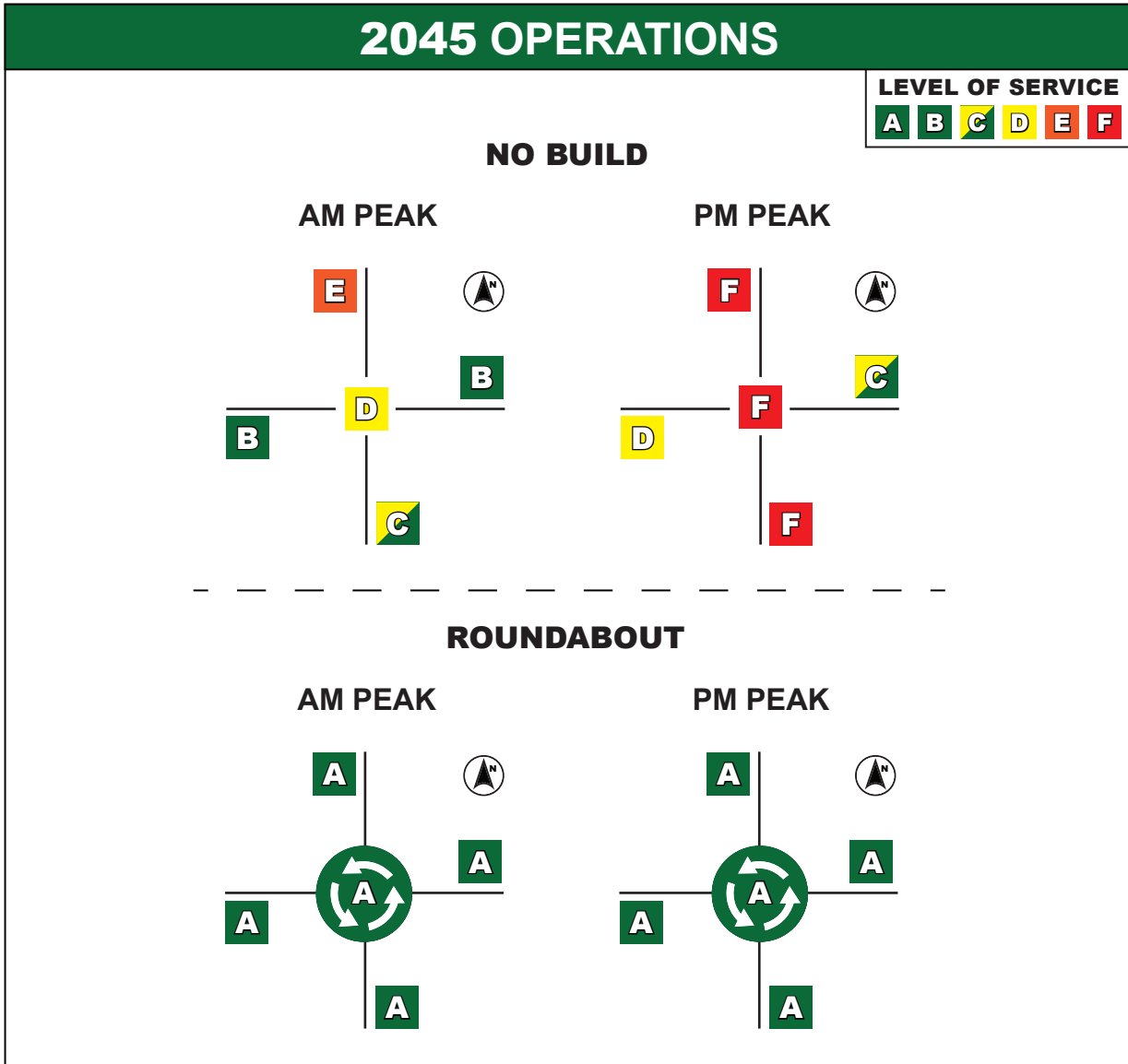


2015-2019 CRASH DATA

CRASHES	INJURIES			
	FATALITIES	TYPE A	TYPE B	TYPE C
9 ANGLE	0	0	0	8
1 HEAD-ON				

2045 OPERATIONS



Opinion of probable cost for single-lane roundabout

\$1.15 MILLION

E. Coutant Road and Elms Road

The intersection of Coutant Road and Elms Road was included in the early preliminary engineering phase with support from the community due to intersection operations and safety concerns. This intersection is included in the 153 intersections that passed the skim analysis for experiencing crashes correctable by a roundabout and is a secondary analysis Tier Three intersection.

During the skim analysis, it was observed that there were nine angle crashes and one head on left turn crash over the 5-year period. These crashes resulted in zero fatalities, zero type A injuries, zero type B injuries, and eight type C injuries at the intersection.

Future No-Build Conditions

The intersection of Coutant Road and Elms Road is an all-way stop control intersection. Stop signs and overhead flashing beacons are present for all approaches. Coutant Road runs east/west and is a two-lane roadway with one lane in each direction. Elms Road runs north/south and is a two-lane road with one lane in each direction. A short (approximately 70-foot) right-turn lane exists on the eastbound Coutant Road approach. There is a church in the southeast quadrant. There are residences in the other quadrants. An aerial of the existing intersection can be seen in Figure 6.

Figure 6: Aerial view of Coutant Road and Elms Road



An operational analysis of the no-build condition was completed for the intersection using the 2045 forecast traffic volumes. The results of the analysis for future no-build conditions reveals that all approaches operate at LOS C or better in the AM peak hour with the exception of southbound Elms Road (LOS E). In the PM peak hour, the Elms Road approaches operate at LOS F, eastbound Coutant Road is LOS D, and westbound Coutant Road is LOS C.

The 95th percentile queue lengths were reviewed at the intersection and results showed that the approaches experienced a maximum queue length of 178 feet (8 vehicles) during the AM peak hour and 573 feet (23 vehicles) during the PM peak hour.

The operational results for future no-build conditions are presented in Table 14.

