

TRAFFIC IMPACT STUDY

Residential Development Grover's Mill Road Lawrence, New Jersey

BE: 21-210TR

March 19, 2024

PREPARED FOR: Tricone Company

2525 US 130, Suite B Cranbury, NJ 08512

PREPARED BY: Bertin Engineering

66 Glen Avenue

Glen Rock, NJ 07452

Calisto J. Bertin, P.E.

New Jersey License No. 28845

Eric M. Hough, P.E.

New Jersey License No. 51893

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ATTACHMENTS

Traffic Counts (2 Sheets)

Level of Service Worksheets (16 Sheets)

ITE Data (2 Sheets)

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1.0 <u>Introduction</u>

This report addresses the traffic impact associated with the development of a proposed residential development by Tricone Company. The site is located on the north side of Grovers Mill Road at the intersection with the Mall Access Road in the Township of Lawerence, Mercer County, New Jersey.

The traffic impact study includes:

- (a) An inventory of the existing roads and traffic controls;
- (b) Traffic counts at the Grovers Mill Road Mall Access Road & the Mall Access Road – Outer Ring Road intersection to determine the existing traffic in the area;
- (c) An estimate of the traffic to be generated by the project; and
- (d) An analysis of the impact this traffic will have on local traffic.

2.0 <u>Site</u>

- 2.1 The site is located in the AT-3 (Apartment & Township Residential) Zone of the Township of Lawrence. The land uses in the area are a combination of residential and commercial, including the "Quaker Bridge Mall" to the north, car dealerships along Route 1 to the west and residential developments to the east.
- 2.2 The property is located on the north side of Grovers Mill Road as seen below.

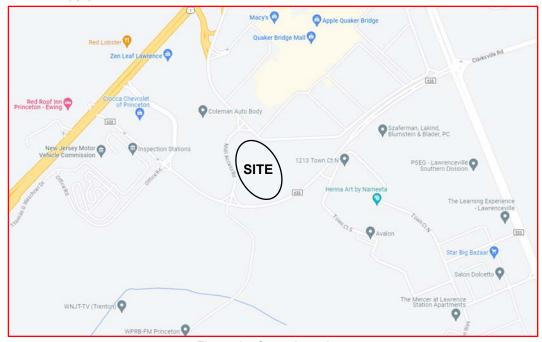


Figure 1 – Street Location



Figure 2 - Aerial

- 2.3 The property is currently vacant and entirely wooded. The site is 6.86 acres in area with approximately 600 feet of frontage along Grovers Mill Road and approximately 630 feet of frontage along Mall Access Road.
- 2.4 Bus stops are available in the area on Grover's Mill Road to the east of the site and at the Quaker Bridge Mall to the north of the site. School bus routes currently travel along Grover's Mill Road.
- 2.5 The rationale for choosing this area is that the location is consistent with existing residential uses in the area and has convenient access to nearby transit via bus stops and close proximity to major highways.

3.0 Roadways

- 3.1 **Grovers Mill Road (County Route 638)** is a county roadway that travels in a general east-west direction. It contains one travel lane in each direction separated by a solid yellow double line. There is no curbing or sidewalks on either side of the roadway and the posted speed limit is 40 MPH in the vicinity of the site.
- 3.2 **Mall Access Road** is a local roadway that runs from Grovers Mill Road to the south to Outer Ring Road of the Quaker Bridge Mall to the north. It contains one lane in each direction separated by a solid yellow double line. There is curbing with no sidewalks along both sides of the road and the posted speed limit is 25 MPH in the vicinity of the site.

- 3.3 **Outer Ring Road** is a local roadway that circulates around the "Quaker Bridge Mall" to the north of the site. It contains two lanes in each direction separated by a solid yellow double line. There is curbing with no sidewalks along both sides of the road and the posted speed limit is 25 MPH in the vicinity of the site.
- 3.4 The Grovers Mill Road Mall Access Road intersection is a stop-controlled intersection located to southwest of the site with the Mall Access Road acting as the minor roadway approach. The Grovers Mill Road eastbound approach contains two approach lanes including a left-turn only lane and a thru lane. The Grovers Mill Road westbound approach contains one shared thru-right turn lane. The Mall Access Road approach contains two approach lanes including a left-turn only lane and a right-turn only lane.
- 3.5 The Mall Access Road Outer Ring Road intersection is a stop-controlled intersection located northwest of the site with the Mall Access Road acting as the minor roadway approach. The Outer Ring Road eastbound approach contains two approach lanes including a shared right-turn/thru lane and a thru only lane. The Outer Ring Road westbound approach contains two approach lanes including a shared left-turn/thru lane and a thru only lane. The Mall Access Road approach contains two approach lanes including a left-turn only lane and a right-turn only lane.

4.0 **Traffic Activity**

4.1 A study of traffic activity was conducted at the Grovers Mill Road – Mall Access Road intersection. Traffic was observed and counted on Tuesday, September 19, 2023 during the morning peak period between the hours of 7:00 AM and 9:00 AM and the evening peak period between the hours of 4:00 PM and 6:00 PM. The traffic activity for the weekday morning and weekday evening are summarized in the following table. The traffic count sheets are attached, and the peak-hour traffic volume is shown in **Figure 3**.

GROVEI	GROVERS MILL ROAD – MALL ACCESS ROAD INTERSECTION Peak-Hour Traffic						
Grovers Mill Road Mall						Access Road	
Peak Hour	Eastl	oound Westbound			Southbound		
	Left	Thru	Thru	Right	Left	Right	
AM (8:00-9:00)	46	471	57	44	6	34	
PM (4:15-5:15)	98	668	41	44	42	22	

4.2 The majority of traffic travels on Grovers Mill Road eastbound with the greater volume in the PM peak-hour. Mall Access Road was found to have more volume in the PM peak-hour. The maximum observed queue on the southbound approach of Mall Access Road was 2 vehicles.

4.3 A study of traffic activity was also conducted at the Mall Access Road – Outer Ring Road intersection. Traffic was observed and counted on Tuesday, September 19, 2023 during the morning peak period between the hours of 7:00 AM and 9:00 AM and the evening peak period between the hours of 4:00 PM and 6:00 PM. The traffic activity for the weekday morning and weekday evening are summarized in the following table. The traffic count sheets are attached and the peak-hour traffic volume is shown in **Figure 3**.

MALL ACCESS ROAD – OUTER RING INTERSECTION Peak-Hour Traffic							
		Outer Rin	g Road		Mall Ac	cess Road	
Peak Hour	Eastl	bound	Westb	ound	Northbound		
	Thru	Right	Left	Thru	Left	Right	
AM (8:00-9:00)	20	33	6	31	79	13	
PM (4:15-5:15)	35	47	17	84	98	43	

- 4.4 The majority of traffic on Mall Access Road eastbound turns left onto Outer Ring Road with a greater volume in the PM peak-hour. The majority of traffic on Outer Ring Road travels eastbound in the AM peak-hour and westbound in the PM peak-hour. The maximum observed queue on the northbound approach of Mall Access Road was 2 vehicles.
- 4.5 There was minimal truck traffic observed with more volume in the morning. At the AM peak-hour, a total of 26 trucks were observed at the Grovers Mill Road–Mall Access Road intersection and a total of 16 trucks were observed at the Mall Access Road–Outer Ring Road intersection.
- 4.6 There was minimal pedestrian traffic during the studied time periods with one pedestrian observed crossing Outer Ring Road in the AM peak hour.

5.0 Proposed Development

- 5.1 The applicant proposes to construct six (6) residential buildings at the project site including two (2) multi-family apartment buildings and four (4) townhouse buildings. There will be a total of 85 units in the proposed development including 54 apartment units and 31 townhouse units. There is parking provided in front of the proposed buildings as well as garage parking located under the two (2) multi-family apartment buildings.
- 5.2 The site will have two access driveways along the Mall Access Road including a right-turn only ingress and egress driveway closest to Grovers Mill Road and a full movement driveway closest to the Outer Ring Road.
- 5.3 Trash rooms are provided near the garage entrance for both apartment buildings to be picked up by a private hauler.

5.4 The development will also include a proposed pool with pool house and dog run located in the center of the property between the townhouse buildings.

6.0 Site Circulation & Pedestrian Access

- 6.1 The proposed interior parking aisles will be 24 feet wide for two-way traffic to provide adequate circulation and the proposed parking spaces will be 9 feet x18 feet.
- 6.2 The site circulation complies with the Lawrence Township Master Plan as the layout was designed to provide efficient movements of people and goods. Private garbage haulers can safely circulate the site for trash pick up during non-peak traffic hours.
- 6.3 Sidewalks which are 5 feet wide are proposed from Mall Access Road that access the building entrances of the multi-family apartment buildings. Interior crosswalks are also provided which access the interior townhouses.

