

MEMORANDUM

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DATE: June 11, 2021

TO: Dan Sanayi, P.E., Montgomery County Department of Transportation

FROM: Kristen Haas, P.E., PTOE, STV

SUBJECT: MD 112 (Seneca Road) at Esworthy Road – Intersection Improvements

Introduction

The purpose of this study is to conduct a traffic analysis for the intersection of MD 112 (Seneca Road) and Esworthy Road. The intersection is a three legged, stop controlled “Y” intersection and is shown in **Figure 1**. A single lane roundabout is proposed in order to improve safety and mitigate sight distance issues. This memorandum documents the data, analysis, findings, and conclusions of the traffic study conducted for the proposed design.

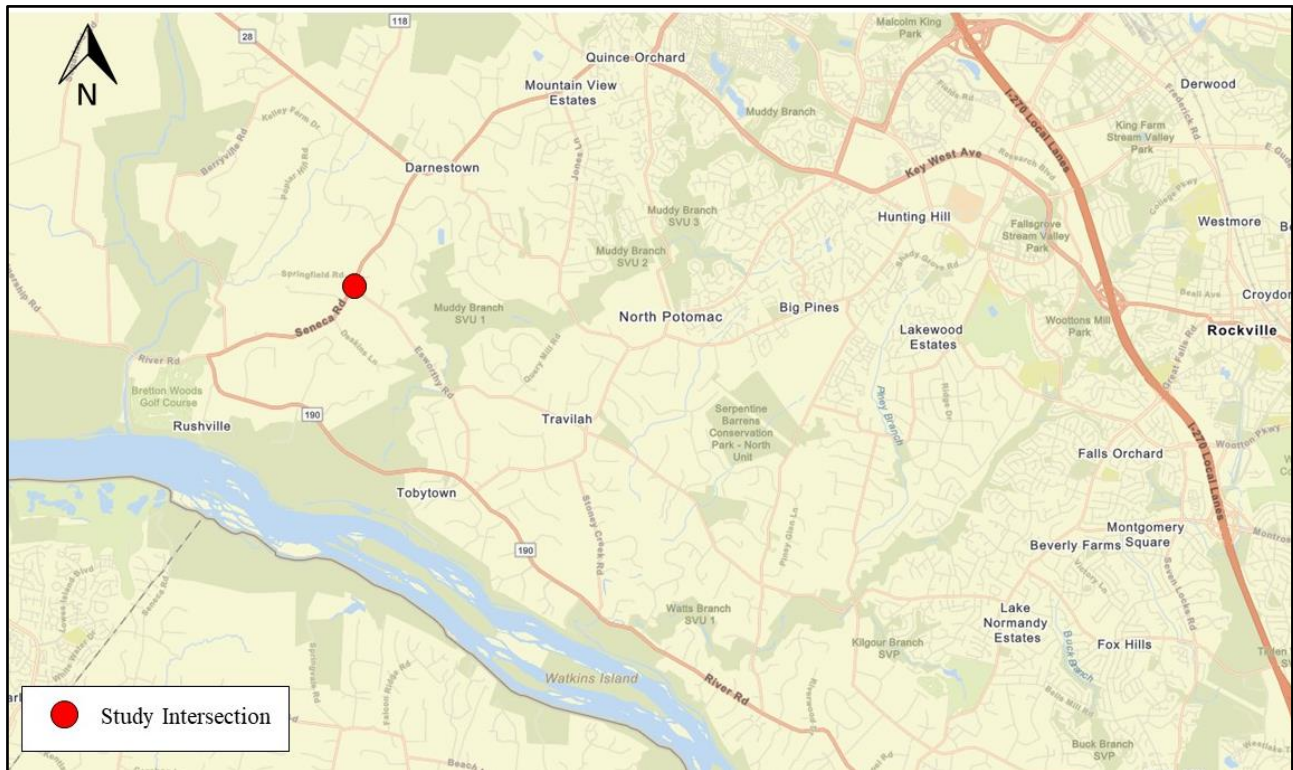


Figure 1: Study Intersection

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Existing Conditions

A 13-hour turning movement count was conducted for the study intersection on Tuesday, May 4, 2021 and is provided in **Appendix A**. Based on the collected data, the AM peak hour is 7:30-8:30 AM and the PM peak hour is 3:45-4:45 PM. Peak hour volumes are shown in **Figure 2** and the existing lane use is shown in **Figure 3**.

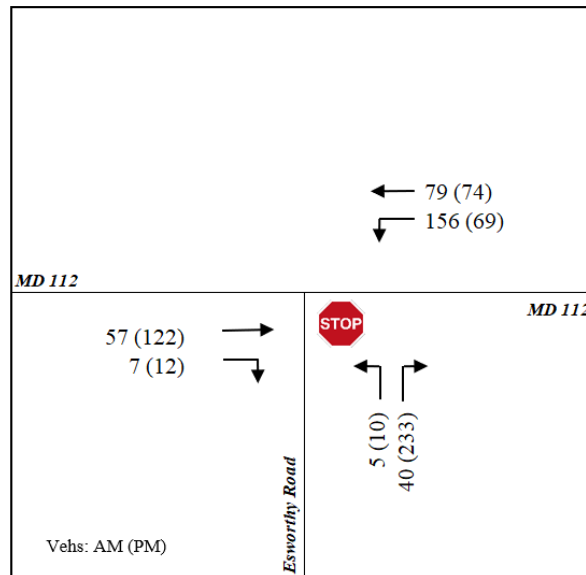


Figure 2: Existing Peak Hour Volumes

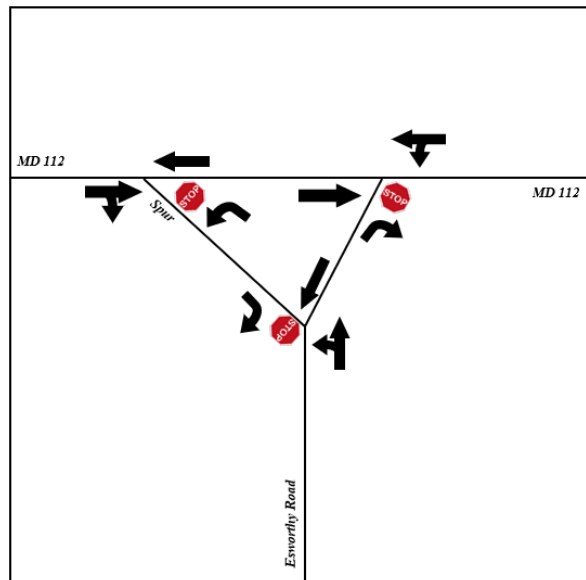


Figure 3: Existing Lane Use and Traffic Control

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It should be noted that the turning movement count was compared to a historical count from 2012 obtained from MDOT SHA’s ITMS website (provided in **Appendix A**), and peak hour volumes varied significantly for the westbound left turn during the AM peak hour and the northbound right turn during the PM peak hour. The 2012 data showed 492 westbound left turns during the AM peak hour, compared to 156 vehicles per hour in 2021 and 415 northbound right turns during the PM peak hour, compared to 233 vehicles in 2021. Historical AADT information for MD 112 also indicates comparable peak hour volumes west of the intersection on MD 112 between 2012 and 2021, further indicating that the subject intersection may have been utilized to route around congestion in Rockville or on I-270 via Esworthy Road prior to the COVID-19 pandemic.

Speed and vehicle classification data collected in May 2021 was provided by MCDOT. The speed data indicates that the daily average and 85th percentile speeds on MD 112 are 40 MPH and 45 MPH, respectively, while the average and 85th percentile speeds on Esworthy Road are 39 MPH and 44 MPH, respectively. The vehicle classification data indicates that 8.3 percent of traffic on MD 112 consists of trucks and buses while 8.6 percent of traffic on Esworthy Road consists of trucks and buses. Summary sheets for the speed and classification data are provided in **Appendix B**.

A capacity analysis was conducted utilizing VISSIM 11 software based on the existing intersection geometry and the peak hour volumes shown in Figure 2. The selected measures of effectiveness (MOEs) evaluated include Level of Service (LOS), delay, and maximum queue length. The results of the capacity analysis for the existing condition are summarized in **Table 1**.

Table 1: Existing Condition VISSIM Analysis

Existing Condition										
Movement	AM Peak Hour					PM Peak Hour				
	Demand	Through-put	Delay (sec)	LOS	Max Queue (ft)	Demand	Through-put	Delay (sec)	LOS	Max Queue (ft)
EBT	57	57	0.0	A	0	122	122	0.1	A	0
EBR*	7	7	4.7	A	50	12	11	4.8	A	58
WBL	156	158	0.9	A	49	69	69	1.0	A	44
WBT	79	77	0.7	A	6	74	74	0.4	A	6
NBL*	5	6	5.9	A	46	10	10	6.6	A	56
NBR*	40	40	5.0	A	76	233	233	7.9	A	170
Overall	-	-	1.4	A	-	-	-	4.0	A	-

* Stop Controlled Movement

The results in Table 1 indicate that the intersection operates with very minimal movement delays during both the AM and PM peak hours. The northbound right turn experiences the most notable maximum queue of 170 feet during the PM peak hour.

