# AVON COMMUNITY SCHOOL CORPORATION PROPOSED MIDDLE SCHOOL

**TRAFFIC IMPACT STUDY** 

SEPTEMBER 6, 2023

PREPARED FOR:

THE VERIDUS GROUP 6280 N. SHADELAND AVENUE SUITE A INDIANAPOLIS IN 46220

PREPARED BY:

CRAWFORD, MURPHY & TILLY, INC. 8790 PURDUE ROAD INDIANAPOLIS, IN 46268





## TABLE OF CONTENTS

TABLE OF CONTENTS	0
INTRODUCTION	1
PROPOSED DEVELOPMENT	1
STUDY AREA	1
Figure 1: Study Area	2
Figure 2: Conceptual Site Plan	3
TRAFFIC VOLUMES	4
Traffic Counts	4
Growth Rates	4
Figure 3: 2023 Existing Volumes — AM Peak Hour (7:30-8:30 AM)	5
Figure 4: 2022 Existing Volumes – PM Peak Hour (2:30-3:30 PM)	6
Trip Generation and Trip Distribution	7
Table 1: Avon Middle School Trip Generation	8
Table 2: ITE Trip Generation For Middle School/Junior High School (For comparison)	8
Figure 5: Distribution of Bus Trips	10
Figure 6: Bus Trips – AM Peak Hour	11
Figure 7: Bus Trips – PM Peak Hour	12
Figure 8: Distribution of Passenger Vehicle Trips	13
Figure 9: Passenger Car Trips – AM Peak Hour	14
Figure 10: Passenger Car Trips – PM Peak Hour	15
Build Traffic Volumes	16
Figure 11: Opening Day Build Traffic – AM Peak Hour	17
Figure 12: Opening Day Build Traffic – PM Peak Hour	18
TRAFFIC ANALYSES	19
Capacity Analysis	19
Table 2A: Capacity Analysis Summary	20
Table 2B: Capacity Analysis Summary	21
Turn Lane Warrants	22
Table 3: Turn Lane Warrant Summary	22
Traffic Signal Warrant	23
Table 4: Traffic Signal Warrant Results	23
Conclusions	24
Improvement Implementation Plan	25

- APPENDIX A: Project Documentation
- APPENDIX B: Traffic Data
- APPENDIX C: Traffic Volume Calculations
- APPENDIX D: Capacity Analyses
- APPENDIX E: Signal Warrant
- APPENDIX F: Turn Lane Warrants
- **APPENDIX G: Review Comments**

I certify that this Traffic Impact Analysis report has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

Gerald T. Bollinger

**Gerald Bollinger** 

Indiana Registration # PE11600724



Consulting Firm: Crawford, Murphy & Tilly, Inc.

## INTRODUCTION

The Avon Community School Corporation (ACSC) is proposing a new Middle School campus in the southwest quadrant of the CR100 and CR 450 intersection in Avon, Indiana. The purpose of this traffic study is to document existing traffic conditions and evaluate future traffic operations with the new Middle School. This study has been prepared in accordance with INDOT and ITE impact study guidelines to meet the Town of Avon requirements. The scope of this study was coordinated with the Town of Avon and documented in a Memorandum of Understanding (MOU) dated May 26, 2023. A Traffic Volume Submittal dated July 5, 2023 was submitted to the Town of Avon and Hendricks County to document study assumptions and traffic volumes for use in this study. Project documentation including correspondence from local agencies is included in **Appendix A**.

## PROPOSED DEVELOPMENT

The proposed plan for the new Avon Middle School campus (west side of CR-450) is shown in **Figure 2** and includes the following components:

- The new Avon Middle School Master Plan includes the construction of a new building in the southwest quadrant of the CR-100 and CR-450 intersection.
- The site will also include tennis courts (8), softball fields (2), baseball fields (2), practice football fields (2) and a football/track field.
- Two new points of access are proposed along the west side of CR-450. The northern access point (# 6) will provide passenger vehicle ingress/egress during school arrival and dismissal periods. The southern access point (# 7) will provide bus ingress/egress during school arrival and dismissal periods and event parking.

No additional development is anticipated in the area except for the proposed middle school.

## STUDY AREA

The study area includes the following five existing intersections (shown in **Figure 1**) and two proposed access points (shown in **Figure 2**).

1.	CR400 @ US36	unsignalized, side-street stop control
2.	CR100 @ CR450	unsignalized, side-street stop control
3.	CR100 @ Foxboro Drive	unsignalized, side-street stop control
4.	CR100 @ CR525	Future roundabout (2024)
5.	CR450 @ CR200	unsignalized, side-street stop control
6.	<ul> <li>CR450 @ North School Access</li> <li>Proposed access to new Middle School</li> </ul>	Proposed

• Passenger car entry, No bus entry or exit

## FIGURE 1: STUDY AREA



Figure 1 – Study Area Map **Avon New Middle School** 

Master Plan | May 2023



## FIGURE 2: CONCEPTUAL SITE PLAN



LEGEND

Car Rider Stacking Automobile Circulation Bus Circulation Student Drop-Off/Pick-Up

Truck Traffic

Pedestrian Circulation

R.O.W. Trail

Cross Country Route

\*\*\*\*\*

Figure 2 – Site Plan and Circulation Plan Avon New Middle School

Master Plan | May 2023



#### 7. CR450 @ South School Access

#### Proposed

- Proposed access to new Middle School
- Bus entry and exit
- Passenger car exit
- No passenger car entry

## TRAFFIC VOLUMES

Traffic impacts attributed to the proposed Avon Middle School are determined by combining new vehicle trips generated by the school and the growth of background traffic volumes on the adjacent public street system. The combination of school traffic and background traffic is referred to as Build Traffic volumes. The purpose of this study is to determine impacts to the study area intersection resulting from new and redistributed traffic volumes added to the road network. The following sections detail the steps involved in preparing traffic volume projections for this study. Traffic volume plates referenced in this section are included in **Appendix C**.

#### TRAFFIC COUNTS

Turning movement counts using Miovision video technology and manual count boards were collected at the five existing study intersections shown in **Figure 1**. Counts were collected on Tuesday 6/6/2023 and Wednesday 6/7/2023 from 7:00 to 9:00 AM and from 2:00 to 6:00 PM. Traffic count data is included in **Appendix B**. Additional information is documented below.

- Traffic counting periods were selected to coincide with the school's operating hours, which will be from 8:15 AM – 2:45 PM. The peak vehicular travel times are anticipated to be 7:30-8:30 AM and 2:30-3:30 PM.
- 2. The morning hour with the highest volume of traffic varied between the five existing intersections. The 7:30-8:30 hour was used since it coincides with the highest generating hour of the proposed school.
- **3.** The afternoon peak hour of the school traffic is expected to be from 2:30 to 3:30 PM. The highest hourly volume at the existing intersections ranges between 4:30 PM and 6:00 PM. However, existing volumes during the 2:30-3:30 hour were used since they coincide with the peak hour of the school.
- 4. Existing peak hour traffic volumes at all study intersections are shown graphically in Figure 3 (AM 7:30-8:30 Peak Hour) and Figure 4 (PM 2:30-3:30 Peak Hour).

#### **GROWTH RATES**

No additional development has been identified in the study area except for the proposed middle school. This assumption was discussed in the project coordination meeting and documented in the study MOU and Traffic Volumes submittal. No increases in existing traffic volumes have been included in this study since the proposed middle school growth will be accounted for in the trip generation procedures described in the following section.



#### FIGURE 3: 2023 EXISTING VOLUMES – AM PEAK HOUR (7:30-8:30 AM)



#### FIGURE 4: 2022 EXISTING VOLUMES - PM PEAK HOUR (2:30-3:30 PM)

## TRIP GENERATION AND TRIP DISTRIBUTION

Full occupancy of the proposed middle school will accommodate 1,100 students. This study will assume the school is at full occupancy on opening day for the purpose of evaluating transportation impacts.

- 990 students (90-percent) will be transported via the district's bus services. The remaining 110 students (10-percent) will be transported via private passenger vehicles. Using an average of 55 students per bus, the 990 students will be transported using a total of 18 buses to and from the new Middle School site. It is assumed that the 18 buses will enter and exit the middle school site during the AM arrival period and during the PM dismissal period for a total of 36 bus trips during the AM arrival hour and 36 bus trips during the PM dismissal hour.
- 110 non-bussed students will be transported in private vehicles at a rate of 1 student per vehicle. Each of the 110 private vehicles will make both an entering trip and an exiting trip from the school campus during the arrival hour and during the dismissal hour for a total of 220 vehicle trips per period. (Note that entering and exiting percentages are based on hourly distributions published by ITE)
- Estimate 75 teachers, administrators, and staff at the proposed middle school. Each of the 75 employees will make both an entering trip and an exiting trip during the arrival hour and during the dismissal hour for a total of 150 trips per period. (Note that entering and exiting percentages are based on hourly distributions published by ITE.)

This information was used as the basis for estimating vehicle trips for the new Middle School campus, as shown in **Table 1.** The combination of 36 bus trips and 370 vehicle passenger vehicle trips results in 406 vehicle trips per period.

Forecasting vehicle trips for traffic studies is traditionally done using data and methodology contained in the Institute of Transportation Engineers document <u>Trip Generation</u> (10th Edition current). The ITE dataset contains trip generation rates for various land uses based on data collected as sites throughout the United States. The ITE trip generation document publishes rates for land use Middle School/Junior High School (Code 522) which is a comparable land use to the proposed Avon Middle School development. Trip generation estimates for 1,100 students using the ITE Middle School/Junior High School land use are summarized in **Table 2**. However, rates for the Middle School land use are based on a broad range of school sites that have a wide range of bus and car rider demographics.

- The ITE methodology estimates 814 vehicle trips in the AM arrival period compared to 406 vehicle trips using the site-specific parameters for Avon Middle School.
- The ITE methodology estimates 396 vehicle trips during the PM dismissal period compared to 406 vehicle trips using the site-specific parameters.

ITE trip generation is useful for estimating trip generation when site-specific information is not available but may be an over-estimate for sites that have a high percentage of students transported via bus services. Since specific transportation information is available for the Avon Middle School development, use of the site-specific trip generation estimates was used in this study.

#### TABLE 1: AVON MIDDLE SCHOOL TRIP GENERATION

		Time		v	/ehicle Trip	s
Land Use	Student	Period	Formula	Total	Entering	Exiting
Middle School	185					
Car Trips	Students	AM Peak - Generator	Average Rate = 2.0	370	204	167
(assume 2 trips per student per time period)	faculty	PM Peak - Generator	Average Rate = 2.0	370	170	200
	staff					
Middle School	18					
Bus Trips	Buses	AM Peak - Generator	Average Rate = 2.0	36	18	18
(18 buses to transport 990 students)		PM Peak - Generator	Average Rate = 2.0	36	18	18
Middle School		AM Peak - Generato	or	406	222	185
Total Trips		PM Peak - Generato	or	406	188	218

#### TABLE 2: ITE TRIP GENERATION FOR MIDDLE SCHOOL/JUNIOR HIGH SCHOOL (FOR COMPARISON)

Land Use	Students	Time Period	ITE Formula	Total Trips	Trips Entering	Trips Exiting
Middle School/Junior High School (6-8)	1,100					
ITE LUC 522	Students	AM Peak - Generator	Average Rate = 0.74	814	448	366
		PM Peak - Generator	Average Rate = 0.36	396	182	214

New vehicle trips generated by the Middle School need to be distributed to the access points on CR450 and to the roadways and intersections in the study area. The following procedures were used to determine trip distribution.

## Step 1: Assignment of bus traffic to the proposed access driveways and intersections

The southern access drive will be the point of entry and exit for all bus traffic during arrival and dismissal periods. All new bus generated trips are assigned to the south access drive. The following bus routing information was provided by ACSC for use in this study:

- 3 buses will be assigned to/from the north on CR450 and east on CR100 (to Parks of Prestwick) – 17% of buses assigned to/from east on CR100
- 0 buses will be assigned to the west on CR100 to avoid the railroad crossing on CR400 just south of US36 0% buses assigned to/from west on CR100
- 1 bus will be assigned to/from the south on CR450 and west on CR200 6% buses assigned to/from west on CR200
- 14 buses will be assigned to/from the south on CR450 and east on CR200 78% of buses assigned to/from east on CR200

Buses distribution is shown graphically in **Figure 5**. New bus trips distributed to the study area roadway network are shown in **Figure 6 (AM peak) and Figure 7 (PM peak)**.

# <u>Step 2: Assignment of passenger car traffic to the proposed access driveways and intersections</u>

The northern-most access drive will be the point of entry for all passenger vehicles during arrival and dismissal periods. Passenger vehicles will be permitted to exit from both the north and south access drive following drop off at the building. 100% of entering passenger vehicle trips are assigned to the north access. 60% of exiting passenger vehicle trips are assigned to the south access drive with the remaining 40% of exiting trips assigned to the north access drive.

Passenger vehicle trips were assigned to CR450 and the adjacent study area intersections according to the following distributions calculated from existing traffic counts:

- To/From the west on CR100 19%
- To/From the east on CR100 36%
- To/From the west on CR200 21%
- To/From the east on CR200 24%

Passenger vehicle distribution is shown graphically in **Figure 8**. New passenger vehicle trips distributed to the study area roadway network are shown in **Figure 9** (**AM peak**) and **Figure 10** (**PM peak**).

## FIGURE 5: DISTRIBUTION OF BUS TRIPS



#### FIGURE 6: BUS TRIPS – AM PEAK HOUR



#### FIGURE 7: BUS TRIPS - PM PEAK HOUR



#### FIGURE 8: DISTRIBUTION OF PASSENGER VEHICLE TRIPS



#### FIGURE 9: PASSENGER CAR TRIPS – AM PEAK HOUR



#### FIGURE 10: PASSENGER CAR TRIPS – PM PEAK HOUR



#### **BUILD TRAFFIC VOLUMES**

The 2023 existing volumes were combined with the new bus trips and new passenger vehicle trips expected to be generated by the proposed Middle School to arrive at the Opening Day Build volumes. Opening Day Build Volumes are shown graphically in **Figures 11 (AM Peak) and 12 (PM Peak).** These are the volumes that will be used for the detailed traffic analyses scoped for this traffic study. Detailed traffic volume calculations are attached.

#### FIGURE 11: OPENING DAY BUILD TRAFFIC - AM PEAK HOUR



#### FIGURE 12: OPENING DAY BUILD TRAFFIC – PM PEAK HOUR



18

#### TRAFFIC ANALYSES

The following traffic analyses were performed as part of this study and are discussed in further detail in the following sections.

- **Capacity analyses**: To determine if acceptable intersection operation can be maintained with the anticipated growth in school related traffic. See **Appendix D**.
- **Turn lane warrants**: To determine if auxiliary turn lanes are warranted at existing intersections and proposed access points to the proposed middle school campus. See **Appendix E.**
- **Traffic signal warrants**: To determine if traffic signal control is warranted at the SR234/CR200 intersection. See **Appendix F.**

Note that storage lane warrants were based on the "need to maintain acceptable levels of service (LOS D or better)" at the unsignalized intersections for the Opening Day Build conditions. The capacity analysis yielded levels of service C or better. Therefore, no storage lane warrants were performed as part of this study.

#### CAPACITY ANALYSIS

Intersection capacity was evaluated using Synchro 11 software. Intersections are evaluated using a level of service (LOS) designation expressed in terms of letter grades with LOS A representing the highest quality traffic flow and minimal delay, and LOS F representing poor traffic operations, significant delay, and substantial vehicle queuing. As defined in the Highway Capacity Manual, level of service for intersections is a measure of vehicle delay.

Capacity analysis results are summarized in **Table 2.** The goal of the capacity analysis was to determine what improvements, if any, are needed to provide an overall intersection level of service D or better with no individual movements below level of service D. All capacity analyses were based on 2025 Opening Day Build traffic volumes (**Figures 11 and 12**).

Details of the capacity analyses are summarized below.

- Capacity analyses used a Peak Hour Factor (PHF) of 0.50 for the intersections within the local roadway network. This PHF was selected since traffic in and around the school site will likely be most concentrated within a 15-30 minute period during the highest generating hour. A PHF of 1.0 indicates that traffic volume in every 15-minute period is the same and therefore traffic flow is consistent throughout the hour. Lower PHF values indicate more variable traffic flows and that traffic volume has a spike during the peak 15-minute interval, such as during school arrival and dismissal periods.
- CR-400 / US-36 intersection with stop control NB/SB and existing lane conditions; single lane approaches (NB and SB). This intersection was evaluated with 2023 existing traffic volumes (AM and PM peak hours) and for 2025 conditions assuming build out of the Avon Middle school master plan. A normalized peak hour factor (PHF) of 0.92 was applied to this outlying intersection.
- CR-100 / CR-450 intersection with stop control NB and existing lane conditions; single lane approaches (NB, EB and WB). This intersection was evaluated with 2023 existing

traffic volumes (AM and PM peak hours) and for 2025 conditions assuming build out of the Avon Middle school master plan.

- CR-100 / Foxboro intersection with stop control NB and existing lane conditions; single lane approaches (NB, EB and WB). This intersection was evaluated with 2023 existing traffic volumes (AM and PM peak hours) and for 2025 conditions assuming build out of the Avon Middle school master plan.
- CR-100 / CR-525 intersection with proposed single lane roundabout. This intersection was evaluated with 2023 existing traffic volumes (AM and PM peak hours) and for 2025 conditions assuming build out of the Avon Middle school master plan.

Year	Time Period	Traffic Control	EBLT	EBTH	EBRT	WBLT	WBTH	WBRT	NBLT	NBTH	NBRT	SBLT	SBTH	SBRT	TOTAL
CR-400E	@ US-36						1								
2023	AM Peak (7:30-8:30AM)	Two-Way Stop Control	A/8.6	-	-	A/9.5	-	-	-	C/15.7	-	-	C/18.2	-	A/1.3
Existing	PM Peak (2:30-3:30PM)	Two-Way Stop Control	A/9.3	-	-	A/8.8	-		-	C/18.3	1	ē	C/19.8		A/1.5
2025 Build	AM Peak (7:30-8:30AM)	Two-Way Stop Control	A/8.6	-	-	A/9.6	-	-	-	C/19.4	-	-	C/21.4	-	A/2.2
	PM Peak (2:30-3:30PM)	Two-Way Stop Control	A/9.3	-		A/8.9	-	k <b>e</b> st	-	C/21.1	-	-	C/22.6	-	A/2.3
CR-100S	@ CR-450E														
2023	AM Peak (7:30-8:30AM)	Two-Way Stop Control	-	FREE	-	-	A/6.3	(11)	A/8.5		A/8.5	-	-	-	A/5.0
Existing	PM Peak (2:30-3:30PM)	Two-Way Stop Control	-	FREE	-	2	A/4.3	-	A/8.6	-	A/8.6	-	-		A/4.8
2025	AM Peak (7:30-8:30AM)	Two-Way Stop Control	-	FREE	-	-	A/7.4		B/11.6	-	B/11.6	-		. <del></del> 1	A/7.7
Build	PM Peak (2:30-3:30PM)	Two-Way Stop Control	-	FREE	-	-	A/6.9	-	B/12.0	-	B/12.0	-	-	¥ 1	A/8.3
CR-100S	@ Foxboro Dri	ve													
2023	AM Peak (7:30-8:30AM)	Two-Way Stop Control	-	FREE	-	-	A/3.6	-	A/8.7	-	-	-			A/4.0
Existing	PM Peak (2:30-3:30PM)	Two-Way Stop Control	-	FREE	s <b>-</b> :	-	A/4.1		A/8.6	-	-	-	-	-1	A/4.3
2025	AM Peak (7:30-8:30AM)	Two-Way Stop Control	-	FREE	225	-	A/6.8	( <u>-</u> )	B/10.0	-	2	-	-	21	A/6.8
Build	PM Peak (2:30-3:30PM)	Two-Way Stop Control	-	FREE	-	÷.	A/6.1	-	A/9.8		2	-	-	-	A/6.9

#### TABLE 2A: CAPACITY ANALYSIS SUMMARY

Letter/Number = Level of Service / Average Delay Per Vehicle

TABLE 2B: CAPACITY ANALYSIS SUMMARY	TABLE	2B:	CAPACITY	ANALYSIS	SUMMARY
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Year	Time Period	Traffic Control	EBLT	EBTH	EBRT	WBLT	WBTH	WBRT	NBLT	NBTH	NBRT	SBLT	SBTH	SBRT	TOTAL
CR-100S	@ CR-525E														
2023	AM Peak (7:30-8:30AM)	Roundabout	A/4.8	-	-	A/4.7	-	-	A/5.1	-	-	A/4.4	-	-	A/4.7
Existing	PM Peak (2:30-3:30PM)	Roundabout	A/4.4	-	-	A/6.0	-	-	A/4.6	-	-	A/5.3	-	-	A/5.4
2025	AM Peak (7:30-8:30AM)	Roundabout	A/8.5	-	-	A/8.4	-	-	A/8.8	-	-	A/7.0	-	-	A/8.2
Build	PM Peak (2:30-3:30PM)	Roundabout	A/6.8	-	-	B/13.7	-	-	A/7.6	-	-	A/7.2	-	-	A/10.0
CR-450E	@ CR-200S	1								1					
2023	AM Peak (7:30-8:30AM)	Two-Way Stop Control	A/1.0	-	-	-	FREE	FREE	-	-	-	A/8.8	-	-	A/1.8
Existing	PM Peak (2:30-3:30PM)	Two-Way Stop Control	A/1.9	-	-	-	FREE	FREE	-	-	-	A/8.9	-	-	A/1.8
2025 Build	AM Peak (7:30-8:30AM)	Two-Way Stop Control	A/4.6	-	-	-	FREE	FREE	-	-	-	B/12.6	-	-	A/6.0
	PM Peak (2:30-3:30PM)	Two-Way Stop Control	A/5.2	-	-	-	FREE	FREE	-	-	-	B/13.8	-	-	A/6.5
North Mi	ddle School Ad	ccess @ CR-									<u>.</u>				
2025	AM Peak (7:30-8:30AM)	Two-Way Stop Control	B/14.6	-	-	-	-	-	-	A/5.3	-	-	FREE	FREE	A/7.6
Build	PM Peak (2:30-3:30PM)	Two-Way Stop Control	C/20.7	-	-	-	-	-	-	A/5.0	-	-	FREE	FREE	A/5.7
South Middle School Access @ CR-															
2025	AM Peak (7:45-8:45AM)	Two-Way Stop Control	B/10.7	-	-	-	-	-	-	A/1.1	-	-	FREE	FREE	A/5.2
Build	PM Peak (2:30-3:30PM)	Two-Way Stop Control	B/11.2	-	-	-	-	-	-	A/1.1	-	-	FREE	FREE	A/5.8

Letter/Number = Level of Service / Average Delay Per Vehicle

- CR-450 / CR-200 intersection with stop control SB and existing lane conditions; single lane approaches (SB, EB and WB). This intersection was evaluated with 2023 existing traffic volumes (AM and PM peak hours) and for 2025 conditions assuming build out of the Avon Middle school master plan.
- CR-450 intersections (North School Access and South School Access) with side street stop control. These intersections were evaluated with 2025 traffic volumes assuming full build out of the master plan. The proposed school access driveways are expected to operate at LOS C or better through the 2025 Opening Day Build conditions.