7.0 Parking

7.1 The Township of Lawrence zoning ordinance requires 1.8 spaces for every 1-Bedroom apartment unit, 2.0 spaces for every 2-Bedroom apartment unit and 2.1 spaces for every 3-Bedroom apartment unit. The total number of spaces required by ordinance is calculated below:

```
1-Bedroom (15 Units) = 15 x 1.8 = 27 spaces

2-Bedroom (36 Units) = 36 x 2.0 = 72 spaces

3-Bedroom (3 Units) = 3 x 2.1 = 6.3 spaces

105 spaces required
```

- 7.2 There will be a total of 105 parking spaces provided for the apartment buildings included 37 spaces for the northernmost Building 'A' (14 surface spaces and 23 garage spaces) and 55 parking spaces for the southernmost Building 'F' (20 surface spaces and 35 garage spaces).
- 7.3 There will also be 13 parking spaces located in front of the proposed pool and dog run for a total of **105 parking spaces** provided overall for the two (2) apartment buildings.
- 7.4 The ADA requires 5 accessible parking spaces for lots from 101 to 150 spaces. Six (6) accessible handicap spaces are provided, which are in both parking garages and in front of the proposed pool.
- 7.5 The Township of Lawrence zoning ordinance requires 2.4 spaces for each townhouse unit for a total of 75 parking spaces required. Each proposed townhouse will provide 2 garage spaces and 1 driveway space for a total of **93 parking spaces** provided for the 31 proposed townhouse units.

7.6 There will be 16 electric vehicle supply equipment (EVSE) spaces proposed and according to recent state legislature, EV spaces shall be counted as 2 for the purpose of complying with required parking resulting in no more than 10% of required.

When accounting for this, 10 of the EVSE can be counted as 2, which will bring the total amount of proposed parking to **208 parking spaces**.

8.0 <u>Traffic Generation and Distribution</u>

8.1 The amount of traffic to be generated has been determined from data published in the <u>TRIP GENERATION</u>, 11th Edition manual, published by the Institute of Transportation Engineers (ITE). "Multifamily Housing (Low-Rise)" (Land Use Code 220) will be used for the proposed use and the table below shows the anticipated traffic to be generated by the proposed development during the weekday peak-hours.

SITE GENERATED TRAFFIC						
Land Use	P	M Peak Hou	ır	P	M Peak Ho	ur
Land Ose	In	Out	Total	In	Out	Total
Multi-Family Residential (85 Units)	3	23	26	27	3	30
Total Trips Generated	3	23	26	24	3	30

8.2 The site-generated traffic has been dispersed onto Mall Access Road as per the existing traffic distribution and the anticipated movements and is shown in **Figure 4**.

9.0 Traffic Impact

9.1 It is anticipated that the residential development will be completed in 2028, the "Build-Year". The traffic growth rate used by the NJDOT for this area is 1.0% per year. The "No Build Year" traffic is shown on **Figure 5** and the combined site-generated and "No Build Year" traffic, which is the "Build-Year Traffic", is shown on **Figure 6**.

GROVERS MILL ROAD – MALL ACCESS ROAD INTERSECTION								
	Level of Service (LOS) Analysis							
	Morning Peak-Hour Afternoon Peak-Hour							
<u>Approach</u>	Existing No Build Build-Year Existing No Build Build-Year							
Southbound	Α	Α	В	С	С	С		
(Mall Access Road) (9.7 sec.) (9.7 sec.) (10.6 sec.) (19.1 sec.) (20.7 sec.) (21.9 sec.)								
Eastbound	Α	Α	Α	Α	Α	Α		
(Grovers Mill Road)	(0.7 sec.)	(0.7 sec.)	(0.7 sec.)	(1.0 sec.)	(1.0 sec.)	(1.1 sec.)		

- 9.2 A capacity analysis has been performed to determine the operating conditions, or Level of Service (LOS), at the Grovers Mill Road Mall Access Road intersection during existing conditions, "no build-year" conditions, and "build-year" traffic conditions. The results of this analysis are shown in the table below and the worksheets attached.
- 9.3 The LOS of the Grovers Mill Road Mall Access Road intersection is not significantly impacted by the site-generated traffic with the LOS of the Mall Access Road approach degrading from an 'A' to a 'B' in AM peak-hour and remaining a LOS 'C' in the PM peak-hour. The Mall Access Road approach delay increased by 0.9 seconds in the AM peak-hour and 1.2 seconds in the PM peak-hour.
- 9.4 An access driveway to a broadcasting station exists on the south side of the intersection, which was not utilized during the site investigation and, therefore, not included in the analysis.
- 9.5 A capacity analysis has been performed to determine the operating conditions, or Level of Service (LOS), at the Outer Ring Road Mall Access Road intersection during existing conditions, "no build-year" conditions, and "build-year" traffic conditions. The results of this analysis are shown in the table below and the worksheets attached.

OUTER RING ROAD – MALL ACCESS ROAD INTERSECTION Level of Service (LOS) Analysis						
	Morning Peak-Hour Afternoon Peak-Hour					
<u>Approach</u>	Existing	No Build	Build-Year	Existing	No Build	Build-Year
Northbound (Mall Access Road)	A (9.3 sec.)	A (9.4 sec.)	A (9.4 sec.)	A (9.8 sec.)	A (9.9 sec.)	A (10.0 sec.)
Westbound (Outer Ring Road)	A (1.3 sec.)	A (1.2 sec.)	A (1.2 sec.)	A (1.3 sec.)	A (1.3 sec.)	A (1.4 sec.)

- 9.6 The LOS of the Outer Ring Road Mall Access Road intersection is not significantly impacted by the site-generated traffic and no approach LOS is degraded upon completion of the project. The Mall Access Road approach delay increases by 0.1 seconds in the PM peak-hour.
- 9.7 A capacity analysis has also been performed at the proposed northernmost site driveway on Mall Access Road during the weekday peak hours under the Build-Year conditions and the results are shown in the table below and the worksheets attached.

Mall Access Road – Proposed Northern Site Driveway Intersection Level of Service (LOS)							
	(Build-Year 2028)						
AM Peak-Hour PM Peak-Hour							
Northern Site Driveway	A	A					
(Westbound)	(Westbound) (9.2 sec) (9.7 sec)						
Mall Access Road A A							
(Southbound)	(0.0 sec)	(0.7 sec)					

- 9.8 The LOS of the Mall Access Road Northern Site Driveway Intersection during peak hours will be acceptable upon completion of the project.
- 9.9 A capacity analysis has also been performed at the proposed southernmost site driveway on Mall Access Road during the weekday peak hours under the Build-Year conditions and the results are shown in the table below and the worksheets attached.

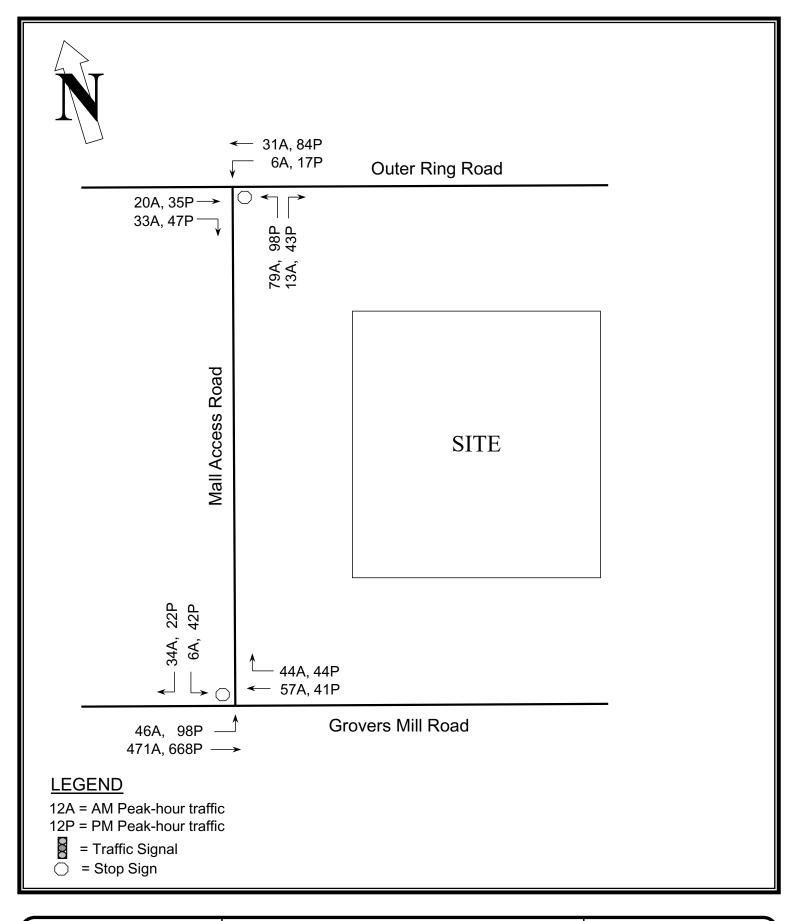
Mall Access Road – Proposed Southern Site Driveway Intersection Level of Service (LOS) (Build-Year 2028)							
	AM Peak-Hour PM Peak-Hour						
Southern Site Driveway (Westbound)	A (8.6 sec)	A (9.2 sec)					

