

To be reviewed by the
Delaware County Engineer's Office

Genoa Christian Academy Expansion Traffic Study

Prepared For:

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Prepared By:



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March 2021

SSI Project #: 752401

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Genoa Christian Academy Expansion Traffic Study

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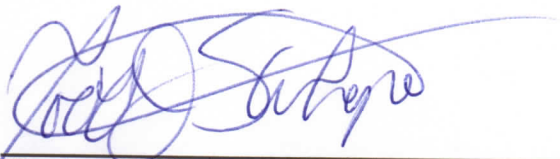
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Under the direction of:



Registered Engineer No. E-64507, Ohio

3-12-2021

Date



March 2021



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BACKGROUND

Genoa Christian Academy (GCA) is proposed to be expanded with a new middle school/high school building on the existing site. Currently there is an existing school (preschool-12th grade) and a church sharing a facility. A new church worship center is presently under construction on the site. The site is located in the southwest quadrant of the intersection of SR 3 & Lewis Center Road. Figure 1 shows the location of the site. Associated with the new building, is a proposed access on Worthington Road. Figure 2 shows the site plan. The permitting agency for the proposed access on Worthington Road is the Delaware County Engineer's Office (DCEO).

Based on a meeting with the DCEO on 1/20/2021 regarding the site, the scope of the traffic impact study was developed, and an MOU dated 1/22/2021 was submitted. A copy of the MOU is in the Appendix.

The following is a summary of the information provided by GCA regarding the expansion:

Grades PK-5 (Ex. Building)

Preschool Start Times: 8:30 AM, 12:15 PM
Preschool Dismissal Times: 11:15 AM, 3:00 PM
K-5 Start and Dismissal Times: 8:30 AM, 3:00 PM
Existing PK-5 students: 246
Future Building capacity PK-5 students: 592

Grades 6-12 (Prop. Building)

Existing Start and dismissal times Grade 6-12: 8:15 AM, 3:15 PM
Existing Grade 6-12 students: 166
Future Building capacity Grade 6-12 students: 432

All Grades (Overall Site)

Existing Start and dismissal times 8:00-8:15 AM & 3:00-3:15 PM
Existing students: 412
Future student capacity: 1024



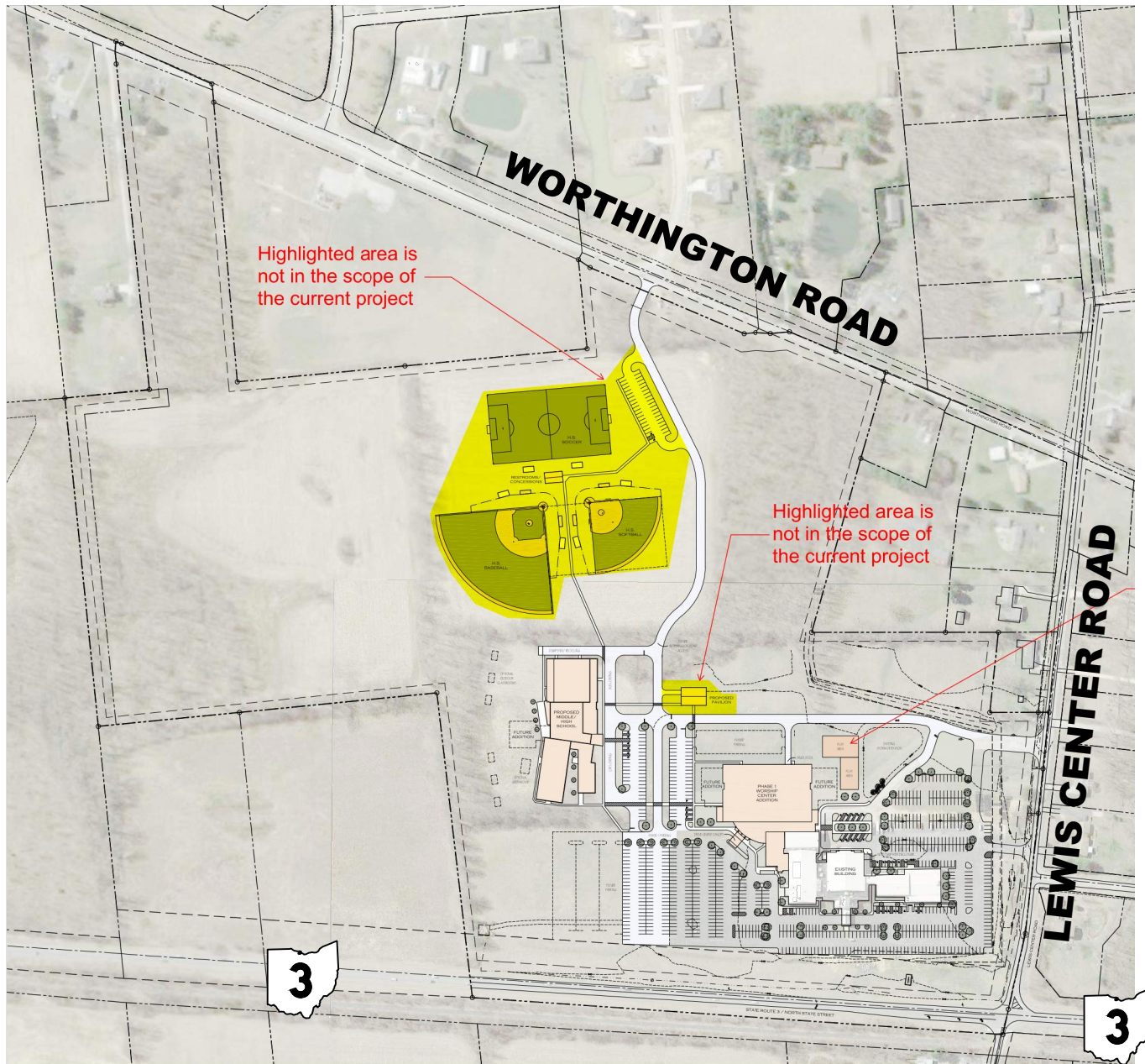


FIGURE 2

SITE LAYOUT

GENOA CHRISTIAN ACADEMY EXPANSION TRAFFIC STUDY

3/2021

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EXISTING CONDITIONS

Table 1 shows the speed limit and classification for the roadways in the study area.

STREET	SPEED LIMIT	DESIGN SPEED	DELAWARE COUNTY THOROUGHFARE PLAN CLASSIFICATION
Worthington Road (CR 13)	45 MPH	45 MPH	Minor Arterial
Lewis Center Road (CR 106)	45 MPH	45 MPH	Major Collector

TABLE 1 - Summary of Roadway Designations

Table 2 shows the summary of the basis of existing traffic volumes.

INTERSECTION/SEGMENT (TRAFFIC CONTROL)	SOURCE	AM (STREET) PEAK HOUR	PM (STREET) PEAK HOUR
*SR 3 & Lewis Center Road West Leg Turns	Smart Services, Inc.	5/1/2018 7:45-8:45 AM	5/1/2018 2:45-3:45 PM
Lewis Center Road & **Worthington Road (Stop Signs on Worthington Rd.)	Smart Services, Inc.	1/26/2021 7:45-8:45 AM	1/26/2021 2:45-3:45 PM
Lewis Center Road & GCA Ex. West Access	Smart Services, Inc.	1/26/2021 7:45-8:45 AM	1/26/2021 2:45-3:45 PM
Lewis Center Road & GCA Ex. East Access	Smart Services, Inc.	1/26/2021 7:45-8:45 AM	1/26/2021 2:45-3:45 PM

*=School Peak Used for distribution input.

**=Worthington Road south of Lewis Center Road PM (Street) Peak is 4:30-5:30 PM and is 8% higher than the intersection peak hour.

TABLE 2 - Summary of Existing Traffic Basis

PROJECTED SITE TRAFFIC

Trip Generation

Typically, trip generation is computed using the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE). However, if the land use category is not represented in the *Trip Generation Manual* or there are minimal samples, there may be superior methods for establishing trip generation. Since this is an expansion of a functioning school, the traffic was increased by the proportional increase in students. Table 3 shows the proposed trip generation.

LAND USE	TIME OF DAY	DATA SET <i>Trip Generation Manual, 10th Edition</i> (Unless noted Otherwise)	RATE OR EQUATION FROM: <i>Trip Generation Manual 10th Edition</i>	TOTAL TRIPS	TOTAL PRIMARY TRIPS	ENTERING		EXITING	
						%	TOTAL TRIPS	%	TOTAL TRIPS
Genoa Christian Academy (412 Students) (Non ITE Source)									
	AM Peak	AM Peak Hour of Generator	Average Rate= 369	548	548	56%	307	44%	241
	PM Peak	PM Peak Hour of Generator	Average Rate= 303	450	450	38%	171	62%	279
Ind. Variable (X) = 1.485 Each									
TOTALS									
		AM Peak		548	548		307		241
		PM Peak		450	450		171		279

Genoa Christian Academy Expansion Traffic Study - 3/2021

TABLE 3 - SITE EXPANSION TRIP GENERATION SUMMARY

Trip Distribution

The distribution of traffic is based on the existing distribution in the peak hours of the site. The following is the distribution of the existing traffic:

AM Peak Entering

- 57% from the east on Lewis Center Road
 - *24% from the south on SR 3
 - 29% from the north on SR 3
 - 4% from the east of SR 3 on Lewis Center Rd
- 43% from west on Lewis Center Road
 - 17% from the south on Worthington Rd
 - 1% from the north on Worthington Rd
 - 25% from the west of Worthington Rd on Lewis Center Rd

AM Peak Exiting

- 51% to the east on Lewis Center Road
 - *36% to the south on SR 3
 - 10% to the north on SR 3
 - 5% to the east of SR 3 on Lewis Center Rd
- 49% to the west on Lewis Center Road
 - 24% to the south on Worthington Rd
 - 4% to the north on Worthington Rd
 - 21% to the west of Worthington Rd on Lewis Center Rd

PM Peak Entering

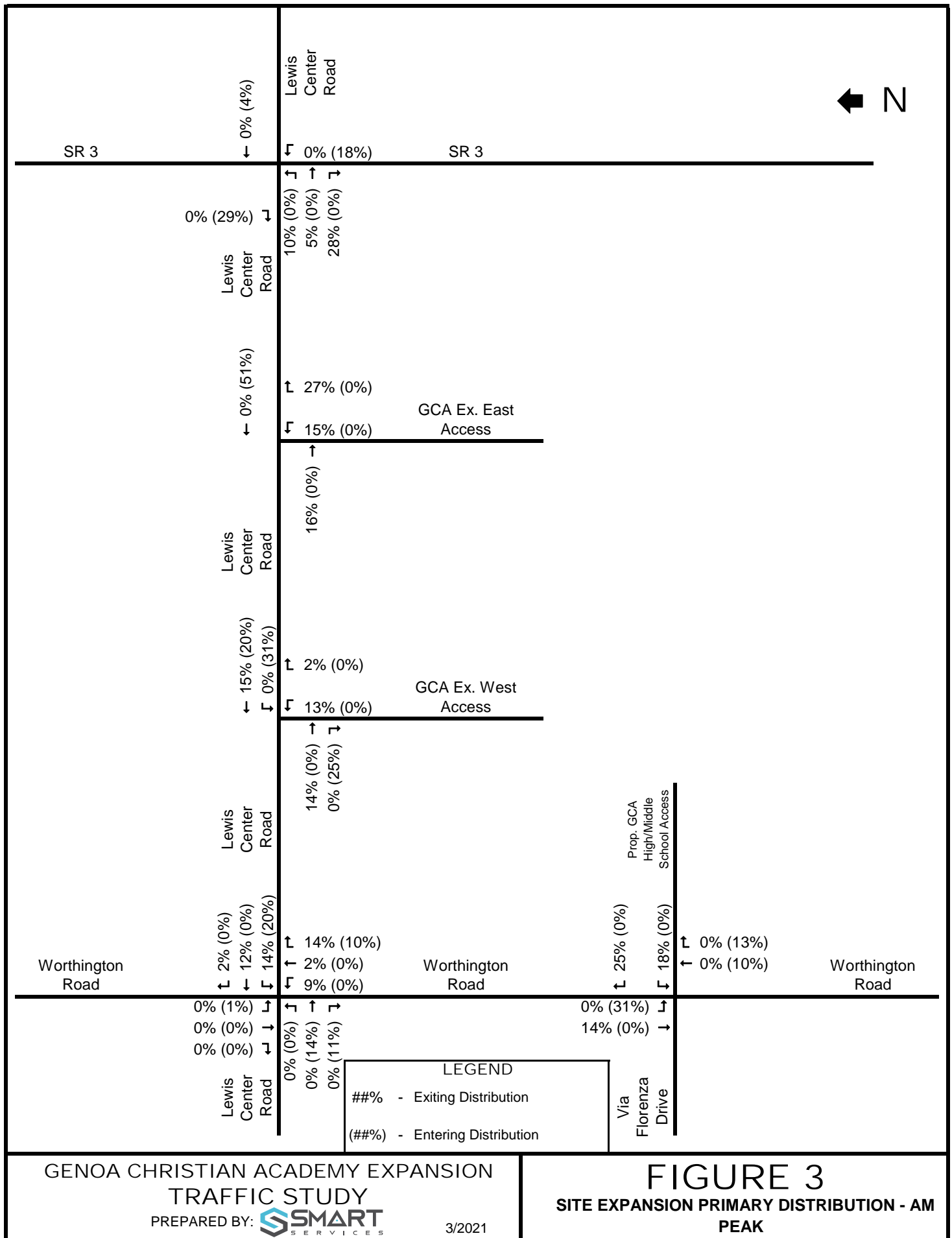
- 53% from the east on Lewis Center Road
 - *32% from the south on SR 3
 - 16% from the north on SR 3
 - 5% from the east of SR 3 on Lewis Center Rd
- 47% from the west on Lewis Center Road
 - 22% from the south on Worthington Rd
 - 3% from the north on Worthington Rd
 - 22% from the west of Worthington Rd on Lewis Center Rd