Table 14: Operational Analysis for 2045 No-Build Conditions

Intersection	Approach	AM Peak		PM Peak	
		Delay/LOS	Queue (veh)*	Delay/LOS	Queue (veh)*
Coutant Street and Elms Road	Eastbound	14.8/B	3 (74 ft)	26.6/D	5 (110 ft)
	Westbound	12.6/B	3 (54 ft)	24.8/C	4 (83 ft)
	Northbound	21.9/C	4 (94 ft)	225.1/F	23 (573 ft)
	Southbound	39.5/E	8 (178 ft)	74.3/F	11 (267 ft)
	Overall	26.5/D		107.3/F	

* 95th percentile queue length

Roundabout Conditions

A compact single-lane roundabout with an inscribed circle diameter of 100 feet would improve traffic operations and safety at this intersection. This design would have a fully mountable central island to facilitate truck movements with the smaller diameter. Compact roundabouts have been implemented over the past 5 years at several similar locations in Washtenaw County, Michigan, with positive results. It is likely that a small amount of permanent right-of-way acquisition would be needed in the northwest, southeast, and northeast quadrants of the intersection. A concept design exhibit for this intersection can be found at the end of this section. If desired later in the design process, a standard single-lane roundabout with diameter of 130 feet or greater could be considered at this location. A larger roundabout could result in greater right-of-way impacts and cost.

An operational analysis of the roundabout (build) condition was completed for the intersection using Rodel software and the 2045 forecast traffic volumes. The results of the analysis for roundabout (build) conditions reveal that all approaches and movements at the intersection operate at LOS A during the AM and PM peak hours.

The 95th percentile queue lengths were reviewed, and results showed that all approaches would experience a maximum queue length of 3.7 vehicles during the AM peak hour and PM peak hour for the compact single-lane roundabout design.

The operational results for future roundabout (build) conditions are presented in Table 15.

Table 15: Operational Analysis for 2045 with Roundabout

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay/LOS	Queue (veh)*	Delay/LOS	Queue (veh)*
Coutant Street and Elms Road	Eastbound	5.2/A	0.5	5.2/A	1.4
	Westbound	3.9/A	0.3	5.2/A	0.7
	Northbound	4.7/A	1.3	6.9/A	3.7
	Southbound	5.0/A	1.8	5.0/A	1.8
	Overall	4.9/A		5.8/A	

* 95th percentile queue length

An opinion of probable cost was developed for the compact single-lane roundabout. The probable cost is \$1.15 million in year 2025 dollars. This cost includes a 20 percent contingency and 3 percent annual inflation. A full breakdown along with all assumptions can be found in Appendix 3.

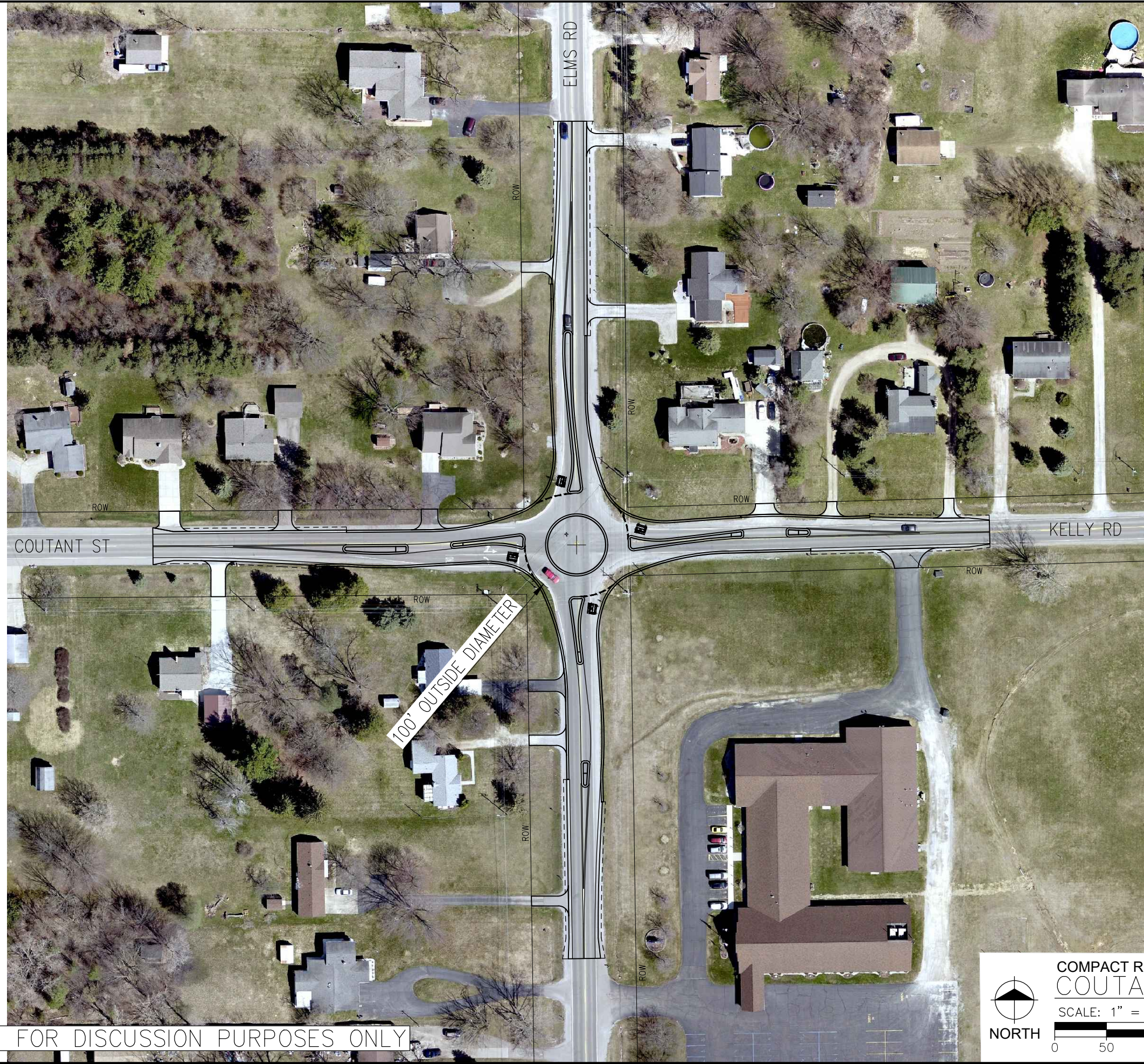
Potential funding sources for this improvement could include regular road improvement funding, safety funds, CMAQ, or an earmark. A TOR was computed with a result of 21.02.

Recommendation

A roundabout appears feasible at this location, assuming GCRC can acquire the limited right-of-way that may be needed.

PLOT INFO: Z:\2020\201202\CAD\PRECED\COUTANT AND ELMS.DWG LAYOUT: FIGURE 1 DATE: 6/2/2021 TIME: 8:36:04 PM USER: AJLEPPEK

CONCEPT PLAN – FOR DISCUSSION PURPOSES ONLY



NORTH

COMPACT ROUNDABOUT
COUTANT AND ELMS

SCALE: 1" = 100'



Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

6/2/2021

PROJECT NO.

