

Traffic Impact Study

JM Turk Road Residential Subdivision
Hall County, Georgia

May 23, 2023
revised January 24, 2024



in collaboration with

ACAMPORA TRAFFIC



Traffic Impact Study

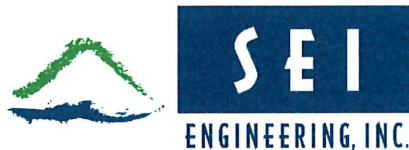
JM Turk Road Residential Subdivision
Hall County, Georgia

study prepared for:

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May 23, 2023

revised January 24, 2024



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Introduction

This study assesses the traffic impact of a proposed residential subdivision in Hall County, Georgia. The site is located along the east side of JM Turk Road at Stanley Road, as shown in Figure 1. The development will consist of 196 detached single family homes and 128 attached townhomes for a total of 324 homes. The project will be served by one vehicular access on JM Turk Road at the current location of its intersection with Stanley Road. A second access will be provided which will be gated for emergency use only.

The purpose of this traffic impact study is to determine existing traffic operating conditions in the vicinity of the proposed subdivision, project future traffic volumes, assess the impact of the subject development, then develop conclusions and recommendations to mitigate the project traffic impact and ensure safe and efficient existing and future traffic conditions in the vicinity of the project.

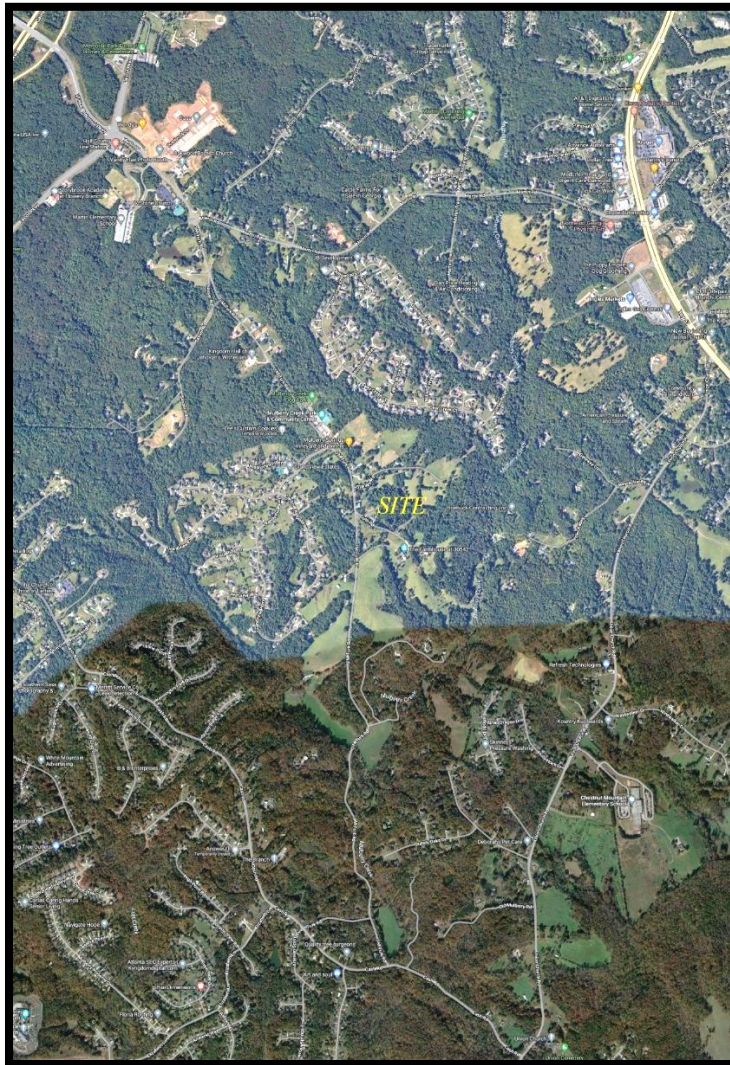


Figure 1 – Site Location Map

Existing Traffic Conditions

Existing traffic operating conditions in the vicinity of the proposed subdivision were assessed. The following is a description of existing transportation facilities, traffic volumes, and intersection operations.