The remaining intersections operate at acceptable levels of service (LOS B or C) for all movements through the 2025 Opening Day Build condition.

#### TURN LANE WARRANTS

Section 46-4.0 of the Indiana Department of Transportation Design Manual provide guidance and graphical solutions for determining the need for left and right turn lanes at unsignalized intersections. An exclusive right-turn lane should be considered at an unsignalized intersection on a 2-lane urban or rural highway when criteria shown in Figure 46-4A is satisfied. An exclusive left-turn lane should be considered at an unsignalized intersection on a 2-lane urban or rural highway which satisfies the criteria shown in Figure 46-4C (Volume Guidelines for Left-Turn Lane on a Two-Lane Highway). The left and right turn lane warrant criteria were evaluated at the following intersections using AM and PM peak hour volumes projected for the school development:

- CR-450 @ School South Access Drive 40 MPH operating speed on CR-450
- CR-450 @ School North Access Drive 40 MPH operating speed on CR-450
- CR-100 @ CR-450 40 MPH operating speed on CR-450

Warrants were not evaluated at the remaining intersections. Warrant results are summarized in **Table 3** with detailed warrant graphs included in **Appendix E.** 

Intersection	Movement	Turn Lane Warrant Result		
CR-450 @ School South	NB Left Turn	Warrant Not Met		
Access Drive	SB Right Turn	Warrant Not Met		
CR-450 @ School North	NB Left Turn	Warrant Met (based on left turn percentage only)		
Access Drive	SB Right Turn	Warrant Met for AM Peak (Marginal)		
CB 100 @ CB 450	WB Left Turn	Warrant Met (with Provisions)		
CR-100 @ CR-450	EB Right Turn	Warrant Not Met		

## TABLE 3: TURN LANE WARRANT SUMMARY

The intersection of CR100 and CR450 is currently stop controlled for the NB CR450 approach. Traffic on CR100 is free flowing and does not stop at the intersection. The geometric conditions of the CR100 and CR 450 intersection are unusual in that CR450 intersects CR100 in a horizontal curve. The addition of school-generated traffic to the CR450/CR100 intersection adds volume to the WB left turn movement which ranges from 89 to 97 percent of the total WB advancing traffic at intersections. The INDOT turn lane warrant thresholds consider left turn percentages up to 30%. Although the WB left turn percentage exceed 30%, the opposing and advancing through volumes on CR100 are very low and fall well below the warrant thresholds for auxiliary turn lanes. Since through volumes are low on CR 100 and LOS A/B is expected for the stop-controlled movements, a standard left turn lane is not recommended.

A right-turn lane is marginally warranted for the SB movement at the north school driveway on CR-450 for the AM Peak Hour. The lane is not warranted for the PM Peak Hour. The SB right turn volume is 112 vehicles in the AM peak hour with only 17 SB advancing through vehicles. The intersection operates at an acceptable level of service with a single southbound through lane. For these reasons, an exclusive SB right turn lane is not recommended at the north access driveway.

#### TRAFFIC SIGNAL WARRANT

Traffic signals should be installed only if an intersection meets at least one of the criteria specified in the <u>Indiana Manual of Uniform Traffic Control Devices</u>, § 4C (Indiana Department of Transportation, 2011 Edition) (hereafter referred to as the IMUTCD). Traffic signal warrant thresholds are dependent on volume of traffic on the major and minor streets, number of approach lanes on the major and minor street, and speed limit on the major street. Direction provided in the scoping meeting for this study was to evaluate traffic signal Warrant 2 (Four Hour Vehicular Volume) for the CR-100/CR-450 intersection.

Warrant 2 requires that certain volume conditions exist for the major street and the minor street on the higher volume approaches during each of any four hours of an average day. Warrant 2 uses a graphical procedure.

The signal warrants were evaluated for the CR-100/CR-450 intersection under the following conditions:

- Using 2023 traffic volumes existing on 06/06/2023 and 06/07/2023. No increase in school generated traffic was included in the analysis.
- Low-volume thresholds were used since the intersection lies within the built-up areas of an isolated community having a population of less than 10,000. These same lower volume thresholds apply when the major street speed exceeds 40 MPH which is the case for CR-100 and the south leg of CR-450.
- Warrants were evaluated assuming CR-100 as the major street and CR-450 as the minor street with single lane approaches. Low-volume thresholds were used since the intersection is in a community with population less than 10,000.

Traffic Signal Warrant results are summarized in **Table 4.** Detailed warrant reports are included in **Appendix E.** 

## TABLE 4: TRAFFIC SIGNAL WARRANT RESULTS

Description	CR100 as Major Street
Warrant 2:	0 hours met of 4 required
Four Hour Vehicular Volume	WARRANT NOT MET

A four-hour warrant is not met (0 of 4 required hours) at the CR-100 / CR-450 for the 2023 volume counts. Signalization should not be considered a required improvement tied to the proposed school redevelopment plan since levels of service are maintained with current conditions.

#### CONCLUSIONS

A new Middle School campus for the Avon Community School Corporation is proposed in the southwest quadrant of the CR100 and CR 450 intersection in Avon, Indiana. The new site will include construction of a new school building and associated sports fields. Two driveways are proposed on the west side of CR-450 to provide access to the new school. The purpose of this study is to document existing traffic conditions and evaluate future traffic operations with the new Middle School. Findings of this study are summarized below.

• The proposed Avon Middle School is expected to add 406 new vehicle trips during the AM arrival period and 406 new vehicles trips during the PM dismissal period. These projections are based on the school district's projections for student transportation.

	New Bus Trips	New Vehicle Trips
To/From east on CR 100 (Parks of Prestwick)	17% (3 buses)	36%
To/From west on CR 100	0%	19%
To/From east on CR 200	78% (14 buses)	21%
To/From west on CR 200	6% (1 bus)	24%

• New school generated trips were distributed to the area roadway network based on percentages shown in the table below:

- Traffic signals are not expected to be warranted at the school driveways or at the CR 100/CR 450 intersection.
- Good levels of service are expected at all study area intersections. LOS A/B is expected at both school driveways and at the CR 100/CR 450 intersection.
- A northbound left turn lane is warranted on CR 450 at the North School Driveway. The southbound right turn lane is marginally warranted at this location.
- No turn lanes are warranted on CR 450 at the South School Driveway.
- The westbound left turn movement from CR 100 to CR 450 exceeds the left turn percentages of the warrant thresholds. However, the through volumes on CR 100 fall well below thresholds for a left turn lane. There is 30 feet of pavement width on the east leg of CR 100 (Parks at Prestwick leg) available to provide a left turn storage lane or for reconfiguration of the intersection. No pavement widening is recommended on CR 100.

#### IMPLEMENTATION PLAN

The draft traffic study dated July 5, 2023 was reviewed by the Town of Avon and Hendricks County. Comments were received by both reviewing agencies with responses. Town and county review comments and responses are included in **Appendix G**. The project was presented to the Town of Avon Advisory Plan Commission on August 28, 2023. Through discussions with the Town of Avon and Hendricks County, the following improvements will be implemented:

- Dedicated left and right turn lanes will be constructed on CR 450E at both the north and south entrances to the new middle school as required by the Town of Avon ordinance.
- A traffic circle with a three-way stop condition will be developed at the intersection of CR 100S and CR 450E.
- A restrictive donation calculated by the Town of Avon will be provided for improvements to be implemented by the Town of Avon at the intersection of CR 200S and CR 450E.
- An escrow will be established for traffic calming measures on CR 100S between CR 450E and CR 525E. An estimate for the traffic calming measures will be developed by Hendricks County and the traffic calming measures will be implemented by Hendricks County.

# **AVON SCHOOLS TIS**

APPENDIX A: PROJECT DOCUMENTATION



## Scott Knebel

From:	William Peeples <wpeeples@avonindiana.gov></wpeeples@avonindiana.gov>
Sent:	Wednesday, June 28, 2023 8:56 AM
То:	Gonzalo Castro Diaz; John Ayers
Cc:	Jerry Rolfson, RA, NCARB, DBIA, LEED AP; Ian Loera; Scott Knebel
Subject:	RE: Avon Middle School traffic submittal

*External Message:* This email was sent from someone outside of CMT. Please use caution with links and attachments from unknown senders or receiving unexpected emails.

Good morning,

It was interesting to see the divergence between what the ITE projects and what the site specific projections say. I do concur that the ITE overestimates trips in the morning.

The distribution seems reasonable to me.

From: Gonzalo Castro Diaz <lcastrodiaz@theveridusgroup.com>
Sent: Thursday, June 22, 2023 1:43 PM
To: William Peeples <wpeeples@avonindiana.gov>; John Ayers <jayers@co.hendricks.in.us>
Cc: Jerry Rolfson, RA, NCARB, DBIA, LEED AP <jrolfson@performanceservices.com>; Ian Loera

Subject: FW: Avon Middle School traffic submittal

Good afternoon Bill and John,

Please see below for a link to the partial report we received for the traffic study. We would appreciate it if you could provide feedback regarding the assumptions being used for the analyses. Let us know if you have any questions.

Thank you,

ShareFile Attachments	Expires December 19, 2023					
R_Avon MS_Traffic Volume Submittal_062223.pdf	9 MB					
Download Attachments						
Gonzalo Castro Diaz uses ShareFile to share documents securely.						

Gonzalo Castro Diaz, PE | The Veridus Group | m: 219-398-8355

From: Scott Knebel <<u>sknebel@cmtengr.com</u>>
Sent: Thursday, June 22, 2023 10:43 AM
To: Gonzalo Castro Diaz <<u>lcastrodiaz@theveridusgroup.com</u>>
Cc: Jerry Rolfson, RA, NCARB, DBIA, LEED AP <<u>jrolfson@PerformanceServices.com</u>>; Beth Sliemers
<<u>bsliemers@cmtengr.com</u>>
Subject: Avon Middle School traffic submittal

#### Gonzalo

Attached is a partial report showing the traffic volumes we propose to use for the detailed analyses. We committed in the MOU to provide this information to obtain concurrence for the public agencies. Please forward this information and request them to provide feedback regarding the assumptions being used for the analyses.

Due to the timeline, we will advance the analysis at risk. Hopefully the town and county concur with the assumptions outlined in the traffic submittal.

Call with questions.

Scott

**SCOTT KNEBEL PE | Crawford, Murphy & Tilly** | w 614.468.1215 | m 937.776.1040 *Vice President* 

From: Scott Knebel
Sent: Thursday, June 8, 2023 9:29 AM
To: Gonzalo Castro Diaz <<u>lcastrodiaz@theveridusgroup.com</u>>
Cc: Jerry Rolfson, RA, NCARB, DBIA, LEED AP <<u>jrolfson@PerformanceServices.com</u>>; Beth Sliemers
<<u>bsliemers@cmtengr.com</u>>
Subject: Avon Middle School trip generation

Gonzalo

Attached is a memo that outlines the trip generation assumptions for the new school. The trips estimated using the standard ITE methodology are much larger than those if using the site-specific information. Therefore are proposing to use the site-specific data (lower trip rate) but want to confirm that the numbers are reasonable. Can you confirm with the school they concur with using the site-specific data – we may need to defend the use of the much lower data?

We plan to generate a more comprehensive traffic memo (06/14/23?) that summarizes our assumptions for distribution to ACSC, the Town of Avon and Hendricks County. We will proceed with the balance of the analysis so any feedback regarding the traffic assumptions will be helpful to expedite the schedule.

Call with questions.

Scott

**SCOTT KNEBEL PE | Crawford, Murphy & Tilly** | w 614.468.1215 | m 937.776.1040 *Vice President* 



## Memorandum of Understanding Avon TIS

DATE: May 31, 2023

TO: Gonzalo Castro Diaz, The Veridus Group

CC: Jerry Rolfson, Performance Systems Cassie Reiter, CMT

RE: Avon traffic study scope

A traffic study in accordance with the Institute of Transportation Engineers (ITS) impact study guidelines is proposed to meet the Town of Avon planning commission requirements. The study is to document existing traffic operations and future operations with the addition of a new middle school located in the southeast quadrant of the E. County Road 100S and S. County Road 450E intersection.

The following scope of work is being advanced unless otherwise directed by the Town.

## STUDY AREA

The site consists of the addition of a new middle school, tennis courts (8), softball fields (2), baseball fields (2), practice football fields (2), and a football/ track field. The study area will include the following existing intersections/new access points as shown on **Figure 1**:

1. E. County Road 400E at US Route 36	unsignalized, side street stop control
2. E. County Road 100S at S. County Road 450E	unsignalized, side street stop control
3. E. County Road 100S at Foxboro Drive	unsignalized, side street stop control
4. E. County Road 100S at County Road 525 E	roundabout (2024)
5. S. County Road 450E at E County Road 200S	unsignalized, side street stop control
6. North middle school access at S. County Road 450E	proposed
7. South middle school access at S. County Road 450E	proposed

The traffic study will assume no additional traffic attributed to developments beyond the future property limits of the Avon middle school site.

## DATA COLLECTION

No information was found on the INDOT Traffic Data Management System (MS2) website within the study area. However, 24-hour traffic data does exist on US Route 36 east of S. County Road 400E.

Turning movement counts (TMC) using Miovision video technology are proposed at the existing intersections (5) listed under the STUDY AREA section. Traffic data will be collected for a 6-hour period (7:00-9:00 AM; 2:00-6:00 PM) on a weekday (Tues-Thurs). Turn counts will be adjusted if multi-cycle queues occur over 15-minute intervals during both peak periods.

## Avon Schools Traffic Study Page 2

Figure 1: Study Area



Full build out of the site (beyond 10 yr horizon) to accommodate 1,100 students – use Full Build for basis of traffic study. School related traffic data will also be included in the traffic study:

- 110 students are dropped off by parents (north access) or 10% of total student population.
- 990 students being transported via bus (10 yr horizon). A staging area that accommodates up to 18 buses (25 bus max capacity on-site) having an average of about 52 students/bus

is proposed to use the south access. Note that the max capacity of a typical school bus is 78 students which accommodates scheduling variations by route and for future expansion.

Trips attributed to the sports fields are assumed to occur during off-peak periods of the adjacent roadways when in-season (see **Figure 2**). Therefore, the use of the parking lot (south access) for event parking (200 spaces) is assumed to be outside the design hour of the school thus not factored into the peak hour of the school. These numbers and growth factors will be confirmed with the Avon school district prior to the start of the traffic study.



Figure 2: Conceptual Site Plan

Avon Schools Traffic Study Page 4

## TRIP GENERATION/DISTRIBUTION

The Opening Day BUILD condition will distribute new trips on the existing roadway network for the Build condition (987 students). Distribution of traffic will be based on the following information:

- Distribution of traffic volumes on the existing roadway network based on the existing traffic volume data.
- The location of the new school site with respect to the Avon Community School Corporation (ACSC) school district.
- Input from the ACSC school district. With the exception of the three (3) buses that will transport students to The Parks of Prestwick, all others will be routed southward on CR 450E to the intersection of 200S. In order to avoid scheduling buses over RR tracks, nearly all of them will turn east onto CR 200S with the exception of those dropping students in the SW quadrant of the district.

The trip generation data will be based on the proposed Middle School traffic data listed above. This methodology is a conversative estimate since the ITE trip generation for students is expected to be lower than the proposed trip rate.

## No background growth rate is proposed when evaluating the Opening Day of the new school unless otherwise directed.

No internal capture trips are included in the trip generation estimates for new traffic. No other adjustments will be made to account for captured trips (i.e., trips between the Middle school and the sports fields). No capture trips are assumed to represent the worst-case scenario during winter where students do not have after-school activities planned at the on-site sports fields.

CMT is to submit traffic volume, trip distribution, and trip generation information to the Town as part of an interim submittal for concurrence. Detailed capacity analyses will advance to provide a study that meets the Town planning requirements.

## ANALYSES

Analyses are to be performed for the Opening Day (2025) condition. Analysis is assumed to be performed for the peak period of the traffic generator (i.e., the ACSC campus) versus the peak hour of the adjacent street which typically is between 5-6PM. Therefore, the analysis will likely be based on an AM peak period (7:30-8:30AM) and a PM peak period (2:30-3:30 PM) are consistent with ASCS school operations (8:10AM to 2:45 PM).

## Capacity Analysis

Intersection analysis will include capacity analyses for the weekday. Several conditions will have capacity analysis performed to assess impacts to the existing roadway network.

- No Build 2025 Opening Day: Existing Conditions. Analysis of adjusted traffic volumes to identify over capacity conditions due, in part, to the short peak period of typical school related traffic.
- BUILD 2025 Opening Day: Future lane configuration/operations with the two access points on S. County Road 450E.

# Design Year (2035) analyses are not proposed if no background growth rate is applied to the existing traffic volumes.

Avon Schools Traffic Study Page 5

Capacity analysis (HCM algorithms) using Synchro 11 software will be used for the traffic study. The draft report will include electronic files of the capacity analysis for review. The capacity analysis summary will include the intersection level of service (LOS) and movement LOS in addition to the approach LOS.

## Signal Warrant Analysis

Signal warrant analysis will be performed at the E. County Road 100S at S. County Road 450E intersection. The analysis would be limited to a 4-hour volume warrant.

## Storage Lane Warrants

The need for auxiliary turn lanes will be based on the need to maintain acceptable levels of service (LOS D or better) in the design year at the unsignalized intersections. A school zone using flashing beacons is assumed to be implemented on County Road 450E when the school is open (2025).

## Storage Length Analysis

Storage lane lengths will be calculated for the design hour. The storage lane length calculations for all warranted and on-site turn lanes for all intersections defined in the Study Area section.

## **Progression Analysis**

Progression analysis is not proposed since multiple signalized intersections are not being proposed with the future year analyses.

## CONCEPTUAL PLAN

A conceptual plan using aerial data will show improvements if needed to mitigate operational issues. The project limits of the conceptual plan will extend a minimum of 500 feet from the limits of the study area or development boundaries. Internal circulation, site geometrics, and access will be evaluated in the narrative of the traffic impact study.

## REPORT

This memo documents the requirements of the traffic study for review and approval by the Town of Avon. The effort includes the collection of information that will be needed for the detailed analysis: define the study area; background growth rates; CAD files of previous geometric alignments/ easements of adjacent public roadways; and general coordination.

A draft report in a PDF document will be prepared for review by the Town. CMT will address comments and prepare the final TIS document. A PDF file of the final report and appendices and supporting analysis will be furnished in an electronic format.

Formal public presentation of findings is not included as part of this project. Coordination with INDOT if required would be a part of a separate contract.
# AVON COMMUNITY SCHOOL CORPORATION PROPOSED MIDDLE SCHOOL

TRAFFIC VOLUME SUBMITTAL

JUNE 22, 2023

PREPARED FOR:

THE VERIDUS GROUP 6280 N. SHADELAND AVENUE SUITE A INDIANAPOLIS IN 46220

PREPARED BY:

CRAWFORD, MURPHY & TILLY, INC. 8790 PURDUE ROAD INDIANAPOLIS, IN 46268





# TABLE OF CONTENTS

INTRODUCTION	1
PROPOSED DEVELOPMENT	1
STUDY AREA	1
TRAFFIC VOLUMES	4
Traffic Counts	4
Growth Rates	4
Figure 3: 2023 Counted Volumes — AM Peak Hour (7:30-8:30 AM) Figure 4: 2022 Counted Volumes — PM Peak Hour (2:30-3:30 PM)	5
Trip Generation and Trip Distribution	7
Table 1: Avon Middle School Trip Generation Table 2: ITE Trip Generation For Middle School/Junior High School (For comparison) Figure 5: Distribution of Bus Trips Figure 6: Bus Trips – AM Peak Hour Figure 7: Bus Trips – PM Peak Hour Figure 8: Distribution of Passenger Vehicle Trips Figure 9: Passenger Car Trips – AM Peak Hour Figure 10: Passenger Car Trips – PM Peak Hour	
Build Traffic Volumes	16
Figure 11: Opening Day Build Traffic — AM Peak Hour Figure 12: Opening Day Build Traffic — PM Peak Hour	17 

- APPENDIX A: Memorandum of Understanding
- APPENDIX B: Traffic Data
- APPENDIX C: Traffic Volume Calculations
- APPENDIX D:
- APPENDIX E:
- APPENDIX F:

# INTRODUCTION

The Avon Community School Corporation (ACSC) is proposing a new Middle School campus in the southwest quadrant of the CR100 and CR 450 intersection in Avon, Indiana. The purpose of this traffic study is to document existing traffic conditions and evaluate future traffic operations with the new Middle School. This study has been prepared in accordance with INDOT and ITE impact study guidelines to meet the Town of Avon requirements. The scope of this study was coordinated with the Town of Avon and documented in a Memorandum of Understanding (MOU) dated May 31, 2023.

# PROPOSED DEVELOPMENT

The proposed Avon Middle School will serve 1,100 students in a new building on the proposed site. The site will also include tennis courts (8), softball fields (2), baseball fields (2), practice football fields (2) and a football/track field. The proposed site and vehicle circulation plan for the proposed Avon Middle School is shown in **Figure 2**.

Two new access points are proposed on CR 450 to facilitate vehicles entering and exiting the school campus. The northern access point is positioned X feet south of CR 100. The southern access point is positioned X feet south of CR 100.

# STUDY AREA

The study area includes the following five existing intersections (shown in **Figure 1**) and two proposed access points (shown in **Figure 2**).

1.	CR400 @ US36	unsignalized, side-street stop control
2.	CR100 @ CR450	unsignalized, side-street stop control
3.	CR100 @ Foxboro Drive	unsignalized, side-street stop control
4.	CR100 @ CR525	Future roundabout (2024)
5.	CR450 @ CR200	unsignalized, side-street stop control
6.	<ul> <li>CR450 @ North School Access</li> <li>Proposed access to new Middle School</li> </ul>	Proposed
	Passenger car entry	
	No bus entry or exit	
7.	<ul><li>CR450 @ South School Access</li><li>Proposed access to new Middle School</li></ul>	Proposed
	Bus entry and exit	
	Passenger car exit	
	No passenger car entry	



Avon New Middle School Master Plan | May 2023





#### LEGEND

Car Rider Stacking

Automobile Circulation

-----

**Bus Circulation** 

Student Drop-Off/Pick-Up Truck Traffic

----

Pedestrian Circulation

R.O.W. Trail

Cross Country Route

Figure 2 – Site Plan and Circulation Plan Avon New Middle School

Master Plan | May 2023





# TRAFFIC VOLUMES

Traffic impacts attributed to the proposed Avon Middle School are determined by combining new vehicle trips generated by the school and the growth of background traffic volumes on the adjacent public street system. The combination of school traffic and background traffic is referred to as Build Traffic volumes. The purpose of this study is to determine impacts to the study area intersection resulting from new and redistributed traffic volumes added to the road network. The following sections detail the steps involved in preparing traffic volume projections for this study. Traffic volume plates referenced in this section are included as an attachment to this document.

