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	2	29	9	40
Cars	13	138	23	174
Totals	15	167	32	

Heavys	0
Trucks	38
Cars	147
Totals	185

East Leg Total: 266
East Entering: 138
East Peds: 0
Peds Cross: ⧖

CR 10

Heavys	Trucks	Cars	Totals
0	8	47	55

CR 1

Heavys	Trucks	Cars	Totals
0	1	15	16
0	4	51	55
0	2	15	17
0	7	81	

Cars	Trucks	Heavys	Totals
30	10	0	40
27	2	0	29
66	3	0	69
123	15	0	

N
W E
S

CR 1

Cars	Trucks	Heavys	Totals
110	18	0	128

CR 10

Peds Cross: ⧖
West Peds: 0
West Entering: 88
West Leg Total: 143

Cars	219
Trucks	34
Heavys	0
Totals	253

Cars	7	102	36	145
Trucks	4	27	5	36
Heavys	0	0	0	0
Totals	11	129	41	

Peds Cross: ⋈
South Peds: 0
South Entering: 181
South Leg Total: 434

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Beeton
Site #: 1301800006
Intersection: CR 10 & CR 1
TFR File #: 12
Count date: 26-Apr-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

North Leg Total: 638
North Entering: 276
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	4	15	9	28
Cars	29	165	54	248
Totals	33	180	63	

Heavys	0
Trucks	20
Cars	342
Totals	362

East Leg Total: 385
East Entering: 175
East Peds: 0
Peds Cross: ⧖

Heavys	Trucks	Cars	Totals
0	9	117	126

CR 10

Cars	Trucks	Heavys	Totals
60	3	0	63
66	3	0	69
41	2	0	43
167	8	0	

CR 1

N
W E
S

Heavys	Trucks	Cars	Totals
0	6	25	31
0	7	58	65
0	0	3	3
0	13	86	

CR 1

Cars	Trucks	Heavys	Totals
188	22	0	210

CR 10

Peds Cross: ⧖
West Peds: 0
West Entering: 99
West Leg Total: 225

Cars	209
Trucks	17
Heavys	0
Totals	226

Cars	22	257	76	355
Trucks	2	11	6	19
Heavys	0	0	0	0
Totals	24	268	82	

Peds Cross: ⋈
South Peds: 0
South Entering: 374
South Leg Total: 600

Comments

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 6:00:00
To: 7:00:00

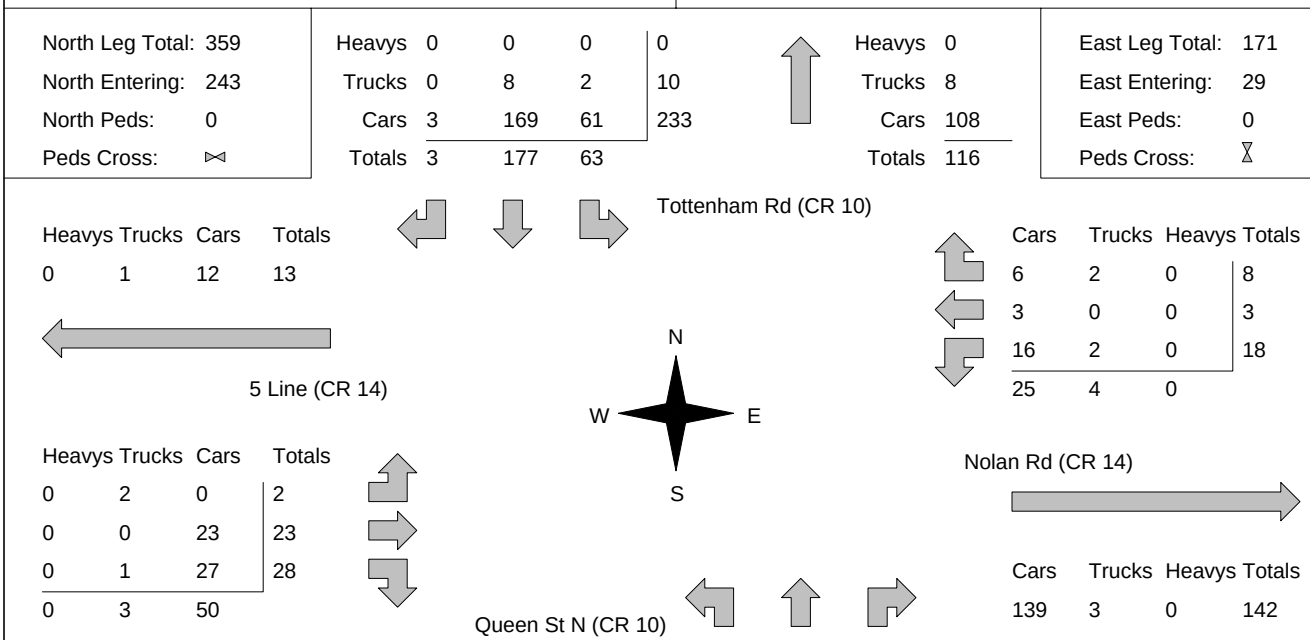
Municipality: Beeton
Site #: 1301800007
Intersection: CR 10 & CR 14
TFR File #: 4
Count date: 31-Jan-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:00:00
To: 16:00:00

Municipality: Beeton
Site #: 1301800007
Intersection: CR 10 & CR 14
TFR File #: 4
Count date: 31-Jan-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: CR 10 runs N/S

North Leg Total: 543
North Entering: 189
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	9	2	11
Cars	14	157	7	178
Totals	14	166	9	

Heavys	0
Trucks	20
Cars	334
Totals	354

East Leg Total: 333
East Entering: 267
East Peds: 0
Peds Cross: ⧖

Tottenham Rd (CR 10)

Heavys	Trucks	Cars	Totals
0	4	111	115

Cars	Trucks	Heavys	Totals
97	8	0	105
60	3	0	63
96	3	0	99
253	14	0	

5 Line (CR 14)

N
W E
S

Heavys	Trucks	Cars	Totals
0	2	16	18
0	0	5	5
0	1	29	30
0	3	50	

Nolan Rd (CR 14)

Cars	Trucks	Heavys	Totals
59	7	0	66

Queen St N (CR 10)

Peds Cross: ⧖
West Peds: 0
West Entering: 53
West Leg Total: 168

Cars	282			
Trucks	13			
Heavys	0			
Totals	295			

Cars	37	221	47	305
Trucks	1	10	5	16
Heavys	0	0	0	0
Totals	38	231	52	

Peds Cross: ⋈
South Peds: 1
South Entering: 321
South Leg Total: 616

Comments

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Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

Municipality: Simcoe
Site #: 1310100004
Intersection: Tottenham Road & Laverock Stree
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Tottenham Road runs N/S

North Leg Total: 540
North Entering: 289
North Peds: 1
Peds Cross: ⋈

Cyclists	0	0	0	0
Trucks	4	27	0	31
Cars	5	248	5	258
Totals	9	275	5	

Cyclists	2
Trucks	18
Cars	231
Totals	251

East Leg Total: 66
East Entering: 52
East Peds: 2
Peds Cross: ⧖

Tottenham Road

Cyclists	Trucks	Cars	Totals
0	8	47	55

Cars	Trucks	Cyclists	Totals
27	0	0	27
2	0	0	2
22	1	0	23
51	1	0	

Access

N
W E
S

Cyclists	Trucks	Cars	Totals
0	0	5	5
0	0	1	1
0	2	28	30
0	2	34	

Laverock Stree

Cars	Trucks	Cyclists	Totals
13	1	0	14

Tottenham Road

Peds Cross: ⧖
West Peds: 1
West Entering: 36
West Leg Total: 91

Cars	298			
Trucks	30			
Cyclists	0			
Totals	328			

Cars	40	199	7	246
Trucks	4	18	1	23
Cyclists	0	2	0	2
Totals	44	219	8	

Peds Cross: ⋈
South Peds: 5
South Entering: 271
South Leg Total: 599

Comments

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Accu-Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:15:00
To: 16:15:00

Municipality: Simcoe
Site #: 1310100004
Intersection: Tottenham Road & Laverock Stree
TFR File #: 1
Count date: 26-Jun-13

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

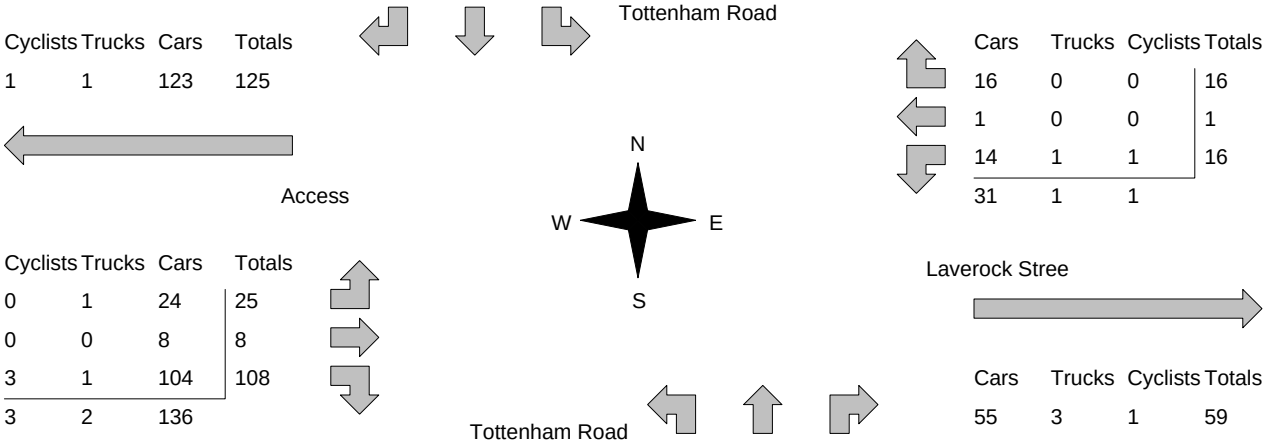
Major Road: Tottenham Road runs N/S

North Leg Total: 729
North Entering: 340
North Peds: 1
Peds Cross: ⋈

Cyclists	0	6	0	6
Trucks	0	14	0	14
Cars	18	278	24	320
Totals	18	298	24	

Cyclists	2
Trucks	37
Cars	350
Totals	389

East Leg Total: 92
East Entering: 33
East Peds: 3
Peds Cross: ⧖



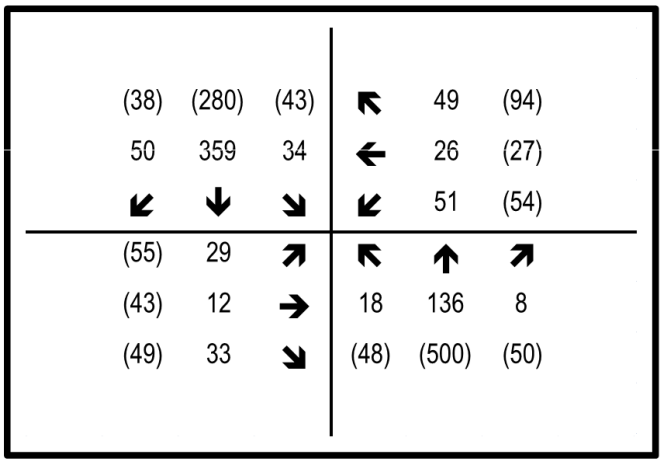
Peds Cross: ⧖
West Peds: 0
West Entering: 141
West Leg Total: 266

Cars	396			
Trucks	16			
Cyclists	10			
Totals	422			

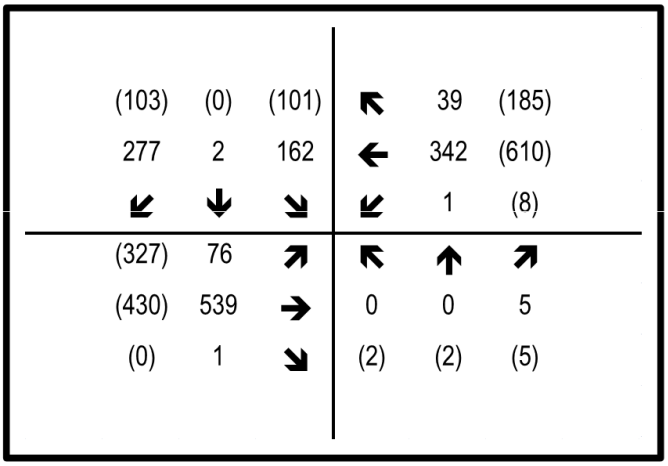
Cars	104	310	23	437
Trucks	1	36	3	40
Cyclists	1	2	1	4
Totals	106	348	27	

Peds Cross: ⋈
South Peds: 6
South Entering: 481
South Leg Total: 903

Comments



23 – Mill Street and Queen Street (County Road 10)



29 – Highway 9 and Tottenham Road (County Road 10)

Peak hour volumes for (1) Mill Street and Queen Street (County Road 10) and (2) Highway 9 and Tottenham Road (County Road 10) obtained from the *Tottenham Bypass Study & South Simcoe Transportation Master Plan, 2012*. Counts were conducted in April and May 2012

Corridor 1

County Road 93

Signal Timing Plans

2013

MICROPROCESSOR MODEL 170

LOCATION CR93 - Vidor

DISTRICT MIDLAND

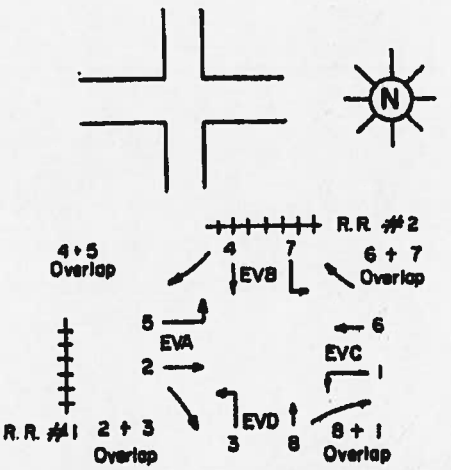
TIMING BASED ON T.M DATED

PROGRAM NUMBER (C-C-O) 114

TIMING INSTALLATION DATE

INSTALLED BY

PROM · CHECK SUM 1(F-9-A) 77 ; 2 (F-9-B) 124



LAG FAZES	1	2	3	4	5	6	7	8
LAGS C-F-O								

For Central Computer Control (C-O-6): 0

FAZE FUNCTION FLAGS		FAZE # 1	2	3	4	5	6	7	8
PERMIT	0	X	X		X	X	X		X
RED LOCK	1								
AMBER LOCK	2		X				X		
VEH. RECALL	3		X				X		
PED. RECALL	4								
VEH. MAX. RECALL	5								
OVERLAP A	6								
OVERLAP B	7								
DBL. ENTRY	8		X		X		X		X
RED TIMING RNG.	9								
ARROW ADV. GREEN	A	X				X			
RED REST	B								
REST IN WALK	C								
FLASHING GREEN	D	X				X			
STARTUP	E		X				X		
(Reserved)	F								

KEYSTROKES F - F - FUNCTION #

KEYSTROKES F - FAZE # - INTERVAL #

FAZE AND PREEMPT TIMES		FAZE # 1	2	3	4	5	6	7	8	PREEMPT	E	
WALK	0		—		—		—		—	RRI DELAY		Q
FLASH D/W	1		—		—		—		—	RRI CLEAR		1
MIN. GREEN	2	5.0	20		10	5.0	20		10	EV A DELAY	.	2
TYPE 3 DET.	3									EV A CLEAR		3
ADD/VEH	4	—	1.0	.	—	—	1.0	.	—	EV B DELAY		4
VEH. EXTEN.	5	2.5	4.0	.	3.0	2.5	4.0	.	.	EV B CLEAR		5
MAX. GAP	6	2.5	4.0	.	3.0	2.5	4.0	.	.	EV C DELAY		6
MIN. GAP	7	2.5	4.0	.	3.0	2.5	4.0	.	.	EV C CLEAR		7
MAX. EXTEN.	8	10	30		.15	10				EV D DELAY		8
MAX. 2	9	—	—		—					EV D CLEAR		9
CALL TO FAZE	A	4				4				RR2 DELAY		A
GRN CLEAR	B	.		.		.		.		RR2 CLEAR		B
REDUCE BY	C	.	.	.	.	.	.	.	.	EV CLR. TMR.		C
REDUCE EVERY	D	.	.	.	.	.	.	.	.	EV DLY. TMR		D
AMBER	E	4.0	5.0	.	5.0	4.0	5.0	.	5.6	RR CLR. TMR.		E
RED CLEAR	F	1.0	2.0	.	2.0	1.0	2.0	.	2.0	RR DLY. TMR.		F

MAX. INITIAL (F-O-E): 30

RED REVERT (F-O-F): 5.0

PREFERRED LEFT TURN: MAIN ST. (F-O-C) _____ (1 or 5) or SIDE ST. (F-O-D) _____ (3 or 7)

EMERG. VEH. FAZES: EVA - FAZE 2 WITH (F-C-A) _____ (5 or 6)

EVB - FAZE 4 WITH (F-C-B) _____ (7 or 8)

DETECTION FAZE	1	2		3	4		5	6		7	8	
		Pres.	L.D.		Pres.	L.D.		Pres.	L.D.		Pres	L.D.
DELAY	5				5		5				5	
CARRY OVER	.	.	.	.	.	.	.	.	.	.	.	.

Pres. Presence Detection at Stop Bar L.D. Long Distance Detection

FIGURE 4

CR93 - ZEHRS/CTC Naztec, Inc. 980 v50.x Programming Sheets

Phase Times [1.1.1]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn	7	10	Ø	10	7	10	7	10								
Gap, Ext	3.0	4.0	Ø	3.0	3.0	4.0	3.0	3.0								
Max 1	15	45	Ø	20	15	45	15	20								
Max 2	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø								
Yel Clr	3.5	5.0	3.5	4.0	3.5	5.0	3.5	4.0								
Red Clr	Ø	2.0	Ø	Ø	Ø	2.0	3.5	2.0								
Walk	Ø	25	Ø	14	Ø	25	Ø	~~20~~14								
Ped Clr	Ø	8	Ø	6	Ø	8	Ø	6								
Red Revt	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø								
Add Init	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø								
Max Init	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø								

Gap Reduction

Time B4																
Cars B4																
Time To																
ReducBy																
Min Gap																
DyMaxLim																
Max Step																

Ø2 + Ø6 - CR93

Ø4 + Ø8 - ZEHRS + CT

Ø1/N1B ADVANCED ARROW

Ø5 - S1B ADVANCED ARROW

Ø7 - E1B ADVANCED ARROW - ZEHRS

CR 93 @ Hugel - Midland
June 2013

Phase Times [1.1.1]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn	5.0	25.0	5.0	10.0		25.0		10.0								
Gap, Ext	3.0	1.0	3.0	3.0		1.0		3.0								
Max 1	7.0	38.0	25.0	7.0		28.0		25.0								
Max 2	0.0	0.0	0.0	0.0		0.0		0.0								
Yel Clr	3.0	5.0	3.0	4.0		5.0		4.0								
Red Clr	0.0	2.0	0.0	2.0		2.0		2.0								
Walk	0.0	30.0	0.0	17.0		30.0		17.0								
Ped Clr	0.0	13.0	0.0	15.0		13.0		15.0								
Red Revt	0.0	0.0	0.0	0.0		0.0		0.0								
Add Init	0.0	0.0	0.0	0.0		0.0		0.0								
Max Init	0.0	0.0	0.0	0.0		0.0		0.0								

Gap Reduction

Time B4																
Cars B4																
Time To																
ReducBy																
Min Gap																
DyMaxLim																
Max Step																

Naztec Timing Card

Model: 980 - A1100

District: Simcoe County

Location: Simcoe Rd 93 & Huronia Mall/ Mountain View Mall - Midland 2004

Timings								
Phases	1	2	3	4	5	6	7	8
Min Green		25		10	5	25		0
Gap Ext.		1.0		3.0	1.0	1.0		0.0
Max 1		25		25	10	25		0
Max 2		0		0	0	0		0
Yellow Clear		5.0		4.5	0.0	5.0		4.5
Red Clear		2.0		1.5	0.0	2.0		1.5
Walk		~~25~~ 20		~~16~~ 17	0	~~25~~ 20		0
Ped Clear		5		~~6~~ 10	0	5		0
Red Revert		0.0		0.0	0.0	0.0		0.0
Add Init		0		0	0	0		0
Max Init		0		0	0	0		0
Gap Reduce								
Time B4								
Cars B4								
Time To								
Reduce By								
Min Gap								
Dynamic Max Limit								
Dynamic Max Step								

-Ped timing change 06/24/04 by Chris Doherty - CD

Options								
Phases	1	2	3	4	5	6	7	8
Enabled		X		X	X	X		
Min Recall								
Max Recall								
Ped Recall		X				X		
Soft Recall								
Lock Calls								
Auto Flash Entry								
Auto Flash Exit								
Dual Entry	X	X	X	X	X	X	X	X
Enable Simulated Gap	X	X	X	X		X		X
Garanted Passage								
Rest in Walk		X				X		
Conditional Service								
Non Actuated 1		X				X		
Non Actuated 2								
Added Init Calc	S	S	S	S	S	S	S	S
Options+								
Reservice								
Ped Clear thu Yellow								
Skip Red - No Call								
Red Rest								
Max 2								
Ped Delay								
Conflicting Ph.								
Omit Yellow, Yellow Ph.								
Ped Out/ Ovrlp Ph.								
Start Yellow, Next Ph.								

20. EPAC300 PROGRAM LOG

Prepared By .....: _____ Date: ___/___/___

Approved By.....: _____ Date: ___/___/___

Intersection Name.....: SIMCOE Rd 93 @ YONGE/SIMCOE 25

UTILITIES - ACCESS

Access Code ..... : _____ Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

Basic Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green	5	30	5	10	0	0	0	0								
Passage Time	3.0	4.0	3.0	3.0	0	0	0	0								
Maximum No 1	17	30	17	30	0	0	0	0								
Maximum No 2	17	30	17	30	0	0	0	0								
Yellow Change	3.0	5.0	3.0	5.0	3.0	3.0	3.0	3.0								
Red Clearance	0	2.0	0	2.0	0	0	0	0								

Density Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation																
Maximum Initial																
Time B4 Reduction																
Cars B4 Reduction																
Time To Reduce																
Minimum Gap																

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		24														
Pedestrian Clearance		6														

Pedestrian Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk																
Extended Pedestrian Clear																
Act Rest In Walk																

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory	1		1	1												
Dual Entry																
Last Car Passage																
Conditional Service																
No Simultaneous Gap																

Vehicle Control Entry: "1" = Yes & "0" = No

Corridor 2

County Road 44

Signal Timing Plans

2004

Traffic Control Technologies (TCT)

INTERSECTION NAME: SIMCOE Rd 44 @ CASINO RAMA INSTALLATION DATE: _____

PROGRAMMED BY: _____ PROGRAM DATE: Aug. 1/95

CONTROLLER SERIAL # _____ SECURITY CODE: _____

INTERSECTION TELEPHONE (IF DIRECT DIAL): _____

SECTION: _____ ADDRESS: _____

INTERVAL	PHASE (ON/OFF)							
	1	2	3	4	5	6	7	8
MEMORY								
EXT RECALL								
MAX RECALL								
PED RECALL								
CNA I		ON				ON		
CNA II								
FL WALK								
SOFT RECALL								
WALK REST								
COND PED								
FWTPCL								

INTERVAL	PHASE TIMINGS							
	1	2	3	4	5	6	7	8
MIN GREEN		25				25		10
PASSAGE		0				0		2.5
YELLOW		4.0				4.0		4.0
RED		2.0				2.0		2.0
MAX I		25				25		23
MAX II		0				0		0
WALK		0				0		10
PED CLEAR		0				0		13
S/A		0				0		0
TBR		0				0		0
TTR		0				0		0
MIN GAP		0				0		0
MAX VI		0				0		0
MAX EXT		0				0		0
AUTO MAX		0				0		0
AMR		0				0		0

PHASES USED

	1	2	3	4	5	6	7	8
ON/OFF		ON				ON		ON
SEQUENCE		2	1 = SEQ, 2 = DUAL RNG, 3-7 = SPEC, 8 = LEAD/LAG					

LEAD/LAG CODES (ONLY USED IF "8" WAS ENTERED FOR SEQUENCE)

PAIRS	1 AND 2	3 AND 4	5 AND 6	7 AND 8
CODE				

LEAD/LAG CODES - 1 = NO REV, 2 = ALWAYS REV, 3 = REV BY C/S/O OR CLOCK/INPUT

INITIALIZE/FLASH

	INITIALIZE	ENTER FLASH	EXIT FLASH
RING 1 PHASE	2	2	2
RING 2 PHASE	6	6	6
INTERVAL	2	1	1

INTERVAL CODES: 1 = RED, 2 = YELLOW, 3 = GREEN

POWER UP/RESTART TIMINGS

MINIMUM FLASH	2	(0-127 SECONDS)
1ST ALL RED AFTER FLASH	2	(0-127 SECONDS)

CR 44 @ CR 45
June 2013

Phase Times [1.1.1]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn		25.0		10.0												
Gap, Ext		1.0		5.0												
Max 1		0.0		30.0												
Max 2		0.0		0.0												
Yel Clr		5.2		5.0												
Red Clr		2.0		2.0												
Walk		20.0		8.0												
Ped Clr		5.0		14.0												
Red Revt		0.0		0.0												
Add Init		0.0		0.0												
Max Init		0.0		0.0												
Gap Reduction																
Time B4																
Cars B4																
Time To																
ReducBy																
Min Gap																
DyMaxLim																
Max Step																

Corridor 3

County Road 124

Signal Timing Plans

20. EPAC300 PROGRAM LOG

Prepared By .....: _____ Date: ___/___/___

Approved By.....: _____ Date: ___/___/___

Intersection Name.....: C.R. #124 & POPLAR S.R.

UTILITIES - ACCESS

Access Code .....: _____ Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

Basic Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green		10		8	5	20		8								
Passage Time		3.0		3.0	3.0	3.0		3.0								
Maximum No 1		26		26	10	26		26								
Maximum No 2		26		26	10	26		26								
Yellow Change		5.0		5.0	3.0	5.0		5.0								
Red Clearance		1.5		1.5	1.0	1.5		1.5								

Density Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation																
Maximum Initial																
Time B4 Reduction																
Cars B4 Reduction																
Time To Reduce																
Minimum Gap																

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		21		21		21		21								
Pedestrian Clearance		5		5		5		5								

Pedestrian Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk																
Extended Pedestrian Clear																
Act Rest In Walk		1				1										

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory		1		1	1	1		1								
Dual Entry		1		1		1		1								
Last Car Passage																
Conditional Service																
No Simultaneous Gap																

Vehicle Control Entry: "1" = Yes & "0" = No

20. EPAC300 PROGRAM LOG

Prepared By ..... : DOUG AUSTIN Date: NOV / 2 / 2000

Approved By ..... : _____ Date: ___ / ___ / ___

Intersection Name ..... : SIMCOE Rd 134 & SIMCOE Rd 91 - DUNTROON

UTILITIES - ACCESS

Access Code ..... : N/A Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

Basic Times / Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green		24		12		12		12								
Passage Time				5.0				5.0								
Maximum No 1		35		25		25		25								
Maximum No 2		35		25		25		25								
Yellow Change		5.0		45		4.5		4.5								
Red Clearance		3.0		3.0		3.0		3.0								

Density Times / Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation																
Maximum Initial																
Time B4 Reduction																
Cars B4 Reduction																
Time To Reduce																
Minimum Gap																

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times / Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk		10		10		10		10								
Pedestrian Clearance		12		12		12		12								

Pedestrian Control / Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk																
Extended Pedestrian Clear																
Act Rest In Walk		1				1										

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control / Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory				1				1								
Dual Entry		1		1		1		1								
Last Car Passage																
Conditional Service																
No Simultaneous Gap																

Vehicle Control Entry: "1" = Yes & "0" = No

Corridor 4

County Road 27

Signal Timing Plans

Naztec, Inc. 980 v50.x Programming Sheets

MARCH 2006

Phase Times [1.1.1]

	WBL 1	EB 2	NBL 3	SB 4	5	WB 6	7	NB 8	9	10	11	12	13	14	15	16
Min Grn	8	20	5	10		20		10								
Gap, Ext	1.0	4.5	1.0	3		4.5		3.0								
Max 1	25	45	15	25		45		25								
Max 2																
Yel Clr	3.0	5.9	3.0	5.9		5.9		5.9								
Red Clr	0.0	1.7	0.0	1.5		1.7		1.5								
Walk																
Ped Clr																
Red Revt																
Add Init																
Max Init																

Gap Reduction

Time B4																
Cars B4																
Time To																
ReducBy																
Min Gap																
DyMaxLim																
Max Step																

20. EPAC300 PROGRAM LOG

Prepared By Chris Doherty Date: Oct / 25 / 2005

Approved By: ____ Date: ___/___/___

Intersection Name CR7 @ ARDATH

UTILITIES PROCESS

Access Code: ____ Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

Basic Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green		7	8	0	8	0	8	0	8								
Passage Time		30	30	0	30	0	30	0	30								
Maximum No 1		12	30	0	25	0	30	0	25								
Maximum No 2		12	30	0	25	0	30	0	25								
Yellow Change		3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0								
Red Clearance		0	3.0	0	2.0	0	2.0	0	2.0								

Density Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation																	
Maximum Initial																	
Time B4 Reduction																	
Cars B4 Reduction																	
Time To Reduce																	
Minimum Gap																	

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk			15		15				15								
Pedestrian Clearance			15		15				15								

Pedestrian Control	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk																	
Extended Pedestrian Clear																	
Act Rest In Walk			1														

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory		1	1		1		1		1								
Dual Entry			1		1		1		1								
Last Car Passage																	
Conditional Service																	
No Simultaneous Gap																	

Vehicle Control Entry: "1" = Yes & "0" = No

Traffic Control Technologies

INTERSECTION NAME: SIMCOE Rd 27 @ BEAR CREEK H.S INSTALLATION DATE: _____

PROGRAMMED BY: _____ PROGRAM DATE: _____

CONTROLLER SERIAL # LMD 9200 SECURITY CODE: _____

INTERSECTION TELEPHONE (IF DIRECT DIAL): _____

SECTION: _____ ADDRESS: _____

2004
2008

Updated Timing mid-Feb. time of day mid-March '09

INTERVAL	PHASE (ON/OFF)							
	1	2	3	4	5	6	7	8
MEMORY								
EXT RECALL								
MAX RECALL		ON				ON		
PED RECALL								
CNA I						ON		
CNA II								
FL WALK								
SOFT RECALL								
WALK REST		ON				ON		
COND PED								
FWTPCL								

INTERVAL	PHASE TIMINGS							
	1	2	3	4	5	6	7	8
MIN GREEN		25		12		25		0
PASSAGE		0		5		0		0
YELLOW		5.0		5.0		5.0		0
RED		3.0		3.0		3.0		0
MAX I		25		30		25		0
MAX II	40	~~25~~		30	40	~~25~~		0
WALK		0		12		0		12
PED CLEAR		0		0		0		0
S/A		0		0		0		0
TBR		0		0		0		0
TTR		0		0		0		0
MIN GAP		0		0		0		0
MAX VI		0		0		0		0
MAX EXT		0		0		0		0
AUTO MAX		0		0		0		0
AMR		0		0		0		0

PHASES USED								
	1	2	3	4	5	6	7	8
ON/OFF		ON		ON		ON		ON
SEQUENCE		2	1 = SEQ, 2 = DUAL RNG, 3-7 = SPEC, 8 = LEAD/LAG					
LEAD/LAG CODES (ONLY USED IF "8" WAS ENTERED FOR SEQUENCE)								
PAIRS	1 AND 2		3 AND 4		5 AND 6		7 AND 8	
CODE								
LEAD/LAG CODES - 1 = NO REV, 2 = ALWAYS REV, 3 = REV BY C/S/O OR CLOCK/INPUT								

INITIALIZE/FLASH				
	INITIALIZE	ENTER FLASH	EXIT FLASH	INTERVAL CODES: 1 = RED, 2 = YELLOW, 3 = GREEN
RING 1 PHASE	2	2	2	
RING 2 PHASE	6	6	6	
INTERVAL	2	1	2	

POWER UP/RESTART TIMINGS		
MINIMUM FLASH	5	(0-127 SECONDS)
1ST ALL RED AFTER FLASH	0	(0-127 SECONDS)

Phase Times [1.1.1]

CR 27 @ CR 21 - Thornton - Aug 2007

	SBL	N/B		W/B		S/B		E/B								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min Grn	7.0	8.0		7.0		8.0		7.0								
Gap, Ext	3.0	3.0		3.0		3.0		3.0								
Max 1	15.0	45.0		40.0		45.0		15.0								
Max 2	50.0	50.0		50.0		50.0		50.0								
Yel Clr	3.5	5.0		4.0		4.0		4.0								
Red Clr	1.5	2.0		2.0		2.0		2.0								
Walk		20.0				20.0		16.0								
Ped Clr		10.0				10.0		10.0								
Red Revt																
Add Init																
Max Init																

Gap Reduction

Time B4																
Cars B4																
Time To																
ReducBy																
Min Gap																
DyMaxLim																
Max Step																

Naztec Timing Card

Model: 980 - A0100

District: County of Simcoe

Location: Simcoe Rd. 27 Simcoe Rd 21 - Thornton

2004 ROBERT STREET

Timings								
Phases	1	2	3	4	5	6	7	8
Min Green	8	20		10		20		10
Gap Ext.	2.0	3.0		3.5		3.0		3.5
Max 1	8	25		18		25		18
Max 2	8	25		18		25		18
Yellow Clear	3.0	4.0		4.0		4.0		4.0
Red Clear		2.0		2.0		2.0		2.0
Walk		9		9		9		9
Ped Clear		8		8		8		8
Red Revert								
Add Init								
Max Init								
Gap Reduce								
Time B4								
Cars B4								
Time To								
Reduce By								
Min Gap								
Dynamic Max Limit								
Dynamic Max Step								

Options								
Phases	1	2	3	4	5	6	7	8
Enabled	X	X		X		X		X
Min Recall	X							
Max Recall		X				X		
Ped Recall								
Soft Recall								
Lock Calls								
Auto Flash Entry								
Auto Flash Exit								
Dual Entry								
Enable Simulated Gap								
Garanted Passage								
Rest in Walk								
Conditional Service								
Non Actuated 1								X
Non Actuated 2								
Added Init Calc								
Options+								
Reservice								
Ped Clear thu Yellow								
Skip Red - No Call								
Red Rest								
Max 2								
Ped Delay								
Conflicting Ph.								
Omit Yellow, Yellow Ph.								
Ped Out/ Ovrlp Ph.								
Start Yellow, Next Ph.								

0. EPAC300 PROGRAM LOG

Prepared By .....: _____ Date: ____/____/____

Approved By .....: _____ Date: ____/____/____

Intersection Name.....: _Hwy 89 & Simcoe Rd. 27_Cookstown_____

UTILITIES - ACCESS

Access Code.....: _____ Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

asic Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green	_5_	_20	___	_10	___	___	___	___	___	___	___	___	___	___	___	___
Passage Time	_40	_40	___	_40	___	___	___	___	___	___	___	___	___	___	___	___
Maximum No 1	_8_	_55	___	_35	___	___	___	___	___	___	___	___	___	___	___	___
Maximum No 2	_8_	_48	___	_42	___	___	___	___	___	___	___	___	___	___	___	___
Yellow Change	_30	_40	___	_40	___	___	___	___	___	___	___	___	___	___	___	___
Red Clearance	_0_	_20	___	_20	___	___	___	___	___	___	___	___	___	___	___	___

ensity Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Maximum Initial	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Time B4 Reduction	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Cars B4 Reduction	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Time To Reduce	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Minimum Gap	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

edestrian Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	___	_11	___	_11	___	___	___	___	___	___	___	___	___	___	___	___
Pedestrian Clearance	___	_13	___	_13	___	___	___	___	___	___	___	___	___	___	___	___

edestrian Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Extended Pedestrian Clear	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Act Rest In Walk	___	1	___	___	___	___	___	___	___	___	___	___	___	___	___	___

EV Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

h Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory	_1_	_1_	___	_1_	___	___	___	___	___	___	___	___	___	___	___	___
Dual Entry	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Last Car Passage	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Conditional Service	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
No Simultaneous Gap	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Vehicle Control Entry: "1" = Yes & "0" = No

eneral Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Initialization	1	3	—	1	—	—	—	—	—	—	—	—	—	—
Non-Act Response	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vehicle Recall	3	2	—	—	—	—	—	—	—	—	—	—	—	—
Pedestrian Recall	—	2	—	—	—	—	—	—	—	—	—	—	—	—
Recall Delay	—	—	—	—	—	—	—	—	—	—	—	—	—	—

EV

odes	0	1	2	3	4
Initialization	NONE	INACTIVE	RED	YELLOW	GREEN
Non-Act Response	NONE	TO NA I	TO NA II	TO BOTH	-----
Vehicle Recall	NONE	1 CALL	MINIMUM	MAXIMUM	SOFT
Pedestrian Recall	NONE	1 CALL	PED	NA	NA+

PHASE DATA - SEQUENCE CONTROL

quence Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Phase Omit	2	—	4	—	6	—	8	—	—	—	—	—	—	—
Phase - Yellow	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Phase Omit Call	—	—	—	—	—	—	—	—	—	—	—	—	—	—

des	0	01 TO 16 (# - PHASE)
Phase Omit	NONE	Phase Is Omitted By # - Phase On
Phase - Yellow	NONE	Phase Yellow Is Omitted By # - Phase Yellow
Phase Omit Call	NONE	When Omitted, Dets Call # Phase

PHASE DATA - VEH DETECTOR CONTROL

ontrol — Detector:	1	2	3	4	5	6	7	8	9	10	11	12	13
Assigned Phase	2	2	4	4	5	2	4	4	—	—	—	—	—
Operation Mode	—	—	—	—	—	—	—	—	—	—	—	—	—
Switch	—	—	—	—	—	—	—	—	—	—	—	—	—
Extend Time	—	—	—	—	—	—	—	—	—	—	—	—	—
Delay Time	—	—	—	—	—	—	—	—	—	—	—	—	—

ontrol — Detector:	17	18	19	20	21	22	23	24	25	26	27	28	29
Assigned Phase	—	—	—	—	—	—	—	—	—	—	—	—	—
Operation Mode	—	—	—	—	—	—	—	—	—	—	—	—	—
Switch	—	—	—	—	—	—	—	—	—	—	—	—	—
Extend Time	—	—	—	—	—	—	—	—	—	—	—	—	—
Delay Time	—	—	—	—	—	—	—	—	—	—	—	—	—

Codes	0	1	2	3	4
Operation Mode	NORM VEH	NORM PED	ONE CALL	ST BAR A	ST BAR B
Assigned Phase	NONE	Detector Is Assigned To # - Phase			
Switch	NONE	Detector Is Switched To # - Phase When The Assigne			
		Phase Is Yellow / Red & # - Phase Is Green			

Naztec Timing Card

Model: 980 - A0100

District: Simcoe County

Location: Simcoe Rd 27 & Simcoe Rd 1 - Bond Head

2004

Timings								
Phases	1	2	3	4	5	6	7	8
Min Green	8	25		10		25		10
Gap Ext.	3.0	1.0		4.0		1.0		4.0
Max 1	15	25		18		25		18
Max 2	0	0		0		0		0
Yellow Clear	3.0	4.0		4.0		4.0		4.0
Red Clear	0.0	2.0		2.0		2.0		2.0
Walk	0	0		15		0		15
Ped Clear	0	0		5		0		5
Red Revert	0.0	0.0		0.0		0.0		0.0
Add Init	0	0		0		0		0
Max Init	0	0						
Gap Reduce								
Time B4								
Cars B4								
Time To								
Reduce By								
Min Gap								
Dynamic Max Limit								
Dynamic Max Step								

Options								
Phases	1	2	3	4	5	6	7	8
Enabled	X	X		X		X		X
Min Recall								
Max Recall		X				X		
Ped Recall								
Soft Recall								
Lock Calls								
Auto Flash Entry								
Auto Flash Exit								
Dual Entry		X		X		X		X
Enable Simulated Gap	X	X		X		X		X
Garanted Passage								
Rest in Walk								
Conditional Service								
Non Actuated 1		X				X		
Non Actuated 2								
Added Init Calc								
Options+								
Reservice								
Ped Clear thu Yellow								
Skip Red - No Call								
Red Rest								
Max 2								
Ped Delay								
Conflicting Ph.								
Omit Yellow, Yellow Ph.								
Ped Out/ Ovrlp Ph.								
Start Yellow, Next Ph.								

20. EPAC300 PROGRAM LOG

Prepared By .....: _____ Date: ___/___/___

Approved By.....: _____ Date: ___/___/___

Intersection Name.....: BOND HEAD CR27 & CR88 NOV 22/2004

UTILITIES - ACCESS

Access Code .....: _____ Codes: Four Digits (0000 - 9999)

PHASE DATA - VEHICLE TIMINGS

Basic Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green	:		50		25												
Passage Time	:		4.5		3.0												
Maximum No 1	:		30		15												
Maximum No 2	:		0		0												
Yellow Change	:		5.0		5.0												
Red Clearance	:		2.0		2.0												

Density Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation	:																
Maximum Initial	:																
Time B4 Reduction	:																
Cars B4 Reduction	:																
Time To Reduce	:																
Minimum Gap	:																

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	:		15		14												
Pedestrian Clearance	:		5		5												

Pedestrian Control	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk	:																
Extended Pedestrian Clear	:																
Act Rest In Walk	:		1														

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control	Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory	:		1		1												
Dual Entry	:		0		0												
Last Car Passage	:		0		0												
Conditional Service	:		0		0												
No Simultaneous Gap	:		0		0												

Vehicle Control Entry: "1" = Yes & "0" = No

Corridor 5

County Road 10

Signal Timing Plans

County Road 10 / Mackenzie Pioneer Intersection

Proposed Signal Timing Plan

By: Mark Jamieson, BA Group

Date: Dec 9, 2009

Phase		AM Honda Peak[2] (6:00am - 9:00am)	Mid Day (9:00am - 2:30pm)	PM Honda Peak (2:30pm - 4:00pm)	All Other
SBL Advance (Callable)	Min Green	7 sec	7 sec	7 sec	7 sec
	Max Green	10 sec	15 sec	10 sec	15 sec
	Amber	3 sec	3 sec	3 sec	3 sec
	Red / SAG	2 sec	2 sec	2 sec	2 sec
N-S Main	Min Green[1]	55 sec	25 sec	55 sec	25 sec
	Max Green[1]	55 sec	40 sec	55 sec	40 sec
	Amber	5 sec	5 sec	5 sec	5 sec
	Red	2 sec	2 sec	2 sec	2 sec
WB Mackenzie Pioneer / Wal-Mart (Callable)	Min Green	7 sec	7 sec	7 sec	7 sec
	Max Green	10 sec	20 sec	10 sec	20 sec
	Amber	3 sec	3 sec	3 sec	3 sec
	Red	2 sec	2 sec	2 sec	2 sec

Notes:

1. NB/SB through approaches will not have detector loops during interim phase. Recommend setting the min=max during Honda peaks to ensure priority for N-S movements. During off-peak times N-S Main can be reduced to a lower minimum if a call is received for SBL or WB approaches.

2. A longer AM peak period is proposed based on input from Honda. There is a manufacturing shift that starts at 6:30 and also a secondary office shift of +/-1,000 people that arrives between 7:00-8:30.

McCORMICK
RANKIN
CORPORATION

GENERIC SIGNAL TIMING SHEET

ACTUATED [X] PRE-TIMED [ ] SIGNAL TO BE MAINTAINED BY: CONTRACTOR - AGI

LOCATION: SIMCOE COUNTY ROAD 10 & HONDA ENTRANCE SIGNAL TO BE OPERATED BY: CONTRACTOR - AGI

MAIN STREET: SIMCOE COUNTY ROAD 10 TIMING DEVELOPED BY: MRC – DAVE THOMPSON

DATE TIMING DEVELOPED : REVISED JULY 28, 2008

GENERIC TIMING IDENTIFIED HERE SHALL BE TRANSCRIBED ONTO "OFFICIAL" TIMING SHEETS FOR THE TRAFFIC SIGNAL CONTROLLER BEING USED AT THIS SIGNALIZED INTERSECTION. A COPY OF THE "OFFICIAL" LOCAL TIMING SHEETS AND COORDINATION SHEETS IF USED, SHALL BE ATTACHED TO THIS FORM AND FILED IN THE MUNICIPAL TRAFFIC OFFICE.

OPERATIONAL NOTES:
1. If serving F2 or F6, the signal must cycle to F4 or F8 prior to serving a call for F5
2. F5 shall timeout concurrently with F2
3. Emergency pre-emption for Ø2 (Northbound) and Ø6 (Southbound) traffic

FUNCTION/OPERATION	MOVEMENT (FAZE)							
	Ø1 (NOT USED)	**Ø2** NB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** EB (FARM ENTR.)	**Ø5** NB LEFT (C.R. 10)	**Ø6** SB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** EB THRU (HONDA)
PERMITTED MOVEMENTS	-	X	-	X	X	X	-	X
RED LOCK	-	-	-	-	-	-	-	-
AMBER LOCK	-	-	-	-	-	-	-	-
VEHICLE RECALL	-	-	-	-	-	-	-	-
PEDESTRIAN RECALL	-	-	-	-	-	-	-	-
VEHICLE MAX RECALL	-	X	-	-	-	X	-	-
OVERLAP A	-	-	-	-	-	-	-	-
OVERLAP B	-	-	-	-	-	-	-	-
PROT/PERM LEFT TURN ARROW	-		-	-	X		-	
PROT/PERM FAST FLASH ADVANCE GREEN	-		-	-	-		-	
FULLY PROTECTED LEFT TURN	-		-	-	-		-	
DISPLAY AMBER ON STARTUP	-	-	-	-	-	-	-	-
PLACE PEDESTRIAN CALLS ON STARTUP	-	-	-	-	-	-	-	-
PLACE VEHICLE CALLS ON STARTUP	-	X	-	X	X	X	-	X
REST IN WALK		X		-		X		
MOVEMENTS MUST GAP OUT SIMULTANEOUSLY	-	-	-	-	-	-	-	-
DOUBLE ENTRY		-		-		-		-
EXCLUSIVE (SEPARATE) PHASING BY APPROACH	-	-	-	X	-	-	-	X

INTERVAL TIMES	MOVEMENT (FAZE)							
	Ø1 (NOT USED)	**Ø2** NB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** EB (FARM ENTR.)	**Ø5** NB LEFT (C.R. 10)	**Ø6** SB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** EB THRU (HONDA)
WALK	-	8.0	-	8.0	8.0	8.0	-	8.0
FLASHING DON'T WALK	-	-	-	-	-	7.0	-	7.0
MINIMUM GREEN	-	-	-	-	-	15.0	-	15.0
VEHICLE EXTENSION (PASSAGE TIME)	-	5.0	-	3.0	3.0	5.0	-	3.0
MAXIMUM GREEN (INCLUDES MIN GREEN)	-	35.0	-	11.0	12.0	35.0	-	58.0
MAXIMUM GREEN 2 (ALT. MAX. GREEN)	-	-	-	-	-	-	-	-
AMBER CLEARANCE	-	4.0	-	3.5	3.0	4.0	-	4.0
ALL RED CLEARANCE	-	2.0	-	2.0	-	2.0	-	2.0
MAX GAP (VEH. EXTENSION)	-	-	-		-	-	-	-
MIN GAP (VEH. EXTENSION)	-	-	-		-	-	-	-
REDUCE GAP BY	-	-	-		-	-	-	-
REDUCE GAP EVERY	-	-	-		-	-	-	-
MAX INITIAL GREEN TIME (VARIABLE INIT)	-	-	-		-	-	-	-

DETECTOR SETUP – N/A	MOVEMENT (FAZE)							
	SB LEFT	NB THRU	EB LEFT	WB THRU	NB LEFT	SB THRU	WB LEFT	EB THRU
DELAY TIME ON PRESENCE DETECTION	-	-	-	-	-	-	-	-
DELAY TIME ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON PRESENCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-

PRE-EMPTION	MOVEMENT (FAZE)							
	SB LEFT	NB THRU	EB LEFT	WB THRU	NB LEFT	SB THRU	WB LEFT	EB THRU
PRE-EMPT HOLD PHASE	-	X	-	-	-	X	-	-
PRE-EMPT EXIT PHASE	-	X	-	-	-	X	-	-
MIN. HOLD TIME	-	10.0	-	-	-	10.0	-	-
MAX. HOLD TIME	-	60.0	-	-	-	60.0	-	-
MIN. PEDESTRIAN CLEARANCE	-	0.0	-	-	-	0.0	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

TIME OF DAY OPERATIONS	TIME OF DAY		DAY OF WEEK							MOVEMENT (FAZE)							
	START	END	S	M	T	W	T	F	S	**Ø1** (NOT USED)	**Ø2** NB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** EB ENTR..	**Ø5** NB LEFT (C.R. 10)	**Ø6** SB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** EB THRU (HONDA)
PHASE OMIT	00:00	23:59	X	X	X	X	X	X	X	X		X				X	
MAX RECALL																	
PED RECALL																	
MIN RECALL																	
MAX GREEN 2																	
REST IN WALK	00:00	23:59	X	X	X	X	X	X			X				X		
AMBER LOCK																	
RED LOCK																	

REVISED GENERIC SIGNAL TIMING SHEET

ACTUATED [X] PRE-TIMED [ ] SIGNAL TO BE MAINTAINED BY: CONTRACTOR - AGI

LOCATION: SIMCOE C.R. 10 & 14th LINE SIGNAL TO BE OPERATED BY: CONTRACTOR - AGI

MAIN STREET: SIMCOE C.R. 10 TIMING DEVELOPED BY: MRC – DAVE THOMPSON

DATE TIMING DEVELOPED : July 28, 2008

GENERIC TIMING IDENTIFIED HERE SHALL BE TRANSCRIBED ONTO "OFFICIAL" TIMING SHEETS FOR THE TRAFFIC SIGNAL CONTROLLER BEING USED AT THIS SIGNALIZED INTERSECTION. A COPY OF THE "OFFICIAL" LOCAL TIMING SHEETS AND COORDINATION SHEETS IF USED, SHALL BE ATTACHED TO THIS FORM AND FILED IN THE MUNICIPAL TRAFFIC OFFICE.

OPERATIONAL NOTES:
1 Emergency pre-emption for Ø2 (Eastbound) and Ø6 (Westbound) traffic
2
3

FUNCTION/OPERATION	MOVEMENT (FAZE)							
	Ø1 (NOT USED)	**Ø2** EB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** NBD 14th LINE	**Ø5** (NOT USED)	**Ø6** WB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** (NOT USED)
PERMITTED MOVEMENTS		X		X		X		
RED LOCK								
AMBER LOCK								
VEHICLE RECALL		X				X		
PEDESTRIAN RECALL								
VEHICLE MAX RECALL								
OVERLAP A								
OVERLAP B								
PROT/PERM LEFT TURN ARROW					X			
PROT/PERM FAST FLASH ADVANCE GREEN								
FULLY PROTECTED LEFT TURN								
DISPLAY AMBER ON STARTUP								
PLACE PEDESTRIAN CALLS ON STARTUP								
PLACE VEHICLE CALLS ON STARTUP		X		X		X		
REST IN WALK								
MOVEMENTS MUST GAP OUT SIMULTANEOUSLY								
DOUBLE ENTRY								
EXCLUSIVE (SEPARATE) PHASING BY APPROACH								

INTERVAL TIMES	MOVEMENT (FAZE)							
	Ø1 (NOT USED)	**Ø2** EB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** NBD 14th LINE	**Ø5** (NOT USED)	**Ø6** WB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** (NOT USED)
WALK	-	7.0	-	7.0	-	7.0	-	-
FLASHING DON'T WALK	-	-	-	-	-	-	-	-
MINIMUM GREEN	-	7.0	-	7.0	-	7.0	-	-
VEHICLE EXTENSION (PASSAGE TIME)	-	5.0	-	3.0	-	5.0	-	-
MAXIMUM GREEN (INCLUDES MIN GREEN)	-	53.0	-	26.0	-	53.0	-	-
MAXIMUM GREEN 2 (ALT. MAX. GREEN)	-	-	-	-	-	-	-	-
AMBER CLEARANCE	-	5.0	-	3.4	-	5.0	-	-
ALL RED CLEARANCE	-	2.2	-	2.2	-	2.2	-	-
MAX GAP (VEH. EXTENSION)	-	5.0	-	3.0	-	5.0	-	-
MIN GAP (VEH. EXTENSION)	-	5.0	-	3.0	-	5.0	-	-
REDUCE GAP BY	-	-	-	-	-	-	-	-
REDUCE GAP EVERY	-	-	-	-	-	-	-	-
MAX INITIAL GREEN TIME (VARIABLE INIT)	-	-	-	-	-	-	-	-

DETECTOR SETUP – N/A	MOVEMENT (FAZE)							
	WB LEFT	EB THRU	SB LEFT	NB RIGHT	EB LEFT	WB THRU	NB LEFT	SB THRU
DELAY TIME ON PRESENCE DETECTION	-	-	-	5.0	-	-	-	-
DELAY TIME ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON PRESENCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-

PRE-EMPTION	MOVEMENT (FAZE)							
	WB LEFT	EB THRU	SB LEFT	NB THRU	EB LEFT	WB THRU	NB LEFT	SB THRU
PRE-EMPT HOLD PHASE	-	X	-	-	-	X	-	-
PRE-EMPT EXIT PHASE	-	X	-	-	-	X	-	-
MIN. HOLD TIME	-	10.0	-	-	-	10.0	-	-
MAX. HOLD TIME	-	60.0	-	-	-	60.0	-	-
MIN. PEDESTRIAN CLEARANCE	-	0.0	-	-	-	0.0	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

TIME OF DAY OPERATIONS	TIME OF DAY		DAY OF WEEK							MOVEMENT (FAZE)							
	START	END	S	M	T	W	T	F	S	**Ø1** (NOT USED)	**Ø2** EB THRU (C.R. 10)	**Ø3** (NOT USED)	**Ø4** NBD 14th LINE	**Ø5** (NOT USED)	**Ø6** WB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** (NOT USED)
PHASE OMIT										-		X		X		X	
MAX RECALL										-	-	-	-	-	-	-	-
PED RECALL										-	-	-	-	-	-	-	-
MIN RECALL										-	X	-	-	-	X	-	-
MAX GREEN 2										-	-	-	-	-	-	-	-
REST IN WALK											-		-		-		-
AMBER LOCK										-	-	-	-	-	-	-	-
RED LOCK										-	-	-	-	-	-	-	-

REVISED GENERIC SIGNAL TIMING SHEET

ACTUATED [X] PRE-TIMED [ ] SIGNAL TO BE MAINTAINED BY: CONTRACTOR - AGI

LOCATION: SIMCOE C.R. 10 / INDUSTRIAL DR. & SIMCOE C.R. 10 (TOTTENHAM RD.) SIGNAL TO BE OPERATED BY: CONTRACTOR - AGI

MAIN STREET: SIMCOE C.R. 10 / INDUSTRIAL DR. TIMING DEVELOPED BY: MRC – DAVE THOMPSON

DATE TIMING DEVELOPED : July 28, 2008

GENERIC TIMING IDENTIFIED HERE SHALL BE TRANSCRIBED ONTO "OFFICIAL" TIMING SHEETS FOR THE TRAFFIC SIGNAL CONTROLLER BEING USED AT THIS SIGNALIZED INTERSECTION. A COPY OF THE "OFFICIAL" LOCAL TIMING SHEETS AND COORDINATION SHEETS IF USED, SHALL BE ATTACHED TO THIS FORM AND FILED IN THE MUNICIPAL TRAFFIC OFFICE.