FIGURE NO.

29

Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Coutant Rd Eastbound						Coutant Rd Westbound						Elms Rd Northbound						Elms Rd Southbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-03-09 7:00AM	0	18	16	0	34	0	2	3	0	0	5	0	10	21	2	0	33	0	0	45	4	0	49	0	121
7:15AM	6	27	12	0	45	0	5	7	2	0	14	0	11	23	1	0	35	0	2	44	1	0	47	0	141
7:30AM	14	31	19	0	64	0	1	8	6	0	15	0	11	57	1	0	69	0	4	74	6	0	84	0	232
7:45AM	11	25	26	0	62	0	4	10	0	0	14	0	13	59	1	0	73	0	5	86	9	0	100	0	249
Hourly Total	31	101	73	0	205	0	12	28	8	0	48	0	45	160	5	0	210	0	11	249	20	0	280	0	743
8:00AM	3	21	19	0	43	0	3	12	1	0	16	0	12	30	5	0	47	0	3	71	3	0	77	0	183
8:15AM	5	24	9	0	38	0	2	12	2	0	16	0	7	41	1	0	49	0	0	56	8	0	64	0	167
8:30AM	2	27	16	0	45	0	3	20	3	0	26	0	16	35	5	0	56	0	4	59	9	0	72	0	199
8:45AM	14	28	32	0	74	0	2	22	2	0	26	0	26	41	4	0	71	0	3	84	17	0	104	0	275
Hourly Total	24	100	76	0	200	0	10	66	8	0	84	0	61	147	15	0	223	0	10	270	37	0	317	0	824
4:00PM	19	31	51	0	101	0	5	22	2	0	29	0	16	100	6	0	122	0	6	66	8	0	80	0	332
4:15PM	12	13	23	0	48	0	6	19	1	0	26	0	13	102	3	0	118	0	1	76	10	0	87	0	279
4:30PM	9	17	17	0	43	0	3	16	7	0	26	0	11	94	3	0	108	0	1	67	8	0	76	0	253
4:45PM	8	8	19	0	35	0	9	23	8	0	40	0	18	88	3	0	109	0	1	61	4	0	66	0	250
Hourly Total	48	69	110	0	227	0	23	80	18	0	121	0	58	384	15	0	457	0	9	270	30	0	309	0	1114
5:00PM	4	11	20	0	35	0	3	15	2	0	20	0	20	101	1	0	122	0	1	48	3	0	52	0	229
5:15PM	4	16	21	0	41	0	10	17	8	0	35	0	19	86	0	0	105	0	3	51	7	0	61	0	242
5:30PM	4	5	17	0	26	0	4	14	5	0	23	0	19	85	4	0	108	0	3	46	9	0	58	0	215
5:45PM	6	13	12	0	31	0	3	20	5	0	28	0	14	98	6	0	118	0	4	37	8	0	49	0	226
Hourly Total	18	45	70	0	133	0	20	66	20	0	106	0	72	370	11	0	453	0	11	182	27	0	220	0	912
Total	121	315	329	0	765	0	65	240	54	0	359	0	236	1061	46	0	1343	0	41	971	114	0	1126	0	3593
% Approach	15.8%	41.2%	43.0%	0%	-	-	18.1%	66.9%	15.0%	0%	-	-	17.6%	79.0%	3.4%	0%	-	-	3.6%	86.2%	10.1%	0%	-	-	-
% Total	3.4%	8.8%	9.2%	0%	21.3%	-	1.8%	6.7%	1.5%	0%	10.0%	-	6.6%	29.5%	1.3%	0%	37.4%	-	1.1%	27.0%	3.2%	0%	31.3%	-	-
Lights	118	312	323	0	753	-	65	234	53	0	352	-	231	1047	46	0	1324	-	39	957	109	0	1105	-	3534
% Lights	97.5%	99.0%	98.2%	0%	98.4%	-	100%	97.5%	98.1%	0%	98.1%	-	97.9%	98.7%	100%	0%	98.6%	-	95.1%	98.6%	95.6%	0%	98.1%	-	98.4%
Single-Unit Trucks	0	2	1	0	3	-	0	1	0	0	1	-	3	6	0	0	9	-	1	5	2	0	8	-	21
% Single-Unit Trucks	0%	0.6%	0.3%	0%	0.4%	-	0%	0.4%	0%	0%	0.3%	-	1.3%	0.6%	0%	0%	0.7%	-	2.4%	0.5%	1.8%	0%	0.7%	-	0.6%
Articulated Trucks	1	0	0	0	1	-	0	0	0	0	0	-	1	1	0	0	2	-	0	3	1	0	4	-	7
% Articulated Trucks	0.8%	0%	0%	0%	0.1%	-	0%	0%	0%	0%	0%	-	0.4%	0.1%	0%	0%	0.1%	-	0%	0.3%	0.9%	0%	0.4%	-	0.2%
Buses	2	1	5	0	8	-	0	4	1	0	5	-	1	7	0	0	8	-	1	5	2	0	8	-	29
% Buses	1.7%	0.3%	1.5%	0%	1.0%	-	0%	1.7%	1.9%	0%	1.4%	-	0.4%	0.7%	0%	0%	0.6%	-	2.4%	0.5%	1.8%	0%	0.7%	-	0.8%
Bicycles on Road	0	0	0	0	0	-	0	1	0	0	1	-	0	0	0	0	0	-	0	1	0	0	1	-	2
% Bicycles on Road	0%	0%	0%	0%	0%	-	0%	0.4%	0%	0%	0.3%	-	0%	0%	0%	0%	0%	-	0%	0.1%	0%	0%	0.1%	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

Full Length (7 AM-9 AM, 4 PM-6 PM)