Description of Existing Roadways

JM Turk Road is a two lane north-south road classified by the Georgia DOT as an urban major collector. The road begins at a roundabout at Martin Road, passes the subject site, and terminates at a side street stop sign controlled T-intersection at Cash Road. The road is winding, the terrain is gently rolling, and the posted speed limit is 45 mph. The cross section is rural with no shoulders, curb-and-gutter, or sidewalks. The road primarily serves accesses to homes and undeveloped land, with a community center and a winery a short distance north of the subject development site. A 24-hour bi-directional traffic volume count collected for this study in May 2023 on JM Turk Road at the project frontage revealed a northbound volume of 692 vehicles, a southbound volume of 724 vehicles, for a two-way volume of 1,416 vehicles. This study was subsequently updated in January 2024. As part of the update, a new 24-hour count was collected on JM Turk Road at the same location as the May 2023 count. The new count revealed a northbound volume of 685 vehicles, a southbound volume of 700 vehicles, for a two-way volume of 1,385 vehicles. The new count reveals a 2.2% decrease in volumes on JM Turk Road.

Pedestrian, Bicycle, and Transit Accessibility

There are no sidewalks or dedicated bicycle lanes along the adjacent roadway and there is no regularly scheduled mass transit in the area.

Existing Traffic Volumes

Existing full turning movement peak hour traffic volume counts were collected at the following intersections in the vicinity of the site:

1. Martin Road at JM Turk Road
2. JM Turk Road at Grandview Parkway
3. Cash Road at JM Turk Road

In addition to the intersection counts, 24-hour bi-directional counts were collected on JM Turk Road adjacent to the site, as described above.

The counts were collected on Tuesday, May 16, 2023, from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. Area schools were in session on the day on which the counts were recorded. The locations of the traffic counts are presented in Figure 2. It was noted above that the volume on JM Turk Road decreased from the May 2023 count collected for this study and an updated count collected on Thursday, January 18, 2024. Because the decrease in volume was small (-2.2%), it was decided to not adjust the May 2023 intersection volumes downward. This produces existing volumes, used in this analysis, which are slightly conservatively high.



Figure 2 – Traffic Volume Count Locations

From the intersection turning movement count data, the highest four consecutive 15-minute interval volumes at each intersection, during each time period, were determined. These volumes make up the existing weekday a.m. and p.m. peak hour traffic volumes at each intersection and are shown in Figure 3. The raw count data is found in Appendix A.