OPERATIONAL NOTES:

1. If serving F2 or F6, the signal must cycle to F4 or F8 prior to serving a call for F1
2. F1 shall timeout concurrently with F6
3. Emergency pre-emption for Ø2 (Eastbound) and Ø6 (Westbound) traffic

FUNCTION/OPERATION	MOVEMENT (FAZE)							
	Ø1 WB LEFT (C.R. 10)	**Ø2** EB THRU (INDUSTRIAL)	**Ø3** (NOT USED)	**Ø4** NBD LEFT (C.R. 10)	**Ø5** (NOT USED)	**Ø6** WB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** (NOT USED)
PERMITTED MOVEMENTS	X	X		X		X		
RED LOCK								
AMBER LOCK								
VEHICLE RECALL		X				X		
PEDESTRIAN RECALL								
VEHICLE MAX RECALL								
OVERLAP A								
OVERLAP B								
PROT/PERM LEFT TURN ARROW	X							
PROT/PERM FAST FLASH ADVANCE GREEN								
FULLY PROTECTED LEFT TURN								
DISPLAY AMBER ON STARTUP								
PLACE PEDESTRIAN CALLS ON STARTUP								
PLACE VEHICLE CALLS ON STARTUP	X	X		X		X		
REST IN WALK		X						
MOVEMENTS MUST GAP OUT SIMULTANEOUSLY								
DOUBLE ENTRY								
EXCLUSIVE (SEPARATE) PHASING BY APPROACH								

INTERVAL TIMES	MOVEMENT (FAZE)							
	Ø1 WB LEFT (C.R. 10)	**Ø2** EB THRU (INDUSTRIAL)	**Ø3** (NOT USED)	**Ø4** NBD LEFT (C.R. 10)	**Ø5** (NOT USED)	**Ø6** WB THRU (C.R. 10)	**Ø7** (NOT USED)	**Ø8** (NOT USED)
WALK	-	7.0	-	7.0	-	7.0	-	-
FLASHING DON'T WALK	-	10.0	-	14.0	-	-	-	-
MINIMUM GREEN	7.0	7.0	-	7.0	-	7.0	-	-
VEHICLE EXTENSION (PASSAGE TIME)	3.0	5.0	-	3.0	-	5.0	-	-
MAXIMUM GREEN (INCLUDES MIN GREEN)	11.0	20.0	-	24.0	-	20.0	-	-
MAXIMUM GREEN 2 (ALT. MAX. GREEN)	13.0	33.0	-	29.0	-	33.0	-	-
AMBER CLEARANCE	3.0	3.8	-	3.8	-	3.8	-	-
ALL RED CLEARANCE	-	2.2	-	2.2	-	2.2	-	-
MAX GAP (VEH. EXTENSION)	-	-	-		-	-	-	-
MIN GAP (VEH. EXTENSION)	-	-	-		-	-	-	-
REDUCE GAP BY	-	-	-		-	-	-	-
REDUCE GAP EVERY	-	-	-		-	-	-	-
MAX INITIAL GREEN TIME (VARIABLE INIT)	-	-	-		-	-	-	-

DETECTOR SETUP – N/A	MOVEMENT (FAZE)							
	WB LEFT	EB THRU	SB LEFT	NB THRU	EB LEFT	WB THRU	NB LEFT	SB THRU
DELAY TIME ON PRESENCE DETECTION	-	-	-	-	-	-	-	-
DELAY TIME ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON PRESENCE DETECTION	-	-	-	-	-	-	-	-
CARRY-OVER ON LONG DISTANCE DETECTION	-	-	-	-	-	-	-	-

PRE-EMPTION	MOVEMENT (FAZE)							
	WB LEFT	EB THRU	SB LEFT	NB THRU	EB LEFT	WB THRU	NB LEFT	SB THRU
PRE-EMPT HOLD PHASE	-	X	-	-	-	X	-	-
PRE-EMPT EXIT PHASE	-	X	-	-	-	X	-	-
MIN. HOLD TIME	-	10.0	-	-	-	10.0	-	-
MAX. HOLD TIME	-	60.0	-	-	-	60.0	-	-
MIN. PEDESTRIAN CLEARANCE	-	0.0	-	-	-	0.0	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

TIME OF DAY OPERATIONS	TIME OF DAY		DAY OF WEEK							MOVEMENT (FAZE)							
	START	END	S	M	T	W	T	F	S	**Ø1** WB LEFT	**Ø2** EB THRU (INDUSTRIAL)	**Ø3** (NOT USED)	**Ø4** NB LEFT	**Ø5** (NOT USED)	**Ø6** WB THRU	**Ø7** (NOT USED)	**Ø8** (NOT USED)
PHASE OMIT										-		X		X		X	
MAX RECALL										-	-	-	-	-	-	-	-
PED RECALL										-	-	-	-	-	-	-	-
MIN RECALL										-	X	-	-	-	X	-	-
MAX GREEN 2	15:00	16:30		X	X	X	X	X	X	X	X	-	X	-	X	-	-
REST IN WALK											-		-		-		-
AMBER LOCK										-	-	-	-	-	-	-	-
RED LOCK										-	-	-	-	-	-	-	-

20. EPAC300 PROGRAM LOG

Prepared By .....: _____ Date: ___/___/___

Approved By.....: _____ Date: ___/___/___

Intersection Name.....: SIMCOE Rd 103 + SIMCOE Rd 1

UTILITIES - ACCESS

Access Code .....: _____ Codes: Four Digits (0000 - 9999)

UNKNOWN BUT ACTIVE

PHASE DATA - VEHICLE TIMINGS

Basic Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Minimum Green	0	25	0	8	0	→	→	→								
Passage Time	0	0	0	50	0	→	→	→								
Maximum No 1	0	30	0	18	0	→	→	→								
Maximum No 2	0	30	0	18	0	→	→	→								
Yellow Change	30	60	30	46	30	30	30	30								
Red Clearance	0	20	0	20	0	→	→	→								

Density Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Seconds/Actuation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Maximum Initial	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Time B4 Reduction	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cars B4 Reduction	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Time To Reduce	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Minimum Gap	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

PHASE DATA - PEDESTRIAN TIMINGS & CONTROL

Pedestrian Times — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	—	—	—	10	—	—	—	—	—	—	—	—	—	—	—	—
Pedestrian Clearance	—	—	—	10	—	—	—	—	—	—	—	—	—	—	—	—

Pedestrian Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flashing Walk	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Extended Pedestrian Clear	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Act Rest In Walk	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Pedestrian Control Entry: "1" = Yes & "0" = No

PHASE DATA - VEHICLE CONTROL

Veh Control — Phase:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Non-Lock Memory	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Dual Entry	—	1	—	1	—	1	—	1	—	—	—	—	—	—	—	—
Last Car Passage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Conditional Service	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No Simultaneous Gap	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Vehicle Control Entry: "1" = Yes & "0" = No

2004

TCT Traffic Control Technologies

INTERSECTION NAME: Simcoe Rd 10 South @ Simcoe Rd 14 TOTTENHAM INSTALLATION DATE: _____

PROGRAMMED BY: _____ PROGRAM DATE: _____

CONTROLLER SERIAL # LMD 8000 (25099825) SECURITY CODE: _____

INTERSECTION TELEPHONE (IF DIRECT DIAL): _____

SECTION: _____ ADDRESS: _____

INTERVAL	PHASE (ON/OFF)							
	1	2	3	4	5	6	7	8
MEMORY								
EXT RECALL								
MAX RECALL		ON				ON		
PED RECALL		ON				ON		
CNA I		ON				ON		
CNA II								
FL WALK								
SOFT RECALL								
WALK REST		ON				ON		
COND PED								
FWTPCL								

INTERVAL	PHASE TIMINGS							
	1	2	3	4	5	6	7	8
MIN GREEN		29		12		29		12
PASSAGE		4		3.5		4		3.5
YELLOW		5.0		4.0		5.0		4.0
RED		2.0		2.0		2.0		2.0
MAX I		30		~~19~~ 30		30		~~19~~ 20
MAX II		30		30		30		30
WALK		11		13		11		13
PED CLEAR		5		5		5		5
S/A		0		0		0		0
TBR		0		0		0		0
TTR		0		0		0		0
MIN GAP		0		3.5		0		3.5
MAX VI		0		0		0		0
MAX EXT		0		0		0		0
AUTO MAX		0		0		0		0
AMR		0		0		0		0

Oct 7/04 Adjusted Timings C.T.

PHASES USED								
	1	2	3	4	5	6	7	8
ON/OFF		ON		ON		ON		ON
SEQUENCE		2	1 = SEQ, 2 = DUAL RNG, 3-7 = SPEC, 8 = LEAD/LAG					
LEAD/LAG CODES (ONLY USED IF "8" WAS ENTERED FOR SEQUENCE)								
PAIRS	1 AND 2		3 AND 4		5 AND 6		7 AND 8	
CODE								
LEAD/LAG CODES - 1 = NO REV, 2 = ALWAYS REV, 3 = REV BY C/S/O OR CLOCK/INPUT								

INITIALIZE/FLASH				
	INITIALIZE	ENTER FLASH	EXIT FLASH	INTERVAL CODES: 1 = RED, 2 = YELLOW, 3 = GREEN
RING 1 PHASE	2	0	0	
RING 2 PHASE	6	0	0	
INTERVAL	2	1		

POWER UP/RESTART TIMINGS		
MINIMUM FLASH	0	(0-127 SECONDS)
1ST ALL RED AFTER FLASH	0	(0-127 SECONDS)

June 2013 Signal Timing Queen Street and Laverock Street, Tottenham

Phase Vehicle Basic Timing Data

June, 2013	Phasing							
Function	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Min Green		15		8	8	15		8
Passage Time		5.0		2.0	2.0	5.0		2.0
Max #1		45		19	9	31		19
Max #2		45		19	9	31		19
Yellow Clearance	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
Red Clearance		2.0		2.0	2.0	2.0		2.0

Phase Pedestrian Timing Data

June, 2013	Phasing							
Function	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Walk		8		7		8		7
Ped Clear		9		8		9		8
Flashing Walk								
Extended Ped Clear								

November 2012 (Revised) Signal Timing Queen Street and Mill Street, Tottenham

November 22, 2012	**Phasing**			
Function	**2**	**4**	**6**	**8**
Min Green	8	8	8	8
Passage Time	30	30	30	30
Max #1	33	18	33	18
Max #2	33	18	33	18
Yellow Clearance	4.0	4.0	4.0	4.0
Red Clearance	3.0	3.0	3.0	3.0

65 second total cycle

Appendix C: Level of Service Definitions

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS[1]

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the *v/c* ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 and ≤ 20
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	> 20 and ≤ 35
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high *v/c* ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35 and ≤ 55
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent occurrences.	> 55 and ≤ 80
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS[1]

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

J:\Capacity Appendix\Unsignalized\hcs unsignalized_delay.doc



Appendix D: Detailed Synchro Reports

HCM Signalized Intersection Capacity Analysis
11: CR93/Penetanguishene Rd & Golf Link Rd/Vindin St

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	80	121	67	51	61	57	323	37	70	460	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00			1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.93			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1723			1772	1547	1623	3539	1296	1750	3505	1463
Flt Permitted		0.93			0.50	1.00	0.44	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)		1618			916	1547	758	3539	1296	966	3505	1463
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	35	94	142	79	60	72	67	380	44	82	541	28
RTOR Reduction (vph)	0	38	0	0	0	58	0	0	20	0	0	13
Lane Group Flow (vph)	0	233	0	0	139	14	67	380	24	82	541	15
Confl. Peds. (#/hr)	1					1	2		1	1		2
Heavy Vehicles (%)	3%	1%	2%	6%	2%	3%	11%	2%	22%	3%	3%	8%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		18.2			18.2	18.2	56.5	51.3	51.3	56.9	51.5	51.5
Effective Green, g (s)		18.2			18.2	18.2	56.5	51.3	51.3	56.9	51.5	51.5
Actuated g/C Ratio		0.19			0.19	0.19	0.60	0.55	0.55	0.61	0.55	0.55
Clearance Time (s)		7.0			7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0	3.0	2.5	4.0	4.0	2.5	4.0	4.0
Lane Grp Cap (vph)		313			177	299	503	1933	708	630	1922	802
v/s Ratio Prot							0.01	0.11		c0.01	c0.15	
v/s Ratio Perm		0.14			c0.15	0.01	0.07		0.02	0.07		0.01
v/c Ratio		0.74			0.79	0.05	0.13	0.20	0.03	0.13	0.28	0.02
Uniform Delay, d1		35.7			36.0	30.8	7.8	10.8	9.8	7.6	11.3	9.7
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		9.3			20.1	0.1	0.1	0.2	0.1	0.1	0.4	0.0
Delay (s)		44.9			56.1	30.9	7.9	11.1	9.9	7.7	11.7	9.7
Level of Service		D			E	C	A	B	A	A	B	A
Approach Delay (s)		44.9			47.5			10.5			11.1	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	93.9	Sum of lost time (s)	19.0	
Intersection Capacity Utilization	56.6%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
12: CR93/Penetanguishene Rd & PA-RCS/PA-CDN Tire

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	8	17	70	8	26	89	455	71	55	518	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0		6.0	6.0		3.5	7.0	7.0	3.5	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1750	1575		1805	1613		1752	3406	1580	1805	3505	1583
Flt Permitted	0.49	1.00		0.74	1.00		0.29	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	897	1575		1399	1613		535	3406	1580	651	3505	1583
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	41	10	22	89	10	33	113	576	90	70	656	58
RTOR Reduction (vph)	0	17	0	0	29	0	0	0	59	0	0	38
Lane Group Flow (vph)	41	15	0	89	14	0	113	576	31	70	656	20
Confl. Peds. (#/hr)	2					2			1	1		
Heavy Vehicles (%)	3%	13%	6%	0%	13%	0%	3%	6%	0%	0%	3%	2%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	26.5	26.5		14.1	14.1		75.5	40.9	40.9	75.5	40.9	40.9
Effective Green, g (s)	26.5	26.5		14.1	14.1		75.5	40.9	40.9	75.5	40.9	40.9
Actuated g/C Ratio	0.22	0.22		0.12	0.12		0.64	0.35	0.35	0.64	0.35	0.35
Clearance Time (s)	7.0	6.0		6.0	6.0		3.5	7.0	7.0	3.5	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	239	352		166	191		696	1175	545	751	1209	546
v/s Ratio Prot	c0.01	0.01			0.01		c0.05	0.17		0.03	c0.19	
v/s Ratio Perm	0.03			c0.06			0.06		0.02	0.03		0.01
v/c Ratio	0.17	0.04		0.54	0.07		0.16	0.49	0.06	0.09	0.54	0.04
Uniform Delay, d1	36.8	36.1		49.1	46.4		9.0	30.6	25.9	8.5	31.3	25.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0		3.3	0.2		0.5	1.5	0.2	0.2	1.8	0.1
Delay (s)	37.1	36.1		52.4	46.6		9.5	32.0	26.1	8.7	33.0	25.9
Level of Service	D	D		D	D		A	C	C	A	C	C
Approach Delay (s)		36.7			50.5			28.1			30.3	
Approach LOS		D			D			C			C	

Intersection Summary				
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.39			
Actuated Cycle Length (s)	118.5	Sum of lost time (s)	23.5	
Intersection Capacity Utilization	67.5%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
13: CR93/Penetanguishene Rd & PA-Hugel Ave/Hugel Ave

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	23	1	84	28	133	4	418	133	156	462	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		6.0	6.0	6.0	7.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1804	1889		1732	1900	1563	1805	3471	1583	1752	3438	1615
Flt Permitted	0.61	1.00		0.74	1.00	1.00	0.45	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	1165	1889		1347	1900	1563	848	3471	1583	675	3438	1615
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	27	27	1	100	33	158	5	498	158	186	550	35
RTOR Reduction (vph)	0	1	0	0	0	139	0	0	104	0	0	11
Lane Group Flow (vph)	27	27	0	100	33	19	5	498	54	186	550	24
Confl. Peds. (#/hr)	1		2	2		1						
Heavy Vehicles (%)	0%	0%	0%	4%	0%	2%	0%	4%	2%	3%	5%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	25.4	25.4		15.1	15.1	15.1	43.0	43.0	43.0	87.6	87.6	87.6
Effective Green, g (s)	25.4	25.4		15.1	15.1	15.1	43.0	43.0	43.0	87.6	87.6	87.6
Actuated g/C Ratio	0.20	0.20		0.12	0.12	0.12	0.34	0.34	0.34	0.70	0.70	0.70
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0	7.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	1.0	1.0	1.0	3.0	1.0	1.0
Lane Grp Cap (vph)	271	380		161	227	187	289	1184	540	824	2390	1122
v/s Ratio Prot	c0.01	0.01			0.02			c0.14		0.07	c0.16	
v/s Ratio Perm	0.01			c0.07		0.01	0.01		0.03	0.08		0.02
v/c Ratio	0.10	0.07		0.62	0.15	0.10	0.02	0.42	0.10	0.23	0.23	0.02
Uniform Delay, d1	40.8	40.7		52.7	49.7	49.4	27.5	31.9	28.3	7.1	7.0	5.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		7.2	0.3	0.2	0.1	1.1	0.4	0.6	0.2	0.0
Delay (s)	41.0	40.8		60.0	50.0	49.6	27.6	33.0	28.7	7.7	7.2	6.0
Level of Service	D	D		E	D	D	C	C	C	A	A	A
Approach Delay (s)		40.9			53.2			31.9			7.3	
Approach LOS		D			D			C			A	

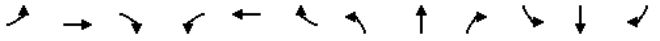
Intersection Summary				
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.35			
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	19.0	
Intersection Capacity Utilization	70.2%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
14: CR93/Penetanguishene Rd & Mountainview Mall/Huronia Mall

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	19	25	39	20	52	35	528	40	70	489	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		2.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.99		0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00		0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1856	1530		1698		1752	3505	1615	1805	3406	1615
Flt Permitted		0.80	1.00		0.87		0.32	1.00	1.00	0.41	1.00	1.00
Satd. Flow (perm)		1513	1530		1496		597	3505	1615	774	3406	1615
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	18	23	30	48	24	63	43	644	49	85	596	12
RTOR Reduction (vph)	0	0	26	0	56	0	0	0	14	0	0	8
Lane Group Flow (vph)	0	41	4	0	79	0	43	644	35	85	596	4
Confl. Peds. (#/hr)	5		3	3		5						
Heavy Vehicles (%)	0%	0%	4%	6%	0%	0%	3%	3%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		9.1	9.1		9.1		54.9	54.9	54.9	23.8	23.8	23.8
Effective Green, g (s)		9.1	9.1		9.1		54.9	54.9	54.9	23.8	23.8	23.8
Actuated g/C Ratio		0.12	0.12		0.12		0.71	0.71	0.71	0.31	0.31	0.31
Clearance Time (s)		6.0	6.0		6.0		2.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		178	180		176		862	2499	1151	239	1052	499
v/s Ratio Prot							0.02	c0.18			c0.18	
v/s Ratio Perm		0.03	0.00		c0.05		0.02		0.02	0.11		0.00
v/c Ratio		0.23	0.02		0.45		0.05	0.26	0.03	0.36	0.57	0.01
Uniform Delay, d1		30.8	30.0		31.6		3.5	3.9	3.2	20.6	22.3	18.4
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.7	0.0		1.8		0.1	0.2	0.0	4.1	2.2	0.0
Delay (s)		31.4	30.1		33.5		3.6	4.1	3.3	24.7	24.5	18.4
Level of Service		C	C		C		A	A	A	C	C	B
Approach Delay (s)		30.9			33.5			4.0			24.4	
Approach LOS		C			C			A			C	

Intersection Summary				
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.40			
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	78.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	142	30	46	77	120	23	404	65	131	365	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1803		1687	1827	1482	1656	3406	1538	1687	3343	1568
Flt Permitted	0.70	1.00		0.47	1.00	1.00	0.49	1.00	1.00	0.47	1.00	1.00
Satd. Flow (perm)	1284	1803		843	1827	1482	862	3406	1538	838	3343	1568
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	157	173	37	56	94	146	28	493	79	160	445	129
RTOR Reduction (vph)	0	15	0	0	0	115	0	0	31	0	0	50
Lane Group Flow (vph)	157	195	0	56	94	31	28	493	48	160	445	79
Heavy Vehicles (%)	3%	1%	10%	7%	4%	9%	9%	6%	5%	7%	8%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	12.1	12.1		12.1	12.1	12.1	34.9	34.9	34.9	34.9	34.9	34.9
Effective Green, g (s)	12.1	12.1		12.1	12.1	12.1	34.9	34.9	34.9	34.9	34.9	34.9
Actuated g/C Ratio	0.21	0.21		0.21	0.21	0.21	0.61	0.61	0.61	0.61	0.61	0.61
Clearance Time (s)	3.0	3.0		3.0	3.0	3.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	3.0	3.0
Lane Grp Cap (vph)	272	382		178	387	314	527	2085	941	513	2046	960
v/s Ratio Prot		0.11			0.05			0.14			0.13	
v/s Ratio Perm	c0.12			0.07		0.02	0.03		0.03	c0.19		0.05
v/c Ratio	0.58	0.51		0.31	0.24	0.10	0.05	0.24	0.05	0.31	0.22	0.08
Uniform Delay, d1	20.2	19.8		18.9	18.6	18.1	4.4	5.0	4.4	5.3	4.9	4.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	1.2		1.0	0.3	0.1	0.2	0.3	0.1	1.6	0.2	0.2
Delay (s)	23.1	21.0		20.0	19.0	18.2	4.6	5.3	4.5	6.9	5.2	4.7
Level of Service	C	C		B	B	B	A	A	A	A	A	A
Approach Delay (s)		21.9			18.8			5.1			5.5	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: CR93/Penetanguishene Rd & Golf Link Rd/Vindin St

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	90	134	51	84	77	171	678	67	111	588	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.93			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1742			1837	1553	1786	3574	1599	1752	3539	1535
Flt Permitted		0.91			0.57	1.00	0.35	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)		1602			1069	1553	653	3574	1599	598	3539	1535
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	48	102	152	58	95	88	194	770	76	126	668	45
RTOR Reduction (vph)	0	34	0	0	0	70	0	0	36	0	0	22
Lane Group Flow (vph)	0	268	0	0	153	18	194	770	40	126	668	23
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	1%	1%	4%	0%	4%	1%	1%	1%	3%	2%	3%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		20.5			20.5	20.5	61.4	52.0	52.0	58.0	50.3	50.3
Effective Green, g (s)		20.5			20.5	20.5	61.4	52.0	52.0	58.0	50.3	50.3
Actuated g/C Ratio		0.21			0.21	0.21	0.62	0.52	0.52	0.58	0.51	0.51
Clearance Time (s)		7.0			7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0	3.0	2.5	4.0	4.0	2.5	4.0	4.0
Lane Grp Cap (vph)		331			220	320	511	1873	838	439	1794	778
v/s Ratio Prot							c0.04	c0.22		0.02	0.19	
v/s Ratio Perm		c0.17			0.14	0.01	0.20		0.02	0.15		0.01
v/c Ratio		0.81			0.70	0.06	0.38	0.41	0.05	0.29	0.37	0.03
Uniform Delay, d1		37.5			36.5	31.6	8.4	14.3	11.5	9.4	14.9	12.2
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		13.6			9.2	0.1	0.3	0.7	0.1	0.3	0.6	0.1
Delay (s)		51.0			45.6	31.7	8.7	15.0	11.6	9.6	15.5	12.3
Level of Service		D			D	C	A	B	B	A	B	B
Approach Delay (s)		51.0			40.5			13.6			14.4	
Approach LOS		D			D			B			B	

Intersection Summary				
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	99.2	Sum of lost time (s)	19.0	
Intersection Capacity Utilization	63.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
12: CR93/Penetanguishene Rd & PA-RCS/PA-CDN Tire

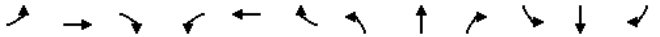
7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	20	37	152	18	97	233	688	138	61	791	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	6.0		6.0	6.0		3.5	7.0	7.0	3.5	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1803	1664		1799	1638		1805	3539	1571	1804	3505	1615
Flt Permitted	0.43	1.00		0.71	1.00		0.17	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	822	1664		1352	1638		327	3539	1571	436	3505	1615
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	155	23	43	177	21	113	271	800	160	71	920	126
RTOR Reduction (vph)	0	29	0	0	95	0	0	0	77	0	0	77
Lane Group Flow (vph)	155	37	0	177	39	0	271	800	83	71	920	49
Confl. Peds. (#/hr)	2		2	2		2			4	4		
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	38.8	38.8		18.5	18.5		63.2	45.0	45.0	63.2	45.0	45.0
Effective Green, g (s)	38.8	38.8		18.5	18.5		63.2	45.0	45.0	63.2	45.0	45.0
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.53	0.38	0.38	0.53	0.38	0.38
Clearance Time (s)	7.0	6.0		6.0	6.0		3.5	7.0	7.0	3.5	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	379	544		211	255		401	1343	596	442	1331	613
v/s Ratio Prot	c0.05	0.02			0.02		c0.10	0.23		0.02	c0.26	
v/s Ratio Perm	0.09			c0.13			0.26		0.05	0.06		0.03
v/c Ratio	0.41	0.07		0.84	0.15		0.68	0.60	0.14	0.16	0.69	0.08
Uniform Delay, d1	29.7	27.4		48.6	43.2		18.3	29.5	24.1	14.6	30.9	23.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1		24.2	0.3		8.8	2.0	0.5	0.8	3.0	0.3
Delay (s)	30.4	27.5		72.8	43.5		27.1	31.4	24.6	15.3	33.9	23.8
Level of Service	C	C		E	D		C	C	C	B	C	C
Approach Delay (s)		29.5			60.2			29.6			31.6	
Approach LOS		C			E			C			C	

Intersection Summary				
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	118.5	Sum of lost time (s)	23.5	
Intersection Capacity Utilization	68.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
13: CR93/Penetanguishene Rd & PA-Hugel Ave/Hugel Ave

7/18/2013

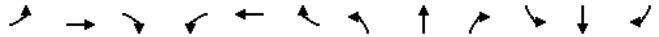


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	65	7	142	89	234	1	679	172	243	710	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		6.0	6.0	6.0	7.0	7.0	7.0	3.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1804	1844		1772	1900	1594	1805	3539	1560	1805	3505	1615
Flt Permitted	0.60	1.00		0.70	1.00	1.00	0.34	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1130	1844		1310	1900	1594	647	3539	1560	364	3505	1615
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	114	76	8	165	103	272	1	790	200	283	826	86
RTOR Reduction (vph)	0	4	0	0	0	226	0	0	117	0	0	28
Lane Group Flow (vph)	114	80	0	165	103	46	1	790	83	283	826	58
Confl. Peds. (#/hr)	1		8	8		1			3	3		
Heavy Vehicles (%)	0%	0%	14%	1%	0%	0%	0%	2%	1%	0%	3%	0%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	37.5	37.5		21.3	21.3	21.3	42.9	42.9	42.9	75.5	75.5	75.5
Effective Green, g (s)	37.5	37.5		21.3	21.3	21.3	42.9	42.9	42.9	75.5	75.5	75.5
Actuated g/C Ratio	0.30	0.30		0.17	0.17	0.17	0.34	0.34	0.34	0.60	0.60	0.60
Clearance Time (s)	3.0	6.0		6.0	6.0	6.0	7.0	7.0	7.0	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	1.0	1.0	1.0	3.0	1.0	1.0
Lane Grp Cap (vph)	406	548		221	321	269	220	1204	531	556	2100	967
v/s Ratio Prot	c0.03	0.04			0.05			c0.22		c0.12	0.24	
v/s Ratio Perm	0.05			c0.13		0.03	0.00		0.05	0.19		0.04
v/c Ratio	0.28	0.15		0.75	0.32	0.17	0.00	0.66	0.16	0.51	0.39	0.06
Uniform Delay, d1	33.2	32.5		49.8	46.0	44.8	27.4	35.3	28.9	15.0	13.2	10.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1		12.9	0.6	0.3	0.0	2.8	0.6	3.3	0.6	0.1
Delay (s)	33.6	32.6		62.6	46.6	45.1	27.5	38.1	29.6	18.3	13.8	10.6
Level of Service	C	C		E	D	D	C	D	C	B	B	B
Approach Delay (s)		33.2			50.7			36.4			14.6	
Approach LOS		C			D			D			B	

Intersection Summary				
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	126.0	Sum of lost time (s)	19.0	
Intersection Capacity Utilization	79.0%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

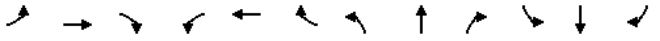
HCM Signalized Intersection Capacity Analysis
14: CR93/Penetanguishene Rd & Mountainview Mall/Huronia Mall

7/18/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	36	90	95	24	65	103	709	66	73	806	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		2.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		0.99		1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1845	1562		1725		1787	3539	1573	1801	3505	1580
Flt Permitted		0.73	1.00		0.79		0.16	1.00	1.00	0.35	1.00	1.00
Satd. Flow (perm)		1387	1562		1401		300	3539	1573	670	3505	1580
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	47	40	100	106	27	72	114	788	73	81	896	34
RTOR Reduction (vph)	0	0	80	0	31	0	0	0	24	0	0	23
Lane Group Flow (vph)	0	87	20	0	174	0	114	788	49	81	896	11
Confl. Peds. (#/hr)	9		13	13		9	1		4	4		1
Heavy Vehicles (%)	0%	0%	1%	2%	0%	0%	1%	2%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)		15.1	15.1		15.1		48.9	48.9	48.9	25.0	25.0	25.0
Effective Green, g (s)		15.1	15.1		15.1		48.9	48.9	48.9	25.0	25.0	25.0
Actuated g/C Ratio		0.20	0.20		0.20		0.64	0.64	0.64	0.32	0.32	0.32
Clearance Time (s)		6.0	6.0		6.0		2.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0		1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)		271	306		274		613	2247	998	217	1137	512
v/s Ratio Prot							0.05	c0.22			c0.26	
v/s Ratio Perm		0.06	0.01		c0.12		0.07		0.03	0.12		0.01
v/c Ratio		0.32	0.06		0.63		0.19	0.35	0.05	0.37	0.79	0.02
Uniform Delay, d1		26.6	25.2		28.4		6.9	6.6	5.3	20.0	23.6	17.7
Progression Factor		1.00	1.00		1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.7	0.1		4.7		0.7	0.4	0.1	4.9	5.6	0.1
Delay (s)		27.2	25.3		33.1		7.6	7.0	5.4	24.8	29.2	17.8
Level of Service		C	C		C		A	A	A	C	C	B
Approach Delay (s)		26.2			33.1			7.0			28.4	
Approach LOS		C			C			A			C	

Intersection Summary				
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	83.0%	ICU Level of Service	E	
Analysis Period (min)	15			
c Critical Lane Group				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	140	53	77	165	171	53	497	43	254	540	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	7.0	7.0	7.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	1822		1719	1881	1530	1769	3539	1482	1736	3505	1581
Flt Permitted	0.54	1.00		0.48	1.00	1.00	0.42	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	1018	1822		875	1881	1530	781	3539	1482	804	3505	1581
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	182	159	60	88	188	194	60	565	49	289	614	249
RTOR Reduction (vph)	0	26	0	0	0	148	0	0	20	0	0	103
Lane Group Flow (vph)	182	193	0	88	188	46	60	565	29	289	614	146
Confl. Peds. (#/hr)	2					2	1					1
Heavy Vehicles (%)	1%	0%	0%	5%	1%	4%	2%	2%	9%	4%	3%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	13.6	13.6		13.6	13.6	13.6	33.4	33.4	33.4	33.4	33.4	33.4
Effective Green, g (s)	13.6	13.6		13.6	13.6	13.6	33.4	33.4	33.4	33.4	33.4	33.4
Actuated g/C Ratio	0.24	0.24		0.24	0.24	0.24	0.59	0.59	0.59	0.59	0.59	0.59
Clearance Time (s)	3.0	3.0		3.0	3.0	3.0	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	3.0	3.0
Lane Grp Cap (vph)	242	434		208	448	365	457	2073	868	471	2053	926
v/s Ratio Prot		0.11			0.10			0.16			0.18	
v/s Ratio Perm	c0.18			0.10		0.03	0.08		0.02	c0.36		0.09
v/c Ratio	0.75	0.44		0.42	0.42	0.13	0.13	0.27	0.03	0.61	0.30	0.16
Uniform Delay, d1	20.1	18.5		18.4	18.4	17.0	5.3	5.8	5.0	7.6	5.9	5.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.4	0.7		1.4	0.6	0.2	0.6	0.3	0.1	5.9	0.4	0.4
Delay (s)	32.5	19.2		19.8	19.0	17.2	5.9	6.1	5.1	13.5	6.3	5.7
Level of Service	C	B		B	B	B	A	A	A	B	A	A
Approach Delay (s)		25.3			18.4			6.0			8.0	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Appendix D2: Detailed Synchro Reports for County Road 44

HCM Signalized Intersection Capacity Analysis
32: CR 44/Rama Rd & Casino Rama Entrance

7/17/2013

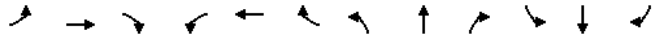
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	9	224	18	7	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1641	1455	1810	1615	1805	1810
Flt Permitted	0.95	1.00	1.00	1.00	0.57	1.00
Satd. Flow (perm)	1641	1455	1810	1615	1076	1810
Peak-hour factor, PHF	0.70	0.70	0.70	0.70	0.70	0.70
Adj. Flow (vph)	14	13	320	26	10	261
RTOR Reduction (vph)	0	12	0	7	0	0
Lane Group Flow (vph)	14	1	320	19	10	261
Heavy Vehicles (%)	10%	11%	5%	0%	0%	5%
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	2.0	2.0	37.1	37.1	37.1	37.1
Effective Green, g (s)	2.0	2.0	37.1	37.1	37.1	37.1
Actuated g/C Ratio	0.04	0.04	0.73	0.73	0.73	0.73
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.5	2.5	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	64	56	1314	1172	781	1314
v/s Ratio Prot	c0.01		c0.18			0.14
v/s Ratio Perm		0.00		0.01	0.01	
v/c Ratio	0.22	0.01	0.24	0.02	0.01	0.20
Uniform Delay, d1	23.8	23.6	2.3	1.9	1.9	2.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.0	0.4	0.0	0.0	0.3
Delay (s)	25.0	23.6	2.8	2.0	2.0	2.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	24.4		2.7			2.6
Approach LOS	C		A			A

Intersection Summary				
HCM 2000 Control Delay	3.6	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.24			
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	51.7%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
33: CR 44/Rama Rd & Fern Resort Rd/CR45/Monck Rd

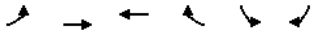
7/17/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	1	7	74	0	15	12	327	29	4	201	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.2	7.2	7.2	7.2	7.2	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00			1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.91			0.98		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1264			1712		1357	1810	1476	1803	1858	
Flt Permitted		0.87			0.75		0.60	1.00	1.00	0.52	1.00	
Satd. Flow (perm)		1115			1341		853	1810	1476	982	1858	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	4	1	9	95	0	19	15	419	37	5	258	4
RTOR Reduction (vph)	0	8	0	0	55	0	0	0	16	0	0	0
Lane Group Flow (vph)	0	6	0	0	59	0	15	419	21	5	262	0
Confl. Peds. (#/hr)									2	2		
Heavy Vehicles (%)	67%	100%	14%	5%	0%	0%	33%	5%	7%	0%	1%	67%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		8.5			8.5		29.4	29.4	29.4	29.4	29.4	
Effective Green, g (s)		8.5			8.5		29.4	29.4	29.4	29.4	29.4	
Actuated g/C Ratio		0.16			0.16		0.56	0.56	0.56	0.56	0.56	
Clearance Time (s)		7.0			7.0		7.2	7.2	7.2	7.2	7.2	
Vehicle Extension (s)		5.0			5.0		1.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)		181			218		481	1021	832	554	1048	
v/s Ratio Prot								c0.23			0.14	
v/s Ratio Perm		0.01			c0.04		0.02		0.01	0.01		
v/c Ratio		0.04			0.27		0.03	0.41	0.03	0.01	0.25	
Uniform Delay, d1		18.4			19.1		5.0	6.4	5.0	5.0	5.8	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.2			1.4		0.1	1.2	0.1	0.0	0.6	
Delay (s)		18.5			20.5		5.2	7.7	5.1	5.0	6.3	
Level of Service		B			C		A	A	A	A	A	
Approach Delay (s)		18.5			20.5			7.4			6.3	
Approach LOS		B			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	14.2	
Intersection Capacity Utilization	67.8%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	384	256	472	38	36	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3273	3282	3399		1480	1509
Flt Permitted	0.43	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1468	3282	3399		1480	1509
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	447	298	549	44	42	408
RTOR Reduction (vph)	0	0	12	0	0	128
Lane Group Flow (vph)	447	298	581	0	42	280
Heavy Vehicles (%)	7%	10%	4%	18%	22%	7%
Turn Type	Perm	NA	NA		NA	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	20.5	20.5	20.5		11.5	11.5
Effective Green, g (s)	20.5	20.5	20.5		11.5	11.5
Actuated g/C Ratio	0.51	0.51	0.51		0.29	0.29
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	752	1682	1741		425	433
v/s Ratio Prot		0.09	0.17		0.03	
v/s Ratio Perm	c0.30					c0.19
v/c Ratio	0.59	0.18	0.33		0.10	0.65
Uniform Delay, d1	6.8	5.2	5.7		10.5	12.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.4	0.2	0.5		0.1	3.3
Delay (s)	10.3	5.5	6.3		10.6	15.8
Level of Service	B	A	A		B	B
Approach Delay (s)		8.4	6.3		15.3	
Approach LOS		A	A		B	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
32: CR 44/Rama Rd & Casino Rama Entrance

7/17/2013

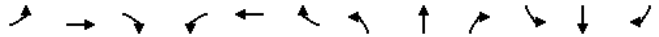
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	59	16	213	40	18	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1615	1827	1495	1805	1810
Flt Permitted	0.95	1.00	1.00	1.00	0.59	1.00
Satd. Flow (perm)	1719	1615	1827	1495	1120	1810
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	77	21	277	52	23	369
RTOR Reduction (vph)	0	18	0	19	0	0
Lane Group Flow (vph)	77	3	277	33	23	369
Heavy Vehicles (%)	5%	0%	4%	8%	0%	5%
Turn Type	NA	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	5.9	5.9	31.1	31.1	31.1	31.1
Effective Green, g (s)	5.9	5.9	31.1	31.1	31.1	31.1
Actuated g/C Ratio	0.12	0.12	0.63	0.63	0.63	0.63
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.5	2.5	0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	206	194	1159	948	710	1148
v/s Ratio Prot	c0.04		0.15			c0.20
v/s Ratio Perm		0.00		0.02	0.02	
v/c Ratio	0.37	0.01	0.24	0.03	0.03	0.32
Uniform Delay, d1	19.8	19.0	3.9	3.3	3.3	4.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.0	0.5	0.1	0.1	0.7
Delay (s)	20.7	19.0	4.3	3.4	3.4	4.8
Level of Service	C	B	A	A	A	A
Approach Delay (s)	20.3		4.2			4.8
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	49.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
33: CR 44/Rama Rd & Fern Resort Rd/CR45/Monck Rd

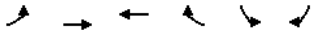
7/17/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	6	48	0	18	28	535	94	19	387	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0		7.2	7.2	7.2	7.2	7.2	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.88			0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1663			1741		1805	1881	1553	1805	1826	
Flt Permitted		0.95			0.78		0.47	1.00	1.00	0.33	1.00	
Satd. Flow (perm)		1583			1406		887	1881	1553	627	1826	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	1	0	8	62	0	23	36	695	122	25	503	3
RTOR Reduction (vph)	0	8	0	0	58	0	0	0	48	0	0	0
Lane Group Flow (vph)	0	1	0	0	27	0	36	695	74	25	506	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	0%	0%	1%	4%	0%	4%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		6.0			6.0		31.2	31.2	31.2	31.2	31.2	
Effective Green, g (s)		6.0			6.0		31.2	31.2	31.2	31.2	31.2	
Actuated g/C Ratio		0.12			0.12		0.61	0.61	0.61	0.61	0.61	
Clearance Time (s)		7.0			7.0		7.2	7.2	7.2	7.2	7.2	
Vehicle Extension (s)		5.0			5.0		1.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)		184			164		538	1141	942	380	1108	
v/s Ratio Prot								c0.37			0.28	
v/s Ratio Perm		0.00			c0.02		0.04		0.05	0.04		
v/c Ratio		0.01			0.16		0.07	0.61	0.08	0.07	0.46	
Uniform Delay, d1		20.1			20.4		4.1	6.3	4.2	4.1	5.5	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0			1.0		0.2	2.4	0.2	0.3	1.4	
Delay (s)		20.1			21.4		4.4	8.7	4.3	4.5	6.8	
Level of Service		C			C		A	A	A	A	A	
Approach Delay (s)		20.1			21.4			7.9			6.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	51.4	Sum of lost time (s)	14.2
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	654	601	380	40	74	637
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	3433	3505	3345		1687	1568
Flt Permitted	0.45	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1635	3505	3345		1687	1568
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	807	742	469	49	91	786
RTOR Reduction (vph)	0	0	20	0	0	142
Lane Group Flow (vph)	807	742	498	0	91	644
Heavy Vehicles (%)	2%	3%	6%	10%	7%	3%
Turn Type	Perm	NA	NA		NA	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)	16.0	16.0	16.0		16.0	16.0
Effective Green, g (s)	16.0	16.0	16.0		16.0	16.0
Actuated g/C Ratio	0.40	0.40	0.40		0.40	0.40
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	654	1402	1338		674	627
v/s Ratio Prot		0.21	0.15		0.05	
v/s Ratio Perm	c0.49					c0.41
v/c Ratio	1.23	0.53	0.37		0.14	1.03
Uniform Delay, d1	12.0	9.1	8.5		7.6	12.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	118.2	1.4	0.8		0.1	43.2
Delay (s)	130.2	10.6	9.3		7.7	55.2
Level of Service	F	B	A		A	E
Approach Delay (s)		72.9	9.3		50.3	
Approach LOS		E	A		D	

Intersection Summary			
HCM 2000 Control Delay	55.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix D3: Detailed Synchro Reports for County Road 24 and County Road 32

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	EB	WB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	1	1	2
Adj Approach Flow, veh/h	164	404	332
Demand Flow Rate, veh/h	174	441	347
Vehicles Circulating, veh/h	307	26	147
Vehicles Exiting, veh/h	187	455	320
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	5.6	5.7	6.5
Approach LOS	A	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LTR	R
Assumed Moves	LT	TR	LT	R	LT	R
RT Channelized						
Lane Util	0.471	0.529	0.333	0.667	0.885	0.115
Critical Headway, s	5.193	5.193	5.193	5.193	4.293	4.113
Entry Flow, veh/h	82	92	147	294	307	40
Cap Entry Lane, veh/h	831	831	1101	1101	1012	1019
Entry HV Adj Factor	0.942	0.947	0.901	0.925	0.951	1.000
Flow Entry, veh/h	77	87	132	272	292	40
Cap Entry, veh/h	783	787	992	1019	963	1019
V/C Ratio	0.099	0.111	0.134	0.267	0.303	0.039
Control Delay, s/veh	5.6	5.7	4.9	6.2	6.9	3.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	0	0	1	1	0

HCM Signalized Intersection Capacity Analysis
51: CR124/Hurontario St & Poplar SRd

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	122	98	29	107	206	92	328	46	116	166	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5		6.5	6.5	4.0	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1656	1743	1509		1687	1482	1624	1776	1292	1594	1802	
Flt Permitted	0.66	1.00	1.00		0.89	1.00	0.56	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	1143	1743	1509		1511	1482	950	1776	1292	895	1802	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	40	144	115	34	126	242	108	386	54	136	195	13
RTOR Reduction (vph)	0	0	85	0	0	198	0	0	20	0	3	0
Lane Group Flow (vph)	40	144	30	0	160	44	108	386	34	136	205	0
Confl. Peds. (#/hr)							3		3	3		3
Heavy Vehicles (%)	9%	9%	7%	28%	7%	9%	11%	7%	22%	13%	4%	9%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	12.0	12.0	12.0		12.0	12.0	41.0	41.0	41.0	31.0	31.0	
Effective Green, g (s)	12.0	12.0	12.0		12.0	12.0	41.0	41.0	41.0	31.0	31.0	
Actuated g/C Ratio	0.18	0.18	0.18		0.18	0.18	0.62	0.62	0.62	0.47	0.47	
Clearance Time (s)	6.5	6.5	6.5		6.5	6.5	4.0	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	316	274		274	269	651	1103	802	420	846	
v/s Ratio Prot		0.08					0.02	c0.22			0.11	
v/s Ratio Perm	0.04		0.02		c0.11	0.03	0.09		0.03	0.15		
v/c Ratio	0.19	0.46	0.11		0.58	0.16	0.17	0.35	0.04	0.32	0.24	
Uniform Delay, d1	22.9	24.1	22.5		24.7	22.8	5.2	6.1	4.9	10.9	10.5	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	1.0	0.2		3.2	0.3	0.1	0.9	0.1	2.0	0.7	
Delay (s)	23.4	25.1	22.7		27.9	23.1	5.3	6.9	5.0	13.0	11.2	
Level of Service	C	C	C		C	C	A	A	A	B	B	
Approach Delay (s)		24.0			25.0			6.4			11.9	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	17.0	
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
52: CR124 & CR91

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	45	2	20	35	93	1	115	70	82	70	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5	7.5		8.0		7.5	7.5	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	1.00		0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		1.00			1.00	0.85		0.95		1.00	0.98	
Flt Protected		0.98			0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1558			1351	1468		1631		1639	1605	
Flt Permitted		0.82			0.84	1.00		1.00		0.61	1.00	
Satd. Flow (perm)		1304			1150	1468		1631		1058	1605	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	50	56	2	25	44	116	1	144	88	102	88	12
RTOR Reduction (vph)	0	1	0	0	0	97	0	22	0	0	5	0
Lane Group Flow (vph)	0	107	0	0	69	19	0	211	0	102	95	0
Confl. Peds. (#/hr)							1		1	1		1
Heavy Vehicles (%)	10%	24%	100%	40%	37%	10%	0%	7%	14%	10%	14%	30%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.7			10.7	10.7		38.3		38.8	38.8	
Effective Green, g (s)		10.7			10.7	10.7		38.3		38.8	38.8	
Actuated g/C Ratio		0.17			0.17	0.17		0.59		0.60	0.60	
Clearance Time (s)		7.5			7.5	7.5		8.0		7.5	7.5	
Vehicle Extension (s)		5.0			5.0	5.0		0.2		0.2	0.2	
Lane Grp Cap (vph)		216			190	243		968		636	965	
v/s Ratio Prot											0.06	
v/s Ratio Perm		c0.08			0.06	0.01		0.13		0.10		
v/c Ratio		0.50			0.36	0.08		0.22		0.16	0.10	
Uniform Delay, d1		24.4			23.9	22.7		6.1		5.7	5.4	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		3.7			2.5	0.3		0.5		0.5	0.2	
Delay (s)		28.2			26.3	23.0		6.6		6.2	5.6	
Level of Service		C			C	C		A		A	A	
Approach Delay (s)		28.2			24.3			6.6			5.9	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.28			
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	15.5	
Intersection Capacity Utilization	68.9%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
47: CR124 & 33/34 Sideroad Nottawasaga

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	16	11	9	13	33	14	231	9	39	180	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	16	21	14	12	17	43	18	300	12	51	234	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)						1						
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	701	683	234	696	683	300	245			312		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	701	683	234	696	683	300	245			312		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	95	94	98	96	95	94	99			96		
cM capacity (veh/h)	310	354	810	323	354	744	1292			1243		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	51	71	318	12	284	12
Volume Left	16	12	18	0	51	0
Volume Right	14	43	0	12	0	12
cSH	400	853	1292	1700	1243	1700
Volume to Capacity	0.13	0.08	0.01	0.01	0.04	0.01
Queue Length 95th (m)	3.4	2.2	0.3	0.0	1.0	0.0
Control Delay (s)	15.3	12.7	0.6	0.0	1.7	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	15.3	12.7	0.6		1.7	
Approach LOS	C	B				

Intersection Summary					
Average Delay	3.2				
Intersection Capacity Utilization	43.4%	ICU Level of Service		A	
Analysis Period (min)	15				

Intersection	
Intersection Delay, s/veh	5.8
Intersection LOS	A

Approach	EB	WB	SB
Entry Lanes	2	2	2
Conflicting Circle Lanes	1	1	2
Adj Approach Flow, veh/h	152	311	336
Demand Flow Rate, veh/h	166	328	361
Vehicles Circulating, veh/h	318	38	111
Vehicles Exiting, veh/h	154	446	255
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	5.8	5.0	6.5
Approach LOS	A	A	A

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LTR	R
Assumed Moves	LT	TR	LT	R	LT	R
RT Channelized						
Lane Util	0.470	0.530	0.338	0.662	0.881	0.119
Critical Headway, s	5.193	5.193	5.193	5.193	4.293	4.113
Entry Flow, veh/h	78	88	111	217	318	43
Cap Entry Lane, veh/h	822	822	1088	1088	1040	1045
Entry HV Adj Factor	0.918	0.917	0.935	0.954	0.925	0.977
Flow Entry, veh/h	72	81	104	207	294	42
Cap Entry, veh/h	755	754	1017	1038	961	1021
V/C Ratio	0.095	0.107	0.102	0.199	0.306	0.041
Control Delay, s/veh	5.7	5.9	4.5	5.3	6.9	3.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	0	0	0	1	1	0

HCM Signalized Intersection Capacity Analysis
51: CR124/Hurontario St & Poplar SRd

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	126	149	45	136	125	104	276	23	174	345	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5		6.5	6.5	4.0	6.5	6.5	6.5	6.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1810	1509		1800	1553	1640	1863	1615	1641	1743	
Flt Permitted	0.57	1.00	1.00		0.87	1.00	0.34	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	1048	1810	1509		1577	1553	579	1863	1615	960	1743	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	37	156	184	56	168	154	128	341	28	215	426	47
RTOR Reduction (vph)	0	0	102	0	0	121	0	0	11	0	4	0
Lane Group Flow (vph)	37	156	82	0	224	33	128	341	17	215	469	0
Confl. Peds. (#/hr)							4					4
Heavy Vehicles (%)	3%	5%	7%	11%	2%	4%	10%	2%	0%	10%	7%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		
Actuated Green, G (s)	14.5	14.5	14.5		14.5	14.5	41.0	41.0	41.0	30.6	30.6	
Effective Green, g (s)	14.5	14.5	14.5		14.5	14.5	41.0	41.0	41.0	30.6	30.6	
Actuated g/C Ratio	0.21	0.21	0.21		0.21	0.21	0.60	0.60	0.60	0.45	0.45	
Clearance Time (s)	6.5	6.5	6.5		6.5	6.5	4.0	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	221	383	319		333	328	445	1115	966	428	778	
v/s Ratio Prot		0.09					0.03	c0.18			c0.27	
v/s Ratio Perm	0.04		0.05		c0.14	0.02	0.14		0.01	0.22		
v/c Ratio	0.17	0.41	0.26		0.67	0.10	0.29	0.31	0.02	0.50	0.60	
Uniform Delay, d1	22.1	23.3	22.5		24.8	21.7	7.0	6.8	5.6	13.5	14.4	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.7	0.4		5.3	0.1	0.4	0.7	0.0	4.2	3.4	
Delay (s)	22.4	24.0	22.9		30.1	21.9	7.4	7.5	5.6	17.7	17.8	
Level of Service	C	C	C		C	C	A	A	A	B	B	
Approach Delay (s)		23.3			26.7			7.3			17.8	
Approach LOS		C			C			A			B	

Intersection Summary				
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	17.0	
Intersection Capacity Utilization	71.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
52: CR124 & CR91