Proposed Condition

A single lane roundabout has been proposed for the intersection and a concept plan for the design is provided in **Appendix C**. The proposed roundabout was modeled in VISSIM and the results of the analysis are summarized in **Table 2**.

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Table 2: Existing Condition VISSIM Analysis

Movement	Demand	Existing Condition				Proposed Condition			
		Through-put	Delay (sec)	LOS	Max Queue (ft)	Through-put	Delay (sec)	LOS	Max Queue (ft)
AM Peak Hour									
EBT	57	57	0.0	A	0	57	1.6	A	59
EBR*	7	7	4.7	A	50	7	1.1	A	59
WBL	156	158	0.9	A	49	158	0.8	A	15
WBT	79	77	0.7	A	6	77	0.8	A	15
NBL*	5	6	5.9	A	46	6	0.5	A	22
NBR*	40	40	5.0	A	76	39	0.5	A	22
Overall	-	-	1.4	A	-	-	0.9	A	-
PM Peak Hour									
EBT	122	122	0.1	A	0	122	1.6	A	26
EBR*	12	11	4.8	A	58	12	0.8	A	26
WBL	69	69	1.0	A	44	68	1.2	A	37
WBT	74	74	0.4	A	6	74	1.3	A	37
NBL*	10	10	6.6	A	56	10	1.7	A	101
NBR*	233	233	7.9	A	170	233	1.6	A	101
Overall	-	-	4.0	A	-	-	1.5	A	-

* Stop Controlled Movement under Existing Condition

The results in Table 2 indicate that the intersection continues to operate with minimal movement delays and an overall intersection LOS of A during the AM and PM peak hour. Under proposed conditions, all approaches experience maximum queues of less than 100 feet with the exception of the northbound approach, which experiences maximum queues of 101 feet during the PM peak hour. It should be noted that the roundabout configuration was previously analyzed with peak hour volumes developed by growing the 2012 ITMS turning movement count, and the intersection continued to operate with minimal delay.

Safety Analysis

Available crash data was obtained from the *dataMontgomery* website for the study intersection and crash data by type for the 5-year period of 2016 through 2020 is shown in **Figure 4**. The crash data is provided in **Appendix D**.

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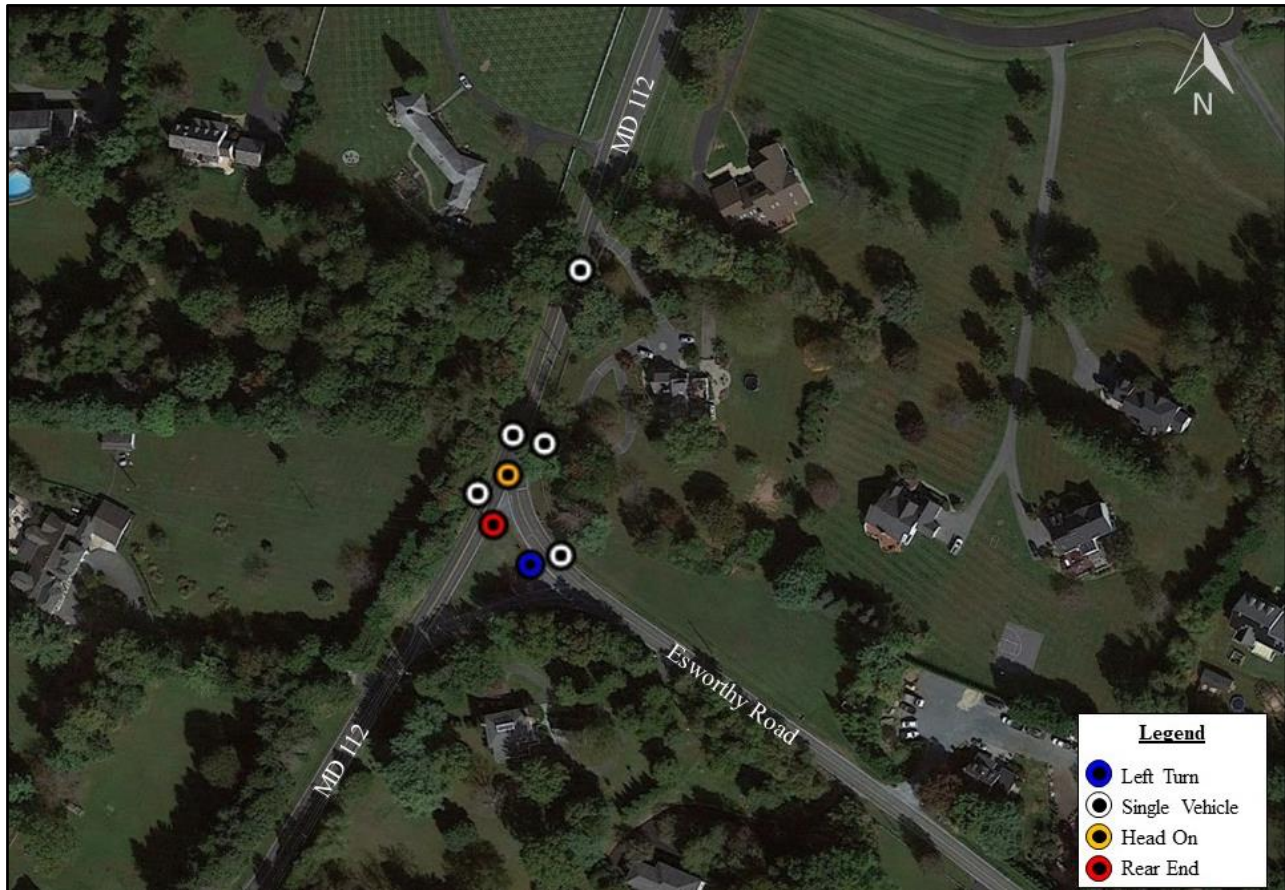


Figure 4: Crash Types at MD 112 at Esworthy Road (2016-2020)

As shown in Figure 4, eight crashes were reported at the intersection between 2016 and 2020. The eight crashes consisted of five single vehicle crashes, one head on crash, one left turn crash, and one rear end crash.

Studies have shown that the installation of roundabouts have resulted in improved safety performance for many locations of varying settings and previous traffic control. The increase in safety can be attributed to the factors including, but not limited to, the reduction in conflict points and lower speeds through the intersection. The crashes reported for a roundabout also tend to be less severe given that motorists are typically driving at similar speeds through a roundabout compared to typical intersection configurations. The FHWA Crash Modification Factors Clearinghouse website indicates that the crash modification factor (CMF) associated with converting a rural, stop controlled intersection into a single lane roundabout is 0.42 for all crash types and severities, meaning that a 58 percent reduction of crashes can be estimated. Details from the CMF website are provided in **Appendix E**.

The proposed roundabout is also expected to improve safety at the intersection by eliminating an existing sight distance issue for the northbound left turn movement. Based on the guidelines outlined in the AASHTO

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Greenbook, a sight distance of 500 feet should be provided for the northbound left turn. The existing sight distance for this movement, however, is 310 feet.

Summary

The purpose of this study is to conduct a traffic analysis for the intersection of MD 112 (Seneca Road) and Esworthy Road. The intersection is a three legged, stop controlled "Y" intersection and a single lane roundabout is proposed in order to improve safety and mitigate a sight distance issue for northbound left turns from Esworthy Road to westbound MD 112. **The results of the traffic analysis indicate that the proposed roundabout is projected to operate with minimal delay and approach queues. Further, based on the FHWA Crash Modification Factors Clearinghouse Website, converting a rural, stop controlled intersection into a single lane roundabout may result in a reduction of crashes of all types and severities by 58 percent.**

APPENDIX

A

Turning Movement Count Data

Start Date: 5/4/2021
 Start Time: 6:00:00 AM
 Site Code: SENECA (EAST INTERSECTION) @ ESWORTHY RD