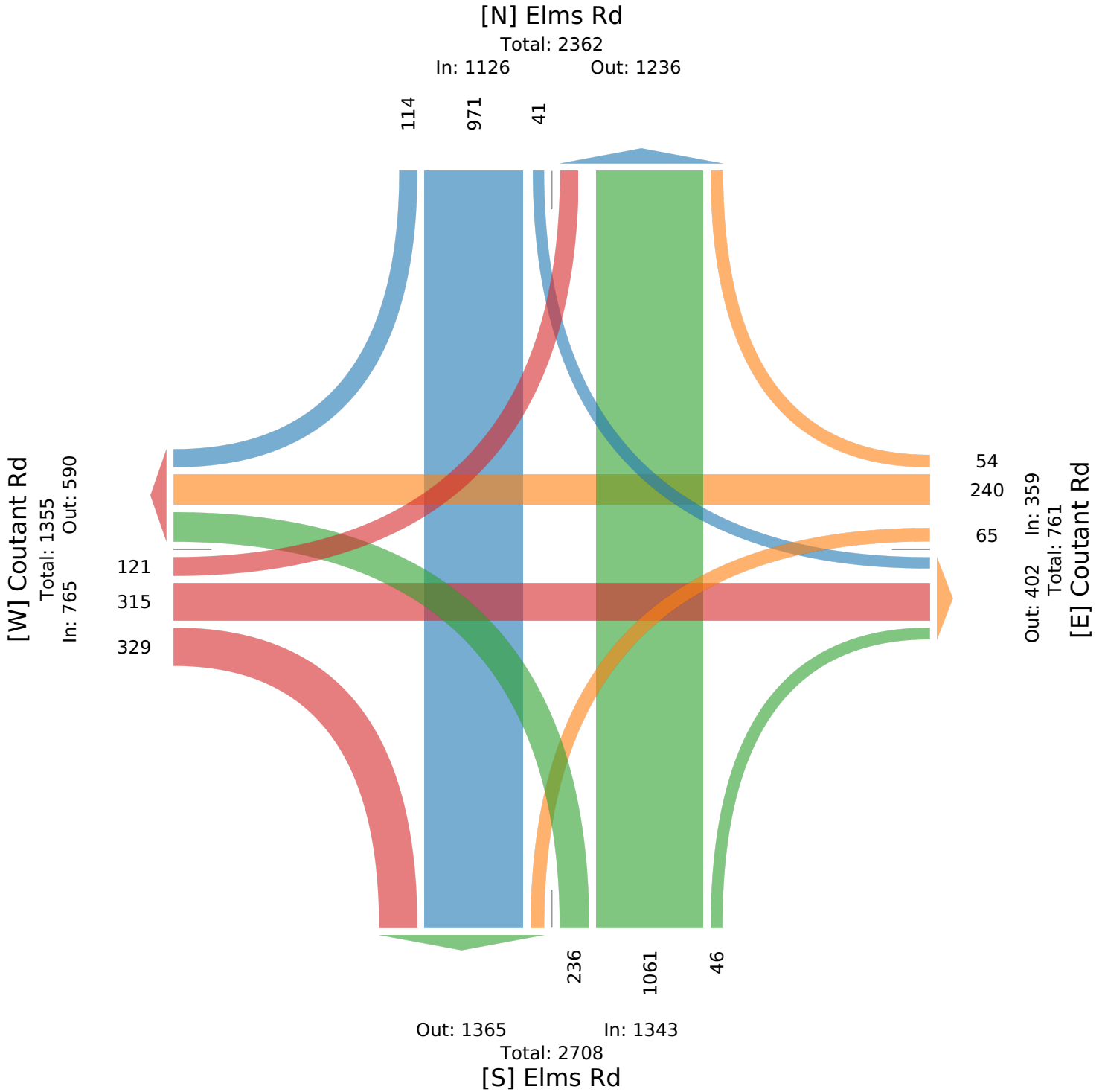
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

AM Peak (7:30 AM - 8:30 AM)

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Coutant Rd Eastbound						Coutant Rd Westbound						Elms Rd Northbound						Elms Rd Southbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-03-09 7:30AM	14	31	19	0	64	0	1	8	6	0	15	0	11	57	1	0	69	0	4	74	6	0	84	0	232
7:45AM	11	25	26	0	62	0	4	10	0	0	14	0	13	59	1	0	73	0	5	86	9	0	100	0	249
8:00AM	3	21	19	0	43	0	3	12	1	0	16	0	12	30	5	0	47	0	3	71	3	0	77	0	183
8:15AM	5	24	9	0	38	0	2	12	2	0	16	0	7	41	1	0	49	0	0	56	8	0	64	0	167
Total	33	101	73	0	207	0	10	42	9	0	61	0	43	187	8	0	238	0	12	287	26	0	325	0	831
% Approach	15.9%	48.8%	35.3%	0%	-	-	16.4%	68.9%	14.8%	0%	-	-	18.1%	78.6%	3.4%	0%	-	-	3.7%	88.3%	8.0%	0%	-	-	-
% Total	4.0%	12.2%	8.8%	0%	24.9%	-	1.2%	5.1%	1.1%	0%	7.3%	-	5.2%	22.5%	1.0%	0%	28.6%	-	1.4%	34.5%	3.1%	0%	39.1%	-	-
PHF	0.589	0.815	0.702	-	0.809	-	0.625	0.875	0.375	-	0.953	-	0.827	0.792	0.400	-	0.815	-	0.600	0.834	0.722	-	0.813	-	0.834
Lights	32	100	68	0	200	-	10	41	8	0	59	-	41	181	8	0	230	-	11	279	24	0	314	-	803
% Lights	97.0%	99.0%	93.2%	0%	96.6%	-	100%	97.6%	88.9%	0%	96.7%	-	95.3%	96.8%	100%	0%	96.6%	-	91.7%	97.2%	92.3%	0%	96.6%	-	96.6%
Single-Unit Trucks	0	0	1	0	1	-	0	0	0	0	0	-	1	3	0	0	4	-	0	3	1	0	4	-	9
% Single-Unit Trucks	0%	0%	1.4%	0%	0.5%	-	0%	0%	0%	0%	0%	-	2.3%	1.6%	0%	0%	1.7%	-	0%	1.0%	3.8%	0%	1.2%	-	1.1%
Articulated Trucks	1	0	0	0	1	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	1
% Articulated Trucks	3.0%	0%	0%	0%	0.5%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0.1%
Buses	0	1	4	0	5	-	0	1	1	0	2	-	1	3	0	0	4	-	1	5	1	0	7	-	18
% Buses	0%	1.0%	5.5%	0%	2.4%	-	0%	2.4%	11.1%	0%	3.3%	-	2.3%	1.6%	0%	0%	1.7%	-	8.3%	1.7%	3.8%	0%	2.2%	-	2.2%
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

AM Peak (7:30 AM - 8:30 AM)