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	52	4	82	54	98	2	135	81	117	122	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.5			7.5	7.5		8.0		7.5	7.5	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.98		1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		0.99			1.00	0.85		0.95		1.00	0.96	
Flt Protected		0.98			0.97	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1715			1658	1549		1624		1656	1700	
Flt Permitted		0.81			0.75	1.00		1.00		0.60	1.00	
Satd. Flow (perm)		1414			1286	1549		1622		1040	1700	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	41	63	5	99	65	118	2	163	98	141	147	53
RTOR Reduction (vph)	0	2	0	0	0	63	0	24	0	0	15	0
Lane Group Flow (vph)	0	107	0	0	164	55	0	239	0	141	185	0
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	6%	8%	25%	16%	4%	2%	50%	7%	17%	9%	10%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		16.1			16.1	16.1		36.9		37.4	37.4	
Effective Green, g (s)		16.1			16.1	16.1		36.9		37.4	37.4	
Actuated g/C Ratio		0.24			0.24	0.24		0.54		0.55	0.55	
Clearance Time (s)		7.5			7.5	7.5		8.0		7.5	7.5	
Vehicle Extension (s)		5.0			5.0	5.0		0.2		0.2	0.2	
Lane Grp Cap (vph)		332			302	364		873		567	928	
v/s Ratio Prot											0.11	
v/s Ratio Perm		0.08			c0.13	0.04		c0.15		0.14		
v/c Ratio		0.32			0.54	0.15		0.27		0.25	0.20	
Uniform Delay, d1		21.7			23.0	20.8		8.5		8.2	7.9	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.2			3.5	0.4		0.8		1.0	0.5	
Delay (s)		22.9			26.5	21.2		9.3		9.2	8.4	
Level of Service		C			C	C		A		A	A	
Approach Delay (s)		22.9			24.2			9.3			8.7	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.35			
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	15.5	
Intersection Capacity Utilization	61.3%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
47: CR124 & 33/34 Sideroad Nottawasaga

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	17	15	13	19	39	13	234	12	57	256	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	4	21	18	16	23	48	16	285	15	70	312	9
Pedestrians		1			2							
Lane Width (m)		3.6			3.6							
Walking Speed (m/s)		1.2			1.2							
Percent Blockage		0			0							
Right turn flare (veh)						1						
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	805	786	313	799	780	287	322			302		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	805	786	313	799	780	287	322			302		
tC, single (s)	7.1	6.6	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	93	97	94	92	94	99			94		
cM capacity (veh/h)	253	297	715	267	306	755	1248			1257		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	43	87	301	15	382	9
Volume Left	4	16	16	0	70	0
Volume Right	18	48	0	15	0	9
cSH	389	644	1248	1700	1257	1700
Volume to Capacity	0.11	0.13	0.01	0.01	0.06	0.01
Queue Length 95th (m)	2.9	3.7	0.3	0.0	1.4	0.0
Control Delay (s)	15.4	14.2	0.5	0.0	1.9	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	15.4	14.2	0.5		1.9	
Approach LOS	C	B				

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	44.8%	ICU Level of Service		A
Analysis Period (min)	15			



Appendix D4: Detailed Synchro Reports for County Road 27

HCM Signalized Intersection Capacity Analysis
71: CR27/PA-CR27 & CR90/Dunlop St W

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	635	316	128	418	18	207	7	131	4	2	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6	7.6	3.0	7.6		3.0	7.4		7.4	7.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.86		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3438	1568	1656	3238		1612	1534		1805	1163	
Flt Permitted	0.47	1.00	1.00	0.32	1.00		0.61	1.00		1.00	1.00	
Satd. Flow (perm)	884	3438	1568	562	3238		1028	1534		1900	1163	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	5	738	367	149	486	21	241	8	152	5	2	6
RTOR Reduction (vph)	0	0	160	0	2	0	0	122	0	0	6	0
Lane Group Flow (vph)	5	738	207	149	505	0	241	38	0	5	2	0
Heavy Vehicles (%)	0%	5%	3%	9%	11%	6%	12%	29%	5%	0%	0%	60%
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	62.1	62.1	62.1	73.5	73.5		21.6	21.6		3.6	3.6	
Effective Green, g (s)	62.1	62.1	62.1	73.5	73.5		21.6	21.6		3.6	3.6	
Actuated g/C Ratio	0.56	0.56	0.56	0.67	0.67		0.20	0.20		0.03	0.03	
Clearance Time (s)	7.6	7.6	7.6	3.0	7.6		3.0	7.4		7.4	7.4	
Vehicle Extension (s)	4.5	4.5	4.5	1.0	4.5		1.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	498	1939	884	458	2161		281	300		62	38	
v/s Ratio Prot		c0.21		c0.02	0.16		c0.12	0.02			0.00	
v/s Ratio Perm	0.01		0.13	0.19			c0.05			0.00		
v/c Ratio	0.01	0.38	0.23	0.33	0.23		0.86	0.13		0.08	0.06	
Uniform Delay, d1	10.5	13.3	12.1	7.1	7.2		41.9	36.5		51.6	51.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.6	0.6	0.2	0.3		21.2	0.2		0.6	0.6	
Delay (s)	10.6	13.9	12.7	7.3	7.5		63.1	36.7		52.2	52.2	
Level of Service	B	B	B	A	A		E	D		D	D	
Approach Delay (s)		13.5			7.4			52.6			52.2	
Approach LOS		B			A			D			D	

Intersection Summary				
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.50			
Actuated Cycle Length (s)	110.1	Sum of lost time (s)	21.0	
Intersection Capacity Utilization	70.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
72: CR27 & Ardagh Rd

7/18/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	147	137	233	112	142	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0	7.0	3.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1641	1509	1792	1455	1687	1827
Flt Permitted	0.95	1.00	1.00	1.00	0.52	1.00
Satd. Flow (perm)	1641	1509	1792	1455	918	1827
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	191	178	303	145	184	409
RTOR Reduction (vph)	0	144	0	77	0	0
Lane Group Flow (vph)	191	34	303	68	184	409
Heavy Vehicles (%)	10%	7%	6%	11%	7%	4%
Turn Type	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	13.5	13.5	33.5	33.5	45.1	45.1
Effective Green, g (s)	13.5	13.5	33.5	33.5	45.1	45.1
Actuated g/C Ratio	0.19	0.19	0.47	0.47	0.63	0.63
Clearance Time (s)	6.0	6.0	7.0	7.0	3.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	309	284	838	680	670	1150
v/s Ratio Prot	c0.12		0.17		0.03	c0.22
v/s Ratio Perm		0.02		0.05	0.14	
v/c Ratio	0.62	0.12	0.36	0.10	0.27	0.36
Uniform Delay, d1	26.7	24.1	12.2	10.6	5.6	6.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	0.2	1.2	0.3	0.2	0.9
Delay (s)	30.3	24.3	13.4	10.9	5.8	7.2
Level of Service	C	C	B	B	A	A
Approach Delay (s)	27.4		12.6			6.8
Approach LOS	C		B			A

Intersection Summary				
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	42.4%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
73: CR27 & PA-BCSS

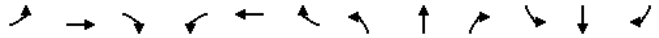
7/18/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	40	71	226	98	115	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0		8.0	8.0	8.0	8.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.91		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1454		1792	1455	1703	1810
Flt Permitted	0.98		1.00	1.00	0.54	1.00
Satd. Flow (perm)	1454		1792	1455	964	1810
Peak-hour factor, PHF	0.60	0.60	0.60	0.60	0.60	0.60
Adj. Flow (vph)	67	118	377	163	192	502
RTOR Reduction (vph)	92	0	0	69	0	0
Lane Group Flow (vph)	93	0	377	94	192	502
Confl. Peds. (#/hr)	1					
Heavy Vehicles (%)	23%	14%	6%	11%	6%	5%
Turn Type	NA		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	13.1		40.0	40.0	40.0	40.0
Effective Green, g (s)	13.1		40.0	40.0	40.0	40.0
Actuated g/C Ratio	0.19		0.58	0.58	0.58	0.58
Clearance Time (s)	8.0		8.0	8.0	8.0	8.0
Vehicle Extension (s)	5.0		0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	275		1037	842	558	1047
v/s Ratio Prot	c0.06		0.21			c0.28
v/s Ratio Perm				0.06	0.20	
v/c Ratio	0.34		0.36	0.11	0.34	0.48
Uniform Delay, d1	24.3		7.8	6.6	7.7	8.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5		1.0	0.3	1.7	1.6
Delay (s)	25.8		8.7	6.8	9.3	10.1
Level of Service	C		A	A	A	B
Approach Delay (s)	25.8		8.2			9.9
Approach LOS	C		A			A

Intersection Summary				
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
74: CR27 & PA-CR21/Innisfil Beach Rd/CR21/Innisfil Beach Rd

7/18/2013

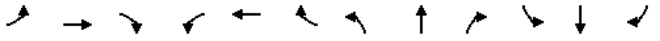


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	107	0	44	0	209	173	170	197	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0	6.0		7.0	7.0	5.0	6.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	1.00		1.00	0.98	1.00	1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1641	1292		1759	1491	1702	1759	
Flt Permitted					0.76	1.00		1.00	1.00	0.54	1.00	
Satd. Flow (perm)					1308	1292		1759	1491	974	1759	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	0	0	0	134	0	55	0	261	216	212	246	0
RTOR Reduction (vph)	0	0	0	0	0	46	0	0	98	0	0	0
Lane Group Flow (vph)	0	0	0	0	134	9	0	261	118	212	246	0
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	0%	0%	0%	10%	0%	25%	0%	8%	6%	6%	8%	0%
Turn Type	Perm			Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					14.7	14.7		50.7	50.7	66.1	66.1	
Effective Green, g (s)					14.7	14.7		50.7	50.7	66.1	66.1	
Actuated g/C Ratio					0.16	0.16		0.55	0.55	0.71	0.71	
Clearance Time (s)					6.0	6.0		7.0	7.0	5.0	6.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)					207	204		961	814	767	1252	
v/s Ratio Prot								0.15		c0.03	0.14	
v/s Ratio Perm					c0.10	0.01			0.08	c0.17		
v/c Ratio					0.65	0.04		0.27	0.14	0.28	0.20	
Uniform Delay, d1					36.6	33.1		11.2	10.4	4.6	4.5	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					6.8	0.1		0.7	0.4	0.2	0.4	
Delay (s)					43.4	33.2		11.9	10.7	4.8	4.8	
Level of Service					D	C		B	B	A	A	
Approach Delay (s)		0.0			40.4			11.4			4.8	
Approach LOS		A			D			B			A	

Intersection Summary				
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.37			
Actuated Cycle Length (s)	92.8	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	64.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
75: CR27 & CR21/Robert St/PA-CR21/Robert St

7/18/2013

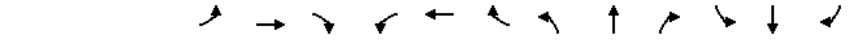


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	275	0	12	0	0	0	14	154	0	0	167	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						6.0			6.0	6.0
Lane Util. Factor		1.00						0.95			1.00	1.00
Frpb, ped/bikes		1.00						1.00			1.00	0.98
Flpb, ped/bikes		1.00						1.00			1.00	1.00
Frt		0.99						1.00			1.00	0.85
Flt Protected		0.95						1.00			1.00	1.00
Satd. Flow (prot)		1767						3331			1810	1463
Flt Permitted		0.73						0.93			1.00	1.00
Satd. Flow (perm)		1361						3101			1810	1463
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	344	0	15	0	0	0	18	192	0	0	209	222
RTOR Reduction (vph)	0	74	0	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	0	285	0	0	0	0	0	210	0	0	209	125
Confl. Peds. (#/hr)			1	1			1					1
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	7%	8%	0%	0%	5%	8%
Turn Type	Perm	NA		Perm			pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		16.2						36.1			36.1	36.1
Effective Green, g (s)		16.2						36.1			36.1	36.1
Actuated g/C Ratio		0.25						0.56			0.56	0.56
Clearance Time (s)		6.0						6.0			6.0	6.0
Vehicle Extension (s)		3.5						3.0			3.0	3.0
Lane Grp Cap (vph)		342						1740			1016	821
v/s Ratio Prot											c0.12	
v/s Ratio Perm		c0.21						0.07				0.09
v/c Ratio		0.83						0.12			0.21	0.15
Uniform Delay, d1		22.8						6.6			7.0	6.8
Progression Factor		1.00						1.00			1.00	1.00
Incremental Delay, d2		16.2						0.0			0.5	0.4
Delay (s)		38.9						6.6			7.4	7.2
Level of Service		D						A			A	A
Approach Delay (s)		38.9			0.0			6.6			7.3	
Approach LOS		D			A			A			A	

Intersection Summary				
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	64.3	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
76: CR27 & Hwy89/Queen St/Hwy89/Church St

7/18/2013

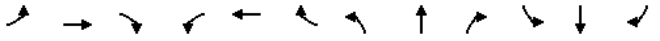


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	434	57	18	380	27	45	56	19	33	133	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes		1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		0.98	1.00		0.99	1.00
Satd. Flow (prot)		1789	1362		1798	1362		1684	1466		1681	1466
Flt Permitted		0.93	1.00		0.96	1.00		0.60	1.00		0.90	1.00
Satd. Flow (perm)		1668	1362		1737	1362		1032	1466		1535	1466
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	50	556	73	23	487	35	58	72	24	42	171	91
RTOR Reduction (vph)	0	0	10	0	0	12	0	0	19	0	0	73
Lane Group Flow (vph)	0	606	63	0	510	23	0	130	5	0	213	18
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	13%	5%	13%	13%	5%	13%	5%	13%	5%	5%	13%	5%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		59.2	59.2		59.2	59.2		17.1	17.1		17.1	17.1
Effective Green, g (s)		59.2	59.2		59.2	59.2		17.1	17.1		17.1	17.1
Actuated g/C Ratio		0.67	0.67		0.67	0.67		0.19	0.19		0.19	0.19
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1118	913		1164	913		199	283		297	283
v/s Ratio Prot												
v/s Ratio Perm		c0.36	0.05		0.29	0.02		0.13	0.00		c0.14	0.01
v/c Ratio		0.54	0.07		0.44	0.03		0.65	0.02		0.72	0.06
Uniform Delay, d1		7.5	5.0		6.8	4.9		32.9	28.8		33.3	29.1
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.5	0.1		1.2	0.1		7.5	0.0		8.0	0.1
Delay (s)		8.1	5.2		8.0	4.9		40.3	28.8		41.3	29.1
Level of Service		A	A		A	A		D	C		D	C
Approach Delay (s)		7.8			7.8			38.5			37.7	
Approach LOS		A			A			D			D	

Intersection Summary				
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	92.1%	ICU Level of Service	F	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
77: CR27 & CR1/Line 8/Line 8

7/18/2013



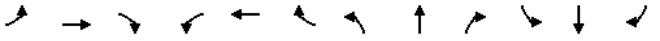
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	37	157	4	11	1	33	60	0	9	236	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		3.0	6.0			6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00			1.00	0.85
Flt Protected		0.98	1.00		0.99		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1866	1468		1569		1492	1520			1803	1495
Flt Permitted		0.87	1.00		0.92		0.53	1.00			0.99	1.00
Satd. Flow (perm)		1657	1468		1460		833	1520			1793	1495
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	27	47	199	5	14	1	42	76	0	11	299	32
RTOR Reduction (vph)	0	0	168	0	1	0	0	0	0	0	0	14
Lane Group Flow (vph)	0	74	31	0	19	0	42	76	0	0	310	18
Heavy Vehicles (%)	0%	0%	10%	50%	9%	0%	21%	25%	0%	11%	5%	8%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		10.6	10.6		10.6		44.9	44.9			38.7	38.7
Effective Green, g (s)		10.6	10.6		10.6		44.9	44.9			38.7	38.7
Actuated g/C Ratio		0.16	0.16		0.16		0.67	0.67			0.57	0.57
Clearance Time (s)		6.0	6.0		6.0		3.0	6.0			6.0	6.0
Vehicle Extension (s)		4.0	4.0		4.0		3.0	1.0			1.0	1.0
Lane Grp Cap (vph)		260	230		229		585	1011			1027	857
v/s Ratio Prot							0.00	c0.05				
v/s Ratio Perm		c0.04	0.02		0.01		0.04				c0.17	0.01
v/c Ratio		0.28	0.14		0.08		0.07	0.08			0.30	0.02
Uniform Delay, d1		25.1	24.5		24.3		4.0	4.0			7.4	6.2
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		0.8	0.4		0.2		0.1	0.1			0.8	0.0
Delay (s)		25.9	24.9		24.5		4.0	4.1			8.2	6.3
Level of Service		C	C		C		A	A			A	A
Approach Delay (s)		25.2			24.5			4.1			8.0	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.29			
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
78: CR27 & Line 7/CR88/Line 7

7/18/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	58	30	93	11	52	5	44	17	138	306	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt		0.96			1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected		1.00			0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1729			1678	1233	1501	1561		1612	1827	1051
Flt Permitted		0.99			0.74	1.00	0.53	1.00		0.71	1.00	1.00
Satd. Flow (perm)		1707			1298	1233	830	1561		1198	1827	1051
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	4	74	38	119	14	67	6	56	22	177	392	5
RTOR Reduction (vph)	0	23	0	0	0	56	0	7	0	0	0	2
Lane Group Flow (vph)	0	93	0	0	133	11	6	71	0	177	392	3
Confl. Peds. (#/hr)			2	2			2					2
Heavy Vehicles (%)	33%	3%	3%	9%	0%	31%	20%	16%	18%	12%	4%	50%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)		12.9			12.9	12.9	53.4	53.4		53.4	53.4	53.4
Effective Green, g (s)		12.9			12.9	12.9	53.4	53.4		53.4	53.4	53.4
Actuated g/C Ratio		0.16			0.16	0.16	0.67	0.67		0.67	0.67	0.67
Clearance Time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0	3.0	4.5	4.5		4.5	4.5	4.5
Lane Grp Cap (vph)		274			208	198	551	1038		796	1214	698
v/s Ratio Prot								0.05			c0.21	
v/s Ratio Perm		0.05			c0.10	0.01	0.01			0.15		0.00
v/c Ratio		0.34			0.64	0.05	0.01	0.07		0.22	0.32	0.00
Uniform Delay, d1		29.9			31.5	28.5	4.5	4.7		5.3	5.7	4.5
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.7			6.3	0.1	0.0	0.1		0.6	0.7	0.0
Delay (s)		30.7			37.8	28.7	4.6	4.8		5.9	6.4	4.5
Level of Service		C			D	C	A	A		A	A	A
Approach Delay (s)		30.7			34.8			4.8			6.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	80.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	697	248	293	307	12	26	62	122	52	302	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1641	3312	1482	1752	3195	1214	1193	3282	1392	1641	3346	
Flt Permitted	0.53	1.00	1.00	0.32	1.00	1.00	0.31	1.00	1.00	0.71	1.00	
Satd. Flow (perm)	918	3312	1482	589	3195	1214	387	3282	1392	1219	3346	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	58	840	299	353	370	14	31	75	147	63	364	36
RTOR Reduction (vph)	0	0	17	0	0	4	0	0	123	0	8	0
Lane Group Flow (vph)	58	840	282	353	370	10	31	75	24	63	392	0
Confl. Peds. (#/hr)							3					3
Heavy Vehicles (%)	10%	9%	9%	3%	13%	33%	51%	10%	16%	10%	5%	19%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	66.0	66.0	66.0	66.0	66.0	66.0	14.4	14.4	14.4	14.4	14.4	
Effective Green, g (s)	66.0	66.0	66.0	66.0	66.0	66.0	14.4	14.4	14.4	14.4	14.4	
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.75	0.75	0.16	0.16	0.16	0.16	0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	685	2472	1106	439	2385	906	63	534	226	198	545	
v/s Ratio Prot		0.25			0.12			0.02			c0.12	
v/s Ratio Perm	0.06		0.19	c0.60		0.01	0.08		0.02	0.05		
v/c Ratio	0.08	0.34	0.25	0.80	0.16	0.01	0.49	0.14	0.11	0.32	0.72	
Uniform Delay, d1	3.0	3.8	3.5	7.1	3.2	2.9	33.7	31.7	31.5	32.7	35.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.4	0.6	14.5	0.1	0.0	5.9	0.1	0.2	0.9	4.5	
Delay (s)	3.3	4.2	4.1	21.6	3.3	2.9	39.6	31.8	31.7	33.6	39.6	
Level of Service	A	A	A	C	A	A	D	C	C	C	D	
Approach Delay (s)		4.1			12.1			32.7			38.8	
Approach LOS		A			B			C			D	

Intersection Summary				
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
71: CR27/PA-CR27 & CR90/Dunlop St W

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	768	283	141	668	65	446	51	127	84	38	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	7.6	7.6	3.0	7.6		3.0	7.4		7.4	7.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.89		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	3343	1538	1770	3431		1770	1620		1770	1660	
Flt Permitted	0.34	1.00	1.00	0.25	1.00		0.58	1.00		0.63	1.00	
Satd. Flow (perm)	623	3343	1538	462	3431		1080	1620		1178	1660	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	29	863	318	158	751	73	501	57	143	94	43	55
RTOR Reduction (vph)	0	0	158	0	5	0	0	75	0	0	38	0
Lane Group Flow (vph)	29	863	160	158	819	0	501	125	0	94	60	0
Heavy Vehicles (%)	4%	8%	5%	2%	4%	2%	2%	4%	5%	2%	11%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		3	8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	61.2	61.2	61.2	73.1	73.1		33.3	33.3		15.3	15.3	
Effective Green, g (s)	61.2	61.2	61.2	73.1	73.1		33.3	33.3		15.3	15.3	
Actuated g/C Ratio	0.50	0.50	0.50	0.60	0.60		0.27	0.27		0.13	0.13	
Clearance Time (s)	7.6	7.6	7.6	3.0	7.6		3.0	7.4		7.4	7.4	
Vehicle Extension (s)	4.5	4.5	4.5	1.0	4.5		1.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	314	1685	775	374	2065		381	444		148	209	
v/s Ratio Prot		c0.26		c0.03	0.24		c0.16	0.08			0.04	
v/s Ratio Perm	0.05		0.10	0.22			c0.20			0.08		
v/c Ratio	0.09	0.51	0.21	0.42	0.40		1.31	0.28		0.64	0.29	
Uniform Delay, d1	15.7	20.1	16.7	11.9	12.6		42.6	34.6		50.4	48.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.1	0.6	0.3	0.6		159.3	0.4		8.6	0.8	
Delay (s)	16.2	21.2	17.3	12.2	13.2		201.9	35.0		59.0	48.9	
Level of Service	B	C	B	B	B		F	C		E	D	
Approach Delay (s)		20.1			13.0			154.3			53.8	
Approach LOS		C			B			F			D	

Intersection Summary				
HCM 2000 Control Delay	50.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	0.78			
Actuated Cycle Length (s)	121.4	Sum of lost time (s)	21.0	
Intersection Capacity Utilization	92.4%	ICU Level of Service	F	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
72: CR27 & Ardagh Rd

7/18/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	76	164	468	127	170	312
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	7.0	7.0	3.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1671	1599	1845	1548	1735	1696
Flt Permitted	0.95	1.00	1.00	1.00	0.32	1.00
Satd. Flow (perm)	1671	1599	1845	1548	592	1696
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	89	193	551	149	200	367
RTOR Reduction (vph)	0	166	0	74	0	0
Lane Group Flow (vph)	89	27	551	75	200	367
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	8%	1%	3%	3%	4%	12%
Turn Type	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	9.4	9.4	33.9	33.9	45.0	45.0
Effective Green, g (s)	9.4	9.4	33.9	33.9	45.0	45.0
Actuated g/C Ratio	0.14	0.14	0.50	0.50	0.67	0.67
Clearance Time (s)	6.0	6.0	7.0	7.0	3.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	233	223	927	778	532	1132
v/s Ratio Prot	c0.05		c0.30		c0.05	0.22
v/s Ratio Perm		0.02		0.05	0.21	
v/c Ratio	0.38	0.12	0.59	0.10	0.38	0.32
Uniform Delay, d1	26.4	25.4	11.9	8.7	5.3	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	2.8	0.2	0.4	0.8
Delay (s)	27.4	25.6	14.7	9.0	5.8	5.5
Level of Service	C	C	B	A	A	A
Approach Delay (s)	26.2		13.5			5.6
Approach LOS	C		B			A

Intersection Summary				
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.52			
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	55.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
73: CR27 & PA-BCSS

7/18/2013

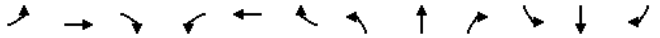
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	8	8	540	1	7	369
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	8.0		8.0	8.0	8.0	8.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.93		1.00	0.85	1.00	1.00
Flt Protected	0.98		1.00	1.00	0.95	1.00
Satd. Flow (prot)	1623		1881	1615	1805	1827
Flt Permitted	0.98		1.00	1.00	0.42	1.00
Satd. Flow (perm)	1623		1881	1615	798	1827
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	9	9	614	1	8	419
RTOR Reduction (vph)	9	0	0	0	0	0
Lane Group Flow (vph)	9	0	614	1	8	419
Heavy Vehicles (%)	0%	13%	1%	0%	0%	4%
Turn Type	NA		NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases				2	6	
Actuated Green, G (s)	2.3		52.2	52.2	52.2	52.2
Effective Green, g (s)	2.3		52.2	52.2	52.2	52.2
Actuated g/C Ratio	0.03		0.74	0.74	0.74	0.74
Clearance Time (s)	8.0		8.0	8.0	8.0	8.0
Vehicle Extension (s)	5.0		0.2	0.2	0.2	0.2
Lane Grp Cap (vph)	52		1392	1195	590	1352
v/s Ratio Prot	c0.01		c0.33			0.23
v/s Ratio Perm				0.00	0.01	
v/c Ratio	0.18		0.44	0.00	0.01	0.31
Uniform Delay, d1	33.2		3.5	2.4	2.4	3.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4		1.0	0.0	0.0	0.6
Delay (s)	36.6		4.5	2.4	2.4	3.7
Level of Service	D		A	A	A	A
Approach Delay (s)	36.6		4.5			3.7
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
74: CR27 & PA-CR21/Innisfil Beach Rd/CR21/Innisfil Beach Rd

7/18/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	258	0	140	0	477	303	107	230	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					6.0	6.0		7.0	7.0	5.0	6.0	
Lane Util. Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Frpb, ped/bikes					1.00	1.00		1.00	1.00	1.00	1.00	
Flpb, ped/bikes					1.00	1.00		1.00	1.00	1.00	1.00	
Frt					1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected					0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)					1728	1482		1863	1509	1719	1863	
Flt Permitted					0.76	1.00		1.00	1.00	0.28	1.00	
Satd. Flow (perm)					1378	1482		1863	1509	515	1863	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	297	0	161	0	548	348	123	264	0
RTOR Reduction (vph)	0	0	0	0	0	119	0	0	177	0	0	0
Lane Group Flow (vph)	0	0	0	0	297	42	0	548	171	123	264	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	0%	0%	0%	4%	0%	9%	0%	2%	7%	5%	2%	0%
Turn Type	Perm			Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)					27.7	27.7		51.5	51.5	66.4	66.4	
Effective Green, g (s)					27.7	27.7		51.5	51.5	66.4	66.4	
Actuated g/C Ratio					0.26	0.26		0.49	0.49	0.63	0.63	
Clearance Time (s)					6.0	6.0		7.0	7.0	5.0	6.0	
Vehicle Extension (s)					3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)					359	386		904	732	423	1165	
v/s Ratio Prot								c0.29		c0.02	0.14	
v/s Ratio Perm					c0.22	0.03			0.11	0.16		
v/c Ratio					0.83	0.11		0.61	0.23	0.29	0.23	
Uniform Delay, d1					36.9	29.8		19.9	15.8	10.7	8.7	
Progression Factor					1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2					14.4	0.1		3.0	0.7	0.4	0.5	
Delay (s)					51.4	29.9		22.9	16.6	11.0	9.1	
Level of Service					D	C		C	B	B	A	
Approach Delay (s)		0.0			43.8			20.5			9.7	
Approach LOS		A			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
75: CR27 & CR21/Robert St/PA-CR21/Robert St

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	345	0	22	0	0	0	33	446	0	0	241	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0						6.0			6.0	6.0
Lane Util. Factor		1.00						0.95			1.00	1.00
Frpb, ped/bikes		1.00						1.00			1.00	0.97
Flpb, ped/bikes		1.00						1.00			1.00	1.00
Frt		0.99						1.00			1.00	0.85
Flt Protected		0.96						1.00			1.00	1.00
Satd. Flow (prot)		1687						3491			1881	1507
Flt Permitted		0.74						0.92			1.00	1.00
Satd. Flow (perm)		1304						3210			1881	1507
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	411	0	26	0	0	0	39	531	0	0	287	344
RTOR Reduction (vph)	0	72	0	0	0	0	0	0	0	0	0	156
Lane Group Flow (vph)	0	365	0	0	0	0	0	570	0	0	287	188
Confl. Peds. (#/hr)	3		6	6		3	5					5
Heavy Vehicles (%)	6%	0%	9%	0%	0%	0%	3%	3%	0%	0%	1%	4%
Turn Type	Perm	NA		Perm			pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		18.0						36.0			36.0	36.0
Effective Green, g (s)		18.0						36.0			36.0	36.0
Actuated g/C Ratio		0.27						0.55			0.55	0.55
Clearance Time (s)		6.0						6.0			6.0	6.0
Vehicle Extension (s)		3.5						3.0			3.0	3.0
Lane Grp Cap (vph)		355						1750			1026	822
v/s Ratio Prot											0.15	
v/s Ratio Perm		c0.28						c0.18				0.12
v/c Ratio		1.03						0.33			0.28	0.23
Uniform Delay, d1		24.0						8.3			8.0	7.8
Progression Factor		1.00						1.00			1.00	1.00
Incremental Delay, d2		55.2						0.0			0.7	0.6
Delay (s)		79.2						8.3			8.7	8.4
Level of Service		E						A			A	A
Approach Delay (s)		79.2			0.0			8.3			8.6	
Approach LOS		E			A			A			A	

Intersection Summary				
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.59			
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	74.5%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
76: CR27 & Hwy89/Queen St/Hwy89/Church St

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	597	34	15	568	35	65	142	38	38	95	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes		1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		0.99	1.00		1.00	1.00		0.98	1.00		0.99	1.00
Satd. Flow (prot)		1796	1461		1807	1461		1768	1461		1774	1461
Flt Permitted		0.75	1.00		0.98	1.00		0.78	1.00		0.67	1.00
Satd. Flow (perm)		1358	1461		1764	1461		1407	1461		1202	1461
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	102	694	40	17	660	41	76	165	44	44	110	159
RTOR Reduction (vph)	0	0	10	0	0	14	0	0	35	0	0	126
Lane Group Flow (vph)	0	796	30	0	677	27	0	241	9	0	154	33
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		66.2	66.2		66.2	66.2		20.7	20.7		20.7	20.7
Effective Green, g (s)		66.2	66.2		66.2	66.2		20.7	20.7		20.7	20.7
Actuated g/C Ratio		0.67	0.67		0.67	0.67		0.21	0.21		0.21	0.21
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		908	977		1180	977		294	305		251	305
v/s Ratio Prot												
v/s Ratio Perm		c0.59	0.02		0.38	0.02		c0.17	0.01		0.13	0.02
v/c Ratio		0.88	0.03		0.57	0.03		0.82	0.03		0.61	0.11
Uniform Delay, d1		13.1	5.5		8.8	5.5		37.3	31.1		35.5	31.6
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		9.5	0.1		2.0	0.1		16.2	0.0		4.4	0.2
Delay (s)		22.6	5.6		10.8	5.6		53.5	31.2		39.9	31.8
Level of Service		C	A		B	A		D	C		D	C
Approach Delay (s)		21.8			10.5			50.0			35.8	
Approach LOS		C			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	98.9	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	114.5%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
77: CR27 & CR1/Line 8/Line 8

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	16	71	1	53	5	149	264	4	2	81	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0		3.0	6.0			6.0	6.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt		1.00	0.85		0.99		1.00	1.00			1.00	0.85
Flt Protected		0.97	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1845	1482		1878		1703	1870			1880	1553
Flt Permitted		0.77	1.00		0.99		0.63	1.00			0.99	1.00
Satd. Flow (perm)		1471	1482		1869		1132	1870			1872	1553
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	30	20	89	1	66	6	186	330	5	2	101	31
RTOR Reduction (vph)	0	0	78	0	5	0	0	1	0	0	0	15
Lane Group Flow (vph)	0	50	11	0	68	0	186	334	0	0	103	16
Heavy Vehicles (%)	0%	0%	9%	0%	0%	0%	6%	1%	25%	0%	1%	4%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		7.8	7.8		7.8		43.6	43.6			32.0	32.0
Effective Green, g (s)		7.8	7.8		7.8		43.6	43.6			32.0	32.0
Actuated g/C Ratio		0.12	0.12		0.12		0.69	0.69			0.50	0.50
Clearance Time (s)		6.0	6.0		6.0		3.0	6.0			6.0	6.0
Vehicle Extension (s)		4.0	4.0		4.0		3.0	1.0			1.0	1.0
Lane Grp Cap (vph)		180	182		229		855	1285			944	783
v/s Ratio Prot							0.03	c0.18				
v/s Ratio Perm		0.03	0.01		c0.04		0.12				0.06	0.01
v/c Ratio		0.28	0.06		0.30		0.22	0.26			0.11	0.02
Uniform Delay, d1		25.2	24.6		25.3		3.6	3.8			8.2	7.9
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		1.1	0.2		1.0		0.1	0.5			0.2	0.0
Delay (s)		26.4	24.8		26.3		3.7	4.3			8.5	7.9
Level of Service		C	C		C		A	A			A	A
Approach Delay (s)		25.3			26.3			4.1			8.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.28			
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	65.0%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

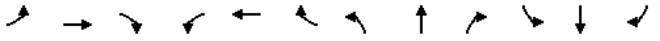
HCM Signalized Intersection Capacity Analysis
78: CR27 & Line 7/CR88/Line 7

7/18/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	48	12	45	104	138	20	277	93	64	59	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	7.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt		0.98			1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1820			1833	1524	1802	1779		1656	1776	1580
Flt Permitted		0.97			0.87	1.00	0.71	1.00		0.47	1.00	1.00
Satd. Flow (perm)		1770			1619	1524	1348	1779		828	1776	1580
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	6	58	14	54	125	166	24	334	112	77	71	7
RTOR Reduction (vph)	0	10	0	0	0	132	0	14	0	0	0	3
Lane Group Flow (vph)	0	68	0	0	179	34	24	432	0	77	71	4
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	0%	2%	0%	7%	0%	6%	0%	1%	8%	9%	7%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)		16.2			16.2	16.2	50.0	50.0		50.0	50.0	50.0
Effective Green, g (s)		16.2			16.2	16.2	50.0	50.0		50.0	50.0	50.0
Actuated g/C Ratio		0.20			0.20	0.20	0.62	0.62		0.62	0.62	0.62
Clearance Time (s)		7.0			7.0	7.0	7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)		3.0			3.0	3.0	4.5	4.5		4.5	4.5	4.5
Lane Grp Cap (vph)		357			327	307	840	1109		516	1107	985
v/s Ratio Prot								c0.24			0.04	
v/s Ratio Perm		0.04			c0.11	0.02	0.02			0.09		0.00
v/c Ratio		0.19			0.55	0.11	0.03	0.39		0.15	0.06	0.00
Uniform Delay, d1		26.6			28.7	26.1	5.8	7.5		6.3	5.9	5.7
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.3			1.9	0.2	0.1	1.0		0.6	0.1	0.0
Delay (s)		26.8			30.6	26.3	5.9	8.5		6.9	6.0	5.7
Level of Service		C			C	C	A	A		A	A	A
Approach Delay (s)		26.8			28.5			8.4			6.4	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.43			
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	80.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	452	68	182	750	7	208	415	207	22	102	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1703	3252	1369	1787	3438	1392	1626	3471	1482	1626	3267	
Flt Permitted	0.29	1.00	1.00	0.47	1.00	1.00	0.65	1.00	1.00	0.49	1.00	
Satd. Flow (perm)	512	3252	1369	880	3438	1392	1104	3471	1482	833	3267	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	79	502	76	202	833	8	231	461	230	24	113	56
RTOR Reduction (vph)	0	0	42	0	0	4	0	0	140	0	37	0
Lane Group Flow (vph)	79	502	34	202	833	4	231	461	90	24	132	0
Heavy Vehicles (%)	6%	11%	18%	1%	5%	16%	11%	4%	9%	11%	5%	5%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		
Actuated Green, G (s)	16.2	16.2	16.2	16.2	16.2	16.2	12.2	12.2	12.2	12.2	12.2	
Effective Green, g (s)	16.2	16.2	16.2	16.2	16.2	16.2	12.2	12.2	12.2	12.2	12.2	
Actuated g/C Ratio	0.45	0.45	0.45	0.45	0.45	0.45	0.34	0.34	0.34	0.34	0.34	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	227	1447	609	391	1530	619	370	1163	496	279	1094	
v/s Ratio Prot		0.15			c0.24			0.13			0.04	
v/s Ratio Perm	0.15		0.02	0.23		0.00	c0.21		0.06	0.03		
v/c Ratio	0.35	0.35	0.06	0.52	0.54	0.01	0.62	0.40	0.18	0.09	0.12	
Uniform Delay, d1	6.6	6.6	5.7	7.3	7.4	5.6	10.2	9.3	8.6	8.3	8.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.2	0.7	0.2	4.8	1.4	0.0	3.3	0.2	0.2	0.1	0.0	
Delay (s)	10.8	7.3	5.9	12.1	8.8	5.6	13.4	9.5	8.7	8.4	8.4	
Level of Service	B	A	A	B	A	A	B	A	A	A	A	
Approach Delay (s)		7.6			9.4			10.3			8.4	
Approach LOS		A			A			B			A	

Intersection Summary				
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.58			
Actuated Cycle Length (s)	36.4	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	53.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group



Appendix D5: Detailed Synchro Reports for County Road 10

HCM Signalized Intersection Capacity Analysis
90: CR10/Industrial Pkw/CR10 & Hwy89/Victoria St

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	391	147	438	185	32	21	16	48	87	299	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3361		3335	3278		1641	1681	1313	1752	1860	
Flt Permitted	0.56	1.00		0.30	1.00		0.29	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	1061	3361		1048	3278		508	1681	1313	1368	1860	
Peak-hour factor, PHF	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Adj. Flow (vph)	16	575	216	644	272	47	31	24	71	128	440	63
RTOR Reduction (vph)	0	92	0	0	27	0	0	0	46	0	13	0
Lane Group Flow (vph)	16	699	0	644	292	0	31	24	25	128	490	0
Heavy Vehicles (%)	0%	3%	3%	5%	8%	6%	10%	13%	23%	3%	0%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	16.3	16.3		16.3	16.3		13.6	13.6	13.6	13.6	13.6	
Effective Green, g (s)	16.3	16.3		16.3	16.3		13.6	13.6	13.6	13.6	13.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.36	0.36	0.36	0.36	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	456	1445		450	1409		182	603	471	490	667	
v/s Ratio Prot		0.21			0.09			0.01			c0.26	
v/s Ratio Perm	0.02			c0.61			0.06		0.02	0.09		
v/c Ratio	0.04	0.48		1.43	0.21		0.17	0.04	0.05	0.26	0.73	
Uniform Delay, d1	6.2	7.8		10.8	6.8		8.3	7.9	7.9	8.6	10.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.2		206.5	0.3		0.4	0.0	0.0	0.3	4.2	
Delay (s)	6.4	8.9		217.3	7.1		8.7	7.9	8.0	8.9	14.8	
Level of Service	A	A		F	A		A	A	A	A	B	
Approach Delay (s)		8.9			147.7			8.2			13.6	
Approach LOS		A			F			A			B	

Intersection Summary				
HCM 2000 Control Delay	62.9	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.11			
Actuated Cycle Length (s)	37.9	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	56.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
91: CR10/Industrial Pkw & 15th Line/Mackenzie Pioneer Rd

7/17/2013

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	54	1	79	33	5	766
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	7.0		5.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1615	3034		1802	3505
Flt Permitted	0.95	1.00	1.00		0.60	1.00
Satd. Flow (perm)	1770	1615	3034		1131	3505
Peak-hour factor, PHF	0.60	0.60	0.60	0.60	0.60	0.60
Adj. Flow (vph)	90	2	132	55	8	1277
RTOR Reduction (vph)	0	2	14	0	0	0
Lane Group Flow (vph)	90	0	173	0	8	1277
Confl. Peds. (#/hr)				1	1	
Heavy Vehicles (%)	2%	0%	16%	6%	0%	3%
Turn Type	NA	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	7.7	7.7	79.1		85.6	85.6
Effective Green, g (s)	7.7	7.7	79.1		85.6	85.6
Actuated g/C Ratio	0.07	0.07	0.75		0.81	0.81
Clearance Time (s)	5.0	5.0	7.0		5.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	129	118	2279		928	2849
v/s Ratio Prot	c0.05		0.06		0.00	c0.36
v/s Ratio Perm		0.00			0.01	
v/c Ratio	0.70	0.00	0.08		0.01	0.45
Uniform Delay, d1	47.7	45.2	3.5		2.0	2.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	15.2	0.0	0.1		0.0	0.5
Delay (s)	62.8	45.2	3.5		2.0	3.4
Level of Service	E	D	A		A	A
Approach Delay (s)	62.5		3.5			3.4
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	105.3	Sum of lost time (s)	17.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
92: CR10/Industrial Pkw & Honda Plant Entrance/Honda Plant-Farm

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	0	22	0	0	0	162	97	0	0	364	506
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				3.0	6.0			6.0	6.0
Lane Util. Factor	0.95	0.91	0.95				1.00	0.95			0.95	1.00
Frt	1.00	0.87	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.99	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1715	1491	1534				1787	3112			3374	1615
Flt Permitted	0.95	0.99	1.00				0.41	1.00			1.00	1.00
Satd. Flow (perm)	1715	1491	1534				774	3112			3374	1615
Peak-hour factor, PHF	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Adj. Flow (vph)	15	0	32	0	0	0	238	143	0	0	535	744
RTOR Reduction (vph)	0	15	15	0	0	0	0	0	0	0	0	369
Lane Group Flow (vph)	13	2	2	0	0	0	238	143	0	0	535	375
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	16%	0%	0%	7%	0%
Turn Type	Split	NA	Perm	Split			pm+pt	NA		Perm	NA	Perm
Protected Phases	4	4		8	8		5	2			6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	8.0	8.0	8.0				51.2	51.2			35.9	35.9
Effective Green, g (s)	8.0	8.0	8.0				51.2	51.2			35.9	35.9
Actuated g/C Ratio	0.11	0.11	0.11				0.72	0.72			0.50	0.50
Clearance Time (s)	6.0	6.0	6.0				3.0	6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0				3.0	5.0			5.0	5.0
Lane Grp Cap (vph)	192	167	172				731	2237			1701	814
v/s Ratio Prot	c0.01	0.00					c0.06	0.05			0.16	
v/s Ratio Perm			0.00				0.18					c0.23
v/c Ratio	0.07	0.01	0.01				0.33	0.06			0.31	0.46
Uniform Delay, d1	28.3	28.1	28.1				3.4	2.9			10.4	11.4
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	0.1	0.0	0.0				1.2	0.1			0.5	1.9
Delay (s)	28.4	28.1	28.1				4.5	3.0			10.9	13.3
Level of Service	C	C	C				A	A			B	B
Approach Delay (s)		28.2			0.0			4.0			12.3	
Approach LOS		C			A			A			B	

Intersection Summary				
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	71.2	Sum of lost time (s)	20.5	
Intersection Capacity Utilization	66.3%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
93: 14th Line & CR10/Industrial Pkw

7/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	237	22	28	395	64	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.2	7.2	7.2	7.2	5.6	5.6
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3374	1615	1530	3438	1805	1561
Flt Permitted	1.00	1.00	0.51	1.00	0.95	1.00
Satd. Flow (perm)	3374	1615	819	3438	1805	1561
Peak-hour factor, PHF	0.57	0.57	0.57	0.57	0.57	0.57
Adj. Flow (vph)	416	39	49	693	112	98
RTOR Reduction (vph)	0	12	0	0	0	85
Lane Group Flow (vph)	416	27	49	693	112	13
Confl. Peds. (#/hr)						1
Heavy Vehicles (%)	7%	0%	18%	5%	0%	2%
Turn Type	NA	Perm	Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	53.1	53.1	53.1	53.1	10.1	10.1
Effective Green, g (s)	53.1	53.1	53.1	53.1	10.1	10.1
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.13	0.13
Clearance Time (s)	7.2	7.2	7.2	7.2	5.6	5.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	3.0	3.0
Lane Grp Cap (vph)	2357	1128	572	2402	239	207
v/s Ratio Prot	0.12			c0.20	c0.06	
v/s Ratio Perm		0.02	0.06			0.01
v/c Ratio	0.18	0.02	0.09	0.29	0.47	0.06
Uniform Delay, d1	3.9	3.5	3.7	4.3	30.5	28.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.0	0.3	0.3	1.5	0.1
Delay (s)	4.1	3.5	4.0	4.6	31.9	28.9
Level of Service	A	A	A	A	C	C
Approach Delay (s)	4.1			4.6	30.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.32			
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	12.8	
Intersection Capacity Utilization	34.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
94: CR10/Tottenham Rd & Industrial Pkw/CR10/Industrial Pkw

7/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	137	92	118	320	99	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	3.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3139	1386	1735	3438	1656	1532
Flt Permitted	1.00	1.00	0.54	1.00	0.95	1.00
Satd. Flow (perm)	3139	1386	979	3438	1656	1532
Peak-hour factor, PHF	0.59	0.59	0.59	0.59	0.59	0.59
Adj. Flow (vph)	232	156	200	542	168	137
RTOR Reduction (vph)	0	90	0	0	0	111
Lane Group Flow (vph)	232	66	200	542	168	26
Confl. Peds. (#/hr)		1	1			2
Heavy Vehicles (%)	15%	14%	4%	5%	9%	4%
Turn Type	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	22.7	22.7	34.1	34.1	11.0	11.0
Effective Green, g (s)	22.7	22.7	34.1	34.1	11.0	11.0
Actuated g/C Ratio	0.40	0.40	0.60	0.60	0.19	0.19
Clearance Time (s)	6.0	6.0	3.0	6.0	6.0	6.0
Vehicle Extension (s)	5.0	5.0	3.0	5.0	3.0	3.0
Lane Grp Cap (vph)	1247	551	695	2053	319	295
v/s Ratio Prot	0.07		c0.04	0.16	c0.10	
v/s Ratio Perm		0.05	c0.13			0.02
v/c Ratio	0.19	0.12	0.29	0.26	0.53	0.09
Uniform Delay, d1	11.2	10.9	5.3	5.5	20.7	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.4	0.2	0.3	1.6	0.1
Delay (s)	11.5	11.3	5.6	5.8	22.3	19.1
Level of Service	B	B	A	A	C	B
Approach Delay (s)	11.4			5.7	20.8	
Approach LOS	B			A	C	

Intersection Summary				
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.37			
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	40.6%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
95: CR10/Tottenham Rd & CR1/8th Line

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	55	17	69	29	40	11	129	41	32	167	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6			8.0			8.0	8.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		0.97			0.96			0.97			1.00	0.85
Flt Protected		0.99			0.98			1.00			0.99	1.00
Satd. Flow (prot)		1702			1609			1532			1587	1429
Flt Permitted		0.91			0.78			0.97			0.92	1.00
Satd. Flow (perm)		1570			1288			1497			1464	1429
Peak-hour factor, PHF	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Adj. Flow (vph)	22	75	23	95	40	55	15	177	56	44	229	21
RTOR Reduction (vph)	0	15	0	0	25	0	0	14	0	0	0	10
Lane Group Flow (vph)	0	105	0	0	165	0	0	234	0	0	273	11
Heavy Vehicles (%)	6%	7%	12%	4%	7%	25%	36%	21%	12%	28%	17%	13%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		14.5			14.5			34.0			34.0	34.0
Effective Green, g (s)		14.5			14.5			34.0			34.0	34.0
Actuated g/C Ratio		0.23			0.23			0.54			0.54	0.54
Clearance Time (s)		6.6			6.6			8.0			8.0	8.0
Vehicle Extension (s)		5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)		360			295			806			788	769
v/s Ratio Prot												
v/s Ratio Perm		0.07			c0.13			0.16			c0.19	0.01
v/c Ratio		0.29			0.56			0.29			0.35	0.01
Uniform Delay, d1		20.1			21.5			8.0			8.3	6.8
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		0.9			3.9			0.9			1.2	0.0
Delay (s)		21.0			25.3			8.9			9.5	6.8
Level of Service		C			C			A			A	A
Approach Delay (s)		21.0			25.3			8.9			9.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.41			
Actuated Cycle Length (s)	63.1	Sum of lost time (s)	14.6	
Intersection Capacity Utilization	68.3%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
96: CR10/Tottenham Rd & CR14/5th Line/5th Line/Nolan Rd

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	23	33	23	3	8	10	126	66	63	197	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			7.0	7.0		7.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		0.92			0.97			1.00	0.85		1.00	
Flt Protected		1.00			0.97			1.00	1.00		0.99	
Satd. Flow (prot)		1662			1568			1807	1583		1795	
Flt Permitted		0.99			0.74			0.96	1.00		0.86	
Satd. Flow (perm)		1647			1197			1739	1583		1566	
Peak-hour factor, PHF	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Adj. Flow (vph)	3	39	56	39	5	14	17	214	112	107	334	5
RTOR Reduction (vph)	0	47	0	0	12	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	51	0	0	46	0	0	231	68	0	446	0
Heavy Vehicles (%)	100%	0%	4%	11%	0%	25%	14%	4%	2%	3%	5%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		9.5			9.5			35.0	35.0		35.0	
Effective Green, g (s)		9.5			9.5			35.0	35.0		35.0	
Actuated g/C Ratio		0.17			0.17			0.61	0.61		0.61	
Clearance Time (s)		6.0			6.0			7.0	7.0		7.0	
Vehicle Extension (s)		3.5			3.5			4.0	4.0		4.0	
Lane Grp Cap (vph)		272			197			1058	963		953	
v/s Ratio Prot												
v/s Ratio Perm		0.03			c0.04			0.13	0.04		c0.28	
v/c Ratio		0.19			0.24			0.22	0.07		0.47	
Uniform Delay, d1		20.7			20.8			5.1	4.6		6.2	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4			0.7			0.5	0.1		1.6	
Delay (s)		21.1			21.6			5.6	4.7		7.8	
Level of Service		C			C			A	A		A	
Approach Delay (s)		21.1			21.6			5.3			7.8	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	13.0	
Intersection Capacity Utilization	75.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
97: CR10/Tottenham Rd & Private Access/Laverock St

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1	30	23	2	27	44	217	8	5	275	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0			6.0			6.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			1.00	
Frpb, ped/bikes		1.00	0.98		0.99			1.00			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.93			1.00			1.00	
Flt Protected		0.96	1.00		0.98			0.99			1.00	
Satd. Flow (prot)		1820	1481		1683			3289			1703	
Flt Permitted		0.71	1.00		0.85			0.85			0.99	
Satd. Flow (perm)		1356	1481		1470			2820			1696	
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	6	1	39	30	3	35	57	282	10	6	357	12
RTOR Reduction (vph)	0	0	36	0	32	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	7	3	0	36	0	0	347	0	0	374	0
Confl. Peds. (#/hr)	1		5	5		1	1		2	2		1
Heavy Vehicles (%)	0%	0%	7%	4%	0%	0%	9%	8%	13%	0%	10%	44%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		5.2	5.2		5.2			52.5			52.5	
Effective Green, g (s)		5.2	5.2		5.2			52.5			52.5	
Actuated g/C Ratio		0.07	0.07		0.07			0.75			0.75	
Clearance Time (s)		6.0	6.0		6.0			6.0			6.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		101	110		109			2124			1277	
v/s Ratio Prot												
v/s Ratio Perm		0.01	0.00		c0.02			0.12			c0.22	
v/c Ratio		0.07	0.03		0.33			0.16			0.29	
Uniform Delay, d1		30.0	29.9		30.6			2.4			2.7	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.3	0.1		1.8			0.0			0.6	
Delay (s)		30.3	30.0		32.3			2.5			3.3	
Level of Service		C	C		C			A			A	
Approach Delay (s)		30.0			32.3			2.5			3.3	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.32			
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	17.0	
Intersection Capacity Utilization	49.6%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
98: CR10/Tottenham Rd & 4th Line/Mill St W/4th Line/Mill St E

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	12	33	51	26	49	18	136	8	34	359	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	0.96		1.00	0.97		1.00	0.96		1.00	0.96
Flpb, ped/bikes		0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		0.97	1.00		0.97	1.00		0.99	1.00		1.00	1.00
Satd. Flow (prot)		1615	1503		1815	1477		1737	1452		1819	1468
Flt Permitted		0.71	1.00		0.76	1.00		0.91	1.00		0.95	1.00
Satd. Flow (perm)		1195	1503		1430	1477		1585	1452		1744	1468
Peak-hour factor, PHF	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Adj. Flow (vph)	45	18	51	78	40	75	28	209	12	52	552	77
RTOR Reduction (vph)	0	0	43	0	0	64	0	0	5	0	0	30
Lane Group Flow (vph)	0	63	8	0	118	11	0	237	7	0	604	47
Confl. Peds. (#/hr)	7		14	14		7	11		12	12		11
Heavy Vehicles (%)	18%	0%	3%	0%	0%	6%	21%	7%	7%	3%	4%	6%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		8.7	8.7		8.7	8.7		36.2	36.2		36.2	36.2
Effective Green, g (s)		8.7	8.7		8.7	8.7		36.2	36.2		36.2	36.2
Actuated g/C Ratio		0.15	0.15		0.15	0.15		0.61	0.61		0.61	0.61
Clearance Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		176	222		211	218		974	892		1071	902
v/s Ratio Prot												
v/s Ratio Perm		0.05	0.01		c0.08	0.01		0.15	0.01		c0.35	0.03
v/c Ratio		0.36	0.03		0.56	0.05		0.24	0.01		0.56	0.05
Uniform Delay, d1		22.6	21.5		23.3	21.6		5.1	4.4		6.7	4.5
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.2	0.1		3.2	0.1		0.6	0.0		2.2	0.1
Delay (s)		23.8	21.6		26.5	21.7		5.7	4.4		8.8	4.6
Level of Service		C	C		C	C		A	A		A	A
Approach Delay (s)		22.8			24.6			5.7			8.4	
Approach LOS		C			C			A			A	