Start Time	WOODS / NO SB APPROACH				SENECA EAST From East				ESWORTHY From South				SENECA EAST From West			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds				
6:00:00 AM	21	4	0	1	0	0	6	0	0	0	0	0				
6:15:00 AM	20	9	0	0	0	0	3	0	0	0	0	0				
6:30:00 AM	28	19	0	0	0	0	5	0	0	0	0	0				
6:45:00 AM	36	8	0	0	0	0	1	0	0	0	0	0				
7:00:00 AM	36	11	0	0	0	0	4	0	0	0	0	0				
7:15:00 AM	32	15	0	0	0	0	10	0	0	0	0	0				
7:30:00 AM	43	26	0	0	0	0	6	0	0	0	0	0				
7:45:00 AM	34	15	0	0	0	0	14	0	0	0	0	0				
8:00:00 AM	41	25	0	0	0	0	5	0	0	0	0	0				
8:15:00 AM	38	13	0	0	0	0	15	0	0	0	0	0				
8:30:00 AM	30	16	0	0	0	0	12	0	0	0	0	0				
8:45:00 AM	36	11	0	0	0	0	16	0	0	0	0	0				
9:00:00 AM	22	21	0	0	0	0	13	0	0	0	0	0				
9:15:00 AM	20	23	0	0	0	0	19	0	0	0	0	0				
9:30:00 AM	20	20	0	0	0	0	10	0	0	0	0	0				
9:45:00 AM	18	18	0	0	0	0	7	0	0	0	0	0				
10:00:00 AM	22	28	0	0	0	0	11	0	0	0	0	0				
10:15:00 AM	12	25	0	0	0	0	13	0	0	0	0	0				
10:30:00 AM	16	24	0	0	0	0	19	0	0	0	0	0				
10:45:00 AM	19	13	0	0	0	0	11	0	0	0	0	0				
11:00:00 AM	15	13	0	0	0	0	17	0	0	0	0	0				
11:15:00 AM	18	22	0	0	0	0	16	0	0	0	0	0				
11:30:00 AM	12	11	0	0	0	0	20	0	0	0	0	0				
11:45:00 AM	21	23	0	0	0	0	21	0	0	0	0	0				
12:00:00 PM	15	16	0	0	0	0	10	0	0	0	0	0				
12:15:00 PM	18	18	0	0	1	0	14	0	0	0	0	0				
12:30:00 PM	23	17	0	0	0	0	19	0	0	0	0	0				
12:45:00 PM	19	13	0	0	1	0	21	0	0	0	0	0				
1:00:00 PM	10	19	0	0	0	0	23	0	0	0	0	0				
1:15:00 PM	11	18	0	0	0	0	15	0	0	0	0	0				
1:30:00 PM	13	16	0	0	0	0	18	0	0	0	0	0				
1:45:00 PM	12	14	0	0	0	0	27	0	0	0	0	0				
2:00:00 PM	10	20	0	0	0	0	22	0	0	0	0	0				
2:15:00 PM	9	17	0	0	0	0	18	0	0	0	0	0				
2:30:00 PM	13	15	0	0	0	0	29	0	0	0	0	0				
2:45:00 PM	14	10	0	0	0	0	22	0	0	0	0	0				
3:00:00 PM	13	11	0	0	0	0	48	0	0	0	0	0				
3:15:00 PM	18	28	0	0	0	0	29	0	0	0	0	0				
3:30:00 PM	14	29	0	0	0	0	44	0	0	0	0	0				
3:45:00 PM	17	19	0	0	0	0	58	0	0	0	0	0				
4:00:00 PM	14	15	0	0	0	0	53	0	0	0	0	0				
4:15:00 PM	17	17	0	0	0	0	54	0	0	0	0	0				
4:30:00 PM	21	23	0	0	0	0	68	0	0	0	0	0				
4:45:00 PM	13	14	0	0	0	0	64	0	0	0	0	0				
5:00:00 PM	11	7	0	0	0	0	57	0	0	0	0	0				
5:15:00 PM	13	10	0	0	0	0	81	0	0	0	0	0				
5:30:00 PM	8	8	0	0	0	0	59	0	0	0	0	0				
5:45:00 PM	14	13	0	0	0	0	45	0	0	0	0	0				
6:00:00 PM	6	14	0	0	0	0	66	0	0	0	0	0				
6:15:00 PM	10	15	0	0	0	0	45	0	0	0	0	0				
6:30:00 PM	7	7	0	0	0	0	28	0	0	0	0	0				
6:45:00 PM	9	11	0	0	0	0	26	0	0	0	0	0				
	982	847	0	1	2	0	1337	0	0	0	0	0				

Start Date: 5/4/2021
 Start Time: 6:00:00 AM
 Site Code: SENECA RD (WEST INTERSECTION) @ ESWORTHY RD

Start Time	WOODS / NO SB APPROACH				SENECA ROAD (WEST INTERSECTION) From East				ESWORTHY RD From South				SENECA ROAD (WEST INTERSECTION) From West			
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds
6:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0
6:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
6:45:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	6	1	0
7:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
7:15:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	0
7:30:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	18	4	0
7:45:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	11	1	0
8:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0
8:15:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	19	1	0
8:30:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	18	2	0
8:45:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	16	4	0
9:00:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2	0
9:15:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	13	3	0
9:30:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	14	1	0
9:45:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	13	3	0
10:00:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	21	0	0
10:15:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	14	1	0
10:30:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	12	0	0
10:45:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	13	1	0
11:00:00 AM	0	0	0	0	0	0	0	3	0	0	0	0	0	22	0	0
11:15:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	13	3	0
11:30:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	20	1	0
11:45:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0
12:00:00 PM	0	0	0	0	0	0	0	3	0	0	0	0	0	20	2	0
12:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1	0
12:30:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	22	0	0
12:45:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	19	1	0
1:00:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	15	1	0
1:15:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	23	2	0
1:30:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	22	2	0
1:45:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	33	3	0
2:00:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	24	4	0
2:15:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	24	1	0
2:30:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	19	1	0
2:45:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	25	1	0
3:00:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	22	3	0
3:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0
3:30:00 PM	0	0	0	0	0	0	0	2	0	0	0	1	0	17	2	0
3:45:00 PM	0	0	0	0	0	0	0	4	0	0	0	0	0	22	3	0
4:00:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	38	5	0
4:15:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	33	2	0
4:30:00 PM	0	0	0	0	0	0	0	3	0	0	0	0	0	29	2	0
4:45:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	21	1	0
5:00:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	28	1	0
5:15:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	15	3	0
5:30:00 PM	0	0	0	0	0	0	0	3	0	0	0	0	0	13	1	0
5:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	16	1	0
6:00:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	19	0	0
6:15:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	17	1	0
6:30:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	13	0	0
6:45:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	11	1	0
	0	0	0	0	0	0	0	66	0	0	1	1	1	892	78	0



Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S2012151558

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

Town: none

Location: MD 112 at ESWORTHY RD (North)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



Begin Hour	U.Turn	Left	Through	Right	TOTAL	U.Turn	Left	Through	Right	TOTAL	U.Turn	Left	Through	Right	TOTAL	U.Turn	Left	Through	Right	TOTAL	GrandTotal
06:00	0	42	2	0	44	0	0	6	0	6	0	0	0	1	1	0	0	0	0	0	51
06:15	0	75	7	0	82	0	0	3	0	3	0	0	0	1	1	0	0	0	0	0	86
06:30	0	79	4	0	83	0	0	8	0	8	0	0	0	4	4	0	0	0	0	0	95
06:45	0	127	7	0	134	0	0	13	0	13	0	0	0	9	9	0	0	0	0	0	156
07:00	0	128	14	0	142	0	0	6	0	6	0	0	0	5	5	0	0	0	0	0	153
07:15	0	120	7	0	127	0	0	25	0	25	0	0	0	5	5	0	0	0	0	0	157
07:30	0	117	5	0	122	0	0	23	0	23	0	0	0	12	12	0	0	0	0	0	157
07:45	0	78	14	0	92	0	0	17	0	17	0	0	0	12	12	0	0	0	0	0	121
08:00	0	90	13	0	103	0	0	23	0	23	0	0	0	12	12	0	0	0	0	0	138
08:15	0	100	29	0	129	0	0	19	0	19	0	0	0	14	14	0	0	0	0	0	162
08:30	0	74	13	0	87	0	0	17	0	17	0	0	0	13	13	0	0	0	0	0	117
08:45	0	75	17	0	92	0	0	24	0	24	0	0	0	15	15	0	0	0	0	0	131
09:00	0	37	12	0	49	0	0	18	0	18	0	1	0	9	10	0	0	0	0	0	77
09:15	0	41	23	0	64	0	0	10	0	10	0	0	0	10	10	0	0	0	0	0	84
09:30	0	42	4	0	46	0	0	12	1	13	0	0	0	14	14	0	0	0	0	0	73
09:45	0	34	10	0	44	0	0	13	0	13	0	0	0	12	12	0	0	0	0	0	69
10:00	0	19	7	0	26	0	0	9	0	9	0	0	0	8	8	0	0	0	0	0	43
10:15	0	11	13	0	24	0	0	12	0	12	0	1	0	12	13	0	0	0	0	0	49
10:30	0	12	13	0	25	0	0	8	0	8	0	0	0	11	11	0	0	0	0	0	44
10:45	0	7	6	0	13	0	0	10	0	10	0	0	0	12	12	0	0	0	0	0	35
11:00	0	17	8	0	25	0	0	12	1	13	0	0	0	15	15	0	0	0	0	0	53
11:15	0	14	9	0	23	0	0	16	0	16	0	0	0	14	14	0	0	0	0	0	53
11:30	0	10	9	0	19	0	0	13	0	13	0	0	0	18	18	0	0	0	0	0	50
11:45	0	7	20	0	27	0	0	21	0	21	0	0	0	6	6	0	0	0	0	0	54
12:00	0	16	8	0	24	0	0	13	0	13	0	1	0	9	10	0	0	0	0	0	47
12:15	0	14	11	0	25	0	0	15	0	15	0	0	0	13	13	0	0	0	0	0	53
12:30	0	8	13	0	21	0	0	13	0	13	0	0	0	19	19	0	0	0	0	0	53



Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S2012151558

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

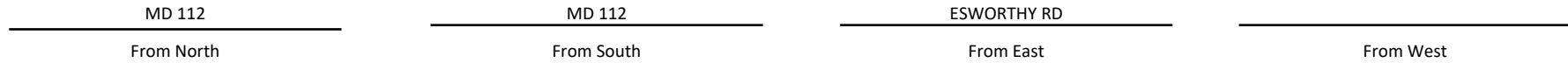
Town: none

Location: MD 112 at ESWORTHY RD (North)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



Begin Hour	MD 112 From North			MD 112 From South			ESWORTHY RD From East			From West		
	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
06:00	0	0		0	0		0	0		0	0	
06:15	0	0		0	0		0	0		0	0	
06:30	0	0		0	0		0	0		0	0	
06:45	0	0		0	0		0	0		0	0	
07:00	0	0		0	0		0	0		0	0	
07:15	0	0		0	0		0	0		0	0	
07:30	0	0		0	0		0	0		0	0	
07:45	0	0		0	0		0	0		0	0	
08:00	0	0		0	0		0	0		0	0	
08:15	0	0		0	0		0	0		0	0	
08:30	0	0		0	0		0	0		0	0	
08:45	0	0		0	0		0	0		0	0	
09:00	0	0		0	0		0	0		0	0	
09:15	0	0		0	0		0	0		0	0	
09:30	0	0		0	0		0	0		0	0	
09:45	0	0		0	0		0	0		0	0	
10:00	0	0		0	0		0	0		0	0	
10:15	0	0		0	0		0	0		0	0	
10:30	0	0		0	0		0	0		0	0	
10:45	0	0		0	0		0	0		0	0	
11:00	0	0		0	0		0	0		0	0	
11:15	0	0		0	0		0	0		0	0	
11:30	0	0		0	0		0	0		0	0	
11:45	0	0		0	0		0	0		0	0	
12:00	0	0		0	0		0	0		0	0	
12:15	0	0		0	0		0	0		0	0	
12:30	0	0		0	0		0	0		0	0	



Maryland Department of Transportation
 State Highway Administration
 Data Services Division

Turning Movement Summary Report

Station ID: S2012151558

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

Town: none

Location: MD 112 at ESWORTHY RD (North)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



Begin Hour	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
12:45	0	0		0	0		0	0		0	0	
13:00	0	0		0	0		0	0		0	0	
13:15	0	0		0	0		0	0		0	0	
13:30	0	0		0	0		0	0		0	0	
13:45	0	0		0	0		0	0		0	0	
14:00	0	0		0	0		0	0		0	0	
14:15	0	0		0	0		0	0		0	0	
14:30	0	0		0	0		0	0		0	0	
14:45	0	0		0	0		0	0		0	0	
15:00	0	0		0	0		0	0		0	0	
15:15	0	0		0	0		0	0		0	0	
15:30	0	0		0	0		0	0		0	0	
15:45	0	0		0	0		0	0		0	0	
16:00	0	0		0	0		0	0		0	0	
16:15	0	0		0	0		0	0		0	0	
16:30	0	0		0	0		0	0		0	0	
16:45	0	0		0	0		0	0		0	0	
17:00	0	0		0	0		0	0		0	0	
17:15	0	0		0	0		0	0		0	0	
17:30	0	0		0	0		0	0		0	0	
17:45	0	0		0	0		0	0		0	0	
18:00	0	0		0	0		0	0		0	0	
18:15	0	0		0	0		0	0		0	0	
18:30	0	0		0	0		0	0		0	0	
18:45	0	0		0	0		0	0		0	0	
TOTAL	0	0		0	0		0	0		0	0	
AMPEAK	0	0		0	0		0	0		0	0	



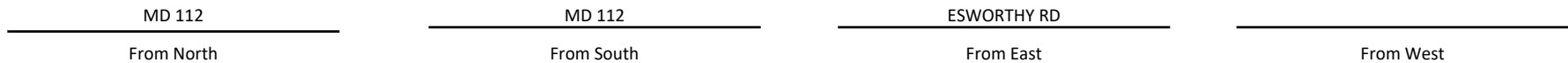
STATE HIGHWAY
ADMINISTRATION

Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S2012151558 County: Montgomery Comments: LOS AM:A PM:A
 Date: 12/11/2012 6:00:00 AM Town: none
 Location: MD 112 at ESWORTHY RD (North) Weather: CLEAR 45
 Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



Begin Hour	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
PMPEAK	0	0		0	0		0	0		0	0	



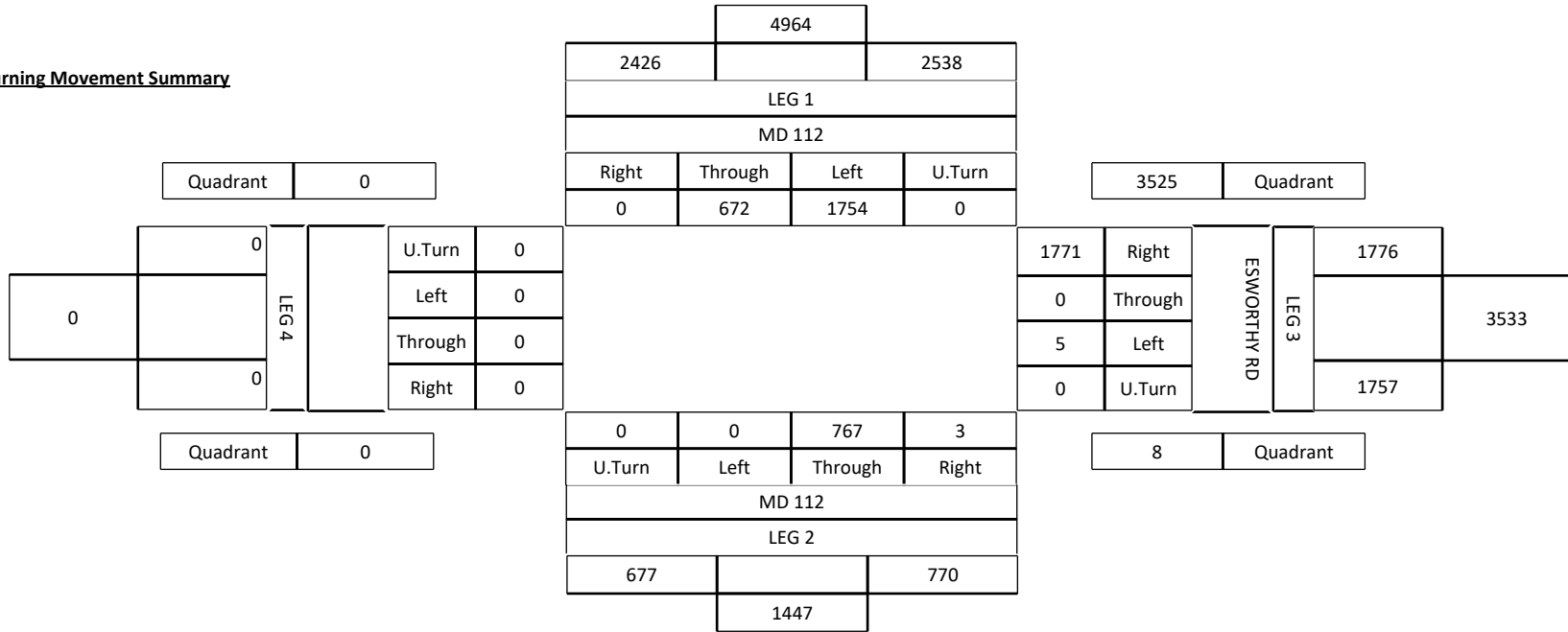
Maryland Department of Transportation
 State Highway Administration
 Data Services Division
 Turning Movement Summary Report

Station ID: S2012151558 County: Montgomery Comments: LOS AM:A PM:A
 Date: 12/11/2012 6:00:00 AM Town: none
 Location: MD 112 at ESWORTHY RD (North) Weather: CLEAR 45
 Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