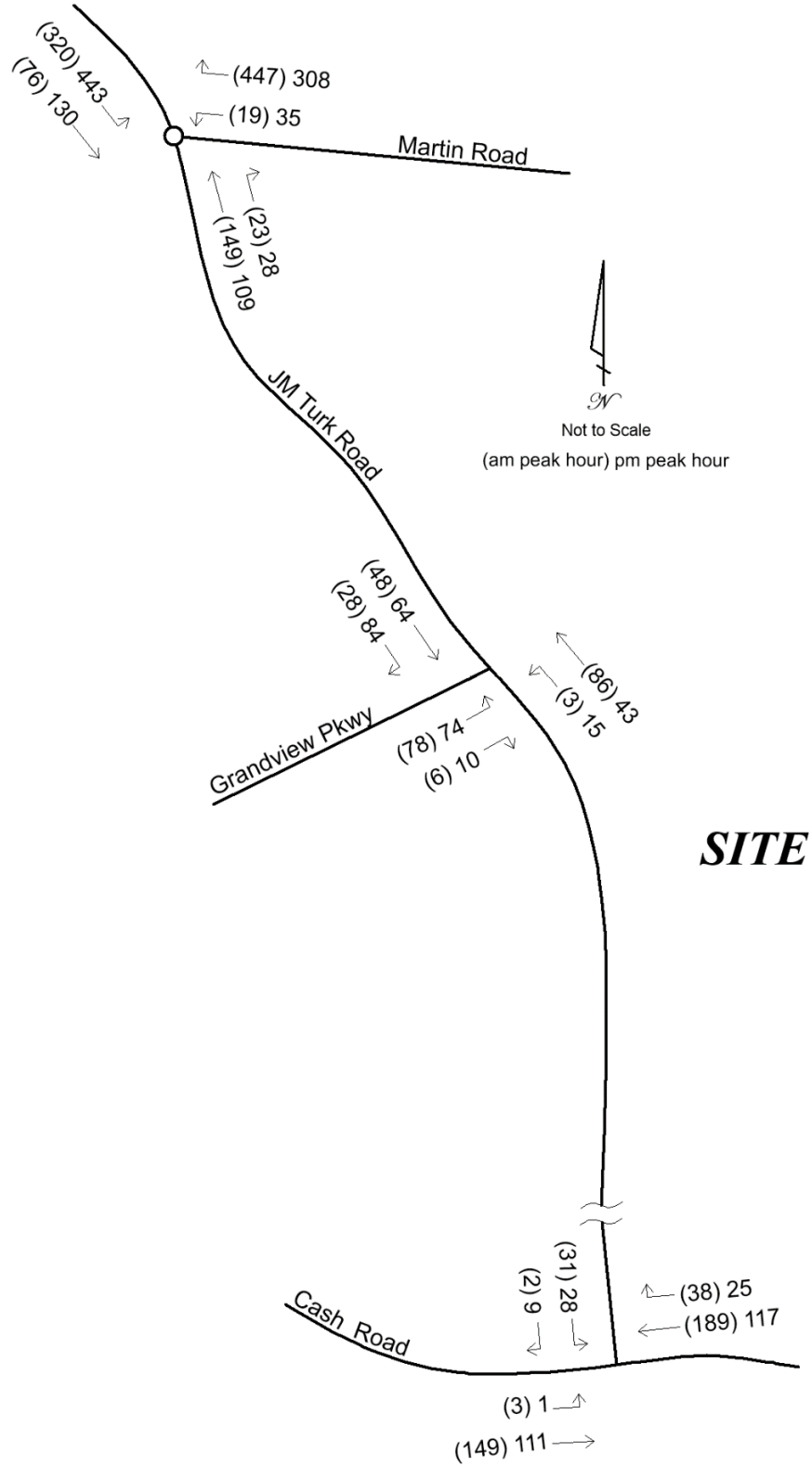


Figure 3 – Existing Weekday A.M. and P.M. Peak Hour Traffic Volumes

Existing Intersection Operations

Existing traffic operations were analyzed at the counted intersections using Synchro software, version 12, in accordance with the methodology presented in the Transportation Research Board's 2022 *Highway Capacity Manual 7th Edition (HCM 7)*. This methodology is presented in Appendix B. The analysis was based on the existing volumes, lanes, and control. The results of the analysis are shown in Table 1. Computer printouts containing detailed results of the existing analysis are located in Appendix C. Levels of service and delays are provided for each overall intersection and for each controlled approach or movement. Locations that operate unacceptably (LOS E or LOS F) are presented in bold type.

Table 1 – Existing Intersection Operations

Intersection / Approach	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay (s/veh)	LOS	Delay (s/veh)
1. Martin Road at JM Turk Road (roundabout)	A	7.3	A	6.8
northbound approach	A	6.7	A	6.5
southbound approach	A	6.7	A	7.4
westbound approach	A	8.1	A	6.1
2. JM Turk Road at Grandview Parkway (side street stop sign)	A	3.5	A	3.6
northbound left turn	A	7.4	A	7.6
eastbound approach	A	10.0	A	10.0
3. Cash Road at JM Turk Road (side street stop sign)	A	1.4	A	1.3
southbound approach	B	12.1	B	10.4
eastbound left turn	A	7.8	A	7.6

The existing analysis reveals acceptable operating conditions at the three study intersections. No mitigation is identified for the existing condition.