Intersection Summary				
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	66.0%	ICU Level of Service	C	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
99: Private Access/CR10/Tottenham Rd & Hwy 9

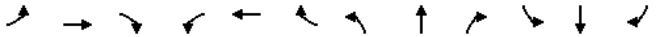
7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	539	1	1	342	39	0	0	5	162	2	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.86		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	
Satd. Flow (prot)	1641	3437		1719	3438	1468		1565		1641	1470	
Flt Permitted	0.46	1.00		0.29	1.00	1.00		1.00		0.75	1.00	
Satd. Flow (perm)	789	3437		526	3438	1468		1565		1300	1470	
Peak-hour factor, PHF	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Adj. Flow (vph)	117	829	2	2	526	60	0	0	8	249	3	426
RTOR Reduction (vph)	0	1	0	0	0	33	0	5	0	0	132	0
Lane Group Flow (vph)	117	830	0	2	526	27	0	3	0	249	297	0
Heavy Vehicles (%)	10%	5%	5%	5%	5%	10%	5%	10%	5%	10%	10%	10%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	16.4	16.4		16.4	16.4	16.4		11.7		11.7	11.7	
Effective Green, g (s)	16.4	16.4		16.4	16.4	16.4		11.7		11.7	11.7	
Actuated g/C Ratio	0.45	0.45		0.45	0.45	0.45		0.32		0.32	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	358	1561		238	1561	666		507		421	476	
v/s Ratio Prot		c0.24			0.15			0.00			c0.20	
v/s Ratio Perm	0.15			0.00		0.02				0.19		
v/c Ratio	0.33	0.53		0.01	0.34	0.04		0.01		0.59	0.62	
Uniform Delay, d1	6.3	7.1		5.4	6.3	5.5		8.3		10.2	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.4		0.1	0.6	0.1		0.0		2.2	2.6	
Delay (s)	6.8	7.4		5.5	6.9	5.6		8.3		12.4	12.9	
Level of Service	A	A		A	A	A		A		B	B	
Approach Delay (s)		7.4			6.8			8.3			12.7	
Approach LOS		A			A			A			B	

Intersection Summary				
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.57			
Actuated Cycle Length (s)	36.1	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	45.5%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
90: CR10/Industrial Pkw/CR10 & Hwy89/Victoria St

7/17/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	587	149	391	588	112	150	350	398	62	314	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		0.97	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3379		3400	3460		1787	1881	1509	1719	1822	
Flt Permitted	0.25	1.00		0.25	1.00		0.31	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	466	3379		895	3460		578	1881	1509	612	1822	
Peak-hour factor, PHF	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Adj. Flow (vph)	121	804	204	536	805	153	205	479	545	85	430	77
RTOR Reduction (vph)	0	56	0	0	38	0	0	0	46	0	17	0
Lane Group Flow (vph)	121	952	0	536	920	0	205	479	499	85	490	0
Heavy Vehicles (%)	2%	4%	2%	3%	2%	1%	1%	1%	7%	5%	1%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	16.0	16.0		16.0	16.0		15.2	15.2	15.2	15.2	15.2	
Effective Green, g (s)	16.0	16.0		16.0	16.0		15.2	15.2	15.2	15.2	15.2	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.39	0.39	0.39	0.39	0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	190	1379		365	1412		224	729	585	237	706	
v/s Ratio Prot		0.28			0.27			0.25			0.27	
v/s Ratio Perm	0.26			c0.60			c0.35		0.33	0.14		
v/c Ratio	0.64	0.69		1.47	0.65		0.92	0.66	0.85	0.36	0.69	
Uniform Delay, d1	9.3	9.6		11.6	9.4		11.4	9.9	11.0	8.5	10.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.2	2.9		225.3	2.3		37.5	2.1	11.6	0.9	3.0	
Delay (s)	24.5	12.4		236.9	11.7		48.8	12.0	22.5	9.5	13.0	
Level of Service	C	B		F	B		D	B	C	A	B	
Approach Delay (s)		13.7			92.5			22.8			12.5	
Approach LOS		B			F			C			B	

Intersection Summary				
HCM 2000 Control Delay	42.6	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.20			
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	73.7%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
91: CR10/Industrial Pkw & 15th Line/Mackenzie Pioneer Rd

7/17/2013

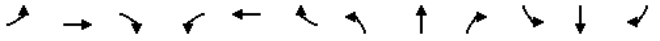
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	100	9	1301	333	14	608
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	7.0		5.0	7.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1719	1455	3418		1805	3195
Flt Permitted	0.95	1.00	1.00		0.05	1.00
Satd. Flow (perm)	1719	1455	3418		99	3195
Peak-hour factor, PHF	0.58	0.58	0.58	0.58	0.58	0.58
Adj. Flow (vph)	172	16	2243	574	24	1048
RTOR Reduction (vph)	0	14	18	0	0	0
Lane Group Flow (vph)	172	2	2799	0	24	1048
Heavy Vehicles (%)	5%	11%	3%	0%	0%	13%
Turn Type	NA	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	10.0	10.0	71.7		79.7	79.7
Effective Green, g (s)	10.0	10.0	71.7		79.7	79.7
Actuated g/C Ratio	0.10	0.10	0.71		0.78	0.78
Clearance Time (s)	5.0	5.0	7.0		5.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	169	143	2409		127	2503
v/s Ratio Prot	c0.10		c0.82		0.01	c0.33
v/s Ratio Perm		0.00			0.14	
v/c Ratio	1.02	0.01	1.16		0.19	0.42
Uniform Delay, d1	45.9	41.4	15.0		28.7	3.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	74.0	0.0	77.9		0.7	0.5
Delay (s)	119.8	41.4	92.9		29.5	4.1
Level of Service	F	D	F		C	A
Approach Delay (s)	113.1		92.9			4.6
Approach LOS	F		F			A

Intersection Summary				
HCM 2000 Control Delay	70.6	HCM 2000 Level of Service	E	
HCM 2000 Volume to Capacity ratio	1.13			
Actuated Cycle Length (s)	101.7	Sum of lost time (s)	17.0	
Intersection Capacity Utilization	71.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
92: CR10/Industrial Pkw & Honda Plant Entrance/Honda Plant-Farm

7/17/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	912	0	283	0	0	0	111	772	0	0	443	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0				3.0	6.0			6.0	6.0
Lane Util. Factor	0.95	0.91	0.95				1.00	0.95			0.95	1.00
Frt	1.00	0.99	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.96	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1715	1636	1534				1770	3505			3406	1615
Flt Permitted	0.95	0.96	1.00				0.16	1.00			1.00	1.00
Satd. Flow (perm)	1715	1636	1534				307	3505			3406	1615
Peak-hour factor, PHF	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Adj. Flow (vph)	1546	0	480	0	0	0	188	1308	0	0	751	366
RTOR Reduction (vph)	0	48	221	0	0	0	0	0	0	0	0	259
Lane Group Flow (vph)	804	742	211	0	0	0	188	1308	0	0	751	107
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	3%	0%	0%	6%	0%
Turn Type	Split	NA	Perm	Split			pm+pt	NA		Perm	NA	Perm
Protected Phases	4	4		8	8		5	2			6	
Permitted Phases			4				2			6		6
Actuated Green, G (s)	58.0	58.0	58.0				50.0	50.0			35.0	35.0
Effective Green, g (s)	58.0	58.0	58.0				50.0	50.0			35.0	35.0
Actuated g/C Ratio	0.48	0.48	0.48				0.42	0.42			0.29	0.29
Clearance Time (s)	6.0	6.0	6.0				3.0	6.0			6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0				3.0	5.0			5.0	5.0
Lane Grp Cap (vph)	828	790	741				274	1460			993	471
v/s Ratio Prot	c0.47	0.45					0.07	c0.37			0.22	
v/s Ratio Perm			0.14				0.22					0.07
v/c Ratio	0.97	0.94	0.29				0.69	0.90			0.76	0.23
Uniform Delay, d1	30.2	29.3	18.6				25.4	32.6			38.6	32.2
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	24.2	18.7	0.2				13.1	8.9			5.4	1.1
Delay (s)	54.4	48.0	18.8				38.5	41.5			44.0	33.4
Level of Service	D	D	B				D	D			D	C
Approach Delay (s)		44.3			0.0			41.1			40.5	
Approach LOS		D			A			D			D	

Intersection Summary				
HCM 2000 Control Delay	42.4	HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio	1.02			
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.5	
Intersection Capacity Utilization	80.6%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
93: 14th Line & CR10/Industrial Pkw

7/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	771	87	100	580	85	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.2	7.2	7.2	7.2	5.6	5.6
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1615	1787	3374	1736	1482
Flt Permitted	1.00	1.00	0.20	1.00	0.95	1.00
Satd. Flow (perm)	3539	1615	370	3374	1736	1482
Peak-hour factor, PHF	0.62	0.62	0.62	0.62	0.62	0.62
Adj. Flow (vph)	1244	140	161	935	137	115
RTOR Reduction (vph)	0	22	0	0	0	52
Lane Group Flow (vph)	1244	118	161	935	137	63
Heavy Vehicles (%)	2%	0%	1%	7%	4%	9%
Turn Type	NA	Perm	Perm	NA	NA	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	53.1	53.1	53.1	53.1	11.3	11.3
Effective Green, g (s)	53.1	53.1	53.1	53.1	11.3	11.3
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.15	0.15
Clearance Time (s)	7.2	7.2	7.2	7.2	5.6	5.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	3.0	3.0
Lane Grp Cap (vph)	2434	1110	254	2320	254	216
v/s Ratio Prot	0.35			0.28	c0.08	
v/s Ratio Perm		0.07	c0.43			0.04
v/c Ratio	0.51	0.11	0.63	0.40	0.54	0.29
Uniform Delay, d1	5.8	4.1	6.7	5.2	30.5	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	11.5	0.5	2.2	0.8
Delay (s)	6.6	4.3	18.1	5.7	32.7	30.1
Level of Service	A	A	B	A	C	C
Approach Delay (s)	6.3			7.6	31.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	12.8	
Intersection Capacity Utilization	49.6%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
94: CR10/Tottenham Rd & Industrial Pkw/CR10/Industrial Pkw

7/17/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	669	195	157	460	197	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	3.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1468	1656	3471	1703	1568
Flt Permitted	1.00	1.00	0.13	1.00	0.95	1.00
Satd. Flow (perm)	3505	1468	224	3471	1703	1568
Peak-hour factor, PHF	0.61	0.61	0.61	0.61	0.61	0.61
Adj. Flow (vph)	1097	320	257	754	323	248
RTOR Reduction (vph)	0	33	0	0	0	186
Lane Group Flow (vph)	1097	287	257	754	323	62
Heavy Vehicles (%)	3%	10%	9%	4%	6%	3%
Turn Type	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	34.7	34.7	49.2	49.2	20.3	20.3
Effective Green, g (s)	34.7	34.7	49.2	49.2	20.3	20.3
Actuated g/C Ratio	0.43	0.43	0.60	0.60	0.25	0.25
Clearance Time (s)	6.0	6.0	3.0	6.0	6.0	6.0
Vehicle Extension (s)	5.0	5.0	3.0	5.0	3.0	3.0
Lane Grp Cap (vph)	1492	625	337	2095	424	390
v/s Ratio Prot	0.31		c0.11	0.22	c0.19	
v/s Ratio Perm		0.20	c0.35			0.04
v/c Ratio	0.74	0.46	0.76	0.36	0.76	0.16
Uniform Delay, d1	19.6	16.7	14.9	8.2	28.4	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	2.4	9.8	0.5	7.9	0.2
Delay (s)	22.8	19.1	24.7	8.7	36.3	24.1
Level of Service	C	B	C	A	D	C
Approach Delay (s)	22.0			12.7	31.0	
Approach LOS	C			B	C	

Intersection Summary				
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.79			
Actuated Cycle Length (s)	81.5	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
95: CR10/Tottenham Rd & CR1/8th Line

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	65	3	43	69	63	24	268	82	63	180	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6			8.0			8.0	8.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frt		1.00			0.95			0.97			1.00	0.85
Flt Protected		0.98			0.99			1.00			0.99	1.00
Satd. Flow (prot)		1646			1707			1752			1712	1442
Flt Permitted		0.83			0.88			0.96			0.78	1.00
Satd. Flow (perm)		1381			1528			1689			1344	1442
Peak-hour factor, PHF	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Adj. Flow (vph)	41	86	4	57	91	83	32	353	108	83	237	43
RTOR Reduction (vph)	0	2	0	0	35	0	0	14	0	0	0	20
Lane Group Flow (vph)	0	129	0	0	196	0	0	479	0	0	320	23
Heavy Vehicles (%)	19%	11%	0%	5%	4%	5%	8%	4%	7%	14%	8%	12%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		14.5			14.5			33.4			33.4	33.4
Effective Green, g (s)		14.5			14.5			33.4			33.4	33.4
Actuated g/C Ratio		0.23			0.23			0.53			0.53	0.53
Clearance Time (s)		6.6			6.6			8.0			8.0	8.0
Vehicle Extension (s)		5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)		320			354			902			718	770
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.13			c0.28			0.24	0.02
v/c Ratio		0.40			0.55			0.53			0.45	0.03
Uniform Delay, d1		20.3			21.2			9.5			8.9	6.9
Progression Factor		1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2		1.7			3.2			2.2			2.0	0.1
Delay (s)		22.1			24.3			11.7			10.9	7.0
Level of Service		C			C			B			B	A
Approach Delay (s)		22.1			24.3			11.7			10.4	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	14.6	
Intersection Capacity Utilization	70.4%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
96: CR10/Tottenham Rd & CR14/5th Line/5th Line/Nolan Rd

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	5	30	99	63	105	42	252	57	9	166	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0			7.0	7.0		7.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99			1.00			1.00	1.00		1.00	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		1.00	
Frt		0.92			0.95			1.00	0.85		0.99	
Flt Protected		0.98			0.98			0.99	1.00		1.00	
Satd. Flow (prot)		1615			1674			1816	1468		1780	
Flt Permitted		0.82			0.84			0.90	1.00		0.97	
Satd. Flow (perm)		1341			1432			1645	1468		1728	
Peak-hour factor, PHF	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Adj. Flow (vph)	31	8	51	168	107	178	71	427	97	15	281	24
RTOR Reduction (vph)	0	33	0	0	35	0	0	0	53	0	4	0
Lane Group Flow (vph)	0	57	0	0	418	0	0	498	44	0	316	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	11%	0%	3%	3%	5%	8%	3%	4%	10%	22%	5%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		23.5			23.5			30.3	30.3		30.3	
Effective Green, g (s)		23.5			23.5			30.3	30.3		30.3	
Actuated g/C Ratio		0.35			0.35			0.45	0.45		0.45	
Clearance Time (s)		6.0			6.0			7.0	7.0		7.0	
Vehicle Extension (s)		3.5			3.5			4.0	4.0		4.0	
Lane Grp Cap (vph)		471			503			746	665		783	
v/s Ratio Prot												
v/s Ratio Perm		0.04			c0.29			c0.30	0.03		0.18	
v/c Ratio		0.12			0.83			0.67	0.07		0.40	
Uniform Delay, d1		14.7			19.8			14.3	10.3		12.2	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.1			11.4			4.7	0.2		1.5	
Delay (s)		14.8			31.3			19.0	10.5		13.8	
Level of Service		B			C			B	B		B	
Approach Delay (s)		14.8			31.3			17.6			13.8	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	66.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
97: CR10/Tottenham Rd & Private Access/Laverock St

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	8	105	15	1	16	105	346	26	24	292	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0			6.0			6.0	
Lane Util. Factor		1.00	1.00		1.00			0.95			1.00	
Frpb, ped/bikes		1.00	0.98		0.99			1.00			1.00	
Flpb, ped/bikes		1.00	1.00		1.00			1.00			1.00	
Frt		1.00	0.85		0.93			0.99			0.99	
Flt Protected		0.96	1.00		0.98			0.99			1.00	
Satd. Flow (prot)		1776	1567		1658			3271			1800	
Flt Permitted		0.75	1.00		0.83			0.76			0.94	
Satd. Flow (perm)		1387	1567		1402			2511			1691	
Peak-hour factor, PHF	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Adj. Flow (vph)	33	11	138	20	1	21	138	455	34	32	384	24
RTOR Reduction (vph)	0	0	124	0	19	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	44	14	0	23	0	0	623	0	0	439	0
Confl. Peds. (#/hr)	1		6	6		1			3	3		
Heavy Vehicles (%)	4%	0%	1%	7%	0%	0%	1%	10%	12%	0%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		6.9	6.9		6.9			48.8			48.8	
Effective Green, g (s)		6.9	6.9		6.9			48.8			48.8	
Actuated g/C Ratio		0.10	0.10		0.10			0.72			0.72	
Clearance Time (s)		6.0	6.0		6.0			6.0			6.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		141	159		142			1809			1218	
v/s Ratio Prot												
v/s Ratio Perm		c0.03	0.01		0.02			0.25			c0.26	
v/c Ratio		0.31	0.09		0.16			0.34			0.36	
Uniform Delay, d1		28.2	27.6		27.8			3.5			3.6	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		1.3	0.2		0.5			0.1			0.8	
Delay (s)		29.5	27.8		28.3			3.6			4.4	
Level of Service		C	C		C			A			A	
Approach Delay (s)		28.2			28.3			3.6			4.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	67.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
98: CR10/Tottenham Rd & 4th Line/Mill St W/4th Line/Mill St E

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	43	49	54	27	94	48	500	50	43	280	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes		1.00	0.92		1.00	0.96		1.00	0.90		1.00	0.91
Flpb, ped/bikes		0.99	1.00		0.97	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		0.97	1.00		0.97	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)		1731	1349		1666	1471		1792	1423		1785	1360
Flt Permitted		0.76	1.00		0.71	1.00		0.92	1.00		0.67	1.00
Satd. Flow (perm)		1347	1349		1223	1471		1649	1423		1208	1360
Peak-hour factor, PHF	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Adj. Flow (vph)	85	66	75	83	42	145	74	769	77	66	431	58
RTOR Reduction (vph)	0	0	62	0	0	90	0	0	26	0	0	23
Lane Group Flow (vph)	0	151	13	0	125	55	0	843	51	0	497	35
Confl. Peds. (#/hr)	15		39	39		15	45		52	52		45
Heavy Vehicles (%)	6%	5%	10%	6%	8%	5%	8%	5%	2%	9%	5%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		10.3	10.3		10.3	10.3		36.3	36.3		36.3	36.3
Effective Green, g (s)		10.3	10.3		10.3	10.3		36.3	36.3		36.3	36.3
Actuated g/C Ratio		0.17	0.17		0.17	0.17		0.60	0.60		0.60	0.60
Clearance Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		228	229		207	250		987	852		723	814
v/s Ratio Prot												
v/s Ratio Perm		c0.11	0.01		0.10	0.04		c0.51	0.04		0.41	0.03
v/c Ratio		0.66	0.06		0.60	0.22		0.85	0.06		0.69	0.04
Uniform Delay, d1		23.5	21.1		23.3	21.7		10.0	5.1		8.3	5.0
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		7.0	0.1		4.9	0.4		9.3	0.1		5.3	0.1
Delay (s)		30.6	21.2		28.2	22.1		19.3	5.2		13.6	5.1
Level of Service		C	C		C	C		B	A		B	A
Approach Delay (s)		27.5			24.9			18.1			12.7	
Approach LOS		C			C			B			B	

Intersection Summary				
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.81			
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	14.0	
Intersection Capacity Utilization	78.4%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
99: Private Access/CR10/Tottenham Rd & Hwy 9

7/17/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	327	430	0	8	610	185	2	2	5	101	0	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.92		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1719	3438		1719	3438	1538		1652		1656	1482	
Flt Permitted	0.27	1.00		0.40	1.00	1.00		0.93		0.75	1.00	
Satd. Flow (perm)	492	3438		724	3438	1538		1556		1305	1482	
Peak-hour factor, PHF	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Adj. Flow (vph)	503	662	0	12	938	285	3	3	8	155	0	158
RTOR Reduction (vph)	0	0	0	0	0	128	0	6	0	0	36	0
Lane Group Flow (vph)	503	662	0	12	938	157	0	8	0	155	122	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	9%	9%	9%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	19.8	19.8		19.8	19.8	19.8		8.2		8.2	8.2	
Effective Green, g (s)	19.8	19.8		19.8	19.8	19.8		8.2		8.2	8.2	
Actuated g/C Ratio	0.55	0.55		0.55	0.55	0.55		0.23		0.23	0.23	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	270	1890		398	1890	845		354		297	337	
v/s Ratio Prot		0.19			0.27						0.08	
v/s Ratio Perm	c1.02			0.02		0.10		0.01		c0.12		
v/c Ratio	1.86	0.35		0.03	0.50	0.19		0.02		0.52	0.36	
Uniform Delay, d1	8.1	4.5		3.7	5.0	4.1		10.8		12.2	11.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	402.2	0.1		0.1	0.9	0.5		0.0		1.7	0.7	
Delay (s)	410.3	4.6		3.8	5.9	4.5		10.8		13.8	12.4	
Level of Service	F	A		A	A	A		B		B	B	
Approach Delay (s)		179.8			5.6			10.8			13.1	
Approach LOS		F			A			B			B	

Intersection Summary				
HCM 2000 Control Delay	80.9	HCM 2000 Level of Service	F	
HCM 2000 Volume to Capacity ratio	1.47			
Actuated Cycle Length (s)	36.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	57.2%	ICU Level of Service	B	
Analysis Period (min)	15			
c Critical Lane Group				



Appendix E: Context Sensitive Road Design

Table E-1: Example Existing Condition Cross-Sections

Corridor	**County Road 93**		**County Road 27**		**County Road 90**	
						
Area	Urban	Rural	Urban	Rural	Urban	Rural
Section	Typical Yonge Street (CR 25) to Lanigan Drive	Typical Lanigan Drive to Vindin Street	Typical South of Line 7/CR 88	Typical South of Line 7/CR 88	Typical South of Commerce Road	Typical East of McKinnon Road
Image						
Jurisdiction	Simcoe County	Simcoe County	Simcoe County	Simcoe County	Simcoe County	Simcoe County
Classification	Primary Arterial – Controlled Access	Primary Arterial – Controlled Access	Primary Arterial	Primary Arterial	Primary Arterial	Primary Arterial – Controlled Access
Posted Speed	60 km/h	80 km/h	50 km/h	80 km/h	50 km/h	70 km/h-80 km/h
Annual Average Daily Traffic	14,500-17,900	14,500-17,900	6,100	6,100	14,100	15,100-20,700
Required Right of Way	36.0 m	36.0 m	40.0 m and 36.0 m where constraints exist	40.0 m and 36.0 m where constraints exist	40.0 m	45.0 m
Predominant Land Use	Highway Commercial – HC, Town of Midland	Rural – RU, Town of Midland	Rural Settlement Residential – R4, Rural Settlement Commercial	Agricultural– A, Town of Bradford West Gwillimbury	Core Commercial – C2	Core Commercial – C2, Residential, Low Density,

			– C5, Town of Bradford West Gwillimbury			Detached - R1, Rural - RL/RL-FF , Township of Essa
Municipality Minimum Front Yard Setback[1,2]	7.5 m – HC	9.0 m – Single Detached Dwelling 8.0 m – Other Uses	7.0 m – R4 12.5m – C5	15.0 m – A	1.5 m – C2	1.5 m – C2 7.5 m – R1 18.0 m (residential), 30.0 m (agricultural) – RL
County Road Setback[3,4]	15 m – basic 1.5 m – parking lot curbing	15.0 m	15.0 m	15.0 m	15.0 m 1.5 m – parking lot curbing	15.0 m
Dedicated Modes	Vehicles, Pedestrians (partial)	Vehicles	Vehicles, Pedestrians	Vehicles	Vehicles, Pedestrians	Vehicles
Cross Section Description	Boulevard-Curb-Lanes-Curb-Boulevard (limited sections with provision of sidewalk)	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch	Sidewalk-Boulevard-Splash Strip - Curb -Lanes-Curb- Splash Strip-Boulevard-Sidewalk	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch	Sidewalk-Asphalt Boulevard-Curb-Lanes-Curb-Asphalt Boulevard-Sidewalk	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch

Corridor	County Road 43		County Road 10	
				
Area	Development	Rural	Urban	Rural
Section	Typical settlements	Typical between settlements	Typical East and North of 14th Line	Typical South of Industrial Parkway
Image				
Jurisdiction	Simcoe County	Simcoe County	Simcoe County	Simcoe County
Classification	Primary Arterial	Primary Arterial	Primary Arterial – Controlled Access	Primary Arterial – Controlled Access
Posted Speed	60 km/h-80 km/h	60 km/h-80 km/h	80 km/h	80 km/h
Annual Average Daily Traffic	1,400-2,700	1,400-2,700	6,400	6,400-7,200
Required Right of Way	36.0 m	36.0 m	45.0 m	40.0 m
Predominant Land Use	Rural Residential – RR, General Industrial Inside Storage – MI-2, Township of Springwater	Agricultural – A, Environmental Protection – EP, Township of Springwater	Agriculture –A1, Urban Industrial – UM, Rural Highway Commercial – RHC, Shopping Centre Commercial Exception – SCC*3, Town of New Tecumseth	Agriculture –A1, Town of New Tecumseth
Municipality Minimum Front Yard Setback[1,2]	15.0 m – RR 20.0 m – MI-2	30 m – A	12.5 m – A1 10.0m – UM 10.0m – RHC	12.5 m – A1

			12.5m – SCC*3	
County Road Setback[3,4]	15.0 m	15.0 m	15.0 m - basic 45.0 m - buildings/structures for heavy industrial uses	15.0 m
Dedicated Modes	Vehicles	Vehicles	Vehicles	Vehicles
Cross Section Description	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch	Splash Strip-Curb-Lanes-Curb-Splash Strip	Ditch-Gravel-Shoulder-Lanes-Shoulder-Gravel-Ditch

[1] Refers to the distance between the front lot line and the nearest main wall of any building or structure on the lot.

[2] Based on *local municipality* zoning bylaws and provided for information; Simcoe County Setback requirements apply for county roadways.

[3] Based on *Simcoe County* by-law No. 5064 requiring a specified setback of any building or structure measured from the property (limit) of the highway.

[4] General exceptions to that 15m setback includes: (1) New buildings or structures in Settlement Areas, as identified in the Official Plan, may have their setback determined as the average of the setback of the adjoining properties or to apply for an exception; (2) New buildings or structures within plans of a subdivision or condominium shall be 10 m plus any road widening conditioned by the county; (3) Buildings or structures for recreational or heavy industrial use shall be 45 m; (3) Sheds to a maximum of 3 square meters without foundation to be set back minimum 3 m; (4) Parking lots and illumination facilities shall be setback 1.5 m from the limit of the highway; and (5) Service roads and window streets shall be setback 7.5 m from the limit of the highway.

Table E-2: Complete Streets Roadway Typology Application

Step	Element	③Roadway Typology					
		Rural	**Rural Settlement**	**Urban-Commercial**	**Urban – Village Core**	**Urban – Main Street**	**Urban - Industrial**
① Roadway Context	Arterial Classification	Identify the arterial classification as (1) Primary Arterial – Controlled Access, (2) Primary Arterial or (3) Secondary Arterial based on the three-tiered classification system identified in the Official Plan which provides guidelines for: volume, movement function, right-of-way, intersection spacing, centre left turn lane provision and access management					
	Posted Speed (km/h)	70-80	50-70	50-60	50-60	50-60	50-70
	Typical Volume (vehicles/day)	5,000-20,000	5,000	15,000-20,000	5,000-10,000	10,000-15,000	5,000-15,000
	Number of Lanes	2-4	2	2-4	2	2-4	2-4
	Development and Land Uses	Limited development: Rural, Agricultural, Environmental/Recreation, Industrial, Commercial	Dispersed Development: Rural, ,Residential, Agricultural, Environmental/Recreation, Industrial, Commercial	Developed: Commercial, Mixed-Use	Developed: Commercial, Residential, Institutional	Developed: Commercial, Mixed-Use, Residential, Institutional	Developed: Industrial, Commercial
② Community Needs and Objectives	Transit Potential	•Limited with transit accommodated in travel lanes	•Limited with transit accommodated in travel lanes	•Identify with transit potential and requirements with local municipality	•Limited with transit accommodated in travel lanes	•Identify with transit potential and requirements with local municipality	•Identify with transit potential and requirements with local municipality
	Pedestrian Accommodation	•Limited •Pedestrian facilities to be determined from communities requirements	•Limited •Required pedestrian facilities to be determined from adjacent landowners	•High importance to promote an active streetscape	•High importance to promote an active community	•High importance to promote an active community	•Pedestrian facilities provided as an alternative mode choice
	Cycling Accommodation	•Shared roadway •Paved shoulder •Active transportation path	•Shared roadway •Paved shoulder •Active transportation path	•Shared roadway •Bicycle lane •Separated bicycle lane •Active transportation path	•Shared roadway •Bicycle lane •Separated bicycle lane	•Shared roadway •Bicycle lane •Separated bicycle lane	•Shared roadway •Bicycle lane •Active transportation path

	Access Management	•Painted medians may be considered for high volume, high speed sections where safety may be improved	•Median not required •Driveway access determined by entrance by-law	•Median provided for turn-lanes, pedestrian refuge, landscaping and access control •Driveway access determined by entrance by-law	•Limited median provided for turn-lanes, landscaping and access control •Driveway access determined by entrance by-law	•Limited median provided for turn-lanes, landscaping and access control •Driveway access determined by entrance by-law	•Median provided for turn-lanes, pedestrian refuge, landscaping and access control •Driveway access determined by entrance by-law

Step	Element	③Roadway Typology					
		Rural	**Rural Settlement**	**Urban-Commercial**	**Urban – Village Core**	**Urban – Main Street**	**Urban - Industrial**
④ Identify Road and Boulevard Elements	Curb Lane	3.5 m-3.75 m	3.5 m-3.75 m	3.5 m	3.5 m	3.5 m	3.5 m
	Median Lane	3.5 m-3.75 m	3.5 m-3.75 m	3.3 m-3.5 m	3.3 m-3.5 m	3.3 m-3.5 m	3.3 m-3.5 m
	Shared Cycle Lane	4.0 m-4.5 m	4.0 m-4.5 m	3.3 m-4.0 m	3.3 m-4.0 m	3.3 m-4.0 m	3.3 m-4.0 m
	Median	No median, 1.0 m or as required for safety	No median, 1.0 m or as required for safety	4.5 m-6.0 m	4.5 m	4.5 m	4.5 m-6.0 m
	On-Street Parking	No parking	No parking	No parking	2.0 m-2.75 m	2.0 m-2.75 m	No parking
	Boulevard (width varies)	•Provided where an active transportation path exists	•Provided where an active transportation path exists	•Provided with landscaping, sidewalks, street furniture and public art	•Provided where right-of-way permits with landscaping, sidewalks, street furniture and public art	•Provided where right-of-way permits with landscaping, sidewalks, street furniture and public art	•Provided with consideration of active transportation and landscaping
	Shoulder	•1.0 m paved •2.5 m gravel •1.2 m-2.0 m paved shoulder cycle	•1.0 m paved •2.5 m gravel •1.2 m-2.0 m paved shoulder cycle	No shoulder	No shoulder	No shoulder	No shoulder
	Bicycle Lane	1.2 m-1.8 m	1.2 m-1.8 m	1.2 m-1.8 m	1.2 m-2.5 m, including buffer,	1.2 m-2.5 m, including buffer,	1.2 m-1.8 m

					where there is parking	where there is parking	
	Separated Bicycle Lane	No separated bicycle lane	No separated bicycle lane	2.0 m-3.0 m, including buffer, and dependent on separation	2.0 m-3.0 m, including buffer, and dependent on separation	2.0 m-3.0 m, including buffer, and dependent on separation	No separated bicycle lane
	Active Transportation Path	1.8 m-4.0 m	1.8 m-4.0 m	1.8 m-4.0 m	No active transportation path	No active transportation path	1.8 m-4.0 m
	Stormwater Management	•Rural ditches	•Rural ditches •Curb and gutter (at constraints)	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles
	Utilities	•Overhead and underground facilities as required	•Overhead and underground facilities as required	•Underground facilities desired	•Underground facilities desired	•Underground facilities desired	•Underground facilities should be considered
⑤Develop Detailed Cross-Section							

Step	Element	③Roadway Typology					
		Rural	**Rural Settlement**	**Urban-Commercial**	**Urban – Village Core**	**Urban – Main Street**	**Urban - Industrial**
④ Identify Road and Boulevard Elements	Curb Lane	3.5 m-3.75 m	3.5 m-3.75 m	3.5 m	3.5 m	3.5 m	3.5 m
	Median Lane	3.5 m-3.75 m	3.5 m-3.75 m	3.3 m-3.5 m	3.3 m-3.5 m	3.3 m-3.5 m	3.3 m-3.5 m
	Shared Cycle Lane	4.0 m-4.5 m	4.0 m-4.5 m	3.3 m-4.0 m	3.3 m-4.0 m	3.3 m-4.0 m	3.3 m-4.0 m
	Median	No median, 1.0 m or as required for safety	No median, 1.0 m or as required for safety	4.5 m-6.0 m	4.5 m	4.5 m	4.5 m-6.0 m
	On-Street Parking	No parking	No parking	No parking	2.0 m-2.75 m	2.0 m-2.75 m	No parking
	Boulevard (width varies)	•Provided where an active transportation path exists	•Provided where an active transportation path exists	•Provided with landscaping, sidewalks, street furniture and public art	•Provided where right-of-way permits with landscaping, sidewalks, street furniture and public art	•Provided where right-of-way permits with landscaping, sidewalks, street furniture and public art	•Provided with consideration of active transportation and landscaping
	Shoulder	•1.0 m paved •2.5 m gravel •1.2 m-2.0 m paved shoulder cycle	•1.0 m paved •2.5 m gravel •1.2 m-2.0 m paved shoulder cycle	No shoulder	No shoulder	No shoulder	No shoulder
	Bicycle Lane	1.2 m-1.8 m	1.2 m-1.8 m	1.2 m-1.8 m	1.2 m-2.5 m, including buffer,	1.2 m-2.5 m, including buffer,	1.2 m-1.8 m

					where there is parking	where there is parking	
	Separated Bicycle Lane	No separated bicycle lane	No separated bicycle lane	2.0 m-3.0 m, including buffer, and dependent on separation	2.0 m-3.0 m, including buffer, and dependent on separation	2.0 m-3.0 m, including buffer, and dependent on separation	No separated bicycle lane
	Active Transportation Path	1.8 m-4.0 m	1.8 m-4.0 m	1.8 m-4.0 m	No active transportation path	No active transportation path	1.8 m-4.0 m
	Stormwater Management	•Rural ditches	•Rural ditches •Curb and gutter (at constraints)	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles	•Curb and gutter with consideration of low impact development principles
	Utilities	•Overhead and underground facilities as required	•Overhead and underground facilities as required	•Underground facilities desired	•Underground facilities desired	•Underground facilities desired	•Underground facilities should be considered
⑤Develop Detailed Cross-Section							



Appendix F: Roundabout Design

Examples of Roundabouts in Canada

Source: City of Hamilton

Wilson St / Hamilton Dr: ***City of Hamilton, ON***
(Single-lane roundabout)

First roundabout in Hamilton

Salient features:

- Near Hwy 403 on/off ramp
- Many driveways located on the approach legs
- Fire station ~50m on the westbound approach leg
- Bus stop on the north and south side of the westbound approach leg
- Provision for an Apron on the inscribed circle
- Year opened 2002

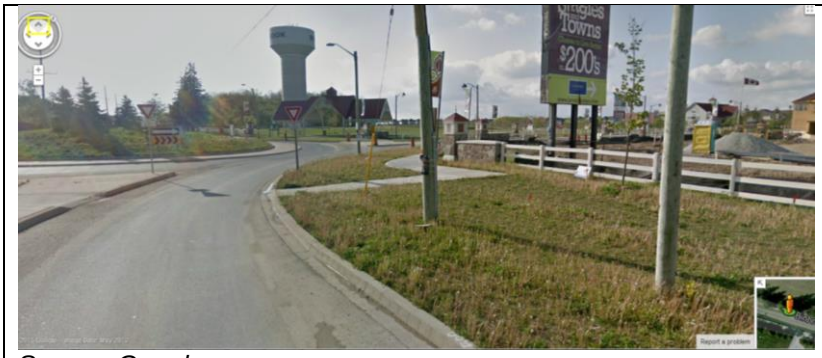
Source: City of Hamilton

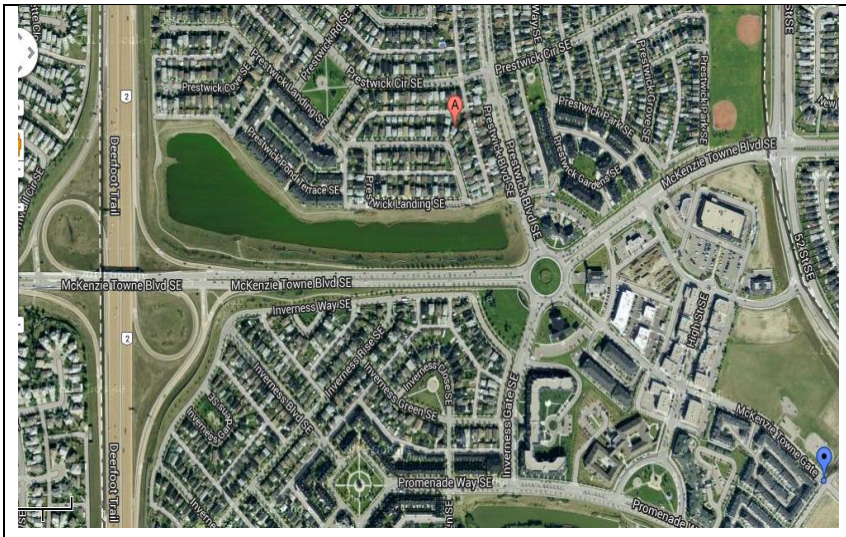
Wilson St / Shaver Rd: ***City of Hamilton, ON***
(Multi-lane roundabout)

Multi-lane roundabout

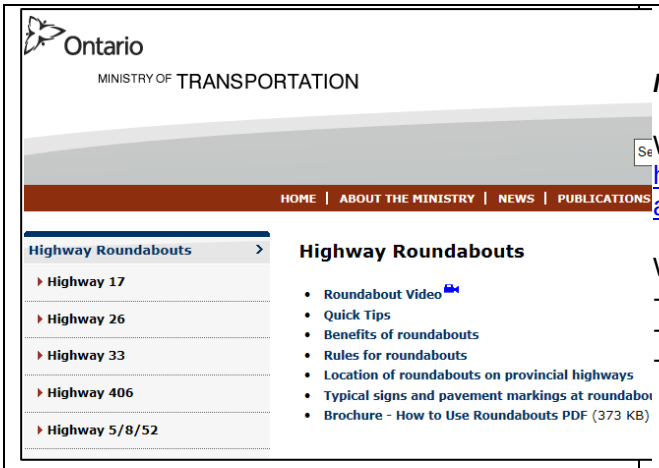
Salient features:

- Multi-lane east-west approach lanes
- Double lane circular roadway
- Bus stops on north and south approach legs
- Provision for an Apron on the inscribed circle
- Year opened 2008

 *Source: Google* Binbrook Rd / Fall Fair Way: ***City of Hamilton, ON*** *(Single-lane roundabout)*	***Roundabout in a new subdivision*** ***Salient features:*** • Located in a new subdivision • In proximity to another roundabout on Fall Fair Way ~400m north • Subdivision also has three traffic circles • Year opened 2007
 *Source: Google* Can-Amera Pkwy / Conestoga Blvd: **Cambridge**, ***Waterloo, ON*** *(Single-lane roundabout, with multi-lane approach)*	***Provision for non-motorized modes of transportation*** ***Salient features:*** • Located in Cambridge near major retail developments to the north • Provision of bicycle ramps • 3-leg roundabout • Noticeable grade differential • Provision of apron on the central island • Multi-lane approach but single lane wide rotary
 *Source: Google* Can-Amera Pkwy / Conestoga Blvd: ***Kitchener, Waterloo, ON*** *(Single-lane roundabout, with multi-lane approach)*	***Roundabout boulevard (on Ira Needles)*** ***Salient features:*** • Series of 5 roundabouts on Ira Needles Blvd • Provision for bicycle ramps • Apron provided on central island • Consideration for sight distance • Reduced speed thru the residential area along Ira Needles Blvd

 *Source: Google* McKinsey Blvd: ***McKinsey Townee, Calgary, AB*** *(five-leg complex roundabout)*	***Complex roundabout*** ***<u>Salient features:</u>*** • In proximity to Hwy 2 interchange to the west and Hwy 52 intersection to the east • Fire station access at from rotary • Several driveways on the approach legs • Significant emphasis on landscaping • 35000-40000 vehicles / day • Designed 16-17 years ago
 *Source: Google* Can-Amera Pkwy / Conestoga Blvd: **Cambridge**, ***Waterloo, ON*** *(Single-lane roundabout, currently in place as per information on Durham Region website)*	***New implementation of a roundabout*** ***<u>Salient features:</u>*** • First roundabout on a regional road in Durham • Notable public outreach efforts on the website • Rural location on regional road 8

List of Resources on Information for Roundabouts



Ministry of Transportation Ontario

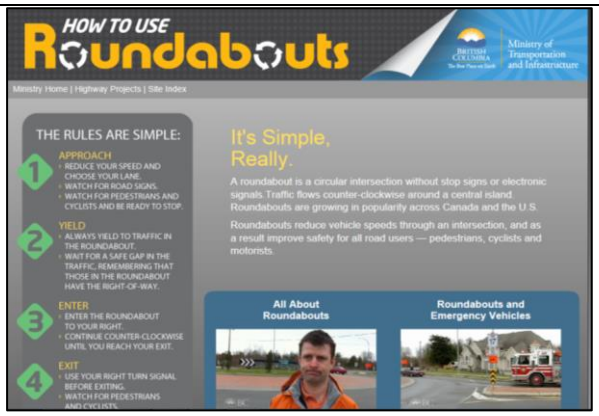
Website:
http://www.mto.gov.on.ca/english/engineering/roundabout/

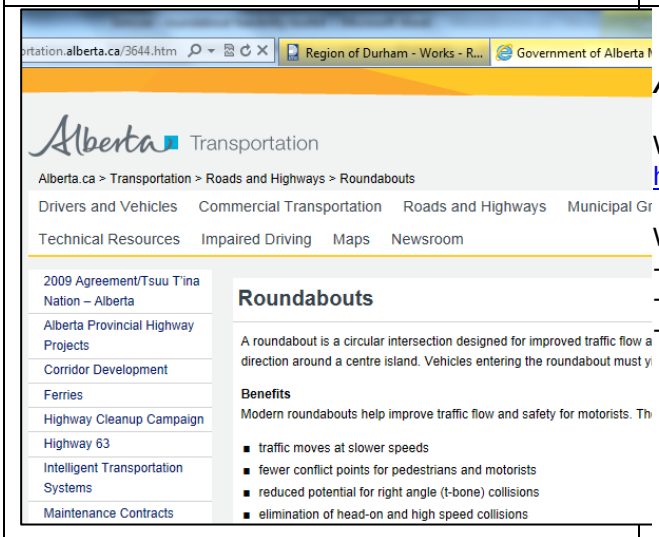
Webpage provides link to:
- Video
- Benefits and rules for roundabout use
- Locations where it has been implemented

British Columbia Ministry of Transportation

Website:
http://www.th.gov.bc.ca/roundabouts/index.html

Webpage provides link to:
- Comprehensive information on roundabouts in British Columbia
- Links to other resources

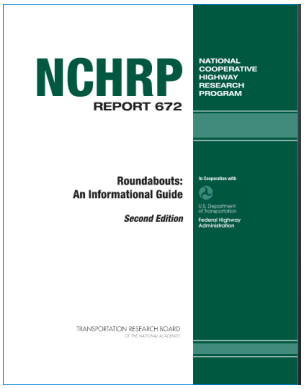
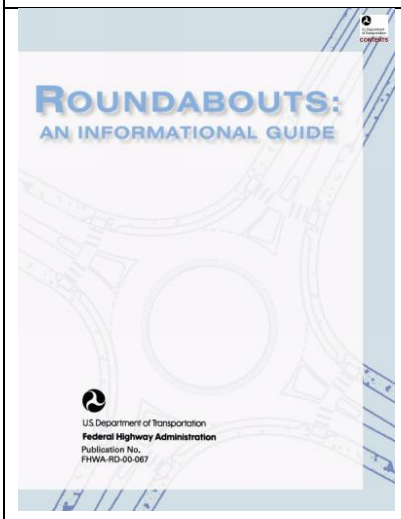
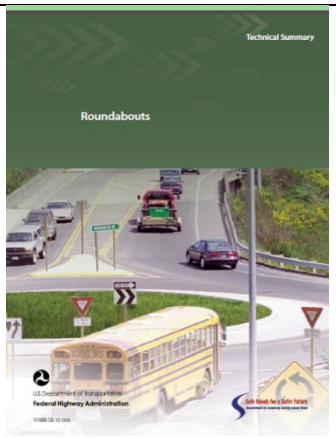




Alberta Departmnet of Transportation

Website:
http://www.transportation.alberta.ca/3644.htm

Webpage provides link to:
- Video animations
- Roundabouts in the province
- Examples of simple and complex roundabouts

Transportation Research Board (TRB) Publication- Roundabouts: An Informational Guide Second Edition Includes chapters on: - Roundabout considerations - Planning - Operations analysis - Safety - Geometric design guidelines	
	***Federal Highway Administration*** Publication - Roundabouts: An Informational Guide This publication was published prior to when the NCHRP 672 was made available, and offers similar guidance. This is a less detailed version of the NCHRP 672. Includes chapters on: - Planning - Operation - Design - Safety
Federal Highway Administration Publication - Technical Summary: Roundabouts Includes chapters on: - Characteristics - Benefits - User considerations - Location considerations - Operation - Design - Cost	

City of Hamilton

Website:
http://www.hamilton.ca/CityDepartments/PublicWorks/CommunityServicesRelatedPoliciesAndGuidelines/RoadsTrafficModernRoundabout.htm

Website provides link to:
- Policy on use of roundabouts in City of Hamilton
- Preliminary design drawings on roundabouts that are under implementation
- Live camera feeds on select locations
- Potential locations for roundabouts
- Additional resources

Region of Waterloo

Website: http://www.regionofwaterloo.ca/en/gettingaround/roundabouts.asp

Website provides link to:
- Public outreach techniques
- Videos to educate roundabout users
- Existing and potential locations of roundabouts

City of Calgary

Website: http://www.calgary.ca/Transportation/TP/Pages/Safety/Roundabout-Safety/Traffic-roundabouts.aspx

Webpage provides link to:
- Roundabout policy
- Roundabout guidelines
- Educational animated videos for travelling through a roundabout

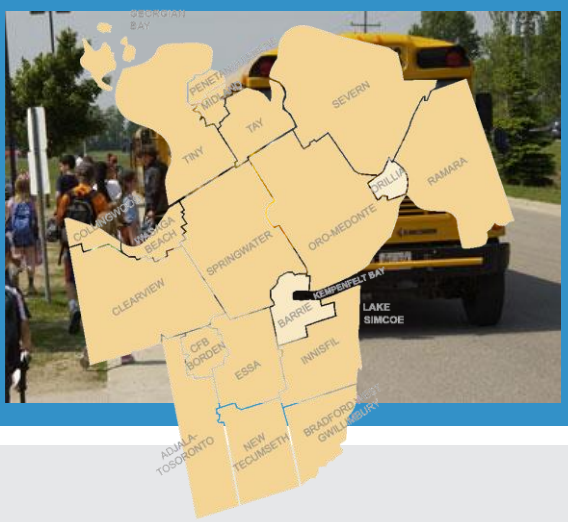
Region of Durham

Website:
http://www.durham.ca/works.asp?nr=/departments/works/roads/traffic/roundabouts/roundabouts.htm

Webpage provides links to:
- Resources on public outreach methods
- Links to websites on roundabouts



Appendix G: Active Transportation



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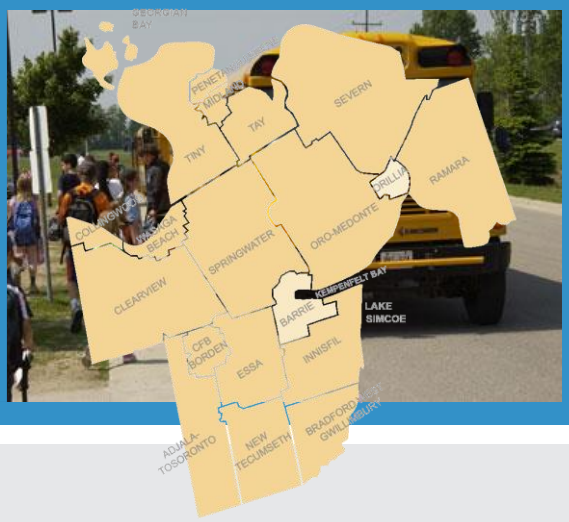


G.0 DESIGNING ACTIVE TRANSPORTATION FACILITIES: A NETWORK DESIGNERS' TOOLBOX

G.1 INTRODUCTION

The guidelines prepared for the design of active transportation facilities in Simcoe County should be treated as a reference for the development and construction of the route network concept. Although they are meant to provide guidance for a range of conditions typically encountered in a County-wide network, they are not intended to address every condition encountered.

The information included in this Appendix is not meant to be prescriptive nor is it intended to replace "sound engineering judgement". The intent is to have regard to the individual guidelines while considering context sensitive conditions when implementing facilities at specific locations to arrive at the most appropriate solution. In some cases an interim solution may be appropriate where the desired long-term solution cannot be achieved in the short or mid-term. When implemented, the interim solution should meet users' needs and safety considerations.

Though the guidelines have been prepared for Simcoe County's reference, those responsible for designing and implementing facilities should use the following design guidelines / standards as the primary reference for facility selection:

- Ontario Traffic Manual (OTM) Book 18 (Cycling Facilities)
- OTM Book 15 (Pedestrians)
- Transportation Associations of Canada Bikeway Control Guidelines
- Accessibility for Ontarians with Disabilities Act, 2005, Amending O. Reg. 191/11. Part IV.1 design of Public Spaces Standards (Accessibility Standards for the Built Environment)

G.2 USING THE DESIGN GUIDELINES

The Purpose:

To assist County and local municipal staff in making informed decisions about active transportation (AT) facility design.

How to Use the Guidelines:

- The guidelines provide general information on cyclists and pedestrians and their needs.
- Where appropriate, summary tables are provided which highlight recommended design treatments and/or considerations when designing active transportation facility types and amenities.
- The information included in these guidelines is thought to represent accepted design practices in North America, and incorporates ongoing research and experience by the consulting team and other professionals involved in active transportation facility design.

Active Transportation Guidelines

G-1	Adopt the active transportation design guidelines presented in **Appendix G** of the Simcoe County Transportation Master Plan Update as the basis for the design of active transportation facilities County-wide.
G-2	County and local municipal staff should supplement the active transportation design guidelines with additional resources including but not limited to the Ontario Traffic Manual (OTM) Books 18 and 15 and other best practices as they emerge.

G.3 CONSIDERATIONS WHEN DESIGNING FOR ACTIVE TRANSPORTATION USERS

Many elements design need to be considered when an AT facility is being developed and implementation. The elements can vary depending on location and are driven by context-sensitive conditions. Some of the characteristics which should be considered when proceeding to the design and implementation stage of facility development include:

- New construction versus upgrading existing trails;
- Trail location;
- Context (urban, rural or suburban);
- Level of separation (on vs. off-road);
- Width;
- Surface type;
- User groups;
- Level of use;
- Seasonal versus year round use;
- Gradient;

- Accessibility;
- Degree of difficulty;
- Length;
- Ownership;
- Sustainability and ability to maintain;
- Access points;
- Transition points / linkages;
- Context sensitive conditions;
- Road crossings; and
- Signage.

Details regarding some of the considerations listed above are provided in sections **G.3.1 – G.3.10**.

G.3.1 THE USER GROUPS

The characteristics and preferences of potential users can be the driver behind how an AT facility is designed. If users experience a sense of comfort and safety when engaging in AT activities they are more likely to continue to do so again.

For the purposes of on and off-road facility design for Simcoe County, pedestrians and cyclists are assumed to be the primary user groups. However, there are also secondary user groups such as inline-skaters, skateboarders, ATVs and Snowmobiles that have also been considered and are expected to be seasonal users of the system.

It is acknowledged that other user groups such as Equestrians, All-Terrain Vehicle (ATV) operators and snowmobilers currently own, operate and use some of the trails found throughout the County. Motorized trail users have not been considered within this guiding document for on and off-road facility design, though there may be some cases where trails intended for non-motorized users overlap with those intended for motorized users. Although the cases may be infrequent, adequate and proper signage related to safe interactions should be implemented.

Definitions of key considerations for the primary user groups are identified below. These should be used by the County and local municipalities when designing and developing AT facilities.

Primary User Groups

Pedestrians

Pedestrian users are typically those who are travelling by foot. They travel at lower speeds (with the exception of some groups e.g. joggers) than cyclists and generally require less manoeuvering space.

Pedestrians can be further defined based on the activity that they are participating in. They include:

- Walking;
- Hiking; and
- Jogging and running.