#### TRAFFIC COUNTS

Turning movement counts using Miovision video technology and manual count boards were collected at the five existing study intersections shown in **Figure 1**. Counts were collected on Tuesday 6/6/2023 and Wednesday 6/7/2023 from 7:00 to 9:00 AM and from 2:00 to 6:00 PM. Traffic count data is included as an attachment to this document. Additional information is documented below.

- Traffic counting periods were selected to coincide with the school's operating hours, which will be from 8:15 AM – 2:45 PM. The peak vehicular travel times are anticipated to be 7:30-8:30 AM and 2:30-3:30 PM.
- 2. The morning hour with the highest volume of traffic varied between the five counted intersections. The 7:30-8:30 hour was used since it coincides with the highest generating hour of the proposed school.
- **3.** The afternoon peak hour of the school traffic is expected to be from 2:30 to 3:30 PM. The highest hourly volume at the existing intersections ranges between 4:30 PM and 6:00 PM. However, volumes counted during the 2:30-3:30 hour were used since they coincide with the peak hour of the school.
- 4. Peak hour counted traffic volumes at all study intersections are shown graphically in Figure 3 (AM 7:30-8:30 Peak Hour) and Figure 4 (PM 2:30-3:30 Peak Hour).

#### **GROWTH RATES**

No additional growth is anticipated in the area except for the proposed middle school. No increases in counted traffic volumes have been included in this study since the proposed middle school growth will be accounted for in the trip generation procedures described in the following section.



#### FIGURE 3: 2023 COUNTED VOLUMES – AM PEAK HOUR (7:30-8:30 AM)



#### FIGURE 4: 2022 COUNTED VOLUMES – PM PEAK HOUR (2:30-3:30 PM)

# TRIP GENERATION AND TRIP DISTRIBUTION

Full occupancy of the proposed middle school will accommodate 1,100 students. This study will assume the school is at full occupancy on opening day for the purpose of evaluating transportation impacts.

- 990 students (90-percent) will be transported via the district's bus services. The remaining 110 students (10-percent) will be transported via private passenger vehicles. Using an average of 55 students per bus, the 990 students will be transported using a total of 18 buses to and from the new Middle School site. It is assumed that the 18 buses will enter and exit the middle school site during the AM arrival period and during the PM dismissal period for a total of 36 bus trips during the AM arrival hour and 36 bus trips during the PM dismissal hour.
- 110 non-bussed students will be transported in private vehicles at a rate of 1 student per vehicle. Each of the 110 private vehicles will make both an entering trip and an exiting trip from the school campus during the arrival hour and during the dismissal hour for a total of 220 vehicle trips per period. (Note that entering and exiting percentages are based on hourly distributions published by ITE)
- Estimate 75 teachers, administrators, and staff at the proposed middle school. Each of the 75 employees will make both an entering trip and an exiting trip during the arrival hour and during the dismissal hour for a total of 150 trips per period. (Note that entering and exiting percentages are based on hourly distributions published by ITE.)

This information was used as the basis for estimating vehicle trips for the new Middle School campus, as shown in **Table 1.** The combination of 36 bus trips and 370 vehicle passenger vehicle trips results in 406 vehicle trips per period.

Forecasting vehicle trips for traffic studies is traditionally done using data and methodology contained in the Institute of Transportation Engineers document <u>Trip Generation</u> (10th Edition current). The ITE dataset contains trip generation rates for various land uses based on data collected as sites throughout the United States. The ITE trip generation document publishes rates for land use Middle School/Junior High School (Code 522) which is a comparable land use to the proposed Avon Middle School development. Trip generation estimates for 1,100 students using the ITE Middle School/Junior High School land use are summarized in **Table 2**. However, rates for the Middle School land use are based on a broad range of school sites that have a wide range of bus and car rider demographics.

- The ITE methodology estimates 814 vehicle trips in the AM arrival period compared to 406 vehicle trips using the site-specific parameters for Avon Middle School.
- The ITE methodology estimates 396 vehicle trips during the PM dismissal period compared to 406 vehicle trips using the site-specific parameters.

ITE trip generation is useful for estimating trip generation when site-specific information is not available but may be an over-estimate for sites that have a high percentage of students transported via bus services. Since specific transportation information is available for the Avon Middle School development, use of the site-specific trip generation estimates was used in this study.

#### TABLE 1: AVON MIDDLE SCHOOL TRIP GENERATION

		Time		v	/ehicle Trip	s
Land Use	Student	Period	Formula	Total	Entering	Exiting
Middle School	185					
Car Trips	Students	AM Peak - Generator	Average Rate = 2.0	370	204	167
(assume 2 trips per student per time period)	faculty	PM Peak - Generator	Average Rate = 2.0	370	170	200
	staff					
Middle School	18					
Bus Trips	Buses	AM Peak - Generator	Average Rate = 2.0	36	18	18
(18 buses to transport 990 students)		PM Peak - Generator	Average Rate = 2.0	36	18	18
Middle School		AM Peak - Generato	or	406	222	185
Total Trips		PM Peak - Generato	or	406	188	218

#### TABLE 2: ITE TRIP GENERATION FOR MIDDLE SCHOOL/JUNIOR HIGH SCHOOL (FOR COMPARISON)

Land Use	Students	Time Period	ITE Formula	Total Trips	Trips Entering	Trips Exiting
Middle School/Junior High School (6-8)	1,100					
ITE LUC 522	Students	AM Peak - Generator	Average Rate = 0.74	814	448	366
		PM Peak - Generator	Average Rate = 0.36	396	182	214

New vehicle trips generated by the Middle School need to be distributed to the access points on CR450 and to the roadways and intersections in the study area. The following procedures were used to determine trip distribution.

# Step 1: Assignment of bus traffic to the proposed access driveways and intersections

The southern access drive will be the point of entry and exit for all bus traffic during arrival and dismissal periods. All new bus generated trips are assigned to the south access drive. The following bus routing information was provided by ACSC for use in this study:

- 3 buses will be assigned to/from the north on CR450 and east on CR100 (to Parks of Prestwich) – 17% of buses assigned to/from east on CR100
- 0 buses will be assigned to the west on CR100 to avoid the railroad crossing on CR400 just south of US36 0% buses assigned to/from west on CR100
- 1 bus will be assigned to/from the south on CR450 and west on CR200 6% buses assigned to/from west on CR200
- 14 buses will be assigned to/from the south on CR450 and east on CR200 78% of buses assigned to/from east on CR200

Buses distribution is shown graphically in **Figure 5**. New bus trips distributed to the study area roadway network are shown in **Figure 6 (AM peak) and Figure 7 (PM peak)**.

# <u>Step 2: Assignment of passenger car traffic to the proposed access driveways and intersections</u>

The northern-most access drive will be the point of entry for all passenger vehicles during arrival and dismissal periods. Passenger vehicles will be permitted to exit from both the north and south access drive following drop off at the building. 100% of entering passenger vehicle trips are assigned to the north access. 60% of exiting passenger vehicle trips are assigned to the south access drive with the remaining 40% of exiting trips assigned to the north access drive.

Passenger vehicle trips were assigned to CR450 and the adjacent study area intersections according to the following distributions calculated from existing traffic counts:

- To/From the west on CR100 19%
- To/From the east on CR100 36%
- To/From the west on CR200 21%
- To/From the east on CR200 24%

Passenger vehicle distribution is shown graphically in **Figure 8**. New passenger vehicle trips distributed to the study area roadway network are shown in **Figure 9** (**AM peak**) and **Figure 10** (**PM peak**).

# FIGURE 5: DISTRIBUTION OF BUS TRIPS



#### FIGURE 6: BUS TRIPS – AM PEAK HOUR



#### FIGURE 7: BUS TRIPS - PM PEAK HOUR



#### FIGURE 8: DISTRIBUTION OF PASSENGER VEHICLE TRIPS



# FIGURE 9: PASSENGER CAR TRIPS – AM PEAK HOUR



#### FIGURE 10: PASSENGER CAR TRIPS – PM PEAK HOUR



#### **BUILD TRAFFIC VOLUMES**

The 2023 counted volumes were combined with the new bus trips and new passenger vehicle trips expected to be generated by the proposed Middle School to arrive at the Opening Day Build volumes. Opening Day Build Volumes are shown graphically in **Figures 11 (AM Peak) and 12 (PM Peak).** These are the volumes that will be used for the detailed traffic analyses scoped for this traffic study. Detailed traffic volume calculations are attached.

#### FIGURE 11: OPENING DAY BUILD TRAFFIC – AM PEAK HOUR



#### FIGURE 12: OPENING DAY BUILD TRAFFIC – PM PEAK HOUR



# **AVON SCHOOLS TIS**

APPENDIX B: TRAFFIC DATA



Full Length (7 AM-9 AM, 2 PM-6 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

Tue Jun 6, 2023

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 

Leg	CR 400	E SB				US 36	WB				CR 400	E NB				US 36 E	EB				
Direction	Southb	ound				Westb	ound				Northbo	ound				Eastbou	nd				
Time	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	Int
2023-06-06 7:00AM	2	1	5	0	8	1	70	0	1	72	2	5	5	0	12	1	185	5	0	191	283
7:15AM	1	1	6	0	8	1	89	2	1	93	8	1	1	0	10	1	207	6	0	214	325
7:30AM	4	4	7	1	16	3	134	1	1	139	8	2	2	0	12	3	212	3	0	218	385
7:45AM	1	2	7	0	10	0	125	2	0	127	9	1	3	0	13	0	188	1	0	189	339
Hourly Total	8	8	25	1	42	5	418	5	3	431	27	9	11	0	47	5	792	15	0	812	1332
8:00AM	2	2	7	0	11	4	127	1	0	132	4	3	1	0	8	2	145	5	0	152	303
8:15AM	2	3	4	0	9	3	99	3	0	105	9	5	2	0	16	0	194	8	0	202	332
8:30AM	3	4	7	0	14	4	109	0	0	113	4	1	3	0	8	0	164	1	0	165	300
8:45AM	2	4	12	0	18	8	103	2	0	113	6	4	4	0	14	0	181	10	0	191	336
Hourly Total	9	13	30	0	52	19	438	6	0	463	23	13	10	0	46	2	684	24	0	710	1271
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00PM	4	1	7	0	12	0	156	2	0	158	4	0	1	0	5	5	131	3	0	139	314
2:15PM	3	3	8	0	14	0	119	7	1	127	6	2	2	0	10	4	134	3	0	141	292
2:30PM	3	6	5	0	14	1	173	5	2	181	3	5	4	0	12	6	151	5	0	162	369
2:45PM	5	3	5	0	13	1	152	5	1	159	2	3	2	0	7	0	127	2	0	129	308
Hourly Total	15	13	25	0	53	2	600	19	4	625	15	10	9	0	34	15	543	13	0	571	1283
3:00PM	5	3	10	0	18	0	174	2	1	177	1	3	4	0	8	4	144	3	0	151	354
3:15PM	4	3	4	0	11	0	200	7	1	208	3	3	3	0	9	6	132	1	0	139	367
3:30PM	8	2	8	0	18	0	146	4	0	150	3	2	5	0	10	2	150	5	0	157	335
3:45PM	5	5	7	0	17	1	175	2	0	178	7	5	3	0	15	2	152	2	0	156	366
Hourly Total	22	13	29	0	64	1	695	15	2	713	14	13	15	0	42	14	578	11	0	603	1422
4:00PM	4	9	6	0	19	0	174	9	1	184	13	1	2	0	16	1	156	2	0	159	378
4:15PM	3	7	3	0	13	0	165	11	0	176	5	1	1	0	7	3	157	4	0	164	360
4:30PM	5	5	8	0	18	1	166	5	0	172	7	3	3	0	13	2	171	1	0	174	377
4:45PM	8	2	6	0	16	0	174	6	0	180	5	9	4	0	18	2	148	3	0	153	367
Hourly Total	20	23	23	0	66	1	679	31	1	712	30	14	10	0	54	8	632	10	0	650	1482
5:00PM	3	4	4	0	11	0	195	6	1	202	4	3	2	0	9	4	146	5	0	155	377
5:15PM	2	11	3	0	16	0	187	7	0	194	0	3	1	0	4	3	155	3	0	161	375
5:30PM	4	2	7	0	13	0	183	5	0	188	4	6	2	0	12	3	134	5	0	142	355
5:45PM	5	7	9	0	21	0	149	9	0	158	4	4	5	0	13	8	132	3	0	143	335
Hourly Total	14	24	23	0	61	0	714	27	1	742	12	16	10	0	38	18	567	16	0	601	1442
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	88	94	155	1	338	28	3544	103	11	3686	121	75	65	0	261	62	3796	89	0	3947	8232
% Approach	26.0%	27.8%	45.9%	0.3%	-	0.8%	96.1%	2.8%	0.3%	-	46.4%	28.7%	24.9% (	J%	-	1.6% 9	96.2%	2.3% (	J%	-	-
% I Otal	1.1%	1.1%	1.9%	0%	4.1%	0.3%	43.1%	1.3%	0.1%	44.8%	1.5%	0.9%	0.8% (	J%	3.2%	0.8% 4	16.1%	1.1% (	J% 4	2704	-
	/9	94	152	0	325	28	33/9	103	9	3519	115	/5	64	0	254	60	3560	84	0	3/04	/802
% Lights	89.8%	100% 9	98.1%	0%	96.2%	100%	95.3%	100%	81.8%	95.5%	95.0%	100% 9	18.5%	J% 5	37.3%	96.8% 9	33.8%	94.4% (	J% 5	3.8%	94.8%
Aruculated Trucks	0 10/	00/	00/	1000/	9	00/	1 52	00/	10 20/	54	00/	00/	1 E0/ (	0	1	00/	/b	1 10/ /	0	2.00/	141
% Articulated Trucks	9.1%	0%	U% . ว	100%	2./%	0%	1.5%	0%	18.2%	1.5%	0%	0%	1.5% (	J%	0.4%	U%	2.0%	1.1%(	J%	2.0%	1./%
0 Pugge and Single Unit I fücks	1	U	3	U	4	0	113	U	U	113	6	U	U	U	0	2	100	4	U	100	289
% buses and Single-Unit Trucks	1.1%	0%	1.9%	0%	1.2%	0%	3.2%	0%	0%	3.1%	5.0%	0%	0% (	)%	2.3%	3.2%	4.2%	4.5% (	0%	4.2%	3.5%

<sup>\*</sup>L: Left, R: Right, T: Thru, U: U-Turn

#### US 36 and CR 400 E - TMC Tue Jun 6, 2023

Full Length (7 AM-9 AM, 2 PM-6 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 



[S] CR 400 E NB

Tue Jun 6, 2023

Leg Direction Time

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

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078494, Loo CR 400 E

<b>494, Location: 3</b> E	9.75759	98, -86	6.4572	258,	Site	Code:	US 3	6 and													
	CR 400 I	E SB				US 36	WB				CR 400 I	E NB				US 36 I	EB				
	Southbo	und				Westbo	ound				Northbo	ind				Eastbo	und				
	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	Int
2023-06-06 7:30AM	4	4	7	1	16	3	134	1	1	139	8	2	2	0	12	3	212	3	0	218	385
7:45AM	1	2	7	0	10	0	125	2	0	127	9	1	3	0	13	0	188	1	0	189	339
8:00AM	2	2	7	0	11	4	127	1	0	132	4	3	1	0	8	2	145	5	0	152	303
0.1E A M	2	С	4	0	0	2	00	С	0	10E	0	E	С	Δ	16	0	104	0	Δ	202	222

Provided by: Crawford Murphy & Tilly Inc. (CMT) :

Columbus OH

7:45AM	1	2	7	0	10	0	125	2	0	127	9	1	3	0	13	0	188	1	0	189	339
8:00AM	2	2	7	0	11	4	127	1	0	132	4	3	1	0	8	2	145	5	0	152	303
8:15AM	2	3	4	0	9	3	99	3	0	105	9	5	2	0	16	0	194	8	0	202	332
Total	9	11	25	1	46	10	485	7	1	503	30	11	8	0	49	5	739	17	0	761	1359
% Approach	19.6%	23.9%	54.3%	2.2%	-	2.0%	96.4%	1.4%	0.2%	-	61.2%	22.4%	16.3% 0	)%	-	0.7%	97.1%	2.2%	0%	-	-
% Total	0.7%	0.8%	1.8%	0.1%	3.4%	0.7%	35.7%	0.5%	0.1%	37.0%	2.2%	0.8%	0.6% 0	)% :	3.6%	0.4%	54.4%	1.3%	0% 5	6.0%	-
PHF	0.563	0.688	0.893	0.250	0.719	0.625	0.905	0.583	0.250	0.905	0.833	0.550	0.667	- (	).766	0.417	0.871	0.531	-	0.873	0.882
Lights	8	11	24	0	43	10	454	7	1	472	28	11	7	0	46	5	682	17	0	704	1265
% Lights	88.9%	100%	96.0%	0%	93.5%	100%	93.6%	100%	100%	93.8%	93.3%	100%	87.5% 0	)% <b>9</b>	3.9%	100%	92.3%	100%	0% <b>9</b>	2.5%	93.1%
Articulated Trucks	1	0	0	1	2	0	13	0	0	13	0	0	1	0	1	0	16	0	0	16	32
% Articulated Trucks	11.1%	0%	0%	100%	4.3%	0%	2.7%	0%	0%	2.6%	0%	0%	12.5% 0	)% :	2.0%	0%	2.2%	0%	0%	2.1%	2.4%
Buses and Single-Unit Trucks	0	0	1	0	1	0	18	0	0	18	2	0	0	0	2	0	41	0	0	41	62
% Buses and Single-Unit Trucks	0%	0%	4.0%	0%	2.2%	0%	3.7%	0%	0%	3.6%	6.7%	0%	0% 0	)%	4.1%	0%	5.5%	0%	0%	5.4%	4.6%

<sup>•</sup>L: Left, R: Right, T: Thru, U: U-Turn

#### US 36 and CR 400 E - TMC Tue Jun 6, 2023

AM Peak, Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 



Out: 23 In: 49 Total: 72 [S] CR 400 E NB

Tue Jun 6, 2023

Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 

Leg Direction	CR 400 Southb	) E SB ound				US 36 Westb	WB ound				CR 400 Northb	) E NB ound				US 36 I Eastboi	EB 1nd				
Time	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	Int
2023-06-06 2:30PM	3	6	5	0	14	1	173	5	2	181	3	5	4	0	12	6	151	5	0	162	369
2:45PM	5	3	5	0	13	1	152	5	1	159	2	3	2	0	7	0	127	2	0	129	308
3:00PM	5	3	10	0	18	0	174	2	1	177	1	3	4	0	8	4	144	3	0	151	354
3:15PM	4	3	4	0	11	0	200	7	1	208	3	3	3	0	9	6	132	1	0	139	367
Total	17	15	24	0	56	2	699	19	5	725	9	14	13	0	36	16	554	11	0	581	1398
% Approach	30.4%	26.8%	42.9%	0%	-	0.3%	96.4%	2.6%	0.7%	-	25.0%	38.9%	36.1% (	0%	-	2.8%	95.4%	1.9%	0%	-	-
% Total	1.2%	1.1%	1.7%	0%	4.0%	0.1%	50.0%	1.4%	0.4%	51 <b>.9%</b>	0.6%	1.0%	0.9% (	0%	2.6%	1.1%	39.6%	0.8%	0% 4	41.6%	-
PHF	0.850	0.625	0.600	- (	0.778	0.500	0.874	0.679	0.625	0.871	0.750	0.700	0.813	-	0.750	0.667	0.917	0.550	-	0.897	0.947
Lights	17	15	24	0	56	2	666	19	5	692	8	14	13	0	35	15	515	11	0	541	1324
% Lights	100%	100%	100%	0%	100%	100%	95.3%	100%	100%	95.4%	88.9%	100%	100% (	)% (	97.2%	93.8%	93.0%	100%	0% 9	93.1%	94.7%
Articulated Trucks	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	11	0	0	11	17
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0.9%	0%	0%	0.8%	0%	0%	0% (	0%	0%	0%	2.0%	0%	0%	1.9%	1.2%
Buses and Single-Unit Trucks	0	0	0	0	0	0	27	0	0	27	1	0	0	0	1	1	28	0	0	29	57
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	3.9%	0%	0%	3.7%	11.1%	0%	0% (	0%	2.8%	6.3%	5.1%	0%	0%	5.0%	4.1%

\*L: Left, R: Right, T: Thru, U: U-Turn

Tue Jun 6, 2023

Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 



Total: 86 [S] CR 400 E NB

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

Tue Jun 6, 2023

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 

Leg	CR 40	) E SB				US 36	WB				CR 400	) E NB				US 36	EB				
Direction	Southb	ound				Westb	ound				Northb	ound				Eastbo	und				
Time	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	R	Т	L	U	Арр	Int
2023-06-06 4:30PM	5	5	8	0	18	1	166	5	0	172	7	3	3	0	13	2	171	1	0	174	377
4:45PM	8	2	6	0	16	0	174	6	0	180	5	9	4	0	18	2	148	3	0	153	367
5:00PM	3	4	4	0	11	0	195	6	1	202	4	3	2	0	9	4	146	5	0	155	377
5:15PM	2	11	3	0	16	0	187	7	0	194	0	3	1	0	4	3	155	3	0	161	375
Total	18	22	21	0	61	1	722	24	1	748	16	18	10	0	44	11	620	12	0	643	1496
% Approach	29.5%	36.1%	34.4%	0%	-	0.1%	96.5%	3.2%	0.1%	-	36.4%	40.9%	22.7%	0%	-	1.7%	96.4%	1.9%	0%	-	-
% Total	1.2%	1.5%	1.4%	0%	4.1%	0.1%	48.3%	1.6%	0.1%	50.0%	1.1%	1.2%	0.7%	0%	2 <b>.9%</b>	0.7%	41.4%	0.8%	0%	43.0%	-
PHF	0.563	0.500	0.656	-	0.847	0.250	0.926	0.857	0.250	0.926	0.571	0.500	0.625	- (	0.611	0.688	0.906	0.600	-	0.924	0.992
Lights	13	22	20	0	55	1	706	24	0	731	16	18	10	0	44	10	593	11	0	614	1444
% Lights	72.2%	100%	95.2%	0% S	90.2%	100%	97.8%	100%	0%	97.7%	100%	100%	100%	0%	100%	90.9%	95.6%	91.7%	0% 9	95.5%	96.5%
Articulated Trucks	4	0	0	0	4	0	2	0	1	3	0	0	0	0	0	0	11	1	0	12	19
% Articulated Trucks	22.2%	0%	0%	0%	6.6%	0%	0.3%	0%	100%	0.4%	0%	0%	0%	0%	0%	0%	1.8%	8.3%	0%	1.9%	1.3%
Buses and Single-Unit Trucks	1	0	1	0	2	0	14	0	0	14	0	0	0	0	0	1	16	0	0	17	33
% Buses and Single-Unit Trucks	5.6%	0%	4.8%	0%	3.3%	0%	1.9%	0%	0%	1.9%	0%	0%	0%	0%	0%	9.1%	2.6%	0%	0%	2.6%	2.2%