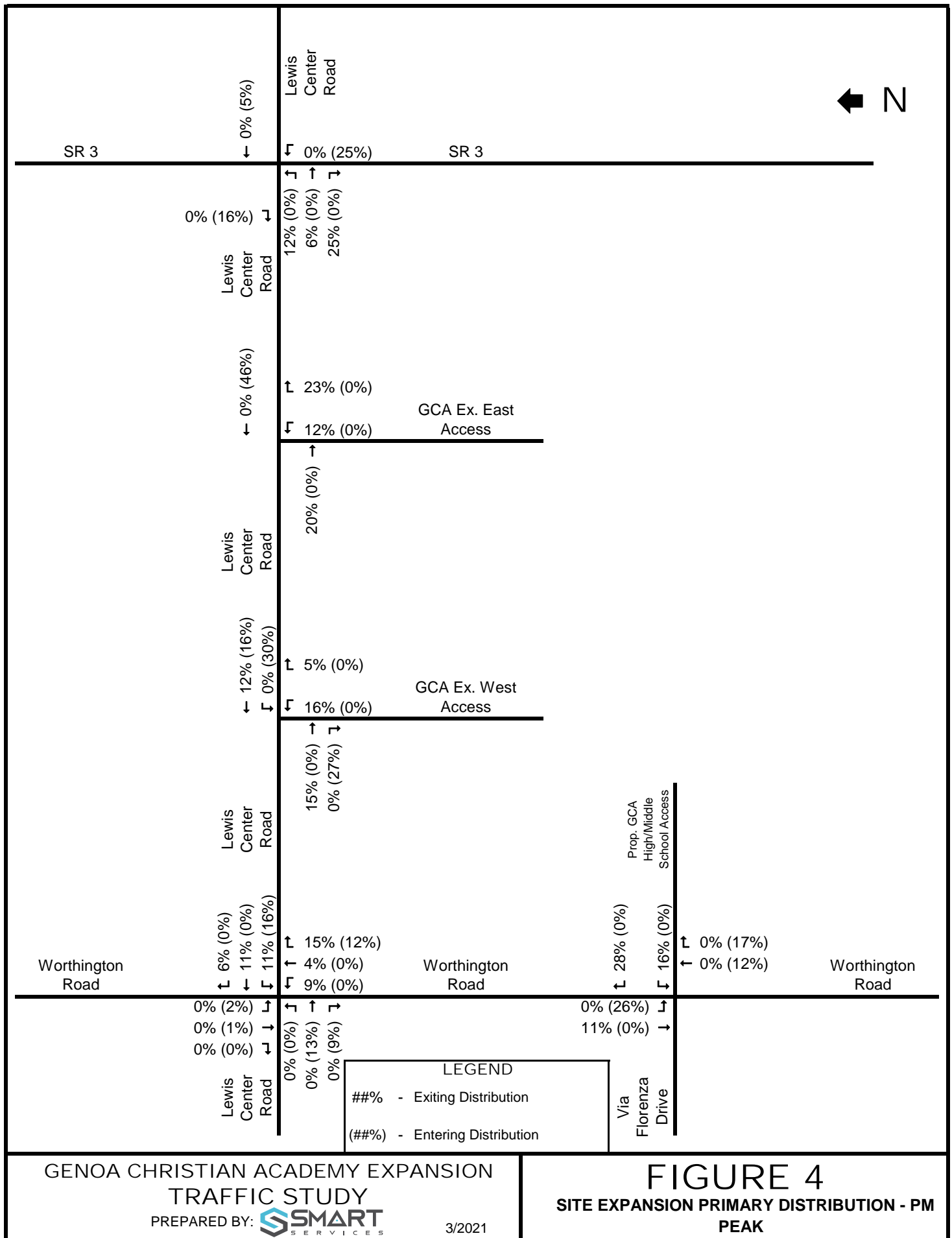
PM Peak Exiting

- 50% to the east on Lewis Center Road
 - *32% to the south on SR 3
 - 12% to the north on SR 3
 - 6% to the east of SR 3 on Lewis Center Rd
- 50% to the west on Lewis Center Road
 - 20% to the south on Worthington Rd
 - 10% to the north on Worthington Rd
 - 20% to the west of Worthington Rd on Lewis Center Rd

* = Assumption that half of the high school/middle school traffic would be diverted to come from the south on Worthington Road.

Figures 3 and 4 show graphically the assignment of new trips.





HIGH/MIDDLE SCHOOL DIVERTED TRAFFIC

Existing traffic for the high school and middle school had to be estimated so it could be diverted to the access on Worthington Road. The existing high/middle school student count is approx. 40% of the existing total. Therefore, 40% of the traffic was diverted to the Prop. GCA High/Middle School Access. The orientation of the existing distribution was assumed to be the same as the proposed site traffic.

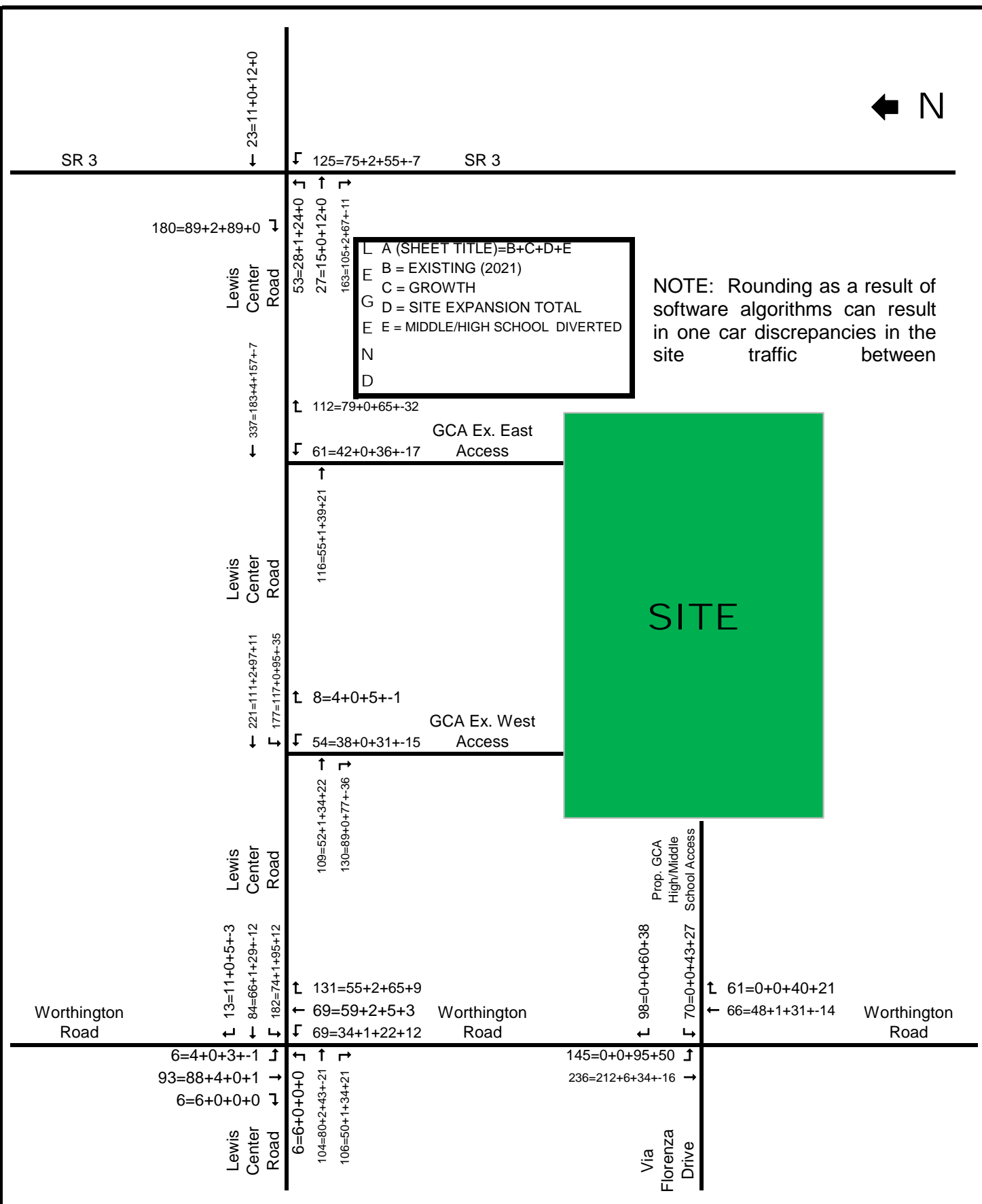
2023 & 2043 TRAFFIC

Based on this level of development, the Delaware County Engineer's Office *TIS Standards* require a 20-Year design horizon. Opening Day is scheduled to be 2023; therefore, the design year is 2043. The Mid-Ohio Regional Planning Commission (MORPC) provided linear annual growth rates for the study area intersections. The correspondence from MORPC is in the Appendix. Table 4 shows the growth rates and corresponding factors applied to the 2021 counts.

SEGMENT	LINEAR ANNUAL GROWTH RATE	2021 TO 2023 FACTOR	2021 TO 2043 FACTOR
Lewis Center Road	1.00%	1.020	1.220
Worthington Road north of Lewis Center Road	2.00%	1.040	1.440
Worthington Road South of Lewis Center Road	1.50%	1.030	1.330

TABLE 4 – 2021 Count Growth Factor Summary

Figures 5 and 6 show the components of the 2023 'Build' traffic. Figures 7 and 8 show the components of the 2043 'Build' traffic.



GENOA CHRISTIAN ACADEMY EXPANSION

TRAFFIC STUDY

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FIGURE 5

2023 'BUILD' W/ MIDDLE/HIGH SCHOOL
DIVERTED - AM PEAK



SR 3

25=11+2+12+0

140=75+17+55+-7

SR 3

198=89+20+89+0

Lewis
Center
Road58=28+6+24+0
30=15+3+12+0
184=105+23+67+11

L A (SHEET TITLE)=B+C+D+E
E B = EXISTING (2021)
C = GROWTH
D = SITE EXPANSION TOTAL
E E = MIDDLE/HIGH SCHOOL DIVERTED
N
D

NOTE: Rounding as a result of software algorithms can result in one car discrepancies in the site traffic between intersections.