Turning Movement Summary





Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S2012151558

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

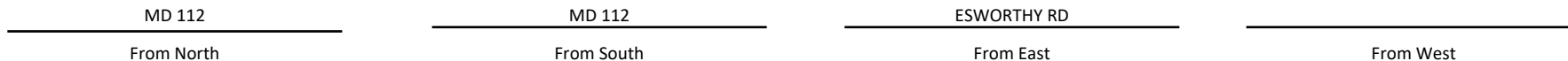
Town: none

Location: MD 112 at ESWORTHY RD (North)

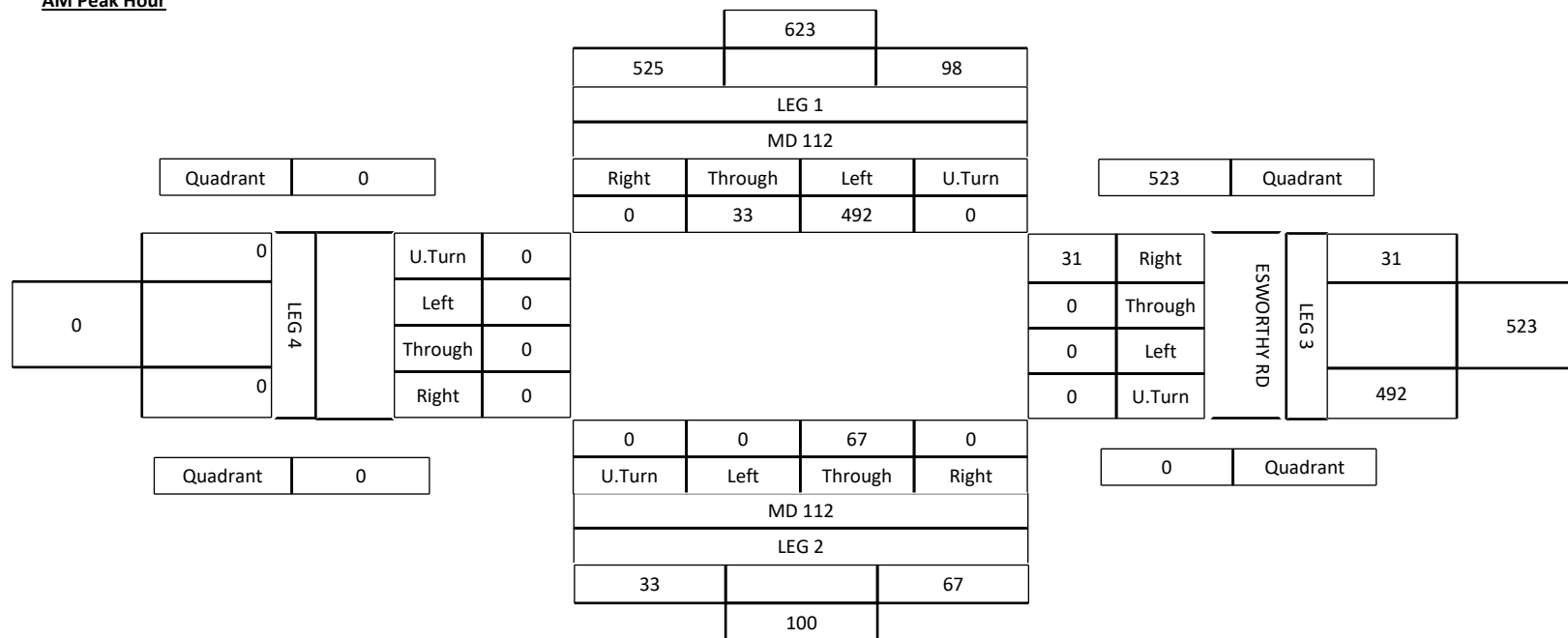
Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A



AM Peak Hour





Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S2012151558

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

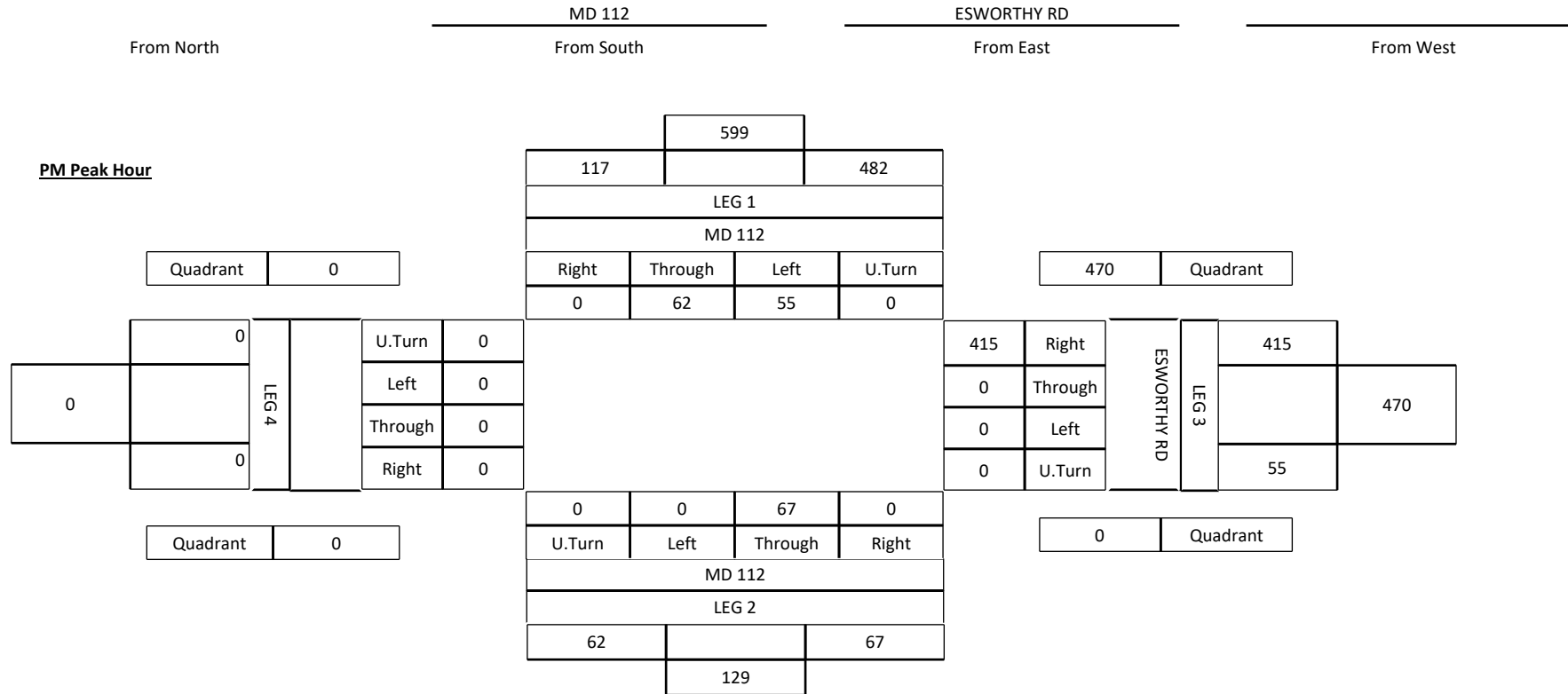
Town: none

Location: MD 112 at ESWORTHY RD (North)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	06:45	07:30	623	A	N/A	12:00PM-19:00PM	17:00	17:45	599	A	N/A





Maryland Department of Transportation
 State Highway Administration
 Data Services Division

Turning Movement Summary Report

Station ID: S1994150004

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

Town: none

Location: MD 112 at ESWORTHY RD (South)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



Begin Hour	MD 112 From North			MD 112 From South			ESWORTHY RD From East			From West		
	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
06:00	0	0		0	0		0	0		0	0	
06:15	0	0		0	0		0	0		0	0	
06:30	0	0		0	0		0	0		0	0	
06:45	0	0		0	0		0	0		0	0	
07:00	0	0		0	0		0	0		0	0	
07:15	0	0		0	0		0	0		0	0	
07:30	0	0		0	0		0	0		0	0	
07:45	0	0		0	0		0	0		0	0	
08:00	0	0		0	0		0	0		0	0	
08:15	0	0		0	0		0	0		0	0	
08:30	0	0		0	0		0	0		0	0	
08:45	0	0		0	0		0	0		0	0	
09:00	0	0		0	0		0	0		0	0	
09:15	0	0		0	0		0	0		0	0	
09:30	0	0		0	0		0	0		0	0	
09:45	0	0		0	0		0	0		0	0	
10:00	0	0		0	0		0	0		0	0	
10:15	0	0		0	0		0	0		0	0	
10:30	0	0		0	0		0	0		0	0	
10:45	0	0		0	0		0	0		0	0	
11:00	0	0		0	0		0	0		0	0	
11:15	0	0		0	0		0	0		0	0	
11:30	0	0		0	0		0	0		0	0	
11:45	0	0		0	0		0	0		0	0	
12:00	0	0		0	0		0	0		0	0	
12:15	0	0		0	0		0	0		0	0	
12:30	0	0		0	0		0	0		0	0	