\*L: Left, R: Right, T: Thru, U: U-Turn

#### US 36 and CR 400 E - TMC Tue Jun 6, 2023

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

ID: 1078494, Location: 39.757598, -86.457258, Site Code: US 36 and CR 400  $\rm E$ 



Total: 101 [S] CR 400 E NB

Tue Jun 6, 2023 Full Length (7 AM-9 AM, 2 PM-6 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

Leg	CR 100 S	S WB				CR 450 E	E NB				CR 100 S	EB				
Direction	Westbou	nd				Northbou	ind				Eastboun	d				
Time	Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-06-06 7:00AM	1	1	0	2	0	3	1	0	4	0	1	0	0	1	0	7
7:15AM	1	3	0	4	0	2	3	0	5	0	2	0	0	2	0	11
7:30AM	1	4	0	5	0	3	2	0	5	0	2	3	0	5	0	15
7:45AM	0	2	0	2	0	1	1	0	2	0	1	2	0	3	0	7
Hourly Total	3	10	0	13	0	9	7	0	16	0	6	5	0	11	0	40
8:00AM	1	5	0	6	0	2	2	0	4	0	0	1	0	1	0	11
8:15AM	0	1	0	1	2	2	0	0	2	0	2	2	0	4	0	7
8:30AM	3	2	0	5	0	2	4	0	6	0	6	1	0	7	0	18
8:45AM	2	2	0	4	0	2	1	0	3	0	2	3	0	5	0	12
Hourly Total	6	10	0	16	2	8	7	0	15	0	10	7	0	17	0	48
9:00AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00PM	2	2	0	4	0	2	0	0	2	0	1	1	0	2	0	8
2:15PM	2	1	0	3	0	3	0	0	3	0	2	1	0	3	0	9
2:30PM	6	7	0	13	0	2	2	0	4	0	1	5	0	6	0	23
2:45PM	1	3	0	4	0	3	3	0	6	0	0	0	0	0	0	10
Hourly Total	11	13	0	24	0	10	5	0	15	0	4	7	0	11	0	50
3:00PM	1	2	0	3	0	5	1	0	6	0	4	1	0	5	0	14
3:15PM	2	3	0	5	0	4	3	0	7	0	2	2	1	5	0	17
3:30PM	0	7	0	7	0	2	3	0	5	0	1	1	0	2	0	14
3:45PM	4	1	0	5	0	4	2	0	6	0	2	1	0	3	0	14
Hourly Total	7	13	0	20	0	15	9	0	24	0	9	5	1	15	0	59
4:00PM	3	4	0	7	0	5	4	0	9	0	0	4	0	4	0	20
4:001 M	0		0	,	0	4	2	0	6	0	3		0	7	0	16
4:101 M	1	2	0	3	0	7	2	1	10	0	2	1	0	3	0	16
4:45PM	3	2	0	5	0	6	2	0	8	0	0	1	0	1	0	10
Hourly Total	7	11	0	18	0	22	10	1	33	0	5	10	0	15	0	66
5:00PM	,	11	0	10	0	1	10	1	5	0	1	10	0	15	0	10
5.00FM	0	2	0	5	0	4	2	0	<u> </u>	0	4	2	0	4	0	20
5.13FW	0		0		0	6		0	11	0	4	2	0		0	20
5.50PM	0	1	0	3	0	7	3	0	- 11	0	2	3	0		0	21
J.43P M	5	1	0	15	0	7	10	0	34	0	12	4	0	/	0	20
Houriy Total	0	9	0	15	0	24	10	0		0	15	9	0		0	/1
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	40	66	0	106	2	88	48	1	137	0	47	43	1	91	0	334
% Approach	37.7%	62.3%	0%	-	-	64.2%	35.0%	0.7%	-	-	51.6%	47.3%	1.1%	-	-	-
% Total	12.0%	19.8%	0%	31.7%	-	26.3%	14.4%	0.3%	41.0%	-	14.1%	12.9%	0.3%	27.2%	-	-
Lights	39	65	0	104	-	87	48	1	136	-	47	43	1	91	-	331
% Lights	97.5%	98.5%	0%	98.1%	-	98.9%	100%	100%	99.3%	-	100%	100%	100%	100%	-	99.1%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	1	1	0	2	-	1	0	0	1	-	0	0	0	0	-	3
% Buses and Single-Unit Trucks	2.5%	1.5%	0%	1.9%	-	1.1%	0%	0%	0.7%	-	0%	0%	0%	0%	-	0.9%
Pedestrians	-	-	-	-	2	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

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

Tue Jun 6, 2023 Full Length (7 AM-9 AM, 2 PM-6 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

1



Out: 114 In: 137 Total: 251 [S] CR 450 E NB

Tue Jun 6, 2023 Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

Leg	CR 100 S	WB				CR 450 E	NB				CR 100 S	EB				
Direction	Westbour	nd				Northbou	nd				Eastbound	ł				
Time	Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-06-06 7:30AM	1	4	0	5	0	3	2	0	5	0	2	3	0	5	0	15
7:45AM	0	2	0	2	0	1	1	0	2	0	1	2	0	3	0	7
8:00AM	1	5	0	6	0	2	2	0	4	0	0	1	0	1	0	11
8:15AM	0	1	0	1	2	2	0	0	2	0	2	2	0	4	0	7
Total	2	12	0	14	2	8	5	0	13	0	5	8	0	13	0	40
% Approach	14.3%	85.7%	0%	-	-	61.5%	38.5%	0%	-	-	38.5%	61.5%	0%	-	-	-
% Total	5.0%	30.0%	0%	35.0%	-	20.0%	12.5%	0%	32.5%	-	12.5%	20.0%	0%	32.5%	-	-
PHF	0.500	0.600	-	0.583	-	0.667	0.625	-	0.650	-	0.625	0.667	-	0.650	-	0.667
Lights	2	12	0	14	-	7	5	0	12	-	5	8	0	13	-	39
% Lights	100%	100%	0%	100%	-	87.5%	100%	0%	92.3%	-	100%	100%	0%	100%	-	97.5%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	0	0	0	0	-	1	0	0	1	-	0	0	0	0	-	1
% Buses and Single-Unit Trucks	0%	0%	0%	0%	-	12.5%	0%	0%	7.7%	-	0%	0%	0%	0%	-	2.5%
Pedestrians	-	-	-	-	2	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Tue Jun 6, 2023 Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E



Out: 17 In: 13 Total: 30 [S] CR 450 E NB

Tue Jun 6, 2023 AM Peak (8 AM - 9 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

Leg	CR 100 S	WB				CR 450 E	NB				CR 100 S	EB				
Direction	Westbour	nd				Northbou	nd				Eastbound	1				
Time	Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-06-06 8:00AM	1	5	0	6	0	2	2	0	4	0	0	1	0	1	0	11
8:15AM	0	1	0	1	2	2	0	0	2	0	2	2	0	4	0	7
8:30AM	3	2	0	5	0	2	4	0	6	0	6	1	0	7	0	18
8:45AM	2	2	0	4	0	2	1	0	3	0	2	3	0	5	0	12
Total	6	10	0	16	2	8	7	0	15	0	10	7	0	17	0	48
% Approach	37.5%	62.5%	0%	-	-	53.3%	46.7%	0%	-	-	58.8%	41.2%	0%	-	-	-
% Total	12.5%	20.8%	0%	33.3%	-	16.7%	14.6%	0%	31.3%	-	20.8%	14.6%	0%	35.4%	-	-
PHF	0.500	0.500	-	0.667	-	1.000	0.438	-	0.625	-	0.417	0.583	-	0.607	-	0.667
Lights	6	10	0	16	-	7	7	0	14	-	10	7	0	17	-	47
% Lights	100%	100%	0%	100%	-	87.5%	100%	0%	93.3%	-	100%	100%	0%	100%	-	97.9%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	0	0	0	0	-	1	0	0	1	-	0	0	0	0	-	1
% Buses and Single-Unit Trucks	0%	0%	0%	0%	-	12.5%	0%	0%	6.7%	-	0%	0%	0%	0%	-	2.1%
Pedestrians	-	-	-	-	2	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Tue Jun 6, 2023 AM Peak (8 AM - 9 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E



Out: 20 In: 15 Total: 35 [S] CR 450 E NB

Tue Jun 6, 2023 Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

Leg	CR 100 S WB					CR 450 F NB					CR 100 S FB					
Direction	Wosthound					Northbound					Easthound					
Direction	westbou	liu				Normidou	nu				EastDouild	1				
Time	Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-06-06 2:30PM	6	7	0	13	0	2	2	0	4	0	1	5	0	6	0	23
2:45PM	1	3	0	4	0	3	3	0	6	0	0	0	0	0	0	10
3:00PM	1	2	0	3	0	5	1	0	6	0	4	1	0	5	0	14
3:15PM	2	3	0	5	0	4	3	0	7	0	2	2	1	5	0	17
Total	10	15	0	25	0	14	9	0	23	0	7	8	1	16	0	64
% Approach	40.0%	60.0%	0%	-	-	60.9%	39.1%	0%	-	-	43.8%	50.0%	6.3%	-	-	-
% Total	15.6%	23.4%	0%	39.1%	-	21.9%	14.1%	0%	35.9%	-	10.9%	12.5%	1.6%	25.0%	-	-
PHF	0.417	0.536	-	0.481	-	0.700	0.750	-	0.821	-	0.438	0.400	0.250	0.667	-	0.696
Lights	10	14	0	24	-	14	9	0	23	-	7	8	1	16	-	63
% Lights	100%	93.3%	0%	96.0%	-	100%	100%	0%	100%	-	100%	100%	100%	100%	-	98.4%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	0	1	0	1	-	0	0	0	0	-	0	0	0	0	-	1
% Buses and Single-Unit Trucks	0%	6.7%	0%	4.0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	1.6%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	

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-<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

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% Bicycles on Crosswalk
Tue Jun 6, 2023 Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E



Total: 45 [S] CR 450 E NB

Tue Jun 6, 2023 PM Peak (5 PM - 6 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E

Leg	CR 100 S	WB				CR 450 E	NB				CR 100 S	EB				
Direction	Westboun	ıd				Northbou	nd				Eastbound	1				
Time	Т	L	U	Арр	Ped*	R	L	U	Арр	Ped*	R	Т	U	Арр	Ped*	Int
2023-06-06 5:00PM	0	1	0	1	0	4	1	0	5	0	4	0	0	4	0	10
5:15PM	3	2	0	5	0	7	2	0	9	0	4	2	0	6	0	20
5:30PM	0	5	0	5	0	6	5	0	11	0	2	3	0	5	0	21
5:45PM	3	1	0	4	0	7	2	0	9	0	3	4	0	7	0	20
Total	6	9	0	15	0	24	10	0	34	0	13	9	0	22	0	71
% Approach	40.0%	60.0%	0%	-	-	70.6%	29.4%	0%	-	-	59.1%	40.9%	0%	-	-	-
% Total	8.5%	12.7%	0%	21.1%	-	33.8%	14.1%	0%	47.9%	-	18.3%	12.7%	0%	31.0%	-	-
PHF	0.500	0.450	-	0.750	-	0.857	0.500	-	0.773	-	0.813	0.563	-	0.786	-	0.845
Lights	6	9	0	15	-	24	10	0	34	-	13	9	0	22	-	71
% Lights	100%	100%	0%	100%	-	100%	100%	0%	100%	-	100%	100%	0%	100%	-	100%
Articulated Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Buses and Single-Unit Trucks	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0
% Buses and Single-Unit Trucks	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%	0%	0%	0%	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	_	-

<sup>\*</sup>Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Tue Jun 6, 2023 PM Peak (5 PM - 6 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078493, Location: 39.747423, -86.447852, Site Code: CR 100 S and CR 450 E



[S] CR 450 E NB

Location:	Foxboro Dr and CR 100 S
Start Date:	6/6/2023
Start Time:	7:00:00 AM
Coordinates:	39°45'0.29"N 86°26'39.38"W
Comment 1:	8:45 values estimated from data trend
Comment 2:	No trucks were observed in the counted hours
	Nearly all vehicles making a NB RT failed to stop and instead yielded or
Comment 3:	did not slow down at all
	About half of vehicles from the WB approach failed to stop and instead
Comment 4:	yielded or did not slow down at all
	When multiple vehicles stopped on the WB approach, the wide width of
Comment 5:	the lane was used as two lanes (a thru and left turn lane)

		CR 100 S			CR 100 S		F		R
Start Time	Thru	Westbound	Dada	Diaht	Northbound	Dada	Diabt	Eastbound	Dede
7.00.00 AM	1 I IIIU	Leit	Peas	Right	Leit	Peus	Right	11110	Peas
7:00:00 AM	1	0	0	10	0	0	1		0
7:15:00 AM	2		0	0	1	0	0	J	0
7:30:00 AM	<u>∠</u>	3	0	14	0	ן ר	1	12	0
7.45.00 AM	3	1	0	0	0	2	0	11	1
8.00.00 AM	4	2	0	3	0	0	0	0	1
8:15:00 AM	4	0	0	CI 11	<u> </u>	0	0	13	0
8:30:00 AM	3	4	0	11	1	0	2	9	0
8:45:00 Alvi	3	ა	0	9	0	0	0	0	0
2:00:00 PM	8	1	0	8	0	0	0	6	0
2:15:00 PM	7	4	0	5	1	0	0	0	0
2:10:00 PM	1	/	0	5	1	0	0	5	0
2:45:00 PM	4	11	0	0	1	1	1	5	1
2:45:00 PM	9 10	0	0	4	1	۱ 0	1	7	0
3:15:00 PM	10	9	0	11	0	0		7	0
3:30:00 PM	5	9	0	6	1	J 1	2	2	0
3:45:00 PM	3	0	0	0	1	3	2	2	1
3.43.00 PM	6	4	0	4	1	J 1	2	10	0
4:00:00 PM	8	9	0	1	1	۱ 0	0	10	0
4:30:00 PM	0	6	1	0	2	2	0	9	0
4:45:00 PM	14	8	1	4 Q	1	2	2	3	0
5:00:00 PM	14	15	0	11	0	۱ 0	1	8	0
5:15:00 PM	15	10	0	0	1	0	1	11	0
5:30:00 PM	10	12	0	J 11	1	0	2	8	0
5:45:00 PM	10	7	0	11	1	0	1	11	0
0.40.00 F M	19	1	0	11	1	0	1	11	0
7:30-8:30 Peak	13	12	0	40	2	3	1	44	1
2:30-3:30 Peak	31	37	0	30	1	4	4	24	1

Location:	Foxboro Dr and CR 100 S
Start Date:	6/6/2023
Start Time:	7:00:00 AM
Coordinates:	39°45'0.29"N 86°26'39.38"W
Comment 1:	8:45 values estimated from data trend
Comment 2:	No trucks were observed in the counted hours
	Nearly all vehicles making a NB RT failed to stop and instead yielded or
Comment 3:	did not slow down at all
	About half of vehicles from the WB approach failed to stop and instead
Comment 4:	yielded or did not slow down at all
	When multiple vehicles stopped on the WB approach, the wide width of
Comment 5:	the lane was used as two lanes (a thru and left turn lane)

		CR 100 S			CR 100 S		F	OXBORO D	R
Start Time		Westbound			Northbound			Eastbound	
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds
7:00:00 AM	1	0	0	10	0	0	1	11	0
7:15:00 AM	2	1	0	6	1	0	0	5	0
7:30:00 AM	2	3	0	14	0	1	1	12	0
7:45:00 AM	3	1	0	8	0	2	0	11	0
8:00:00 AM	4	2	0	3	0	0	0	8	1
8:15:00 AM	4	6	0	15	2	0	0	13	0
8:30:00 AM	3	4	0	11	1	0	2	9	0
8:45:00 AM	3	3	0	9	0	0	0	8	0
2:00:00 PM	8	4	0	8	0	0	0	6	0
2:15:00 PM	6	7	0	5	1	0	0	6	0
2:30:00 PM	4	11	0	8	0	0	0	5	0
2:45:00 PM	9	8	0	4	1	1	1	5	1
3:00:00 PM	9	9	0	7	0	0	2	6	0
3:15:00 PM	8	9	0	11	0	3	1	7	0
3:30:00 PM	5	6	0	6	1	1	2	2	0
3:45:00 PM	8	4	0	4	1	3	2	6	1
4:00:00 PM	6	8	0	7	0	1	0	10	0
4:15:00 PM	8	8	0	6	1	0	0	1	0
4:30:00 PM	8	6	1	4	2	2	0	9	0
4:45:00 PM	14	8	0	9	1	1	2	3	0
5:00:00 PM	6	15	0	11	0	0	1	8	0
5:15:00 PM	15	12	0	8	1	0	1	11	0
5:30:00 PM	10	11	0	11	1	0	2	8	0
5:45:00 PM	19	7	0	11	1	0	1	11	0

Location:	Foxboro Dr and CR 100 S
Start Date:	6/6/2023
Start Time:	7:00:00 AM
Coordinates:	39°45'0.29"N 86°26'39.38"W
Comment 1:	8:45 values estimated from data trend
Comment 2:	No trucks were observed in the counted hours
	Nearly all vehicles making a NB RT failed to stop and instead yielded or
Comment 3:	did not slow down at all
	About half of vehicles from the WB approach failed to stop and instead
Comment 4:	yielded or did not slow down at all
	When multiple vehicles stopped on the WB approach, the wide width of
Comment 5:	the lane was used as two lanes (a thru and left turn lane)

Start Time		CR 100 S			CR 100 S	1	F	OXBORO D	R
Start Time	Thru	l eft	Peds	Right		Peds	Right	Thru	Peds
7:00:00 AM	0	0	1 Cu3		0	1 003	1 Kight	0	0
7:15:00 AM	0	0	0	0	0	0	0	0	0
7:30:00 AM	0	0	0	0	0	0	0	0	0
7:45:00 AM	0	0	0	0	0	0	0	0	0
8:00:00 AM	0	0	0	0	0	0	0	0	0
8:15:00 AM	0	0	0	0	0	0	0	0	0
8:30:00 AM	0	0	0	0	0	0	0	0	0
8:45:00 AM	0	0	0	0	0	0	0	0	0
			-	-					
2:00:00 PM	0	0	0	0	0	0	0	0	0
2:15:00 PM	1	0	0	0	0	0	0	0	0
2:30:00 PM	0	0	0	0	0	0	0	0	0
2:45:00 PM	0	0	0	0	0	0	0	0	0
3:00:00 PM	1	0	0	0	0	0	0	1	0
3:15:00 PM	0	0	0	0	0	0	0	0	0
3:30:00 PM	0	0	0	0	0	0	0	0	0
3:45:00 PM	0	0	0	0	0	0	0	0	0
4:00:00 PM	0	1	0	0	0	0	0	0	0
4:15:00 PM	0	0	0	0	0	0	0	0	0
4:30:00 PM	1	0	0	0	0	0	0	0	0
4:45:00 PM	0	0	0	0	0	0	0	0	0
5:00:00 PM	0	0	0	0	0	0	0	0	0
5:15:00 PM	0	0	0	1	0	0	0	0	0
5:30:00 PM	0	0	0	0	0	0	0	0	0
5:45:00 PM	0	0	0	0	0	0	0	0	0

Wed Jun 7, 2023 Full Length (7 AM-9 AM, 2 PM-6 PM)