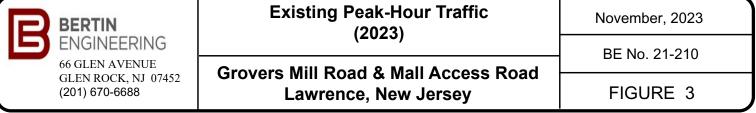
9.10 The LOS of the Mall Access Road – Southern Site Driveway Intersection during peak hours will be acceptable upon completion of the project.

10.0 Conclusion

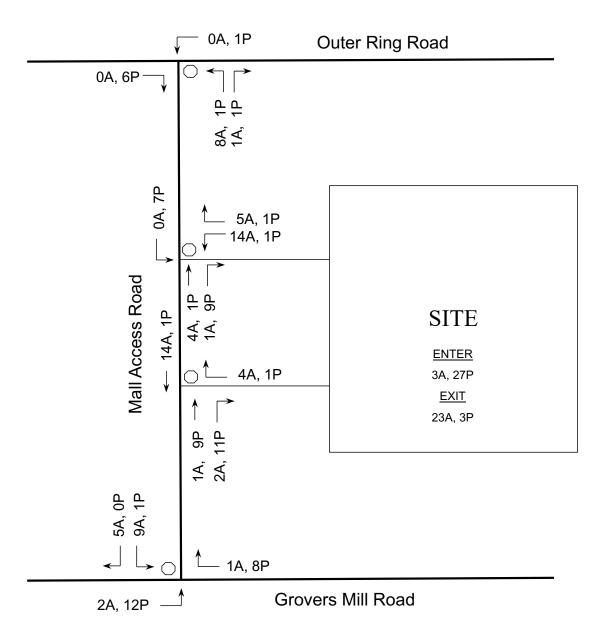
The proposed development will not have a substantial negative impact on area traffic for the reasons discussed in this report and summarized below:

- (a) The proposed residential development is compatible from a traffic generation standpoint with the surrounding properties in the area;
- (b) The proposed access driveways for the site are properly located to provide sufficient sight visibility of the street traffic;
- (c) The on-site vehicular traffic circulation is safe and efficient;
- (d) The proposed sidewalks promote transit use and a reduction in vehicle trips.
- (e) The overall LOS of the studied intersections are adequate upon completion of the project, and
- (f) The LOS of both site driveways are adequate upon completion of the project.









LEGEND

12A = AM Peak-hour traffic

12P = PM Peak-hour traffic

= Traffic Signal

= Stop Sign

B	BERTIN ENGINEERING
	66 GLEN AVENUE GLEN ROCK, NJ 07452 (201) 670-6688

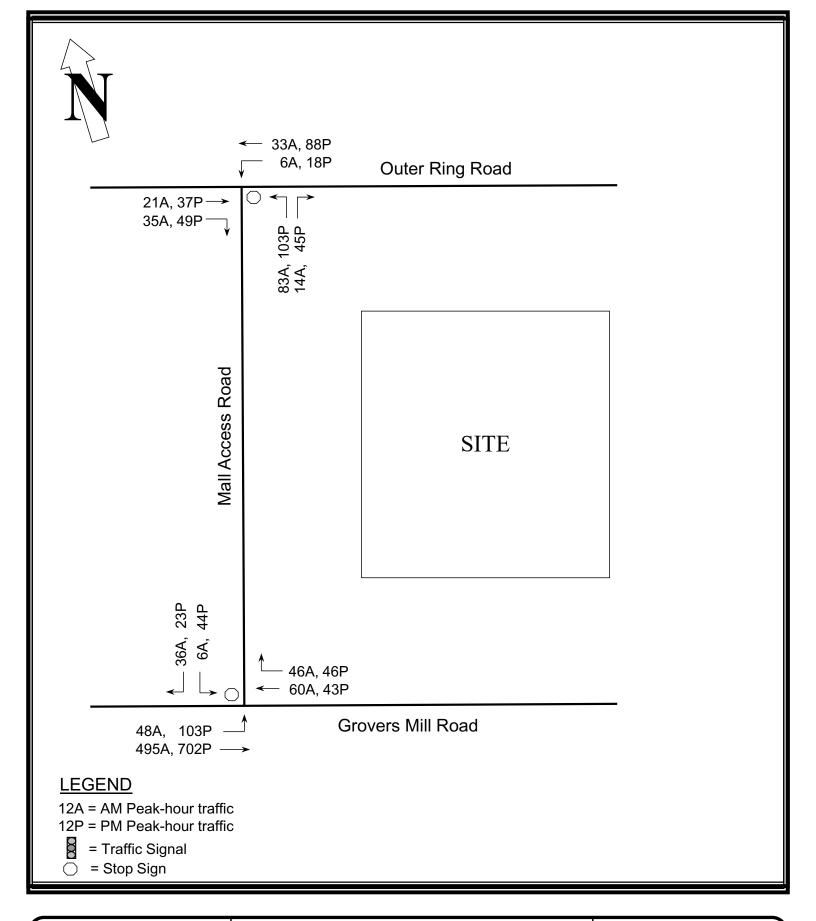
Site Generated Peak-Hour Traffic
(2028)

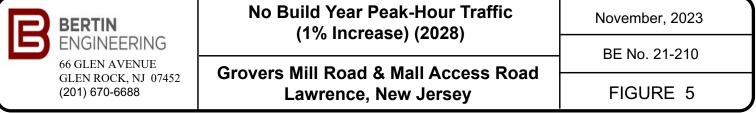
Grovers Mill Road & Mall Access Road Lawrence, New Jersey

November, 2	2023
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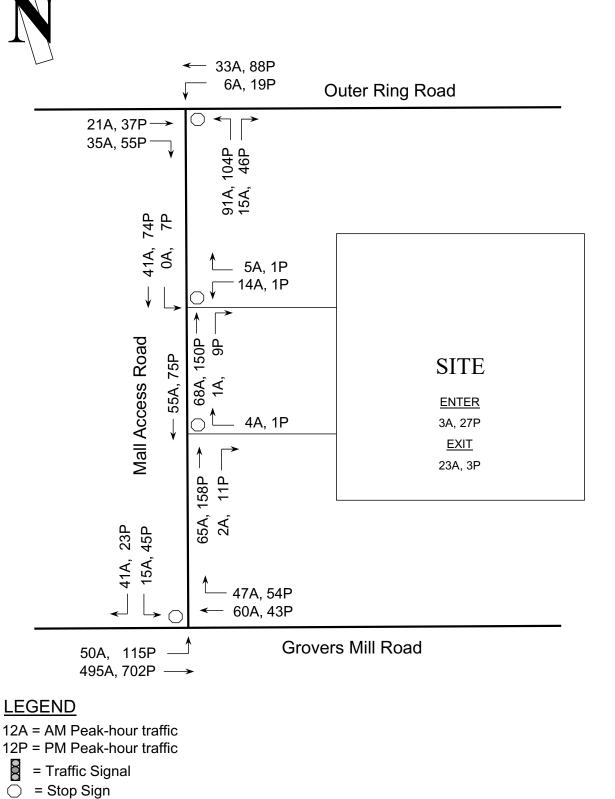
BE No. 21-210

FIGURE 4





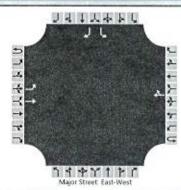






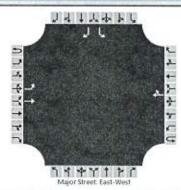
Build-Year Peak-Hour Traffic (2028)	November, 2023
Grovers Mill Road & Mall Access Road	BE No. 21-210
Lawrence, New Jersey	FIGURE 6