112=79+0+65+-32

GCA Ex. East
Access

61=42+0+36+-17

Lewis
Center
Road

127=55+12+39+21

243=111+24+97+11
177=117+0+95+-35

8=4+0+5+-1

GCA Ex. West
Access

54=38+0+31+-15

Lewis
Center
Road119=52+11+34+22
130=89+0+77+-3615=11+2+5+-3
98=66+15+29+-12
197=74+16+95+12

147=55+18+65+9

86=59+19+5+3

79=34+11+22+12

Worthington
RoadWorthington
RoadProp. GCA
High/Middle
School Access

98=0+0+60+38

61=0+0+40+21

81=48+16+31+14

Worthington
Road

8=4+2+3+-1

128=88+39+0+1

9=6+3+0+0

Lewis
Center
Road7=6+1+0+0
120=80+18+43+-21
116=50+11+34+21

145=0+0+95+50

300=212+70+34+-16

Via
Florenza
Drive

GENOA CHRISTIAN ACADEMY EXPANSION

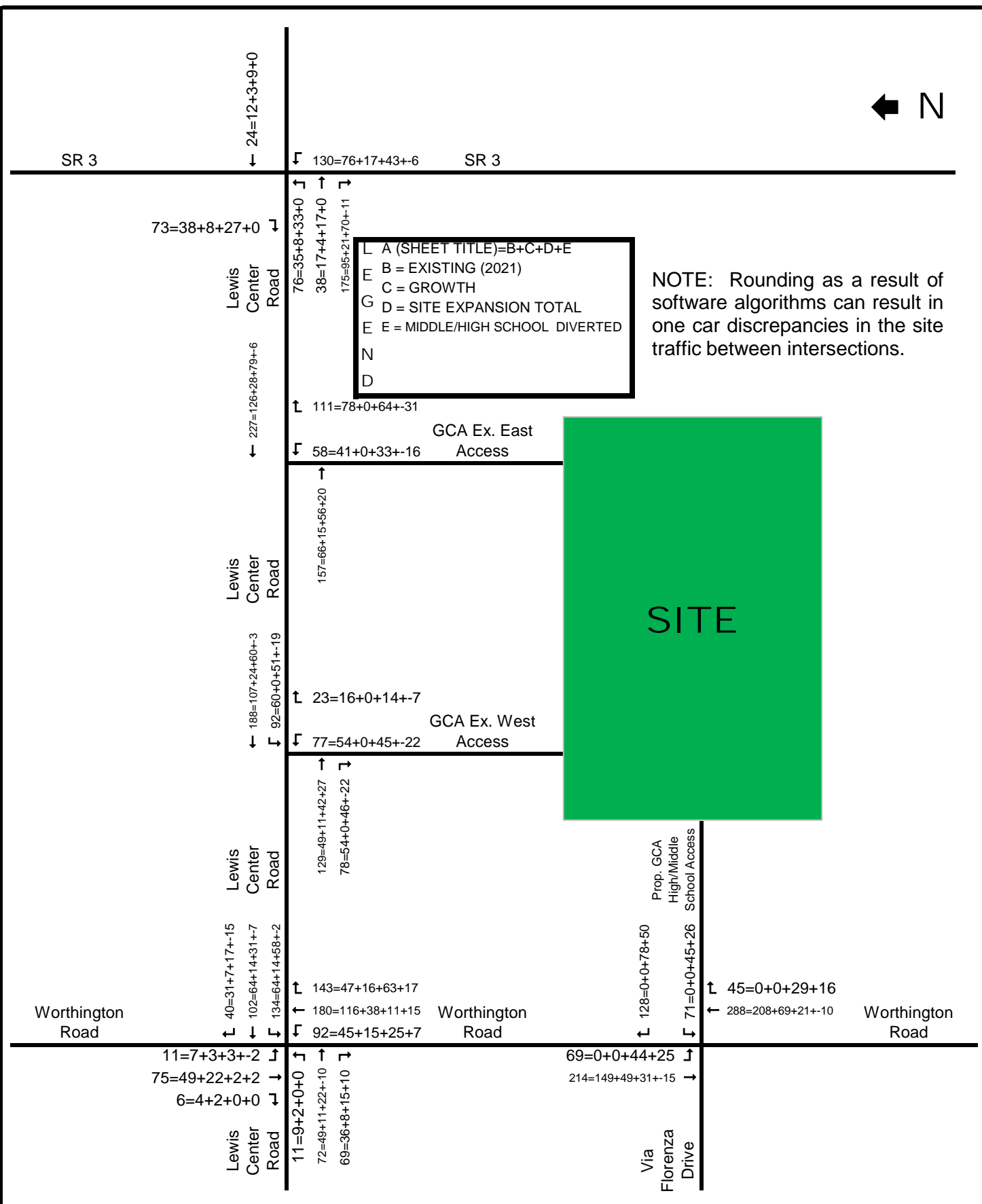
TRAFFIC STUDY

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FIGURE 7

2043 'BUILD' W/ MIDDLE/HIGH SCHOOL
DIVERTED - AM PEAK



GENOA CHRISTIAN ACADEMY EXPANSION

TRAFFIC STUDY

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FIGURE 8

2043 'BUILD' W/ MIDDLE/HIGH SCHOOL
DIVERTED - PM PEAK

TRAFFIC ANALYSIS

Turn Lane Warrant Analysis

Left Turn Lanes – According to the *TIS Standards*, the criteria to determine if left turn lanes are warranted on arterials and major collector streets with posted speeds 40 MPH and above is if there are more than 10 left turning vehicles during the peak hour for full build-out of the development. This criterion would apply to the proposed site access on Worthington Road. Table 5 shows a summary of the results.

Right Turn Lanes - Per the *TIS Standards*, the procedures for determining whether right turn lanes are required are found in the *ODOT L&D Manual* which is referenced from the *State Highway Access Management Manual (SHAMM)*. Table 5 also shows a summary of the results of the right turn lane warrants. The graphs from the *ODOT L&D Manual* are in the Appendix.

INTERSECTION	MOVE- MENT	PEAK HOUR	2023 'BUILD'	2043 'BUILD'
Worthington Road & Prop. GCA High/Middle School Access	SB LT	AM Peak	Warranted >10 SB LT	Warranted >10 SB LT
		PM Peak	Warranted >10 SB LT	Warranted >10 SB LT
	NB RT	AM Peak	Warrant Not Met	Warrant Not Met
		PM Peak	Warrant Not Met	Warrant Not Met

TABLE 5 – Summary of Turn Lane Warrant Analyses

Turn Lane Length Analysis

Turn lane lengths for the warranted turn lanes per the turn lane analyses were calculated. The calculations were performed per Section 400 of the *ODOT L&D Manual*. The design speeds in Table 1 were used in the calculations. Table 6 shows a summary of the results. The calculations are in the Appendix.

LOCATION	2023 BUILD'	2043 'BUILD'
	<i>ODOT L&D Manual</i>	<i>ODOT L&D Manual</i>
Worthington Road & Prop. GCA High/Middle School Access SB LT	275'	275'

TABLE 6 – Turn Lane Length Results (Includes the 50' diverging taper

Roundabout Capacity Analysis

Roundabout capacity analyses were performed for the proposed background condition at the intersection of Worthington Road & Lewis Center Road. In the capacity analyses, delays are computed which correspond to a Level of Service (LOS) “A” through “F”. Typically, Level of Service (LOS) “D” or above is considered an acceptable LOS. The LOS criteria for roundabouts are shown in Table 7.

LEVEL OF SERVICE	DELAY (seconds/vehicle)
A	<10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Source: *Highway Capacity Manual 2010*

TABLE 7 - Level of Service Criteria for Roundabouts

The following comprises the background of the analysis:

- *HCS 7* was used to perform the analysis.
- The existing PHF was used in the analysis.
- The existing heavy vehicle percentage was used in the analysis.

A summary of the results is shown in Table 8. The *HCS7* reports are in the Appendix. The results are discussed in the Conclusions section.

INTESECTION	TIME	YEAR	DELAY (LEVEL OF SERVICE)				
			Intersection	Eastbound	Westbound	Northbound	Southbound
Lewis Center Road & Worthington Road	AM Peak	2023 'No Build' Traffic	4.6 (A)	5.1 (A)	4.5 (A)	4.5 (A)	4.5 (A)
		2023 'Build' Traffic	6.5 (A)	7.5 (A)	6.4 (A)	6.0 (A)	5.8 (A)
		2043 'No Build' Traffic	5.3 (A)	5.9 (A)	5.1 (A)	5.1 (A)	5.3 (A)
		2043 'Build' Traffic	7.5 (A)	8.9 (A)	7.2 (A)	6.8 (A)	7.0 (A)
	PM Peak	2023 'No Build' Traffic	4.4 (A)	4.1 (A)	4.8 (A)	4.5 (A)	3.8 (A)
		2023 'Build' Traffic	5.6 (A)	4.8 (A)	6.1 (A)	5.8 (A)	4.4 (A)
		2043 'No Build' Traffic	5.0 (A)	4.4 (A)	5.5 (A)	5.2 (A)	4.2 (A)
		2043 'Build' Traffic	6.4 (A)	5.2 (A)	7.0 (A)	6.7 (A)	4.9 (A)

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TABLE 8 - Unsignalized Capacity Summary - Roundabout)

CONCLUSIONS

2023 and 2043 volumes were developed for use in turn lane warrant analyses, capacity analyses, and turn lane length analyses. Below is a summary of the conclusions for each condition:

2023 'No Build'

- Lewis Center Road & Worthington Road
 - The intersection and all approaches operate at an acceptable Level of Service (LOS).

2023 'Build'

- Lewis Center Road & Worthington Road
 - Same as 'No Build': The intersection and all approaches operate at an acceptable Level of Service (LOS).
- Worthington Road & Prop. GCA High/Middle School Access-Via Florenza Drive
 - A southbound left turn lane is warranted. The length of the lane is 275 feet which includes the 50-foot diverging taper. The owner requests a fee in lieu of construction of this turn lane.
 - A northbound right turn lane is not warranted.

2033 'No Build'

- Lewis Center Road & Worthington Road
 - The intersection and all approaches operate at an acceptable Level of Service (LOS).

2033 'Build'

- Lewis Center Road & Worthington Road
 - Same as 'No Build': The intersection and all approaches operate at an acceptable Level of Service (LOS).
- Worthington Road & Prop. GCA High/Middle School Access-Via Florenza Drive
 - A southbound left turn lane is warranted. The length of the lane is 275 feet which includes the 50-foot diverging taper. The owner requests a fee in lieu of construction of this turn lane.
 - A northbound right turn lane is not warranted.

There has been concern expressed that the alignment of the proposed driveway opposite Via Florenza Drive will result in traffic on Via Florenza Drive that would not have destinations within the Mirasol subdivision. The reason neighborhoods would have external traffic is when there is a time advantage in relation to the arterial or collector streets meant to carry the traffic. In this case, the engineering judgement is there would not be a time savings for the following reasons:

- Worthington Road and Lewis Center Road have higher speed limits 45 MPH on Worthington Road and Lewis Center Road (50 MPH west of Rome

Corners Road) compared to 25 MPH speed limits within the Mirasol subdivision

- The results of the roundabout capacity analysis show that the intersection and all approaches will operate at Level of Service A which is the best Level of Service so there would be minimal delay getting through this intersection.
- The route through Mirasol has two curves which would lessen the appeal of this as an alternate route.

The conclusion of the traffic study is a southbound left turn lane is warranted. On Worthington Road at the Proposed GCA High/Middle School Access. The length of the lane is 275 feet which includes the 50-foot diverging taper. The owner requests a fee in lieu of the construction of this turn lane.

APPENDIX



January 22, 2021

Mr. Michael Love, PE, PTOE
Delaware County Engineer's Office
50 Channing Street
Delaware, OH 43015

Re: Genoa Christian Academy Expansion MOU
Genoa Township, Delaware County, Ohio

Dear Mike:

Please consider this letter a Memo of Understanding (MOU) for the traffic impact study (TIS) for the subject development. Genoa Christian Academy is proposed to be expanded with a new middle school/high school building on the existing site. Currently there is an existing school (preschool-12th grade) and a church sharing a facility. A new church worship center is presently under construction on the site. The site is located in the southwest quadrant of the intersection of SR 3 & Lewis Center Road. Associated with the new building, is a proposed access on Worthington Road. The permitting agency for the proposed access on Worthington Road is the Delaware County Engineer's Office (DCEO).

Based on a meeting with the DCEO on 1/20/2021 regarding the site, below is our understanding of the required scope of the TIS:

- The DCEO is the sole reviewing agency for the TIS.
- The study area is the proposed site access on Worthington Road and the intersection of Lewis Center Road & Worthington Road. Table A includes information for study area roads.

STREET	SPEED LIMIT	DESIGN SPEED	DELAWARE COUNTY THOROUGHFARE PLAN CLASSIFICATION
Worthington Road	45 MPH	45 MPH	Minor Arterial
Lewis Center Road	45 MPH	45 MPH	Major Collector

Table A - Summary of Roadway Designations

- The time of analysis will be the weekday school peaks. AM Peak hour (one hour between 7 and 9 AM) and the weekday PM Peak hour (one hour between 2 and 4 PM).
- Data Collection: New weekday peak hour (7-9 AM and 2-6 PM) turning movement counts will be taken at the existing site accesses on Lewis Center

Road. The DCEO has indicated that they can provide design traffic at the intersection of Lewis Center Road & Worthington Road for reference.

- Trip Generation – The “site” traffic in the study will be the additional traffic as a result of the expanded capacity. In the *Trip Generation Manual*, there are limited categories and limited number of studies which may not be appropriate to estimate trip generation. There is enough data collection assumed in the scope to be able to project traffic from the existing activity. Smart Services will obtain information from Genoa Christian Academy to provide specific information about existing enrollment, future building capacities, and time of day school is in session. An estimate of trip generation with supporting information will be provided to the DCEO as part of the TIS.

- Design Year Traffic Development – The DCEO requires a 10-year or 20-year design horizon depending on the trips generated. Analysis will be performed for both opening day and one horizon year.

- Analyses

- Turn lane warrant analyses will be performed at the proposed site access on Worthington Road per DCEO's standards.