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

All Movements

ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E

Leg	CR 525	5 E SB					CR 100	S WB				CR 52	5 E NB				CR 100	S EB					
Direction	Southb	ound					Westbo	und				Northb	ound				Eastbou	ind					
Time	R	Т	L	U	App Pe	d*	R	Т	L	U	App Ped*	R	Т	L U	App	Ped*	R	Т	L	U	Арр	Ped*	Int
2023-06-07 7:00AM	5	3	20	0	28	0	7	1	0	0	8 (	) 5	16	0 0	21	0	3	19	6	0	28	0	85
7:15AM	1	9	19	0	29	0	21	2	1	0	<b>24</b> (	6	14	0 0	20	0	0	10	4	0	14	0	87
7:30AM	3	14	18	0	35	0	17	3	1	0	<b>21</b> (	) 7	19	1 0	27	0	4	16	6	0	26	0	109
7:45AM	3	17	16	0	36	0	24	5	4	0	<b>33</b> (	6	18	0 0	24	0	2	21	5	0	28	0	121
Hourly Total	12	43	73	0	128	0	69	11	6	0	<b>86</b> (	24	67	1 0	92	0	9	66	21	0	96	0	402
8:00AM	1	8	16	0	25	0	18	1	1	0	<b>20</b> (	) 4	14	1 0	19	0	2	16	8	0	26	0	90
8:15AM	6	10	13	0	29	0	24	5	1	0	<b>30</b> (	8	27	2 0	37	0	1	14	10	0	25	0	121
8:30AM	4	16	25	0	45	0	18	3	3	0	<b>24</b> (	6	18	0 0	24	0	0	24	6	0	30	0	123
8:45AM	6	16	18	0	40	0	26	5	1	0	32 (	) 7	17	0 0	24	0	2	12	12	0	26	0	122
Hourly Total	17	50	72	0	139	0	86	14	6	0	<b>106</b> (	25	76	3 0	104	0	5	66	36	0	107	0	456
9:00AM	0	0	0	0	0	0	0	0	0	0	0 (	0 0	0	0 0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0 (	0 0	0	0 0	0	0	0	0	0	0	0	0	0
2:00PM	7	13	14	0	34	0	14	5	5	0	<b>24</b> (	) 3	11	0 0	14	0	0	11	5	0	16	0	88
2:15PM	8	17	26	0	51	0	26	11	3	0	<b>40</b> (	) 4	9	1 0	14	0	0	11	4	0	15	0	120
2:30PM	13	12	17	0	42	0	32	8	6	0	<b>46</b> (	) 4	7	2 0	13	0	2	7	7	0	16	0	117
2:45PM	8	17	15	0	40	0	41	12	5	0	<b>58</b> (	) 2	29	0 0	31	0	0	10	6	0	16	0	145
Hourly Total	36	59	72	0	167	0	113	36	19	0	<b>168</b> (	13	56	3 0	72	0	2	39	22	0	63	0	470
3:00PM	8	15	16	0	39	0	36	10	4	0	<b>50</b> (	) 3	20	0 0	23	0	0	4	3	0	7	0	119
3:15PM	8	24	22	0	54	0	44	19	6	0	<b>69</b> (	) 3	21	0 0	24	0	0	10	5	0	15	0	162
3:30PM	8	24	30	0	62	0	34	11	7	0	<b>52</b> (	) 3	18	1 0	22	0	1	10	2	0	13	0	149
3:45PM	8	18	22	0	48	0	42	12	3	0	57 (	9	27	1 0	37	0	0	5	7	0	12	2	154
Hourly Total	32	81	90	0	203	0	156	52	20	0	<b>228</b> (	18	86	2 0	106	0	1	29	17	0	47	2	584
4:00PM	10	18	25	0	53	0	38	9	9	0	<b>56</b> (	) 4	14	2 0	20	0	1	12	10	0	23	2	152
4:15PM	11	19	35	0	65	0	40	11	5	0	<b>56</b> (	) 4	25	0 0	29	0	1	13	5	0	19	0	169
4:30PM	9	31	33	0	73	0	42	10	6	0	<b>58</b> (	0 0	20	2 0	22	0	2	8	2	0	12	0	165
4:45PM	11	27	34	0	72	0	35	15	7	0	57 (	) 3	18	1 0	22	0	0	11	6	0	17	0	168
Hourly Total	41	95	127	0	263	0	155	45	27	0	227 (	11	77	5 0	93	0	4	44	23	0	71	2	654
5:00PM	13	24	33	0	70	0	42	14	3	0	59 (	9	23	0 0	32	0	1	7	8	0	16	0	177
5:15PM	14	20	45	0	79	0	41	13	6	0	60 (	2	23	3 0	28	0	2	16	7	0	25	2	192
5:30PM	15	27	39	0	81	0	47	16	6	0	69 (		21	2 0	24	0	1	18	7	0	26	0	200
5:45PM	8	21	29	0	58	0	48	17	8	0	73 (	7	26	1 0	34	0	2	15	7	0	24	2	189
Hourly Total	50	92	146	0	288	0	178	60	23	0	261 (	19	93	6 0	118	0	6	56	29	0	91	4	758
6:00PM Hourly Total	0	0	0	0	0	0	0	0	0	0	0 (		0	0 0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0 0		0	0 0	0	0	0	0	0	0	0	0	0
fotal	15 00/	420	580	0	1188	0	757	218	101	U 201/	10/6 (	10 00/	455	20 0	585	0	27	300	148	0	475	8	3324
% Approach	15.8%	35.4%	48.8%	0%	-	-	/0.4% 2	20.3%	9.4% (	J%	-	- 18.8%	//.8%	3.4% 0%	-	-	5./% t	03.2% 3	31.2%	0%	-	-	-
% Iotal	5./%	12.6%	17.4%	0%3	1172	-	22.8%	0.6%	3.0% (	J% .	32.4%	- 3.3%	13./%	0.6% 0%	L7.6%	-	0.8%	9.0%	4.5%	0%1	4.3%	-	-
Lights 0/ Lights	100/	41/	07.00/	00/ 0	11/3	-	/51	215	99	0	1005	00 10/	442	20 0	5/1	-	2/	290	14/	00/0	4/0	-	32/9
70 Lights	100%	99.3%	97.9%	0%:	0.770	-	99.2% 5	0.0%	90.0% (	070 :	99.0%	- 99.1%	97.1%	100% 0%	97.0%	-	100% 5	0.770 5	99.5%	0%9	0.9%	-	90.0%
Anticulated Trucks	00/	00/	00/	00/	0%	-	00/	00/	00/ 0	0	00/	- 0	00/	00/ 00/	00/	-	00/	00/	00/	00/	00/	-	00/
% Alucuideu Hucks	0%	0%	0%	070	070	-	0%	0%	0%	J70	0%	- 0%	0%	0% 0%	0%	-	0%	0%	0%	070	070		0%
Trucks	0	3	12	0	15	_	6	3	2	0	11	. 1	13	0 0	14	-	0	4	1	0	5	_	45
% Buses and Single-Unit				-	-		-			-							-				-		
Trucks	0%	0.7%	2.1%	0%	1.3%	-	0.8%	1.4%	2.0% (	)%	1.0%	0.9%	2.9%	0% 0%	2.4%	-	0%	1.3%	0.7%	0%	1.1%	-	1.4%
Pedestrians	-	-	-	-	-	0	-	-	-	-	- (	) –	-		-	0	-	-	-	-	-	7	
% Pedestrians	-	-	-	-	-	-	-	-	-	-		-	-		-	-	-	-	-	-	- 8	37.5%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	- (	) -	-		-	0	-	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-		-	-		-	-	-	-	-	-	- 1	12.5%	-

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

Wed Jun 7, 2023 Full Length (7 AM-9 AM, 2 PM-6 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements

ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525  $\rm E$ 



Wed Jun 7, 2023 Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E

,			<i>,</i>																						
Leg	CR 52	5 E SB					CR 100	) S WB					CR 525	5 E NB					CR 10	0 S EB				I	1
Direction	Southb	ound					Westbo	ound					Northb	ound					Eastbo	und					
Time	R	Т	L	U	App P	ed*	R	Т	L	U	Арр	Ped*	R	Т	L	U	App F	'ed*	R	Т	L	U	App I	'ed*	Int
2023-06-07 7:30AM	3	14	18	0	35	0	17	3	1	0	21	0	7	19	1	0	27	0	4	16	6	0	26	0	109
7:45AM	3	17	16	0	36	0	24	5	4	0	33	0	6	18	0	0	24	0	2	21	5	0	28	0	121
8:00AM	1	8	16	0	25	0	18	1	1	0	20	0	4	14	1	0	19	0	2	16	8	0	26	0	90
8:15AM	6	10	13	0	29	0	24	5	1	0	30	0	8	27	2	0	37	0	1	14	10	0	25	0	121
Total	13	49	63	0	125	0	83	14	7	0	104	0	25	78	4	0	107	0	9	67	29	0	105	0	441
% Approach	10.4%	39.2%	50.4%	0%	-	-	79.8%	13.5%	6.7%	0%	-	-	23.4%	72.9%	3.7%	0%	-	-	8.6%	63.8%	27.6% (	)%	-	-	-
% Total	2.9%	11.1%	14.3%	0%2	28.3%	-	18.8%	3.2%	1.6%	0%	23.6%	-	5.7%	17.7%	0.9%	0%	24.3%	-	2.0%	15.2%	6.6% (	)% 2	23.8%	-	-
PHF	0.542	0.721	0.875	-	0.868	-	0.865	0.700	0.438	-	0.788	-	0.781	0.722	0.500	-	0.723	-	0.563	0.798	0.725	-	0.938	-	0.911
Lights	13	49	61	0	123	-	81	13	7	0	101	-	25	78	4	0	107	-	9	66	29	0	104	-	435
% Lights	100%	100%	96.8%	0% 9	98.4%	-	97.6%	92.9%	100%	0%	97.1%	-	100%	100%	100%	0%	100%	-	100%	98.5%	100% (	)% 9	9.0%	-	98.6%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0% (	)%	0%	-	0%
Buses and Single-Unit																									
Trucks	0	0	2	0	2	-	2	1	0	0	3	-	0	0	0	0	0	-	0	1	0	0	1	-	6
% Buses and Single-Unit																									
Trucks	0%	0%	3.2%	0%	1.6%	-	2.4%	7.1%	0%	0%	2.9%	-	0%	0%	0%	0%	0%	-	0%	1.5%	0% (	)%	1.0%	-	1.4%
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

Wed Jun 7, 2023 Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E



Total: 172 [S] CR 525 E NB

Wed Jun 7, 2023 AM Peak (8 AM - 9 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E

Leg	CR 525	5 E SB					CR 100	) S WB					CR 525	5 E NB					CR 100	) S EB				I	1
Direction	Southb	ound					Westbo	ound					Northb	ound					Eastbo	und					
Time	R	Т	L	U	App I	ed*	R	Т	L	U	Арр	Ped*	R	Т	L	U	App P	ed*	R	Т	L	U	App P	'ed*	Int
2023-06-07 8:00AM	1	8	16	0	25	0	18	1	1	0	20	0	4	14	1	0	19	0	2	16	8	0	26	0	90
8:15AM	6	10	13	0	29	0	24	5	1	0	30	0	8	27	2	0	37	0	1	14	10	0	25	0	121
8:30AM	4	16	25	0	45	0	18	3	3	0	24	0	6	18	0	0	24	0	0	24	6	0	30	0	123
8:45AM	6	16	18	0	40	0	26	5	1	0	32	0	7	17	0	0	24	0	2	12	12	0	26	0	122
Total	17	50	72	0	139	0	86	14	6	0	106	0	25	76	3	0	104	0	5	66	36	0	107	0	456
% Approach	12.2%	36.0%	51.8%	0%	-	-	81.1%	13.2%	5.7%	0%	-	-	24.0%	73.1%	2.9%	0%	-	-	4.7% (	51.7%	33.6% (	)%	-	-	-
% Total	3.7%	11.0%	15.8%	0%	30.5%	-	18.9%	3.1%	1.3%	0%	23.2%	-	5.5%	16.7%	0.7%	0%	22.8%	-	1.1%	14.5%	7.9% (	)% 2	23.5%	-	-
PHF	0.708	0.781	0.720	-	0.772	-	0.827	0.700	0.500	-	0.828	-	0.781	0.704	0.375	-	0.703	-	0.625	0.688	0.750	- (	0.892	-	0.927
Lights	17	50	71	0	138	-	85	14	6	0	105	-	25	76	3	0	104	-	5	65	36	0	106	-	453
% Lights	100%	100%	98.6%	0%	99.3%	-	98.8%	100%	100%	0%	99.1%	-	100%	100%	100%	0%	100%	-	100% 9	98.5%	100% (	)% 9	9.1%	-	99.3%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0% (	)%	0%	-	0%
Buses and Single-Unit																									
Trucks	0	0	1	0	1	-	1	0	0	0	1	-	0	0	0	0	0	-	0	1	0	0	1	-	3
% Buses and Single-Unit																									
Trucks	0%	0%	1.4%	0%	0.7%	-	1.2%	0%	0%	0%	0.9%	-	0%	0%	0%	0%	0%	-	0%	1.5%	0% (	)%	0.9%	-	0.7%
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



Total: 165 [S] CR 525 E NB

Wed Jun 7, 2023 Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E

,			·			·																			-
Leg	CR 52	5 E SB					CR 100	) S WB					CR 525	5 E NB					CR 10	0 S EB				I	1
Direction	Southb	ound					Westbo	ound					Northb	ound					Eastbo	und					
Time	R	Т	L	U	App 1	Ped*	R	Т	L	U	App	Ped*	R	Т	L	U	App P	ed*	R	Т	L	U	App P	'ed*	Int
2023-06-07 2:30PM	13	12	17	0	42	0	32	8	6	0	46	0	4	7	2	0	13	0	2	7	7	0	16	0	117
2:45PM	8	17	15	0	40	0	41	12	5	0	58	0	2	29	0	0	31	0	0	10	6	0	16	0	145
3:00PM	8	15	16	0	39	0	36	10	4	0	50	0	3	20	0	0	23	0	0	4	3	0	7	0	119
3:15PM	8	24	22	0	54	0	44	19	6	0	69	0	3	21	0	0	24	0	0	10	5	0	15	0	162
Total	. 37	68	70	0	175	0	153	49	21	0	223	0	12	77	2	0	91	0	2	31	21	0	54	0	543
% Approach	21.1%	38.9%	40.0%	0%	-	-	68.6%	22.0%	9.4%	0%	-	-	13.2%	84.6%	2.2%	0%	-	-	3.7%	57.4%	38.9% (	0%	-	-	-
% Total	6.8%	12.5%	12.9%	0%	32.2%	-	28.2%	9.0%	3.9%	0%4	41.1%	-	2.2%	14.2%	0.4%	0% 1	16.8%	-	0.4%	5.7%	3.9%	0%	9.9%	-	-
PHF	0.712	0.708	0.795	-	0.810	-	0.869	0.645	0.875	-	0.808	-	0.750	0.664	0.250	-	0.734	-	0.250	0.775	0.750	-	0.844	-	0.838
Lights	37	68	68	0	173	-	151	48	19	0	218	-	12	72	2	0	86	-	2	30	21	0	53	-	530
% Lights	100%	100%	97.1%	0%	98.9%	-	98.7%	98.0%	90.5%	0% 9	97.8%	-	100%	93.5%	100%	0% 9	94.5%	-	100%	96.8%	100%	0% 9	98.1%	-	97.6%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0% (	0%	0%	-	0%
Buses and Single-Unit																									
Trucks	0	0	2	0	2	-	2	1	2	0	5	-	0	5	0	0	5	-	0	1	0	0	1	-	13
% Buses and Single-Unit																									
Trucks	0%	0%	2.9%	0%	1.1%	-	1.3%	2.0%	9.5%	0%	2.2%	-	0%	6.5%	0%	0%	5.5%	-	0%	3.2%	0%	0%	1.9%	-	2.4%
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

Wed Jun 7, 2023 Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk) All Movements ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525



[S] CR 525 E NB

PM Peak (5 PM - 6 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians,

Bicycles on Crosswalk) All Movements

Wed Jun 7, 2023

ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525 E

T		- E CD					CD 100						CD FO	E ND					CD 10	O C ED					1
Leg	CR 52	DESB					CR 100	JSWB	<b>b</b>				CR 525	DENB					CR 10	USEB					
Direction	Southb	ound					Westbo	ound					Northb	ound					Eastbo	und					
Time	R	Т	L	U	App I	Ped*	R	Т	L	U	App	Ped*	R	Т	L	U	App I	Ped*	R	Т	L	U	Арр	Ped*	Int
2023-06-07 5:00PM	13	24	33	0	70	0	42	14	3	0	59	0	9	23	0	0	32	0	1	7	8	0	16	0	177
5:15PM	14	20	45	0	79	0	41	13	6	0	60	0	2	23	3	0	28	0	2	16	7	0	25	2	192
5:30PM	15	27	39	0	81	0	47	16	6	0	69	0	1	21	2	0	24	0	1	18	7	0	26	0	200
5:45PM	8	21	29	0	58	0	48	17	8	0	73	0	7	26	1	0	34	0	2	15	7	0	24	2	189
Total	50	92	146	0	288	0	178	60	23	0	261	0	19	93	6	0	118	0	6	56	29	0	91	4	758
% Approach	17.4%	31.9%	50.7%	0%	-	-	68.2%	23.0%	8.8%	0%	-	-	16.1%	78.8%	5.1%	0%	-	-	6.6%	61.5%	31.9%	0%	-	-	-
% Total	6.6%	12.1%	19.3%	0% 3	38.0%	-	23.5%	7.9%	3.0%	0%	34.4%	-	2.5%	12.3%	0.8%	0% :	15.6%	-	0.8%	7.4%	3.8%	0% 1	2.0%	-	-
PHF	0.833	0.852	0.811	-	0.889	-	0.927	0.882	0.719	-	0.894	-	0.528	0.894	0.500	-	0.868	-	0.750	0.778	0.906	-	0.875	-	0.948
Lights	50	91	144	0	285	-	178	60	23	0	261	-	18	91	6	0	115	-	6	55	29	0	90	-	751
% Lights	100%	98.9%	98.6%	0% 9	99.0%	-	100%	100%	100%	0%	100%	-	94.7%	97.8%	100%	0% 9	97.5%	-	100%	98.2%	100%	0% 9	8.9%	-	99.1%
Articulated Trucks	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0
% Articulated Trucks	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%
Buses and Single-Unit																									
Trucks	0	1	2	0	3	-	0	0	0	0	0	-	1	2	0	0	3	-	0	1	0	0	1	-	7
% Buses and Single-Unit																									
Trucks	0%	1.1%	1.4%	0%	1.0%	-	0%	0%	0%	0%	0%	-	5.3%	2.2%	0%	0%	2.5%	-	0%	1.8%	0%	0%	1.1%	-	0.9%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

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

PM Peak (5 PM - 6 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks,

Pedestrians, Bicycles on Crosswalk)

All Movements

Wed Jun 7, 2023

ID: 1078496, Location: 39.74762, -86.433327, Site Code: CR 100 S and CR 525  $\rm E$ 



Out: 121 In: 118 Total: 239 [S] CR 525 E NB

Wed Jun 7, 2023

Full Length (7 AM-9 AM, 2 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements Provided by: Crawford Murphy & Tilly Inc. (CMT) : Columbus OH 8101 N. High Street, Columbus, OH, 43235, US

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E

Leg	CR 450 E S	В			CR 200 S V	VВ			CR 200 S E	В			
Direction	Southbound				Westbound				Eastbound				
Time	R	L	U	Арр	R	Т	U	Арр	Т	L	U	Арр	Int
2023-06-07 7:00AM	3	2	0	5	0	2	0	2	11	0	0	11	18
7:15AM	1	6	0	7	1	5	0	6	14	1	0	15	28
7:30AM	2	1	0	3	1	8	0	9	8	2	0	10	22
7:45AM	1	2	0	3	1	6	0	7	11	0	0	11	21
Hourly Total	7	11	0	18	3	21	0	24	44	3	0	47	89
8:00AM	2	2	0	4	2	7	0	9	12	2	0	14	27
8:15AM	0	2	0	2	1	2	0	3	9	2	0	11	16
8:30AM	0	2	0	2	0	5	0	5	5	3	0	8	15
8:45AM	1	2	0	3	1	2	0	3	11	1	0	12	18
Hourly Total	3	8	0	11	4	16	0	20	37	8	0	45	76
2:00PM	0	0	0	0	1	14	0	15	8	1	0	9	24
2:15PM	4	3	0	7	3	14	0	17	7	4	0	11	35
2:30PM	2	3	0	5	2	16	0	18	5	3	0	8	31
2:45PM	2	1	0	3	4	8	0	12	6	0	0	6	21
Hourly Total	8	7	0	15	10	52	0	62	26	8	0	34	111
3:00PM	4	1	0	5	2	17	0	19	10	2	0	12	36
3:15PM	1	3	0	4	4	18	0	22	6	4	0	10	36
3:30PM	6	1	0	7	4	17	0	21	8	3	0	11	39
3:45PM	3	2	0	5	2	14	0	16	9	2	0	11	32
Hourly Total	14	7	0	21	12	66	0	78	33	11	0	44	143
4:00PM	1	1	0	2	2	13	0	15	8	2	0	10	27
4:15PM	2	2	0	4	3	10	0	13	11	5	0	16	33
4:30PM	3	3	0	6	5	13	0	18	10	2	0	12	36
4:45PM	3	3	0	6	4	24	0	28	9	3	0	12	46
Hourly Total	9	9	0	18	14	60	0	74	38	12	0	50	142
5:00PM	4	4	0	8	3	14	0	17	13	3	0	16	41
5:15PM	2	2	0	4	8	24	0	32	8	5	0	13	49
5:30PM	3	3	0	6	2	16	0	18	7	3	0	10	34
5:45PM	2	5	0	7	5	10	0	15	13	0	0	13	35
Hourly Total	11	14	0	25	18	64	0	82	41	11	0	52	159
6:00PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	52	56	0	108	61	279	0	340	219	53	0	272	720
% Approach	48.1%	51.9%	0%	-	17.9%	82.1%	0%	_	80.5%	19.5%	0%	-	
% Total	7.2%	7.8%	0%	15.0%	8.5%	38.8%	0%	47.2%	30.4%	7.4%	0%	37.8%	-
Lights	52	54	0	106	61	273	0	334	214	51	0	265	705
% Lights	100%	96.4%	0%	98.1%	100%	97.8%	0%	98.2%	97.7%	96.2%	0%	97.4%	97.9%
Articulated Trucks	0	1	0	1	0	0	0	0	3	0	0		4
% Articulated Trucks	0%	1.8%	0%	0.9%	0%	0%	0%	0%	1.4%	0%	0%	1.1%	0.6%
Buses and Single-Unit Trucks	0	1	0	1	0	6	0	6	2	2	0	4	11
% Buses and Single-Unit Trucks	0%	1.8%	0%	0.9%	0%	2.2%	0%	1.8%	0.9%	3.8%	0%	1.5%	1.5%
4:00PM 4:15PM 4:30PM 4:30PM 4:45PM Hourly Total 5:00PM 5:15PM 5:30PM 5:45PM Hourly Total 6:00PM Hourly Total 6:00PM Hourly Total Courly Total 6:00PM Hourly Total 6:00PM Hourly Total Lights Karticulated Trucks % Articulated Trucks % Buses and Single-Unit Trucks	1 2 3 3 9 4 2 3 2 2 11 0 0 0 52 48.1% 7.2% 52 100% 0 0 0%	1 2 3 3 9 4 4 2 3 5 5 1 4 0 0 0 5 6 5 1.9% 5 4 96.4% 1 1.8%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 4 6 6 18 8 4 6 7 7 25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 3 3 4 4 3 8 2 5 5 18 0 0 0 6 1 17.9% 8.5% 6 1 100% 0 0 0 0%	13   10   13   24   60   14   24   16   100   64   0   279   82.1%   38.8%   273   97.8%   0   0%   6   2.2%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	15 13 18 28 74 17 32 18 15 82 0 0 0 340 - - 47.2% 334 98.2% 0 0 % 6 1.8%	8 11 10 9 38 38 7 13 41 0 0 219 80.5% 30.4% 214 97.7% 3 3 1.4% 2 2 0.9%	2 5 2 3 3 5 3 3 0 0 111 0 0 0 5 3 19.5% 7.4% 51 96.2% 0 0 0% 2 3.8%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 16 12 50 16 13 13 10 13 52 0 0 0 0 272 37.8% 265 97.4% 3 31.1% 4 1.5%	27 33 36 46 142 41 49 34 35 159 0 0 720 - - - - - - - - - - - - - - - - - - -

\*L: Left, R: Right, T: Thru, U: U-Turn

Wed Jun 7, 2023 Full Length (7 AM-9 AM, 2 PM-6 PM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and



Wed Jun 7, 2023

Provided by: Crawford Murphy & Tilly Inc. (CMT) : Columbus OH 8101 N. High Street, Columbus, OH, 43235, US

AM Peak (7:15 AM - 8:15 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E

Leg	CR 450 E S	В			CR 200 S W	'B			CR 200 S E	В			
Direction	Southbound				Westbound				Eastbound				
Time	R	L	U	Арр	R	Т	U	Арр	Т	L	U	Арр	Int
2023-06-07 7:15AM	1	6	0	7	1	5	0	6	14	1	0	15	28
7:30AM	2	1	0	3	1	8	0	9	8	2	0	10	22
7:45AM	1	2	0	3	1	6	0	7	11	0	0	11	21
8:00AM	2	2	0	4	2	7	0	9	12	2	0	14	27
Total	6	11	0	17	5	26	0	31	45	5	0	50	98
% Approach	35.3%	64.7%	0%	-	16.1%	83.9%	0%	-	90.0%	10.0%	0%	-	-
% Total	6.1%	11.2%	0%	17.3%	5.1%	26.5%	0%	31.6%	45.9%	5.1%	0%	51.0%	-
PHF	0.750	0.458	-	0.607	0.625	0.813	-	0.861	0.804	0.625	-	0.833	0.875
Lights	6	11	0	17	5	26	0	31	44	5	0	49	97
% Lights	100%	100%	0%	100%	100%	100%	0%	100%	97.8%	100%	0%	98.0%	99.0%
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	1	0	0	1	1
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	2.2%	0%	0%	2.0%	1.0%