	HCS Two-W	/ay Stop-Control Report						
General Information		Site Information						
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road					
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence					
Date Performed	11/28/2023	East/West Street	Grovers Mill Road					
Analysis Year	2023	North/South Street	Mall Access Road					
Time Analyzed	AM Existing	Peak Hour Factor	0.92					
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00					
Project Description	Proposed Residential - 21-210	***************************************						



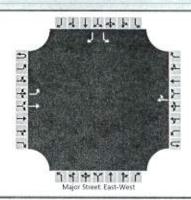
Approach		Eastl	bound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	T	R		
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1		
Configuration		L	Т					TR						L		R		
Volume (veh/h)		46	471				57	44						6		34		
Percent Heavy Vehicles (%)		3												3		3		
Proportion Time Blocked																		
Percent Grade (%)									0									
Right Turn Channelized								٨	lo									
Median Type Storage	Undivided																	
Critical and Follow-up H	eadwa	ys	-			e Ki		04198	wir.	hills:						Y AY		
Base Critical Headway (sec)		4.1												7.1		6.2		
Critical Headway (sec)		4.13												6.43		6.23		
Base Follow-Up Headway (sec)		2.2												3.5		3.3		
Follow-Up Headway (sec)		2.23												3.53		3.33		
Delay, Queue Length, an	d Leve	of S	ervice			Will	100					1000				100		
Flow Rate, v (veh/h)		50									Г	T		7		37		
Capacity, c (veh/h)		1474												391		970		
v/c Ratio		0.03												0.02		0.04		
95% Queue Length, Q ₉₅ (veh)		0.1												0.1		0.1		
Control Delay (s/veh)		7.5												14.4		8.9		
Level of Service (LOS)		A								В		A						
Approach Delay (s/veh)		0.7								9.7								
Approach LOS			A				A .								A			

HCS Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road							
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence							
Date Performed	11/28/2023	East/West Street	Grovers Mill Road							
Analysis Year	2028	North/South Street	Mall Access Road							
Time Analyzed	AM No-Build	Peak Hour Factor	0.92							
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00							
Project Description	Proposed Residential - 21-210		*							



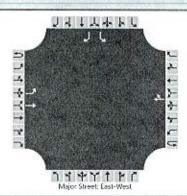
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	Ų	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	Т					TR						L		R
Valume (veh/h)		48	495				60	46						6		36
Percent Heavy Vehicles (%)		3				-								3		3
Proportion Time Blocked																
Percent Grade (%)												0.				
Right Turn Channelized											N	lo				
Median Type Storage	Undivided															
Critical and Follow-up He	eadway	/s	er d		A TOTAL					SCH		3 11 12		01800	OLEY E	
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2,2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33
Delay, Queue Length, and	d Level	of Se	ervice						D.C. S.	Warning.	1000	69155	SER IS	AL. V		Par
Flow Rate, v (veh/h)		52												7		39
Capacity, c (veh/h)		1467												373		965
v/c Ratio		0.04												0.02		0.04
95% Queue Length, Q ₉₅ (veh)		0.1												0.1		0.1
Control Delay (s/veh)		7.5											14.8		8.9	
Level of Service (LOS)		A												В		А
Approach Delay (s/veh)		0.7												9	.7	
Approach LOS		A								-		A				

HCS Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road						
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence						
Date Performed	11/28/2023	East/West Street	Grovers Mill Road						
Analysis Year	2028	North/South Street	Mall Access Road						
Time Analyzed	AM Build-Year	Peak Hour Factor	0.92						
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00						
Project Description	Proposed Residential - 21-210								



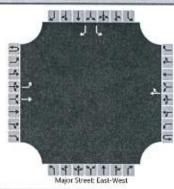
Vehicle Volumes and Ad	justme	nts														
Approach	T	Easti	bound			West	bound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0	-	0	0	0		1	0	1
Configuration		L	Т					TR						L		R
Volume (veh/h)		50	495				60	47						15		41
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized										N	lo.					
Median Type Storage		Undivided									-					
Critical and Follow-up H	eadwa	eadways						1				100				
Base Critical Headway (sec)		4.1									T			7.1		6.2
Critical Headway (sec)		4.13										212-2012-2		6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33
Delay, Queue Length, an	d Leve	l of S	ervice			9	S WAR	RES		POLE	200					
Flow Rate, v (veh/h)		54									T			16		45
Capacity, c (veh/h)		1466												370		964
v/c Ratio	0.04									0.04		0.05				
95% Queue Length, Q ₉₅ (veh)		0.1												0.1		0.1
Control Delay (s/veh)		7,6												15.2		8.9
Level of Service (LOS)		A											С		Α	
Approach Delay (s/veh)		0.7								-			10	0.6	•	
Approach LOS		65	A						В							

	HCS Two-W	ay Stop-Control Report						
General Information		Site Information						
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road					
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence					
Date Performed	11/28/2023	East/West Street	Grovers Mill Road					
Analysis Year	2023	North/South Street	Mall Access Road					
Time Analyzed	PM Existing	Peak Hour Factor	0.88					
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00					
Project Description	Proposed Residential - 21-210							



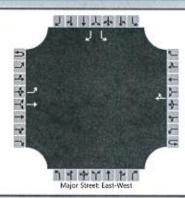
Approach		East	aund			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	Т					TR						L		R
Volume (veh/h)		98	668				41	44						42		22
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)									25			0				
Right Turn Channelized											N	lo				
Median Type Storage		Undivided														
Critical and Follow-up H	eadwa	ys		939						I AR			l let			
Base Critical Headway (sec)		4.1										Γ		7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2										i –		3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32
Delay, Queue Length, an	d Leve	l of S	ervice	The second	181				VOHA!		1					
Flow Rate, v (veh/h)	T	111					T	Г			Г	Г		48		25
Capacity, c (veh/h)		1497												232		991
v/c Ratio		0.07												0.21		0.03
95% Queue Length, Q ₉₅ (veh)		0.2		1000										0.8		0.1
Control Delay (s/veh)		7.6												24.5		8.7
Level of Service (LOS)		Α										С		А		
Approach Delay (s/veh)		1	.0											19	9.1	
Approach LOS		18	A												c	

	HCS Two-W	ay Stop-Control Report	
General Information		Site Information	
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence
Date Performed	11/28/2023	East/West Street	Grovers Mill Road
Analysis Year	2028	North/South Street	Mall Access Road
Time Analyzed	PM No-Build	Peak Hour Factor	0.88
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Proposed Residential - 21-210		



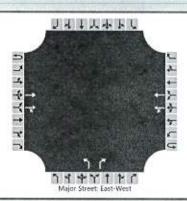
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	U	L	T	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0	EX.51	0	0	0	TINA.	1	0	1
Configuration		L	Т					TR						L		R
Volume (veh/h)	100	103	702	4000	35.8	500	43	46	B-1/2	5.8	9266	Birth		44	Hard.	23
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked					Barris	7,536	37/8	AVE ST	AND S	1376		9.596	Hall	Thursday.	958	
Percent Grade (%)											(0				
Right Turn Channelized								YALL Y	B P.	11-8/	N	lo	1020			
Median Type Storage		Undivided														
Critical and Follow-up H	eadwa	ys		7024					PASS							9/6/8
Base Critical Headway (sec)	T	4.1												7.1		6.2
Critical Headway (sec)		4.12		L. Pal	1111	SAU	150 100	Joseph Company	Seine	15.81	1.9	1245	1.50	6.42	WIT	6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)	327.5	2.22	0.11		4495	Name of	Pilot.	100		NSU.	(28)	Part I	100	3.52	1	3.32
Delay, Queue Length, an	d Leve	l of Se	ervice	NI S	S NEVA	No.			100				NEW	And page	NA ST	
Flow Rate, v (veh/h)	T	117												50		26
Capacity, c (veh/h)	1	1491	3275	Pites.	3.83	(lips)	10.004	20182	100	20	1034	5 107	308	214	Visit	986
v/c Ratio	0.08													0.23		0.03
95% Queue Length, Q ₉₅ (veh)	- 301	0.3		L service	Elle	ME	Jane 1	CAN'T	No.	70.5		V2.039	g(5)	0.9	5 82	0.1
Control Delay (s/veh)		7.6												26.9		8.7
Level of Service (LOS)	191	A Company							26	Mesk	180	100	100	D	100	A
Approach Delay (s/veh)		1.0							-			20).7	-		
Approach LOS	1 1 1 1		Α	A A Section 1								4	С			