People in wheelchairs are also included in this category as they tend to operate at speeds more comparable to pedestrians than cyclists. Design considerations for the three anticipated pedestrian activities are presented in **Table G.1.**

Table G.1 – Pedestrian Activity Design Considerations

Walking
► **Interests and Motivators:** leisure, relaxation, socializing, exploring, making contact with nature, meditation, fitness, or dog walking. ► **Utilitarian Walkers:** typically community-driven and engage in trips focusing on shopping and errands or walking to work and school. They are typically found within more urban areas and use sidewalks, parking lots and plazas as well as trails where they are convenient, well designed and properly maintained. ► **Facility Considerations:** Trails can provide a more convenient "short cut" to traveling on sidewalks to get to a destination. Where no sidewalks are provided and there are no shoulders (in urban and/or rural areas), pedestrians should walk on the edge of the roadway, facing oncoming traffic according to the Ontario Highway Traffic Act. Signs warning motorists of pedestrians ahead are recommended in these locations.
Hiking
► **Interests and Motivators:** Often considered the elite of the recreational walking group and may challenge themselves to cover long distances. ► **Types of Facilities & Trips:** Typically engage in day trips that may range between 5 and 30 km in length and may be more keenly interested in natural features. They tend to be more adept at map reading, are more self-sufficient than leisure walkers, may expect fewer amenities and are often attracted to challenging terrain and rural areas. Trail planners should assume that there may be hikers even in remote or highway environments despite the fact that the frequency may be very low. In some cases hikers can be willing to walk on sections of rural roadway shoulder considered less safe or less interesting by the majority of leisure walkers.
Jogging / Running
► Interests and Motivators: Typically fitness is the driving factor; however, they may share more in terms of profile characteristics with long distance hikers than they do with leisure walkers. ► Types of Facilities & Trips: Typically are accomplishment oriented, enjoy trails at higher speed for distances between 3 and 15 km or more and avoid hard surfaces such as asphalt and concrete and prefer to run on granular, natural (earth) and turf surfaces as they provide more cushioning effect.

95% of all pedestrian trips are less than 2.5 km in length (Transportation Tomorrow Survey, in Hamilton Cycling Aster Plan 1996), though it is to be expected that some walkers who are out for exercise / health / fitness purposes might make trips that are between 5 and 10 km in length.

Cyclists

Cyclists include most users that are on wheels. They can travel at higher rates of speed and require more space to manoeuver than users who are on foot. Wheeled users are also typically willing or able to travel longer distances than those on foot but are more susceptible to steep grades.

The average travel speed for a cyclist on a trail can range from 15-20 km/h and 18-30+ km/h on a road, with speeds in excess of 50 km/h while traveling downhill on roads and some hard surface trails. Where excessive speed is a potential issue on trails, speed limits and warnings should be posted to discourage fast riding and aggressive behaviour. When using roads, cyclists generally travel 0.5 – 1.0m from the curb or other obstructions because of the possibility of accumulated debris, uneven longitudinal joints, catch basins, steep cross slopes, or concern over hitting a pedal on the curb or handlebar on vertical obstacles. However, when cyclists use or cross a public roadway they are considered vehicles by law and are expected to follow the same traffic laws as motorized vehicles.

Cyclists other than young children should be discouraged from cycling on sidewalks because of potential conflicts with pedestrians and potentially dangerous intersections with intersecting public road, private driveways and entrances. Many municipalities have prohibited sidewalk cycling through local by-law, however, some municipalities permit sidewalks cycling for children learning to ride (e.g. the City of Guelph).

Cyclists can include a range of different wheeled activities including on-road cycling, mountain biking, hybrid or leisure cycling and the increasingly popular e-bicycle (please refer to **OTM Book 18** for additional details and considerations regarding designing for e-bikes). Mountain bikers are typically able to travel easily over stone dust and gravel surfaces, whereas, traditional narrow-tired touring and racing bicycles require very well compacted granular surfaces or hard surface pavements such as asphalt.

At a high level, cycling can also be defined by the type or purpose of the trip. **Table G.2** is a summary of three different trip types which cyclists could engage in.

Table G.2 – Types of Cyclists Trips

Utilitarian
Definition: Those who use cycling or walking as their day to day mode of transportation to get to and from work, school, errands, etc.
Key Consideration: Often use the streets that are part of the trail and cycling network year-round in all weather conditions as opposed to those roads which do not make up part of the formal network. In some cases they may choose to use public transit or other modes of transportation during the winter season. Typically, utilitarian users have good mobility skills and are cognisant of the “rules of the road”.
Recreational
Definition: These pedestrians and cyclists will typically use the network for fitness or leisure purposes.
Key Consideration: Trips are typically used for travel on weekends as opposed to weekdays and will consist of trips to and from destinations of cultural or natural significance including off-road recreational trails. They will typically use the secondary / local neighbourhood connections as part of the overall network.

Touring
Definition: These pedestrians and cyclists use hiking and cycling as a means of exploring areas of significant long-distances from their point of origin.
Key Consideration: Trips can vary from full day excursions to multi-day excursions. They may plan their trips in advance and are willing to spend money for accommodation and food at their destination point. In some cases they travel in groups.

Table G.3 summarizes some key design considerations for cyclists based on the type of activity and trip purposes.

Table G.3 – Key Cycling Considerations

- The mechanical efficiency of the bicycle allows users of all ages to travel greater distances at a higher rate of speed than pedestrians.
- Distances covered vary widely from a few kilometres to well over a hundred depending on the fitness level and motivation of the individual cyclist.
- Cyclists have the right to access the public roadway system, with the exception of the 400 series and major provincial highways
- Some cyclists feel unsafe sharing the road with automobiles and do not have the desire or skill level to ride in traffic.
- Some cyclists tend to prefer off-road trails, shared with pedestrians as these facilities offer the less experienced and less confident cyclist a more comfortable environment.
- Cyclists that travel longer are more likely to focus a significant portion of their route on the roadway network, and often seek out quieter, scenic routes over busier roads even if the pavement quality is lower than on busier roads.

Active Transportation Guidelines

G-3 Planning and design of an active transportation network should be based on the primary user groups – pedestrians and cyclists. Most other modes fall under the two categories:

Secondary User Groups

Skateboarders & Non-Motorized Scooters

Skateboarding and the use of non-motorized scooters are becoming increasingly popular among all age groups, particularly in urban areas. No consistent guidelines have been widely adopted. In some municipalities, skateboarders and scooter users have been prohibited from using either roadways or sidewalks by local by-laws. Consequently, they are avid users of hard-surface off-road facilities and may travel some distance to reach a facility that suits their needs.

This user group prefers a very smooth, hard surface. Loose sand, gravel, twigs, branches, fallen leaves and puddles can be significant hazards. Though skateboarders and scooter users can quickly become pedestrians by dismounting, they too are vulnerable to the effect of grades (both up and

downhill) and require ample maneuvering space. An inability to come quickly to a complete stop can be a significant concern for all but the most experienced users in this group. Long or steep hills with limited visibility may be viewed as either challenging or terrifying depending on an individual's level of experience.

All-Terrain Vehicle (ATV) & Snowmobiles

Since All-Terrain Vehicles and Snowmobiles are motorized vehicles and do not qualify as a sustainable mode of transportation, this document does not directly address their requirements in terms of on and off AT planning and design. However, in the more rural areas of Simcoe County, ATVs and snowmobiles have existing and planned facilities. For the purposes of the route network concept, it has been assumed that in some cases the multi-use trail facilities may be shared between pedestrians, cyclists and ATVs / snowmobiles. As a result, there are a few general guidelines that should be given consideration when planning and designing multi-use trails to ensure that all trail users are able to enjoy them in a safe and comfortable manner:

- Signage should be installed, warning users of potential ATV and snowmobile traffic and vice-versa;
- Trails should be wide enough (where necessary), to allow ATVs and snowmobiles to safely pass other trail users; and
- Trails should be patrolled and monitored to ensure that trail users are acting in a safe manner with respect to each other.

Active Transportation Guidelines

G-4	Skateboarders and in-line skaters have more specific design considerations and requirements. These should be considered when designing an on or off-road facility which accommodates a range of user groups.
G-5	Although ATVs and snowmobiles are not sustainable modes of transportation, their requirements and interactions with users should be considered where their uses are permitted. The County should also consider including informational messaging and signage when a range of user groups are using the same space.

ATV and Snowmobile Use of Trails - Source: gunflint-trail.com

G.3.2 Minimum Operating Dimensions

The physical dimensions and operating space of cyclists can vary due to a cyclist's bicycle type, age and ability. Cyclists require a certain amount of space to maintain stability when operating a bicycle. **Figure G.1** illustrates a cyclist's typical operating space.

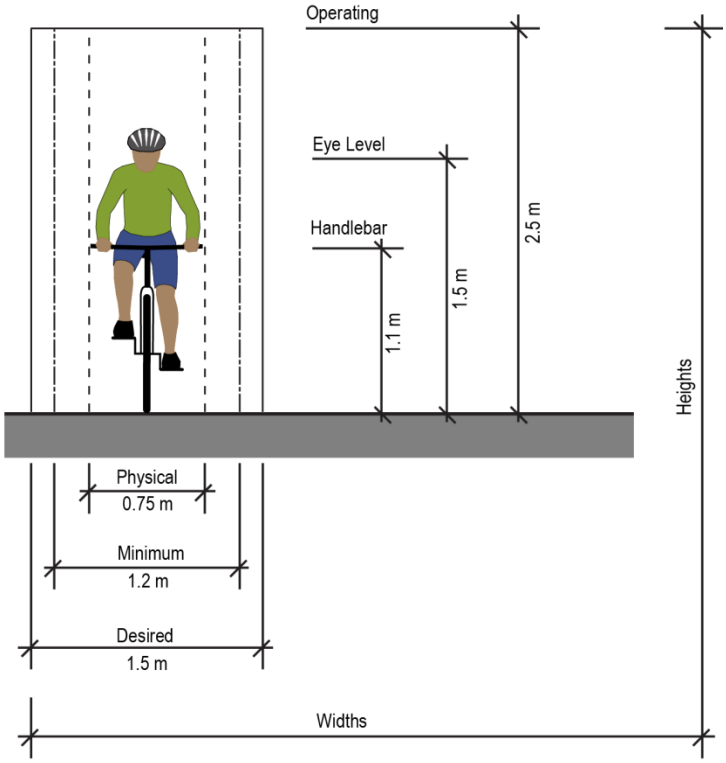


Figure G.1 – Typical Cyclist Operating Space

Source: Based on information from the AASHTO Guide for the Planning, Design and Operation of Bicycle Facilities, 2012 / OTM Book 18 : Cycling Facilities, 2013

Generally, an operating width of 1.2 to 1.5 metres is sufficient to accommodate forward movement by most cyclists. This width is greater than the physical width momentarily occupied by a cyclist in order to accommodate natural side-to-side movement that varies with speed, wind, and cyclist proficiency. Cyclists do not travel in a straight line. Manoeuvring space is needed to allow for side-to-side movement during operation. The operating height of 2.5 metres can generally accommodate an average adult cyclist standing upright on the pedals of a bicycle.

The design of on and off-road active transportation facilities require different considerations with regard to the user's operating space. The minimum operating dimensions referenced above pertain specifically to cyclists using on-road facilities. The design parameters outlined below address typical design considerations required for the design of trail facilities.

Trail Design Parameters

Careful consideration should be given to the physical, aesthetic and environmental requirements for the different multi-use trail types. In many instances, physical design criteria related to operating space, design speed, alignment and clear zones are often governed by the needs of the fastest, most common user group on the majority of the trails. For the design of on and off-road facilities for Simcoe County, the user group that would fit this profile would be cyclists.

Therefore, many of the physical design criteria outlined in the following sections pertain most specifically to cycling. This is not to say that all multi-use trails need to be designed to meet the requirements for cyclists; however, when multi-use trails are being designed it is prudent to use parameters for the cyclist.

When considering single or specialty uses where part of the trail experience involves maneuvering through challenging conditions (e.g. BMX or mountain biking), the parameters outlined below may not apply. In these instances, designers should consult directly with the user group and/or design manuals that are specific for that use.

Trail user operating space is a measurement of the horizontal space that the user requires. In the case of in-line skating and cycling, the space includes room required for side to side body motion used to maintain balance and generate momentum. **Table G.4** outlines minimum and preferred operating space for different uses.

Table G.4 – Minimum and Preferred Operating Space for Off-Road Trail Users

Operating Condition by Trail User Type	Minimum (metres)	Preferred (metres)
One way travel (one wheelchair user)	1.2	1.5
One way travel (two pedestrians)	1.5	2.0
One way travel (one cyclist)	1.2 (in constrained locations)	1.5+
One way travel (one in-line skater)	2.3	3.0
Two way travel (two cyclists)	3.0	3.0+
Two way travel (two wheelchair users)	3.0	3.0+

Horizontal clear distance is the space beside the trail bed that should be kept clear of protruding objects. Vertical clear distance is the space above the head of the user while using the trail (i.e. walking or mounted on their bicycle). **Table G.5** provides minimum and preferred horizontal and vertical clear distance.

Table G.5 – Horizontal and Vertical Clear Distance

Clearance Condition	Minimum (metres)	Preferred (metres)
Horizontal clearance to stationary objects	0.5	1.0
Vertical clearance to stationary objects	2.5	3.0

Slope refers to both the measured fall over a given distance and both the centerline (longitudinal slope) and perpendicular to the centerline (cross slope). Cross slope can be configured so that all runoff is directed to one side of the trail, or so that there is centre crown and runoff is shed to either side of the trail. **Table G.6** provides guidance regarding longitudinal and cross slope.

Table G.6 – Longitudinal and Cross Slope

Longitudinal Grade or Slope	
0% to 3%	► Preferred
5%-10%	► Provide additional trail width where trail segments are greater than 100m in length. ► Introduce level rest areas every 100 to 150m of horizontal distance. ► Consider design strategies such as switchbacks. ► Install signing to alert users of upcoming steep grades. ► Avoid grades over 5% for off road trails. Where steeper slopes are necessary "trail hardening" should be considered. ► Note: 10:1 (horizontal distance or run: vertical distance or rise), or 10% over at changes in level between 14mm and 200mm is the maximum permissible slope for meeting accessibility standards.
10% to 15%	► Consider the use of structures such as steps, step and ramp combinations, or stairways. ► Consider locating the trail elsewhere.
15% or over	► Based on local experience, 15% represents the maximum possible longitudinal slope for a sustainable pathway or trail surface. Where slopes approach or exceed 15% significant washouts become and ongoing issue. ► Structures such as steps, step and ramp combinations and stairways should be employed. Otherwise, an alternative location for the pathway should be sought.
Cross Slope	
2%	► Minimal, acceptable on hard surfaced trails, may not provide adequate drainage on granular surfaced trails.
2 to 4%	► Preferred range for both hard and granular surfaced trails.

Table G.6 – Longitudinal and Cross Slope

Greater than 4%	► Avoid wherever possible as excessive cross slopes can be difficult and potentially dangerous for some levels of physical ability and certain user groups as they can result in difficulty maintaining balance, especially among user groups with a high centre of gravity.

Design speed is used to determine trail width, minimum curve radius, horizontal alignment and banking or super elevation to ensure that trail users have adequate space and time to safely approach and navigate sharper curves along the trail.

The design speed for recreational cyclists is generally considered adequate for all self-propelled trail users including pedestrians, in-line skaters, skateboarders, scooter users and those using mobility devices such as wheelchairs. The average recreational cyclists can maintain speeds of up to 18-25 km/h on some multi-use pathways. For granular surfaced off-road multi-use pathways or trails, a design speed in the area of 25 km/h is usually adequate, whereas a design speed of 40 km/h should be considered for hard surfaced multi-use pathways and trails on steeper descents. Cautionary signing should be used to warn of upcoming steep grades and sharp curves.

Cyclists are the critical user group when designing off-road multi-use pathways and trails for self-propelled users as they have the highest average travel speed. The minimum radius of a curve on an off-road cycling facility depends on the bicycle speed and super-elevation. The AASHTO Guide for the Development of Bicycle Facilities, published in 2012 recommends that the general design speed should be 29 km/h for multi-use trails where cycling is the highest speed user group. Based on research, 29 km/h represents the 85th percentile for bicycle speed on granular surfaced pathways. The slightly lower design speed will allow for slightly smaller curve radii and potentially less construction impact as compared to multi-use pathways and trails requiring larger radii. For suggested centreline radii for a range of design speeds and super elevations please refer to **Table G.7**.

Table G.7 – Suggested Pathways and Trail Radii Based on Travel Speeds

Design speed (km/h)	Suggested Radius (m) where super elevation = 0.02m/m	Suggested Radius (m) where super elevation = 0.05m/m
25	15	14
30	24	21
35	33	30
40	47	42
45	64	57

When horizontal curves are sharp (i.e. a very small radius), facility widening should be considered to compensate for the tendency of cyclists to track toward the outside of the curve.

Table G.8 outlines additional widening requirements for curves on multi-use pathways and trails where the radii are less than the recommended minimum for the design speed selected.

Table G.8 – Additional Trail Widening on the Outside of Curve

Radius (m)	Additional widening (m)
0-7.5	1.2
7.5-15	0.9
15-22.5	0.6
22.5-30	0.3

Stopping Sight Distance is the distance required for trail users to come to a full controlled stop upon spotting an obstacle. It is a function of the user's perception and reaction time. Stopping sight distances for off-road multi-use pathways and trails are typically governed by the distance required for cyclists since pedestrians and other trail users (with the exception of in-line skaters) can typically stop more immediately than cyclists regardless of the trail configuration. In terms of in-line skaters, though no definitive data currently exists regarding stopping distance, from a number of experiences and observations from in-line skaters, representatives and manufacturers, it can be surmised that a proficient in-line skater travelling close to the same speed as a cyclist can stop in a distance equal to or less than that of a cyclist. Therefore, basing stopping distance on the distance required for a cyclist should accommodate all other expected self-propelled trail users including in-line skaters.

Active Transportation Guidelines

G-6	The County and its local municipalities should refer to the minimum and preferred trail user operating space widths identified in **Table G.4** when developing or reviewing multi-use pathway designs.
G-7	The County and its local municipalities should refer to the minimum and preferred horizontal and vertical clear distances identified in **Table G.5** when developing or reviewing multi-use pathway designs.
G-8	The County and its local municipalities should refer to the longitudinal and cross slope guidelines identified in **Table G.6** when developing or reviewing multi-use pathway designs.
G-9	The County and its local municipalities should consider the suggested trail curve radii and additional trail widening dimensions identified in **Table G.7** and **Table G.8** when developing or reviewing multi-use pathway designs.

G.3.3 AT Facilities in Urban, Suburban and Rural Areas

Typically urban / suburban users live closer to their destinations than rural users. As such, they are more likely to make short trips and / or utilitarian / commuter trips. Urban and suburban systems will generally have a higher order of infrastructure than rural systems due to a higher density of users.

The application of bike lanes, signed routes, multi-use pathways in the road right-of-way should be considered for those routes found in the urban and suburban areas. Routes in rural areas may accommodate paved shoulders, fewer designated routes and some linear off-road trails (e.g. trails along or within an active or abandoned railway or a utility corridor).

G.3.4 Freight, Transit and Emergency Service Route

Special consideration should be made for those routes that are designated as freight, transit and / or emergency service routes. The implementation of formal cycling facilities or multi-use trails within the road right-of-way on these routes should be considered to accommodate the operating and design needs of large vehicles which conflict with those of cyclists. Cyclists' level of comfort and overall safety can be compromised due to the presence of large vehicles which may require the implementation of more separated cycling facilities (e.g. bike lanes and / or multi-use pathways outside of the road right-of-way) and / or alternate / parallel routes. In these scenarios, the application of traffic calming measures may not be appropriate because of the potential disturbance that speed bumps tend to create and the turning space required for larger vehicles.

For those transit routes which are identified as part of the overall network, there is the potential for increased conflict points where buses are required to merge over proposed bicycle facilities to access transit stops. In these scenarios, the applications of left-side bike lanes or other design treatments could be considered to accommodate boarding passengers and to reduce the number of conflict points between passengers and cyclists. **Figure G.2** illustrates a design application of a designated cycling facility approaching a transit stop.

Figure G.2 – Transit Stop & Cycling Facility
Source: MMM Group, Sherbourne Cycle Tracks, 2012

G.3.5 Intersections

An intersection is where two or more roadways come together at grade. At this point different modes of transportation and associated facilities cross paths which can cause conflicts between cyclists and motorists. **OTM Book 18** and **TAC Bikeway Control Guidelines (2012)** sets out measures to decrease roadway user risk by:

- Increasing visibility for both cyclists and motorists and other roadway users (ensure cyclists and motorists can easily see each other);

- Designating and clearly marking a travel path for all roadway and intersection users including cyclists, motorists and pedestrians;
- Introducing designs that minimize the need for complex manoeuvers for cyclists;
- Managing intersection access to mitigate conflict points; and
- Facilitating awareness and understanding between competing modes of transportation.

The most frequently occurring conflicts between motorists and cyclists at an intersection can be broken into right-turn conflicts and left-turn conflicts.

- **Right-turn conflicts** - when a cyclist is trying to make a through movement while a motorist is trying to make a right turn and to do so the motorist must cross over the on-road bicycle facility.
- **Left-turn conflicts** - when cyclists try to merge across one or more lanes of through vehicle traffic in order to turn left using the same path as motorized vehicles.

Both types of conflicts can be mitigated using innovative design solutions that incorporate elements such as pavement markings and signage, pavement colour, designated holding areas for cyclists, medians, and bicycle traffic signals or by adjusting signal timings to accommodate cyclists. **Figure G.3** illustrates the typical bicycle and automobile movements at an intersection which can be used to better understand the different conflict points which can occur at major intersections. For additional details on these conflict areas and mitigation measures, County and local municipal staff should refer to **OTM Book 18** and **TAC's Bikeway Traffic Control Guidelines (2012**).

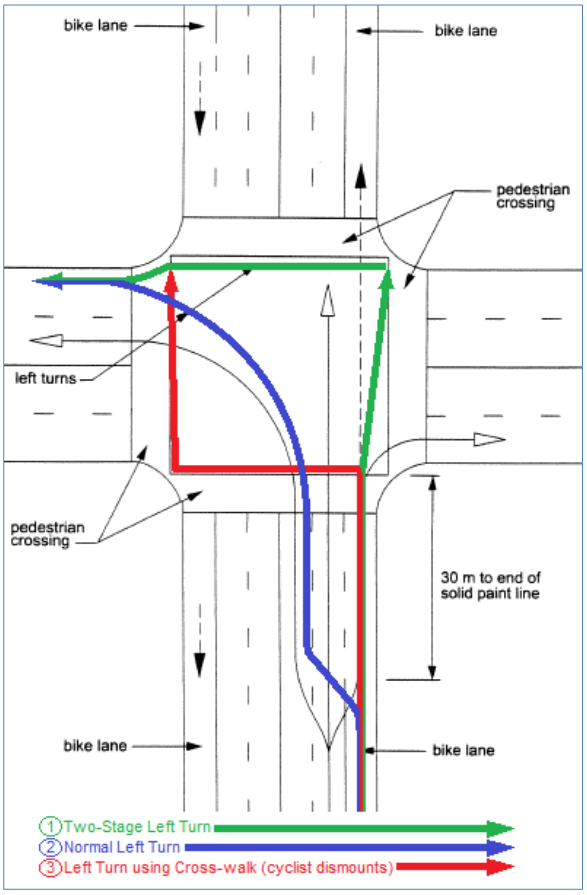


Figure G.3 – Typical Bicycle and Motorized Vehicle Movements at an Intersection of Multi-lane Roadways and associated Conflict Points

Credit: Based on TAC Geometric Design Guide for Canadian Roads, 1999

G.3.6 Interchanges

The integration of cyclists and pedestrians at interchanges is often more complex. Interchanges possess unique characteristics and functions that present challenges when designing for pedestrians and cyclists especially when retrofitting bicycle facilities on existing interchange structures. Cycling facilities can either be implemented at an existing interchange during an upgrade or retrofitting project, or as part of a new interchange design.

Should the County choose to retrofit any of their existing interchanges the following guidelines should be considered:

- **For lower speed merging/diverging ramps (< 70 km/h.)**, the bicycle lane should continue straight across the ramp using a white, dashed line pavement marking.
- **For high speed merging/diverging ramps (> 70 km/h.)**, the bicycle lane should not be carried straight across the ramp. Instead, it is recommended that for diverging ramps, designers either place a crossing further up the ramp with indicating signage or implement a "jughandle" crossing.

For more details on the design of these facilities, the County and local municipalities should refer to the interchange and ramp crossing design treatments outlined in the **OTM Book 18** and **TAC's Bikeway Traffic Control Guidelines (2012)**.

G.3.7 Transition Points

The design of active transportation facilities should take into consideration maximizing the consistency for users and decreasing potential conflicts with other modes of transportation. Where possible, active transportation facilities should be built to provide direct connections to destinations within the community, to surrounding municipalities or to key utilitarian or recreational routes. Routes that are isolated only provide short connections, do not access key destinations and/or begin and end abruptly and should not be considered for implementation unless previously identified as part of the route network concept for Simcoe County.

The network should be designed to provide smooth transition points between active transportation facilities. Abrupt transition points make it difficult for pedestrians and cyclists to navigate through the on and off-road routes and could potentially increase the number of conflict points. The County and local municipalities should design facilities to minimize these scenarios at key locations throughout the County.

Figure G.4 illustrates the proposed signage which can be implemented at transition points to increase driver, pedestrian and cyclists awareness of the presence of bicycle facilities. The County and local municipalities should refer to the signage standards provided in the **TAC Bikeway Traffic Control Guidelines 2012** and the facility design guidelines as part of **OTM Book 18**.

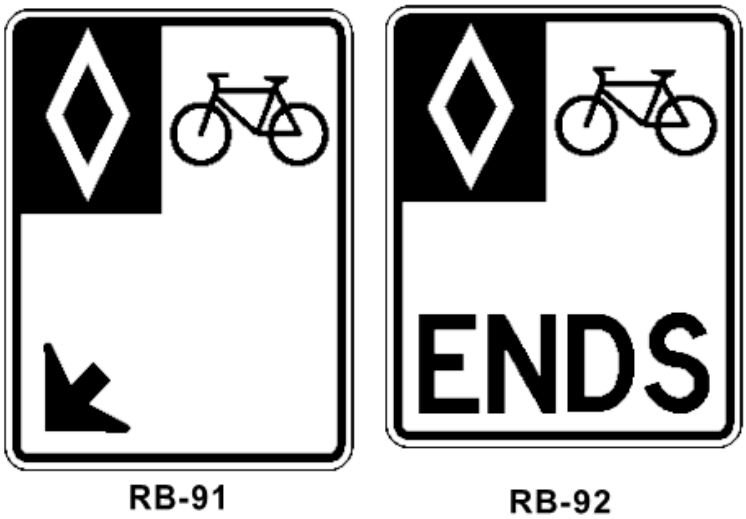


Figure G.4 – Transition Point Signage

Credit: TAC Bikeway Traffic Control Guidelines (2012)

G.3.8 Accessibility

Approximately one in eight Canadians suffer from some type of physical disability. Mobility, agility, and pain-related disabilities are by far the most common types, each accounting for approximately 10% of reported disabilities nationally. Disability increases with age from 3.3% among children, to 9.9% among working-age adults (15 to 64), and 31.2% among seniors 65 to 74 years of age. Disability rates are highest among older seniors (75 and over), with fully 53.3% in this age group reporting a disability.

The **Accessibility for Ontarians with Disabilities Act (AODA)** states that "The people of Ontario support the right of persons of all ages with disabilities to enjoy equal opportunity and to participate fully in the life of the province." The stated goal of the AODA is "to make Ontario accessible for people with disabilities by 2025."

The **Accessibility Standards for the Built Environment** is the standard that applies to pathways and trails. The intent is that it will help remove barriers in buildings and outdoor spaces for people with disabilities. The standard will only apply to new construction and extensive renovation.

AODA Criteria which are to be considered when designing for cyclists include: operational experience, width, running slope, cross slope, total slope, surface, changes in level and signage. The guidelines and criteria set out in these documents apply to the development of trail and sidewalk facilities and are not required for consideration when designing and developing on-road cycling facilities.

When designing and implementing cycling facilities, the County should utilize the guidelines outlined in the Built Environment Standards to ensure that the needs of all user groups are accommodated and satisfying the requirements of the AODA to the greatest extent possible, given the context of each trail's location, the surrounding environment and type of trail experience that is desired. Sections 80.8 and 80.10 of the Accessibility Standards for the Built Environment provide the technical requirements for recreational trails. These include:

- Minimum clear width 1.0m;
- Minimum head room clearance of 2.1m above trail;
- Surfaces are to be firm, stable with minimal glare;
- Maximum running/longitudinal slope of 10%;
- Maximum cross slope of 2%;
- High tonal or textural changes to distinguish the edge;
- Standards also address changes in level, openings in the surface, edge protection (e.g. near water); and
- Signage shall be easily understood and detectable by users of all abilities. It is important to ensure that signage and mapping/messaging clearly communicates which pathways are accessible so that users can make an informed personal decision about which pathways they will use.

Universal Trail Design is a concept that takes into consideration the abilities, needs, and interests of the widest range of possible users. For trails, it means planning and developing a range of facilities that can be experienced by a variety of users of all abilities. Principles of universal trail design can be summarized as follows:

- **Equitable use:** provide opportunity for trail users to access, share and experience the same sections of trail rather than providing separate facilities;

- **Flexibility in use**: provide different options for trail users in order to accommodate a variety of experiences and allow choice;
- **Simple, intuitive and perceptible information:** whether conveying trail information through signage, maps or a web site, communicate using simple, straightforward forms and formats with easy to understand graphics and/or text;
- **Tolerance for error:** design trails and information systems so as to minimize exposure to hazards, and indicate to users any potential risks or challenges that may be encountered;
- **Low physical effort:** trails may provide for challenge but should not exceed the abilities of the intended users; where appropriate, rest areas should be provided; and
- **Size and space for approach and use:** trails and amenities should provide for easy access, comfort and ease in their usage.

Transition Point Signage: Source: (Left) www.en.wikipedia.org; (Right) www.americantrails.org

Ontario's Best Trails – (2006) provides an in depth discussion of the application of Universal Design principles and their application. Where possible and practical, trails and multi-use pathways should be designed to be accessible to all levels of ability. It must be recognized, that not all trails and multi-use pathways throughout the system can meet all of the accessibility requirements.

Steep slopes are one of the most significant barriers for those with physical disabilities. Designing trails and multi-use pathways to be within the threshold (5%) for universal access will not only overcome this significant barrier but it will help to reduce the potential for erosion of the trail surface. The following are some additional considerations for making existing and new trails accessible:

- Designers should consult the most current standards available;
- Where the trail requires an accessibility solution that is above and beyond what is normally encountered, a representative of the local accessibility advisory committee should be consulted early on in the process to determine if it is practical and desirable to design the specific trail to be fully accessible;
- Where it has been determined that full accessibility is appropriate, the accessibility representative should be consulted during the detailed design process to ensure that the design is appropriate; and

- Work collaboratively with the local accessibility advisory committee to consider developing signage/content to clearly indicate trail accessibility conditions, which allow users with mobility-assisted devices to make an informed decision about using a particular trail prior to travelling on it.

Active Transportation Guidelines

G-10	Every effort should be made to ensure that off-road trails meet or exceed minimum accessibility requirements. Secondary Multi-use Pathways and Internal Park Trails will be designed to meet minimum accessibility requirements where feasible and practical. Hiking / Foot Trails are typically not designed to meet accessibility requirements.
G-11	Signage and maps should be designed to communicate which pathways and trails meet minimum accessibility requirements so that users can make their own advance decision about using the route.

G.3.9 Personal Security

To the extent that it is possible, active transportation routes should be designed to allow users to feel comfortable, safe, and secure. Although personal safety can be an issue for all, women, the elderly and children, are among the most vulnerable groups. Principles of Crime Prevention Through Environmental Design (CPTED) should be considered and applied to help address security issues concerning trail use, particularly in locations where trails are lightly used, isolated or in areas where security problems have occurred in the past. The four main underlying principles of CPTED are:

Natural Access Control: deters access to a target and creates a perception of risk to the offender.

Natural Surveillance: The placement of physical features and / or activities and people that maximizes natural visibility or observation.

Territorial Reinforcement: Defines clear borders of controlled space from public to semi-private to private, so that users of an area develop a sense of ownership.

Maintenance: Allows for the continued use of space for its intended purpose.

Active Transportation Guidelines

G-12	When implementing networks, the underlying principles of CPTED should always be considered including: ► Natural Access Control; ► Natural Surveillance; ► Territorial Reinforcement; and ► Maintenance.

G-13 Signage and maps should be designed to communicate which pathways and trails meet minimum accessibility requirements so that users can make their own advance decision about using the route.

G.3.10 Multi-modal Integration - "Complete Streets"

There is a growing desire to evaluate transportation services of roadways from a multimodal perspective. Given the emphasis of contemporary planning concepts such as 'Smart Growth' and 'Complete Streets', alternative modes of travel – specifically transit, cycling and walking – should be considered when exploring the development of a system of on and off-road active transportation routes.

There is an increasing amount of research regarding the design and development of complete streets. There is not a "one size fits all" solution or specific design standard that can be universally applied. The Toronto Centre for Active Transportation (TCAT) recently published a report documenting the benefits, challenges, best practices and design alternatives for complete streets which are being implemented world-wide. Simcoe County and its local municipalities are encouraged to use this reference as a guide for future roadway design.

There are many kinds of complete streets, each are guided by the unique characteristics of the municipality in which they are being developed including but not limited to the community context and land use, the role of the street in the overall transportation network, traffic volumes of the proposed roadway and the existing transportation modes being accommodated. It is important to note that the implementation of a "complete street" approach requires coordination and support from a number of different sources including residents, businesses, planners and policy makers, engineers and landscape architects. Their combined input provides the balance of needs required to accommodate all modes of transportation including cycling while designing a useable space for all.

Credit: www.raisethehammer.org - Example of Complete Street Redesign in Hamilton, ON

G.4 SELECTING & DESIGNING ACTIVE TRANSPORTATION FACILITIES

G.4.1 Facility Selection

Facility selection is an important component in network development. As planning and design active transportation (bicycle and pedestrian) facilities continue, the County and its local municipalities should refer to the facility selection process outlined in **OTM Book 18 Cycling Facility Design**. The

process provides a consistent framework that is easy to apply, technically based (was developed based on current research and knowledge of facility type selection), and allows flexibility to account for the differences in physical and operational characteristics from one site to another.

The selection tool does not tell designers when and when not to provide a certain facility type but rather sets out a process for selecting an appropriate facility type given the context and readily available data.

G.4.2 Active Transportation Facilities

Active transportation facilities can be divided into the following two categories:

- **On-road Active Transportation Facilities:** refers to facilities within the road right-of-way that are located on or along an existing road and may be incorporated into the existing of future street network. This may also include a facility within the road right-of-way that is physically separated from motor vehicle traffic by a curb or shoulder often referred to as a "boulevard" or "verge".
- **Off-road Active Transportation Facilities:** refers to facilities that are outside the road right-of-way through open spaces, valleys and parklands, as well as linear corridors such as abandoned railway lines, unopened road allowances and utility corridors.

Within these categories, there are a range of different facility types. The facility types are often described in terms of their degree of separation from motor vehicles (see graphic below). For a more detailed description of each please refer to sections **G.4.2.1** – **G.4.2.3**. As mentioned above, the information presented in this document should be supplemented with the bicycle and pedestrian facility design guidelines outlined in **OTM Book 18, OTM Book 15** and **TAC's Bikeway Traffic Control Guidelines (2012)**.

Shared Facilities	Dedicated Facilities	Separated Facilities
► Signed-only Bike Routes on Local Roads ► Signed-only Bike Routes on Wide Travelled Lanes ► Signed Bike Routes with "Sharrow" Symbols ► Bikeway Boulevards ► Edge Lines	► Signed Bike Routes with Paved Shoulders ► Signed Bike Routes with Buffered Paved Shoulders ► Bike Lanes ► Buffered Bike Lanes	► Multi-use Pathway in place of a sidewalk ► Multi-use Trails outside the Road Right-of-Way ► Rails with Trails

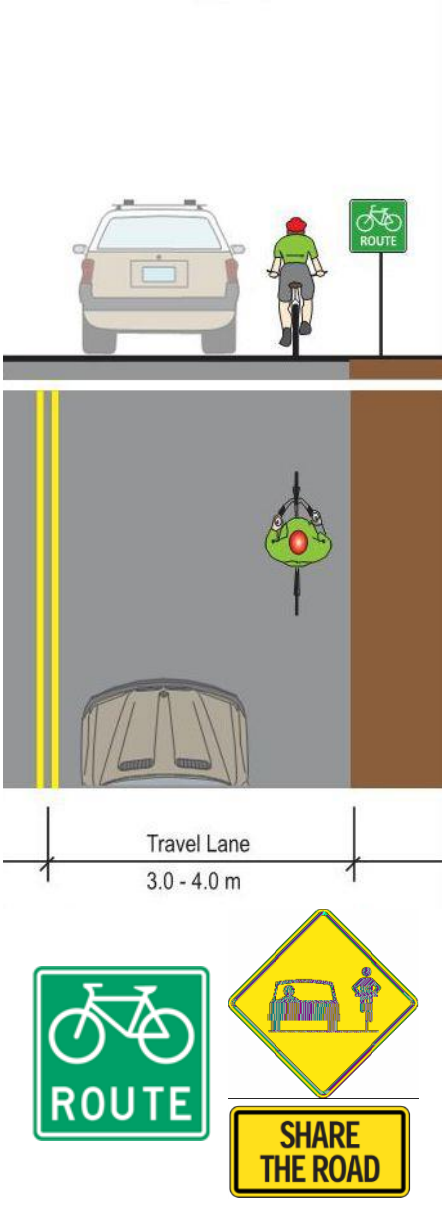
Least Separation

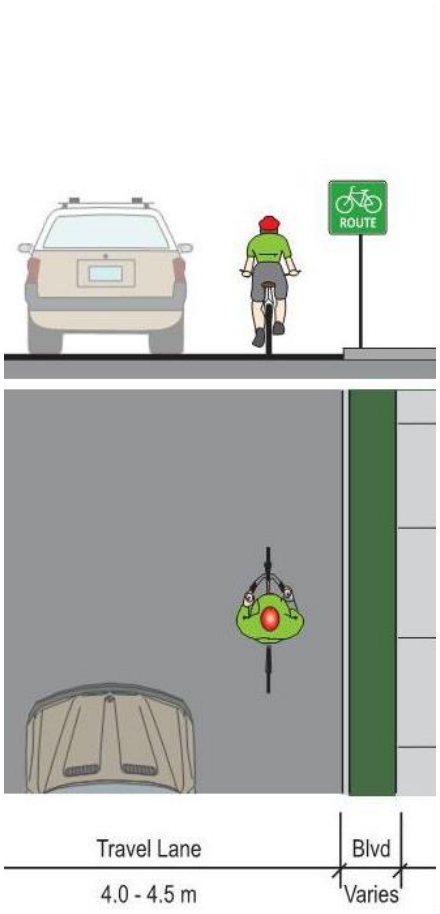
Generally associated with lower volume, lower speed roads

Most Separation

Generally associated with higher volume, higher speed roads

G.4.2.1 Shared Facilities

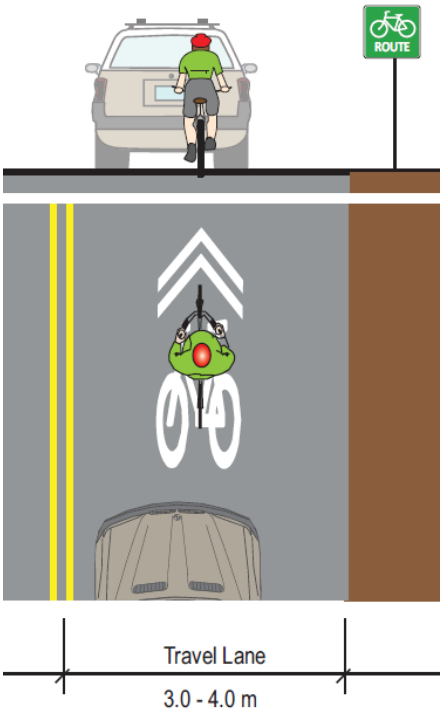
Signed-only Cycling Routes on Local Roads		
Definition	Signed-only Bike Routes are routes where both motorists and cyclists share the same vehicular travel lane and 'Bicycle Route Marker' signs are used to provide route guidance. Aside from 'Bicycle Route Marker' signs, there are generally no other provisions used for Signed-only Bike Routes.	
Considerations	► Bicycles and motor vehicles share the right-most travel lane, no physical space is dedicated for bicycle use only; ► Design does not include pavement markings for bicycles; ► Marked with 'Bicycle Route Marker' signs which may be supplemented by optional 'Share the Road' signs; ► Should typically only be signed as on-road bike routes where acceptable (e.g. lower) motor vehicle operating speeds and traffic volumes exist; and ► Should be supported by education programming for both cyclists and motorists.	
Typical Application	Typical for residential streets where motor vehicle traffic volumes and speeds are low, and rural roads where traffic volumes are low.	
Pedestrian Uses	Pedestrians use the sidewalk in residential areas, and may use the road shoulder in rural areas.	
Guideline G-14: Signed-only Bike Routes may be used on roads where traffic volume is considered relatively low and adequate sightlines exist. Adding edge lines in urban areas may be suitable where there is sufficient width or removal of on-street parking for bike lanes is not supported by the local neighbourhood.		

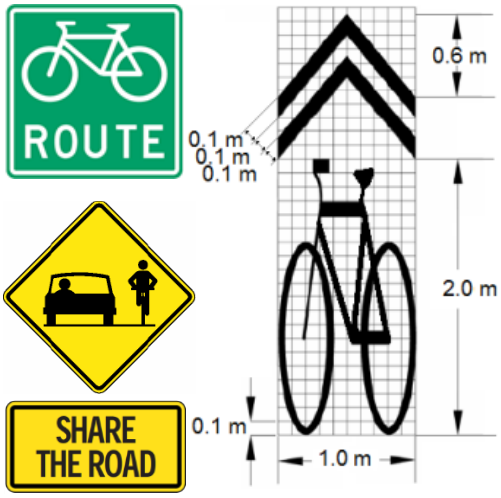
Signed-only Cycling Routes on Wide Travelled Lanes		
Definition	Similar to Signed-only Bike Routes with the exception that the travel lane shared by motorists and cyclists is wider than the standard motor vehicle travel lane (e.g. 4.0 to 5.0 m). The extra width allows motorists and cyclists to travel side-by-side more comfortably. Travelled lane widths should not be more than 5.0 m wide as this may encourage unsafe passing by motorists.	
Considerations	► Bicycles and motor vehicles share the right-most travel lane, no physical space is dedicated for bicycle use only; ► Design does not include pavement markings for bicycles; ► Marked with 'Bicycle Route Marker' signs which may be supplemented by optional 'Share the Road' signs; ► 'Share the Road' signs and sharrows should be considered at pinch points; and ► Wide travelled lanes should have sufficient width to allow motorists to pass cyclists without encroaching on an adjacent travel lane (if one exists).	
Typical Application	Typical for multi-lane roads with wide right-most travelled lanes which may be created by narrowing the inside travel lanes.	
Pedestrian Uses	Pedestrians use the sidewalk in urban areas, and may use the road shoulder in rural areas.	

Guideline G-15: Signed-only Bike Routes on Wide Travelled Lanes may be retrofitted on 4-lane cross-sections by narrowing the inside travel lane. Supplementary 'Share the Road' signs and sharrows should be considered at pinch points to make both cyclists and motorists aware of narrow zones.

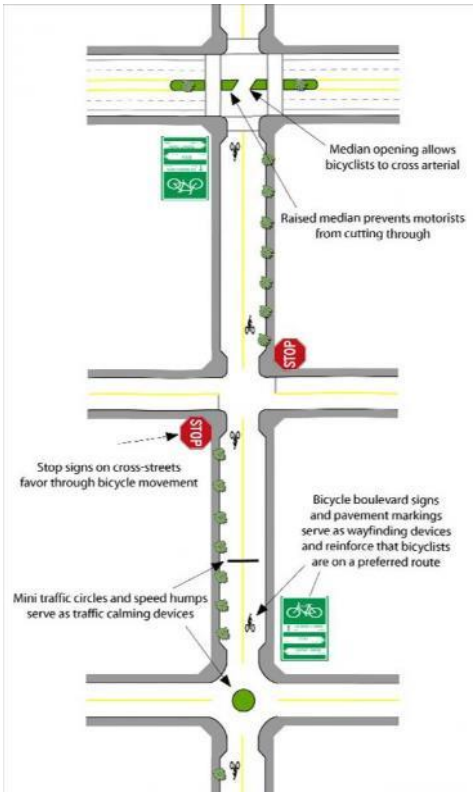
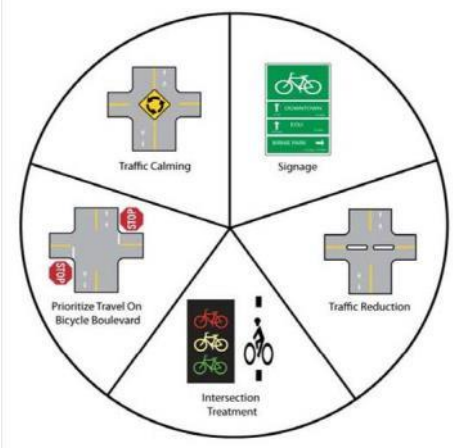
Signed Bike Routes with Sharrow Symbols

Definition	Shared use lane markings, also called "sharrows", are symbols placed on the pavement surface in the intended area of bicycle travel. Sharrows provide added route guidance and help cyclists position themselves appropriately in the travelled lane. Sharrows also increase driver awareness of the presence of cyclists and help deter unsafe passing manoeuvres by motorists.
Considerations	► Bicycles and motor vehicles share the right-most travel lane; ► Pavement markings indicate appropriate positioning for cyclists. Cyclists align their front wheel with the point on the chevron; ► Especially useful in congested areas where traffic is generally moving slowly (e.g. a "downtown" street or urban centre); ► Clear pavement markings and signs illustrate the concept of "Share the Road" within space-confined roadways; and ► Can be an appropriate solution for urban downtown / main street areas where on-street parking cannot be removed to implement dedicated bike lanes.
Typical Application	Placement of the Sharrow symbol indicates to cyclists where they should be traveling on the road (e.g. approximately 1.0 m from the curb where there is no on-street parking and 3.4 m from the curb where there is on-street parking on a multi-lane road).
Pedestrian Uses	Pedestrians use the sidewalks in urban areas

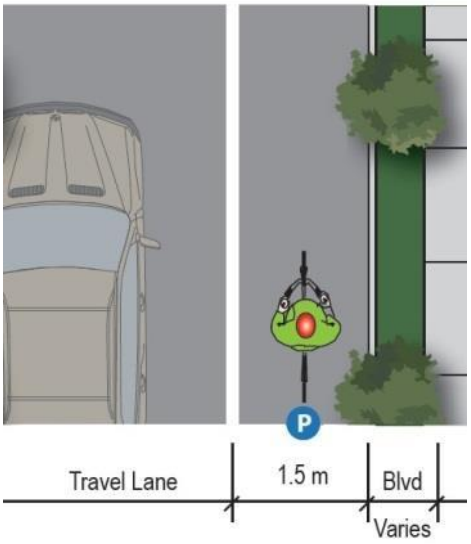




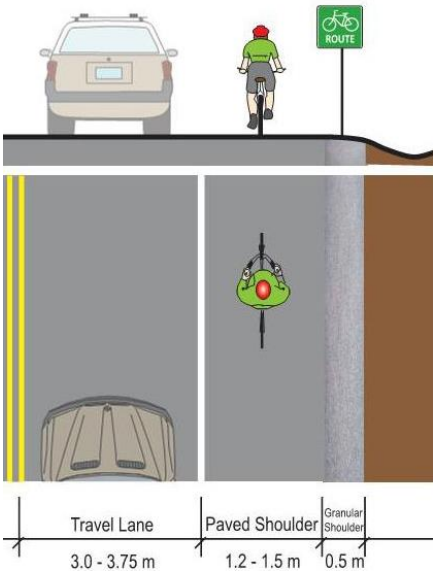
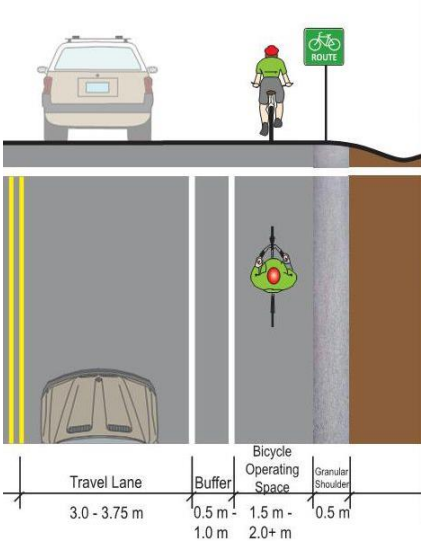
Guideline G-16: Signed-only Bike Routes with Sharrows may be used on congested local and county roads where traffic generally moves slowly and at pinch points to make both cyclists and motorists aware of narrow zones.

Bikeway Boulevard (Bicycle Priority Streets)		
Definition	In some areas, particularly residential neighbourhoods, traffic calming techniques such as through travel restrictions for cars, traffic circles and reduction in the number of stop signs can be used to create “bicycle priority streets” which allow the cyclist to travel more efficiently by not having to break momentum and stop at frequently placed four way stops.	
Considerations	Design strategies and elements are employed to encourage through-travel for cyclists and enable them to maintain momentum, yet discourage or restrict through travel by motorists.	
Typical Application	Typically reserved for local roadways and residential street and include traffic calming measures to encourage an increased comfort level for cyclists.	
Pedestrian Uses	Pedestrians use the sidewalk in residential areas.	

Guideline G-17: Bikeway Boulevards or Bicycle Friendly Design Applications may be used on local roads and residential streets where a formal bicycle facility is not required however, with the introduction of traffic calming measures cycling may increase due to a greater sense of comfort.

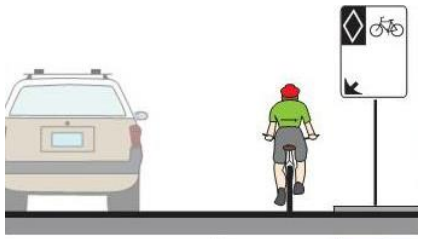
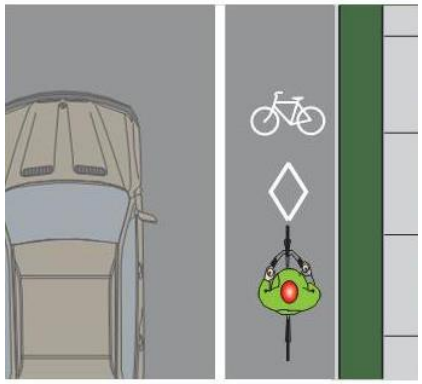
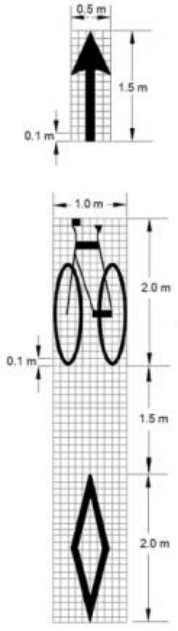
Edge Lines		
Definition	Signed-only Bike Routes may be supplemented with edge lines. Edge lines are a creative way of providing cyclists with operating space outside the motor vehicle travelled portion of the roadway without affecting on-street parking since on-street parking is still permitted. This may be a useful first step towards implementing future bicycle lanes where the removal of on-street parking is an issue with neighbouring residents, yet demand is low.	
Considerations	► Bicycles and parked motor vehicles share the space to the right of the edge line; ► Design does not include pavement markings for bicycles; ► Marked with 'Bicycle Route Marker' signs; ► Should only be signed as on-road bike routes where acceptable (e.g. lower) motor vehicle operating speeds and traffic volumes exist; and ► Should be supported by education programming for both cyclists and motorists.	
Typical Application	Typical for residential streets where motor vehicle traffic volumes are low and speeds are low to moderate. Edge lines may be a useful first step towards implementing future bicycle lanes along a roadway where the removal of on-street parking is an issue with neighbouring residents but parking demand is low.	
Pedestrian Uses	Pedestrians use the sidewalk in residential areas	

Guideline G-17: Edge lines should be considered as an option in residential areas with on-street parking where providing cyclist operating space outside the motor vehicle travelled portion of the roadway is desired but providing dedicated bicycle lanes are not feasible or appropriate given the content.

Signed Cycling Route with Paved Shoulder		
Definition	Signed Bike Routes with Paved Shoulders provide a convenient place for cyclists to ride, on a road with a rural road cross section (no curbs). A buffer made up of two edge lines with or without diagonal hatching or with a rumble strip in between can be used to provide cyclists riding on the paved shoulder with added separation.	
Considerations	► Provides a space for cyclists on rural road cross-sections (no curb and gutter); ► Where motor vehicle speeds or volumes are high, a wide shoulder and / or painted buffer enables more separation between the cyclists and the motor vehicle, and also reduces the impact of wind-shear on the cyclist; ► The paved shoulder provides a convenient location for cyclists to travel; ► Rumble strips can be added to the painted buffer as an additional cue, provided that there are clearly marked breaks at regular intervals, allowing the cyclists to move in or out of the paved shoulder areas to overtake slower moving cyclists, safely pass stalled vehicles or to make a left turn; and ► 'Bike Route Marker' signs and 'Share the Road' signs may be used.	
Typical Application	Implemented on rural cross-sections (no curbs) where motor vehicle traffic volume and speeds are higher.	
Pedestrian Uses	Pedestrians may use the paved shoulder or the remaining portion of the gravel shoulder. Pedestrians must walk facing on-coming traffic in accordance with the Highway Traffic Act.	

Guideline G-18: Signed Bike Routes with Paved Shoulders may form part of the County's active transportation network along rural road cross sections.

G.4.2.2 Separated Facilities

Bike Lanes		
Definition	A Bike Lane is a portion of a roadway which has been designated by pavement markings and signage for preferential or exclusive use by one way cyclist traffic often along the right-most curb or edge of road.	
Considerations	► Motor vehicles are typically not permitted to park or stand in the bike lane, but right turning motor vehicles can enter the bike lane at intersections to complete their turn (enforced through municipal bylaw); ► Width of the bike lane (or adding a buffer zone) should be increased (to a maximum of 2.0 m) where motor vehicle traffic volumes, percentages of trucks and commercial vehicles and motor vehicle speeds are higher; ► Sufficient space should be provided to mitigate conflict between cyclists and open car doors on streets where on-street parking is permitted; and ► Consistency in the design and signing of bike lanes and other bikeway facilities is crucial to educate and inform cyclists and motorists on their proper use.	
Typical Application	Typically implemented on a cross-section road where motor vehicle traffic volume and speeds are higher than typical threshold values for shared space routes.	
Pedestrian Uses	Pedestrians use sidewalks in urban areas (sidewalks would be installed at least on one side of the road along designated AT routes where none currently exist in the urban area).	