\*L: Left, R: Right, T: Thru, U: U-Turn

Wed Jun 7, 2023 AM Peak (7:15 AM - 8:15 AM)

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E



Wed Jun 7, 2023

Provided by: Crawford Murphy & Tilly Inc. (CMT) : Columbus OH 8101 N. High Street, Columbus, OH, 43235, US

Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E

Leg	CR 450 E S	В			CR 200 S W	'B			CR 200 S E	В			
Direction	Southbound				Westbound				Eastbound				
Time	R	L	U	Арр	R	Т	U	Арр	Т	L	U	Арр	Int
2023-06-07 7:30AM	2	1	0	3	1	8	0	9	8	2	0	10	22
7:45AM	1	2	0	3	1	6	0	7	11	0	0	11	21
8:00AM	2	2	0	4	2	7	0	9	12	2	0	14	27
8:15AM	0	2	0	2	1	2	0	3	9	2	0	11	16
Total	5	7	0	12	5	23	0	28	40	6	0	46	86
% Approach	41.7%	58.3%	0%	-	17.9%	82.1%	0%	-	87.0%	13.0%	0%	-	-
% Total	5.8%	8.1%	0%	14.0%	5.8%	26.7%	0%	32.6%	46.5%	7.0%	0%	53.5%	-
PHF	0.625	0.875	-	0.750	0.625	0.719	-	0.778	0.833	0.750	-	0.821	0.796
Lights	5	7	0	12	5	23	0	28	39	6	0	45	85
% Lights	100%	100%	0%	100%	100%	100%	0%	100%	97.5%	100%	0%	97.8%	98.8%
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Buses and Single-Unit Trucks	0	0	0	0	0	0	0	0	1	0	0	1	1
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	0%	0%	0%	2.5%	0%	0%	2.2%	1.2%

\*L: Left, R: Right, T: Thru, U: U-Turn

Wed Jun 7, 2023 Forced Peak (7:30 AM - 8:30 AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E



Wed Jun 7, 2023

Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E

Leg	CR 450 E SI	В			CR 200 S W	/B			CR 200 S E	В			
Direction	Southbound				Westbound				Eastbound				
Time	R	L	U	Арр	R	Т	U	Арр	Т	L	U	Арр	Int
2023-06-07 2:30PM	2	3	0	5	2	16	0	18	5	3	0	8	31
2:45PM	2	1	0	3	4	8	0	12	6	0	0	6	21
3:00PM	4	1	0	5	2	17	0	19	10	2	0	12	36
3:15PM	1	3	0	4	4	18	0	22	6	4	0	10	36
Total	9	8	0	17	12	59	0	71	27	9	0	36	124
% Approach	52.9%	47.1%	0%	-	16.9%	83.1%	0%	-	75.0%	25.0%	0%	-	-
% Total	7.3%	6.5%	0%	13.7%	9.7%	47.6%	0%	57.3%	21.8%	7.3%	0%	29.0%	-
PHF	0.563	0.667	-	0.850	0.750	0.819	-	0.807	0.675	0.563	-	0.750	0.861
Lights	9	7	0	16	12	58	0	70	27	9	0	36	122
% Lights	100%	87.5%	0%	94.1%	100%	98.3%	0%	98.6%	100%	100%	0%	100%	98.4%
Articulated Trucks	0	1	0	1	0	0	0	0	0	0	0	0	1
% Articulated Trucks	0%	12.5%	0%	5.9%	0%	0%	0%	0%	0%	0%	0%	0%	0.8%
Buses and Single-Unit Trucks	0	0	0	0	0	1	0	1	0	0	0	0	1
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	1.7%	0%	1.4%	0%	0%	0%	0%	0.8%

\*L: Left, R: Right, T: Thru, U: U-Turn

Wed Jun 7, 2023 Forced Peak (2:30 PM - 3:30 PM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and

CR 450 E



Wed Jun 7, 2023

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450 E

Leg	CR 450 E S	В			CR 200 S W	/B			CR 200 S E	В			
Direction	Southbound				Westbound				Eastbound				
Time	R	L	U	Арр	R	Т	U	Арр	Т	L	U	Арр	Int
2023-06-07 4:30PM	3	3	0	6	5	13	0	18	10	2	0	12	36
4:45PM	3	3	0	6	4	24	0	28	9	3	0	12	46
5:00PM	4	4	0	8	3	14	0	17	13	3	0	16	41
5:15PM	2	2	0	4	8	24	0	32	8	5	0	13	49
Total	12	12	0	24	20	75	0	95	40	13	0	53	172
% Approach	50.0%	50.0%	0%	-	21.1%	78.9%	0%	-	75.5%	24.5%	0%	-	-
% Total	7.0%	7.0%	0%	14.0%	11.6%	43.6%	0%	55.2%	23.3%	7.6%	0%	30.8%	-
PHF	0.750	0.750	-	0.750	0.625	0.781	-	0.742	0.769	0.650	-	0.828	0.878
Lights	12	12	0	24	20	74	0	94	39	12	0	51	169
% Lights	100%	100%	0%	100%	100%	98.7%	0%	98.9%	97.5%	92.3%	0%	96.2%	98.3%
Articulated Trucks	0	0	0	0	0	0	0	0	1	0	0	1	1
% Articulated Trucks	0%	0%	0%	0%	0%	0%	0%	0%	2.5%	0%	0%	1.9%	0.6%
Buses and Single-Unit Trucks	0	0	0	0	0	1	0	1	0	1	0	1	2
% Buses and Single-Unit Trucks	0%	0%	0%	0%	0%	1.3%	0%	1.1%	0%	7.7%	0%	1.9%	1.2%

<sup>\*</sup>L: Left, R: Right, T: Thru, U: U-Turn

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)

All Movements

Wed Jun 7, 2023

ID: 1078498, Location: 39.732755, -86.447573, Site Code: CR 200 S and CR 450  $\rm E$ 



# **AVON SCHOOLS TIS**

APPENDIX C: TRAFFIC VOLUME CALCULATIONS



## Avon Community School Corporation Traffic Impact Study Trip Generation Comparisons for the Proposed Middle SchoolCampus Southeast quadrant of CR100S and CR450E

Land Use	Students	Time Period	ITE Formula	Total Trips	Trips Entering	Trips Exiting
Middle School/Junior High School (6-8)	1,100					
ITE LUC 522	Students	AM Peak - Generator	Average Rate = 0.74	814	448	366
		PM Peak - Generator	Average Rate = 0.36	396	182	214

Applying ITE Trip Generation Rates for Middle School (1,100 students)

Applying site specific rates based on District busing and car rider estimates

	ehicle Trips					
Land Use	Student	Period	Formula	Total	Entering	Exiting
Middle School	185					
Car Trips	Students	AM Peak - Generator	Average Rate = 2.0	370	204	167
(assume 2 trips per student per time period)	faculty staff	PM Peak - Generator	Average Rate = 2.0	370	170	200
Middle School	18					
Bus Trips	Buses	AM Peak - Generator	Average Rate = 2.0	36	18	18
(18 buses to transport 990 students)		PM Peak - Generator	Average Rate = 2.0	36	18	18
Middle School Total Trips		AM Peak - Generato PM Peak - Generato	or Or	406 406	222 188	185 218




























# **AVON SCHOOLS TIS**

APPENDIX D: CAPACITY ANALYSES



**EXISTING CONDITIONS – AM PEAK HOUR** 



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	<b>↑</b> 1→		ľ	<b>†</b> Ъ			\$			4	
Traffic Volume (veh/h)	17	739	5	7	485	10	8	11	30	25	11	9
Future Volume (Veh/h)	17	739	5	7	485	10	8	11	30	25	11	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	803	5	8	527	11	9	12	33	27	12	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	538			808			1137	1396	404	1025	1392	269
vC1, stage 1 conf vol							842	842		548	548	
vC2, stage 2 conf vol							296	554		476	844	
vCu, unblocked vol	538			808			1137	1396	404	1025	1392	269
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			96	95	94	91	95	99
cM capacity (veh/h)	1026			813			250	253	596	296	253	729
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	18	535	273	8	351	187	54	49				
Volume Left	18	0	0	8	0	0	9	27				
Volume Right	0	0	5	0	0	11	33	10				
cSH	1026	1700	1700	813	1700	1700	389	322				
Volume to Capacity	0.02	0.31	0.16	0.01	0.21	0.11	0.14	0.15				
Queue Length 95th (ft)	1	0	0	1	0	0	12	13				
Control Delay (s)	8.6	0.0	0.0	9.5	0.0	0.0	15.7	18.2				
Lane LOS	А			А			С	С				
Approach Delay (s)	0.2			0.1			15.7	18.2				
Approach LOS							С	С				
Intersection Summary												
Average Delay			1.3									
Intersection Capacity Utiliz	zation		33.9%	10	CU Level o	of Service			А			
Analysis Period (min)			15									

	-	7	1	←	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	ţ,			ą	¥		
Traffic Volume (veh/h)	8	5	12	2	5	8	
Future Volume (Veh/h)	8	5	12	2	5	8	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	9	5	13	2	5	9	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None			None			
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume			14		40	12	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			14		40	12	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			99		99	99	
cM capacity (veh/h)			1604		964	1069	
Direction. Lane #	EB 1	WB 1	NB 1				
Volume Total	14	15	14				
Volume Left	0	13	5				
Volume Right	5	0	9				
cSH	1700	1604	1029				
Volume to Capacity	0.01	0.01	0.01				
Queue Length 95th (ft)	0.01	1	1				
Control Delay (s)	0.0	63	85				
Lane LOS	0.0	A	A				
Approach Delay (s)	0.0	6.3	8.5				
Approach LOS	0.0	0.0	A				
Intersection Summers							
			<b>F</b> 0				
Average Delay	. C		5.0			( <b>0</b>	
Intersection Capacity Utiliz	zation		17.4%	IC	U Level o	of Service	1
Analysis Period (min)			15				

	×	2	5	×	3	~
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	14			្ឋ	¥	
Traffic Volume (veh/h)	44	1	12	13	2	40
Future Volume (Veh/h)	44	1	12	13	2	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0 92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	1	13	14	2	43
Pedestrians	10		10		<u>_</u>	10
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)	NUNE					
Instream signal (ff)						
nX nlatoon unblocked						
vC. conflicting volume			10		88	/18
vC1 stage 1 conf vol			73		00	-10
vC2 stage 2 conf vol						
			40		88	48
tC single (s)			/ 1		6.4	62
tC, single (s) $tC = 2 \text{ stars}(s)$			4.1		0.4	0.2
tF(c)			2.2		35	22
n (3)			2.2		100	06
cM canacity (yeb/b)			1558		005	1020
			1550		300	1020
Direction, Lane #	SE 1	NW 1	NE 1			
Volume Total	49	27	45			
Volume Left	0	13	2			
Volume Right	1	0	43			
cSH	1700	1558	1014			
Volume to Capacity	0.03	0.01	0.04			
Queue Length 95th (ft)	0	1	3			
Control Delay (s)	0.0	3.6	8.7			
Lane LOS		А	А			
Approach Delay (s)	0.0	3.6	8.7			
Approach LOS			А			
Intersection Summary						
			4.0			
Average Delay	rotion		4.0	10		of Convinc
Analysis Daried (rein)	zauon		10.2%	IC	U Level C	JI Service
Analysis Period (min)			15			

Intersection				
Intersection Delay, s/veh	4.7			
Intersection LOS	А			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	115	113	116	135
Demand Flow Rate, veh/h	117	115	119	137
Vehicles Circulating, veh/h	131	124	176	27
Vehicles Exiting, veh/h	33	171	72	212
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.8	4.7	5.1	4.4
Approach LOS	А	А	А	А
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	I TR
Assumed Moves				=
	LTR	LTR	LTR	LTR
RT Channelized	LTR	LTR	LTR	LTR
RT Channelized Lane Util	LTR 1.000	LTR 1.000	LTR 1.000	LTR 1.000
RT Channelized Lane Util Critical Headway, s	LTR 1.000 5.193	LTR 1.000 5.193	LTR 1.000 5.193	LTR 1.000 5.193
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h	LTR 1.000 5.193 117	LTR 1.000 5.193 115	LTR 1.000 5.193 119	LTR 1.000 5.193 137
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h	LTR 1.000 5.193 117 991	LTR 1.000 5.193 115 998	LTR 1.000 5.193 119 948	LTR 1.000 5.193 137 1100
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor	LTR 1.000 5.193 117 991 0.979	LTR 1.000 5.193 115 998 0.980	LTR 1.000 5.193 119 948 0.977	LTR 1.000 5.193 137 1100 0.985
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor Flow Entry, veh/h	LTR 1.000 5.193 117 991 0.979 115	LTR 1.000 5.193 115 998 0.980 113	LTR 1.000 5.193 119 948 0.977 116	LTR 1.000 5.193 137 1100 0.985 135
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor Flow Entry, veh/h Cap Entry, veh/h	LTR 1.000 5.193 117 991 0.979 115 970	LTR 1.000 5.193 115 998 0.980 113 978	LTR 1.000 5.193 119 948 0.977 116 926	LTR 1.000 5.193 137 1100 0.985 135 1083
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor Flow Entry, veh/h Cap Entry, veh/h V/C Ratio	LTR 1.000 5.193 117 991 0.979 115 970 0.118	LTR 1.000 5.193 115 998 0.980 113 978 0.115	LTR 1.000 5.193 119 948 0.977 116 926 0.126	LTR 1.000 5.193 137 1100 0.985 135 1083 0.125
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor Flow Entry, veh/h Cap Entry, veh/h V/C Ratio Control Delay, s/veh	LTR 1.000 5.193 117 991 0.979 115 970 0.118 4.8	LTR 1.000 5.193 115 998 0.980 113 978 0.115 4.7	LTR 1.000 5.193 119 948 0.977 116 926 0.126 5.1	LTR 1.000 5.193 137 1100 0.985 135 1083 0.125 4.4
RT Channelized Lane Util Critical Headway, s Entry Flow, veh/h Cap Entry Lane, veh/h Entry HV Adj Factor Flow Entry, veh/h Cap Entry, veh/h V/C Ratio Control Delay, s/veh LOS	LTR 1.000 5.193 117 991 0.979 115 970 0.118 4.8 A	LTR 1.000 5.193 115 998 0.980 113 978 0.115 4.7 A	LTR 1.000 5.193 119 948 0.977 116 926 0.126 5.1 A	LTR 1.000 5.193 137 1100 0.985 135 1083 0.125 4.4 A

	٠	-	+	*	1	1
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		đ	14		¥	
Traffic Volume (veh/h)	6	40	23	5	7	5
Future Volume (Veh/h)	6	40	23	5	7	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	43	25	5	8	5
Pedestrians	· ·	10	20	Ű	Ű	Ŭ
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)		NONE	NONE			
Linstream signal (ff)						
nX platoon unblocked						
vC conflicting volume	20				Q/I	28
vC1 stage 1 conf vol	50				04	20
vC1, stage 1 confivel						
	30				Q/	28
tC single (s)	30				04 6.4	20
	4.1				0.4	0.2
IC, Z Stage (S)	0.0				25	2.2
IF (S)	2.2				3.5	ა.ა 100
pu queue free %	100				99	100
civi capacity (ven/n)	1583				913	1048
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	50	30	13			
Volume Left	7	0	8			
Volume Right	0	5	5			
cSH	1583	1700	960			
Volume to Capacity	0.00	0.02	0.01			
Queue Length 95th (ft)	0	0	1			
Control Delay (s)	1.0	0.0	8.8			
Lane LOS	А		А			
Approach Delay (s)	1.0	0.0	8.8			
Approach LOS			A			
Interception Summers						
			1.0			
Average Delay	ination		1.0	10		4 Consider
Intersection Capacity Util	Ization		17.2%	IC		or Service
Analysis Period (min)			15			

**EXISTING CONDITIONS – PM PEAK HOUR** 



	٦	-	7	1	←	*	1	1	1	1	Ŧ	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	<b>†</b> 1 <sub>2</sub>		1	<b>†</b> Ъ			4			\$	
Traffic Volume (veh/h)	11	554	16	19	699	2	13	14	9	24	15	17
Future Volume (Veh/h)	11	554	16	19	699	2	13	14	9	24	15	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	602	17	21	760	2	14	15	10	26	16	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	762			619			1082	1438	310	1146	1446	381
vC1, stage 1 conf vol							634	634		803	803	
vC2, stage 2 conf vol							448	804		342	643	
vCu, unblocked vol	762			619			1082	1438	310	1146	1446	381
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			95	94	99	90	93	97
cM capacity (veh/h)	846			957			280	246	686	252	244	617
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	12	401	218	21	507	255	39	60				
Volume Left	12	0	0	21	0	0	14	26				
Volume Right	0	0	17	0	0	2	10	18				
cSH	846	1700	1700	957	1700	1700	310	304				
Volume to Capacity	0.01	0.24	0.13	0.02	0.30	0.15	0.13	0.20				
Queue Length 95th (ft)	1	0	0	2	0	0	11	18				
Control Delay (s)	9.3	0.0	0.0	8.8	0.0	0.0	18.3	19.8				
Lane LOS	А			А			С	С				
Approach Delay (s)	0.2			0.2			18.3	19.8				
Approach LOS							С	С				
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utiliza	tion		30.5%	IC	CU Level o	of Service			А			
Analysis Period (min)			15									

	-	7	*	+	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	£.			ą	¥		
Traffic Volume (veh/h)	8	7	15	10	9	14	
Future Volume (Veh/h)	8	7	15	10	9	14	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	9	8	16	11	10	15	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None			None			
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume			17		56	13	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			17		56	13	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			99		99	99	
cM capacity (veh/h)			1600		942	1067	
Direction Lane #		\//R 1	NR 1				
Volumo Total	17	07	25				
Volume Loff	0	16	10				
Volume Leit	0	10	10				
	0 1700	1600	1012				
Volume to Conseitu	0.01	0.01	1013				
Volume to Capacity	0.01	0.01	0.02				
Queue Length 95th (ft)	0	1	2				
Control Delay (s)	0.0	4.3	8.6				
Lane LOS	0.0	A	A				
Approach Delay (s)	0.0	4.3	8.6				
Approach LOS			A				
Intersection Summary							
Average Delay			4.8				
Intersection Capacity Utiliza	ition		18.0%	IC	U Level o	of Service	÷
Analysis Period (min)			15				

	×	2	5	×	3	~
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	14			ភ្	¥	
Traffic Volume (veh/h)	24	4	37	31	1	30
Future Volume (Veh/h)	24	4	37	31	1	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	4	40	34	1	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			30		142	28
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			30		142	28
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	97
cM capacity (veh/h)			1583		829	1047
Direction, Lane #	SE 1	NW 1	NE 1			
Volume Total	30	74	34			
Volume Left	0	40	1			
Volume Right	4	0	33			
cSH	1700	1583	1039			
Volume to Capacity	0.02	0.03	0.03			
Queue Length 95th (ft)	0	2	3			
Control Delay (s)	0.0	4.1	8.6			
Lane LOS		А	A			
Approach Delay (s)	0.0	4.1	8.6			
Approach LOS			А			
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilizati	on		20.8%	IC	U Level o	of Service
Analysis Period (min)			15	.0		

Intersection				
Intersection Delay, s/veh	5.4			
Intersection LOS	А			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	59	242	99	190
Demand Flow Rate, veh/h	60	246	101	194
Vehicles Circulating, veh/h	176	111	136	79
Vehicles Exiting, veh/h	97	126	100	278
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.4	6.0	4.6	5.3
Approach LOS	А	А	А	А
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	60	246	101	194
Cap Entry Lane, veh/h	948	1011	986	1044
Entry HV Adj Factor	0.989	0.984	0.983	0.977
Flow Entry, veh/h	59	242	99	190
Cap Entry, veh/h	937	995	970	1020
V/C Ratio	0.063	0.243	0.102	0.186
Control Delay, s/veh	4.4	6.0	4.6	5.3
LOS	А	A	А	А
95th %tile Queue, veh	0	1	0	1

	٦	-	+	•	5	1	
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		្ន	14		¥		
Traffic Volume (veh/h)	9	27	59	12	8	9	
Future Volume (Veh/h)	9	27	59	12	8	9	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	10	29	64	13	9	10	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		None	None				
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	77				120	70	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	77				120	70	
tC, single (s)	4.1				6.4	6.2	
tC, 2 stage (s)							
tF (s)	2.2				3.5	3.3	
p0 queue free %	99				99	99	
cM capacity (veh/h)	1522				870	992	
Direction, Lane #	EB 1	WB 1	SB 1				
Volume Total	39	77	19				
Volume Left	10	0	9				
Volume Right	0	13	10				
cSH	1522	1700	930				
Volume to Capacity	0.01	0.05	0.02				
Queue Length 95th (ft)	0	0	2				
Control Delay (s)	1.9	0.0	8.9				
Lane LOS	А		А				
Approach Delay (s)	1.9	0.0	8.9				
Approach LOS			А				
Intersection Summary							
Average Delay			1.8				
Intersection Capacity Utiliz	zation		18.6%	IC	U Level c	of Service	А
Analysis Period (min)			15				

2025 BUILD - AM PEAK HOUR



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	<b>†</b> Ъ		ሻ	<b>1</b>			\$			\$	
Traffic Volume (veh/h)	17	739	19	20	485	10	20	22	40	25	24	9
Future Volume (Veh/h)	17	739	19	20	485	10	20	22	40	25	24	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	803	21	22	527	11	22	24	43	27	26	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	538			824			1180	1432	412	1069	1436	269
vC1, stage 1 conf vol							850	850		576	576	
vC2, stage 2 conf vol							330	582		492	860	
vCu, unblocked vol	538			824			1180	1432	412	1069	1436	269
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			91	90	93	90	89	99
cM capacity (veh/h)	1026			802			238	245	589	268	239	729
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	18	535	289	22	351	187	89	63				
Volume Left	18	0	0	22	0	0	22	27				
Volume Right	0	0	21	0	0	11	43	10				
cSH	1026	1700	1700	802	1700	1700	338	282				
Volume to Capacity	0.02	0.31	0.17	0.03	0.21	0.11	0.26	0.22				
Queue Length 95th (ft)	1	0	0	2	0	0	26	21				
Control Delay (s)	8.6	0.0	0.0	9.6	0.0	0.0	19.4	21.4				
Lane LOS	А			А			С	С				
Approach Delay (s)	0.2			0.4			19.4	21.4				
Approach LOS							С	С				
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utiliza	tion		33.2%	](	CU Level o	of Service			А			
Analysis Period (min)			15									