HCS Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Eric M. Hough	Intersection	Grovers Mill Road - Mall Access Road							
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence							
Date Performed	11/28/2023	East/West Street	Grovers Mill Road							
Analysis Year	2028	North/South Street	Mall Access Road							
Time Analyzed	PM Build-Year	Peak Hour Factor	0.88							
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00							
Project Description	Proposed Residential - 21-210	·								



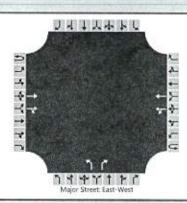
Vehicle Volumes and Ad	justme	nts															
Approach		Eastb	ound			West	bound			North	bound		Southbound				
Movement	U	L	T	R	U	L	Т	R	U	L	T	R	U	L	Т	R	
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	0	1	0	THE R	0	0	0	2010	1	0	1	
Configuration		L	Т					TR						L		R	
Volume (veh/h)	1 100	115	702	W. A.	起想	100	43	54	4	-	395.96	10-198	199	45	112.5	23	
Percent Heavy Vehicles (%)		2												2		2	
Proportion Time Blocked	yat.					3/6	1000	150.53	313	888	F788	1	100	18vb	72.88	811	
Percent Grade (%)											-				0		
Right Turn Channelized	1000	Marin I		10.00	TO SEE	STIG			SE SE		auga.		-	- 1	10	30	
Median Type Storage				Undi	vided												
Critical and Follow-up H	eadwa	ys				Pay	IF ST	100		I PL	Part I				BILL		
Base Critical Headway (sec)	T	4.1									T	T		7.1	П	6.2	
Critical Headway (sec)		4.12	Med)	200	1832	200	W.	N. S.	100	143	1236	1200	1800	6.42	360	6.2	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)	1957	2.22		JIS.		die s		100	Per il	1150	1230	13350	Bau sw	3.52	1200	3.3	
Delay, Queue Length, an	d Leve	of Se	ervice	A SUPL			PE IV		1000		B/F				1000	W	
Flow Rate, v (veh/h)	T	131												51		26	
Capacity, c (veh/h)	CARR	1480	SHAMI	10.0		sett.	141	Wen.		108	360	N/E	AAW	203	(40)	98	
v/c Ratio		0.09												0.25		0.0	
95% Queue Length, Q ₉₅ (veh)		0.3				10.000	N. W.	91840	SUME.	Service.	1000	War.	Us IS	1.0	3218	0.1	
Control Delay (s/veh)		7.7												28.7		8.8	
Level of Service (LOS)	160	Α				TAXA B	E L	1	1	L.	TOKE!	77/20	3/2	D	1800	A	
Approach Delay (s/veh)		1.1										2	1.9	_			
Approach LOS	100	Α					77.77		1000	H WAY		W = 15	С				

HCS Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Eric M. Hough	Intersection	Outer Ring Road - Mall Access Road						
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence						
Date Performed	11/28/2023	East/West Street	Outer Ring Road						
Analysis Year	2023	North/South Street	Mall Access Road						
Time Analyzed	AM Existing	Peak Hour Factor	0.80						
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00						
Project Description	Proposed Residential - 21-210	•							



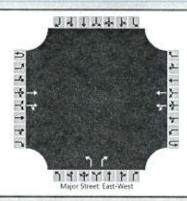
Vehicle Volumes and Ad	justme	nts														
Approach	T	Eastl	oound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	T	R	U	L	T	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0 0 2 0 0 0 2 0						1	0	1		0	0	0		
Configuration			Т	TR		LT	T			L		R				
Volume (veh/h)			20	33		6	31			79		13				
Percent Heavy Vehicles (%)						33				3		3				
Proportion Time Blocked																
Percent Grade (%)										- (0					
Right Turn Channelized										N	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	/s					LIVE)		King			15.46		W YEAR		
Base Critical Headway (sec)	T					4.1			Т	7.5		6.9				
Critical Headway (sec)						4.76				6.86		6.96				$\overline{}$
Base Follow-Up Headway (sec)						2.2				3.5		3.3				\vdash
Follow-Up Headway (sec)						2.53				3.53		3.33				
Delay, Queue Length, an	d Level	of S	ervice		MEG.	28/55		N. Dire								RECT
Flow Rate, v (veh/h)	T					8			Г	99		16				
Capacity, c (veh/h)						1334				905		1030				
v/c Ratio						0.01				0.11		0.02				\vdash
95% Queue Length, Q ₉₅ (veh)						0.0				0.4		0.0				
Control Delay (s/veh)						7.7	0.0			9.5		8.6				
Level of Service (LOS)						А	Α			А		A				
Approach Delay (s/veh)		1.3							9,3					-		-
Approach LOS		A						A								

HCS Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Eric M. Haugh	Intersection	Outer Ring Road - Mall Access Road						
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence						
Date Performed	11/28/2023	East/West Street	Outer Ring Road						
Analysis Year	2028	North/South Street	Mall Access Road						
Time Analyzed	AM No-Build	Peak Hour Factor	0.80						
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00						
Project Description	Proposed Residential - 21-210								



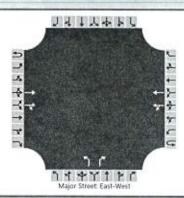
Vehicle Volumes and Ad	justme	nts														
Approach	T	Easti	ound			West	bound		T	North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		1	0	1		0	0	0
Configuration			Т	TR		LT	Т			L		R				
Volume (veh/h)			21	35		6	33			83		14				
Percent Heavy Vehicles (%)						33				3		3				
Proportion Time Blocked																
Percent Grade (%)			-								0					
Right Turn Channelized							-			1	No.					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	ys				Tip:			PLAN		7			1		
Base Critical Headway (sec)	T					4.1		Г	T	7,5		6.9				Г
Critical Headway (sec)						4.76				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.53				3.53		3.33				
Delay, Queue Length, an	d Level	of S	ervice	ALL HE	1000	Para		mail					274112	NAME OF		HS.
Flow Rate, v (veh/h)	T					8		Г	T	104		18				Т
Capacity, c (veh/h)						1329				900		1027				1
v/c Ratio						0.01				0.12		0.02				
95% Queue Length, Q ₉₅ (veh)						0.0				0.4		0.1				
Control Delay (s/veh)						7.7	0.0			9.5		8.6				\vdash
Level of Service (LOS)						Α	Α			А		Α				
Approach Delay (s/veh)		1.2							9.4					-		
Approach LOS		A									A					

HCS Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Eric M. Hough	Intersection	Outer Ring Road - Mall Access Road							
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence							
Date Performed	11/28/2023	East/West Street	Outer Ring Road							
Analysis Year	2028	North/South Street	Mall Access Road							
Time Analyzed	AM Build-Year	Peak Hour Factor	0.80							
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00							
Project Description	Proposed Residential - 21-210									



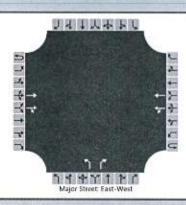
Approach		Eastb	ocund			West	oound			North	bound		Southbound			
Movement	U	L	T	R	U	L	Т	R	U	L	T	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		1	0	1		0	0	0
Configuration			Т	TR		LT	Т			L		R				
Volume (veh/h)			21	35		6	33			91		15				
Percent Heavy Vehicles (%)						33				3		3				
Proportion Time Blacked																
Percent Grade (%)										- ()					
Right Turn Channelized										N	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	/s		Mag			7 4				Can.				4	
Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4,76				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.53				3.53		3.33		1		
Delay, Queue Length, an	d Level	of S	ervice	New			15(5)			H.		M			N/III	
Flow Rate, v (veh/h)						8				114		19				
Capacity, c (veh/h)						1329				900		1027				
v/c Ratio						0.01				0.13		0.02				
95% Queue Length, Q ₉₅ (veh)						0.0				0.4		0.1				
Control Delay (s/veh)						7.7	0.0			9.6		8.6				
Level of Service (LOS)						А	А			Α		Α				
Approach Delay (s/veh)						1	.2	9,4								_
Approach LOS	T	A						A					-		_	

HCS Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Eric M. Hough	Intersection	Outer Ring Road - Mall Access Road						
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence						
Date Performed	11/28/2023	East/West Street	Outer Ring Road						
Analysis Year	2023	North/South Street	Mall Access Road						
Time Analyzed	PM Existing	Peak Hour Factor	0.82						
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00						
Project Description	Proposed Residential - 21-210								