Maryland Department of Transportation
 State Highway Administration
 Data Services Division

Turning Movement Summary Report

Station ID: S1994150004

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

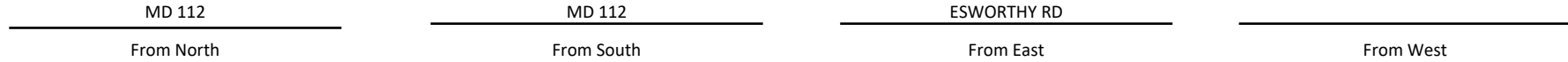
Town: none

Location: MD 112 at ESWORTHY RD (South)

Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



Begin Hour	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
12:45	0	0		0	0		0	0		0	0	
13:00	0	0		0	0		0	0		0	0	
13:15	0	0		0	0		0	0		0	0	
13:30	0	0		0	0		0	0		0	0	
13:45	0	0		0	0		0	0		0	0	
14:00	0	0		0	0		0	0		0	0	
14:15	0	0		0	0		0	0		0	0	
14:30	0	0		0	0		0	0		0	0	
14:45	0	0		0	0		0	0		0	0	
15:00	0	0		0	0		0	0		0	0	
15:15	0	0		0	0		0	0		0	0	
15:30	0	0		0	0		0	0		0	0	
15:45	0	0		0	0		0	0		0	0	
16:00	0	0		0	0		0	0		0	0	
16:15	0	0		0	0		0	0		0	0	
16:30	0	0		0	0		0	0		0	0	
16:45	0	0		0	0		0	0		0	0	
17:00	0	0		0	0		0	0		0	0	
17:15	0	0		0	0		0	0		0	0	
17:30	0	0		0	0		0	0		0	0	
17:45	0	0		0	0		0	0		0	0	
18:00	0	0		0	0		0	0		0	0	
18:15	0	0		0	0		0	0		0	0	
18:30	0	0		0	0		0	0		0	0	
18:45	0	0		0	0		0	0		0	0	
TOTAL	0	0		0	0		0	0		0	0	
AMPEAK	0	0		0	0		0	0		0	0	



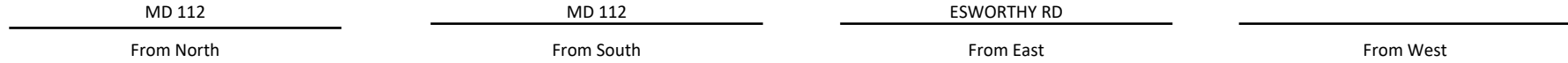
STATE HIGHWAY
ADMINISTRATION

Maryland Department of Transportation
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Data Services Division

Turning Movement Summary Report

Station ID: S1994150004 County: Montgomery Comments: LOS AM:A PM:A
 Date: 12/11/2012 6:00:00 AM Town: none
 Location: MD 112 at ESWORTHY RD (South) Weather: CLEAR 45
 Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



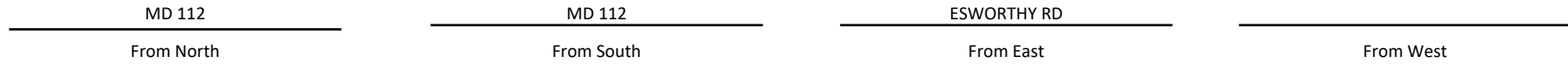
Begin Hour	School Children	Pedestrians	Bicycles	School Childer	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles	School Children	Pedestrians	Bicycles
PMPEAK	0	0		0	0		0	0		0	0	



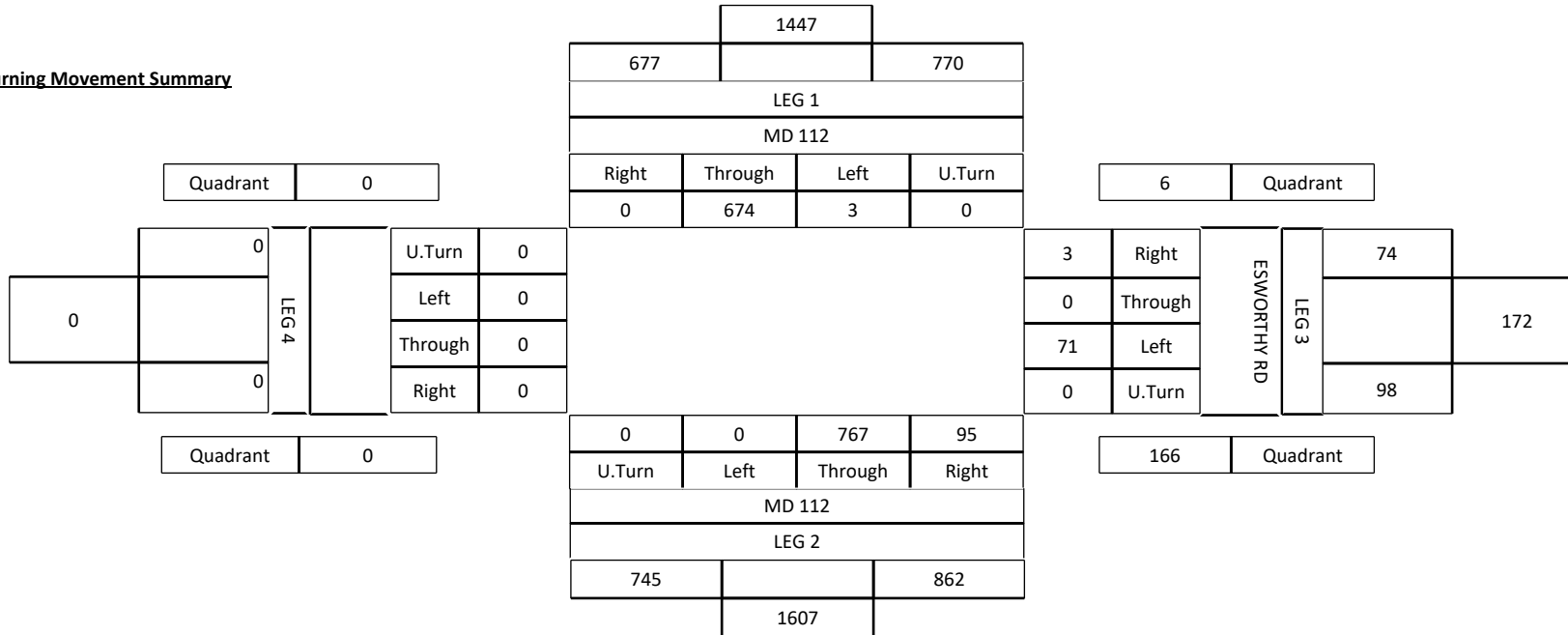
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Station ID: S1994150004 County: Montgomery Comments: LOS AM:A PM:A
 Date: 12/11/2012 6:00:00 AM Town: none
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PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