-	7	1	←	1	1
EBT	EBR	WBL	WBT	NBL	NBR
14			ភ្	M	
8	45	88	2	37	71
8	45	88	2	37	71
Free			Free	Stop	
0%			0%	0%	
0.50	0.50	0.50	0.50	0.50	0.50
16	90	176	4	74	142
None			None		
		106		417	61
		106		417	61
		4.1		6.4	6.2
		2.2		3.5	3.3
		88		86	86
		1485		522	1004
EB 1	WB 1	NB 1			
106	180	216			
0	176	74			
90	0	142			
1700	1485	763			
0.06	0.12	0.28			
0	10	29			
0.0	7.6	11.6			
	А	В			
0.0	7.6	11.6			
		В			
		7.7			
n		24.7%	IC	U Level o	of Service
		15		2 201010	
	EBT	EBT  EBR    8  45    8  45    8  45    Free  0%    0.50  0.50    16  90    7  7    None  7    EB 1  WB 1    106  180    0  176    90  0    1700  1485    0.06  0.12    0  10    0.0  7.6    A  0.0    0.0  7.6	EBT    EBR    WBL      1    -    -      8    45    88      8    45    88      Free    -    -      0%    -    -      0.50    0.50    0.50      16    90    176      None    -    -      None    -    -      106    4.1    -      2.2    88    -      106    4.1    -      2.2    88    1485      EB 1    WB 1    NB 1      106    180    216      0    176    74      90    0    142      1700    1485    763      0.06    0.12    0.28      0    10    29      0.0    7.6    11.6      B    0.0    7.6      11.6    B    B      0.0    7.6    11.6      B	EBT  EBR  WBL  WBT    1	EBT    EBR    WBL    WBT    NBL      8    45    88    2    37      8    45    88    2    37      Free    Free    Stop    0%    0%    0%      0.50    0.50    0.50    0.50    0.50    1050    1050      16    90    176    4    74    74      None    None    106    417    417      106    417    4.1    6.4    74      2.2    3.5    88    86    1485    522      EB 1    WB 1    NB 1    2.2    3.5    88    86      1485    522    522    522    522    522    522    522    522    53    53    54    52    52    52    52    52    52    52    52    52    52    53    53    54    52    52    54    52    52    52    52 <t< td=""></t<>

	×	2	~	×	5	~
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	14			đ	¥	
Traffic Volume (veh/h)	44	5	84	13	5	100
Future Volume (Veh/h)	44	5	84	13	5	100
Sign Control	Free	-		Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50
Hourly flow rate (yph)	88	10	168	26	10	200
Pedestrians	00	10	100	20	10	200
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage yeb)	NULLE			NULLE		
Unstroom signal (#)						
ny platoon unblocked						
pr, platoon unblocked			00		155	02
			90		400	90
vC1, stage 1 coni voi						
VC2, stage 2 cont voi			00		455	02
			98		455	93
tC, single (s)			4.1		6.4	b.Z
tC, 2 stage (s)			0.0		2.5	0.0
t⊢ (s)			2.2		3.5	3.3
pu queue free %			89		98	79
cM capacity (veh/h)			1495		500	964
Direction, Lane #	SE 1	NW 1	NE 1			
Volume Total	98	194	210			
Volume Left	0	168	10			
Volume Right	10	0	200			
cSH	1700	1495	923			
Volume to Capacity	0.06	0.11	0.23			
Queue Length 95th (ft)	0	9	22			
Control Delay (s)	0.0	6.8	10.0			
Lane LOS		A	В			
Approach Delay (s)	0.0	6.8	10.0			
Approach LOS	0.0	0.0	В			
			_			
			~ ~			
Average Delay			6.8			
Intersection Capacity Utiliz	zation		26.4%	IC	U Level o	of Service
Analysis Period (min)			15			

Intersection				
Intersection Delay, s/veh	8.2			
Intersection LOS	A			
Approach	FB	WR	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adi Approach Flow, yeh/h	330	310	21/	20/
Demand Flow Rate veh/h	336	316	214	300
Vehicles Circulating, veh/h	2/3	263	//7	155
Vehicles Exiting veh/h	243	402	132	424
Follow-I In Headway	3 186	3 186	3 186	3 186
Ped Vol Crossing Leg. #/h	0.100	0.100	0.100	0
Ped Cap Adi	1 000	1 000	1 000	1 000
Approach Delay, s/veh	8.5	8.4	8.8	7.0
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	336	316	218	300
Cap Entry Lane, veh/h	886	869	723	968
Entry HV Adj Factor	0.981	0.982	0.981	0.980
Flow Entry, veh/h	330	310	214	294
Cap Entry, veh/h	869	853	709	948
V/C Ratio	0.379	0.364	0.302	0.310
Control Delay, s/veh	8.5	8.4	8.8	7.0
1.00			٨	٨
LOS	A	A	A	A

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Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		र्स	4		Y		
Traffic Volume (veh/h)	50	40	23	67	60	42	
Future Volume (Veh/h)	50	40	23	67	60	42	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	
Hourly flow rate (vph)	100	80	46	134	120	84	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		None	None				
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	180				393	113	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	180				393	113	
tC, single (s)	4.1				6.4	6.2	
tC, 2 stage (s)							
tF (s)	2.2				3.5	3.3	
p0 queue free %	93				79	91	
cM capacity (veh/h)	1396				568	940	
Direction, Lane #	EB 1	WB 1	SB 1				
Volume Total	180	180	204				
Volume Left	100	0	120				
Volume Right	0	134	84				
cSH	1396	1700	678				
Volume to Capacity	0.07	0.11	0.30				
Queue Length 95th (ft)	6	0	32				
Control Delay (s)	4.6	0.0	12.6				
Lane LOS	А		В				
Approach Delay (s)	4.6	0.0	12.6				
Approach LOS			В				
Intersection Summary							
Average Delay			6.0				
Intersection Capacity Utiliz	zation		24.1%	IC	U Level o	of Service	A
Analysis Period (min)			15				

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	_	
Lane Configurations	Y			र्स	4Î			
Traffic Volume (veh/h)	36	82	15	104	25	3		
Future Volume (Veh/h)	36	82	15	104	25	3		
Sign Control	Stop			Free	Free			
Grade	0%			0%	0%			
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50		
Hourly flow rate (vph)	72	164	30	208	50	6		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type				None	None			
Median storage veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume	321	53	56					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	321	53	56					
tC, single (s)	6.4	6.2	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.3	2.2					
p0 queue free %	89	84	98					
cM capacity (veh/h)	660	1014	1549					
Direction Lane #	FR 1	NR 1	SB 1					
Volume Total	236	238	56					
	200	200	0					
Volume Pight	16/	0	6					
cSH	871	15/19	1700					
Volume to Canacity	0.27	0.02	0.03					
Ouque Length 95th (ft)	0.27	0.02	0.05					
Control Delay (s)	10.7	1 1	0.0					
	10.7 D	1.1	0.0					
Approach Dolay (c)	10.7	1 1	0.0					
Approach LOS	10.7 D	1.1	0.0					
	D							
Intersection Summary								
Average Delay			5.2					
Intersection Capacity Utilization	n		26.7%	IC	CU Level c	of Service		
Analysis Period (min)			15					

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			é.	ef 👘		
Traffic Volume (veh/h)	58	8	91	49	17	0	
Future Volume (Veh/h)	58	8	91	49	17	0	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	
Hourly flow rate (vph)	116	16	182	98	34	0	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	496	34	34				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	496	34	34				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	75	98	88				
cM capacity (veh/h)	472	1039	1578				
Direction, Lane #	EB 1	NB 1	SB 1				
Volume Total	132	280	34				
Volume Left	116	182	0				
Volume Right	16	0	0				
cSH	505	1578	1700				
Volume to Capacity	0.26	0.12	0.02				
Queue Length 95th (ft)	26	10	0				
Control Delay (s)	14.6	5.3	0.0				
Lane LOS	B	A	5.0				
Approach Delav (s)	14.6	5.3	0.0				
Approach LOS	В	2.0					
Intersection Summary							
			7.6				
Intersection Canacity Litilization	n		24.6%	IC		of Service	
Analysis Period (min)			15				

2025 BUILD - PM PEAK HOUR



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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	<b>1</b>		ሻ	<b>1</b>			4.			đ.	
Traffic Volume (veh/h)	11	554	28	30	699	2	27	27	21	24	26	17
Future Volume (Veh/h)	11	554	28	30	699	2	27	27	21	24	26	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	602	30	33	760	2	29	29	23	26	28	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		1			1							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	762			632			1119	1469	316	1190	1483	381
vC1, stage 1 conf vol							641	641		827	827	
vC2, stage 2 conf vol							478	828		362	656	
vCu, unblocked vol	762			632			1119	1469	316	1190	1483	381
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			89	88	97	89	88	97
cM capacity (veh/h)	846			947			262	238	680	233	233	617
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	12	401	231	33	507	255	81	72				
Volume Left	12	0	0	33	0	0	29	26				
Volume Right	0	0	30	0	0	2	23	18				
cSH	846	1700	1700	947	1700	1700	304	276				
Volume to Capacity	0.01	0.24	0.14	0.03	0.30	0.15	0.27	0.26				
Queue Length 95th (ft)	1	0	0	3	0	0	26	25				
Control Delay (s)	9.3	0.0	0.0	8.9	0.0	0.0	21.1	22.6				
Lane LOS	А			А			С	С				
Approach Delay (s)	0.2			0.4			21.1	22.6				
Approach LOS							С	С				
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utiliz	ation		37.1%	](	CU Level o	of Service			А			
Analysis Period (min)			15									

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1.			ę	¥	
Traffic Volume (veh/h)	8	40	79	10	47	89
Future Volume (Veh/h)	8	40	79	10	47	89
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50
Hourly flow rate (vph)	16	80	158	20	94	178
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)				10110		
Upstream signal (ff)						
nX platoon unblocked						
vC conflicting volume			96		392	56
vC1_stage 1 conf vol			00		002	00
vC2 stage 2 conf vol						
			96		392	56
tC single (s)			4 1		64	62
tC 2 stage (s)			т. і		<b>U</b> .न	5.2
tF (s)			22		35	33
n0 queue free %			89		83	82
cM canacity (veh/h)			1498		548	1011
			1-700		0-0	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	96	178	272			
Volume Left	0	158	94			
Volume Right	80	0	178			
cSH	1700	1498	782			
Volume to Capacity	0.06	0.11	0.35			
Queue Length 95th (ft)	0	9	39			
Control Delay (s)	0.0	6.9	12.0			
Lane LOS		А	В			
Approach Delay (s)	0.0	6.9	12.0			
Approach LOS			В			
Intersection Summarv						
Average Delay			8.3			
Intersection Canacity Utilization	n		26.3%	IC	Ulevelo	of Service
Analysis Poriod (min)			15	10		

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Movement	SET	SER	NWL	NWT	NEL	NER		
Lane Configurations	Ţ,			đ	Y			
Traffic Volume (veh/h)	24	7	98	31	5	101		
Future Volume (Veh/h)	24	7	98	31	5	101		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50		
Hourly flow rate (vph)	48	14	196	62	10	202		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None			None				
Median storage veh)								
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume			62		509	55		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol			62		509	55		
tC, single (s)			4.1		6.4	6.2		
tC, 2 stage (s)								
tF (s)			2.2		3.5	3.3		
p0 queue free %			87		98	80		
cM capacity (veh/h)			1541		457	1012		
Direction Lane #		NI\// 1	NE 1					
Volume Total	- <u>-</u> C	259	<u>010</u>					
	02	106	10					
Volume Leit	1/	190	202					
	1700	15/1	202					
Volume to Canacity	0.04	0.12	907					
Ouque Longth 05th (ft)	0.04	0.13	0.22					
Control Doloy (a)	0	6.1	21					
Control Delay (S)	0.0	0.1	9.0					
Lane LUS	0.0	A C 1	A 0.0					
Approach LOS	0.0	0.1	9.0					
Approach LOS			A					
Intersection Summary								
Average Delay			6.9					
Intersection Capacity Utilization	ation		28.4%	IC	U Level o	of Service		
Analysis Period (min)			15					

Intersection				
Intersection Delay, s/veh	10.0			
Intersection LOS	А			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	250	532	182	252
Demand Flow Rate, veh/h	255	543	185	257
Vehicles Circulating, veh/h	188	247	394	235
Vehicles Exiting, veh/h	304	332	49	555
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.8	13.7	7.6	7.2
Approach LOS	А	В	А	А
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	255	543	185	257
Cap Entry Lane, veh/h	936	883	762	893
Entry HV Adj Factor	0.979	0.980	0.983	0.980
Flow Entry, veh/h	250	532	182	252
Cap Entry, veh/h	917	865	749	876
V/C Ratio	0.272	0.615	0.243	0.288
Control Delay, s/veh	6.8	13.7	7.6	7.2
LOS	Δ	P	Δ	Δ
	~	D	~	П

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Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		र्स	<u>t</u>		¥		
Traffic Volume (veh/h)	46	27	59	66	69	53	
Future Volume (Veh/h)	46	27	59	66	69	53	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	
Hourly flow rate (vph)	92	54	118	132	138	106	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		None	None				
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	250				422	184	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	250				422	184	
tC, single (s)	4.1				6.4	6.2	
tC, 2 stage (s)							
tF (s)	2.2				3.5	3.3	
p0 queue free %	93				75	88	
cM capacity (veh/h)	1316				547	858	
Direction, Lane #	EB 1	WB 1	SB 1				
Volume Total	146	250	244				
Volume Left	92	0	138				
Volume Right	0	132	106				
cSH	1316	1700	649				
Volume to Capacity	0.07	0.15	0.38				
Queue Length 95th (ft)	6	0	44				
Control Delay (s)	5.2	0.0	13.8				
Lane LOS	А		В				
Approach Delay (s)	5.2	0.0	13.8				
Approach LOS			В				
Intersection Summary							
Average Delay			6.5				
Intersection Capacity Utilizat	tion		28.2%	IC	U Level o	of Service	А
Analysis Period (min)			15				

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			र्स	ef 👘		
Traffic Volume (veh/h)	43	95	15	99	32	3	
Future Volume (Veh/h)	43	95	15	99	32	3	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	
Hourly flow rate (vph)	86	190	30	198	64	6	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume	325	67	70				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	325	67	70				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	87	81	98				
cM capacity (veh/h)	656	997	1531				
Direction, Lane #	EB 1	NB 1	SB 1				
Volume Total	276	228	70				
Volume Left	86	30	0				
Volume Right	190	0	6				
cSH	858	1531	1700				
Volume to Capacity	0.32	0.02	0.04				
Queue Length 95th (ft)	35	1	0				
Control Delay (s)	11.2	1.1	0.0				
Lane LOS	В	А					
Approach Delay (s)	11.2	1.1	0.0				
Approach LOS	В						
Intersection Summary							
Average Delay			5.8				
Intersection Canacity Litilization	n		27.6%	IC		of Service	
Analysis Period (min)	·••		15				

	٠	7	1	1	Ļ	1
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			đ	4	
Traffic Volume (veh/h)	70	0	76	66	72	94
Future Volume (Veh/h)	70	0	76	66	72	94
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50
Hourly flow rate (vph)	140	0	152	132	144	188
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	674	238	332			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	674	238	332			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	100	88			
cM capacity (veh/h)	368	801	1227			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	140	284	332			
Volume Left	140	152	0			
Volume Right	0	0	188			
cSH	368	1227	1700			
Volume to Canacity	0.38	0.12	0.20			
Queue Length 95th (ft)	43	11	0.20			
Control Delay (s)	20.7	5.0	0.0			
Lane LOS	20.1 C	0.0 A	0.0			
Approach Delay (s)	20.7	50	0.0			
Approach LOS	C	0.0	0.0			
Interception Summery						
			E 7			
Average Delay	tion		5.7			4 Comiles
Intersection Capacity Utilizat	lion		31.1%	IC		or Service
Analysis Period (min)			15			

# **AVON SCHOOLS TIS**

APPENDIX E: SIGNAL WARRANTS


Signal Wa	arrant	Study	,										
Roadway Charact	eristics												
			Roadway	/		Orier	ntation	Movin (One	g Lanes Way)		Da	ate	
Mainline	CR-100					East	-West		1		6/20	/2022	East-Wes
Cross Roadway	CR-450					North	n-South		1		0/30,	2023	orth-Sou
													]
Does the posted s major street exce	speed limit ed 40 MPH	on the ?	NO	Does the having a	intersecti populatio	on lie witł n less thar	hin the bui n 10,000 p	ilt-up area eople?	i of an isol	ated comr	nunity	YES	
Warrant Summar	y										Meets		
Warrant #1	Eight-Ho	ur Vehicul	ar Volume	е							NO		
Warrant #2	Four-Hou	ur Vehicula	ar Volume	5							NO		
Warrant #3	Peak Hou	ur									NO		
Warrant #4	Pedestria	an Volume									NO		
Warrant #5	School C	rossing									NO		
Warrant #6	Coordina	ted Signal	System								NO		
Warrant #7	Crash Ex	perience									NO		
Warrant #8	Roadway	/ Network									NO		
Warrant #9	Intersect	ion Near a	Grade Cr	rossing							NO		
'	1			Fill ou	ut fields hi	ghlighted	in TAN						
NOTE: This spread	dsheet is co	onfigured f	or whole	hour coun	ts (not 15	minute co	ounts)						
									Last Re	evision: G. E	Bollinger (0	1/17/2019)	

Raw Traffic Count	s (6/06/23	i)											
Hour	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM		5	6	10	3		7		9				
8:00 AM		7	10	10	6		7		8				
9:00 AM													
10:00 AM													
11:00 AM													
12:00 PM													
1:00 PM													
2:00 PM		7	4	13	11		5		10				
3:00 PM		5	9	13	7		9		15				
4:00 PM		10	5	11	7		10		22				
5:00 PM		9	13	9	6		10		24				
6:00 PM													
7:00 PM													
8:00 PM													
9:00 PM													
Select lane configu	uration:												
Ŧ			т	Any con	figuration v	with exclusi	ve right-	-	r		-	r	
				turr	riane (usua	$rac{1}{2} = 600 \text{ fr}$	eet)						
L <b>C</b>		L	R			R		L	R	L			R
					(								
A		/	A		ì				A		ŀ	A	
Configuration:	1												

Adjusted Traffic Co	ounts												
Hour	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
7:00 AM	5	5	6	10	3	0	7	0	5	0	0	0	
8:00 AM	0	7	10	10	6	0	7	0	5	0	0	0	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
2:00 PM	0	7	4	13	11	0	5	0	6	0	0	0	
3:00 PM	0	5	9	13	7	0	9	0	9	0	0	0	
4:00 PM	0	10	5	11	7	0	10	0	13	0	0	0	
5:00 PM	0	9	13	9	6	0	10	0	10	0	0	0	
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	
Warrant #1 Eight	t Hour Tra	ffic Count	s	l.	'	l.	,	1		Meets V	Varrant	NO	
Appropriate table t	o use fror	n MUTCD	(2009)		40	C-1							
Vehicles Per Hour	Threshold	s		Stand	-Alone			Comb	ination				
Number	of Lanes		Cond	tion A	Condi	ition B	Cond	ition A	Cond	ition B			
Major Street	Major	Street	Major	Minor	Major	Minor	Major	Minor	Major	Minor			
1		1	350	105	525	53	280	84	420	42			
Hour	Major	Hi Minor		Stand	Alone (eit	her or)			Com	bination (	both)		
	(2-Way)	(1-Way)	Condi	tion A	Condi	tion B	Meets	Cond	ition A	Condi	ition B	Meets	
7:00 AM	29	12	1	n	1	n	N		n	-	n	N	
8:00 AM	33	12	1	n	1	n	N		n	-	n	N	
9:00 AM	0	0	1	n	1	n	N		n	-	n	N	
10:00 AM	0	0		n	1	n	N		n		n	N	
11:00 AM	0	0		n	1	n	N		n		n	N	
12:00 PM	0	0		n	1	n	N		n		n	N	
1:00 PM	0	0		n	1	n	N		n		n	N	
2:00 PM	35	11		n	1	n	N		n		n	N	
3:00 PM	34	18		n	1	n	N		n	-	n	N	
4:00 PM	33	23		n	1	n	N		n	-	n	N	
5:00 PM	37	20		n	1	n	N		n		n	N	
6:00 PM	0	0		n	<u> </u>	n	N		n		n	N	
7:00 PM	0	0		n	<u> </u>	n	N		n		n	N	
8:00 PM	0	0		n	1	n	N		n		n	N	
9:00 PM	0	0		n	1	n	N	ļ	n		n	N	
Does Stand-Alone of	or Combin	ation mee	t threshol	ds for 8 to	otal hours	?	NO					NO	
Warrant #2 Four	Hour Tra	fic Counts	5							Meets V	Varrant	NO	

Appropriate	e table t	o use fror	n MUTCD	(2009)		40	C-4						1	
Number of	moving	lanes on r	major stre	et (one-wa	-way) 1 one-way) 1		1							
Number of	moving	lanes on r	minor app	roach (one	e-way)	:	1						-	
Hour	r	Major	Hi Minor	Critical I	Minor Vol	ume Per	Plot abo	ove line?						
7:00 A	M	( <u>2-way)</u> 29	(1-Way) 12		358	+	Γ	lo						
8:00 A	M	33	12		355		n N	10					-	
9:00 A	M	0	0		377		Γ	lo	-				-	
10:00 Å	٩M	0	0		377		٦	١o						
11:00 /	٩M	0	0		377		٦	10	Do at lea	st four ho	urs meet t	he		
12:00 F	PM	0	0		377		Γ	lo	threshold	d?			NO	
1:00 P	M	0	0		377		٦	١o					•	
2:00 P	M	35	11		354		٦	10					-	
3:00 P	M	34	18		355		٦	10						
4:00 P	M	33	23		355		٦	١o						
5:00 P	M	37	20		353		٦	10						
6:00 P	M	0	0		377		٩	10						
7:00 P	M	0	0		377		٢	lo	_					
8:00 P	M	0	0		377		٢	lo						
9:00 P	M	0	0		377	1	1	lo						
		-												
Warrant #3	Peak	Hour Vol	ume	1		1		1		1	Meets V	Varrant	NO	
								1						
Appropriate	e table t	o use fror	n MUTCD	(2009)		40	2-6							
Number of	moving	lanes on r	najor stre	et (one-wa	ay)		1						-	
Number of	moving	lanes on r	ninor appi	roach (one	e-way)		1						-	
Hour	r	Major (2-Way)	Hi Minor (1-Way)	Critical I	Minor Vol Table 4C-3	ume Per 3	Plot abo	ove line?		Does at l	east one h	our meet	NO	
7:00 A	M	29	12		498	-	٦	١o		the thres	hold?		No	
8:00 A	M	33	12		495		٦	١o					1	
9:00 A	M	0	0		520		٦	lo						
10:00 A	٩M	0	0		520		٦	lo		Note:				
11:00 A	AM	0	0		520		١	10		This warr	ant shall o	only be ap	plied in	
12:00 F	PM	0	0		520		٢	lo		unsual ca	ises. Such	as the foll	owing:	
1:00 P	M	0	0		520		Ν	10		Office 0	Complexes	6		
2:00 P	M	35	11		494		Ν	10		• Manufa	acturing P	ants	<u> </u>	
3:00 P	M	34	18		494		٦	10		• Industr	ial Comple	exes		
4:00 P	M	33	23		495		٦	10		• High-O	ccupancy	Vehicle Fa	cilities	
5:00 P	M	37	20		492		1	lo						
6:00 P	M	0	0		520		1	lo		Do any	unsual cas	es exist?	NO	
7:00 P	M	0	0		520	1	٦	10					-	
warrant #4	Pede	strian Vo	ume								Weets V	varrant	NO	
Fourthere														
Appropriate	ofigure	to use fre				Apolycic								
Appropriate	e ngure	to use IIO		(2009), F		-11019515		40	C-4					