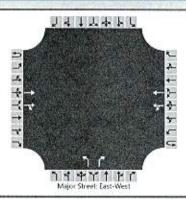
Vehicle Volumes and Ad	justine	10000	DOM:		11.00										100	
Approach		East	oound			Westl	oound			North	bound		Southbound			
Movement	U	Ł	T	R	U	L	Т	R	U	L	Т	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0 0 2 0 0 0 2 0					0		1	0	1		0	0	0	
Configuration			Т	TR		LT	Т			L,		R				
Volume (veh/h)			35	47	-	17	84			98		43				
Percent Heavy Vehicles (%)						1				2		2	ĵ			
Proportion Time Blocked																
Percent Grade (%)					0 1011					(0					-
Right Turn Channelized										N	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	ys	EVI's							PIVALE		N. CO.			in it	
Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.12				6.84		6.94				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.21				3.52		3.32				
Delay, Queue Length, an	d Level	of S	ervice		- 1034	Table 1		100	NIA.				1	(5)		
Flow Rate, v (veh/h)						21				120		52				
Capacity, c (veh/h)						1498				799		1008				
v/c Ratio						0.01				0.15		0.05				
95% Queue Length, Q ₉₅ (veh)						0.0				0.5		0.2				
Control Delay (s/veh)						7.4	0.1			10,3		8.8				
Level of Service (LOS)						А	Α			В		Α				
Approach Delay (s/veh)						1	.3	-		9	.8					
Approach LOS		A							A							

HCS Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Eric M. Hough	Intersection	Outer Ring Road - Mall Access Road							
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence							
Date Performed	11/28/2023	East/West Street	Outer Ring Road							
Analysis Year	2028	North/South Street	Mall Access Road							
Time Analyzed	PM No-Build	Peak Hour Factor	0.82							
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00							
Project Description	Proposed Residential - 21-210									



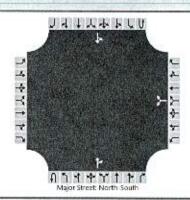
Vehicle Volumes and Adj	iustme	nts														
Approach	T	Easth	oound			Westl	bnuoc			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0	185	1	0	1	9,43	0	0	0
Configuration			T	TR		LT	Т			L		R				
Volume (veh/h)	- SYSTEM	STA	37	49	1	18	88	SERVICE SERVICE	180	103	1	45	30 m	1,53		1
Percent Heavy Vehicles (%)						1				2		2				
Proportion Time Blocked	- 5/25	To the	A STATE OF	-	91013		distrib	1000	- Care			No.	8211		1995	3.9
Percent Grade (%)			-							()					
Right Turn Channelized	420		MC USES					il Mil	1904	N	lo		Ale.			and i
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys								1	AT S			(1-17)		
Base Critical Headway (sec)	T					4.1				7.5		6.9				Г
Critical Headway (sec)	I SUPE	0.00	2000	1	23	4.12	7200	1000	100	6.84	77.38	6.94	1004	1500	1000	20
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)	1	- A.S.K	188	1	48	2.21	15.28	Unit	9921	3.52	V 103	3.32			1	
Delay, Queue Length, an	d Leve	of S	ervice								9 11	NAT.				1
Flow Rate, v (veh/h)	T					22				126		55				П
Capacity, c (veh/h)	0.004	SISS	1	100	100	1492	100		M.	789	Li de	1004	950	24	0.23	
v/c Ratio						0.01				0.16		0.05				
95% Queue Length, Q ₉₅ (veh)	J. C. S.	120	780			0.0	100	100	1.55	0.6	E ALL	0.2	404	Things	100	
Control Delay (s/veh)						7.4	0.1			10.4		8.8				
Level of Service (LOS)	No.		51116	506	3	Α	Α	B A					800	3.6	1	1
Approach Delay (s/veh)		1.3						9.9						1.	_	
Approach LOS	1	Α				155	A						565			

HCS Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Eric M. Hough	Intersection	Outer Ring Road - Mall Access Road							
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence							
Date Performed	11/28/2023	East/West Street	Outer Ring Road							
Analysis Year	2028	North/South Street	Mall Access Road							
Time Analyzed	PM Build-Year	Peak Hour Factor	0.82							
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00							
Project Description	Proposed Residential - 21-210									



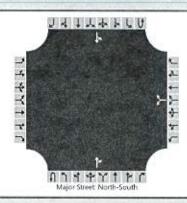
Approach	T	Eastl	oound		Ι	Westl	oound		T T	North	bound			South	bound	
Movement	U	L	т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	0	2	0		1	0	1		0	0	0
Configuration			Т	TR		LT	Т			L		R				
Volume (veh/h)			37	55		19	88			104		46				
Percent Heavy Vehicles (%)						1				2		2				
Proportion Time Blocked																
Percent Grade (%)						-					0					
Right Turn Channelized	200									N	lo					
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadway	adways														
Base Critical Headway (sec)						4,1				7.5		6.9		Г		Г
Critical Headway (sec)						4.12				6.84		6.94				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)		-				2.21				3.52		3.32				
Delay, Queue Length, an	d Level	of S	ervice			Tuy on					DE.	ig ligh				
Flow Rate, v (veh/h)	T				Γ	23	Γ			127		56				Г
Capacity, c (veh/h)						1483		- 1		781		999				\vdash
v/c Ratio						0.02				0.16		0.06				
95% Queue Length, Q ₉₅ (veh)						0.0				0.6		0.2				
Control Delay (s/veh)						7.5	0.1			10.5		8.8				
Level of Service (LOS)						А	Α			В		Α				
Approach Delay (s/veh)						1	.4			10	0.0	•				
Approach LOS							Α				A					

	HCS Two-W	ay Stop-Control Report	
General Information		Site Information	
Analyst	Eric M. Hough	Intersection	Mall Access Road - Northern Site Driveway
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence
Date Performed	11/28/2023	East/West Street	Northern Site Driveway
Analysis Year	2028	North/South Street	Mall Access Road
Time Analyzed	AM Build-Year	Peak Hour Factor	0.80
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Proposed Residential - 21-210		-



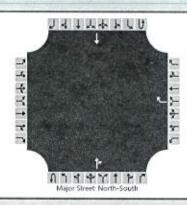
Vehicle Volumes and Adj	ustme	nts														
Approach	T	Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						14		5			68	1		0	41	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)							0									_
Right Turn Channelized							-									
Median Type Storage				Undi	ivided											
Critical and Follow-up H	eadwa	ys				WANT, K		PANCE.	ante				Jeny			
Base Critical Headway (sec)	T			Γ	7.1 6.2						T			4.1		Г
Critical Headway (sec)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3					2.2			
Follow-Up Headway (sec)						3.50		3.30						2.20		
Delay, Queue Length, an	d Leve	of Se	ervice	400	61/3				3616	14.15	ALM.		er taki		TOP	
Flow Rate, v (veh/h)	Т			Г	Г	1	24				T	Г		0		
Capacity, c (veh/h)					3.000		889							1523		
v/c Ratio							0.03							0.00		
95% Queue Length, Q _{is} (veh)							0.1							0.0		
Control Delay (s/veh)							9.2							7.4	0.0	
Level of Service (LOS)							Α							Α	Α	
Approach Delay (s/veh)		71				9	.2			Still Liver				0	.0	
Approach LOS	T						A								A	

	HCS Two-W	ay Stop-Control Report	
General Information		Site Information	
Analyst	Eric M. Hough	Intersection	Mall Access Road - Northern Site Driveway
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence
Date Performed	11/28/2023	East/West Street	Northern Site Driveway
Analysis Year	2028	North/South Street	Mall Access Road
Time Analyzed	PM Build-Year	Peak Hour Factor	0.82
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Proposed Residential - 21-210		



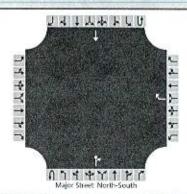
Approach		Eastb	ound			Westl	bound			North	bound			South	pound	
Movement	U	L	T	R	U	L	T	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						1		1			150	9		7	74	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)						31	0									
Right Turn Channelized																
Median Type Storage	1			Undi	vided											
Critical and Follow-up H	eadway	ys		U DEL										YOU	CAR	
Base Critical Headway (sec)		7						6,2						4.1		
Critical Headway (sec)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		
Delay, Queue Length, an	d Level	of Se	rvice	i in	Veril.	e (e)							Visite (48	25
Flow Rate, v (veh/h)							2							9		
Capacity, c (veh/h)							768							1391		
v/c Ratio							0.00							0.01		
95% Queue Length, Q ₉₅ (veh)							0.0							0.0		
Control Delay (s/veh)							9.7							7.6	0.0	
Level of Service (LOS)							Α							Α	Α	
Approach Delay (s/veh)						9	.7							0	.7	
Approach LOS							A								۸	