Guideline G-19: Bike lanes should be provided on urban arterial and major collector roads that are part of the AT network where traffic volume and speed are higher. Bike lanes should also be clearly identified on roadways with bicycle symbol pavement markings and 'Reserved Bicycle Lane' signs.

Road Diet (Reallocation of Space for Bike Lanes)

Definition	Retrofitting existing roadways without roadway widening involves the reallocation of space for the implementation of bicycle facilities.
Considerations	► Narrowing of vehicular travel lane where practical and safe; ► Reducing the number of through vehicular travel lanes; ► Reconfiguring on-street parking or removing it on roadways with low demand; and ► Redistributing existing road space to accommodate cycling facilities can in some cases be a more appropriate and affordable solution.
Typical Application	Wide curb lanes may allow for easy implementation of shared lane markings (sharrows) or even conventional bicycle lanes. On rural road cross-sections, gravel shoulders may be paved to provide cyclists with an area for riding that is adjacent to vehicular travel lanes offering separation between bicycle traffic and vehicular traffic. ► Bicycle lanes have a preferred design width of 1.5m to edge of pavement (design minimum of 1.5m to face of curb) and 1.8 – 2.0m wide if adjacent to a parking lane. ► Additional width can be obtained from the adjacent travel lanes and/or parking lanes. ► In constrained corridors, over short distances, bicycle lanes should not be less than 1.2 m wide including the gutter.
Pedestrian Uses	N/A

4-Lane Collector;

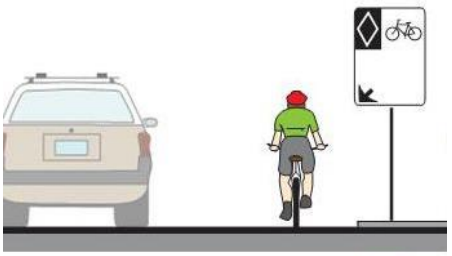
On-street parking permitted, but low demand; and

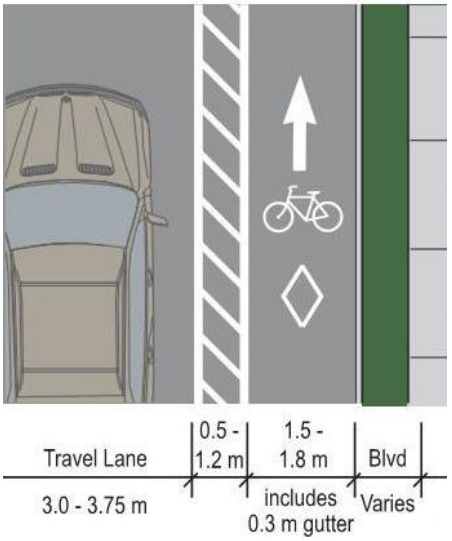
Moderate to high operating speeds for this neighbourhood location (high speed is noted as an ongoing problem).

Guideline G-20: Where applicable, the County should consider retrofitting existing roadways to accommodate cycling facilities including edge lines or bike lanes at a minimum width of 1.5m to the edge of the pavement or 1.8m – 2.0m wide if beside a parking lane.

Buffered Bike Lanes

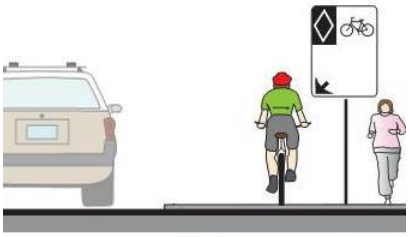
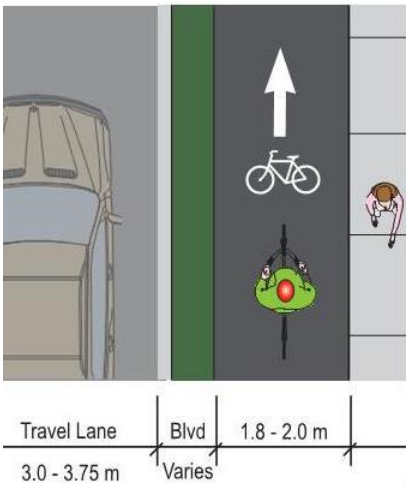
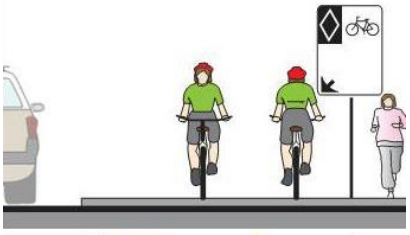
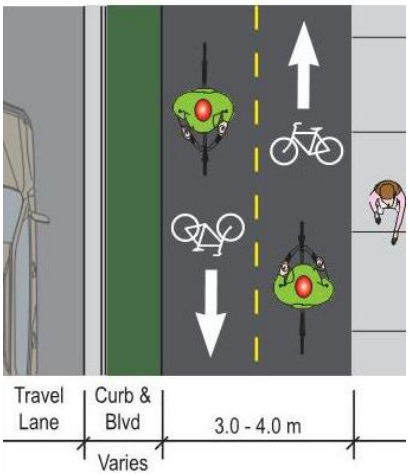
Definition	Buffered Bike Lanes provide additional space/separation between the cyclist and motor vehicles and can use a number of separation alternatives to address this, including pavement markings, rumble strips, planters, etc.
Considerations	► There are various types of physical buffers that are available and can be used to create separation but not all barrier types completely restrict the encroachment of motorized vehicles into the bicycle lane. ► Where a barrier is used to separate the bike lane from vehicle traffic (e.g., bollard, curb, planters etc.), this type of facility is commonly referred to as a Cycle Track. ► For a separated bicycle facility, a designated buffer space separates the bicycle lane from the adjacent motor vehicle travel lane. ► Signage and wayfinding provide additional guidance to cyclists, motorists and other road users.
Typical Application	Typically implemented along urban roadways with high motor vehicle volumes and/or speed where increased separation is required. Could also be implemented on roadways with on-street parking and high parking turnover where double parking is an issue or major corridors that provide direct and convenient access to key destination points (i.e., corridors with heavy cycle traffic) or in front of schools.
Pedestrian Uses	Pedestrians use sidewalks in urban areas (sidewalks would be installed at least on one side of the road along designated AT routes where none currently exist in the urban area).

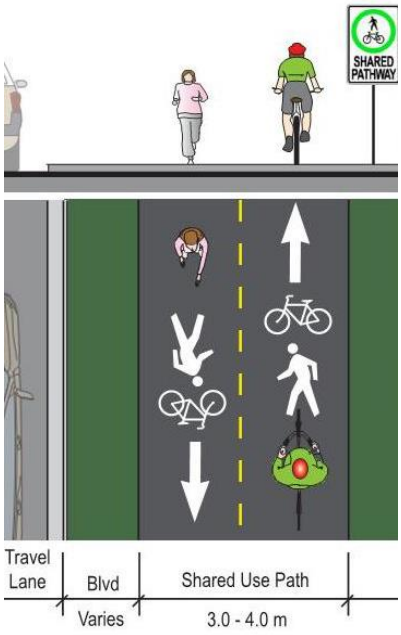
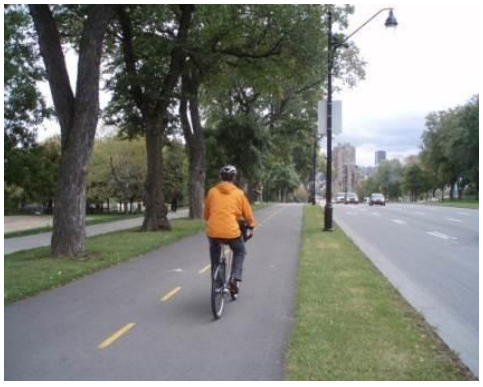




Guideline G-21: Buffered Bike lanes should be provided on urban arterial and major collector roads that are part of the AT network where traffic volume and speed exceed threshold levels for the implementation of Conventional Bike Lanes.

G.4.2.3 Off-Road Facilities

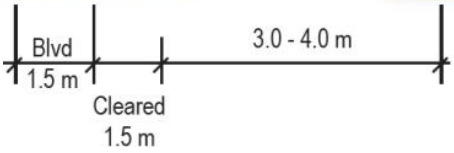
Multi-use Trails (In Place of a Sidewalk)		
Definition	Is a bicycle path or a combined bicycle/pedestrian path physically separated from motor vehicle traffic by a strip of grass (often referred to as a "boulevard" or "verge") within the roadway right-of-way or in place of an existing or previously proposed sidewalk. This facility type is typically designed for a wide range of non-motorized users including pedestrians, cyclists, in-line skaters, and skateboarders.	
Considerations	► Surface may be compacted granular (e.g., Limestone Screening) or hard surface (e.g., Asphalt) to accommodate different users and a yellow centre line may be used on busier asphalt surface; ► Should not be applied in locations where lot frontages are narrow and there are numerous intersections per kilometre; ► Separation or setback from the road is a very important consideration. Where separation cannot be achieved, one direction of cycling traffic is required to ride against motor vehicle traffic; ► When the available right-of-way is too narrow it may be prudent to consider a reduction of the existing or proposed widths of elements such as travel lane and shoulder widths (any reduction to less than MTO, TAC, AASHTO or municipal approved design criteria should be supported by a documented engineering analysis); ► Some cyclists may continue to use the roadway even if an multi-use pathway is provided which may lead to conflicts with motorists who feel all cyclists should be on the path	  

	provided; and ► Consideration should be given to motorists falsely expect cyclists to stop or yield at all cross-streets and driveways.	
Typical Application	The application of Multi-use Pathways adjacent to a roadway, especially as a cycling facility, should only be considered for cycling when an on-road facility is not feasible or when a municipality seeks to provide a primarily recreational path for pedestrians and cyclists and cannot or chooses not to provide a parallel on-road facility for cycling. This is an appropriate facility choice in areas where there is high cycling demand and a large proportion of the users are youth or seniors with a low to moderate level of experience and where there are few intersections/conflict points per kilometre.	
Pedestrian Uses	A Multi-use Pathway in place of a sidewalk can take on two forms, one where the bicycle path is distinct from the sidewalk and the other where a single path is shared by cyclists and pedestrians. On the Shared Use Active Transportation Path pedestrians are able to use the facility type along with cyclists and other user groups (e.g., in-line skaters, skateboarders, etc.).	

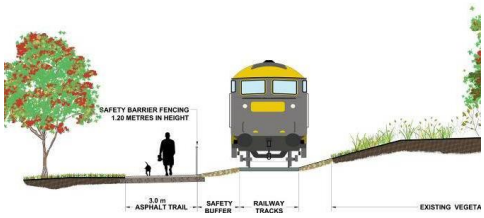
Guideline G-22: Multi-use Trails (in place of sidewalks) should be considered in areas where there is high cycling demand and a large proportion of the users are youth or seniors with a low to moderate level of experience and where there are few intersection /conflict points per kilometre (typical for residential streets where motor vehicle traffic volumes and speeds are low, and rural roads where traffic volumes are low).

Off-Road Multi-use Trails Outside of the Road Right-of-Way

Definition	Off-Road Multi-Use Trails are shared facilities located outside the road right-of-way for use by cyclists and other non-motorized users. If permitted, multi-use trails may also be used by recreational motorized vehicles.
Considerations	► Generally used to provide a recreational opportunity and may also be appropriate to provide a direct cycling commuter route in corridors not served directly by on-road facilities. ► Surface may vary, may be granular in rural areas and asphalt in urban areas to accommodate a wider range of users. ► Designers must consider the specific users when determining the operating and design characteristics of the off-road facility. ► Signage and/or painted centrelines can be utilized to identify separate lanes for opposing directions of travel and encourage the practice of keeping to the right side of the trail.
Typical Application	Typically located outside the road right-of-way through a park, public open space corridor, along a utility corridor, or other linear facilities such as within an abandoned railway corridor.
Pedestrian Uses	Multi-use trails accommodate the widest range of Active Transportation user groups including cyclists, pedestrians, in-line skaters, skateboarders, and wheelchair users depending on the trail surface. If permitted, equestrians and recreational motorized vehicles including snowmobiles and all-terrain vehicles may also be permitted to use certain sections of a multi-use trail outside of the road right-of-way.



Guideline G-23: Off-Road Multi-use Trails provide for the widest range of user ability and should be considered as an integral part of the active transportation network. They also provide connections to local/secondary trails.

Rails with Trails		
Definition	Rails with Trails are off-road trail facilities which are implemented adjacent to abandoned or existing railways.	
Considerations	► Under certain conditions active rail rights-of-way may also be able to accommodate an active transportation function. ► In cases where abandoned rail lines currently host multi-use trails and need to be converted to active rail use in the future consideration should be given to reinstating rail infrastructure without losing the use of the multi-use trail by moving the trail to the edge of the right-of-way.	
Typical Application	Candidates for “rails with trails” are those with a wide enough right-of-way to safely accommodate a multi-use trail in addition to existing rail operations, low speed, and low frequency railways.	
Pedestrian Uses	Trails accommodate cyclists as well as pedestrians in both urban and rural applications.	
Guideline G-24: Where applicable, rails with trails should be considered to best utilize active or non-active railways throughout the County and to accommodate, in a safe and effective manner, both pedestrians and cyclists.		

The design concepts and guidelines prepared for Simcoe County are intended to be used by staff as well as those responsible for the design and implementation of active transportation facilities through the County and local municipalities including but not limited to the conservation authorities, representatives from cycling and / or trail groups and organizations, the County as well as private land owners. The following trail design concepts from **G.5** to **G.27** should be considered for the design and implementation of the active transportation network for Simcoe County.

G.4.3 Designing for Intersections & Crossings

A significant challenge when implementing an active transportation network is how to accommodate users when crossing various physical barriers and roads. The following section provides guidance on crossing design.

G.4.3.1 Minor Roads

In the case of lower volume and lower speed roads, the crossing should include the following:

- Creation and maintenance of an open sight triangle at each crossing point;
- Access barriers to prevent unauthorized motorized users from accessing the pathway;
- Advisory signing along the roadway in advance of the crossing point to alert motorists to the upcoming crossing;
- Signing along the pathway to alert users of the upcoming roadway crossing;
- Alignment of the crossing point to achieve as close to possible a perpendicular crossing of the roadway, to minimize the time that users are in the traveled portion of the roadway;
- Concrete ramp in boulevard between the sidewalk and roadway; and
- Curb ramps on both sides of the road.

Pavement markings, to delineate a crossing, should not be considered at “uncontrolled” trail intersections with roads as trail users are required to wait for a gap in traffic before crossing at these locations. Pavement markings designed to look like a pedestrian cross over may give pedestrian and trail users the false sense that they have the right-of-way over motor vehicles, which is contrary to the Highway Traffic Act of Ontario for uncontrolled intersections. In some locations, signing on the trail may not be enough to get trail users to stop before crossing the road. Under these circumstances or in situations where the sight lines for motorists are reduced and/or where there is a tendency for motorists to travel faster than desirable, the addition of other elements into the trail crossing may be necessary. Changing the trail alignment may help to get trail users to slow and stop prior to crossing. Changes to the streetscape may also provide a cue and traffic calming effect for vehicles.

Active Transportation Guidelines

G-25 Trail crossings of local minor roads at mid-block locations include advance advisory pedestrian crossing signs on the roadway approaches and a yield or stop sign on the trail approaches.

G.4.3.2 Crossing with Median Refuge Island

Pedestrian refuge islands are medians that are placed in the centre of the roadway separating opposing lanes of traffic. They allow trail users to cross one direction of traffic at a time, resting on the refuge island in the centre. They are particularly suited for roadways with multiple lanes since the cognitive requirements to select a gap in traffic traveling in two directions in multiple lanes is considerably higher than that required for cross two lanes of traffic. A number of jurisdictions have implemented Pedestrian Refuge Islands. Guidelines for the typical design elements for a pedestrian refuge island are as follows:

- Islands are typically a minimum of 6 m in length;
- Islands should be a width of at least 1.8 m wide, but 2.4 m is preferred to accommodate wheelchairs in a level landing 1.2 m wide plus 0.6 m wide detectable warning devices on each side. The 2.4 m width will also accommodate bicycles in the refuge;
- Curb ramps are provided to allow access to the roadway and island for wheelchair users, and detectable warning devices (0.6 m in width) should be placed at the bottom of the curb ramps;
- The pathway on the island is constructed of concrete, not asphalt. Users with low vision or complete visual impairment can better detect the change in texture and contrast in colour supplemented by the detectable warning devices to locate the refuge island;
- Appropriate tapers are required to diverge traffic around the island based on the design speed of the roadway;
- The pathway on the island can be angled so that pedestrians are able to view on-coming traffic as they approach the crossing;
- Illumination should be provided on both sides of the crossing;
- Signage associated with the pedestrian refuge island includes “Keep Right” and “Object Marker” warning signs installed on the island facing traffic, and “Pedestrian Crossing Ahead” warning signs installed on the roadway approaching the crossing. “Wait for Gap” warning signs can be installed on the far side of the crossing and on the refuge island if pedestrians are failing to cross in a safe manner;
- Crosswalk markings are not provided unless the crossing is at an intersection controlled by signals, stop or yield signs, or controlled by a school crossing guard; and
- Railings on the island to control pedestrian access are not recommended because they are a hazard in potential collisions (spearing of driver or pedestrian). Some pedestrians will walk in front of or behind the island to avoid the railings, a less safe refuge location than on the island.

The graphic on the following page illustrates an application of a midblock pedestrian signal with a median refuge.

There are a number of design alternatives which could be used to ensure the safe crossing of roadways by pedestrians and cyclists when on trails. One of the design alternatives that has recently emerged is a cross-ride. A cross-ride can be used by pedestrians and cyclists when crossing a roadway and provides a designated space for both users and helps to prevent possible conflict areas at crossings. Recently implemented in communities such as the City of Mississauga and the City of Burlington, this innovative design features is now endorsed and promoted by **OTM Book 18**.

Mid-block Pedestrian Signal with Median Refuge Credit: MMM Group, 2010

Midblock Pedestrian Signal Without Median
Credit: MMM Group, 2012

G.4.3.3 Midblock Pedestrian Signal

The midblock pedestrian signal is a device to assist pedestrians crossing major streets and is a more positive and effective pedestrian crossing device than a pedestrian crossover (PXO).

A midblock pedestrian signal includes standard traffic signal indications to control traffic on the major street and standard pedestrian “Walk” and “Don’t Walk” signals, activated by push buttons, for pedestrians wishing to cross the major street at the designated crossing point. Midblock pedestrian signals may be considered when:

- A multi-use path or trail crosses a high volume and/or multi-lane road;
- A grade separation is not practical; and
- Crossing nearby.

The graphic above illustrates an application of a midblock pedestrian signal.

Active Transportation Guidelines

G-26 At-grade mid-block multi-use pathways crossings of collector and arterial roadways should be controlled by a pedestrian signal or pedestrian cross over where possible.

G.4.3.4 Active Railways

Currently, in order to establish a pathway crossing of an active rail line, proponents must submit their request directly to the railroad company. Submissions need to identify the crossing location and its basic design. Designs should be consistent with Draft RTD-10, Road/Railway Grade Crossings: Technical Standards and Inspection, Testing and Maintenance Requirements (2002) available from Transport Canada. In the event that an agreement cannot be reached on some aspect of the crossing, then an application may be submitted to the Canadian Transportation Agency, who will mediate a resolution between the parties.

The graphics below illustrates an at-grade crossing of an active railway in Newmarket, Ontario and some design concepts and considerations which could be explored for a similar location.

At-Grade Trail Crossing of a Railway - Location: Newmarket, ON Credit (Right / Left): MMM Group, 2012

G.3.3.5 Abandoned Rail Lines

In rural areas where abandoned rail corridors are being considered for multi-use trails, owners of farming operations who have property on both sides of the corridor and/or are using a portion of the corridor to gain access to their fields are sometimes apprehensive when plans are made for trails as they see this important access being restricted or discontinued.

Where site specific concerns are identified it is important for trail designers and managers work with the adjacent landowner(s) to develop a mutually beneficial solution.

Successful solutions have been developed elsewhere in Ontario and have included:

- Post and wire fencing along both sides of the corridor in the section of concern;
- Lockable wire or metal gates in locations that serve the landowner's needs, with a local that remains in the possession of the landowner;
- Access ramp(s) to reach the trail bed, which may already be in place and require only minor improvements such as grading, culverts or drainage;
- Trail widening where the machinery must cross and / or along the length of the segment that the owner may be required to travel on the trailbed (in the case of a diagonal or offset crossing);
- Cautionary signs to warn trail users in advance of the crossing point or zone that the machinery needs to use the trailbed; and
- Signs at trailheads to forewarn trail users that they may expect to encounter farm machinery crossing or using the trail, and that this may be more frequent during certain times of the year.

G.3.3.6 Bridges

Where possible, the active transportation network should make use of existing bridges, including pedestrian bridges, vehicular bridges and abandoned railway bridges in appropriate locations. In

cases where this is not possible, a new structure will be needed and the type and design of a structure needs to be assessed on an individual basis.

The following are some general considerations: In most situations the prefabricated steel truss bridge is a practical, cost effective solution;

- In locations where crossing distances are short, a wooden structure constructed on site may be suitable;
- Railings should be considered if the height of the bridge deck exceeds 60cm above the surrounding grade, and should be designed with a “rub rail” to prevent bicycle pedals and handlebars from becoming entangled in the pickets;
- When considering barrier free access to bridges, an appropriate hardened surface should be employed on the trail approaches and bridge decking should be spaced sufficiently close to allow easy passage by a person using a mobility-assisted device;
- Decking running perpendicular to the path of travel is preferred over decking running parallel, as the latter is more difficult for use by wheelchairs, strollers, in-line skates and narrow tired bicycles;
- Maintenance considerations; and
- Accessibility.

Sample Pathways on Bridges - Top: Brampton, ON; Bottom: St. John’s, Nfld. Credit: MMM Group, 2012

G.4.3.6 Underpasses & Tunnels

Often an underpass or tunnel is the only way to cross significant barriers such as elevated railways and multi-lane highways. Designing trails through underpasses and tunnels can be challenging because of the confined space.

Underpasses should be wide enough to accommodate all active transportation users whether they are traveling by foot, bicycle, in-line skates, wheelchair or other forms of active transportation. Where feasible, it is suggested that trail widths through underpasses be equal to or greater than that of the approaching trail. The guidelines provided below outline key considerations for the development of an underpass crossing.

Active Transportation Guidelines

G-27

- The minimum recommended underpass or tunnel width for a multi-use pathway is 3.5m. Where the structure exceeds 20m in length, in high traffic and/or urban areas the width should be increased to 4.2m or greater where possible;
- For shorter length underpasses, a vertical clearance of 2.5m is usually sufficient;
- For longer structures a vertical clearance of 3.0m should be considered. If service and/or emergency vehicles are to be accommodated within the underpass, an increase in vertical clearance may also need to be provided;
- Underpasses and tunnels can be a security concern and also present maintenance challenges. To address these issues, tunnels should be well lit with special consideration made to security, maintenance and drainage. Approaches and exits should be clear and open to provide unrestricted views into and beyond the end of the structure wherever possible;
- Abutments should be appropriately painted/marked with reflective hazard markings; and
- Ideally, the transition between the multi-use pathway and underpass crossing should be level and provide for accessibility. In the case where an underpass crosses beneath ground-level travel/road ways, ramps should be provided to allow a transition down to the lower grade under the passage, with grade or alignment changes being taken up by the access ramps wherever possible.

C.4.4 Multi-use Trail Surface Type

There are a number of options for trail surfaces, each with advantages and disadvantages related to cost, availability, ease of installation, lifespan and compatibility with various trail users groups. **Table G.9** is a summary of the most commonly used trail surfacing materials along with some advantages and disadvantages for each. There is no one surface material that is appropriate in all locations, and material selection during the design stage must be considered in the context of the anticipated users and location.

Table G.9– Comparison of Trail Surfacing Materials

Advantage	Disadvantage
Concrete	
► Smooth surface, can be designed with a variety of textures and colours, providing flexibility for different urban design treatments. ► Long lasting, easy to maintain.	► High cost to install. ► Requires expansion joints which can create discomfort for users with mobility aids. ► Must be installed by skilled trades people. ► Is not flexible; Cracking can lead to heaving and shifting, sometimes creating large step joints.

Table G.9– Comparison of Trail Surfacing Materials

Advantage	Disadvantage
Unit Pavers	
► Relatively smooth surface, available in a variety of patterns and colours to meet urban design needs. ► Long lasting, can be easily repaired by lifting and relaying.	► High cost to install. ► Users with mobility aids may find textured surface difficult to negotiate. ► Must be installed by skilled trades people.
Asphalt	
► Smooth surface, moulds well to surrounding grades, and is easily negotiated by a wide range of trail user groups. ► Relatively easy to install by skilled trades people. ► Patterned and coloured surface treatments are available, however patterning in surface may be difficult for some user groups to negotiate, and may not satisfy AODA requirements. ► Retains heat and dries more quickly in comparison to other materials, allowing for easier use during the winter months.	► Moderate-high cost to install. ► Must be installed by skilled trades people. Has a lifespan of 15-20 years depending on the quality of the initial installation. Poor base preparation can lead to significant reduction in lifespan. ► Cracking and “alligatoring” occurs near the edges, grass and weeds can invade cracks and speed up deterioration. ► Must be appropriately disposed of after removal.
Granulars (for bases only)	
► Pit Run: Mixed granular material “straight from the pit” containing a range of particle sizes from sand to cobbles. Excellent for creating a strong sub base, relatively inexpensive (for bases only).	► Not appropriate for trail surfacing.
► ‘B’ Gravel: Similar characteristics to Pit Run with regulated particle size (more coarse than ‘A’ Gravel). Excellent for creating strong, stable and well drained sub bases and bases. Relatively inexpensive (for bases only).	► Not appropriate for trail surfacing.
► ‘A’ Gravel: Similar characteristics to ‘B’ Gravel, with smaller maximum particle size. Excellent for trail bases, may be appropriate for trail surfacing of rail trails in rural areas and woodlands. Easy to spread and regrade where surface deformities develop (for bases only).	► Subject to erosion on slopes. ► Some users have difficulty negotiating surface due to range in particle size and uneven sorting of particles that can take place over time with surface drainage.

Table G.9– Comparison of Trail Surfacing Materials

Advantage	Disadvantage
Granulars	
► Clear stone: Crushed and washed granular, particles of uniform size, no sand or fine particles included. Excellent bedding for trail drainage structures and retaining wall backfilling, if properly leveled and compacted, makes an excellent base for asphalt trails. (for bases only)	► Not appropriate for trail surfacing.
Stone Dust	
► Stone dust (Screenings): Mixture of fine particles and small diameter crushed stone. Levels and compacts very well and creates a smooth surface that most trail users can negotiate easily. Easy to spread and regrade where surface deformities develop. Inexpensive and easy to work with. Widely used and accepted as the surface of choice for most granular surfaced trails. ► Crushed 3/8" Limestone material. This surfacing material has been used successfully by some municipalities where finer stone dust has washed out.	► Subject to erosion on slopes. ► Wheelchair users have reported that stone shards picked up by wheels can be hard on hands. ► May not be suitable as a base for hard surfaced trails in some locations.
Mulches and Wood Chips	
► Bark or wood chips, particle size ranges from fine to coarse depending on product selected, soft under foot, very natural appearance that is aesthetically appropriate for woodland and natural area settings. ► Some user groups have difficulty negotiating the softer surface, therefore this surface can be used to discourage some uses such as cycling. Generally does not meet AODA requirements. ► May be available at a very low cost depending on source, and easy to work with.	► Breaks down over time, therefore requires “topping up”. ► Source of material must be carefully researched to avoid unintentional importation of invasive species (plants and insects).
Earth / Natural Surface	
► Native soils existing in situ. Only cost is labour to clear and grub out vegetation and regrade to create appropriate surface. Appropriate for trails in natural areas provided that desired grades can be	► Subject to erosion on slopes. ► Different characteristics in different locations along the trail can lead to soft spots. ► Some user groups will have difficulty

Table G.9– Comparison of Trail Surfacing Materials

Advantage	Disadvantage
achieved and that soil is stable (do not use organic soils). ► May not meet AODA requirements.	negotiating surface.
Soil Cement and Soil Binding Agents	
► Soil Cement is a mixture of Portland Cement and native/parent trail material. When mixed and sets it creates a stable surface that can be useful for "trail hardening" on slopes, particularly in natural settings. ► Soil Binding Agents=mix of granulars and polymers that create a solid, yet flexible surface that may be appropriate for "trail hardening" on slopes in natural areas. ► May not meet AODA requirements. ► Limits volume and weight of materials to be hauled into remote locations.	► Useful for specific locations only. ► Soil binding agents tend to be expensive and have been met with mixed success.
Wood	
► Attractive, natural, renewable material that creates a solid and level travel surface. Choose rough sawn materials for deck surfacing for added traction.	► Requires skill to install, particularly with the substructure. ► Wood gradually decomposes, this can be accelerated in damp and shady locations, and where wood is in contact with soil. ► Expensive to install.

G.4.5 Multi-use Trail Lighting

Lighting multi-use pathways must be carefully considered and can be a key element for designing trail facilities to reflect CPTED principles. Very few municipalities make the decision to light their entire trail system for a number of important reasons, including:

- The cost of initial installation can be prohibitive. General budget figures range from $130,000 to $160,000 per kilometre including cabling, transformers, power supply and fixtures;
- Staff time and material cost to properly monitor, maintain lamp fixtures and replace broken and burned out bulbs on an ongoing basis;
- A tendency for vandals to target light bulbs, however, light fixtures can designed to protect bulbs;
- Energy consumption, however, options for energy-efficiency lighting are available;
- Excessive light pollution, especially in residential rear yards and adjacent to natural areas (though this can be controlled with proper shielding);

- Potential detrimental effects on flora and fauna, especially with light pollution in natural areas such as woodlands and tributary buffers;
- Lighting can promote use which may create greater security if users increase their presence; and
- Inability of the human eye to adapt to the high contrast resulting from brightly lit and dark shadowed areas adjacent one another.

Although generally not recommended, there may be some locations along multi-use pathways where lighting may be appropriate. The decision of whether or not to light segments of the multi-use pathway network should be made on a location-specific basis. Some criteria for pathway lighting include:

- Main connections to important attractions such major parks;
- Heavily used commuter routes (anecdotal information on volume of use supported by user counts);
- Key school routes; and
- Numerous requests for lighting, supported by similar results through public consultation.

Where it has been determined that lighting is appropriate, the quality and intensity of lighting should be consistent with prevailing standards that fit the setting being considered.

Examples of Different Off-road Trail Lighting Designs Credit: fayettevilleflyer.com (left); vistacorp.mwnewsroom.com (right)

G.5 ACTIVE TRANSPORTATION AMENITIES & STRUCTURES

The design and implementation of active transportation amenities and structures is sometimes overlooked even though they are considered essential features to promote safe use of active transportation facilities. Developing and maintaining a comprehensive network does not automatically mean people will use the routes and facilities. A user needs to feel comfortable and safe using the system with access to adequate on and off-road active transportation facilities at strategic locations. This section outlines some of the amenities that should be considered during the design and implementation of the active transportation network to complement the implementation of facilities.

G.5.1 Multi-use Trail Structures

G.5.1.1 Gate and Barrier System

Access barriers are intended to allow free flowing passage by permitted user groups, and prohibit access by others. Barriers typically require some mechanism to allow access by service and emergency vehicles. Depending on site conditions, it may also be necessary to provide additional treatments between the ends of the access barrier and limit of the multi-use pathway right of way to prevent bypassing of the barrier altogether.

Within the context of Simcoe County, consideration should be given to the design of each existing or proposed access point. The County should explore the evaluation of select access points to determine if additional treatments are necessary. Additional treatments can consist of plantings, boulders, fencing or extension of the barrier treatment depending on the location. There are many design alternatives for trail access barriers, with some proving to be more successful than others. Gates and barrier features can generally be grouped into three categories:

- Bollards;
- Offset Swing Gates; and
- Single Swing Gates.

In general, the County should assume that the design of the gates and bollards should be done in a way that encourages cyclists to dismount.

Bollards

The bollard is the simplest and least costly barrier. The structure can range from permanent, direct buried wood or metal posts, to more intricately designed cast metal units that are removable by maintenance staff. An odd number of bollards (usually one or three) can be placed in the multi-use pathway bed to create an even number of “lanes” for users to follow as they pass through the barrier.

Although the removable bollard system provides flexibility to allow service vehicle access, they can be difficult to maintain as the metal sleeves placed below grade can be damaged by equipment and can become jammed with gravel and debris from the trail bed.

Swing Gates

A single swing gate combines the ease of opening for service vehicle access, with the ease of passage of the bollard. Gates also provide a surface / support for mounting signage. The swing gate should provide a permanent opening to allow permitted users to flow freely through the barrier. The width of the permanent opening must be carefully considered so that it will allow free passage by wheelchairs, wide jogging, double strollers and bicycle trailers and electric scooters. However, they should not be designed to allow passage by unauthorized vehicles such as snowmobiles and all-terrain vehicles.

The offset gate is similar to the single swing gate, except that barriers are paired and offset from one another. Although they can be effective in limiting access by unauthorized users and can be easily opened by operations staff, some groups including cyclists, especially cyclists pulling trailers and

wheelchair users, can have difficulty negotiating the offset swing gate if the spacing between the gates is not adequate.

In urban areas, the single swing gate or bollard is quite effective for most applications. For large parks, park service access/pathway routes, more rural settings and locations where unauthorized access is an ongoing problem, a more robust single swing gate should be employed.

G.5.1.2 Boardwalks

Where multi-use pathways and trails pass through sensitive environments such as marshes, swamps, or woodlands with a large number of exposed roots, an elevated trail-bed or boardwalk is usually required to minimize impacts on the natural features. If these areas are left untreated, trail users tend to walk around obstacles such as wet spots, gradually creating a wider, often braided trail through the surrounding vegetation. The turnpike and low profile boardwalk are two relatively simple yet effective methods for some trails found within park spaces or those designed specifically for hiking or pedestrian traffic.

The turnpike is a low tech, low cost method that works very well in areas where organic soils are encountered. Various geosynthetic products have also been successfully used to overcome difficult soil conditions. The United States Department of Agriculture (Forest Service) has evaluated many products and design applications in the construction of trails in heavily used parks and on backcountry trails.

Low profile boardwalks have been successfully employed by trail managers across Ontario. In some cases, the simple construction method provides a great opportunity for construction by supervised volunteers where precast “deck blocks” have been used for the foundation of the boardwalk.

Where the trail is in a high profile location, where it is necessary to provide a fully accessible trail, or where the trail surface must be greater than 60cm above the surrounding grade, a more sophisticated design and installation is necessary. This is likely to include engineered footings or abutments, structural elements and railings. A professional who is trained in structural design and approval requirements should be retained for these types of applications. The graphics below illustrate potential design alternatives for trail boardwalks.

Boardwalk Examples- Hamilton, ON (left) & Boardwalk Foundation on Helical Piles (Halton Hills) (right) Credit: MMM Group

G.5.1.3 Switchbacks and Stairs

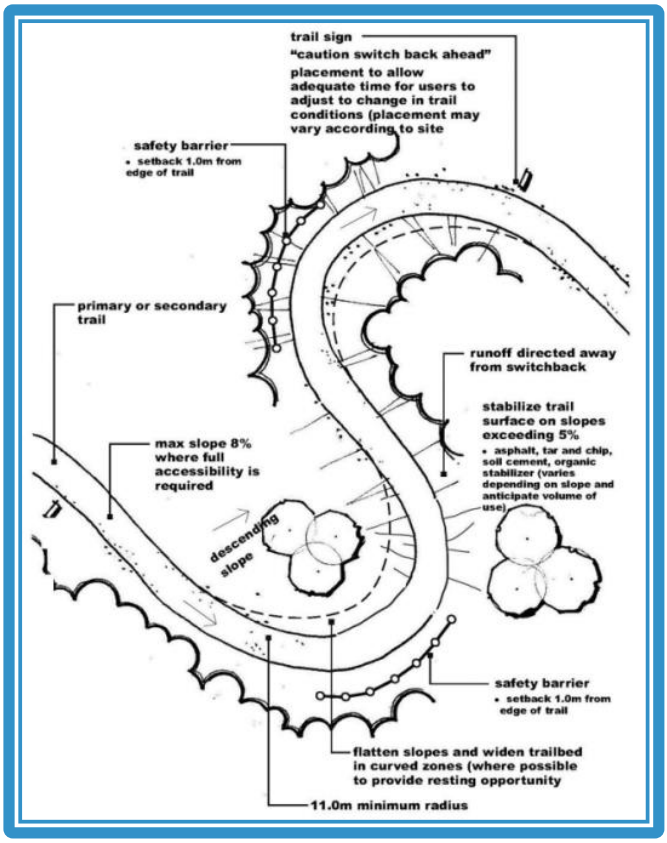
Pedestrian and some self-propelled users are capable of ascending grades of 30% or more whereas some users are limited to grades of less than 10%. For example, a slope of 5% is the threshold for a fully accessible facility. Once trail slopes exceed this threshold and slopes are long (i.e. more than 30m) it is important to consider alternative methods of ascending slopes. Two alternatives to consider are switchbacks and stairs.

Where construction is feasible, switchbacks are generally preferred because they allow wheeled users such as cyclists to maintain their momentum, and there is less temptation to create shortcuts, as might be the case where stairways are used. Switchbacks are constructed with turns of about 180 degrees and are used to decrease the grade of the multi-use pathway. A properly constructed switchback also provides outlets for runoff at regular intervals, thus reducing the potential for erosion. Switchbacks typically require extensive grading and are more suited to open locations where construction activity will not cause major disruption to the surrounding environment. Switchbacks can be difficult to implement in wooded areas without significant impacts to surrounding trees.

When designing switchback and stair structures on trails the following should be considered:

- Use slip resistant surfacing materials, especially in shady locations.
- Incorporate barriers on either side of the upper and lower landing to prevent trail users from bypassing the stairs; and
- Provide signs well in advance of the structure to inform users that may not be able to climb stairs.

The following graphics illustrate a sample switch-back design concept and design concept for stairs which could be implemented on a steep trail.



Switchback Example (left) and Woven Metal Stairs, Dundurn Stairs, Hamilton (top)
Credit: MMM Group, Word Press

In addition, there are a number of design concepts which can be considered for trails which are designed in a space with a greater than permitted slope.

Active Transportation Guidelines

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When slopes exceed 15%, or where there is inadequate room to develop a switchback or another accessible solution, a stairway system should be considered. In these situations the site should be carefully studied so that the most suitable design can be developed. The following are some considerations for stairway design:

- Provide a gutter integrated into the stairway for cyclists to push their bicycles up and down (where appropriate to have bicycles);
- Develop a series of short stair sections with regularly spaced landings rather than one long run of stairs;
- For long slopes, provide landings at regular intervals (e.g. every 8-16 risers) and an enlarged landing at the mid-way point complete with benches to allow users the opportunity to rest; and
- On treed slopes, lay the stairway out so that the minimum number of trees will be compromised or removed.

G.5.2 Trip End Facilities for Commuters

Installation of showers and lockers at workplaces and educational institutions help to promote the use of the network for utilitarian purposes. Lockers can be used to store personal belongings such as cycling accessories and a change of clothing. Businesses or institutions with employees who commute by bicycle, in-line skating, or other modes should be encouraged to offer these facilities. The facilities which could be considered may include:

- Bicycle Parking which can include a variety of types from the simple post and ring style rack for 2 bicycles to larger and more elaborate systems for large numbers of bicycles at destinations where use/demand is high; and
- Change and Shower Facilities at the cyclist's destination.

Active Transportation Guidelines

G-29 Simcoe County and its partners should provide trip-end facilities for employees and visitors at all public buildings where feasible, and the private sector should be encouraged to do the same for residential, commercial and institutional developments.

G.5.3 Transit Connections

Providing defined access for cyclists to and from a bus stop is extremely important. Transit stops, particularly bus stops, should be designed in a way that provides safe, convenient, and comfortable places for people to wait. Desirable features at bus stops also include waste-recycling receptacles, seating, lighting and bike racks.

Bike racks on buses is one example of a cycling-transit link. It allows cyclists to ride their bike to a transit stop or station, attach it to a bus-mounted bike rack, travel to their stop, disembark and continue on their bicycle to their final destination. The cycling-transit link can also make access to transit less expensive. In suburban neighbourhoods, population densities are often too low to offer transit service within the typical walking distance of 500 metres of every commuter. Within the last 20 years, many transit agencies built expansive motor vehicle park-and-ride lots or centralized depots as an alternative to costly feeder bus service. Many of these facilities are within easy cycling distance, provide opportunities to increase cycling and transit ridership and reduce taxpayer costs, traffic congestion and air pollution.

Active Transportation Guidelines

G-30 Transit terminals and hubs (e.g. GO Train station) within Simcoe County should provide safe and convenient cycling access, including direct links to sidewalks, trails and major destinations

G.5.4 Bicycle Parking

The provision of bicycle parking facilities is essential for encouraging more bicycle use in Simcoe County. The lack of adequate bicycle parking supply or type can deter many from considering using their bicycle as a basic mode of transportation. Bicycle parking can be divided into two categories bicycle racks and bicycle lockers.

Bicycle Racks

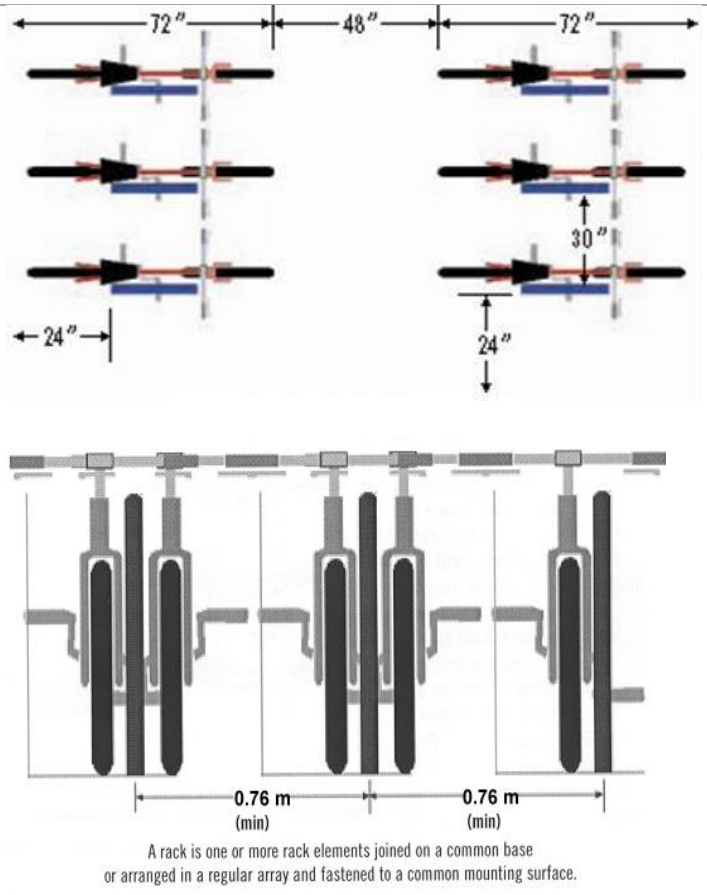
When designing bicycle racks the following components presented in **Table G.10** must be considered. Additional considerations and guidelines can be found in the **TAC Manual** as well as **OTM Book 18**.

Table G.10 - Design Considerations for Bicycle Racks

The Rack Element	The Rack	The Rack Area
Definition: The portion of a bicycle rack that supports the bicycle.	**Definition:** A grouping of rack elements.	**Definition:** The "bicycle parking lot" or area where more than one bicycle rack is installed. Bicycle racks are separated by aisles, much like a typical motor vehicle parking lot.
Key Considerations: ► Can be joined on any common base or arranged in a regular array and fastened to a common mounting surface. ► May be used to accommodate a varying number of bicycles securely in a particular location. ► Various types of available bicycle rack designs e.g. "Ribbon" rack, the "Ring" rack, the "Ring and Post" rack and the "Swerve" rack. ► Rack should support the bicycle by its frame in two places and prevent the wheel from tipping over. ► Should allow front-in parking and back-in parking with a U-lock able to lock the front and the rear wheel.	Key Considerations: ► Consist of a grouping of the rack elements either by attaching them to a single frame or allowing them to remain as single elements mounted in close proximity to one another. ► Should be securely fastened to a mounting surface to prevent the theft of a bicycle attached to a rack. ► Be easily and independently accessed by the user. ► Should be arranged to allow enough room for two bicycles to be secured to each rack element. ► Should be arranged in a way that is quick, easy and convenient for a cyclist to lock and unlock their bicycle to and from the rack.	Key Considerations: ► The recommended minimum width between aisles should be 1.2 m. ► Aisle widths of 1.8 m are recommended in high traffic areas. ► A 1.8 m depth should be provided for each row of parked bicycles. ► Large bicycle rack areas with a high turnover rate should have more than one entrance to help facilitate user flow. ► If possible, the rack area should be sheltered to protect the bicycles from the elements. ► Bicycle racks should be placed as close as possible to the entrance, no more than 15 m, and should be clearly visible along a major building approach line but not impede pedestrian traffic. ► To avoid excessive bicycle riding on the grass, bicycle racks

Table G.10 - Design Considerations for Bicycle Racks

The Rack Element	The Rack	The Rack Area
		should only be placed on grass surfaces located within close proximity to a paved cycling route, such as on off-road multi-use trail, or an on-road route.
Additional Considerations:		
Bicycle racks should not only allow for a secure lock between the bicycle and the rack, but should also provide support for the bicycle frame itself. The rack element should also be designed to resist being cut or detached by common hand tools such as bolt and pipe cutters, wrenches and pry bars which can easily be concealed in backpacks.	N/A	Bicycle racks should not be placed in the following areas: ► Bus loading areas; ► Goods delivery zones; ► Taxi zones; ► Emergency vehicle zones; ► Hotel loading zones; ► Within 4.0 m of a fire hydrant; ► Within 2.5 m of a driveway or access lane; and ► Within 10.0 m of an intersection.



Sample Bicycle Parking Design Concepts and Applications Credit: APBP

Bicycle Lockers

Definitions: Bicycle lockers are individual storage units. They are weather-protected, enclosed and operated by a controlled access system that may use keys, swipe card (key fob) or an electronic key pad located on a locker door. Some locker systems are set up for multiple users (i.e. coin operated or secured with personal locks). On average, two standard car parking spaces (of 5.6 m x 2.6 m each) can accommodate 10 individual bicycle locker spaces but this may differ depending on the locker model.

Key Considerations:

- Security and durability are important to consider when selecting a bicycle locker.

Design Alternatives:

- Transparent panels are available on some models to allow surveillance of locker contents;
- Stackable models can double bicycle parking capacity on site;
- Options for customer access can vary from a simple, single-use key system to a multi-user system that allows secure access through smart card technology or electronic key pads;

- Bike Lockers require a level surface, clearance for locker doors and should be located close to building entrances or on the first level of a parking garage and within range of security surveillance. Bicycle Lockers are best placed away from sidewalks and areas with high pedestrian traffic. High quality, durable models should be able to withstand regular use, intense weather conditions and potential vandalism; and
- The installation of lockers and showers at workplaces and educational institutions helps to promote the use of cycling for utilitarian purposes. Businesses or institutions with more than 20 employees commuting by bicycle should be encouraged to offer these facilities.

The graphics below illustrate sample bike box lockers as a potential bicycle parking facility.

Sample Design for Bike Lockers Credit: www.transportation.ubc.ca (left) and www.winnipegtransit.com (right)

Active Transportation Guidelines

G-31	Using the criteria outlined the type of bicycle parking facility, number of available spaces and location should be carefully considered on a site by site basis.
G-32	The County and its partners should build upon any infrastructure previously implemented and consider initiating a program to install racks on an as requested basis for destinations throughout the County.

G.5.5 Bicycle Friendly Catch Basin Cover

Catch basin grates and utility covers are potential obstructions to cyclists, as well as in-line skaters. Therefore, bicycle-safe grates should be used, and grates and covers should be located in a manner which will minimize severe and/or frequent manoeuvring by the cyclist. Catch basin grates with slots parallel to the roadway, or a gap between the frame and the grate, can trap the front wheel of a bicycle, causing loss of steering control. If the slot spacing is wide enough, narrow bicycle wheels can

drop into the grates. Conflicts with grates may result in serious damage to the bicycle wheel and frame as well as injury to the cyclist.

Key Considerations:

- When new curbed roadways are constructed or rehabilitated, curb face inlets should be considered to minimize the number of potential obstructions.
- Catch basin grates and utility covers should be placed or adjusted to be flush with the adjacent pavement surface.

These grates should be replaced with bicycle-safe, hydraulically efficient versions. All on-road cycling facilities in urban areas with curb gutter and storm drains should be made bicycle-friendly through the provision of bicycle-friendly catch basin covers. The Region of Niagara has recently adopted a new standard for catch basin covers that is bicycle friendly. Simcoe County may want to consider a standard similar to the one used in the Region of Niagara and develop a standard bicycle-friendly catch basin cover.

Active Transportation Guidelines

G-33	Simcoe County should ensure that all catch basin covers are bicycle-friendly. Catch basin covers on proposed bicycle routes as part of the active transportation network for Simcoe County, should receive priority for adjustments.

G.5.6 Rest and Staging Areas

Rest areas should be provided along routes where users tend to stop, such as interpretative stations, lookouts, restaurants, museums and other attractions / services, which are logical locations for rest areas.

Ideally, there should be a rest area at least every five kilometres on popular rural recreational trails or at major intersections and gathering places near on-road facilities or along sidewalks and boulevard trails.

In urban centres, rest areas should be provided more frequently, and in areas where trail/AT route demand is high such as popular urban trails, trails near seniors' centres, along waterfront promenades etc., opportunities for resting/seating should be much more tightly spaced (e.g. consider intervals of 100 – 250 m). In addition to seating, a number of other amenities should be considered for rest areas including:

- Tables;
- Washrooms and potable water;
- Waste receptacles;
- Parking for automobiles;
- Information signing complete with mapping; and
- Bicycle parking facilities.

The following graphics illustrate elements which could be considered for implementation in Simcoe County and its local municipalities.

Pathway Seating & Rest Areas Credit: Confederation Trail Georgetown PEI, (Left) MMM Group, Caledon Trailway, Palgrave, ON (Right) MMM Group

Active Transportation Guidelines

G-34 Rest and staging areas should be provided at strategic locations such as gathering points, attractions and destinations, as well as other locations where cyclists and pedestrian area expected to stop. Simcoe County and its partners should work together to identify and implement rest and staging areas where necessary.

G.6 SIGNING THE ACTIVE TRANSPORTATION NETWORK

The design and construction of the network should incorporate a hierarchy of signs each with a different purpose and message. This hierarchy is organized into a "family" of signs with unifying design and graphic elements, materials and construction techniques. The unified system becomes immediately recognizable by the user and can become a branding element. Generally the family of signs includes:

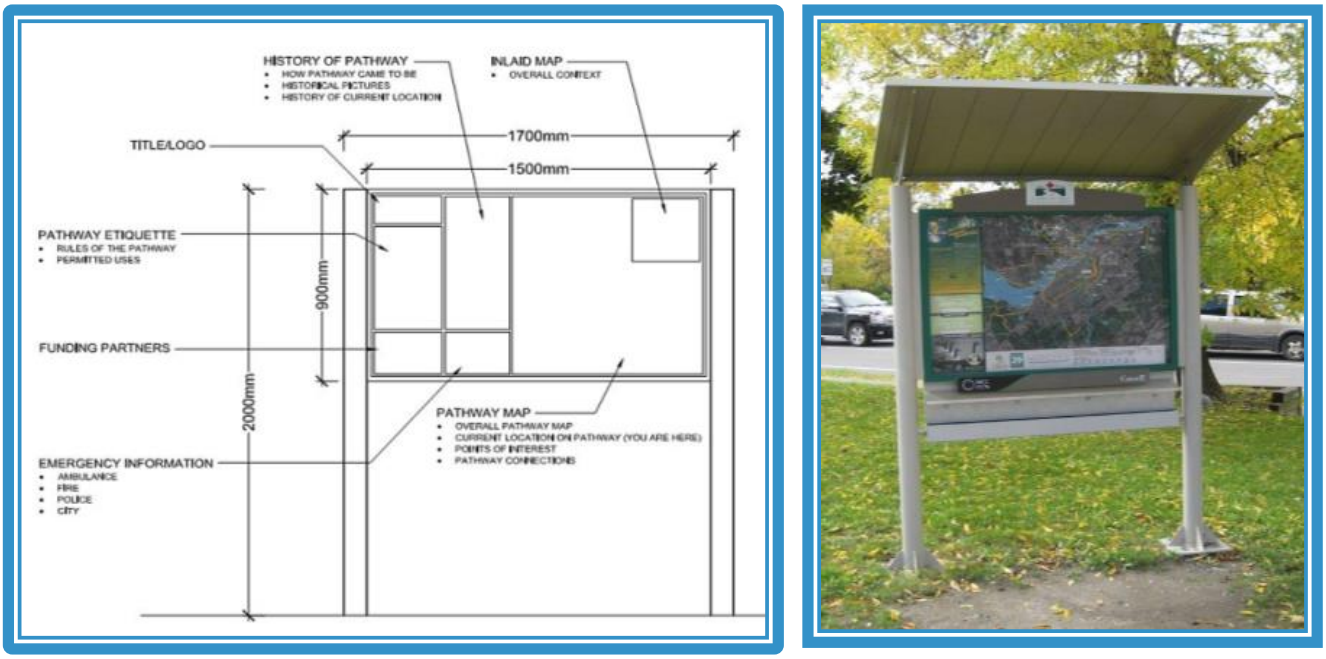
Orientation & Trailheads

Description:

- Typically located at key destination points and major network junctions.
- Provide orientation to the network through mapping, network information and rules and regulations.
- Useful landmark where network nodes are visible from a distance.
- Used as an opportunity to sell advertising space to offset cost of signs.