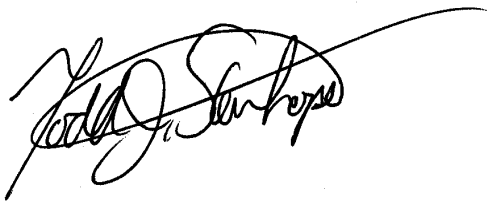
- Turn lane lengths will be calculated for any warranted turn lanes.

- Capacity analyses for a future single lane roundabout will be performed at the intersection of Lewis Center Road & Worthington Road to ensure that the planned improvement can accommodate the additional site traffic.

A report will be produced that includes the data and provides the conclusions as well as the methods and analyses used.

If this MOU is acceptable to you, please indicate your approval in the space provided below. If not, please let us know what items need to be changed. If you have any questions, please contact me. Thank you!

Sincerely,
SMART SERVICES, INC.



Todd J. Stanhope, PE, PTOE
Director of Traffic Engineering

Submitted: One electronic copy (PDF format) via e-mail

Cc: A. Heydinger – Gandee Heydinger Group, LLC

Delaware County Engineer's Office

Approved: _____ Date: _____

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : SR_3_&_Lewis_Center_Road_518883_05-01-2018
Site Code : 731001
Start Date : 5/1/2018
Page No : 1

Groups Printed- Cars - Trucks - Bicycles on Crosswalk - Pedestrians

	SR 3 Southbound					Lewis Center Road Westbound					SR 3 Northbound					Lewis Center Road Eastbound					
Start Time	Left	Thru	Right	North Crosswalk	App. Total	Left	Thru	Right	East Crosswalk	App. Total	Left	Thru	Right	South Crosswalk	App. Total	Left	Thru	Right	West Crosswalk	App. Total	Int. Total
06:00 AM	0	85	5	0	90	2	2	0	0	4	1	19	1	0	21	0	0	5	0	5	120
06:15 AM	1	101	8	0	110	1	3	0	0	4	1	25	0	0	26	2	0	6	0	8	148
06:30 AM	0	164	11	0	175	1	6	0	0	7	3	36	0	0	39	1	0	4	0	5	226
06:45 AM	2	165	10	0	177	1	1	0	0	2	4	50	0	0	54	1	3	16	0	20	253
Total	3	515	34	0	552	5	12	0	0	17	9	130	1	0	140	4	3	31	0	38	747
07:00 AM	0	157	7	0	164	1	2	1	0	4	2	59	0	0	61	1	2	6	0	9	238
07:15 AM	0	186	15	3	204	1	1	2	5	9	8	71	0	0	79	1	3	5	0	9	301
07:30 AM	3	229	12	0	244	0	2	2	0	4	15	100	2	0	117	0	2	8	0	10	375
07:45 AM	0	173	19	0	192	1	1	0	0	2	18	69	4	0	91	6	2	15	0	23	308
Total	3	745	53	3	804	3	6	5	5	19	43	299	6	0	348	8	9	34	0	51	1222
08:00 AM	2	150	31	0	183	1	3	1	0	5	29	76	1	0	106	6	5	34	0	45	339
08:15 AM	2	136	23	0	161	1	5	1	0	7	19	51	1	0	71	8	5	32	0	45	284
08:30 AM	2	153	16	3	174	1	2	1	4	8	9	44	0	0	53	8	3	24	0	35	270
08:45 AM	0	163	17	0	180	1	0	1	4	6	3	48	2	0	53	5	4	13	0	22	261
Total	6	602	87	3	698	4	10	4	8	26	60	219	4	0	283	27	17	103	0	147	1154
09:00 AM	2	120	7	0	129	0	3	2	3	8	7	68	3	0	78	5	2	12	0	19	234
09:15 AM	1	108	10	0	119	0	5	2	5	12	8	81	0	1	90	0	2	8	0	10	231
09:30 AM	0	109	6	0	115	1	1	1	2	5	8	58	0	0	66	3	3	6	0	12	198
09:45 AM	0	81	5	0	86	0	7	1	2	10	6	56	0	0	62	5	4	6	0	15	173
Total	3	418	28	0	449	1	16	6	12	35	29	263	3	1	296	13	11	32	0	56	836
10:00 AM	3	71	2	0	76	0	4	1	2	7	4	66	1	0	71	4	1	10	0	15	169
10:15 AM	0	89	8	0	97	1	2	0	3	6	9	71	2	0	82	8	0	3	0	11	196
10:30 AM	0	86	5	0	91	0	1	2	1	4	11	80	3	0	94	2	1	4	0	7	196
10:45 AM	3	75	4	0	82	0	3	0	4	7	8	89	2	0	99	4	1	6	0	11	199
Total	6	321	19	0	346	1	10	3	10	24	32	306	8	0	346	18	3	23	0	44	760
11:00 AM	0	80	8	0	88	0	0	1	4	5	10	79	2	0	91	0	4	21	0	25	209
11:15 AM	1	93	10	0	104	0	2	2	5	9	6	72	1	0	79	0	5	17	0	22	214
11:30 AM	0	89	6	0	95	2	0	2	4	8	6	92	2	0	100	3	2	8	0	13	216
11:45 AM	2	63	8	0	73	1	3	1	3	8	10	98	2	0	110	5	1	8	0	14	205
Total	3	325	32	0	360	3	5	6	16	30	32	341	7	0	380	8	12	54	0	74	844

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : SR_3_&_Lewis_Center_Road_518883_05-01-2018
Site Code : 731001
Start Date : 5/1/2018
Page No : 2

Groups Printed- Cars - Trucks - Bicycles on Crosswalk - Pedestrians

	SR 3 Southbound					Lewis Center Road Westbound					SR 3 Northbound					Lewis Center Road Eastbound					
Start Time	Left	Thru	Right	North Crosswalk	App. Total	Left	Thru	Right	East Crosswalk	App. Total	Left	Thru	Right	South Crosswalk	App. Total	Left	Thru	Right	West Crosswalk	App. Total	Int. Total
12:00 PM	5	84	8	0	97	0	0	2	1	3	8	78	3	0	89	9	4	15	0	28	217
12:15 PM	1	78	4	0	83	0	1	2	3	6	8	89	2	0	99	5	3	10	0	18	206
12:30 PM	3	79	6	0	88	1	5	1	5	12	9	77	0	0	86	7	1	2	0	10	196
12:45 PM	2	89	7	0	98	0	2	2	4	8	4	91	3	0	98	3	3	5	0	11	215
Total	11	330	25	0	366	1	8	7	13	29	29	335	8	0	372	24	11	32	0	67	834
01:00 PM	2	77	8	0	87	0	2	1	0	3	11	92	3	0	106	3	1	11	0	15	211
01:15 PM	1	88	3	0	92	0	3	2	3	8	4	92	3	0	99	3	2	3	0	8	207
01:30 PM	2	81	5	0	88	1	1	2	5	9	12	86	2	0	100	8	3	9	0	20	217
01:45 PM	1	77	4	0	82	2	2	5	6	15	11	104	3	0	118	5	3	9	0	17	232
Total	6	323	20	0	349	3	8	10	14	35	38	374	11	0	423	19	9	32	0	60	867
02:00 PM	0	92	4	0	96	0	1	2	5	8	10	98	3	0	111	5	3	6	0	14	229
02:15 PM	3	81	8	0	92	0	1	2	7	10	8	99	3	0	110	3	4	5	0	12	224
02:30 PM	2	91	9	0	102	1	3	1	5	10	13	122	1	0	136	4	2	9	0	15	263
02:45 PM	2	90	10	0	102	2	3	0	4	9	28	106	3	0	137	12	4	11	0	27	275
Total	7	354	31	0	392	3	8	5	21	37	59	425	10	0	494	24	13	31	0	68	991
03:00 PM	1	75	13	0	89	1	4	1	6	12	20	112	5	0	137	8	3	30	0	41	279
03:15 PM	5	94	7	0	106	1	3	2	8	14	15	157	2	0	174	9	8	38	0	55	349
03:30 PM	1	102	8	0	111	3	2	2	5	12	13	147	2	0	162	6	2	16	0	24	309
03:45 PM	1	107	9	0	117	0	3	1	3	7	14	167	2	0	183	5	6	9	0	20	327
Total	8	378	37	0	423	5	12	6	22	45	62	583	11	0	656	28	19	93	0	140	1264
04:00 PM	0	100	5	0	105	2	3	0	0	5	9	169	5	0	183	4	4	14	0	22	315
04:15 PM	1	89	9	0	99	0	1	1	6	8	19	206	5	0	230	13	2	9	0	24	361
04:30 PM	1	116	9	0	126	2	2	0	5	9	15	181	4	0	200	3	6	12	0	21	356
04:45 PM	4	117	5	0	126	1	1	2	4	8	19	202	3	0	224	8	9	10	0	27	385
Total	6	422	28	0	456	5	7	3	15	30	62	758	17	0	837	28	21	45	0	94	1417
05:00 PM	5	106	4	2	117	2	5	1	12	20	10	181	4	0	195	12	1	7	3	23	355
05:15 PM	3	93	11	0	107	1	4	1	7	13	10	198	4	0	212	7	5	13	0	25	357
05:30 PM	2	95	23	0	120	1	2	1	15	19	18	152	2	0	172	5	2	10	0	17	328
05:45 PM	2	87	18	0	107	2	6	4	25	37	33	156	4	0	193	4	2	7	0	13	350
Total	12	381	56	2	451	6	17	7	59	89	71	687	14	0	772	28	10	37	3	78	1390
Grand Total	74	5114	450	8	5646	40	119	62	195	416	526	4720	100	1	5347	229	138	547	3	917	12326
Apprch %	1.3	90.6	8	0.1		9.6	28.6	14.9	46.9		9.8	88.3	1.9	0		25	15	59.7	0.3		
Total %	0.6	41.5	3.7	0.1	45.8	0.3	1	0.5	1.6	3.4	4.3	38.3	0.8	0	43.4	1.9	1.1	4.4	0	7.4	
Cars	61	4974	425	0	5460	40	115	52	0	207	505	4597	98	0	5200	217	134	527	0	878	11745
% Cars	82.4	97.3	94.4	0	96.7	100	96.6	83.9	0	49.8	96	97.4	98	0	97.3	94.8	97.1	96.3	0	95.7	95.3
Trucks	13	140	25	0	178	0	4	10	0	14	21	123	2	0	146	12	4	20	0	36	374
% Trucks	17.6	2.7	5.6	0	3.2	0	3.4	16.1	0	3.4	4	2.6	2	0	2.7	5.2	2.9	3.7	0	3.9	3

Smart Services, Inc.

88 W. Church Street
Newark, OH 43055
(740) 345-4700

File Name : SR_3_&_Lewis_Center_Road_518883_05-01-2018
Site Code : 731001
Start Date : 5/1/2018
Page No : 3

Groups Printed- Cars - Trucks - Bicycles on Crosswalk - Pedestrians

	SR 3 Southbound					Lewis Center Road Westbound					SR 3 Northbound					Lewis Center Road Eastbound					
	Left	Thru	Right	North Crosswalk	App. Total	Left	Thru	Right	East Crosswalk	App. Total	Left	Thru	Right	South Crosswalk	App. Total	Left	Thru	Right	West Crosswalk	App. Total	Int. Total
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	123	123	0	0	0	0	0	0	0	0	0	0	123
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	63.1	29.6	0	0	0	0	0	0	0	0	0	0	1
Pedestrians	0	0	0	8	8	0	0	0	72	72	0	0	0	1	1	0	0	0	3	3	84
% Pedestrians	0	0	0	100	0.1	0	0	0	36.9	17.3	0	0	0	100	0	0	0	0	100	0.3	0.7

	SR 3 Southbound					Lewis Center Road Westbound					SR 3 Northbound					Lewis Center Road Eastbound					
Start Time	Left	Thru	Right	North Crosswalk	App. Total	Left	Thru	Right	East Crosswalk	App. Total	Left	Thru	Right	South Crosswalk	App. Total	Left	Thru	Right	West Crosswalk	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	186	15	3	204	1	1	2	5	9	8	71	0	0	79	1	3	5	0	9	301
07:30 AM	3	229	12	0	244	0	2	2	0	4	15	100	2	0	117	0	2	8	0	10	375
07:45 AM	0	173	19	0	192	1	1	0	0	2	18	69	4	0	91	6	2	15	0	23	308
08:00 AM	2	150	31	0	183	1	3	1	0	5	29	76	1	0	106	6	5	34	0	45	339
Total Volume	5	738	77	3	823	3	7	5	5	20	70	316	7	0	393	13	12	62	0	87	1323
% App. Total	0.6	89.7	9.4	0.4		15	35	25	25		17.8	80.4	1.8	0		14.9	13.8	71.3	0		
PHF	.417	.806	.621	.250	.843	.750	.583	.625	.250	.556	.603	.790	.438	.000	.840	.542	.600	.456	.000	.483	.882

Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:15 PM

04:15 PM	1	89	9	0	99	0	1	1	6	8	19	206	5	0	230	13	2	9	0	24	361
04:30 PM	1	116	9	0	126	2	2	0	5	9	15	181	4	0	200	3	6	12	0	21	356
04:45 PM	4	117	5	0	126	1	1	2	4	8	19	202	3	0	224	8	9	10	0	27	385
05:00 PM	5	106	4	2	117	2	5	1	12	20	10	181	4	0	195	12	1	7	3	23	355
Total Volume	11	428	27	2	468	5	9	4	27	45	63	770	16	0	849	36	18	38	3	95	1457
% App. Total	2.4	91.5	5.8	0.4		11.1	20	8.9	60		7.4	90.7	1.9	0		37.9	18.9	40	3.2		
PHF	.550	.915	.750	.250	.929	.625	.450	.500	.563	.563	.829	.934	.800	.000	.923	.692	.500	.792	.250	.880	.946

Lewis Center Road & Worthington Road - TMC

Tue Jan 26, 2021

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

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810559, Location: 40.197846, -82.913261



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound					Lewis Center Rd Westbound					Worthington Rd Northbound					Worthington Rd Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2021-01-26 7:00AM	0	4	8	0	12	7	7	0	0	14	3	8	4	0	15	0	22	1	0	23	64
7:15AM	0	7	4	0	11	9	4	0	0	13	3	12	6	0	21	0	17	1	0	18	63
7:30AM	2	11	5	0	18	6	6	1	0	13	3	9	7	0	19	0	26	1	0	27	77
7:45AM	1	19	12	0	32	11	7	0	0	18	11	19	16	0	46	1	31	2	0	34	130
Hourly Total	3	41	29	0	73	33	24	1	0	58	20	48	33	0	101	1	96	5	0	102	334
8:00AM	4	35	16	0	55	22	31	5	0	58	11	13	17	0	41	0	19	1	0	20	174
8:15AM	1	13	15	0	29	26	18	3	0	47	7	14	16	0	37	1	17	2	0	20	133
8:30AM	0	13	7	0	20	15	10	3	0	28	5	13	6	0	24	2	21	1	0	24	96
8:45AM	2	5	5	0	12	8	7	0	0	15	5	9	2	0	16	0	18	1	0	19	62
Hourly Total	7	66	43	0	116	71	66	11	0	148	28	49	41	0	118	3	75	5	0	83	465
2:00PM	3	8	6	0	17	7	10	0	0	17	4	18	10	0	32	0	15	1	0	16	82
2:15PM	1	12	5	0	18	10	7	1	0	18	10	24	3	0	37	2	11	0	0	13	86
2:30PM	1	10	4	0	15	11	12	0	0	23	5	22	8	0	35	0	12	0	0	12	85
2:45PM	0	21	5	0	26	12	15	8	0	35	16	24	18	0	58	4	6	1	0	11	130
Hourly Total	5	51	20	0	76	40	44	9	0	93	35	88	39	0	162	6	44	2	0	52	383
3:00PM	3	11	9	0	23	15	20	6	0	41	17	26	15	0	58	1	10	1	0	12	134
3:15PM	3	8	12	0	23	24	16	11	0	51	6	39	8	0	53	1	14	1	0	16	143
3:30PM	3	9	10	0	22	13	13	6	0	32	6	27	6	0	39	1	19	1	0	21	114
3:45PM	1	7	8	0	16	6	12	6	0	24	15	39	4	0	58	2	12	1	0	15	113
Hourly Total	10	35	39	0	84	58	61	29	0	148	44	131	33	0	208	5	55	4	0	64	504
4:00PM	3	9	8	0	20	10	8	0	0	18	14	33	8	0	55	1	16	3	0	20	113
4:15PM	1	12	9	0	22	16	10	2	0	28	12	39	6	0	57	1	15	0	0	16	123
4:30PM	4	9	9	0	22	13	7	2	0	22	11	29	10	0	50	0	19	0	0	19	113
4:45PM	1	10	9	0	20	8	13	0	0	21	17	52	10	0	79	0	13	1	0	14	134
Hourly Total	9	40	35	0	84	47	38	4	0	89	54	153	34	0	241	2	63	4	0	69	483
5:00PM	5	12	6	0	23	7	9	1	0	17	13	35	8	0	56	0	14	0	0	14	110
5:15PM	2	17	9	0	28	11	7	1	0	19	20	40	5	0	65	1	19	1	0	21	133
5:30PM	2	11	10	0	23	8	12	1	0	21	7	45	8	0	60	0	13	4	0	17	121
5:45PM	3	12	8	0	23	8	8	1	0	17	7	25	9	0	41	0	18	0	0	18	99
Hourly Total	12	52	33	0	97	34	36	4	0	74	47	145	30	0	222	1	64	5	0	70	463
Total	46	285	199	0	530	283	269	58	0	610	228	614	210	0	1052	18	397	25	0	440	2632
% Approach	8.7%	53.8%	37.5%	0%	-	46.4%	44.1%	9.5%	0%	-	21.7%	58.4%	20.0%	0%	-	4.1%	90.2%	5.7%	0%	-	-
% Total	1.7%	10.8%	7.6%	0%	20.1%	10.8%	10.2%	2.2%	0%	23.2%	8.7%	23.3%	8.0%	0%	40.0%	0.7%	15.1%	0.9%	0%	16.7%	-
Lights and Motorcycles	41	280	185	0	506	281	260	55	0	596	218	609	206	0	1033	16	391	24	0	431	2566
% Lights and Motorcycles	89.1%	98.2%	93.0%	0%	95.5%	99.3%	96.7%	94.8%	0%	97.7%	95.6%	99.2%	98.1%	0%	98.2%	88.9%	98.5%	96.0%	0%	98.0%	97.5%
Heavy	5	5	14	0	24	2	9	3	0	14	10	5	4	0	19	2	6	1	0	9	66
% Heavy	10.9%	1.8%	7.0%	0%	4.5%	0.7%	3.3%	5.2%	0%	2.3%	4.4%	0.8%	1.9%	0%	1.8%	11.1%	1.5%	4.0%	0%	2.0%	2.5%

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

Lewis Center Road & Worthington Road - TMC

Tue Jan 26, 2021

AM Peak (7:45 AM - 8:45 AM) - Overall Peak Hour

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810559, Location: 40.197846, -82.913261



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound					Lewis Center Rd Westbound					Worthington Rd Northbound					Worthington Rd Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2021-01-26 7:45AM	1	19	12	0	32	11	7	0	0	18	11	19	16	0	46	1	31	2	0	34	130
8:00AM	4	35	16	0	55	22	31	5	0	58	11	13	17	0	41	0	19	1	0	20	174
8:15AM	1	13	15	0	29	26	18	3	0	47	7	14	16	0	37	1	17	2	0	20	133
8:30AM	0	13	7	0	20	15	10	3	0	28	5	13	6	0	24	2	21	1	0	24	96
Total	6	80	50	0	136	74	66	11	0	151	34	59	55	0	148	4	88	6	0	98	533
% Approach	4.4%	58.8%	36.8%	0%	-	49.0%	43.7%	7.3%	0%	-	23.0%	39.9%	37.2%	0%	-	4.1%	89.8%	6.1%	0%	-	-
% Total	1.1%	15.0%	9.4%	0%	25.5%	13.9%	12.4%	2.1%	0%	28.3%	6.4%	11.1%	10.3%	0%	27.8%	0.8%	16.5%	1.1%	0%	18.4%	-
PHF	0.375	0.571	0.781	-	0.618	0.712	0.532	0.550	-	0.651	0.773	0.776	0.809	-	0.804	0.500	0.710	0.750	-	0.721	0.766
Lights and Motorcycles	5	79	45	0	129	74	63	11	0	148	33	58	54	0	145	3	86	6	0	95	517
% Lights and Motorcycles	83.3%	98.8%	90.0%	0%	94.9%	100%	95.5%	100%	0%	98.0%	97.1%	98.3%	98.2%	0%	98.0%	75.0%	97.7%	100%	0%	96.9%	97.0%
Heavy	1	1	5	0	7	0	3	0	0	3	1	1	1	0	3	1	2	0	0	3	16
% Heavy	16.7%	1.3%	10.0%	0%	5.1%	0%	4.5%	0%	0%	2.0%	2.9%	1.7%	1.8%	0%	2.0%	25.0%	2.3%	0%	0%	3.1%	3.0%

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

Lewis Center Road & Worthington Road - TMC

Tue Jan 26, 2021

PM Peak (2:45 PM - 3:45 PM)

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810559, Location: 40.197846, -82.913261



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound					Lewis Center Rd Westbound					Worthington Rd Northbound					Worthington Rd Southbound					
Time	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	L	T	R	U	App	Int
2021-01-26 2:45PM	0	21	5	0	26	12	15	8	0	35	16	24	18	0	58	4	6	1	0	11	130
3:00PM	3	11	9	0	23	15	20	6	0	41	17	26	15	0	58	1	10	1	0	12	134
3:15PM	3	8	12	0	23	24	16	11	0	51	6	39	8	0	53	1	14	1	0	16	143
3:30PM	3	9	10	0	22	13	13	6	0	32	6	27	6	0	39	1	19	1	0	21	114
Total	9	49	36	0	94	64	64	31	0	159	45	116	47	0	208	7	49	4	0	60	521
% Approach	9.6%	52.1%	38.3%	0%	-	40.3%	40.3%	19.5%	0%	-	21.6%	55.8%	22.6%	0%	-	11.7%	81.7%	6.7%	0%	-	-
% Total	1.7%	9.4%	6.9%	0%	18.0%	12.3%	12.3%	6.0%	0%	30.5%	8.6%	22.3%	9.0%	0%	39.9%	1.3%	9.4%	0.8%	0%	11.5%	-
PHF	0.750	0.583	0.750	-	0.904	0.667	0.800	0.705	-	0.779	0.662	0.744	0.653	-	0.897	0.438	0.645	1.000	-	0.714	0.911
Lights and Motorcycles	7	48	31	0	86	63	62	29	0	154	40	116	47	0	203	6	49	4	0	59	502
% Lights and Motorcycles	77.8%	98.0%	86.1%	0%	91.5%	98.4%	96.9%	93.5%	0%	96.9%	88.9%	100%	100%	0%	97.6%	85.7%	100%	100%	0%	98.3%	96.4%
Heavy	2	1	5	0	8	1	2	2	0	5	5	0	0	0	5	1	0	0	0	1	19
% Heavy	22.2%	2.0%	13.9%	0%	8.5%	1.6%	3.1%	6.5%	0%	3.1%	11.1%	0%	0%	0%	2.4%	14.3%	0%	0%	0%	1.7%	3.6%

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

Lewis Center Road & Genoa Church/GCA West Ac... - TMC

Tue Jan 26, 2021

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

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810566, Location: 40.197257, -82.910419



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA West Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 7:00AM	4	4	0	8	5	14	0	19	0	1	0	1	28
7:15AM	10	2	0	12	6	13	0	19	0	0	0	0	31
7:30AM	9	8	0	17	18	12	0	30	0	0	0	0	47
7:45AM	13	23	0	36	29	15	0	44	2	2	0	4	84
Hourly Total	36	37	0	73	58	54	0	112	2	3	0	5	190
8:00AM	13	39	0	52	56	44	0	100	14	1	0	15	167
8:15AM	10	21	0	31	31	31	0	62	16	1	0	17	110
8:30AM	16	6	0	22	1	21	0	22	6	0	0	6	50
8:45AM	7	0	0	7	4	15	0	19	0	0	0	0	26
Hourly Total	46	66	0	112	92	111	0	203	36	2	0	38	353
2:00PM	16	2	0	18	1	16	0	17	1	1	0	2	37
2:15PM	13	4	0	17	9	16	0	25	1	1	0	2	44
2:30PM	11	5	0	16	9	18	0	27	3	0	0	3	46
2:45PM	20	26	0	46	26	22	0	48	13	3	0	16	110
Hourly Total	60	37	0	97	45	72	0	117	18	5	0	23	237
3:00PM	7	21	0	28	22	27	0	49	16	4	0	20	97
3:15PM	11	6	0	17	10	30	0	40	20	3	0	23	80
3:30PM	11	1	0	12	2	28	0	30	5	6	0	11	53
3:45PM	15	0	0	15	2	20	0	22	5	2	0	7	44
Hourly Total	44	28	0	72	36	105	0	141	46	15	0	61	274
4:00PM	14	4	0	18	5	17	0	22	1	0	0	1	41
4:15PM	13	6	0	19	6	25	0	31	3	0	0	3	53
4:30PM	14	5	0	19	3	18	0	21	5	0	0	5	45
4:45PM	17	2	0	19	6	22	0	28	2	0	0	2	49
Hourly Total	58	17	0	75	20	82	0	102	11	0	0	11	188
5:00PM	14	6	0	20	12	17	0	29	2	1	0	3	52
5:15PM	19	3	0	22	7	18	0	25	0	0	0	0	47
5:30PM	13	6	0	19	4	17	0	21	5	1	0	6	46
5:45PM	13	6	0	19	3	15	0	18	1	0	0	1	38
Hourly Total	59	21	0	80	26	67	0	93	8	2	0	10	183
Total	303	206	0	509	277	491	0	768	121	27	0	148	1425
% Approach	59.5%	40.5%	0%	-	36.1%	63.9%	0%	-	81.8%	18.2%	0%	-	-
% Total	21.3%	14.5%	0%	35.7%	19.4%	34.5%	0%	53.9%	8.5%	1.9%	0%	10.4%	-
Lights and Motorcycles	295	203	0	498	273	477	0	750	120	25	0	145	1393
% Lights and Motorcycles	97.4%	98.5%	0%	97.8%	98.6%	97.1%	0%	97.7%	99.2%	92.6%	0%	98.0%	97.8%
Heavy	8	3	0	11	4	14	0	18	1	2	0	3	32
% Heavy	2.6%	1.5%	0%	2.2%	1.4%	2.9%	0%	2.3%	0.8%	7.4%	0%	2.0%	2.2%