	HCS Two-W	ay Stop-Control Report	
General Information		Site Information	
Analyst	Eric M. Hough	Intersection	Mall Access Road - Southern Site Driveway
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence
Date Performed	11/28/2023	East/West Street	Southern Site Driveway
Analysis Year	2028	North/South Street	Mall Access Road
Time Analyzed	AM Build-Year	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Proposed Residential - 21-210		



Approach		Eastb	ound			West	bnuoc			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	1	0	0	1	0	0	0	1	0
Configuration								R				TR			Т	
Volume (veh/h)								4			65	2			55	
Percent Heavy Vehicles (%)								0								
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized						N	lo									
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys			WY.	A Da	3394	(All	EHO!	43						
Base Critical Headway (sec)	T				6.2						T	Г				
Critical Headway (sec)								6.20								
Base Follow-Up Headway (sec)								3,3								
Follow-Up Headway (sec)								3.30								\vdash
Delay, Queue Length, an	d Leve	of Se	ervice	151									Mar.		TARA	Y IB
Flow Rate, v (veh/h)								4			Т					
Capacity, c (veh/h)								996								
v/c Ratio								0.00								
95% Queue Length, Q ₉₅ (veh)								0.0								
Control Delay (s/veh)								8.6								
Level of Service (LOS)								А			<u> </u>					
Approach Delay (s/veh)						8	.6	-								_
Approach LOS		-					A			_	-					

	HCS Two-W	ay Stop-Control Report	
General Information		Site Information	
Analyst	Eric M. Hough	Intersection	Mall Access Road - Southern Site Driveway
Agency/Co.	Bertin Engineering	Jurisdiction	Lawrence
Date Performed	11/28/2023	East/West Street	Southern Site Driveway
Analysis Year	2028	North/South Street	Mall Access Road
Time Analyzed	PM Build-Year	Peak Hour Factor	0.88
Intersection Orientation	North-South	Analysis Time Period (hrs)	1.00
Project Description	Proposed Residential - 21-210		



Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U.	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		.0	0	1	0	0	1	0	0	0	1	0
Configuration								R				TR			Т	
Volume (veh/h)								1			158	11			75	
Percent Heavy Vehicles (%)								0								
Proportion Time Blocked																
Percent Grade (%)							0						1			
Right Tum Channelized						N	lo									
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys							SHAPE .						15	SULV VANS
Base Critical Headway (sec)				7				6.2							I	Г
Critical Headway (sec)								6.20								
Base Follow-Up Headway (sec)								3.3								
Follow-Up Headway (sec)								3.30			THE STATE OF					
Delay, Queue Length, an	d Leve	of Se	ervice	No.	292	t Hotel	Carrie				(SELEV		(delign)	30		
Flow Rate, v (veh/h)								1			T					Г
Capacity, c (veh/h)								862								
v/c Ratio								0.00								
95% Queue Length, Q ₉₅ (veh)								0.0								
Control Delay (s/veh)								9.2								
Level of Service (LOS)								A								
Approach Delay (s/veh)						9	.2									_
Approach LOS						- 8	A									

Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

AM Peak Hour of Generator

Setting/Location: Dense Multi-Use Urban

Number of Studies: 3

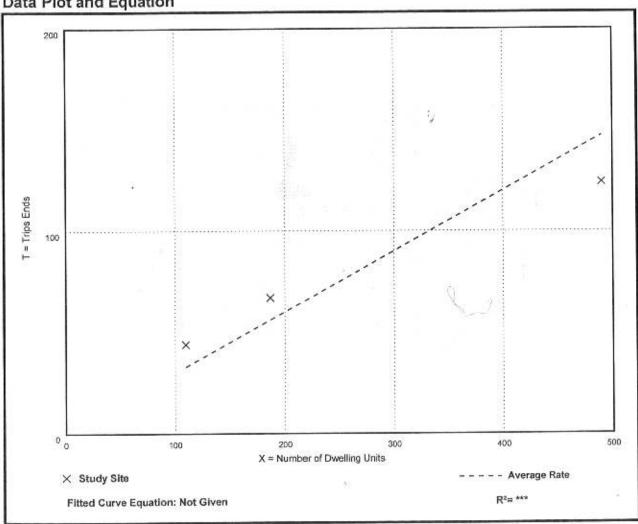
Avg. Num. of Dwelling Units: 262

Directional Distribution: Not Available

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.25 - 0.40	0.07

Data Plot and Equation



Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

PM Peak Hour of Generator

Setting/Location: Dense Multi-Use Urban

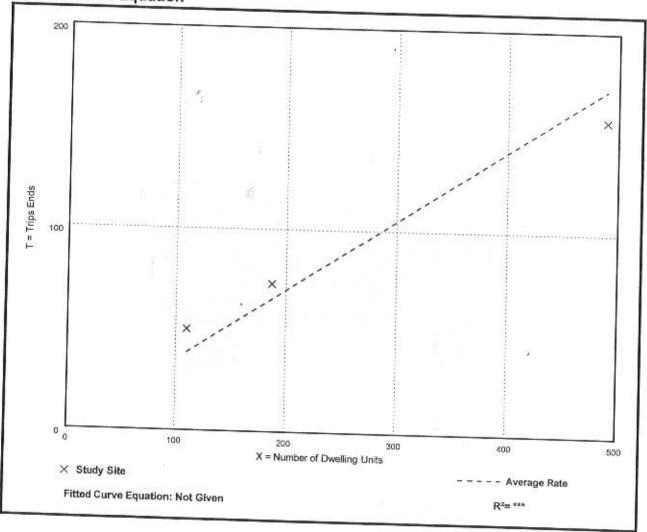
Number of Studies: 3 Avg. Num. of Dwelling Units: 262

Directional Distribution: Not Available

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.35	0.00 0.44	Otalidal d Deviation
	0.32 - 0.45	0.06

Data Plot and Equation



National Data & Surveying Services Intersection Turning Movement Count

Location: Mall Access Rd & Rte 638 City: Lawrence Township Control: 1-Way Stop(SB)

Project ID: 23-340113-002 Date: 9/19/2023

								Data - Inca	i ocai			33					
NS/EW Streets:		Mall Act	Mall Access Rd			Mall Access Rd	ess Rd			Rte 638	38			Rte 638	38		
		NORTH	NORTHBOUND			SOUTHBOUND	GNINDS			EASTBOUND	CUND			WESTE	BOUND		
AM	0	0	0	0	1	0	1	0	H	-	0	0	0	+1	-1	0	
	Z	Ā	M	ON.	JS.	St	SR	SU	EL	Ш	Æ	B	WL	W	WR	WU	TOTAL
7:00 AM	0	0	0	0	2	0	ď	0	4	98	0	0	0	4	uŋ	0	102
7:15 AM	0	0	0	0	7	0	4	0	4	103	0	0	0	7	œ	0	128
7:30 AM	0	0	0	0	m	0	8	0	4	94	0	0	0	17	Ÿ.	0	140
7:45 AM	0	o	0	0	0	0	m	0	œ	118	0	0	0	14	16	0	159
8:00 AM	0	0	0	0	2	0	ō	0	o.	113	0	0	0	20	10	0	163
8:15 AM	0	0	0	0	0	0	9	0	o,	119	0	0	0	18	12	D	164
8:30 AM	o	o	0	0	2	0	'n	0	10	114	0	0	0	ø	13	0	152
8:45 AM	0	0	0	0	2	0	14	0	18	125	0	0	0	11	6	0	179
	ž	IN	NR	NO	ਲ	15	SR	SU	급	ш	æ	E	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES:	0	0	0	0	13	0	22	0	99	872	0	0	0	8	28	0	1187
APPROACH % S :					20.03%	0.00%	13.37%	0.00%	7.04%	97.30%	0.00%	0,00%	0.00%	53.23%	46.77%	0.00%	
PEAK HR:		08:00 AM - 09:00 AM	- 09:00 AM		61.6/2			AL TON							1000	1	TOTAL
PEAK HR VOL:	0	0	0	0	9	0	34	0	46	471	0	0	0	57	4	0	658
PEAK HR FACTOR:	0.000	0.000	0.000	0.000	0.750	00000	209'0	0.000	0.639	0.942	0.000	0.000	0.000	0.713	0.846	00000	0.010
						0.625	5			0 000	T T	THE COLUMN		0.84	13		0.313