Guideline: Orientation signs could be considered for implementation when entering the County or at trail junctions. Additional design concepts and considerations for orientation signs and trailhead alternatives are presented in **Figure G.13** and **G.15.**

Application:



Trailhead Sign Examples Ottawa, ON (Right); Credit – MMM Group

User Etiquette

Description:

- Should be posted at public access points to clearly articulate which trail uses are permitted, regulations and laws that apply, as well as trail etiquette, safety and emergency contact information.
- At trailheads, this information can be incorporated into trailhead signs.
- In other areas, this information can be integrated with access barriers.

Guideline: Etiquette signs should be considered for implementation at public access points or where trailheads are located.

Regulatory, Warning and Information

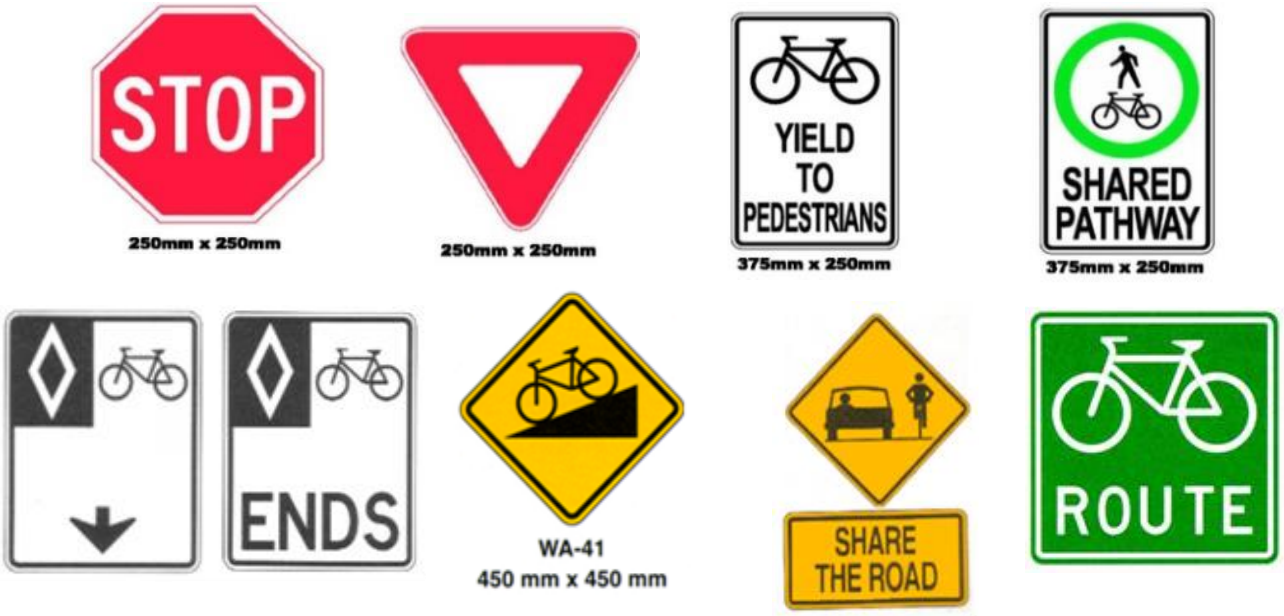
Description:

- Required throughout the system. Where traffic control signs are needed (stop, yield, curve ahead etc.), it is recommended that recognizable traffic control signs be used (refer to the **TAC Bikeway Control Guidelines** or **OTM Book 18**).
- Intended to control particular aspects of travel and be used along the road or off-road network.
- Warning signs are used to highlight bicycle route conditions that may pose a potential safety or convenience concern to network users.

- These signs are more applicable to cycling routes and multi-use trails than pedestrian systems.

Guideline: Signs should be considered for implementation along proposed multi-use trails or in locations where conditions may change drastically enough that users should be made aware.

Application:



Examples of Warning and Information Sign – Regulatory, Warning and Information

Source: OTM Book 18. TAC

Interpretive

Description:

- Should be located at key trail features having a story to be told. These features may be cultural, historical, or natural. Interpretive signs should be highly graphic and easy to read.
- Should be located carefully in highly visible locations to minimize the potential for vandalism.

Guideline: Signs should be implemented throughout the network in locations where cultural or historic information should be highlighted. Additional design concepts and considerations for interpretive signs are presented in **Figure G.11.**

Application:

Interpretive Sign Examples; Top Left: Erin; MMM, Bottom Left: Fundy National Park; MMM; Top Right: Tobermory; MMM; Bottom Right: Sauble Beach; MMM Group.

Route Marker & Trail Directional

Description:

- Should be located at key network intersections and at regular intervals along long, uninterrupted sections of network.
- Purpose is to provide a simple visual message to users that they are travelling on the pathway network.
- May include the network logo or "brand" and communicate other information to users such as directional arrows and distances in kilometres to major attractions and settlement areas.
- Should be mounted on standard sign poles and be located on all legs of an intersection or off-road trail junction, as well as at gateways.
- Should be consistent with the Regional Tourism Organization 7 specifications and standards for wayfinding and signage.
- Should be in compliance with the Accessibility for Ontarians with Disabilities Act (AODA).

Guideline: Signs should be considered as part of the overall network to identify a route brand and provide users with directional / wayfinding information. Additional design concepts and considerations for route markers and trail directional signs are presented in **Figure G.10.**

Application:

Route Marker & Trail Directional Sign Examples - Essex (Left)-Photo Essex Region Conservation Authority; Kissing Bridge Trail, Guelph / Eramosa (Second from left) Photo MMM Group; Halton Hills (Third from Left)-Photo MMM Group; Confederation Trail (Right) Photo MMM Group



Appendix H: Recommended Locations for Carpool Lots

Recommended Location (P1): Orillia; Old Barrie Road & University Avenue

Proposed Phase:

Priority [5 Year]

Partners:

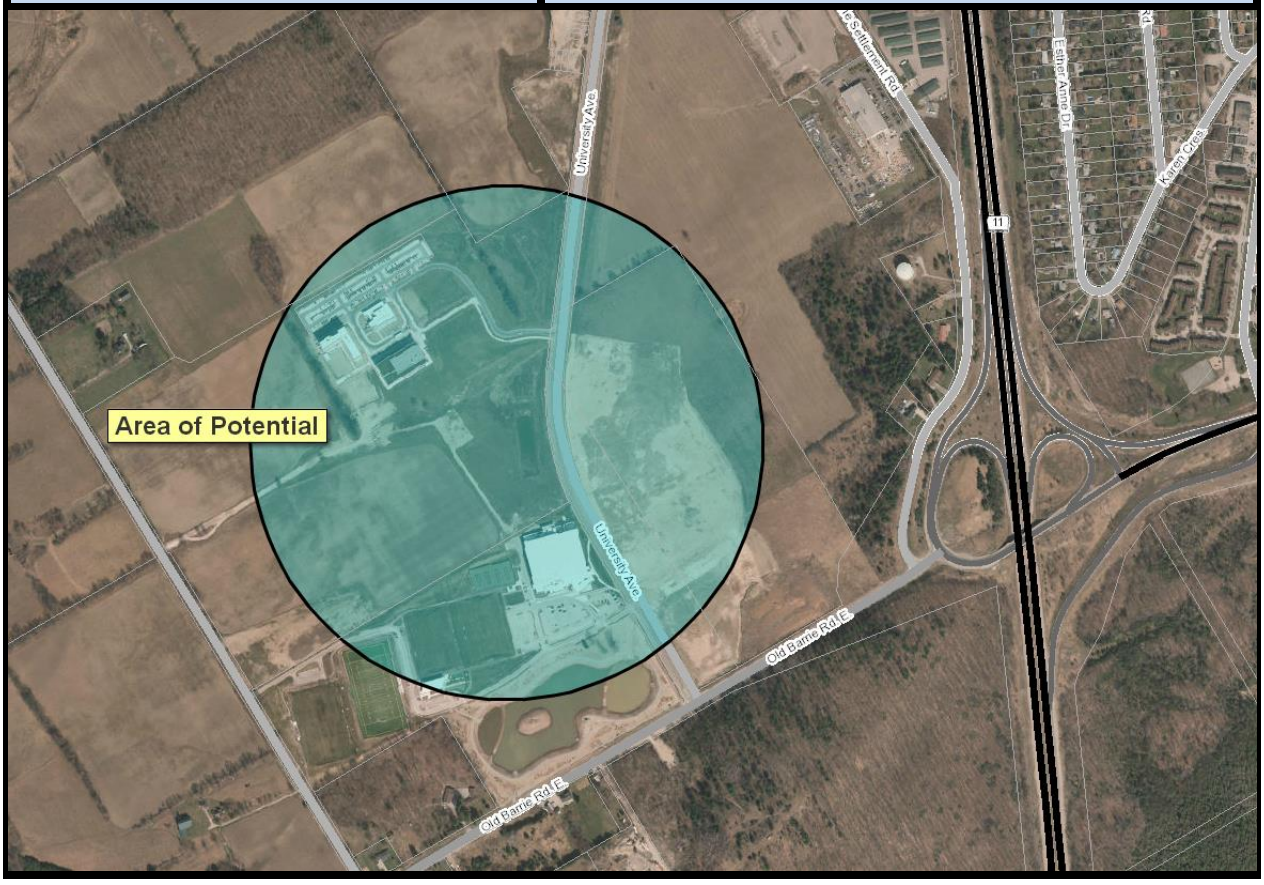
- City of Orillia
- Georgian College
- Lakehead Orillia

Characteristics:

- Location near Highway 11 & 12 interchange
- Near Lakehead Orillia Campus and Rotary Place
- On transit network
- Lack of Carpool lots available near City

Approach for Success:

- Short-term Priority Carpool Lots can be developed with existing partnerships in critical areas.
- Utilize County Roads and Right-of-ways to identify potential locations.



Recommended Location (P2): Midland; Yonge Street, Hamelin Lane & CR 93

Proposed Phase:

Priority [5 Year]

Partners:

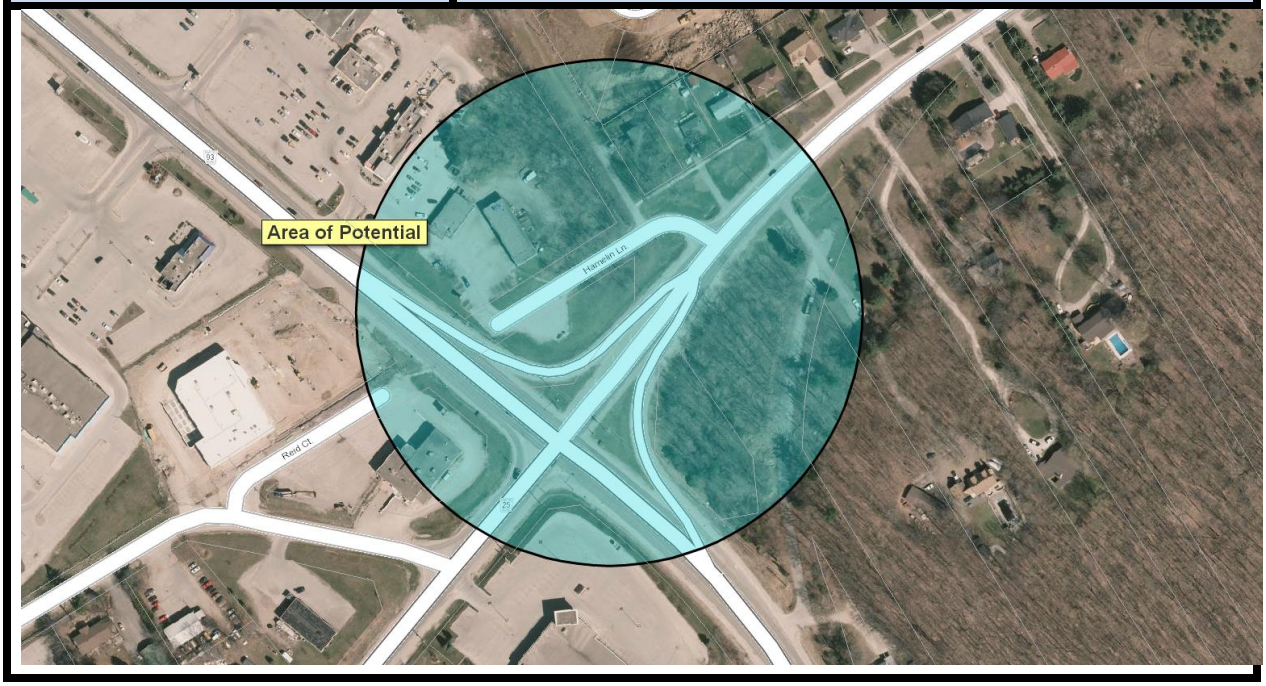
- Town of Midland

Characteristics:

- Location on Highway 93/ County Road 93
- Near Downtown Midland
- On transit network
- Large Right-of-way and Vacant space

Approach for Success:

- Offering infrastructure upgrades, paving and storm water management.
- Utilize County Roads and Right-of-ways to identify potential locations.



Recommended Location (P3): Perkinsfield; County Road 6 at Perkinsfield Park

Proposed Phase:

Priority [5 Year]

Partners:

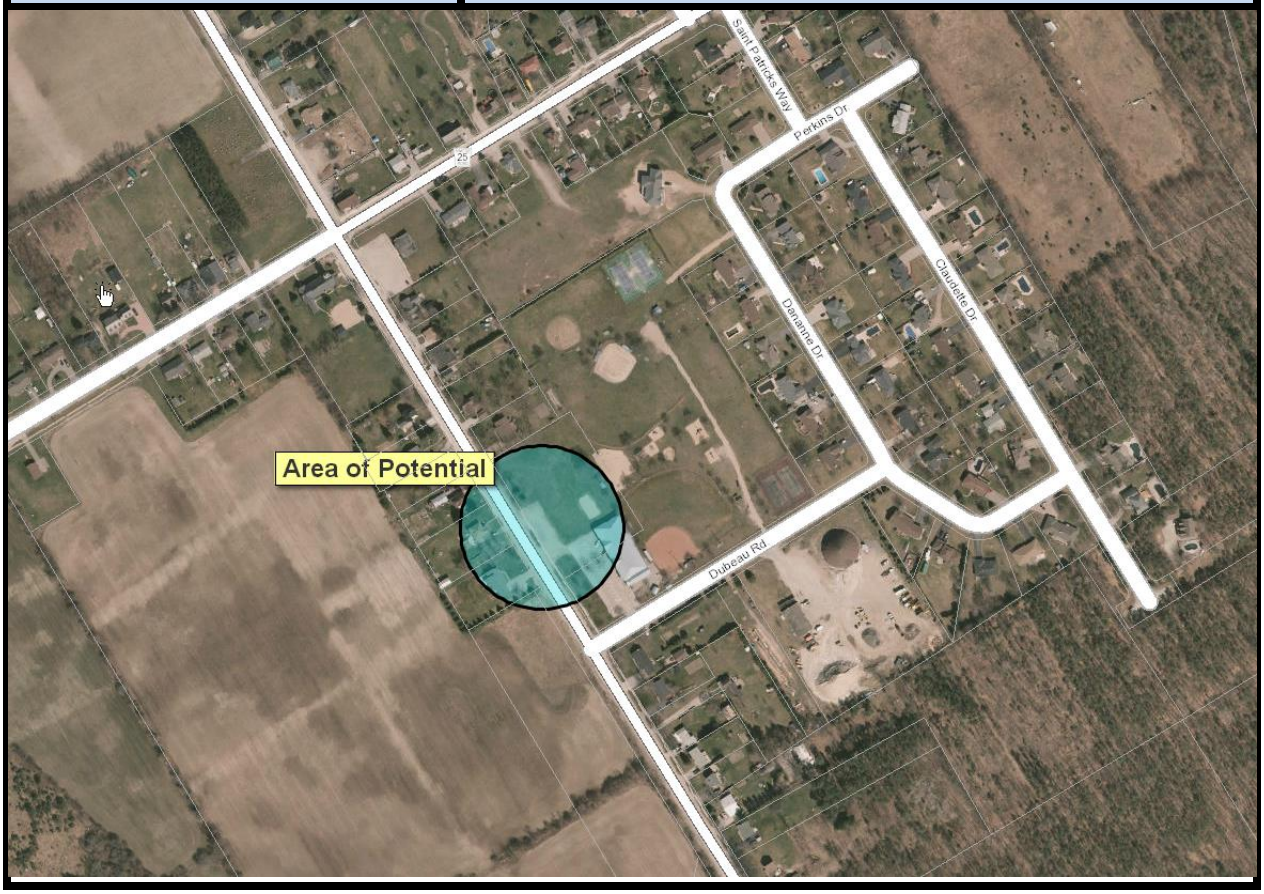
- Tiny Township

Characteristics:

- Location on County Road 6
- High Traffic Corridor
- Informal Use
- Lack of Carpool lots available in Township

Approach for Success:

- Offering infrastructure upgrades, paving and storm water management.
- Utilize County Roads and Right-of-ways to identify potential locations.



Recommended Location (P4): Craighurst; Highway 400 & County Road 22

Proposed Phase:

Priority [5 Year]

Partners:

- Township of Oro-Medonte
- MTO
- Infrastructure Ontario (land owner)

Characteristics:

- Location near Highway 400 & CR 22 & Highway 93 interchange
- Near Craighurst and Horseshoe Valley
- Near major transportation routes
- Lack of Carpool lots available

Approach for Success:

- Short-term Priority Carpool Lots can be developed with existing partnerships in critical areas.
- Utilize County Roads and Right-of-ways to identify potential locations. Near County owned Paramedic Station.

Recommended Location (P5): Alliston; Highway 89 & County Road 10

Proposed Phase:

Priority [5 Year]

Partners:

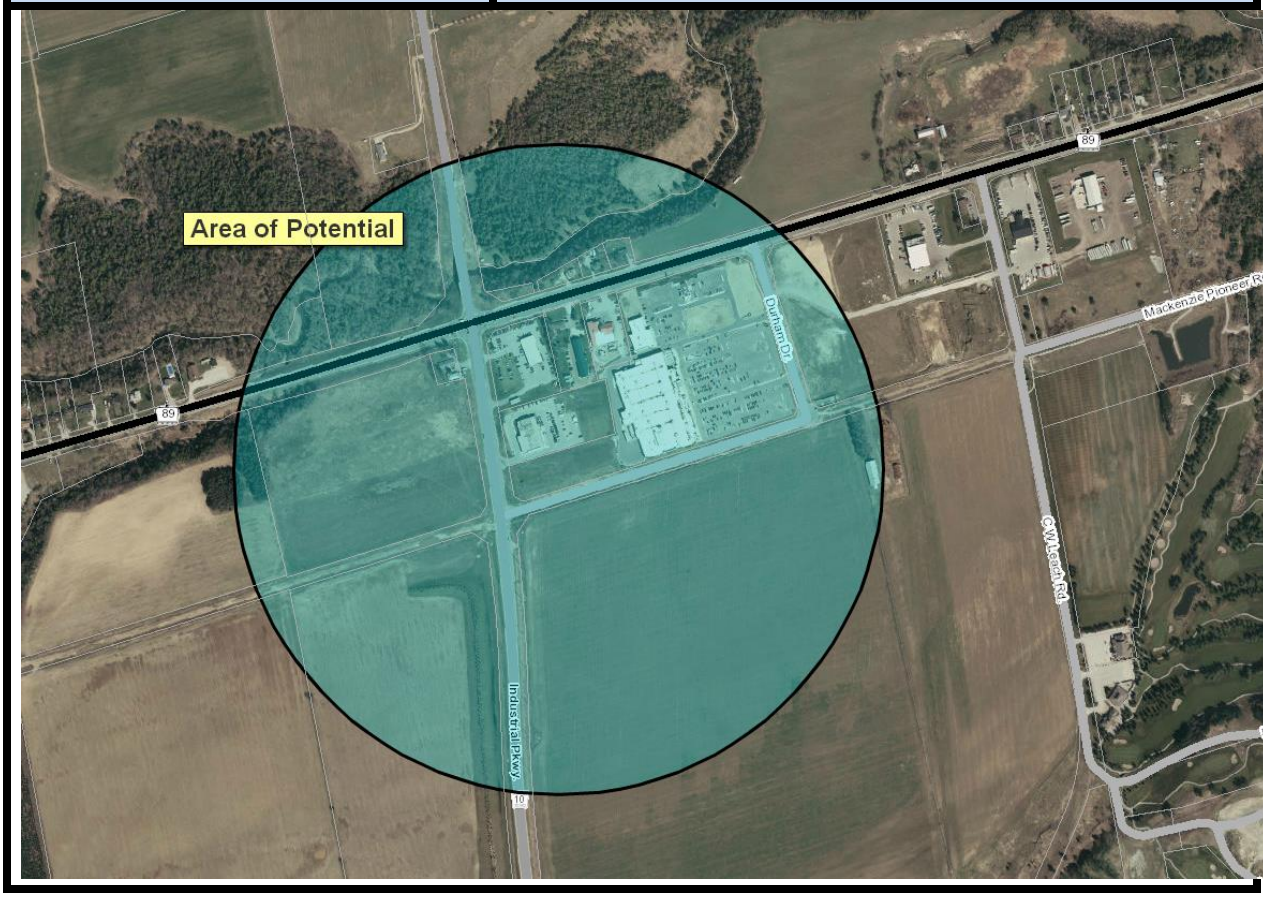
- Town of New Tecumseth
- Commercial Partners
- Industrial Partners
- MTO

Characteristics:

- Location on Highway 89 & CR10
- Near large commercial plaza
- Lack of Carpool lots available in Town
- Close proximity to Downtown Alliston

Approach for Success:

- Short-term Priority Carpool Lots can be developed with existing partnerships in critical areas.
- Develop Partnerships with Commercial Partners.



Long-term Carpool Lot Locations:

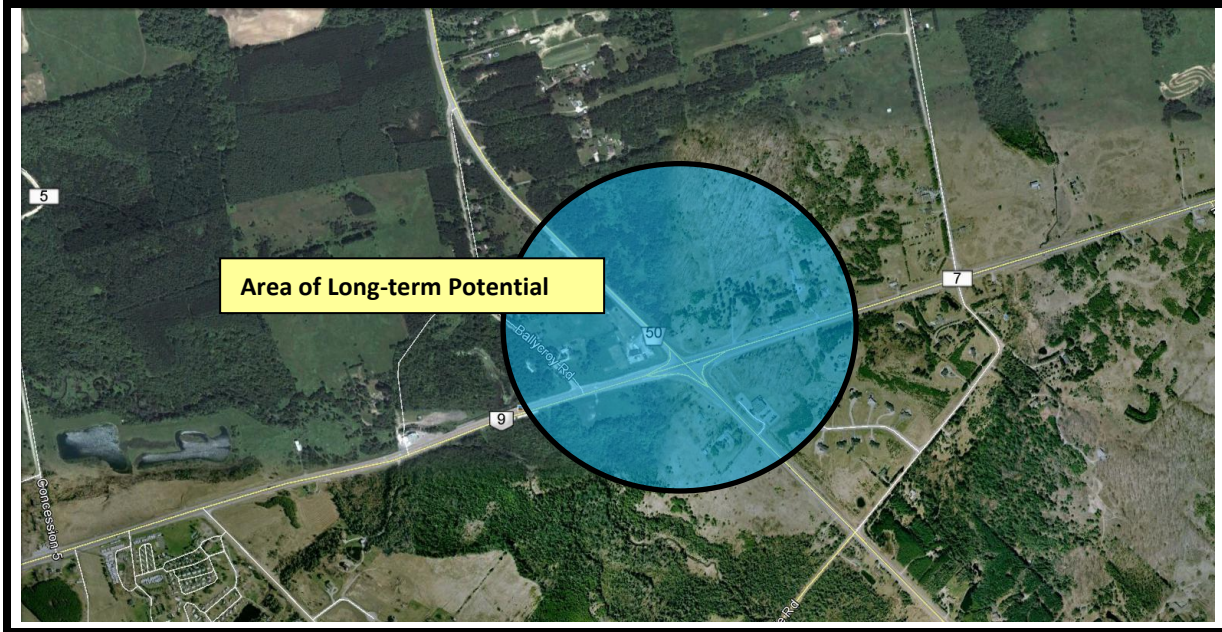
Recommended Location (P6): South New Tecumseth; Highway 9 & County Road 50

Proposed Phase:
Long-term

Partners:
- Town of New Tecumseth
- Peel Region
- MTO

Characteristics:
- Location on Highway 9 & CR50
- High Traffic Volume
- County Boundary
- Forecast Traffic Congestion

Approach for Success:
- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.
- Develop Partnerships with neighbouring Regions.



Recommended Location (P7): Angus; County Road 90 & 10, Mill Street

Proposed Phase:

Long-term

Partners:

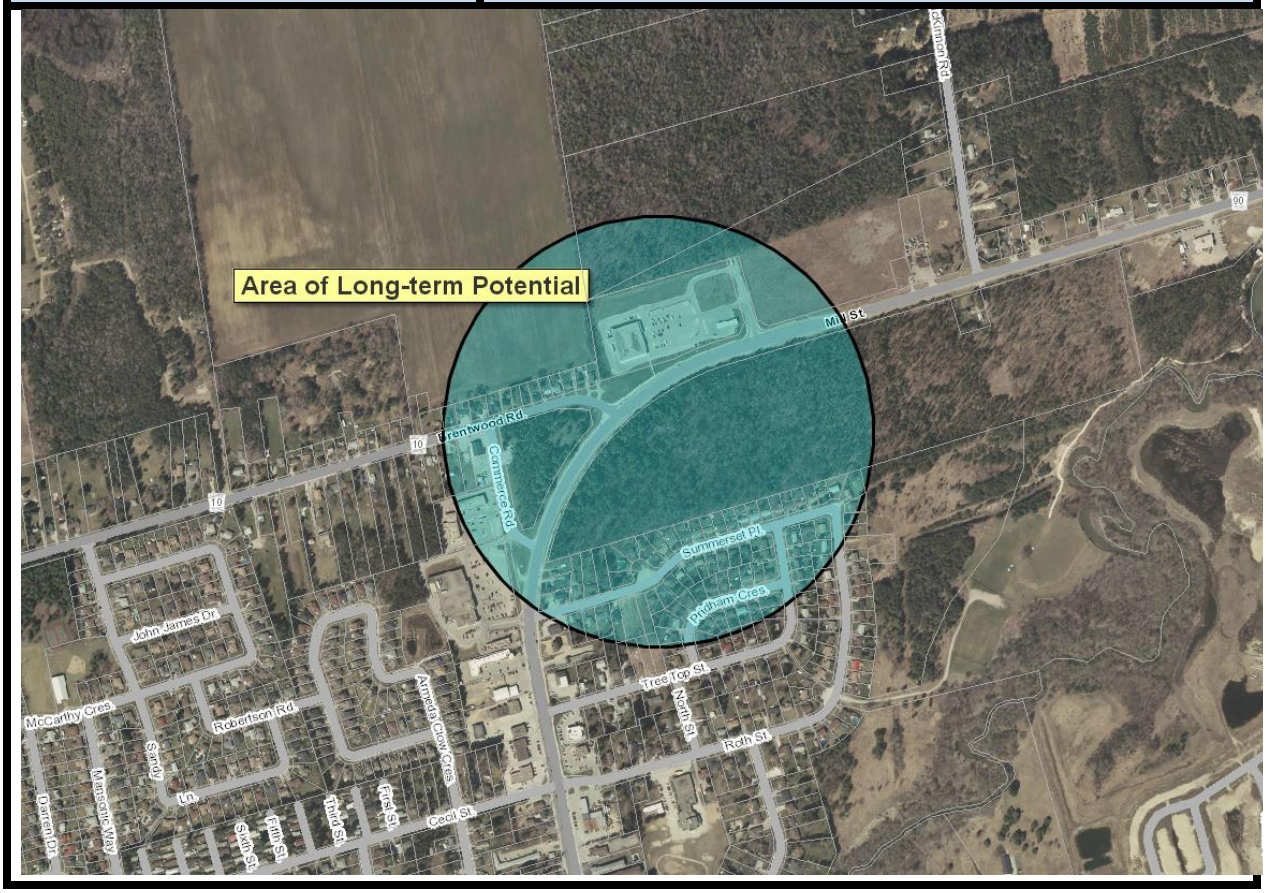
- Township of Essa
- CFB Base Borden

Characteristics:

- Location on CR10 & 90 intersection
- High Traffic Volume
- Availability of County owned Property
- On existing Transit Route
- Close Proximity to Population Centre (Angus and Borden)

Approach for Success:

- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.



Recommended Location (P8): Sunnidale Corners; Highway 26 & County Road 7

Proposed Phase:

Long-term

Partners:

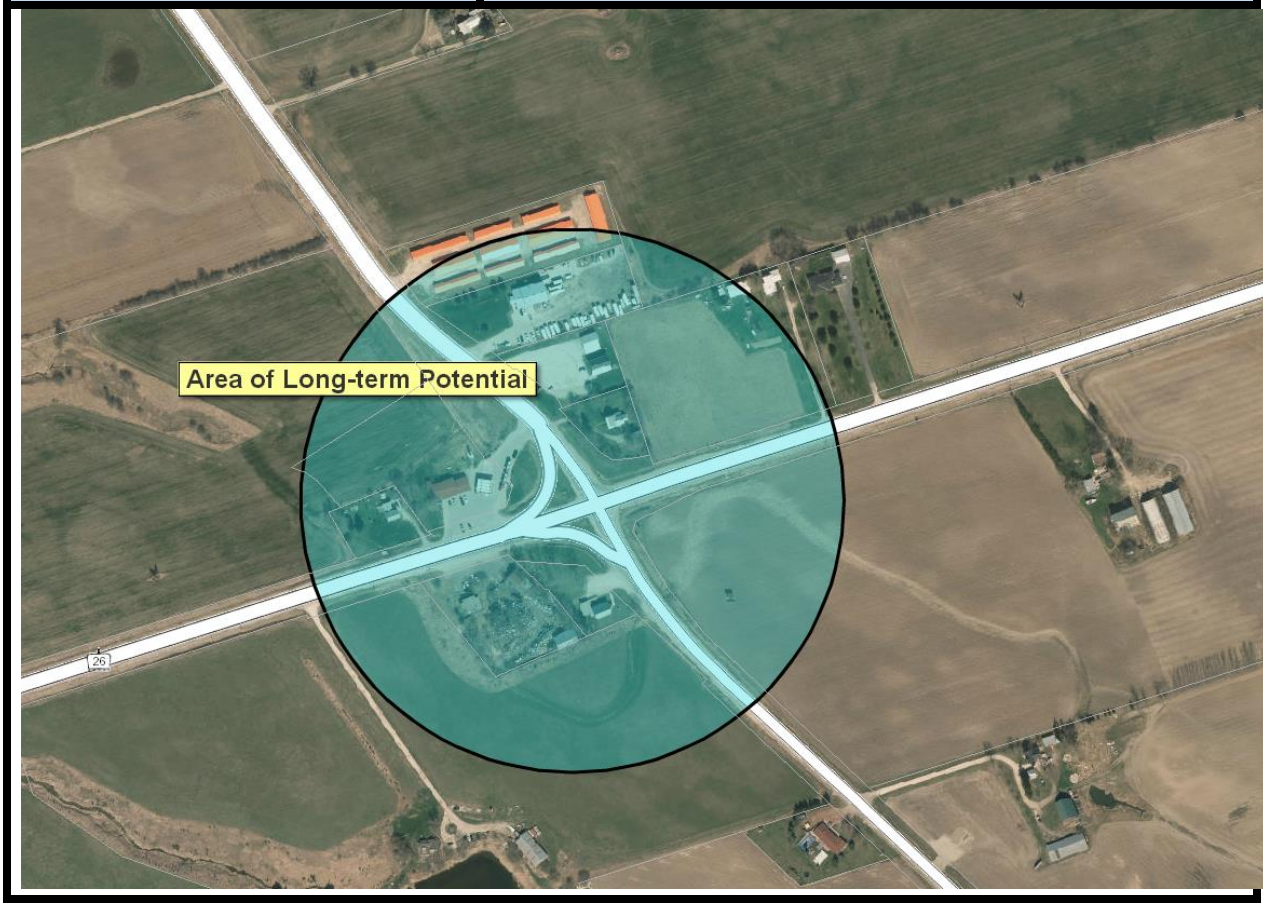
- Township of Clearview
- MTO

Characteristics:

- Location on Highway 26 & CR7
- High Traffic Volume
- Informal use
- Catch-all location for Collingwood, Stayner, and Wasaga Beach

Approach for Success:

- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.



Recommended Location (P9): Elmvale; County Road 6, Yonge Street

Proposed Phase:

Long-term

Characteristics:

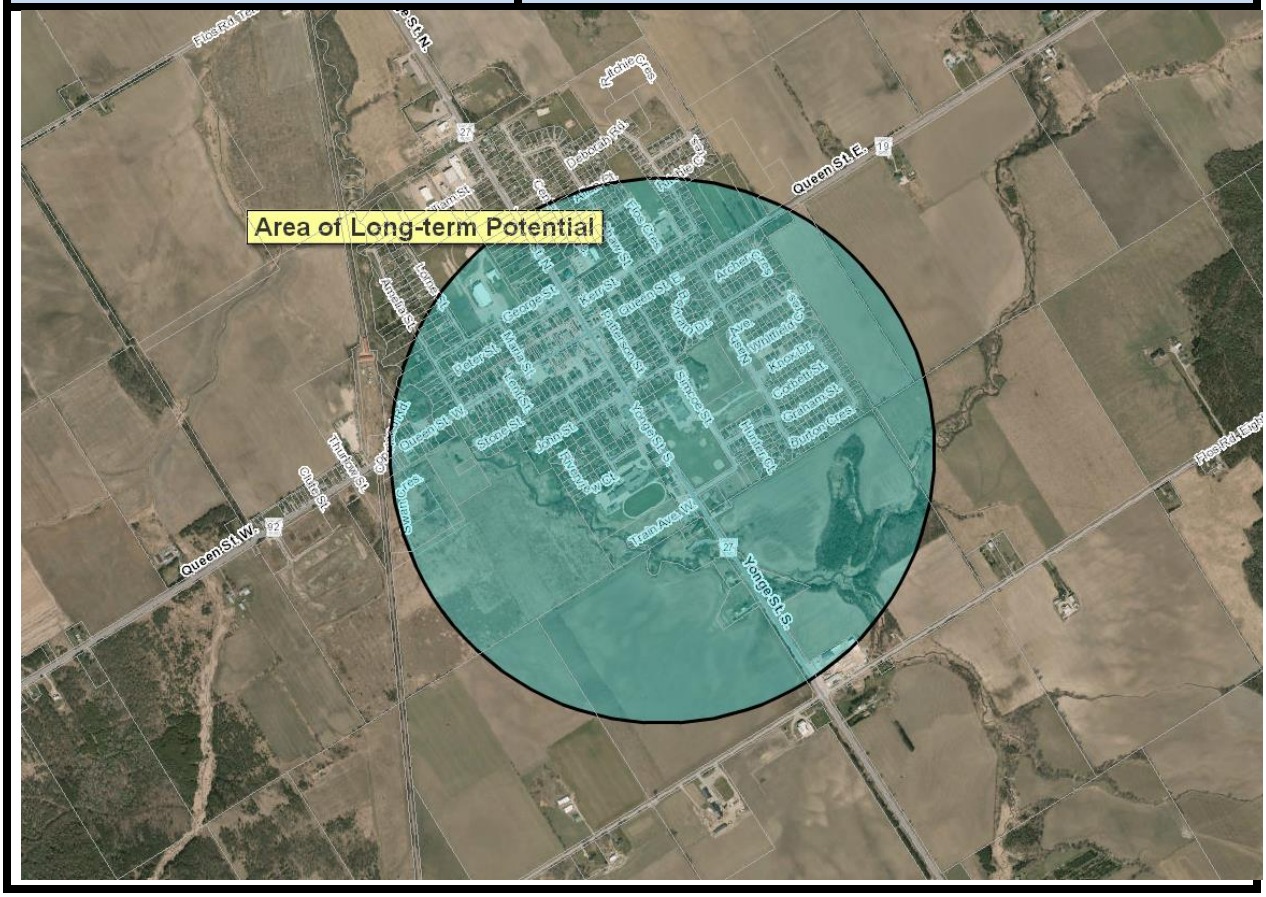
- Location near CR 6 & 92
- On existing Coach Route
- Near Population Centre (Elmvale)

Partners:

- Township of Springwater

Approach for Success:

- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.



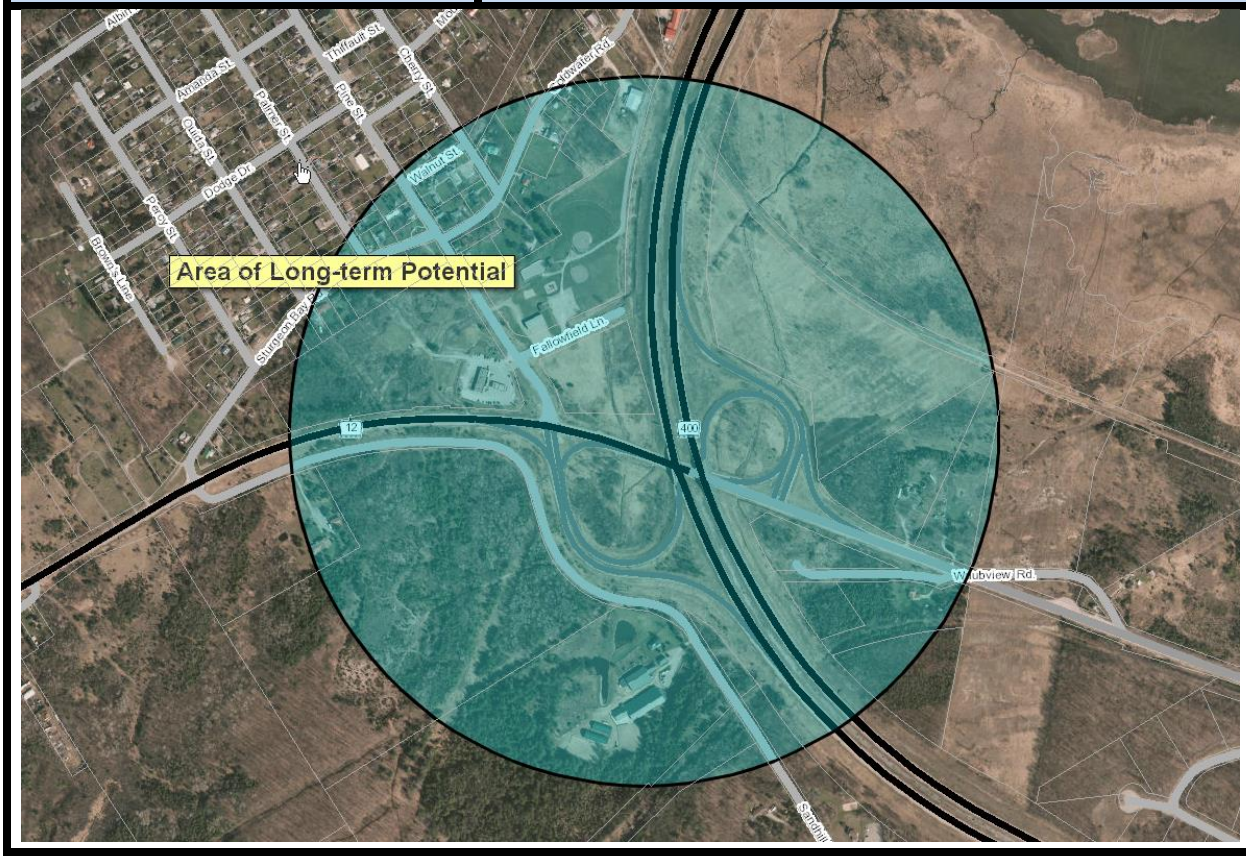
Recommended Location (P10): Waubaushene
Highway 400 & Highway 12

Proposed Phase:
Long-term

Partners:
- Township of Severn
- Township of Tay
- MTO

Characteristics:
- Intersection of major transportation routes; Highway 400 and Highway 12
- High Traffic Volume
- On existing Coach Route

Approach for Success:
- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.



Recommended Location (P11): Atherly; Highway 12 & County Road 44

Proposed Phase:

Long-term

Characteristics:

- High Traffic Volume
- Near Population Centre (Orillia)
- Availability of County owned property

Partners:

- Township of Ramara
- City of Orillia
- Mnkikaning First Nation
- MTO

Approach for Success:

- Long-term Carpool Lots can be developed for areas with planned population and infrastructure growth.

Appendix I: Notice of Public Information Centre Round 2

Transportation Master Plan Update

Notice of Public Information Centre Round 2

HOW DO **YOU** THINK TRANSPORTATION CAN BE IMPROVED IN SIMCOE COUNTY?

Study Purpose: To update the County of Simcoe's Transportation Master Plan to ensure that growth, land use, and infrastructure planning is integrated and is based on valued input from the public, private sector, government agencies, and municipalities. The updated Master Plan will establish a multi-modal transportation strategy that includes transit, cyclists, pedestrians, cars, and trucks.

This study is being conducted in accordance with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment, which is an approved process under the Environmental Assessment Act.

Your Involvement is Important! Provide your input by…

Attending Public Information Centres Round 2

Location #1
Barrie Home Show
County of Simcoe Booth
11 a.m. – 2 p.m.
March 8, 2014

Location #2
Town of Penetanguishene
Georgian Village Auditorium
4 p.m. – 7 p.m.
March 18, 2014

Location #3
Town of Innisfil
Recreational Complex,
North Lobby
4 p.m. – 7 p.m.
March 20, 2014

Location #4
Town of Wasaga Beach
Rec Plex,
Oakview Meeting Room
4:30 p.m. – 7:30 p.m.
March 25, 2014

Purpose of the Public Information Centres:

- To present recommendations for roads, transit and active transportation networks.
- To provide residents and stakeholders with the opportunity to provide their comments and speak with members of the study team about multi-modal transportation options and opportunities in the County of Simcoe.

- Filling out the online questionnaire https://www.research.net/s/SimcoeTMP
- Visiting the study webpage at simcoe.ca
- Contacting the study representatives listed below.

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TMP Project Co-ordinator
Planning Department
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rachelle.hamelin@simcoe.ca

David Richardson
Partner, Senior Project Manager
MMM Group Limited
100 Commerce Valley Drive West
Thornhill, ON L3T 0A1
905-882-7302
richardsond@mmm.ca

COUNTY OF SIMCOE For the Greater Good

MMM GROUP

CAMBIUM

Appendix J: Media Coverage of Public Information Centre Round 2

County Transportation Master Plan

Sunday, March 9, 2014 3:10 PM by Catherine Thompson
Residents can give feedback on Simcoe's updated Transportation Master Plan.

(Simcoe County) -

You have the opportunity to give feedback on the County of Simcoe's updated Transportation Master Plan.

A number of public information sessions are being held through out the county.

One will be at the Georgian Village Auditorium in Penetanguishene on Tuesday, March 18th from 4 to 7 pm.

Another will be held in Innisfil on the 20th and then in Wasaga Beach, at the Rec Plex, on Tuesday, March 25th from 4:30 to 7:30 pm.

The Transportation Master Plan is a document to guide future planning of roads, transit and active transportation.

Previous Page | Print This Story

Simcoe.com

Simcoe County works to end rule of car in new plan

Barrie Advance

PUBLIC INFO SESSIONS

• March 8: Barrie Home Show, 11 a.m. to 2 p.m.

• March 18: Georgian Village auditorium, 4 to 7 p.m.

• March 20: Innisfil Recreation Complex, 4 to 7 p.m.

• March 25: Wasaga Beach Rec Plex, 4:30 to 7:30 p.m.

The era of catering to the car is coming to an end as Simcoe County seeks to expand trails and transit.

In updating its transportation master plan, planner Rachelle Hamelin has heard two clear messages from residents: find ways to help hikers and cyclists get around and foster public transit links between communities.

“Therefore the need for another lane may not be warranted (on some roads),” said Hamelin. “It’s forward thinking. We don’t want to keep making our roads bigger because you just keep encouraging people to use (cars).”

The draft plan is being unveiled at a series of public information centres before it is presented to council March 25. Once the draft plan goes to council, it will be posted on simcoe.ca.

Hamelin said trails and bike lanes will be both on and off-road, to give cyclists choice.

“A lot of local municipalities have work over the past five to 10 years to build active transportation facilities and now at the regional level, we have an opportunity to look at connecting them,” she said.

Hamelin added the public has also been asking the county to take a leadership role in planning and encouraging public transit between municipalities.

“There are some initiatives, like Barrie and Angus and Collingwood and Wasaga Beach. What’s the county’s role in facilitating that further? We’re looking at the longer term.”

Simcoe.com

Time traffic lights on alternative routes during Hwy. 400 closures: councillor

Innisfil Journal

Vehicles were still lined up at intersections on alternative routes more than seven-hours after last Wednesday's fatal crash on Hwy. 400.

County Rd. 27, Yonge Street, and Sideroad 10 and 5 were still packed with northbound commuters at about 7 p.m. because Hwy. 400 remained closed so crews could replace barriers that were smashed during the tractor-trailer crash near the Conc. 4 overpass.

The alternative route overload was just as long Feb. 27 during a 96-car pile up on Hwy. 400 near Innisfil Beach Road.

While frustrated northbound motorists were stopped at intersections Wednesday, long-time councillor Lynn Dollin was voicing some frustrations of her own during that night's council meeting.

Dollin wondered if traffic signals could be timed during Hwy. 400 emergencies to increase north-south traffic flow through intersections. Green lights are longer for east-west traffic lights in the Cookstown area making the alternative routes slower, she said.

"The green lights are so short for north-south traffic," she said. "We should be able to override the signals to make traffic flow better."

Town deputy CAO Andy Campbell said although the issue hasn't been studied, timing the lights during emergencies should be possible.

"We haven't put a plan together yet, but it's a good idea," Campbell said.

It wasn't the first time Dollin has pushed for alternative route planning for Hwy. 400 closures.

She raised the issue in 2008 after alternative routes were heavily congested due to overwhelming Hwy. 400 cottage country traffic on the Canada Day long weekend.

Dollin called on the police services board to create an emergency route protocol that would include cops at crossroads or traffic light adjustments.

"There really needs to be plan in place — a policy when the 400 shuts down," she said nearly six years ago. "If there was a good plan in place, it would stop other accidents from happening on the sideroads."

However, overlapping jurisdictional issues stopped the plan in its tracks.

Creating a Hwy. 400 emergency route plan would involve the Ontario Ministry of Transportation, Simcoe County, the towns of Innisfil and Bradford West Gwillimbury, South Simcoe Police and the OPP, former police board chairperson Patti Vanderdonk said.

Who would pay for the essentials of a plan — policing and intersection improvements — was a challenging problem, Vanderdonk said at the time.

Click here and submit local news tips.

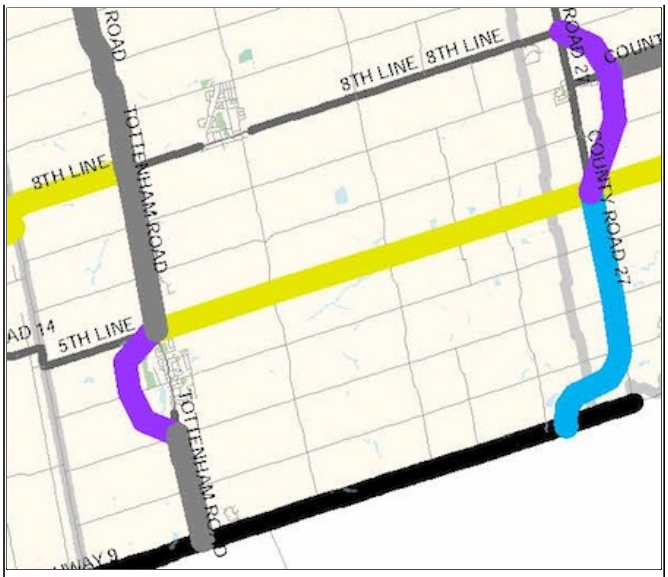
Local/News

TMP pushes bypass beyond 2031, County seeks active role in public transit

Posted March 19, 2014

The latest interim update related to Simcoe County's draft Transportation Master Plan (TMP) doesn't foresee the need to build a bypass around Tottenham until after 2031, while the 5th Line, currently a municipal roadway, would be uploaded into the County road network prior to 2031.

The TMP proposes the bypass to run between the 3rd Line to just north of the 5th Line. But the study's evaluation score card, which sets a score of above 24 in various categories as being implemented prior to 2031, puts this project right at 24. The proposed bypass scored a zero as a transit network because potential ridership in the stretch would be nominal.



"The volume of traffic expected on the local roads through Tottenham is very similar with or without the bypass, and in both cases those roads are expected to operate at capacity," according to the TMP. "Therefore the decision on whether to construct the Tottenham Bypass is independent of network capacity."

A proposed bypass around Bond Head area between the 5th Line and 8th Line on Cty Rd 27 falls into the same category, and also eyed for beyond 2031.

Last October, New Tecumseth and Simcoe County entered into a "best efforts agreement" to upload 15.3 kms of local roads to the upper tier within the next 20 years, or the deal is terminated. Included is the 10.5 km stretch of the 5th Line between County Road 10 (Tottenham Road) and the boundary with Bradford West Gwillimbury which would provide the County with an uninterrupted east-west link from Highway 27 to Highway 50. And, Industrial Parkway between County Road 10 (Tottenham Road) and Highway 89 (Young Street), a 4.8 km urban road that will provide the County with a westerly bypass for the community of Alliston.

The TMP recommends expanding the County road classifications to the following six categories:

- Rural: High speed roadways connecting communities throughout the County;
- Rural Settlement: Characteristics are similar to a rural environment with localized low-density development in sections along the corridor;
- Urban - Commercial: Supported primarily by commercial and large format retail development;
- Urban - Village Core: A roadway around which a community is developed involving commercial, retail and residential;
- Urban - Main Street: Supported by mixed-use development with a focus on retail in urban communities; and
- Urban -Industrial: Primarily services industrial employments centres.

In addition to roads, the TMP also delves into public transit, and recommends a greater partnership role for the County with municipalities that currently provide bus services including Essa/Barrie and Collingwood, Wasaga Beach and Midland.

The County would take on a facilitator role, and in 2015, "co-fund a transit planning study to establish target thresholds, including

population and employment, densities and other criteria, to indicate when Simcoe County communities should consider or expand transit as a community service. Answer the question, "When is it time to study transit feasibility at the community level?" and in 2015/2016 co-fund Transit Feasibility Studies and Implementation Plan for the Alliston area and for the Alcona / Innisfil area.

"Looking ahead to the long-term horizon, Simcoe County must be a well-connected region. Its Primary Settlement Areas and municipal growth nodes will be the focus of higher-density growth with diverse economies and a variety of services and amenities. Areas of urban growth should move towards community transit services funded by local municipalities or Transit Service Boards. Residents should be able to travel from community to community for work, school, health or recreational purposes without being wholly dependent on the automobile. The vastness of the County of SimcoeÕs geographic area is such that its rural areas will require innovative ways of providing transportation choices, opportunities and linkages. While establishing long-term recommendations is not practical, it is imperative to ensure the decisions made during the actionable life of this plan (approximately five years) do not compromise the County of Simcoe's ability to reach the future vision for transit that remains on the horizon."

Click here to send a Letter to the Editor.

OPINION COLUMN

Simcoe County's new transportation plan rolling along

By Cal Patterson
Thursday, March 20, 2014 10:37:14 EDT AM

Simcoe County's Administration Building (Examiner Files)

Simcoe County spans across 4,800 kilometre of land and is home to 16 municipalities, as well as two separated cities. With such diversity, it is important that the county's transportation strategy considers our vast geography, growing permanent and seasonal residents, and expanding economy.

In 2013, we informed the public about a county initiative to update the 2008 Transportation Master Plan, which provided the "big picture" framework for planned transportation in Simcoe County for the next 25 years. The first phase of the update commenced in spring 2013, and included Public Information Centres and an online survey to obtain feedback from of our residents, stakeholders and government partners.

Your feedback was tremendous. Many of the suggestions obtained have been incorporated into an updated Transportation Master Plan Report. The updated report is aimed at presenting a multi-modal, long-term vision for sustainable transportation within the county.

These updates incorporate the public's feedback about key topics, such as connecting cycling and walking networks, investing in infrastructure, expanding transit service and investigating strategies to reduce volume on county roads.

The updated report includes recommendations for the following eight focus areas:

· An enhanced Roads Network that accommodates active transportation, supports transit and considers environmental impacts;

· Development of Context-Sensitive Road Designs to accommodate supportive modes of travel for all users including pedestrians, cyclists, transit, motor vehicles and freight;

· The feasibility of Roundabouts as a future intersection control measure;

· Research into a future multi-municipal transit network and creation of a Transit Working Group;

· A focus on developing an active transportation route network and planning that recognizes active transportation as an alternative transportation mode, a way to promote healthy lifestyle and opportunities for the tourism industry;

· Consideration of other multi-modal transportation options including strategies for air, marine and rail travel;

· Strategies to reduce volume and manage demand on county roads;

· An overview of feedback gathered through public consultations and stakeholder meetings.

Public feedback is key to the ongoing development of the updated Transportation Master Plan. As such, the County of Simcoe has undertaken a second round of Public Information Centres throughout March.

There are two public information centres remaining on Thursday March 20 at the Town of Innisfil Recreation Complex and Tuesday March 25 at the Town of Wasaga Beach RecPlex. If you can't attend one of them, an online questionnaire is available at research.net/s/SimcoeTMP.

The next phase of the Transportation Master Plan update will include an implementation strategy. The final Plan is scheduled to be presented to County Council for final approval in fall 2014. For more information, visit simcoe.ca/dpt/pln/trsplanupdate/index.htm.

Warden Cal Patterson, County of Simcoe

Reader's comments »

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By adding a comment on the site, you accept our terms and conditionsand our netiquette rules.