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

Lewis Center Road & Genoa Church/GCA West Ac... - TMC

Tue Jan 26, 2021

AM Peak (7:45 AM - 8:45 AM) - Overall Peak Hour

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810566, Location: 40.197257, -82.910419



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA West Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 7:45AM	13	23	0	36	29	15	0	44	2	2	0	4	84
8:00AM	13	39	0	52	56	44	0	100	14	1	0	15	167
8:15AM	10	21	0	31	31	31	0	62	16	1	0	17	110
8:30AM	16	6	0	22	1	21	0	22	6	0	0	6	50
Total	52	89	0	141	117	111	0	228	38	4	0	42	411
% Approach	36.9%	63.1%	0%	-	51.3%	48.7%	0%	-	90.5%	9.5%	0%	-	-
% Total	12.7%	21.7%	0%	34.3%	28.5%	27.0%	0%	55.5%	9.2%	1.0%	0%	10.2%	-
PHF	0.813	0.571	-	0.678	0.522	0.631	-	0.570	0.594	0.500	-	0.618	0.615
Lights and Motorcycles	49	89	0	138	117	107	0	224	38	4	0	42	404
% Lights and Motorcycles	94.2%	100%	0%	97.9%	100%	96.4%	0%	98.2%	100%	100%	0%	100%	98.3%
Heavy	3	0	0	3	0	4	0	4	0	0	0	0	7
% Heavy	5.8%	0%	0%	2.1%	0%	3.6%	0%	1.8%	0%	0%	0%	0%	1.7%

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

Lewis Center Road & Genoa Church/GCA West Ac... - TMC

Tue Jan 26, 2021

PM Peak (2:45 PM - 3:45 PM)

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810566, Location: 40.197257, -82.910419



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA West Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 2:45PM	20	26	0	46	26	22	0	48	13	3	0	16	110
3:00PM	7	21	0	28	22	27	0	49	16	4	0	20	97
3:15PM	11	6	0	17	10	30	0	40	20	3	0	23	80
3:30PM	11	1	0	12	2	28	0	30	5	6	0	11	53
Total	49	54	0	103	60	107	0	167	54	16	0	70	340
% Approach	47.6%	52.4%	0%	-	35.9%	64.1%	0%	-	77.1%	22.9%	0%	-	-
% Total	14.4%	15.9%	0%	30.3%	17.6%	31.5%	0%	49.1%	15.9%	4.7%	0%	20.6%	-
PHF	0.613	0.519	-	0.560	0.577	0.892	-	0.852	0.675	0.667	-	0.761	0.773
Lights and Motorcycles	48	53	0	101	58	103	0	161	53	15	0	68	330
% Lights and Motorcycles	98.0%	98.1%	0%	98.1%	96.7%	96.3%	0%	96.4%	98.1%	93.8%	0%	97.1%	97.1%
Heavy	1	1	0	2	2	4	0	6	1	1	0	2	10
% Heavy	2.0%	1.9%	0%	1.9%	3.3%	3.7%	0%	3.6%	1.9%	6.3%	0%	2.9%	2.9%

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

Lewis Center Road & Genoa Church/GCA East Ac... - TMC

Tue Jan 26, 2021

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

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810568, Location: 40.19703, -82.909407



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA East Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 7:00AM	5	0	0	5	3	19	0	22	0	0	0	0	27
7:15AM	10	1	0	11	1	18	0	19	0	0	0	0	30
7:30AM	9	0	0	9	1	31	0	32	1	0	0	1	42
7:45AM	14	0	0	14	0	41	0	41	1	5	0	6	61
Hourly Total	38	1	0	39	5	109	0	114	2	5	0	7	160
8:00AM	14	0	0	14	0	76	0	76	25	37	0	62	152
8:15AM	11	0	0	11	0	46	0	46	14	25	0	39	96
8:30AM	16	0	0	16	0	20	0	20	2	12	0	14	50
8:45AM	7	0	0	7	0	19	0	19	0	3	0	3	29
Hourly Total	48	0	0	48	0	161	0	161	41	77	0	118	327
2:00PM	17	0	0	17	0	17	0	17	0	4	0	4	38
2:15PM	14	0	0	14	0	26	0	26	0	1	0	1	41
2:30PM	11	0	0	11	0	26	0	26	1	6	0	7	44
2:45PM	23	0	0	23	0	41	0	41	9	11	0	20	84
Hourly Total	65	0	0	65	0	110	0	110	10	22	0	32	207
3:00PM	11	0	0	11	0	38	0	38	11	25	0	36	85
3:15PM	14	0	0	14	0	22	0	22	15	31	0	46	82
3:30PM	18	0	0	18	0	25	0	25	6	11	0	17	60
3:45PM	17	0	0	17	0	15	0	15	6	5	0	11	43
Hourly Total	60	0	0	60	0	100	0	100	38	72	0	110	270
4:00PM	14	0	0	14	0	21	0	21	1	6	0	7	42
4:15PM	13	0	0	13	0	27	0	27	3	9	0	12	52
4:30PM	14	0	0	14	0	17	0	17	4	2	0	6	37
4:45PM	17	0	0	17	2	27	0	29	3	6	0	9	55
Hourly Total	58	0	0	58	2	92	0	94	11	23	0	34	186
5:00PM	15	0	0	15	0	28	0	28	1	11	0	12	55
5:15PM	19	0	0	19	0	24	0	24	0	1	0	1	44
5:30PM	14	0	0	14	0	19	0	19	2	2	0	4	37
5:45PM	13	0	0	13	0	16	0	16	2	1	0	3	32
Hourly Total	61	0	0	61	0	87	0	87	5	15	0	20	168
Total	330	1	0	331	7	659	0	666	107	214	0	321	1318
% Approach	99.7%	0.3%	0%	-	1.1%	98.9%	0%	-	33.3%	66.7%	0%	-	-
% Total	25.0%	0.1%	0%	25.1%	0.5%	50.0%	0%	50.5%	8.1%	16.2%	0%	24.4%	-
Lights and Motorcycles	321	1	0	322	7	645	0	652	105	213	0	318	1292
% Lights and Motorcycles	97.3%	100%	0%	97.3%	100%	97.9%	0%	97.9%	98.1%	99.5%	0%	99.1%	98.0%
Heavy	9	0	0	9	0	14	0	14	2	1	0	3	26
% Heavy	2.7%	0%	0%	2.7%	0%	2.1%	0%	2.1%	1.9%	0.5%	0%	0.9%	2.0%

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

Lewis Center Road & Genoa Church/GCA East Ac... - TMC

Tue Jan 26, 2021

AM Peak (7:45 AM - 8:45 AM) - Overall Peak Hour

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810568, Location: 40.19703, -82.909407



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA East Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 7:45AM	14	0	0	14	0	41	0	41	1	5	0	6	61
8:00AM	14	0	0	14	0	76	0	76	25	37	0	62	152
8:15AM	11	0	0	11	0	46	0	46	14	25	0	39	96
8:30AM	16	0	0	16	0	20	0	20	2	12	0	14	50
Total	55	0	0	55	0	183	0	183	42	79	0	121	359
% Approach	100%	0%	0%	-	0%	100%	0%	-	34.7%	65.3%	0%	-	-
% Total	15.3%	0%	0%	15.3%	0%	51.0%	0%	51.0%	11.7%	22.0%	0%	33.7%	-
PHF	0.859	-	-	0.859	-	0.602	-	0.602	0.420	0.534	-	0.488	0.590
Lights and Motorcycles	52	0	0	52	0	180	0	180	42	79	0	121	353
% Lights and Motorcycles	94.5%	0%	0%	94.5%	0%	98.4%	0%	98.4%	100%	100%	0%	100%	98.3%
Heavy	3	0	0	3	0	3	0	3	0	0	0	0	6
% Heavy	5.5%	0%	0%	5.5%	0%	1.6%	0%	1.6%	0%	0%	0%	0%	1.7%

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

Lewis Center Road & Genoa Church/GCA East Ac... - TMC

Tue Jan 26, 2021

PM Peak (2:45 PM - 3:45 PM)

All Classes (Lights and Motorcycles, Heavy)

All Movements

ID: 810568, Location: 40.19703, -82.909407



Provided by: Smart Services, Inc.
88 W. Church Street, Newark, OH, 43055, US

Leg Direction	Lewis Center Rd Eastbound				Lewis Center Rd Westbound				GCA East Access Northbound				
Time	T	R	U	App	L	T	U	App	L	R	U	App	Int
2021-01-26 2:45PM	23	0	0	23	0	41	0	41	9	11	0	20	84
3:00PM	11	0	0	11	0	38	0	38	11	25	0	36	85
3:15PM	14	0	0	14	0	22	0	22	15	31	0	46	82
3:30PM	18	0	0	18	0	25	0	25	6	11	0	17	60
Total	66	0	0	66	0	126	0	126	41	78	0	119	311
% Approach	100%	0%	0%	-	0%	100%	0%	-	34.5%	65.5%	0%	-	-
% Total	21.2%	0%	0%	21.2%	0%	40.5%	0%	40.5%	13.2%	25.1%	0%	38.3%	-
PHF	0.717	-	-	0.717	-	0.768	-	0.768	0.683	0.629	-	0.647	0.915
Lights and Motorcycles	65	0	0	65	0	122	0	122	40	77	0	117	304
% Lights and Motorcycles	98.5%	0%	0%	98.5%	0%	96.8%	0%	96.8%	97.6%	98.7%	0%	98.3%	97.7%
Heavy	1	0	0	1	0	4	0	4	1	1	0	2	7
% Heavy	1.5%	0%	0%	1.5%	0%	3.2%	0%	3.2%	2.4%	1.3%	0%	1.7%	2.3%

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



88 W. Church Street
Newark, OH 43055
(740) 345-4700

www.smartservices-inc.com

Date:

1/26/2021

Genoa Christian Academy Existing Site Traffic Summary

TIME	WEST DRIVEWAY AT LEWIS CENTER ROAD						EAST DRIVEWAY AT LEWIS CENTER			TOTAL SITE						
	WB LT	EB RT	IN	NB LT	NB RT	OUT	NB LT	NB RT	OUT	WB LT	EB RT	IN	NB LT	NB RT	OUT	TOTAL
7:00 AM	5	4	9	0	1	1	0	0	0	5	4	9	0	1	1	10
7:15 AM	6	2	8	0	0	0	0	0	0	6	2	8	0	0	0	8
7:30 AM	18	8	26	0	0	0	1	0	1	18	8	26	1	0	1	27
7:45 AM	29	23	52	2	2	4	1	5	6	29	23	52	3	7	10	62
8:00 AM	56	39	95	14	1	15	25	37	62	56	39	95	39	38	77	172
8:15 AM	31	21	52	16	1	17	14	25	39	31	21	52	30	26	56	108
8:30 AM	1	6	7	6	0	6	2	12	14	1	6	7	8	12	20	27
8:45 AM	4	0	4	0	0	0	0	3	3	4	0	4	0	3	3	7
AM Peak	117	89	206	38	4	42	42	79	121	117	89	206	80	83	163	369
	57%	43%		23%	2%		26%	48%		57%	43%	56%	49%	51%	44%	
AM Totals	150	103	253	38	5	43	43	82	125			253			168	421
2:00 PM	1	2	3	1	1	2	0	4	4	1	2	3	1	5	6	9
2:15 PM	9	4	13	1	1	2	0	1	1	9	4	13	1	2	3	16
2:30 PM	9	5	14	3	0	3	1	6	7	9	5	14	4	6	10	24
2:45 PM	26	26	52	13	3	16	9	11	20	26	26	52	22	14	36	88
3:00 PM	22	21	43	16	4	20	11	25	36	22	21	43	27	29	56	99
3:15 PM	10	6	16	20	3	23	15	31	46	10	6	16	35	34	69	85
3:30 PM	2	1	3	5	6	11	6	11	17	2	1	3	11	17	28	31
3:45 PM	2	0	2	5	2	7	6	5	11	2	0	2	11	7	18	20
4:00 PM	5	4	9	1	0	1	1	6	7	5	4	9	2	6	8	17
4:15 PM	6	6	12	3	0	3	3	9	12	6	6	12	6	9	15	27
4:30 PM	3	5	8	5	0	5	4	2	6	3	5	8	9	2	11	19
4:45 PM	6	2	8	2	0	2	3	6	9	6	2	8	5	6	11	19
5:00 PM	12	6	18	2	1	3	1	11	12	12	6	18	3	12	15	33
5:15 PM	7	3	10	0	0	0	0	1	1	7	3	10	0	1	1	11
5:30 PM	4	6	10	5	1	6	2	2	4	4	6	10	7	3	10	20
5:45 PM	3	6	9	1	0	1	2	1	3	3	6	9	3	1	4	13
PM Peak	60	54	114	54	16	70	41	78	119	60	54	114	95	94	189	303
	53%	47%		29%	8%		22%	41%		53%	47%	38%	50%	50%	62%	
PM Totals	127	103	230	83	22	105	64	132	196			230			301	531
AM & PM Totals	277	206	483	121	27	148	107	214	321			483			469	952

Todd Stanhope

From: Hwashik Jang <hjang@morpc.org>
Sent: Friday, March 05, 2021 3:05 PM
To: Todd Stanhope
Cc: Nick Gill; Love, Michael; Aaron Heydinger; Zhuojun Jiang
Subject: RE: Growth Rate Request - Lewis Center Road & Worthington Road

Todd,

We have completed processing growth rates for your traffic study intersection.