Turning Movement Summary





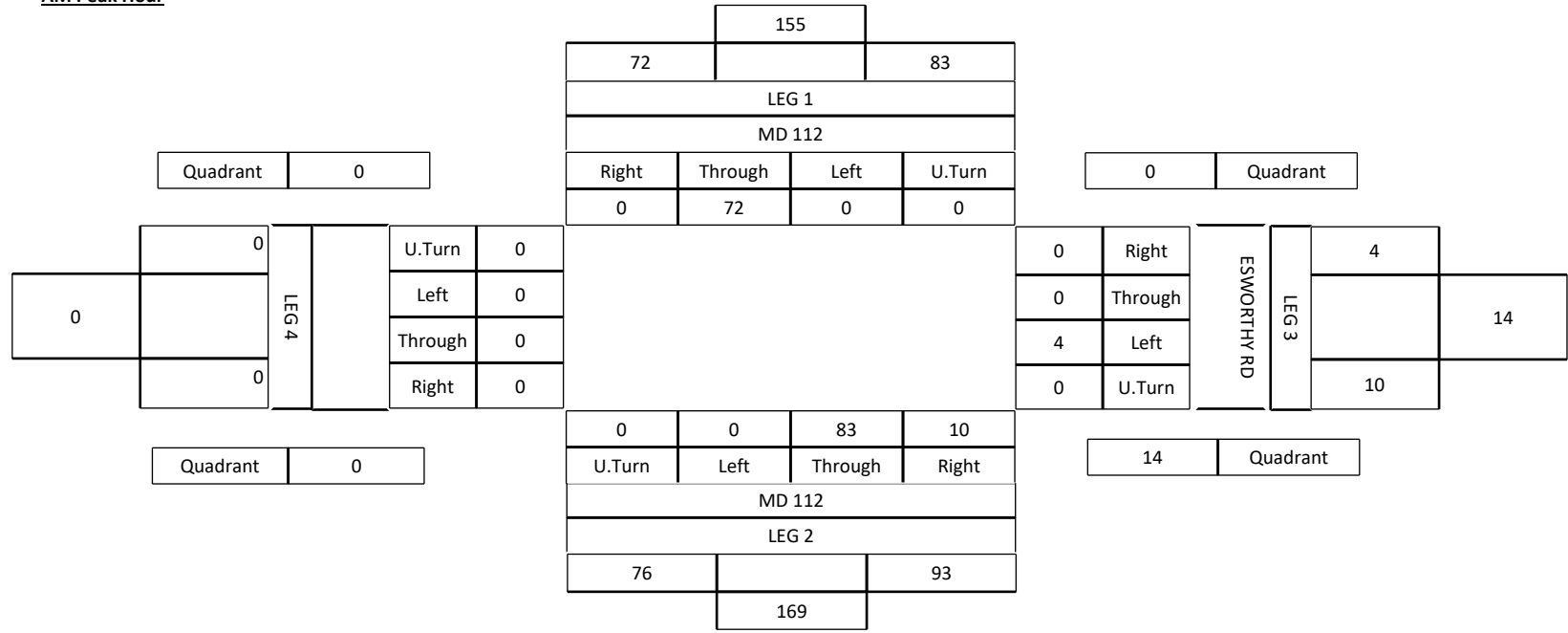
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State Highway Administration
Data Services Division
Turning Movement Summary Report

Station ID: S1994150004	County: Montgomery	Comments: LOS AM:A PM:A
Date: 12/11/2012 6:00:00 AM	Town: none	
Location: MD 112 at ESWORTHY RD (South)	Weather: CLEAR 45	
Interval: 15 Min		

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



AM Peak Hour





Maryland Department of Transportation
State Highway Administration
Data Services Division

Turning Movement Summary Report

Station ID: S1994150004

County: Montgomery

Comments: LOS AM:A PM:A

Date: 12/11/2012 6:00:00 AM

Town: none

Location: MD 112 at ESWORTHY RD (South)

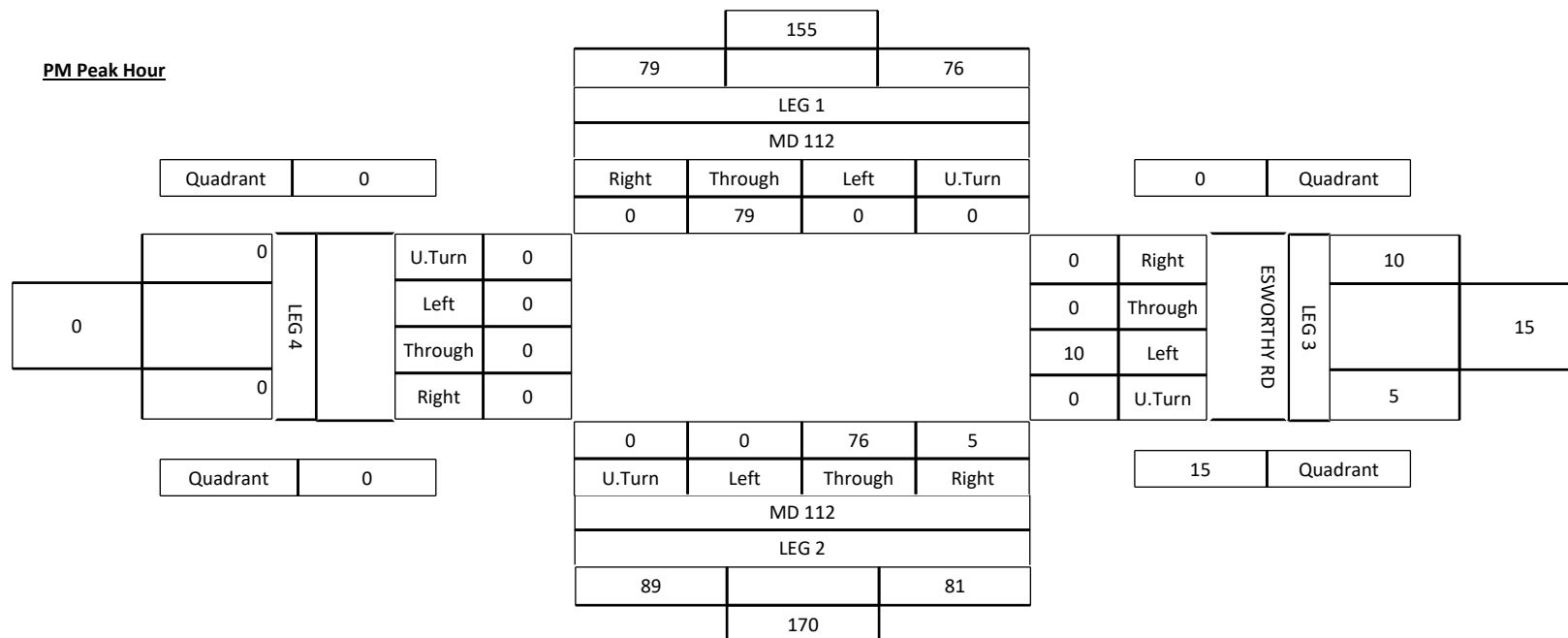
Weather: CLEAR 45

Interval: 15 Min

PEAK	AM PERIOD	Start	End	Volume	LOS	V/C	PM PERIOD	Start	End	Volume	LOS	V/C
Hours	6:00AM-12:00PM	08:00	08:45	169	A	N/A	12:00PM-19:00PM	14:45	15:30	170	A	N/A



PM Peak Hour



APPENDIX

B

Speed and Vehicle Classification Data

SUMMARY SHEET - SPEED

POSTED SPEED LIMIT:

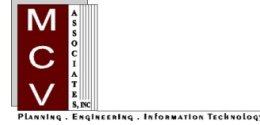
DAILY	NB								SB							
	16-May-21	17-May-21	18-May-21	19-May-21	20-May-21	21-May-21	22-May-21	16-May-21	17-May-21	18-May-21	19-May-21	20-May-21	21-May-21	22-May-21		
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
85th	45 MPH	45 MPH	45 MPH	45 MPH	45 MPH	44 MPH	45 MPH	44 MPH	45 MPH	45 MPH	45 MPH	44 MPH	44 MPH	44 MPH		
Mean Speed	40 MPH	40 MPH	40 MPH	40 MPH	39 MPH	39 MPH	39 MPH	40 MPH	40 MPH	40 MPH	40 MPH	40 MPH	39 MPH	40 MPH		
10 MPH Pace	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH		
AM Peak Hour	11:00 AM	11:00 AM	10:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	11:00 AM		
85th	47	45	45	45	44	44	44	44	43	44	44	43	43	44		
PM Peak Hour	2:00 PM	4:00 PM	5:00 PM	4:00 PM	4:00 PM	4:00 PM	2:00 PM	2:00 PM	3:00 PM	3:00 PM	5:00 PM	3:00 PM	3:00 PM	3:00 PM		
85th	43	44	43	43	43	44	45	43	45	45	46	44	44	44		

SUMMARY SHEET - CLASS

VEHICLE CLASS TYPE	NB (Volume)								SB (Volume)							
	16-May-21	17-May-21	18-May-21	19-May-21	20-May-21	21-May-21	22-May-21	16-May-21	17-May-21	18-May-21	19-May-21	20-May-21	21-May-21	22-May-21		
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
Motorbikes	23	24	23	26	21	27	39	25	25	17	22	18	28	39		
Auto / P.U.	1925	2039	2273	2296	2384	2478	2408	1887	1894	2097	2173	2087	2242	2376		
Buses	8	15	17	13	18	23	21	6	19	20	20	18	19	22		
Trucks	94	222	240	228	266	237	138	62	190	208	206	203	188	107		
TOTAL	2050	2300	2553	2563	2689	2765	2606	1980	2128	2342	2421	2326	2477	2544		
	NB (Percentage)								SB (Percentage)							
Motorbikes	1.1%	1.0%	0.9%	1.0%	0.8%	1.0%	1.5%	1.3%	1.2%	0.7%	0.9%	0.8%	1.1%	1.5%		
Auto / P.U.	93.9%	88.7%	89.0%	89.6%	88.7%	89.6%	92.4%	95.3%	89.0%	89.5%	89.8%	89.7%	90.5%	93.4%		
Buses	0.4%	0.7%	0.7%	0.5%	0.7%	0.8%	0.8%	0.3%	0.9%	0.9%	0.8%	0.8%	0.8%	0.9%		
Trucks	4.6%	9.7%	9.4%	8.9%	9.9%	8.6%	5.3%	3.1%	8.9%	8.9%	8.5%	8.7%	7.6%	4.2%		