County seeks public input on Transportation master Plan

March 26, 2014 · 0 Comments

An information session was held last week to gather public input and gauge opinions of what has been proposed as updates to the Transportation Master Plan (TMP) for Simcoe County.

Updates include infrastructure for public transit and active transportation methods like cycling, roller blades and pedestrian traffic. The County is also looking at new or expanded transit service, carpooling locations, paved shoulders and railways.

Existing railways are also being considered for the transportation of people and goods.

The construction of active transportation facilities both on and off-road have been a key recommendation from the public during this study, as well as the desire for carpool lots and rideshare programs.

Research shows that 81 per cent of Simcoe County residents commute by car and without additional passengers. In 30 years the population in the area is forecasted to jump 78 per cent, to 769 thousand residents. With such a large increase in the population, managing traffic is a major focus.

In Innisfil, one of the most frequent comments residents have shared is that they would like communities to be better connected through rural areas.

Although updates to the TMP are scheduled for every five years, the changes initiated now are intended to help with transportation needs over the next 30 years. TMP project co-ordinator, Rachelle Hamelin says that's why it's important to hear from different generations. Hearing from residents of all ages will help develop a plan that addresses the wide variety of needs in the county, even kids were asked how they wanted to get around town.

Because of the size of the county, Hamelin says it would have been an enormous cost to have a consultant evaluate every road and recommend updates. Instead, they reached out to the community with these information sessions to get recommendations from the people who know the communities best, the residents themselves.

People who stopped by the drop-in information session were asked to identify on a map what type of infrastructure they would like to see and where. From bike lanes to carpool lots to railways, residents were full of suggestions.

The next step will be phase three of the project, updating the TMP based on approval from County Council and developing an implementation strategy. The updating process should be complete in August, when the capital cost for the plan will be evaluated.

Residents of all ages are encouraged to speak up with their thoughts and comments about the strategies and recommendations outlined in the TMP draft by filling out a questionnaire at https://www.research.net/s/SimcoeTMP. The survey will be available until August, 2014.

By Emily Wood

The County of Simcoe has been collecting information since last year, using public input to shape their plan. A few key focuses were identified that reflect the wide variety of needs in Simcoe County.

TAKE A LOOK – Poster boards were set up inside the YMCA highlighting the key changes and next steps for the project of updating the Transportation Master Plan for Simcoe County, a process that is undertaken every five years. People were able to take a look as they passed by, getting some key points from the posters. Representatives from the county and the consulting group involved were also there to answer further questions.

Readers Comments (0)

You must be logged in to post a comment.

Letters to the Editor

- Why did Stephen Harper say 'no'?
- We need the trail in New Tecumseth
- Flood preparedness
- Take the HST off necessities
- Follow up: stop sign removed
- Changes to licencing seniors coming April 21
- Trail talk continues
- Glad the stop sign is gone
- Trail users will treat farmers' fields with respect in New Tec

Headline News

County seeks public input on Transportation master Plan

An information session was held last week to gather public input and gauge opinions of what has been proposed as updates to the Transportation Master ...

Town to take part in Earth Hour

The lights will go off on Saturday, March 29, at 8:30 p.m. in administration buildings throughout the municipality. This will be done where safe and ...

Brett Sears

From: Dave McLaughlin
Sent: March-28-14 9:11 AM
To: Brett Sears; David Richardson
Cc: Communications at MMM
Subject: MMM's Simcoe County TMP in the news

THE BARRIE EXAMINER

IBR work rolling ahead

The Barrie Examiner
Fri Mar 28 2014
Page: A2
Section: News
Byline: MIRIAM KING, QMI AGENCY

INNISFIL -Future improvements to a busy south Innisfil road are in the works.

Innisfil Beach Road (IBR), from west of Alcona to County Road 27 in Thornton, will be transformed in stages over the next six years.

A preliminary construction and widening schedule of IBR was on display at a public information centre held at the Innisfil Recreational Complex on March 20, which provided an update on Simcoe County's transportation master plan. That document sets priorities to the 2031 planning horizon for roads, transit and **active transportation**.

A few major projects in south Simcoe are still a go.

According to Christian Meile, the county's director of transportation and engineering, the **environmental assessment** (EA) for IBR is still ongoing, although the main intersections are already in the preliminary **design** phase, and some construction has been carried out, including the IBR and 10 Sideroad intersection and reconstruction of Innisfil Beach Road west of there.

Work on the Innisfil Beach Road and 5 Sideroad intersection is slated for 2015, followed by Innisfil Beach Road and Yonge Street in 2016.

The widening of Innisfil Beach Road (County Road 21) to four lanes west of 20th Sideroad is slated for 2017, although there are issues with the intersection where the two busy roads, and a GO train track, share close quarters. That intersection is slated for reconstruction in 2015, but according to the county, planning for the intersection centres around talks with Metrolinx, which operates the Go trains.

"The county has been in discussions with Metrolinx officials over the last two years to purchase land that would allow the county to make improvements to the road," Meile said. "We are hopeful that the land purchase process with Metrolinx will be approved shortly and that road improvements will proceed as planned."

Metrolinx would not comment on the discussions.

The EA for the stretch of IBR to Yonge Street is ongoing and alternative transportation elements (e. g. bicycle trails) are still under consideration.

"Nothing has been decided," Meile said.

The widening of Yonge Street (County Road 4) to four lanes from Innisfil Beach Road to Bradford's northern limits is ongoing.

The **environmental assessment** for the stretch of Yonge from Bradford north to County Road 89 has been completed and is now in preliminary **design**. The budget estimate for that project is $35 million and construction isn't expected to begin before 2016.

At this stage, the county is looking at possibly including some type of trail within the right-of-way along Yonge Street, despite a number of bottlenecks that could restrict the amount of property available.

Rachelle Hamelin, the county's planner and transportation master plan project co-ordinator, was optimistic that a trail could be included in the **design**, but senior project manager David Richardson, of the MMM Group, said there was a need to "look at the road platform, look at the right-of-ways.

"There are a lot of choices that have to be made," based on traffic "volumes, speeds, the number of trucks, the topography," before the proposals can go "from lines on a plan to facilities on the ground," Richardson said.

Many of the comments at last week's public information centre dealt not with roads and infrastructure but with **public transit**, especially the need for a county-wide transit system.

The transportation master plan proposes a less direct role for the county as a facilitator for municipal transit, co-ordinator of transit systems and 'change agent': negotiating with GO Transit and Metrolinx to extend GO train and bus service beyond the existing corridors.

Hamelin also recommends the county continue to explore funding and partnership opportunities as well as pursue a long-term transit plan.

"Merit for a regional transit system has been expressed by the public and this information will be presented to county council for their consideration," she said.

"There's really nothing that's off the table, when it comes to transit," Richardson said.

To see the second interim transportation master plan report, visit www.simcoe.caand check under business, planning, then click on transportation master plan.

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Partner
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MMM Group – Enriching the Quality of People's Lives

NEWS LOCAL

County updates its Transportation Master Plan

By Miriam King, QMI Agency
Friday, March 28, 2014 9:53:00 EDT AM

David Richardson, Senior Project Manager and Partner with MMM Group Ltd. Transportation Planning, and Rachelle Hamelin, Transportation Master Plan Project Co-ordinator at the County of Simcoe Planning Department, at the TMP Public Information Centre held at the Innisfil Recreation Complex, Thursday, March 20, 2014. MIRIAM KING/BRADFORD TIMES/SUNMEDIA

The County of Simcoe is working on updating its 2008 Transportation Master Plan - a document that will set priorities for Roads, Transit, and Active transportation, to the 2031 planning horizon.

A public information centre was held at the Innisfil Recreation Complex on March 20, to provide residents with an update. It was an opportunity to check the maps, identify the projects that are in the works, and to comment. Visitors were invited to scrawl their remarks on sticky notes, and stick them to the maps on display - and to go online to fill out a short survey on transportation, at www.research.net/s/SimcoeTMP

Most of the comments dealt not with roads and infrastructure, but with public transit - especially the need for a County-wide transit system. The Transportation Master Plan proposes a less direct role for the County: as a Facilitator for municipal transit, Co-ordinator of transit systems, and "Change Agent" - negotiating with GO Transit and Metrolinx to extend GO Train and Bus service beyond the existing corridors.

Rachelle Hamelin, Planner and Transportation Master Plan Project Co-ordinator with the County of Simcoe noted that the report does recommend that the County "continue to explore funding and partnership opportunities as well as pursue a long-term transit plan. Merit for a "regional" transit system has been expressed by the public, and this information will be presented to County Council for their consideration."

Senior Project Manager with MMM Group, David Richardson also noted, "There's really nothing that's off the table, when it comes to transit."

There might be roads projects that are "off the table", based on the update of growth patterns and job creation - but at least two major projects in South Simcoe still appear to be near the top of the list. The widening of Innisfil Beach Road (County Rd. 21) to 4 lanes, west of 20th Sideroad in Innisfil; and the widening to 4 lanes of Yonge St. (County Rd. 4) from Innisfil Beach Rd. to Bradford's northern limits, are in the works.

According to Christian Meile, County Director of Transportation and Engineering, the Environmental Assessment for Innisfil Beach Rd. is still ongoing - although the main intersections are already in the preliminary or detailed design phase, and some construction has been carried out.

Work on the intersection of Innisfil Beach Rd. and 5 Sideroad is slated for 2015; Innisfil Beach Rd. and Yonge St. in 2016. Innisfil Beach Rd. and 20th Sideroad is also ready to proceed in 2015, but is being held up by Metrolinx at this point, Meile suggested.

Actual widening of Innisfil Beach Road, from 20th Sideroad west to Yonge, could take place as early as 2017 - but the EA is still ongoing, and Active Transportation facilities (e.g. , bicycle trails) from Yonge St. east to Alcona, "are still under consideration... Nothing has been decided."

As for the Yonge St. widening, the Environmental Assessment for the stretch of road from Bradford north to Hwy. 89 has been completed, and is now in "preliminary design." The budget estimate is $35 million; construction is not expected to begin before 2016.

At this stage, the County is still looking at the possibility of including a "trail" within the right-of-way along Yonge, despite a number of bottlenecks that could restrict the amount of property available.

Hamelin was optimistic that a trail could be included in the design, but Richardson acknowledged there was a need to "look at the road platform, look at the right-of-ways... There are a lot of choices that have to be made," based on traffic "volumes, speeds, the number of trucks, the topography" before the proposals can go "from lines on a plan, to facilities on the ground."

To see the 2nd Interim Report, visit www.simcoe.ca and check under Planning; click on Transportation Master Plan.

Reader's comments »

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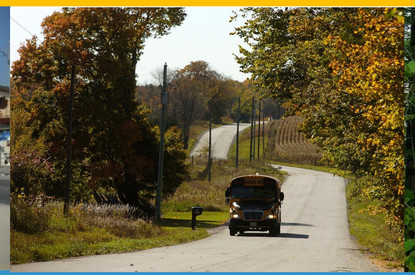
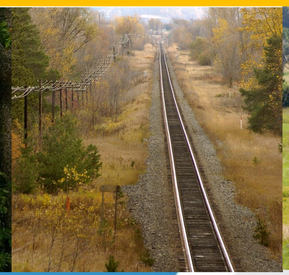
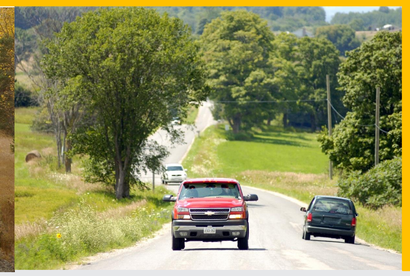
Appendix K: Presentation Boards used for Public Information Centre Round 2





SIMCOE COUNTY

TRANSPORTATION
MASTER PLAN UPDATE

Public Information Centre #2

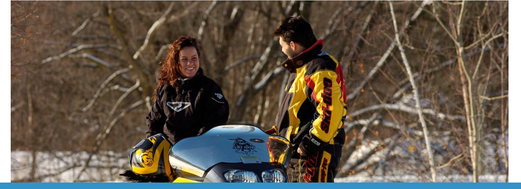
COUNTY OF SIMCOE
For the Greater Good

In partnership with

MMM GROUP

CAMBIUM





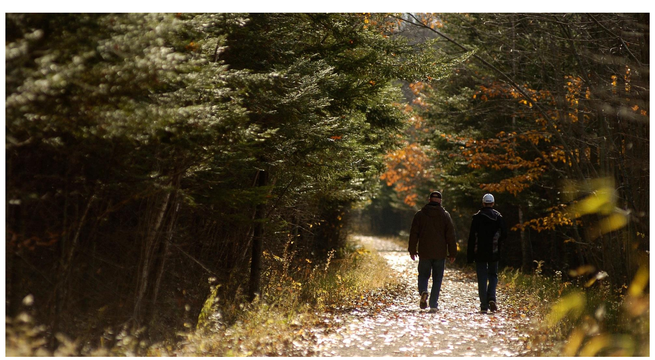

WHY ARE WE PREPARING THIS UPDATE?

Update the Transportation Master Plan to…

- Integrate land use planning with transportation initiatives
- Build upon local knowledge
- Plan for transit, cyclists, pedestrians and motor vehicle needs

This study complies with the requirements of Phases 1 and 2 of the Municipal Class Environmental Assessment process





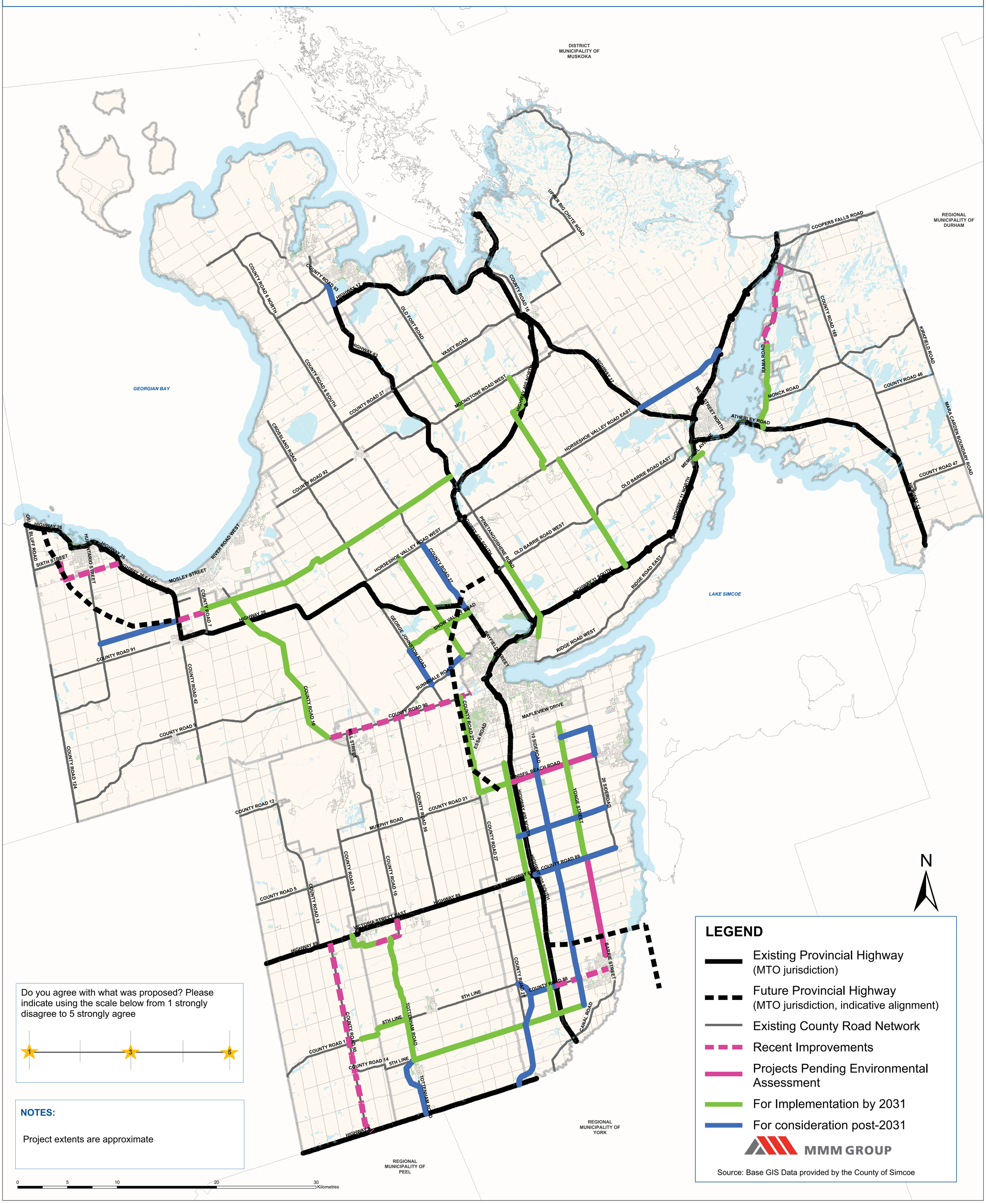


WHAT WE HAVE HEARD *YOU* SAY!

Connected Cycling and Walking Network → **Investment in Infrastructure** → **New or Expanded Transit Service** → **Car Pooling, Work from Home, Flexible Work Schedules**


DRAFT FEBRUARY 2014

DRAFT FUTURE ROAD NETWORK
COUNTY OF SIMCOE TRANSPORTATION MASTER PLAN UPDATE



Do you agree with what was proposed? Please indicate using the scale below from 1 strongly disagree to 5 strongly agree

1 — 3 — 5

NOTES:

Project extents are approximate

0 5 10 20 30 Kilometres

N

LEGEND

- Existing Provincial Highway (MTO jurisdiction)
- Future Provincial Highway (MTO jurisdiction, indicative alignment)
- Existing County Road Network
- Recent Improvements
- Projects Pending Environmental Assessment
- For Implementation by 2031
- For consideration post-2031

MMM GROUP

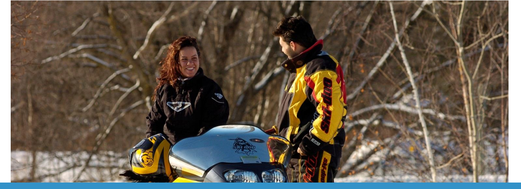
Source: Base GIS Data provided by the County of Simcoe

COUNTY OF SIMCOE
For the Greater Good

DRAFT FEBRUARY 2014

FIGURE 6.3
DRAFT ACTIVE TRANSPORTATION NETWORK CONCEPT
COUNTY OF SIMCOE TRANSPORTATION MASTER PLAN UPDATE






WHAT WE PROPOSE FOR TRANSIT

Three-level Approach

Facilitator (Community level)

- Evaluate the business case for transit

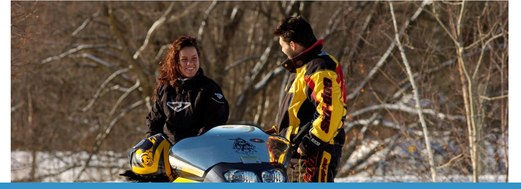
Co-ordinator (Inter-Community level)

- Establish Simcoe Transit Working Group (municipal operators, private operators, Simcoe County Student Transportation Consortium, not-for-profit groups)

Change Agent (Inter-Regional level)

- Advocate for increased Metrolinx extension of GO Rail and Bus service to Highway 400 and beyond





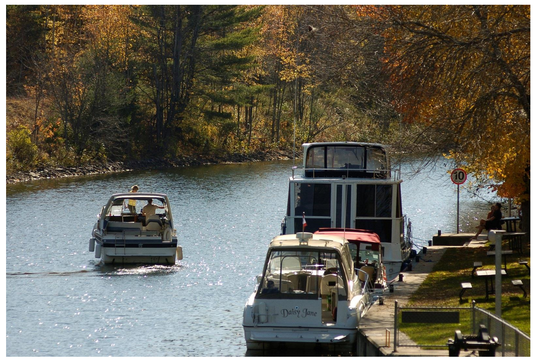

WHAT WE PROPOSE FOR OTHER TRAVEL MODES

Airports

- Capitalize on the Customs Port of Entry Status at the Lake Simcoe Regional Airport and the Collingwood Regional Airport by establishing a working group to promote economic development.

Marine

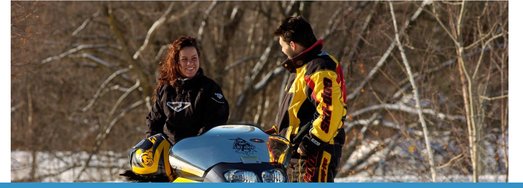
- As a long term measure, consider marine facilities as a means to ferry passengers between destinations along Lake Simcoe, Georgian Bay and the Trent Severn Waterway



Rail

- Consider existing rail facilities as multi-modal opportunities for people and goods movement, as well as possibilities to combine Active Transportation facilities along these corridors
- Purchase the Barrie-Collingwood Railway (BCRY). Preserve and consider opportunities to use the corridor for active transportation plus passenger and goods movement
- Prepare a BCRY Viability and Management Study to outline the corridor's uses and how adjacent development can be treated.

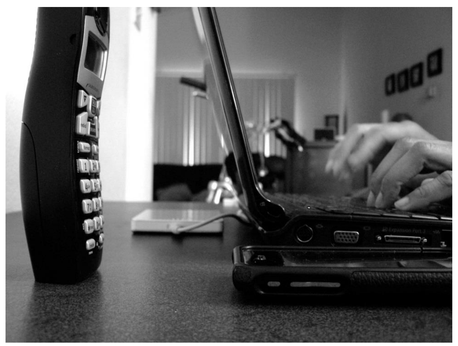





WHAT WE ADDITIONALLY PROPOSE TO MANAGE TRAFFIC

Ridesharing

Teleworking



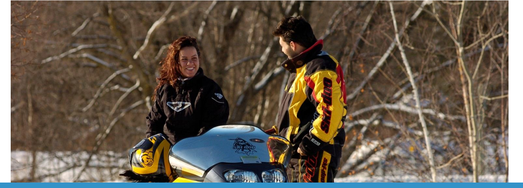
Carsharing

Flextime

Smart Commute

Establishment of Simcoe County Chapter of SmartCommute

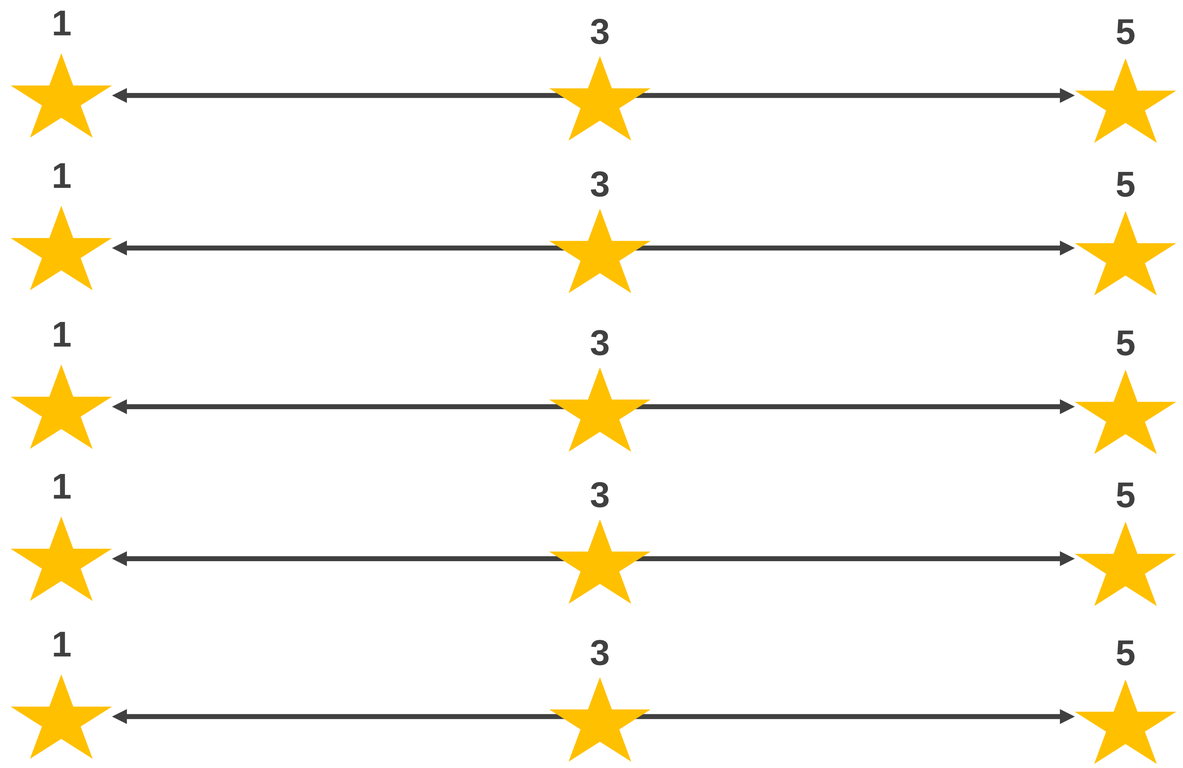





DO YOU AGREE?

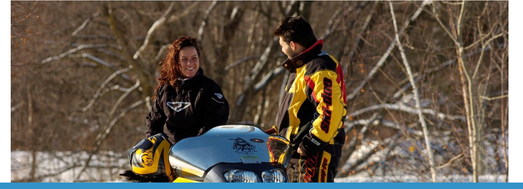
Do you agree with what was proposed for the following areas? Please indicate using the scale beside each option from 1 (strongly disagree) to 5 (strongly agree).

- Roads
- Active Transportation
- Transit
- Other Travel Modes
- Additional Measures to Manage Traffic



Did we miss something? If so, write your comments directly in this box or provide suggested changes to the recommendations:






STUDY NEXT STEPS

Phase 1

Assessment of the Existing TMP and Travel Conditions

- Stakeholder Meetings #1
- Public Information Centre #1
- Prepare and Submit Interim Report #1

Phase 2

Needs / Opportunities Assessment of Multi-modal Transportation Strategies

- Stakeholder Meetings #2
- Public Information Centre #2
- Prepare and Submit Interim Report #2

We are Here

Phase 3

Update the TMP and Develop the Implementation Strategy

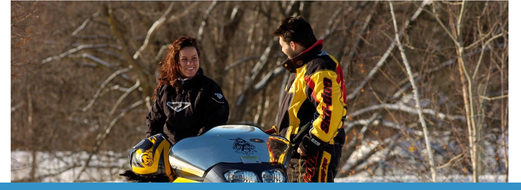
- Stakeholder Meetings #3
- Prepare and Submit Interim Report #3

Phase 4

Complete the TMP Report

March 2013 → **August 2014**






THANK YOU FOR PARTICIPATING

What do you think of the solutions we are proposing? Let us know if you think they will work!

Please continue to stay involved as we finalize the study by….

- Completing our short online questionnaire: https://www.research.net/s/SimcoeTMP
- Visiting the County of Simcoe's webpage: simcoe.ca
- Contacting us (write, phone, email or fax) using the study business cards or the information provided.
- Follow us on Twitter and Facebook for updates about the study, upcoming events and how to get involved.

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Appendix L: Summary of Written Comments Received

County of Simcoe Transportation Master Plan Update
Summary of Agency / Stakeholder / Public Comments
Project Record

In Partnership with

Updated: November 27, 2014

No.	Date	Source	Contact	Comment	Action
1	19-May-13	Email	Konrad Brenner, Orillia, ON	The County should consider more carpool parking lots near provincial highways and other main routes. It should also pave shoulder areas in order to accommodate all modes of travel (i.e. not just cars and trucks).	Comment has been included in the consultation record. Carpool lots and other car-share improvements will be explored as part of the TDM component of the TMP Update.
2	3-Jun-13	Email	The Friends of Fuller Avenue	The Harbourview - Fuller Avenue roads connecting the Town of Midland and the Town of Penetanguishene needs to be accessible for all travel modes due to the lack of a transit system. This is a major industrial area and it needs to accommodate employees/residents who do not own cars or who wish to utilize alternative travel modes. The increase in traffic on this corridor has made traveling unsafe for these users. Moreover, there are residents (i.e. para/quadriplegics) who live along Fuller Avenue, who feel trapped because they do not have a safe way to integrate into the community.	Comment has been included in the consultation record. A multi-modal future with increased emphasis on transit and active transportation is a main theme of the TMP Update.
3	10-Jun-13	Email	Dr. Bryan Marshall, Collingwood, ON	Collingwood has a great walking trail system for pedestrians. However, transportation facilities for pedestrians and cyclists can be greatly improved (e.g. better defined paths for pedestrians and bikes/bike ports/bike routes/sidewalks in housing developments). These facilities should connect communities, such as between Wasaga Beach and Collingwood. Furthermore, laws on newer alternatives, such as e-bikes, should be addressed more clearly and speed limits should be established for these trails.	Comment has been included in the consultation record.
4	16-Aug-13	Email	Sharon Godlewski	The County should plan for bike lanes, especially, in Alliston, Beeton and Tottenham, for those who want to ride to work or school.	Comment has been included in the consultation record. An active transportation candidate route network has been developed as part of the TMP Update.
5	10-Nov-13	Email	Peter Armstrong, Barrie, ON	The County of Simcoe includes several communities that cover a large area. In order to connect the communities and shorten the gap, the County needs to consider all means of transportation, specifically, bicycling. These activities can foster activities such as mountain biking and bring needed tourism and economic growth to the area.	Comment has been included in the consultation record. An active transportation candidate route network has been developed as part of the TMP Update.
6	20-Nov-13	Email/Staff Report	Township of Tay	The Township would like to transfer Duck Bay Road over to the County's jurisdiction and in exchange would like the control of County Road 58.	Comment has been included in the consultation record.
7	10-Dec-13	Letter	Utopia (Township of Essa), ON	Essa should be considered for the transportation hub or trailhead location since it is located in the midst of the County, with County Roads 90 and 10 passing through it. Stop -off points and waterway "trails" should also facilitated. Additionally, the BCRY and CPR meet on Essa land and this transfer point could be developed for more convenient travel. The Township would also like some clarification on the future of the BCRY, and if the rail will no longer be supported, the Township would like an interim policy for the promotion and support of the use of an abandoned rail bed. Moreover, the Township would also like to have a regional public transit system with the County playing a more active role in the funding of the transit system. Other general points on active transportation provided by the Township: constructing medians to help facilitate pedestrian crossings, putting County roads in urban areas on a road diet, lifting the controlled-access status from Mill Street in the urban core, and developing a street tree policy.	Comment has been included in the consultation record. The TMP Update addresses the BCRY, transit and active transportation.
8	9-Jan-14	Email	Debra Harsany, Barrie, ON	There should be public transit servicing the route between Orillia and Barrie. There is a bus going through these locations but it does not directly service them.	Comment has been included in the consultation record. Recommendations for next steps for transit are included in the TMP Update.

No.	Date	Source	Contact	Comment	Action
9	29-Jan-14	Email	Town of Collingwood	Comments provided on draft active transportation map for routes in Collingwood.	Comment has been included in the consultation record. Active transportation comments have been considered in the development of the active transportation candidate route network that is part of the TMP Update.
10	30-Jan-14	Email	Town of Collingwood	Consider incorporating the Town's provisions for "Share the Road" routes into the County's TMP Update.	Comment has been included in the consultation record. The comment has been incorporated into the TMP update where suitable.
11	13-Feb-14	Email	Township of Tiny	Concession 5 from Tiny Beaches Road South to Wyevale should be identified on the AT map as opposed to Concession 4 West.	Comment has been included in the consultation record and considered in the development of the candidate active transportation route.
12	20-Feb-14	Email	District Municipality of Muskoka	There is a lack of connectivity to Muskoka Road 5 in Port Severn and Muskoka Road 49 at Hamlet. Furthermore, there should be connectivity to the proposed service road at Severn Bridge. It will likely become an extension of Road 169 in Muskoka and it will be beneficial for both Simcoe and Muskoka if it was connected to Simcoe Road 169. Finally, the Manitoulin Cycling Advocates group would like to endorse Muskoka Road 13 for a complete streets approach as it suffers the same problems as Fuller Avenue between Penetanguishene and Midland.	Comment has been included in the consultation record. Context-sensitive design of streets has been addressed in the TMP Update.
13	26-Feb-14	Email	Konrad Brenner, Orillia, ON	The County should improve access to County forests during the winter either by building parking lots of enforcing parking restrictions.	Comment has been included in the consultation record.
14	26-Feb-14	Letter	York Region	Draft future road network maps should identify planned provincial highway improvements (e.g. Bradford Bypass, widening of Highway 400) and "out of scope" should be replaced with "MTO jurisdiction". A summary table describing the planned provincial highway improvement and their status and timing should be included since this will have a critical impact on the future base network that Simcoe County builds their TMP on. Additionally, Metrolinx transit improvements should be shown in a future transit network map. Inter-regional transit should be summarized in a table, including, existing service levels, planned future service, project status and timing. Simcoe County should increase their role presence in transit planning and coordination between specific inter-municipal links and major origin-destination pairs. Finally, in the detailed analysis of existing travel demand and patterns, carpooling opportunities should be identified as a basis for TDM/Smart Commute.	Comment has been included in the consultation record and considered in the development of the TMP Update.
15	2-Mar-14	Staff Report	Town of Collingwood	The Town is interested in shifting transit from its administration to a regional transit system for the County. Furthermore, the Town would like to see the TMP address the County's role in the regional airports. For instance, the Lake Simcoe Regional Airport is owned jointly by the City of Barrie, the County of Simcoe and the Township of Oro-Medonte. The Town feels it would benefit from a similar partnership with its surrounding municipalities. Furthermore, the BCRY is discussed in the TMP but the Town of Collingwood is no longer funding the operation of the rail line. Staff are currently working on reviewing the viability of the rail line. Moreover, Poplar Sideroad may benefit from traffic calming options at locations such as: Poplar and Sixth Line, Poplar and Tenth Line, and the Tenth Line and Sixth Street. Finally, the Town is implementing "Share the Road" routes as part of its Active Transportation Plan - some of the routes include County roads.	Comment has been included in the consultation record. The TMP Update addresses the BCRY, transit and active transportation.
16	7-Mar-14	Email	Lake Simcoe Region Conservation Authority	The Lake Simcoe Region conservation authority incorporate the following principles, the avoidance as the first approach when considering impacts to natural heritage and natural hazards in the Lake Simcoe Watershed. Where there is no reasonable alternative, appropriate planning, design and construction practices should be adopted to minimize any negative impact. The avoidance of areas with high aquifer vulnerability and significant groundwater recharge and or the use of alternative winter maintenance strategies to maintain and improve water quality. The consideration of innovative stormwater management practices and road design to help reduce impervious areas and provide the ability to accommodate low impact development practices to maintain water balance and improve water quality in the watershed. They are supportive of creating appropriate active transportation connections as part of the Master Transportation Plan Update.	Comment has been included in the consultation record. Environmental impact is an important criterion used in the multiple account evaluation of road projects.

No.	Date	Source	Contact	Comment	Action
17	26-Mar-14	Letter	Simcoe Muskoka District Health Unit	SMDHU commends the County on the idea of complete streets. They recommend the following: the County create a *Simcoe County Active Transportation Master Plan,* provide leadership for the establishment/growth of inter-county transit, collaborate with MTO to ensure alignment between the TMP and the Simcoe Area Multi-Modal Transportation Strategy (the TMP does not clearly identify how these plans with fit together), consideration of additional features that will enhance the health and safety of AT users (e.g. lighting and signage, smoke-free space, sun safety, rest areas, ease of use etc.).	Comment has been included in the consultation record. Recommendations for next steps for context-sensitive design of streets, active transportation and interaction with MTO are included in the TMP Update.
18	30-Mar-14	Email	Alan Masters, Beeton, ON	The contact is advocating on behalf of the residents of New Tecumseth for the implementation of a basic public transportation service in the TNT	Comment has been included in the consultation record. Recommendations for transit are included in the TMP Update.
19	3-Apr-14	Email	City of Barrie	Maintenance Agreement for County Road #54: Clause 5 - The County should include the "boundary road" section in their studies and DC by-law	Comment has been included in the consultation record.
20	24-Apr-14	Email	City of Barrie	The City of Barrie is proposing uni-direction on-road bike facilities on Yonge Street in Barrie which would then connect to County Road 4 (extension of Yonge Street) at the City's boundary. However, the County's draft AT network plan identifies an off-road facility on County Road 4. This facility type was originally proposed in the County's draft Trails Master Plan. The City also wanted the Simcoe County TMP to identify a proposed link to York Region and the proposed Lake Simcoe to Lake Ontario Trail.	Comment has been included in the consultation record. Upon further review, the TMP Update is proposing on-road (e.g. buffered paved shoulders) on County Road 4 from Barrie south to Bradford. This is more realistic given the existing road platform width, shoulder width and adjacent drainage ditches and eliminates the need for a transition from on-road (in Barrie) to off-road. It will also likely be less expensive to implement. The Simcoe County draft Trails Master Plan was reviewed again as well as the Bradford West Gwillimbury Trails System Master Plan and have proposed an on-road link that best accommodates this connection between Simcoe County and York Region.
21	29-Apr-14	Letter	The Town of Midland, Planning and Building Services	The staff of Midland has made suggests to the following sections of the updated TMP. The future road requirements, the context sensitive design, transit in the context of evaluating the road for the county as a direct provider of community transit, and the exploration of the Town of Penetanguishene past transit options. The staff generally supports the recommendations made on active transportation and finally the sustainability of the region in terms of public design efficient facilities, the promotion of wellness, and protection of active living activities.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
22	12-May-14	Bike Summit	City of Barrie	1)The City of Barrie proposed a uni-direction on-road bike facility from Yonge Street to County Road 4; however, the County's draft AT network plan identifies an off-road facility on County Road 4. 2) TMP should propose a link to York Region and a proposed trail from Lake Simcoe to Lake Ontario	1) The County is still reviewing an off-road cycling option. 2) The County agrees with the proposed Lake to Lake route.
23	14-May-14	Letter	Simcoe Muskoka District Health Unit	Again, SMDHU is pleased with the idea of complete streets (AT, public transit, context-sensitive road design, roundabouts etc.). SMDHU provides the following feedback: they are unsure about the weighting of the selection criteria of the MAE (should Goods Movement be ranked as the same priority as Environmental Impact especially since AT places such an emphases on healthy design principles?); again, how will the Simcoe Area Multi-Modal Transportation Strategy (MTO) and the TMP (County) align?; SMDHU support the roles identified for the County in the Future of Transit section of IR#2 but they feel the TMP could benefit from a similar role identification for AT plans, SMDHU has offered to be a steward in the promotion and outreach of AT	Comment has been included in the consultation record.

No.	Date	Source	Contact	Comment	Action
24	4-Jun-14	Staff Report	Town of Penetanguishene	The staff is not confident in the results obtained through the MAE analysis for the portion of road on CR#93 between Highway 12 and Balm Beach Road. For example, the MAE does not assign vales for Goods Movement, Connectivity and Active Transportation, which staff believe is not justified. Midland believes the suggestion that the road be considered for improvement post-2031 is overlooking the importance of the intra and inter municipal roadway; the opinion is that the roadway should be qualified for improvements by 2031. In addition, staff say the report undercounts the AADT for the CR#93 corridor in both directions. The Town fully supports the Complete Streets approach; however, they would request that the County look into the storm water management issue identified at the intersection of CR#93 and Hugel Avenue. Suggestions include: formalizing a time frame for the active transportation recommendations, including the Fuller Avenue Bike Lane and the proposed CR#93 Bike Lane between Midland and Penetanguishene in the figures in IR#2, and addressing the status and potentially expanding the County Trails funding program. Again, the Town also requests that the County plays a more direct role in community and inter-community transit. Specifically, the County should include take an active role in the implementation of transit options in the Midland-Penetanguishene area. This could also include formalizing and expanding the transit funding programs governed by the County.	Comment has been included in the consultation record and have been incorporated into the TMP Update where suitable.
25	15-Jul-14	Email	City of Barrie	The following comments should be considered, the Request the population and employment assumed for Midhurst for the existing and future condition. The TMP should assess transportation improvements required if MTO doesn't build the Barrie Bypass in consideration that this improvement is linked to the 427 extension which also hasn't been considered by the Simcoe TMP. Provide existing and future traffic volumes on all transportation linkages with the City of Barrie. Clarify what form of active transportation would be provided on all transportation linkages with the City of Barrie. Request confirmation assumptions for Hwy 26 north of Barrie. CR 27 is proposed to widen from 2 to 4 lanes. At a stakeholder meeting it was stated that Hwy 26 will be widened to 7 lanes north of Barrie.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
26	16-Jul-14	Letter	The Town of Midland	The Town is supportive of the inclusion of County Road 93, between Country Road 25 and Highway 12 and the inclusion of the additional accounts in the MAE to ensure value is assigned to goods movement, connectivity and active transportation.	Comment has been included in the consultation record.
27	29-Jul-14	Email	Town of Collingwood	TMP agrees with the actions currently being undertaken that should unfold in the new couple of years. Review potential alignment of the Collingwood By-pass to shift it slightly to the west.	Comment has been included in the consultation record.
28	8-Aug-14	Email	Town of Penetanguishene	The County should improve Highway 93 in 2031 given that the report has indicated that the highway will be overcapacity in 2013. Furthermore, there is no specific mention of active transportation updates for Highway 93 between the Towns of Penetanguishene and Midland - this project, as identified in the Simcoe County Active Transportation Plan, should be considered a priority. The connectivity and expansion of municipal and County trails should be encouraged through the County Trails Funding program. Finally, the Town has also expressed the desire to see the County play a more direct role in providing public transit.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
29	18-Aug-14	Letter	Simcoe Muskoka District Health Unit	SMDHU would like to express its concern with the number of road widening projects in the short, medium, and long horizons. While road upgrades to improve surface conditions, grading and other factors are understood, it is clear that adding lanes increases mean speed, which is a key factor in both collisions and the severity of collisions, especially considering pedestrians and cyclists. While the movement of goods and people is an important consideration for County roads, SMDHU is interested in the safety of all users of the road network. Integration of AT infrastructure and accompanying safety elements will be important considerations as these road widening projects unfold. SMDHU would like to express their interest in participating on the committee for the furthering of Active Transportation in Simcoe Country. SMDHU would be keen to engage in further work as a stakeholder, consultant, or partner to the County in the installation of roundabouts, trails, AT, transit and preservation of rail corridors.	Comment has been included in the consultation record. All road projects were analyzed using a multiple account evaluation before including them in the TMP report. Sustainability for active transportation was one of the evaluation criterion. Additionally, the impact of road widenings were considered in the development of the active transportation candidate route network.
30	18-Aug-14	Email	Region of Peel	The following comments have been recommended, the movement of car pool lot P6 to County Road 50 at Highway 9. TDM measures where regarding the reduction of automobile use and its associated name, and the associated measure. Finally the active transportation network could consider potential partnerships with Peel for AT outreach and promotion.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.

No.	Date	Source	Contact	Comment	Action
31	21-Aug-14	Email	Town of Innisfil	The Town would like to express the following concerns, to see a 3 meter hard surface pathway from CR4 to Alcona on CR21. The cost estimate along with the local transportation funding issues. Finally the suggestion that commuters have difficulty parking at lots at Highway 89 and 400.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
32	20-Aug-14	Email	Town of Bradford West Gwillimbury	The Town has would like to express the following concerns: Executive summary, Page x, add in the list of projects, 2011 Development Charges Update Transportation / Roadway Network Assessment 2011 to 2031, March 2012. On page xi, five County Roads are identified for detailed traffic operations. The list does not include County Road 4 (Yonge Street) within Bradford. Please include this corridor in detailed analysis. Executive Summary, Table ES-2 (medium term), identified Line 5 (Hwy. 400 to SR10) for widening to four lanes. Please recheck the project limit as it should be Line 5 from Hwy. 400 to CR27. This section of road (west of Hwy. 400) falls under the County of Simcoe jurisdiction and will have v/c ratio of greater than 1 in west bound direction in AM by 2031 as per Town's overall network Study conducted as part of 2011 road network assessment. Note that section of Line 5 from Hwy. 400 to SR10 falls under the Town's jurisdiction and is planned for widening to four lanes in 2016 once Line 5 and Hwy. 400 interchange is constructed in 2016. So easterly section of Line 5 should be moved under table ES-1 (short term) and update table 5.3.3-1, page 141 accordingly. Executive Summary, Table ES-3 (long term), Not sure what are the recommendations of SR10 from Line 5 to CR21, 4 versus 2 lanes? Please elaborate. Note that SR10 from Line 5 to CR88 falls currently under the jurisdiction of Town of Bradford and is planned for widening to 4 lanes in 2016. Please move SR10 section up to CR88 under short term table ES-1. Also update table 5.3.3-2 on page 142 accordingly as portion of the Side Road 10 is planned for widening in near term. Note "10 Sideroad" is called as "Sideroad 10" within BWG area as per Official Plan. Please update the name accordingly. As per Town's Transportation / Network Assessment, 2011, section of CR 88 from Hwy. 400 to CR27 will have v/c ratio of 0.92 by 2021 and v/c of 1.03 by 2031. Thus County should consider improvements to this section of CR88 before 2031 versus post 2031. Suggest to move this project under table 5.3.3-1. Suggest table 5.3.3-1 be further divided to identify projects need for improvements within 5 years (approx. 2021) versus 15 years (approx. 2031) to assist BWG and other municipalities on when (which planning horizon year) to code these improvements in their transportation models. Page 150, figure 5.5-1, provide additional details on horizon years for improvements to various corridors such as 2021, 2026 or 2031? Page 152, table 6.1-1, For primary arterial road, centre left turn lane warrant/consideration is based on minimum 25 entrances per kilometer, suggest revisiting this criteria to include locations where there are cluster of homes together such as 10-15 entrances very close to each other, it will be preferred to have centre turn lane for safe ingress and egress without impeding the through traffic.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.

No.	Date	Source	Contact	Comment	Action
32	20-Aug-14	Email	Town of Bradford West Gwillimbury	Page 166, Section 6.5.1, Identified cycling/active transportation facilities for rural cross-section element, suggest to expand the list to include pedestrian facilities as well. This will promote / encourage area residents for walking and promote healthy environment. Pedestrian facilities has been identified as one of the elements for urban cross-section. Page 171, Table 6.5.5-1 to table 6.5.5-5, under step 4, rural topology, 2.0m paved shoulder is being recommended as cycling facility for these corridors. Suggest to review this consideration as it brings cyclists very close to traffic specifically as these are heavy goods movement corridors as well. It is recommended a separate cycling facility be provided for safety purposes as well make pedestrian/cyclist safer when using these corridors for recreation or other purposes as part of promoting active transportation in the County. Page 211, Section 8.5 recommends more collaboration between County and Metrolinx, so as mentioned in the beginning it will be prudent for County to include two way GO Service to Bradford and north as one of their action items with the Metrolinx. Note Metrolinx long term plan include two way GO service up to Green Lane GO Station, just south of Bradford West Gwillimbury. Page 212, Figure 8.6-1, the long term plan should include east/west Regional / GO service along Highway 400 as well as along County Road 88 from Bond Head to Hwy. 400 carpool lot to Downtown Bradford GO Station. The Regional transit service can be further extended further west to connect to Town of New Tecumseth proposed GO station. Page 225, Figure 9.2.6-2, Within Bradford, Line 5 and Side Road 10 as shown as proposed on-Road route for active transportation system. Also Town's Trail Master Plan (2010) has identified the need for cycling corridor along these routes. Given the nature of corridor (high traffic volume with goods movements) along with high speed (design 90km/hr. and posted 80-70km/hr.), Town is constructing 2.5m wide multi-use path in boulevard to facilitate two way cyclists movement in safe manner while maintaining separation between cyclist and fast/heavy moving traffic. Suggest to update the plan accordingly to reflect off-road cycling facilities for all major corridors specifically Line 5 and SR10. Even a single life saved with these measures will pay off the cost of these improvements. Recent fatal cyclist accident on Innisfil Beach Road is a prime example. Note, even the shoulders are for pull over of vehicles during emergency and are not a designated cycling facility. Page 263, Update figure 13.3.3.-1 and tables 16.2-1 to table 16.2.-3 as per above comments. Identify approx. horizon years for completion of these projects under short term (2016?), medium term (2021?) and long term (2031?).	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.

No.	Date	Source	Contact	Comment	Action
33	25-Aug-14	Letter - Road Comments	Ministry of Transportation	Consult with the Ministry on future provincial highway improvement program to identify its impacts on County network. Table ES-1: Any proposed county road improvements that intersect provincial highways should be circulated to MTO for review and approvals (Encroachment permits required). CR4 and CR21 are not listed as they are subject to EA approval (see Table 5-2-1). Simcoe County is reminded that MTO approvals are required where CR21 crosses Highway 400 and CR4 crosses the Bradford By-Pass. Page xxi: For update to Development Charges By-Law, Simcoe County needs to ensure that they are collecting for any county road crossings of Highway 400 where additional capacity on the county road is anticipated in order to help fund any future bridge replacements (e.g.. CR21 / Innisfil Beach Rd.) Fig. 5.3.2-1: …Future Provincial Highway; only the Bradford By-Pass has Provincial EA approval. Why is alignment shown to turn south when in York Region? Table 5.3.5-1: CR21 said to be 'congested despite improvement'. Does this include the section through the Highway 400 interchange? CR88 is also said to be congested but it's not clear if this also includes the section through the Highway 400 interchange. Page 146: CR21 again said to be expected to remain congested; this remains a concern, as MTO is not aware that Simcoe County has submitted any detailed analysis on the CR21 EA through the Highway 400 interchange. Page 146: mention of need for improved access to and across Highway 400 be considered with MTO, in particular planned Line 5 interchange. Is the new Line 5 interchange considered the solution to this issue, or is the County suggesting an additional interchange is needed north of CR88? Sec. 5.3.6 / Provincial Highway Assumptions: MTO believes that this may be a new section, not previously shared with MTO, as it reflects the 2008 TMP that was never circulated to or endorsed by MTO. Most of these assumed new highways do not have EA approval. Page 148: CR21 widening from CR27 to CR39 said to be EA approved, however as noted above, MTO is not aware of it being circulated to MTO for review in relation to Highway 400 impacts. Sec. 6: Sensitive Road Design/Complete Streets/Bike Facilities on County roads that cross/intersect provincial highways should be submitted to MTO for Highway Engineering and Traffic to review.Sec. 9 / Active Transportation: note that trail crossings of highways will require MTO permit approvals, while routes/trails within/along MTO ROW are typically not permitted.Fig. 13.3.3-1: please check location of Bradford By-Pass shown (should be between 8th and 9th Line).Are there specific traffic items in the TMP Update that the County wishes to discuss with MTO?	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
33	25-Aug-14	Letter - Active Transportation Comments	Ministry of Transportation	The TMP could include a reference to the province's Transit Supportive Guidelines. The Trails Connecting Communities program is referenced. More detail could be given on the program and how interested parties can use it to access project funding. Explain which County departments will be responsible for cycling planning, as well as how the County will fit into the AT steering committee, which the TMP recommends establishing. Elaborate on how the barriers and challenges informed the network concept, and if there were any particularly challenging areas of the county to incorporate AT infrastructure in. Many municipalities identify AT related goals as part of their AT planning process, often aiming for higher cycling mode shares, infrastructure related goals, and safety related goals. It is worth considering doing the same for future cycling planning in Simcoe County. As part of the evaluation of progress of AT plan implementation, many municipalities establish performance indicators, often related to their AT goals. These often include plans for new methods of data collection on cycling. This could be considered in future cycling planning in Simcoe County. As part of their cycling planning process, many jurisdictions consider the "5 E's" of cycling planning: Engineering, Education, Encouragement, Enforcement, and Evaluation. Recommendations are made for AT outreach in the TMP. The plan mentions existing outreach efforts from the county and district health unit. More detail on existing AT outreach efforts, as well as any education or enforcement efforts, could be given.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.
33	25-Aug-14	Letter - Goods Movement Comments	Ministry of Transportation	Commercial and retail development in urban areas should consider the unique parking demands related to delivery for goods and courier services Road designs that accommodate commercial vehicles (e.g., roundabouts: Widened entry and exit lanes, Truck aprons, Bypass lanes, Gates for pass through traffic). Any changes to grade crossings on the BCRY line should be in compliance with the federal grade crossing regulation. Designate and preserve land uses adjacent to or in the vicinity of major highway interchanges, air, marine and rail yards to be compatible with and supportive of the primary goods movement function.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.

No.	Date	Source	Contact	Comment	Action
33	25-Aug-14	Letter - Transit Comments	Ministry of Transportation	Developing a process for integrating transit planning and growth planning at the local level in Simcoe County to ensure that new developments will have enough persons and jobs density to support a sufficient level of transit service that encourages ridership and can lead to a more cost-effective service provision. The Transit-supportive Guidelines recommends density thresholds required for different levels of transit service on page 24. The Master Plan identifies the high costs of transit service as a barrier to providing transit in Simcoe County. Often, the financial performance of transit routes is related to distances along a transit route where there is undeveloped land. In managing growth in the identified community transit nodes, transit-supportive policies that ensure new housing or commercial developments are built adjacent to existing communities could help municipalities to extend transit service cost-effectively as communities develop. Convenient and safe multi-modal access to transit stops and stations are critical to the success of transit service. The Plan's Section 6.5 provides for the development and design of complete streets which is consistent with transit-supportive land-use. The polices related to complete streets development could be incorporated or referenced in Section 8 on transit development, ensuring that complete streets are aligned with transit routes, providing safe and comfortable cycling and walking access to transit. Or Section 6.5 could incorporate transit service and access into the design guidelines for complete streets. Similarly, transit-supportive policies need to focus on the street network. A walkable street network that links destinations and transit relies on a fine-grained pattern of streets and blocks. The Plan's recommendations for transit-supportive policies could include developing a measure for street intersection density that would enable new developments to maximize connectivity. See Transit-Supportive Guidelines, 2.1.1, p. 40. Transportation access in rural areas is raised as an issue in the Master Plan and cites examples of existing coordinated door-to-door, demand responsive service provided by community agencies in the County. To better respond to rural needs, the Plan's approach to a transit strategy for the County could be strengthened by including additional recommendations and actions for more coordinated services and agency collaboration.	Comment has been included in the consultation record. Comments have been incorporated into the TMP update where suitable.