Please use linear annual growth rates as summarized below.

<u>Location</u>	<u>Linear Annual Growth Rate</u>
Lewis Center Rd e/o Worthington Rd	1.00%
Worthington Rd n/o Lewis Center Rd	2.00%
Lewis Center Rd w/o Worthington Rd	1.00%
Worthington Rd s/o Lewis Center Rd	1.50%

Note: The above rate was derived based on planning level analysis by using MORPC's regional travel demand model.

If you have any questions, please let me know.

Thanks,

HWASHIK JANG

Senior Planner, Transportation & Infrastructure Development | Mid-Ohio Regional Planning Commission

T: 614.233.4145 | hjang@morpc.org

111 Liberty Street, Suite 100 | Columbus, OH 43215



Given increasing concerns and rapid changing conditions due to COVID-19, MORPC offices are currently closed to the public. In taking such steps, we are protecting the health and safety of our staff, members and the general public. During this time, MORPC will continue its operations remotely to provide services to our members and community partners. For updates and other information visit our website at www.morpc.org/covid19. Thank you for your patience and understanding as we navigate through these unique challenges.

From: Todd Stanhope <TStanhope@smartservices-inc.com>
Sent: Wednesday, February 10, 2021 11:43 AM
To: Zhuojun Jiang <zjiang@morpc.org>
Cc: Nick Gill <NGILL@morpc.org>; Hwashik Jang <hjang@morpc.org>; Love, Michael <mlove@co.delaware.oh.us>; Aaron Heydinger <aheydinger@ghgcivil.com>
Subject: Growth Rate Request - Lewis Center Road & Worthington Road

Zhuojun

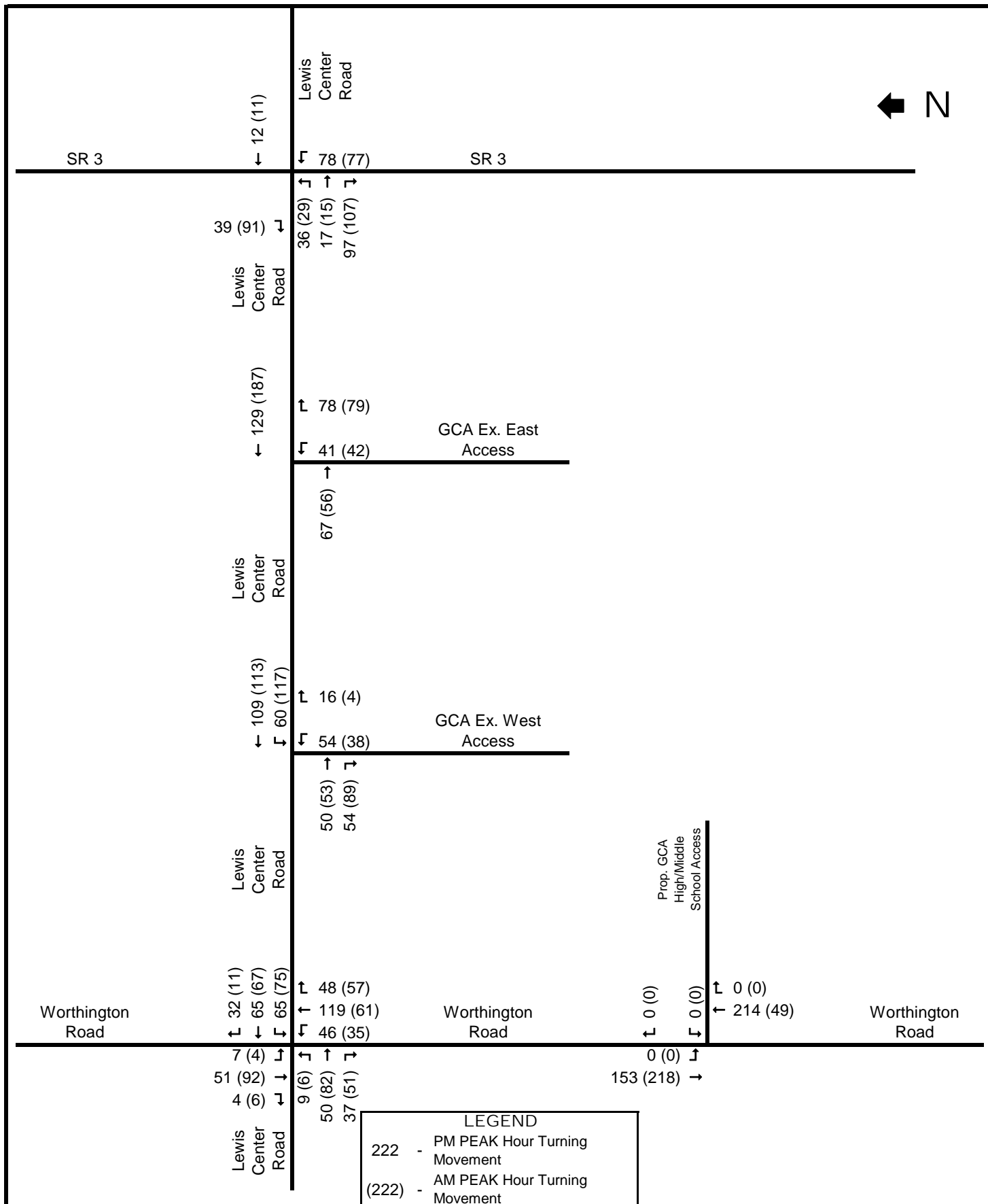
We are performing a traffic impact study for an expansion of Genoa Christian Academy. Please provide growth rates for all legs of the Lewis Center Road & Worthington Road intersection.

Below is MORPC's requested information about the study:

1. Traffic Data upon which you would be applying these growth rates (preferably 24 hour counts). A 6 hour turning movement count was taken at the intersection of Lewis Center Road & Worthington Road as part of the project and is attached.
2. Open Year & Design Year, for this study: 2023 and *2033 (*Trips associated with the school expansion have not been computed yet. County's requirement is based on trips generated so assuming 10 year design horizon for now)
3. Roadway network assumptions: Any roadway assumptions/changes in the vicinity, such as change in number of lanes or roadway alignments, etc: None anticipated.
4. Land use assumptions: General info on proposed site location & development, such as: site map, Trip Generation (excel file, preferably). An MOU has been submitted to the Delaware County Engineer's Office and is attached for reference.
5. Project Review Contact Person: Mike Love will be coordinating the review for the Delaware County Engineer's Office. His e-mail address is in the cc: line.

Thank you!





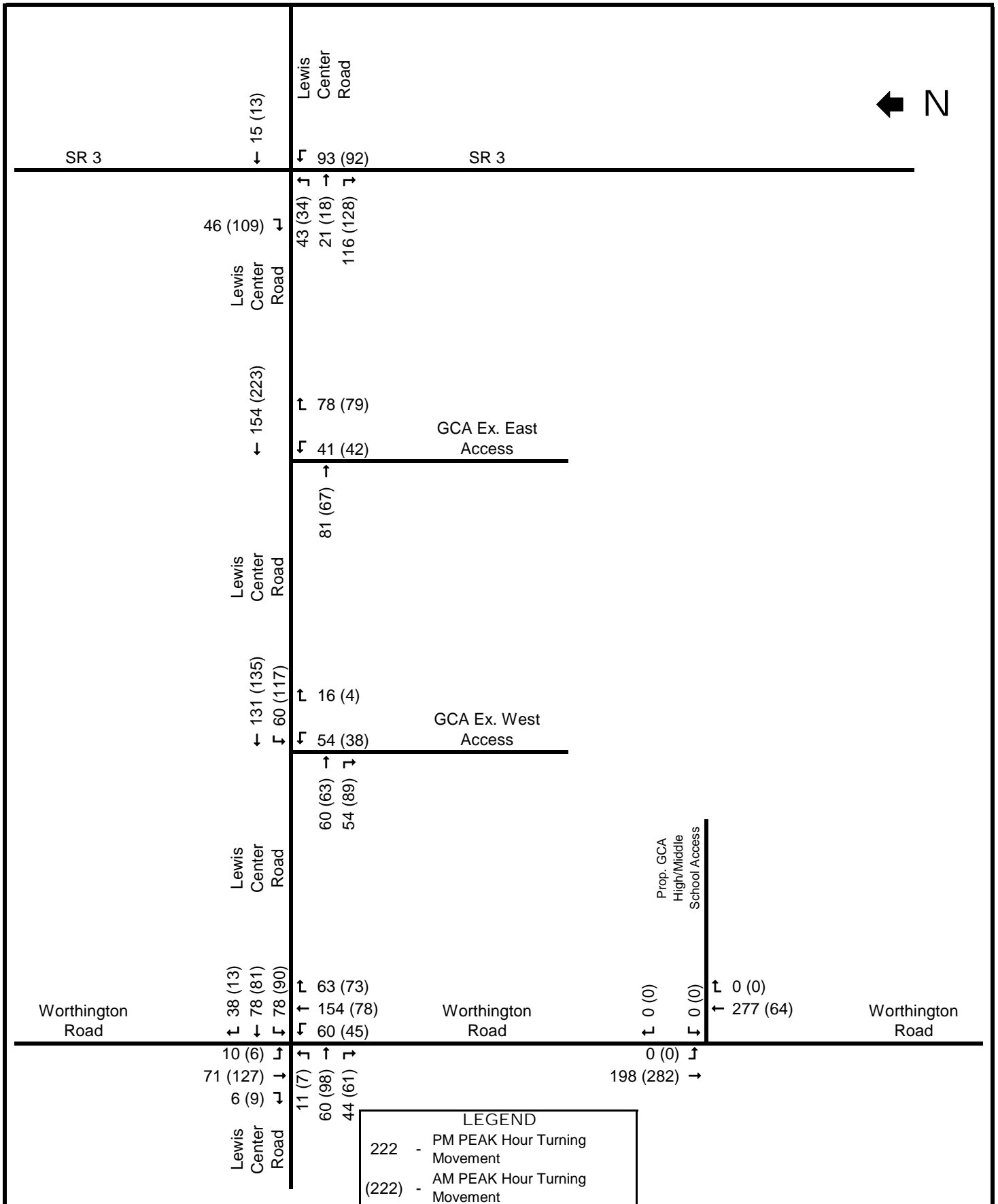
GENOA CHRISTIAN ACADEMY EXPANSION TRAFFIC STUDY

PREPARED BY: **SMART** SERVICES

3/2021

APPENDIX EXHIBIT

2023 'NO BUILD' TRAFFIC



GENOA CHRISTIAN ACADEMY EXPANSION TRAFFIC STUDY

PREPARED BY: **SMART**
SERVICES

3/2021

APPENDIX EXHIBIT

2043 'NO BUILD' TRAFFIC

(1) PROP. GCA HIGH/MIDDLE SCHOOL ACCESS & WORTHINGTON ROAD - SB LT - 2023 'BUILD' W/ MIDDLE/HIGH SCHOOL DIVERTED

Critical Analysis Period: AM PEAK

Type = Unsignalized Through Road

Speed = 45 MPH

Cycle Length = 60 seconds

Turning Volume = 145 VPH

of Turning Lanes = 1

Advancing Volume = 381 VPH

Turning % (>10% HIGH) 38.1% HIGH

Design Condition = C

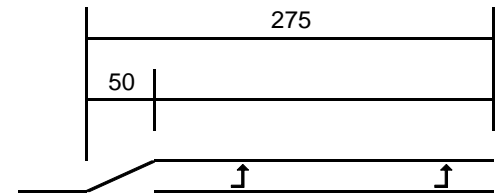
Vehicles per Cycle = 2.4

Storage Length (Calc) = 150 feet

Storage Length (Adj) = 150 feet

Deceleration/Div. Taper = 125 feet

Turn Lane Length = 275 feet



Calculations based on 401-7E in ODOT
L&D Manual. All dimensions are in feet.