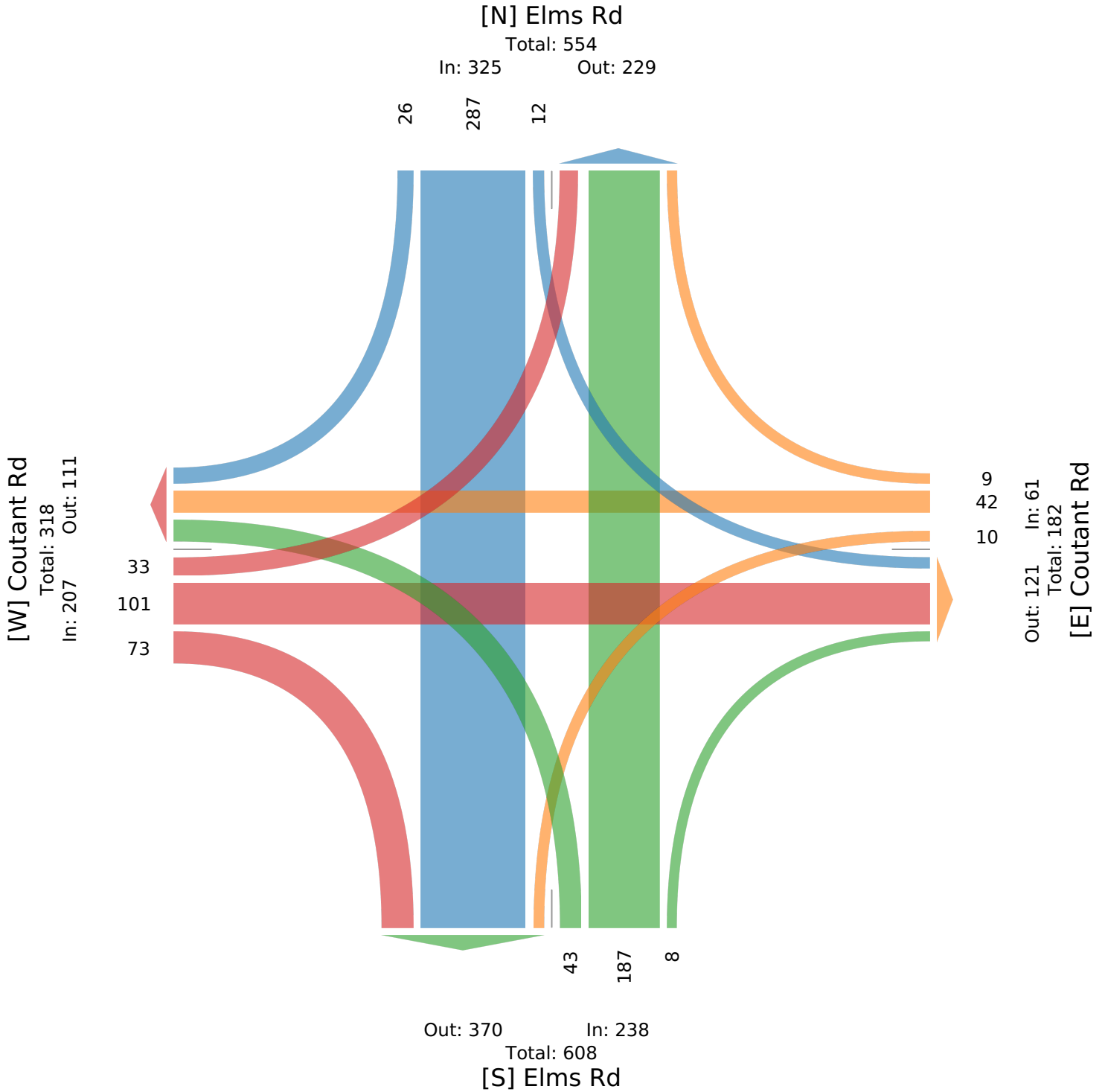
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

PM Peak (4 PM - 5 PM) - Overall Peak Hour

All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	Coutant Rd Eastbound						Coutant Rd Westbound						Elms Rd Northbound						Elms Rd Southbound						Int
	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	
2021-03-09 4:00PM	19	31	51	0	101	0	5	22	2	0	29	0	16	100	6	0	122	0	6	66	8	0	80	0	332
4:15PM	12	13	23	0	48	0	6	19	1	0	26	0	13	102	3	0	118	0	1	76	10	0	87	0	279
4:30PM	9	17	17	0	43	0	3	16	7	0	26	0	11	94	3	0	108	0	1	67	8	0	76	0	253
4:45PM	8	8	19	0	35	0	9	23	8	0	40	0	18	88	3	0	109	0	1	61	4	0	66	0	250
Total	48	69	110	0	227	0	23	80	18	0	121	0	58	384	15	0	457	0	9	270	30	0	309	0	1114
% Approach	21.1%	30.4%	48.5%	0%	-	-	19.0%	66.1%	14.9%	0%	-	-	12.7%	84.0%	3.3%	0%	-	-	2.9%	87.4%	9.7%	0%	-	-	-
% Total	4.3%	6.2%	9.9%	0%	20.4%	-	2.1%	7.2%	1.6%	0%	10.9%	-	5.2%	34.5%	1.3%	0%	41.0%	-	0.8%	24.2%	2.7%	0%	27.7%	-	-
PHF	0.632	0.556	0.539	-	0.562	-	0.639	0.870	0.563	-	0.756	-	0.806	0.941	0.625	-	0.936	-	0.375	0.888	0.750	-	0.888	-	0.839
Lights	47	68	109	0	224	-	23	78	18	0	119	-	58	381	15	0	454	-	8	269	30	0	307	-	1104
% Lights	97.9%	98.6%	99.1%	0%	98.7%	-	100%	97.5%	100%	0%	98.3%	-	100%	99.2%	100%	0%	99.3%	-	88.9%	99.6%	100%	0%	99.4%	-	99.1%
Single-Unit Trucks	0	1	0	0	1	-	0	0	0	0	0	-	0	2	0	0	2	-	1	0	0	0	1	-	4
% Single-Unit Trucks	0%	1.4%	0%	0%	0.4%	-	0%	0%	0%	0%	0%	-	0%	0.5%	0%	0%	0.4%	-	11.1%	0%	0%	0%	0.3%	-	0.4%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	1	-	1
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0.4%	0%	0%	0.3%	-	0.1%
Buses	1	0	1	0	2	-	0	2	0	0	2	-	0	1	0	0	1	-	0	0	0	0	0	-	5
% Buses	2.1%	0%	0.9%	0%	0.9%	-	0%	2.5%	0%	0%	1.7%	-	0%	0.3%	0%	0%	0.2%	-	0%	0%	0%	0%	0%	-	0.4%
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Bicycles on Road	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Coutant Street & Elms Road - TMC