Appropriate figure	e to use fro	m MUTCD	(2009), P	eak Hour	Analysis		40	C-6					
Number of movin	g lanes on r	major stre	et (one-w	ay)		:	1						
Number of movin	g lanes on r	minor app	roach (on	e-way)	:	1							
Hour	Major	Peds C	rossing	Plot abo	ve line in	Plot abo	ve line in						
	(2-Way)	Major	Street	Figure	e 4C-4?	Figure	4C-6?						1
7:00 AM	29			N	10	N	10		Do at lea	st four ho	urs meet	NO	
8:00 AM	33			N	10	N	10		threshold	tor Figur	e 4C-4?		
9:00 AM	0			N	10	N	10						
10:00 AM	0			N	10	N	10		Does one	hour me	et	NO	
11:00 AM	0			N	10	N	10		threshold	d for Figur	e 4C-6?		
12:00 PM	0			Ν	10	N	10						
1:00 PM	0			Ν	10	N	10						
2:00 PM	35			Ν	10	N	10						
3:00 PM	34			Ν	10	N	10						
4:00 PM	33			N	10	N	10						
5:00 PM	37			N	10	N	10						
6:00 PM	0			Ν	10	N	10						
Warrant #5 Sch	ool Crossin	g	l	1	1	l	1	l		Meets V	Varrant	NO	
If both questions	are "Ves" t	hen the w	arrant is r	net									
		inch the w											
Do at least 20 sch	ool childrer	n cross the	e major str	reet durin	g the highe	est crossin	ig hour?						
Has an engineerin	ig study sho	own that t	he numbe	er of gaps v	when scho	ol childre	n are cross	sing is less	s than the	number o	f minutes		
that school childre	en are pres	ent?											
Warrant #6 Coc	ordinated S	ignal Syste	em	1	1	1			1	Meets V	Varrant	NO	
If one statement i	s marked "	Yes", then	the warra	ant is met.									
On a one-way stre	eet or a stre	eet that ha	is traffic p	redomina	tely in one	direction	, the adjad	ent traffi	c control s	ignals are	so far		
apart that they do	o not provid	le the nec	essary deg	gree of vel	hicular pla	tooning.							
								<u> </u>					
On a two-way stre	eet, adjacer	nt traffic colle	ontrol sigr	nals do no	t provide t	he necess	ary degre	e of plato	oning and	the propo	osed and		
	introi sigild		Letively pr		ogressive	operation	•	1	1	1	1		

Warrant #7 Crasl	n Experier	ice								Meets V	Varrant	NO	
If all statements are	e marked '	"Yes". the	n the warı	rant is met	t.								
Adequate trial of al	ternatives	with sati	sfactory o	bservance	and enfo	rcement h	as failed t	o reduce i	the crash f	frequency			
Eive or more report	tod crache	c of type		alo to corr	oction by	a traffic c	ontrol cign		courred w	uithin a 12	month		
neriod each crash	involving i	es, or type: personal in	s susceptil	operty da	mage ann	a traffic co	ceeding th	iai, liave u ne annlica	ble requir	ements fo	-monun		
reportable crash	Involving		ijury or pr	operty ua	mage app	arentiy ex	ceeuing ti	ie applica	bie require	ements it	n a		
For each of any 8 h in Table 4C-1, or th higher-volume min percent of the requ be for the same 8 h of the 8 hours.	ours of an e vph in b or street a lirements lours. On	average of oth of the approach, specified the minor	day, the ve 80 percer respective in the Ped r street, th	chicles per nt columns ely, to the estrian Vo e higher v	hour (vpl s* of Conc intersecti olume war rolume sha	n) given in lition B in on, or the rant. The all not be r	both of th Table 4C-2 volume o se major s required to	ne 80 perc L exists or f pedestria treet and o be on th	cent colum the majo an traffic i: minor stre le same ap	nns* of Co r street ar s not less eet volum oproach di	ndition A nd the than 80 es shall uring each		
* Substitute 56% co	olumn for	major stre	eet speed	limits grea	ter than 4	10 mph or	if located	in built-u	p areas of				
isolated towns with	a popula	tion less t	han 10,00	0 people.	1	1	1	1					
Warrant #8 Road	lway Netv	vork								Meets V	Varrant	NO	
If any of the statem	ients are r	narked "Y	es". and th	he roads o	ualifv as a	maior ro	ute. then t	he warra	nt is met.				
, The intersection ha	s a total e	xisting, or	immediat	tely projec	ted, ente	ring volum	e of at lea	nst 1,000 v	ehicles pe	er hour du	ring the		
peak hour of a typi	cal weekd	ay and ha	s 5-year pi	rojected tr	raffic volu	mes, base	d on an er	ngineering	, study, tha	at meet o	ne or		
more of Warrants 1	L, 2 and 3	during an	average w	veekday; o	or				-				
The intersection ha	s a total e	xisting or	immediat	ely project	ted enteri	ng volume	e of at leas	t 1,000 ve	ehicles per	day for e	ach of		
any 5 hours of a no	n-normal	business o	day (Saturo	day or Sun	nday).								
A major route as us	ed in this	signal wa	rrant shall	have at le	east one o	f the follow	wing crite	ria:					
								CR	-100	CR	-450		
It is part of the stre	et or high	wav svste	m that ser	ves as the	principal	roadwav i	network						
for through traffic f	low.	, .,			. le le e .								
It includes rural or	suburban	highwavs	outside. e	ntering or	traversin	g a city.							
It annears as a mai	or route o	n an offici	al nlan su	ch as a ma	aior street	nlan in ar	urhan					-	
area traffic and trai	nsportatio	n study.	ai pian, sa			plan in ai	i di bull						
										D.C	· · · · · · · · ·	NO	
warrant #9 Inter	section N	ear a Grac	ae crossin	8						weets v	varrant	NO	
		\/  +L_			<u> </u>								
If all statements are	e marked	Yes, the	n the war	ant is met			+		!				
A grade crossing ex	ists on an	approach t of the st	on line or	vield line	on the an	o sign anu broach: an	the cente	r or the tr	ack neares	st to the			
		,											
During the highest	traffic volu	ume hour	during wh	hich rail tra	affic uses t	he crossin	ig, the plo	tted point	t represen	ting the v	ehicles		
per nour on the ma	ijor street	(lotal of t	ng vobielo	aches) an	a the corr	esponding	approach	that crock	on the maj	jor street ck (ono di	(lotal of		
only approaching t	he interse	ction) fall	s above th	s per our ( ne annlicat	ole curve i	n Figure A	appi uach C-9 or 4C-	10 for the	existing o	ombinati	on of		
approach lanes over	r the trac	k and the	distance D	), which th	ne clear st	orage dist;	ance as de	fined in S	ection 1A	13.			
									1	1	1		

# **AVON SCHOOLS TIS**

APPENDIX F: TURN LANE WARRANTS





Operating	Opposing		Advancing Volume (veh/h)								
Speed (mph)	Volume (veh/h)	5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns						
	800	330	240	180	160						
	600	410	305	225	200						
40	400	510	380	275	245						
	200	640	470	350	305						
	(100)	720	515	390	(340)						
	800	280	210	165	135						
Sec. 1	600	350	260	195	170						
50	400	430	320	240	210						
	200	550	400	300	270						
	100	615	445	335	295						
	800	230	170	125	115						
-040	600	290	210	160	140						
60	400	365	270	200	175						
	200	450	330	250	215						
	100	505	370	275	240						

# Avon Middle School - CR-100 & CER-450

40 MPH on CR-450

### VOLUME GUIDELINES FOR LEFT-TURN LANE ON TWO-LANE HIGHWAY

Figure 46-4C

88/90 = 97% WBLT AM Peak: 56 Left Turns - Percentage of Left Turns = 38/60 = 97% Advancing Volume = 58+2 = 60 9 0 Opposing Volume = 45+8 = 53



79/89= WBLT PM Peak: 79 61 Left Turns - Percentage of Left Turns = 61/71 = 86% 89'/. Advancing Volume = 10+1 = X1 89 Opposing Volume = 40+8 = 48

Operating	Opposing		Advancing Vo	olume (veh/h)	
Speed (mph)	Volume (veh/h)	5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns
	800	330	240	180	160
	600	410	305	225	200
40	400	510	380	275	245
	200	640	470	350	305
	100	720	515	390	340
	800	280	210	165	135
	600	350	260	195	170
50	400	430	320	240	210
	200	550	400	300	270
E	100	615	445	335	295
	800	230	170	125	115
	600	290	210	160	140
60	400	365	270	200	175
	200	450	330	250	215
	100	505	370	275	240

### Avon Middle School - Proposed North Access & 450

#### 40 MPH on CR-450

VOLUME GUIDELINES FOR LEFT-TURN LANE ON TWO-LANE HIGHWAY

Figure 46-4C

#### NBLT AM Peak:

91 Left Turns - Percentage of Left Turns = 91/140 = 65% Advancing Volume = 91+49 = 140 Opposing Volume = 112+17 = 129

### NBLT PM Peak:

76 Left Turns - Percentage of Left Turns = 76/142 = 54% Advancing Volume = 76+66 = 142 Opposing Volume = 94+22 = 116



Operating	Opposing		Advancing Vo	olume (veh/h)	
Speed (mph)	Volume (veh/h)	5% Left Turns	10% Left Turns	20% Left Turns	30% Left Turns
	800	330	240	180	160
	600	410	305	225	200
40	400	510	380	275	245
	200	640	470	350	305
	100	720	515	390	340
	800	280	210	165	135
	600	350	260	195	170
50	400	430	320	240	210
	200	550	400	300	270
E.	100	615	445	335	295
	800	230	170	125	115
	600	290	210	160	140
60	400	365	270	200	175
	200	450	330	250	215
	100	505	370	275	240

# Avon Middle School - Proposed South Access & 450

#### 40 MPH on CR-450

VOLUME GUIDELINES FOR LEFT-TURN LANE ON TWO-LANE HIGHWAY

Figure 46-4C

## NBLT AM Peak:

15 Left Turns - Percentage of Left Turns = 15/119 = 13% Advancing Volume = 104+15 = 119 Opposing Volume = 3+25 = 28

## NBLT PM Peak:

15 Left Turns - Percentage of Left Turns = 15/114 = 13% Advancing Volume = 15+199 = 114 Opposing Volume = 32+3 = 35



# **AVON SCHOOLS TIS**

APPENDIX G: REVIEW COMMENTS





August 28, 2023

Ian Loera Senior Planner Town of Avon 6570 East US Highway 36 Avon, In 46123

Re: Avon Middle School Traffic Impact Study

Dear Mr. Loera,

Please see the design team's response to comments from your review in conjunction with John Ayers (Hendricks County Highway Department) and Steve Moore (Avon Public Works Director) regarding Proposed Middle School Traffic Impact Study prepared by Crawford, Murphy & Tilly, Inc. and dated July 5, 2023.

1. The Impact Study assumed no background traffic growth. The study should be modified and the analyses rerun to include background growth.

**Response:** The assumption of no background traffic growth was discussed in a 05/08/23 coordination meeting, documented in a revised MOU on 05/30/23, and included in a traffic volume submittal on 06/22/23. The assumption of No Background growth was proposed due to limited development within the study area and the ability to document the impacts of school specific traffic.

The study can be amended following agreement on background growth parameters. Note that the very good levels of service (LOS A) would not expect to degrade to unacceptable levels (LOS E or worst) even with high volume estimates for future traffic. If levels of service did degrade to LOS E or worse due to background traffic, then the other future developments should be expected to mitigate the impacts of the specific development.

- 2 As noted in the review letter, the Impact Study's trip generation estimate for the A.M. peak hour was significantly less than what the ITE Trip Generation Manual recommends (406 and 814, respectively.) The Study needs to justify this difference *Response:* The traffic study explains the rationale for using Avon school specific volumes instead of the generic dataset contained in the ITE Trip Generation Manual. This rationale was documented in a traffic volume submittal on 06/22/23. The Town concurred with the trip generation assumptions on 06/28/23.
- 3. As noted in the review letter, the westbound left turn movements from CR 100 S to CR 450 E appear to be tabulated incorrectly and should be corrected and the capacity analysis for that intersection updated. *Response: The traffic study volumes have been revised. The WR left turn volume abaneed from*

**Response:** The traffic study volumes have been revised. The WB left turn volume changed from 58 to 88 vehicles in the AM peak and from 61 to 79 vehicles in the PM peak. The level of service (LOS) with the revised volumes remains unchanged (LOS A).

4. Hendricks County supports requiring turn lanes at 450 E and 100 S, and at 450 E and 200 S.



**Response:** The through volumes at the CR100/ CR450 intersection are low (10 or less) in the peak hours. The need for a dedicated left turn lane to reduce delays of through traffic on CR100 should consider actual volumes when determining the need for infrastructure improvements at the CR100/ CR450 intersection. Additional infrastructure at an intersection having an LOS A in the peak hour may encourage higher operating speeds. Avon Schools will participate in determining and contributing to improvements at this intersection attributed to this project.

The request for additional turn lanes at the CR450/CR200 are not required based on the conclusions of the traffic study. Avon Schools will participate in determining and contributing to improvements at this intersection attributed to this project.

- Hendricks County also supports requiring turn lanes at both school entrances on 450 E.
  *Response: Left and right turn lanes will be provided to meet ordinances.*
- 6. The County is very concerned about added traffic through the Parks at Prestwick development. The Study assumes the majority of passenger car traffic will not be going that direction due to the distribution of the student population. However, as noted in the review letter, the bulk of the Avon School District is located north and east of this location which indicates the estimated traffic flow through Parks at Prestwick may be much higher than the Study assumes. The Study should reconsider and verify the trip distributions used.

**Response:** Concurrence was obtained from the Town on 06/28/23 regarding trip distribution based on a traffic volume submittal on 06/22/23. Changes to the trip distribution is not expected to degrade the study area intersections to unacceptable levels of service (LOS E or worse) due to the very good levels of service (LOS A) documented in the draft traffic study. The trip distribution assumptions can be adjusted. Revised values will need to be provided by Hendricks County and/or the Town of Avon.

7. Regardless of the final number, it's safe to assume that the traffic on CR 100 S through Parks at Prestwick will increase by a significant amount as will average speeds. Hendricks County requests that the school be required to place funds in escrow to construct traffic calming measures on County streets within the development. The type, placement, and estimated costs of said measures will be determined by the County Engineer.

**Response:** Avon Schools will participate in determining and contributing to appropriate traffic calming measures attributed to this project.

If you have any further questions or comments, please feel free to contact me and I will be glad to provide any further clarity as needed.

Sincerely, Jennifer Lasch, PE, LEED AP BD+C Gonzalo Castro Diaz, P.E.

Cc: file Client Ryan Cannon, Town Manager



August 28, 2023

Ian Loera Senior Planner Town of Avon 6570 East US Highway 36 Avon, IN 46123

Re: Traffic Impact Study Review Avon Middle School

Dear Mr. Loera,

Please see the design team's response to comments from your review in conjunction with Etica Group regarding Proposed Middle School Traffic Impact Study prepared by Crawford, Murphy & Tilly, Inc. and dated July 5, 2023.

- Etica Group concurs with the analyzed AM and PM peak hours that coincide with anticipated school arrival (7:30-8:30 AM) and dismissal (2:30-3:30 PM) time periods. *Response: Noted.*
- 2 It should be noted that the Traffic Impact Study assumed no additional background traffic will be added to the street network due to future off-site development within the study area. Therefore, the analysis included year existing traffic volumes plus estimated traffic for the proposed Middle School at full occupancy (1,100 students and 75 faculty). If any developments in addition to the Middle School are currently planned for the area, the analysis should account for added background traffic as necessary.

**Response:** The assumption that no additional background traffic was discussed in a coordination meeting with the Town/ County on 05/08/23 and included as part of a revised MOU on 05/30/23. The assumption of No Background growth was proposed due to limited development within the study area and the ability to document the impacts of school specific traffic.Concurrence was obtained from the Town on 06/28/23 regarding trip generation and trip distribution for the study.

3. The trip generation was based on 90% of the 1,100 students being transported to school by bus (990 students) and the remaining 10% (110 students) by private passenger vehicles. Per the study, this breakdown reflects available site-specific transportation information for the Middle School. For the PM peak hour this method resulted in 406 total site trips, which was conservative compared to the Institute of Transportation Engineers (ITE) Trip Generation Manual estimated 396 trips. However, the ITE Trip Generation Manual estimated 814 total trips during the AM peak hour compared to 406 trips based on the site-specific information (essentially the ITE Trip Generation Manual accounts for a higher percentage of car riders during the AM arrival period resulting in a more conservative (higher) volume of added site trips. As such, the confidence level of the site-specific trip parameters applied to the trip generation is important to ensuring the AM peak hour school trips do not have a larger impact on the road network than what the traffic analysis accounted for.



**Response:** Concurrence was obtained from the Town on 06/28/23 regarding trip generation based on a traffic volume submittal on 06/22/23.

4. Two entrances to the Middle School are proposed along CR 450 East. The trip distribution for estimated school traffic accounted for passenger car use only at the northern entrance. The southern entrance accommodates all arriving and departing buses, as well as a portion of the passenger vehicles exiting the site. Bus trips were assigned to the road network based on routes provided by ACSC. No buses were assumed to arrive from or depart to CR 400 East to the north of the Middle School in order to avoid conflicts with the at-grade railroad crossing just south of US 36. Etica Group concurs with this assumption.

Response: Noted.

5. Passenger vehicle trips were assigned to the road network based on existing traffic volumes per the study. This resulted in 21% of passenger vehicles arriving from/departing to CR 200 South (west of CR 450 East). The proposed Middle School site is located in the southwestern corner of the ACSC District Map and a higher density of residences that would contribute to the school's transportation shed are located to the east/northeast. This may reduce the traffic accessing the school from the west on CR 200 South (as shown in the study) and increase projected volumes utilizing CR 100 South and CR 200 South from the east.

**Response:** Concurrence was obtained from the Town on 06/28/23 regarding trip distribution based on a traffic volume submittal on 06/22/23.

6. It appears the AM and PM peak hour passenger car trips for westbound left-turn movements from CR 100 South to CR 450 East on pages 14 and 15 of the study are tabulated incorrectly based on the projected turning movements shown at the intersection of CR 100 South and Foxboro Drive. This should be checked and the capacity analysis for the intersection of CR 100 South at CR 450 East updated as necessary.

**Response:** The traffic study volumes have been revised. The WB left turn volume changed from 58 to 88 vehicles in the AM peak and from 61 to 79 vehicles in the PM peak. The level of service (LOS) with the revised volumes remain unchanged (LOS A).

7. The layout of the existing road network within the area of the proposed school site makes it advantageous for a larger portion of the new site trips to utilize CR 100 South through The Parks at Prestwick to access the Middle School from the east. The study indicated just over a third of the projected site trips will use this route, which substantially increases the traffic on CR 100 South through the neighborhood. The added cut-through traffic may increase the potential for speeding as this section of CR 100 South is posted at 25 mph.

**Response:** The traffic study estimates AM traffic volumes to equal 169 vehicles (2-way traffic) in the AM peak and 186 vehicles in the PM peak. Capacity of a 2-lane roadway can vary from 2,800 veh/hour (HCM) to 1,000 veh/hr which represents less than 20% (worst case) of the roadway capacity of CR100.

We are not aware of metrics that can estimate the average operating speed on a roadway based only on volume. However, higher speeds are also more probable when fewer vehicles are present and delay is low. Actual speeds on any roadway are a function of the posted speed limit, roadway environment (wider roads = higher speeds) and enforcement.



8. The study indicates that a dedicated left-turn lane is warranted for westbound CR 100 South at CR 450 East, but recommended a passing blister be installed. Based on the existing intersection geometrics and the horizontal curvature of the east approach of CR 100 South, a dedicated westbound left-turn lane may be more easily achieved and operate more safely than a passing blister at this intersection.

**Response:** The through volumes at the CR100/CR450 intersection are low (10 or less) in the peak hours. The need for a dedicated left turn lane to reduce delays of through traffic on CR100 should consider actual volumes when determining the need for infrastructure improvements at the CR100/CR450 intersection. Additional infrastructure at an intersection having an LOS A in the peak hour may encourage higher operating speeds.

- 9. The northbound left-turn movement from CR 450 East at the school's proposed northern entrance also meets warrants for a dedicated left-turn lane. The recommendation was to install a passing blister based on acceptable levels of service with full build-out of the school. Additionally, the southbound right-turn lane is warranted based on projected volumes, but not recommended due to satisfactory level of service being achieved as well. Per the Town of Avon Construction Standards, the minimum commercial entrance requirements include providing a dedicated left and right-turn lane with a minimum 150' storage and taper length of 100'. **Response:** Left and right turn lanes will be provided to meet ordinances. The north bound left turn lane will exceed the 150' minimum dimension and will maximize stacking between entrances.
- 10. No warrants for left or right-turn lanes were satisfied for the Middle School's south entrance where all buses will enter and exit the site. As previously noted, per Town of Avon Construction Standards, the minimum commercial entrance requirements include providing a dedicated left and right-turn lane with a minimum 150' storage and taper length of 100'. Providing these turn lanes would also enhance safety for bus turn movements in the future as volumes on CR 450 East continue to increase.

**Response:** Left and right turn lanes will be provided to meet ordinances versus need. Note that additional infrastructure will enable higher operating speeds on CR450 especially at intersections with good levels of service in the peak hour (LOS A).

11. Although the analysis shows the two proposed entrances operate satisfactorily during the AM and PM peak hour with one exiting lane, providing two-exiting lanes at each location would better accommodate traffic leaving the site during events and as CR 450 East volumes increase in the future.

**Response:** Two exiting lanes will be provided at each entrance. Note that vehicles leaving the site can be expected to occlude each other with a 2-lane configuration on an approach having a stop condition.

- 12. Etica Group concurs that a traffic signal is not warranted at the intersection of CR 450 East and CR 100 South based on projected volumes at full occupancy of the school. **Response:** Noted.
- A Statement of Certification in accordance with INDOT's Applicant's Guide to Traffic Impact 13. Analysis with signature/stamp by a registered professional engineer should be included as part of the Traffic Impact Study. **Response:** Included in updated study.



If you have any further questions or comments, please feel free to contact me and I will be glad to provide any further clarity as needed.

Sincerely,

Veridus Group, Inc. Jennifer M Lasch, PE, LEED AP BD+C Gonzalo Castro Diaz, P.E.

Cc: file Client Ryan Cannon, Town Maager