## PM# 0 0 0 0 0 1 0 1 0 1 1			NORT	NORTHBOUND			SOUTH	GNINOS			EASTBOUND	OUND			WESTBO	SOUND		
NL	PN	0	0	0	0	1	0	1	0	1	н	0	0	0	-	-	0	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Z	F	NR	NO.	ĸ	TS	Œ	75	Щ	ы	ER	EU	WL	WT	WR	WU	TOTAL
0 0 0 0 0 8 0 0 2 154 0 0 0 9 9 111 0 0 1 0 1 0 1 0 1 0 1 0 1	4:00 PM	0	0	0	0	7	0	6	0	23	159	0	0	0	10	01	0	217
0	4:15 PM	0	0	0	0	80	0	7	0	22	154	0	0	0	0	11	0	206
0 0 0 0 10 10 0 2 0 32 185 0 0 0 10 7 0 0 10 7 0 0 10 10 0 0 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 1	4:30 PM	0	0	0	0	00	0	9	0	19	145	0	0	0	10	11	o	199
0 0 0 0 16 0 16 0 7 0 25 184 0 0 0 12 15 0 0 0 0 10 10 10 10 10 10 10 10 10 10 1	4:45 PM	0	0	0	0	10	0	~	0	32	185	0	0	0	10	7	0	251
0 0 0 0 0 0 0 12 0 6 0 9 14 151 0 0 0 6 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5:00 PM	0	0	0	0	16	0	7	0	25	184	0	0	0	12	15	0	259
0 0 0 0 0 0 0 12 0 6 0 9 139 0 0 0 0 4 10 0 0 0 0 0 0 0 0 0 0 0 0 0	5:15 PM	0	0	0	0	7	0	00	0	14	151	0	0	0	ø	13	0	199
NL NT NR NU SL ST SR SU EL ET ER EU WL WT WR WU	5:30 PM	0	0	0	0	12	0	9	0	Ø,	139	0	0	0	v	10	0	180
NL NT NR NU SL ST SR SU EL ET ER EU WL WT WR WU O 74 0 51 0 153 1234 0 0 0 70 83 0.00%	5;45 PM	0	0	0	0	9	0	9	0	o.	117	0	0	0	6	7	0	154
0 0 0 0 0 70 83 0 0 0 0 0 0 0 0 211 0 153 1234 0 0 0 0 0 0 70 83 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		N	IN	NR	N	더	15	SR	SI	급	日	ER	EI	WL	TW	WR	WU	TOTAL
04:15 PM - 05:15 PM 39:20% 0.00% 42.00% 0.00% 42.00% 0.00% 42.75% 0.00% 42.75% 0.00% 42.75% 0.00% 42.75% 0.00% 44.00% 0.00%	TOTAL VOLUMES:		0	0	0	74	0	51	0	153	1234	0	0	0	22.5	83	0	1665
0 0 0 0 0 0 42 0 22 0 98 668 0 0 0 0 41 44 0 0 0.000 0.000 0.000 0.000 0.786 0.000 0.766 0.903 0.000 0.000 0.854 0.733 0.000 0.000 0.000 0.000 0.000 0.000 0.000	APPROACH 30 S :		04:15 PM	- 05:15 PM		39.20%	0.000	40.0070	0.0070	11.0378	86.97%	0.00.0	0.00%	0.00%	45,75%	24-C2.76	0.00%	TOTAL
0.000 0.000 0.000 0.000 0.056 0.000 0.786 0.000 0.766 0.903 0.000 0.000 0.000 0.854 0.733 0.000 0.000 0.882 0.787	PEAK HR VOL:	0	0	0	0	42	0	22	0	86	899	0	0	0	41	4	0	915
	PEAK HR FACTOR:		0.000	0000	0.000	0.656	0.000	0.786 6	0.000	992'0	0.903	0.000	0.000	0.000	0.854	0,733	0.000	0.883

National Data & Surveying Services Intersection Turning Movement Count

Location: Mall Access Rd & Outer Ring Rd City: Lawrence Township Control: 1-Way Stop(NB)

Project ID: 23-340113-001 Date: 9/19/2023

NS/EW Streets:		Mall Access Rd	ess Rd			Mall Act	Mall Access Rd			Outer Ring Rd	ing Rd			Outer Ring Rd	ng Rd	S. Carlotte	
		NORTHBOUND	BOUND			SOUTH	SOUTHBOUND			EASTBOUND	OUND			WESTBOUNG	ONIO		
AM	1	0	-1	0	0	0	0	0	0	2	-	0	0	2	0	0	
	NL	TN	NR	NO	성	ST	SR	S	EF	Ш	ER	EU	W	TW	WR	W	TOTAL
7:00 AM	N)	0	4	0	0	0	0	0	0	4	н	0	2	ıs	0	0	21
7:15 AM	5	0	2	0	0	0	0	0	0	9	ব	0	m	7	0	0	31
7:30 AM	17	0	7	0	0	0	0	0	0	S	0	0	-	4	0	0	38
7:45 AM	17	0	uo	0	0	0	0	0	0	1	2	0	7	m	0	0	33
8:00 AM	13	0	9	0	0	0	0	0	0	Ŋ	œ	o	7	0	0	0	43
8:15 AM		0	-	0	0	0	0	0	0	4	ф	0	0	^	0	0	39
8:30 AM	20	0	4	0	0	0	0	0	0	m	9	0	2	00	0	0	43
8:45 AM		0	2	0	0	0	0	0	0	00	Ð	0	7	7	0	0	22
	N	IN	NR	NU	ᅜ	R	85	SU	E	П	æ	EU	WL	100	WR	MU	TOTAL
TOTAL VOLUMES:	127	0	56	0	0	0	0	0	0	36	49	0	14	20	0	0	302
APPROACH %'s:	83.01%	%00.0	16.99%	0.00%					%00'0	42,35%	57.65%	0.00%	21.88%	78,13%	0.00%	0.00%	
PEAK HR:	200	08:00 AM - 09:00 AM	09:00 AM	7	163	7000		0.00	Carlo Sun		THE SAME	A	1 1 1 1 1	STATE Y		1	TOTAL
PEAK HR VOL:	62	0	13	0	0	0	0	0	0	20	33	0	9	31	0	0	182
PEAK HR FACTOR:	0.790	0.000	0,542	0.000	0.000	0.000	0.000	0.000	0.000	0.625	-	0.000	0.750	0.861	0,000	0.000	0.798

The second		NORTHBOUN	BOUND			SOUTH	HBOUND			EASTE	GNNO			WESTB	SOUND		
PN N	1	0	м	0	o	0	0	0	0	2		0	0	2	0	0	
	N	TN.	NR	NO	ız	S	SS	SU	Ц	ш	ER	B	W	TW	WR	WU	TOTAL
4:00 PM	22	0	11	0	0	0	0	0	0	7	Φ	0	7	29	0	0	85
4:15 PM	17	0	15	0	0	0	0	0	0	ch ch	Ð	0	2	22	0	0	74
4:30 PM	26	o	12	0	0	0	0	0	0	10	12	0	,,	16	0	0	20
4:45 PM	24	0	15	0	0	0	0	0	0	9	10	0	7	20	0	0	85
5:00 PM	31	0	00	0	0	0	0	0	0	10	16	0	7	56	0	1	8
5:15 PM	16	0	12	0	0	0	0	0	0	9	10	0	ın	18	0	0	29
5:30 PM	11	0	φ	0	0	0	0	0	0	13	115	0	4	20	0	0	69
5:45 PM	10	0	80	0	0	0	0	0	0	D.	90	0	en:	25	0	0	63
	N	TN	NR	ON	S,	ST	SS	SIL	П	ы	ER	EI	WL	WT	WR	WD	TOTAL
TOTAL VOLUMES:	157	0	80	0	0	0	0	0	0	70	88	0	8	176	0	H	609
APPROACH %'s :	66.24%	0.00%	33.76%	9,000					0.00%	44.03%	55.97%	%00.0	16.90%	82.63%	0.00%	0.47%	- medicas
PEAK HR:		04:15 PM - 05:15 PM	05:15 PM		HASA BELL	SERVICE STATE	STATE OF THE PERSON NAMED IN	School Section									TOTAL
PEAK HR VOL:	86	0	43	0	0	0	0	0	0	35	47	0	17	84	0	1	325
PEAK HR FACTOR:	0.790	0.000	0.717	00000	0000	0.000	00000	00000	0.000	0.875	0.734	0.000	0.607	0.808	0.000	0.250	0.821
		0.304	45							V.V.	00			0.75	200		