Tue Mar 9, 2021

PM Peak (4 PM - 5 PM) - Overall Peak Hour

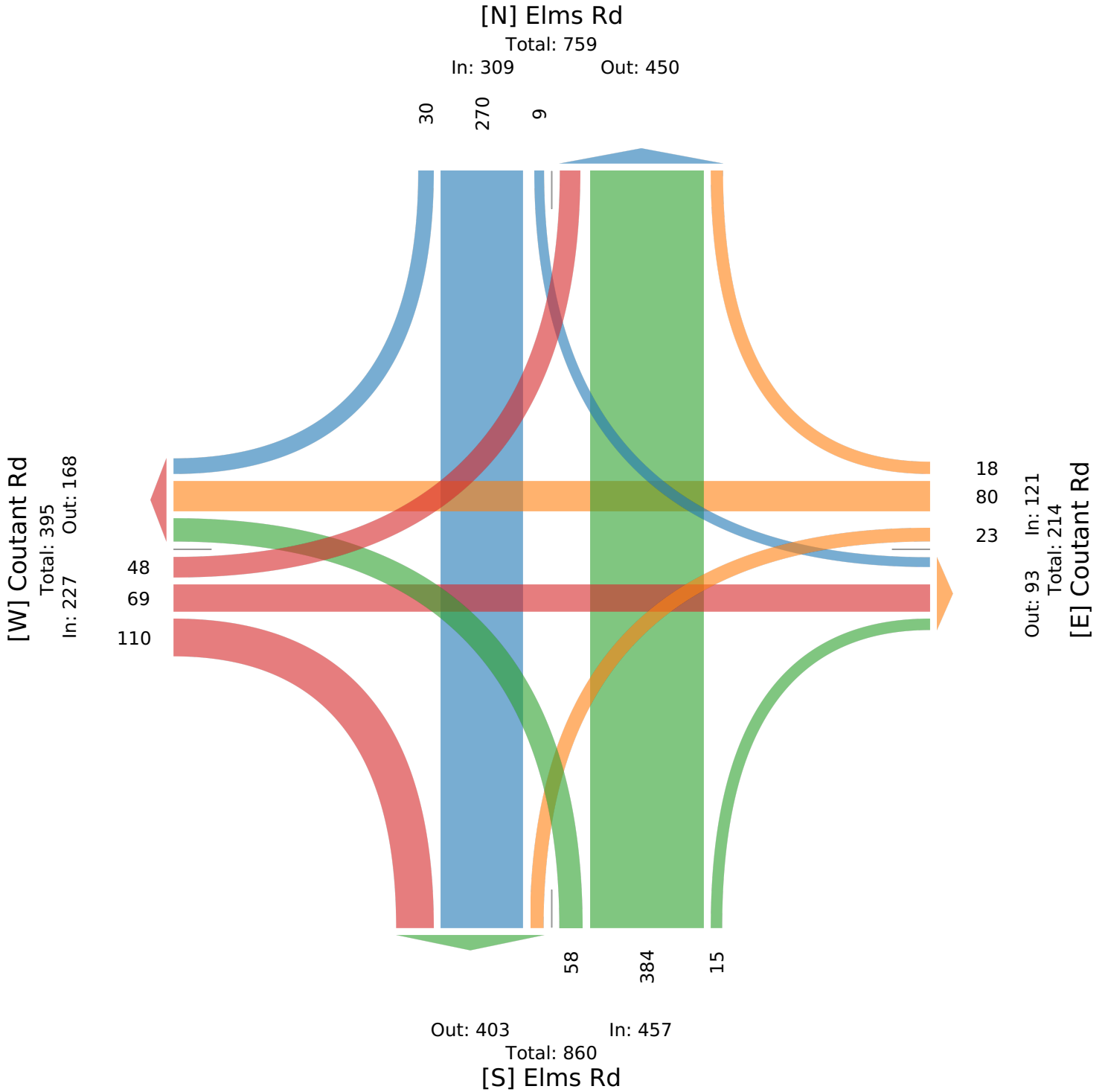
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)

All Movements

ID: 817407, Location: 43.067368, -83.813279



Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



Intersection	
Intersection Delay, s/veh	26.5
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔			↔			↔	
Traffic Vol, veh/h	43	131	95	13	55	12	56	243	10	16	373	34
Future Vol, veh/h	43	131	95	13	55	12	56	243	10	16	373	34
Peak Hour Factor	0.81	0.81	0.81	0.95	0.95	0.95	0.82	0.82	0.82	0.81	0.81	0.81
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	53	162	117	14	58	13	68	296	12	20	460	42
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	14.8	12.6	21.9	39.5
HCM LOS	B	B	C	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	18%	25%	0%	16%	4%
Vol Thru, %	79%	75%	0%	69%	88%
Vol Right, %	3%	0%	100%	15%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	309	174	95	80	423
LT Vol	56	43	0	13	16
Through Vol	243	131	0	55	373
RT Vol	10	0	95	12	34
Lane Flow Rate	377	215	117	84	522
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.674	0.454	0.22	0.182	0.887
Departure Headway (Hd)	6.439	7.605	6.758	7.773	6.115
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	561	473	530	459	590
Service Time	4.498	5.366	4.519	5.863	4.167
HCM Lane V/C Ratio	0.672	0.455	0.221	0.183	0.885
HCM Control Delay	21.9	16.6	11.4	12.6	39.5
HCM Lane LOS	C	C	B	B	E
HCM 95th-tile Q	5.1	2.3	0.8	0.7	10.4

Intersection: 9007: Coutant St & Elms Rd

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	86	83	67	124	221
Average Queue (ft)	48	38	33	54	90
95th Queue (ft)	74	64	54	94	178
Link Distance (ft)	601		591	575	593
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		75			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Network Summary

Network wide Queuing Penalty: 1

Intersection	
Intersection Delay, s/veh	107.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕			↕			↕	
Traffic Vol, veh/h	62	90	143	30	104	23	75	499	20	12	351	39
Future Vol, veh/h	62	90	143	30	104	23	75	499	20	12	351	39
Peak Hour Factor	0.56	0.56	0.56	0.76	0.76	0.76	0.94	0.94	0.94	0.89	0.89	0.89
Heavy Vehicles, %	1	1	1	2	2	2	1	1	1	1	1	1
Mvmt Flow	111	161	255	39	137	30	80	531	21	13	394	44
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	26.6	24.8	225.1	74.3
HCM LOS	D	C	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	13%	41%	0%	19%	3%
Vol Thru, %	84%	59%	0%	66%	87%
Vol Right, %	3%	0%	100%	15%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	594	152	143	157	402
LT Vol	75	62	0	30	12
Through Vol	499	90	0	104	351
RT Vol	20	0	143	23	39
Lane Flow Rate	632	271	255	207	452
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.421	0.669	0.565	0.529	0.996
Departure Headway (Hd)	8.097	9.859	8.913	10.565	8.935
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	449	369	409	343	411
Service Time	6.192	7.559	6.613	8.565	6.935
HCM Lane V/C Ratio	1.408	0.734	0.623	0.603	1.1
HCM Control Delay	225.1	30.4	22.6	24.8	74.3
HCM Lane LOS	F	D	C	C	F
HCM 95th-tile Q	30.7	4.6	3.4	2.9	12.2