Location: Esworthy Rd E of MD 112
 Count Date: 05-05-2021 -- 05-11-2021
 Request No: ISI-1



MCV Associates, Inc.
 4605-C Pinecrest Office Park Drive
 Alexandria VA 22312-1442

SUMMARY SHEET - SPEED

POSTED SPEED LIMIT:

DAILY	EB								WB							
	05-May-21	06-May-21	07-May-21	08-May-21	09-May-21	10-May-21	11-May-21	05-May-21	06-May-21	07-May-21	08-May-21	09-May-21	10-May-21	11-May-21		
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday		
85th	43 MPH	43 MPH	43 MPH	43 MPH	43 MPH	43 MPH	43 MPH	45 MPH	44 MPH	43 MPH	44 MPH	44 MPH	45 MPH	44 MPH		
Mean Speed	39 MPH	39 MPH	38 MPH	38 MPH	38 MPH	39 MPH	39 MPH	40 MPH	39 MPH	38 MPH	39 MPH	40 MPH	40 MPH	40 MPH		
10 MPH Pace	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH	36-45 MPH		
AM Peak Hour	8:00 AM	8:00 AM	7:00 AM	11:00 AM	11:00 AM	8:00 AM	8:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	10:00 AM		
85th	43	44	42	43	43	43	43	45	44	44	44	44	47	44		
PM Peak Hour	4:00 PM	2:00 PM	2:00 PM	4:00 PM	5:00 PM	5:00 PM	3:00 PM	4:00 PM	4:00 PM	5:00 PM	3:00 PM	3:00 PM	4:00 PM	4:00 PM		
85th	44	42	42	43	42	43	42	44	43	42	43	46	43	43		

SUMMARY SHEET - CLASS

VEHICLE CLASS TYPE	EB (Volume)								WB (Volume)							
	05-May-21	06-May-21	07-May-21	08-May-21	09-May-21	10-May-21	11-May-21	05-May-21	06-May-21	07-May-21	08-May-21	09-May-21	10-May-21	11-May-21		
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday		
Motorbikes	0	8	3	11	0	2	6	1	5	2	1	0	1	4		
Auto / P.U.	1116	1175	1070	965	849	968	1122	1262	1422	1499	880	699	971	1274		
Buses	1	2	5	1	0	1	11	2	7	4	2	3	11	5		
Trucks	105	151	101	43	37	115	127	128	163	161	62	24	111	137		
TOTAL	1222	1336	1179	1020	886	1086	1266	1393	1597	1666	945	726	1094	1420		
	EB (Percentage)								WB (Percentage)							
Motorbikes	0.0%	0.6%	0.3%	1.1%	0.0%	0.2%	0.5%	0.1%	0.3%	0.1%	0.1%	0.0%	0.1%	0.3%		
Auto / P.U.	91.3%	87.9%	90.8%	94.6%	95.8%	89.1%	88.6%	90.6%	89.0%	90.0%	93.1%	96.3%	88.8%	89.7%		
Buses	0.1%	0.1%	0.4%	0.1%	0.0%	0.1%	0.9%	0.1%	0.4%	0.2%	0.2%	0.4%	1.0%	0.4%		
Trucks	8.6%	11.3%	8.6%	4.2%	4.2%	10.6%	10.0%	9.2%	10.2%	9.7%	6.6%	3.3%	10.1%	9.6%		

APPENDIX

C

Proposed Roundabout Concept



MD 112 (SENECA ROAD)

MD 112 (SENECA ROAD)

ESWORTHY ROAD

120' DIAMETER

120' DIAMETER

120' DIAMETER

11'

6'

11'

15'

8'

15'

8'

10'

10'



APPENDIX

D

Crash Data

MD 112 (Seneca Road) at Esworth Road
Crash Data (2016-2020)

Report Number	Local Case Number	Agency Name	ACRS Report Type	Crash Date/Time	Lane Direction	Lane Number	Number of Lanes	Direction	Distance	Road Name	Cross-Street Name	At Fault	Collision Type	Weather	Surface Condition	Light
MCP2968001C	170500761	Montgomery County Police	Injury Crash	4/6/2017 17:34	South	1	1	East	0	SENECA RD	ESWORTHY RD	DRIVER	HEAD ON	RAINING	WET	DAYLIGHT
MCP1366006W	170549214	Montgomery County Police	Injury Crash	12/18/2017 7:43	East	1	1	East	0	SENECA RD	ESWORTHY RD	DRIVER	HEAD ON LEFT TURN	CLEAR	WET	DAWN
MCP25260016	170523049	Montgomery County Police	Property Damage Crash	8/4/2017 19:14	West	2	2	East	0	SENECA RD	ESWORTHY RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT
MCP1048004B	190011816	Montgomery County Police	Injury Crash	3/14/2019 13:29	East	2	2	East	200	SENECA RD	ESWORTHY RD	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT
MCP2167000Q	180003469	Montgomery County Police	Property Damage Crash	1/21/2018 14:04	West	1	1	East	0	SENECA RD	ESWORTHY RD	UNKNOWN	SINGLE VEHICLE	CLOUDY	DRY	DAYLIGHT
MCP2689001R	16014914	Montgomery County Police	Injury Crash	3/26/2016 18:37	West	1	1	East	0	SENECA RD	SPUR FR ESWORTHY RD	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT
MCP13540010	180042438	Montgomery County Police	Property Damage Crash	8/26/2018 0:35	North	1	1	East	0	ESWORTHY RD	SENECA RD	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DARK NO LIGHTS
MCP26890054	180057279	Montgomery County Police	Injury Crash	11/15/2018 8:31	East	1	1	East	40	ESWORTHY RD	SPUR TO MD 112	DRIVER	SINGLE VEHICLE	SNOW	SNOW	DAYLIGHT

APPENDIX

E

FHWA CMF Clearinghouse Details



CRASH MODIFICATION FACTORS CLEARINGHOUSE

STUDY DETAILS

Study Title: Observational Before-After Study of the Safety Effect of U.S. Roundabout Conversions Using the Empirical Bayes Method

Authors: Persaud et al.

Publication Date: 2001

Abstract:

Study Citation: Persaud, B. N., Retting, R. A., Garder, P. E., and Lord, D., "Observational Before-After Study of the Safety Effect of U.S. Roundabout Conversions Using the Empirical Bayes Method." Transportation Research Record, No. 1751, Washington, D.C., Transportation Research Board, National Research Council, (2001)

CMFS ASSOCIATED WITH THIS STUDY

CATEGORY: INTERSECTION GEOMETRY

Countermeasure: Conversion of signalized intersection into single- or multi-lane roundabout

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type
0.65	35	★★★★★	All	All	Not specified	Urban
0.26	74	★★★★★	All	A,B,C	Not specified	Urban

Countermeasure: Conversion of stop-controlled intersection into multi-lane roundabout

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type
0.95	5	★★★★★	All	All	Not specified	Urban

Countermeasure: Conversion of stop-controlled intersection into single-lane roundabout

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type
0.28	72	★★★★★	All	All	Not specified	Urban

0.42	58	★★★★★	All	All	Not specified	Rural
0.12	88	★★★★★	All	A,B,C	Not specified	Urban
0.18	82	★★★★★	All	A,B,C	Not specified	Rural

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

For more information, contact Karen Scurry at karen.scurry@dot.gov

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CMF / CRF Details

CMF ID: 207

Conversion of stop-controlled intersection into single-lane roundabout

Description:

Prior Condition: *No Prior Condition(s)*

Category: Intersection geometry

Study: [Observational Before-After Study of the Safety Effect of U.S. Roundabout Conversions Using the Empirical Bayes Method, Persaud et al., 2001](#)

Star Quality Rating:



Crash Modification Factor (CMF)

Value: 0.42

Adjusted Standard Error: 0.13

Unadjusted Standard Error: 0.07

Crash Reduction Factor (CRF)

Value: 58 (This value indicates a **decrease** in crashes)

Adjusted Standard Error: 13

Unadjusted Standard Error:	7
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Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Not specified
Number of Lanes:	
Road Division Type:	
Speed Limit:	
Area Type:	Rural
Traffic Volume:	
Time of Day:	

If countermeasure is intersection-based

Intersection Type:	Roadway/roadway (not interchange related)
Intersection Geometry:	Not specified
Traffic Control:	Stop-controlled
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details

Date Range of Data Used:	
Municipality:	
State:	

Country:	
Type of Methodology Used:	2
Sample Size Used:	

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	Dec-01-2009
Comments:	

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