(2) PROP. GCA HIGH/MIDDLE SCHOOL ACCESS & WORTHINGTON ROAD - SB LT - 2043 'BUILD' W/ MIDDLE/HIGH SCHOOL DIVERTED

Critical Analysis Period: AM PEAK

Type = Unsignalized Through Road

Speed = 45 MPH

Cycle Length = 60 seconds

Turning Volume = 145 VPH

of Turning Lanes = 1

Advancing Volume = 445 VPH

Turning % (>10% HIGH) 32.6% HIGH

Design Condition = C

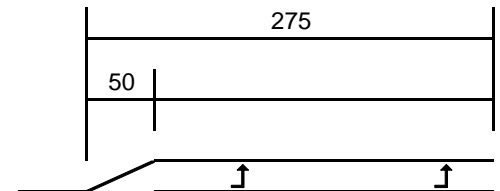
Vehicles per Cycle = 2.4

Storage Length (Calc) = 150 feet

Storage Length (Adj) = 150 feet

Deceleration/Div. Taper = 125 feet

Turn Lane Length = 275 feet



Calculations based on 401-7E in ODOT
L&D Manual. All dimensions are in feet.

GENOA CHRISTIAN ACADEMY EXPANSION
TRAFFIC STUDY

PREPARED BY:  SMART
SERVICES

3/2021

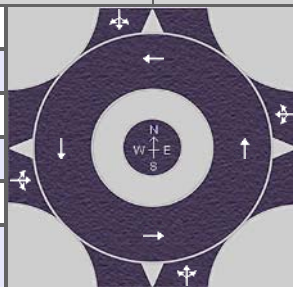
APPENDIX

LEFT TURN LANE CALCULATIONS

HCS7 Roundabouts Report

General Information

Analyst	TJS
Agency or Co.	Smart Services
Date Performed	3/7/2021
Analysis Year	2023
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Project Description	GCA Expansion TIS



Site Information

Intersection	LewisCenter & Worthington
E/W Street Name	Lewis Center Road
N/S Street Name	Worthington Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.77
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	6	82	51	0	75	67	11	0	35	61	57	0	4	92	6
Percent Heavy Vehicles, %	0	17	2	10	0	0	5	0	0	3	2	2	0	25	2	0
Flow Rate (V_{PCE}), pc/h	0	9	109	73	0	97	91	14	0	47	81	76	0	6	122	8
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		191			202			204			136	
Entry Volume, veh/h		181			198			200			132	
Circulating Flow (v_c), pc/h	225			137			124			235		
Exiting Flow (v_{ex}), pc/h	191			146			104			292		
Capacity (C_{PCE}), pc/h		1097			1200			1216			1086	
Capacity (c), veh/h		1039			1174			1190			1057	
v/c Ratio (x)		0.17			0.17			0.17			0.13	

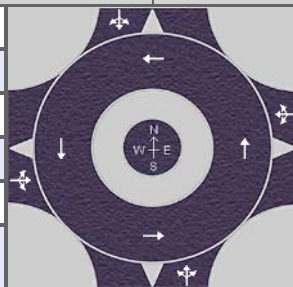
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.1			4.5			4.5			4.5	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.6			0.6			0.4	
Approach Delay, s/veh	5.1			4.5			4.5			4.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	4.6						A					

HCS7 Roundabouts Report

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Site Information

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N/S Street Name	Worthington Road
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Peak Hour Factor	0.91
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	9	50	37	0	65	65	32	0	46	119	48	0	7	51	4
Percent Heavy Vehicles, %	0	22	2	14	0	2	3	7	0	11	0	0	0	14	0	0
Flow Rate (V_{PCE}), pc/h	0	12	56	46	0	73	74	38	0	56	131	53	0	9	56	4
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		114			185			240			69	
Entry Volume, veh/h		105			179			234			68	
Circulating Flow (v_c), pc/h	138			199			77			203		
Exiting Flow (v_{ex}), pc/h	118			134			181			175		
Capacity (C_{PCE}), pc/h		1199			1126			1276			1122	
Capacity (c), veh/h		1105			1090			1246			1104	
v/c Ratio (x)		0.10			0.16			0.19			0.06	

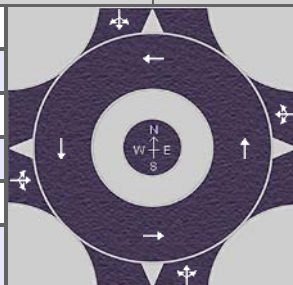
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.1			4.8			4.5			3.8	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			0.6			0.7			0.2	
Approach Delay, s/veh	4.1			4.8			4.5			3.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	4.4						A					

HCS7 Roundabouts Report

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Peak Hour Factor	0.77
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	6	104	106	0	182	84	13	0	69	69	131	0	6	93	6
Percent Heavy Vehicles, %	0	17	2	10	0	0	5	0	0	3	2	2	0	25	2	0
Flow Rate (V_{PCE}), pc/h	0	9	138	151	0	236	115	17	0	92	91	174	0	10	123	8
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		298			368			357			141	
Entry Volume, veh/h		280			363			349			137	
Circulating Flow (v_c), pc/h	369			192			157			443		
Exiting Flow (v_{ex}), pc/h	322			215			117			510		
Capacity (C_{PCE}), pc/h		947			1135			1176			878	
Capacity (c), veh/h		891			1118			1150			851	
v/c Ratio (x)		0.31			0.32			0.30			0.16	

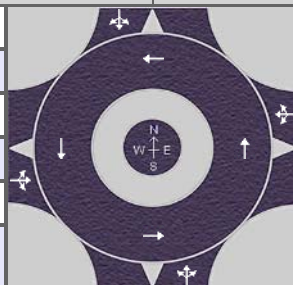
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.5			6.4			6.0			5.8	
Lane LOS		A			A			A			A	
95% Queue, veh		1.4			1.4			1.3			0.6	
Approach Delay, s/veh	7.5			6.4			6.0			5.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	6.5						A					

HCS7 Roundabouts Report

General Information

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Site Information

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Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	9	62	62	0	121	89	34	0	78	145	128	0	8	55	4
Percent Heavy Vehicles, %	0	22	2	14	0	2	3	7	0	11	0	0	0	14	0	0
Flow Rate (V_{PCE}), pc/h	0	12	69	78	0	136	101	40	0	95	159	141	0	10	60	4
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		159			277			395			74	
Entry Volume, veh/h		146			269			386			73	
Circulating Flow (v_c), pc/h	206			266			91			332		
Exiting Flow (v_{ex}), pc/h	220			200			211			274		
Capacity (C_{PCE}), pc/h		1118			1052			1258			984	
Capacity (c), veh/h		1026			1021			1228			967	
v/c Ratio (x)		0.14			0.26			0.31			0.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.8			6.1			5.8			4.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.5			1.1			1.4			0.2	
Approach Delay, s/veh	4.8			6.1			5.8			4.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	5.6						A					

HCS7 Roundabouts Report

General Information

Analyst	TJS
Agency or Co.	Smart Services
Date Performed	3/7/2021
Analysis Year	2043
Time Analyzed	2043 No Build - AM Peak
Project Description	GCA Expansion TIS



Site Information

Intersection	LewisCenter & Worthington
E/W Street Name	Lewis Center Road
N/S Street Name	Worthington Road
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.77
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	7	98	61	0	90	81	13	0	45	78	73	0	6	127	9
Percent Heavy Vehicles, %	0	17	2	10	0	0	5	0	0	3	2	2	0	25	2	0
Flow Rate (V_{PCE}), pc/h	0	11	130	87	0	117	110	17	0	60	103	97	0	10	168	12
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		228			244			260			190	
Entry Volume, veh/h		216			239			254			185	
Circulating Flow (v_c), pc/h	295			174			151			287		
Exiting Flow (v_{ex}), pc/h	237			182			131			372		
Capacity (C_{PCE}), pc/h		1021			1156			1183			1030	
Capacity (c), veh/h		967			1131			1157			1001	
v/c Ratio (x)		0.22			0.21			0.22			0.18	

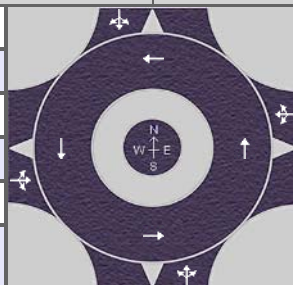
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.9			5.1			5.1			5.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.9			0.8			0.8			0.7	
Approach Delay, s/veh	5.9			5.1			5.1			5.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	5.3						A					

HCS7 Roundabouts Report

General Information

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Site Information

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Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	11	60	44	0	78	78	38	0	60	154	63	0	10	71	6
Percent Heavy Vehicles, %	0	22	2	14	0	2	3	7	0	11	0	0	0	14	0	0
Flow Rate (V_{PCE}), pc/h	0	15	67	55	0	87	88	45	0	73	169	69	0	13	78	7
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		137			220			311			98	
Entry Volume, veh/h		126			213			304			96	
Circulating Flow (v_c), pc/h	178			257			95			248		
Exiting Flow (v_{ex}), pc/h	149			168			229			220		
Capacity (C_{PCE}), pc/h		1151			1062			1253			1072	
Capacity (c), veh/h		1060			1027			1223			1054	
v/c Ratio (x)		0.12			0.21			0.25			0.09	

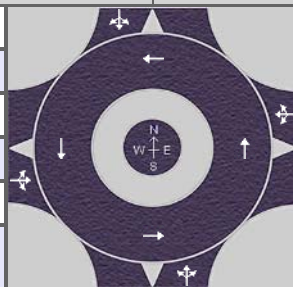
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.4			5.5			5.2			4.2	
Lane LOS		A			A			A			A	
95% Queue, veh		0.4			0.8			1.0			0.3	
Approach Delay, s/veh	4.4			5.5			5.2			4.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	5.0						A					

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Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	7	120	116	0	197	98	15	0	79	86	147	0	8	128	9
Percent Heavy Vehicles, %	0	17	2	10	0	0	5	0	0	3	2	2	0	25	2	0
Flow Rate (V_{PCE}), pc/h	0	11	159	166	0	256	134	19	0	106	114	195	0	13	170	12
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		336			409			415			195	
Entry Volume, veh/h		316			403			406			189	
Circulating Flow (v_c), pc/h	439			231			183			496		
Exiting Flow (v_{ex}), pc/h	367			252			144			592		
Capacity (C_{PCE}), pc/h		882			1090			1145			832	
Capacity (c), veh/h		830			1073			1120			807	
v/c Ratio (x)		0.38			0.38			0.36			0.23	

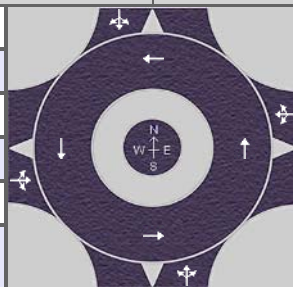
Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.9			7.2			6.8			7.0	
Lane LOS		A			A			A			A	
95% Queue, veh		1.8			1.8			1.7			0.9	
Approach Delay, s/veh	8.9			7.2			6.8			7.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	7.5						A					

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Jurisdiction	DCEO

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	11	72	69	0	134	102	40	0	92	180	143	0	11	75	6
Percent Heavy Vehicles, %	0	22	2	14	0	2	3	7	0	11	0	0	0	14	0	0
Flow Rate (V_{PCE}), pc/h	0	15	81	86	0	150	115	47	0	112	198	157	0	14	82	7
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		182			312			467			103	
Entry Volume, veh/h		167			303			456			101	
Circulating Flow (v_c), pc/h	246			325			110			377		
Exiting Flow (v_{ex}), pc/h	252			234			260			318		
Capacity (C_{PCE}), pc/h		1074			991			1234			939	
Capacity (c), veh/h		986			961			1204			924	
v/c Ratio (x)		0.17			0.31			0.38			0.11	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.2			7.0			6.7			4.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			1.4			1.8			0.4	
Approach Delay, s/veh	5.2			7.0			6.7			4.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	6.4						A					