Intersection: 9007: Coutant St & Elms Rd

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	150	94	99	559	363
Average Queue (ft)	52	46	48	256	118
95th Queue (ft)	110	85	83	573	267
Link Distance (ft)	601		591	575	593
Upstream Blk Time (%)				8	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)		75			
Storage Blk Time (%)	3	2			
Queuing Penalty (veh)	8	6			

Network Summary

Network wide Queuing Penalty: 14

Coutant & Elms AM Peak

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File View Help

Project: Coutant & Elms Date: 12-May-2021 Model: Rodel 2017 Timeslice: 7.5 Full Geometry: Full Geometry Peak: AM Feet: RHD

Name: Mini Roundabout Flows: 2045 Delay: Queuing Results: Veh Peak60/15m Synthetic Flow Profile: Conf: 50 Light: 30

Approach Geometry						Entry Geometry						Circ Geom			Exit Geometry				Entry Capacity Mods	
Leg Name	Bearing	G	V	n		E	n	L'	R	Φ	D	C	n	Ex	n	Vx	n	-> Cap (v/h)	Xwalk Fact	
1 SB Elms	Y	0	0	12.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	12.00	1	0	1.000	
2 EB Coutant	Y	90	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	
3 NB Elms	Y	180	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	
4 WB Coutant	Y	270	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	

Volume Modifiers			Turning Volumes (veh/hr)						Arrival Volume Ratios			Arrival Volume Times (min)			PHF
Leg Name	%Truck	Factor	U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Ratio1	Ratio2	Ratio3	Time1	Time2	Time3		
1 SB Elms	3.4	1.00	0	16	373	34	0	0.750	1.125	0.750	0	30	60		
2 EB Coutant	3.4	1.00	0	43	131	95	0	0.750	1.125	0.750	0	30	60		
3 NB Elms	3.4	1.00	0	56	243	10	0	0.750	1.125	0.750	0	30	60		
4 WB Coutant	3.3	1.00	0	13	55	12	0	0.750	1.125	0.750	0	30	60		

Peak 60min Results	Bypass Type	Flow Rate (veh/hr)		Opp Rate (veh/hr)		Capacity (veh/hr)		Ave VCR		Ave Del (sec/veh)		Max Q (veh)		Max Q95% (veh)		LOSA-F		
		Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass	Leg	Entry	Bypass	Entry	By	Leg	
1 SB Elms	None	423		124		1122		0.3771		4.95		4.95	0.71	1.84		A	A	A
2 EB Coutant	None	269		402		936		0.2874		5.23		5.23	0.48	1.25		A	A	A
3 NB Elms	None	309		190		1052		0.2936		4.67		4.67	0.48	1.26		A	A	A
4 WB Coutant	None	80		342		971		0.0824		3.93		3.93	0.10	0.27		A	A	A
All Intersection										4.87								A

Results 60 Results 15 Int / Slope - 60 Int / Slope - 15 Economics Global Results

Coutant & Elms PM Peak

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File View Help

Project: Coutant & Elms Date: 12-May-2021 Model: Rodel 2017 Timeslice: 7.5 Full Geometry: Full Geometry Peak: PM Feet: RHD

Name: Mini Roundabout Flows: 2045 Delay: Queuing Results: Veh Peak60/15m Synthetic Flow Profile: Conf: 50 Light: 32

Approach Geometry						Entry Geometry						Circ Geom			Exit Geometry				Entry Capacity Mods	
Leg Name	Bearing	G	V	n		E	n	L'	R	Φ	D	C	n	Ex	n	Vx	n	-> Cap (v/h)	Xwalk Fact	
1 SB Elms	Y	0	0	12.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	12.00	1	0	1.000	
2 EB Coutant	Y	90	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	
3 NB Elms	Y	180	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	
4 WB Coutant	Y	270	0	11.00	1	16.00	1	30.00	75.00	30.00	100.00	20.00	1	16.00	1	11.00	1	0	1.000	

Volume Modifiers			Turning Volumes (veh/hr)						Arrival Volume Ratios			Arrival Volume Times (min)			PHF
Leg Name	%Truck	Factor	U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Ratio1	Ratio2	Ratio3	Time1	Time2	Time3		
1 SB Elms	0.9	1.00	0	12	351	39	0	0.750	1.125	0.750	0	30	60		
2 EB Coutant	1.3	1.00	0	62	90	143	0	0.750	1.125	0.750	0	30	60		
3 NB Elms	0.7	1.00	0	75	499	20	0	0.750	1.125	0.750	0	30	60		
4 WB Coutant	1.7	1.00	0	30	104	23	0	0.750	1.125	0.750	0	30	60		

Peak 60min Results	Bypass Type	Flow Rate (veh/hr)		Opp Rate (veh/hr)		Capacity (veh/hr)		Ave VCR		Ave Del (sec/veh)		Max Q (veh)		Max Q95% (veh)		LOSA-F		
		Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass	Leg	Entry	Bypass	Entry	By	Leg	
1 SB Elms	None	402		209		1131		0.3555		4.95		4.95	0.68	1.75		A	A	A
2 EB Coutant	None	295		393		986		0.2993		5.20		5.20	0.52	1.36		A	A	A
3 NB Elms	None	594		164		1127		0.5272		6.86		6.86	1.47	3.72		A	A	A
4 WB Coutant	None	157		636		844		0.1861		5.22		5.22	0.28	0.73		A	A	A
All Intersection										5.81								A

Results 60 Results 15 Int / Slope - 60 Int / Slope - 15 Economics Global Results

Intersection

Coutant Street & Elms Road

Opinion of Probable Cost

By: Fishbeck

Date: 5/7/2021

PAY ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
Mobilization (10%)	1	LSUM	\$77,600.00	\$77,600.00
Pavt, Rem	5900	Syd	\$10.00	\$59,000.00
Curb and Gutter, Rem	125	Ft	\$10.00	\$1,250.00
Embankment, CIP	1000	Cyd	\$15.00	\$15,000.00
Excavation, Earth	1500	Cyd	\$10.00	\$15,000.00
Aggregate Base	2560	Ton	\$21.00	\$53,760.00
Shoulder, CI II	90	Ton	\$25.00	\$2,250.00
HMA Approach	75	Ton	\$50.00	\$3,750.00
Conc Pavt, Nonreinf, 8 inch	5330	Syd	\$45.00	\$239,850.00
Joint, Contraction, Cp	4080	Ft	\$10.00	\$40,800.00
Joint, Expansion, E3	120	Ft	\$15.00	\$1,800.00
Driveway, Nonreinf Conc, 9 inch	160	Syd	\$50.00	\$8,000.00
Curb and Gutter, Conc, Det B2	1650	Ft	\$25.00	\$41,250.00
Curb and Gutter, Conc, Det D1	1215	Ft	\$25.00	\$30,375.00
Conc Pavt, Decorative Colored, 9 inch	4565	Sft	\$12.50	\$57,062.50
Turf Establishment, Performance	5500	Syd	\$5.00	\$27,500.00
Signal Removal	1	LSUM	\$1,500.00	\$1,500.00
Drainage	1	LSUM	\$85,000.00	\$85,000.00
MOT	1	LSUM	\$57,500.00	\$57,500.00
Pavement Markings	1	LSUM	\$15,000.00	\$15,000.00
Signing	1	LSUM	\$20,000.00	\$20,000.00
ESTIMATED CONSTRUCTION COST				\$853,248

CONTINGENCY (20%) \$170,649.5

ESTIMATED TOTAL CONSTRUCTION COST (YEAR 2021) \$1,023,897.0

3% ANNUAL INFLATION 2021 TO 2025 \$128,508.09

ESTIMATED TOTAL CONSTRUCTION COST (YEAR 2025) \$1,152,405.09**Assumptions:**

Full Depth Concrete Reconstruct assumed for all pavements (HMA Paving, HMA base crushing and shaping, or cold milling and overlay could be utilized as a cost savings)

Pavement section assumed to be 8" Nonreinforced Concrete over 6" Aggregate Base for roadway

HMA Driveway section assumed to be 3" HMA over 6" Aggregate Base

Existing Gravel Drives paved with HMA to ROW or 20', whichever comes first

HMA and Concrete removal incorporated under Pavt, Rem

Joints assumed for concrete roadway and central island/splitter islands

Drainage includes enclosed storm for all curbed areas, spillways, and underdrain

MOT taken as approximately ~8% of total before mobilization; based on previous roundabout projects

ROW acquisition costs not included

NUMBER OF CRASHES OR INJURED PERSONS.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	2015	2016	2017	2018	2019

Fatal and A-Injury Reduction	%REDUCTION	78%	Roundabout		
Number of Crashes	0	0	0	0	0

A-Injured or Killed Persons	0	0	0	0	0
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Minor Crash Reduction	%REDUCTION	57%	0		
Number of Crashes	0	0	0	0	28
	0	0	0	0	28
	0	0	0	0	0

	%REDUCTION	0%			
Number of Crashes	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
A-Injured or Killed Persons	0	0	0	0	0

	%REDUCTION	0%			
Number of Crashes	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
A-Injured or Killed Persons	0	0	0	0	0

	%REDUCTION	0%			
Number of Crashes	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
A-Injured or Killed Persons	0	0	0	0	0

of A-injuries: 0 For reference only
 # of Fatalities: 0 For reference only; "Q" accounts

PROJECT COST ESTIMATE : \$1,152,405 for the risk of a fatality. If unknown, enter "0" (zero).
 ADTb (before-volume) 1.0 You may change these
 ADTa (after-volume) 1.1 default ADT values.
 # OF YEARS OF DATA: 5.00 3 to 5 years should be used.
 RATE OF INFLATION: 2.50%
 AREA TYPE: Urban "Rural", "Urban", or "Between"

REMARKS:

Coutant Street and Elms Road
 Genesee County Roundabout Study
 1506105, 1523901
 2.1700582, 10.6307480
 Roundabout

COMPUTED BENEFITS DERIVED THROUGH CRASH REDUCTION

TOR 2021

Date **9-Jul-21**

Project: **Coutant Street and Elms Road**

City/Twp. **Mt. Morris Township**

Prepared By: **ROWE Professional Services Company**

County **Genesee County**

PR: **1506105, 1523901** PR MP Range: **2.1700582, 10.6307480**

The method of evaluating crash costs, used below, is given on page 67 of Roy Jorgensen's report of Highway Safety Improvement Criteria, 1966 edition. This same method is given in the Bureau of Public Roads IM21-3-67. In 1994 we have adapted the Q formula to blend Fatalities and A-injuries only.

In the following analysis the costs provided by the National Safety Council are :

2019 NSC VALUES:

Death	\$1,659,000	=FATCOST
Disabling (A) injury:	\$96,200	=ACOST
B-injury:	\$27,800	=BCOST
PDO and/or Minor Injury Crash:	\$12,200	=PDOCOST

$BTOTAL = ADTa / ADTb \times [(Q \times R1) + (BCOST \times R2) + (PDOCOST \times R3)]$

WHERE:

BTOTAL =	Total Benefit in Dollars Over Years Used	\$214,183
ADTa =	Average traffic volume after the improvement	1.1
ADTb =	Average traffic volume before the improvement	1.0
R1 =	Reduction in fatalities and A-Injuries Combined.	0.0
R2 =	Reduction in B-Injury crashes:	0.0
R3 =	Reduction in PDO and C-injury crashes:	16.0
Q =	$[FATCOST + ((I/F) \times INJCOST)] / [1 + (I/F)]$	
=	$[1,659,000 + (6.10 \times 96,200)] / [1 + 6.10]$	\$316,400
	for AREA TYPE "Urban"	
I/F =		6.10

Q-Reference	Q	A-Inuries	Fatalities	I/F
RURAL	\$363,900	6,072	1,255	4.84
URBAN	\$316,400	9,902	1,624	6.10
BETWEEN	\$334,900	15,974	2,879	5.55

Data from Safety Programs Unit
5-Year Statewide Non-Trunkline Crash Figures Used.
(*From 1-1-2015 Through 12-31-2019).

Time of Return (T.O.R.) is based on 5 years of data.

NOINFB =No-Inflation Annual Benefit=BTOTAL/years \$42,837

With an inflation rate of 2.50%

B=Annual Benefit=Present Value (with Inflation) \$54,835

C = Project Cost \$1,152,405

TOR=C/B=COST/ANNUAL BENEFIT= **21.02**

E. Coutant and Elms

1. [2045 AM Peak Hour No Build](#)
2. [2045 PM Peak Hour No Build](#)
3. [2045 AM Peak Hour Roundabout](#)
4. [2045 PM Peak Hour Roundabout](#)