No-Build Traffic Conditions

A 2029 no-build condition was developed. This represents the traffic conditions that will exist in the future at the anticipated date of the build-out of the subdivision, but not including the subdivision's trips. The purpose of the analysis of this condition is to isolate the traffic impacts of the proposed development from background growth in volumes that are expected to occur in the area while the subdivision is under construction.

In order to develop no-build volumes, background growth factors were developed using historic Georgia DOT 24-hour traffic counts that were collected in this area for the years 2018 through 2022 (the latest year for which data was available at the time of this study), as shown in Table 2.

Table 2 – Historic Georgia DOT Traffic Volume Counts and Annual Growth Rates

Year	Cash W of JM Turk	Annual Growth	Union Church S of Winder Hwy	Annual Growth	Winder Hwy S of Martin	Annual Growth
Station ID	139-0779		139-7386		139-0287	
2018	2,810		3,470		25,000	
2019	2,870	2.1%	4,410	27.1%	31,600	26.4%
2020	2,660	-7.3%	4,100	-7.0%	28,600	-9.5%
2021	2,830	6.4%	4,360	6.3%	30,100	5.2%
2022	3,110	9.9%	4,460	2.3%	30,700	2.0%
<i>avg growth</i>		2.0%		5.1%		4.2%

Growth in the area has been moderate and positive. Each intersection experienced a decrease in volumes from 2019 to 2020. This is attributable to the COVID-19 pandemic and is considered an anomaly, and the growth the subsequent year is considered mostly a return to pre-pandemic conditions. The latest year saw modest-to-solid positive growth. Based on the growth trends identified in Table 2, and taking the pandemic into consideration, a 3.0% annual growth factor was applied to the existing volumes when projecting the future no-build volumes. The growth factor was applied for five years, for a total of 15.9% growth that will occur while the proposed subdivision is under construction. The existing traffic volumes were increased by the 15.9% growth factor. The results are the 2029 no-build traffic volumes that will be on the roadway network in the future when the proposed subdivision is completely developed, but excluding the subdivision's trips.

Programmed Transportation Infrastructure Improvements

The Gainesville-Hall Regional Transportation Plan 2020 and the Georgia DOT projects website were reviewed for programmed (scheduled and funded) and planned (anticipated) transportation infrastructure projects in the vicinity of the proposed development. No projects were identified.

No-Build Intersection Operations

The no-build condition includes the no-build traffic volumes, as described above. These were entered into the Synchro model and the 2029 no-build traffic operations were analyzed at the study intersections using Synchro 12 software in accordance with the HCM 7 methodology. The results of the no-build analysis are shown in Table 3. Computer printouts containing detailed results of the no-build analysis are located in Appendix D. Levels of service and delays are provided for each overall intersection and for each controlled approach or movement. Locations that operate unacceptably (LOS E or LOS F) are presented in bold type.

Table 3 – No-Build Intersection Operations

Intersection / Approach	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay (s/veh)	LOS	Delay (s/veh)
1. Martin Road at JM Turk Road (roundabout)	A	8.6	A	7.9
northbound approach	A	7.9	A	7.6
southbound approach	A	7.7	A	8.6
westbound approach	A	9.8	A	6.9
2. JM Turk Road at Grandview Parkway (side street stop sign)	A	3.6	A	3.7
northbound left turn	A	7.5	A	7.6
eastbound approach	B	10.4	B	10.3
3. Cash Road at JM Turk Road (side street stop sign)	A	1.5	A	1.3
southbound approach	B	13.0	B	10.8
eastbound left turn	A	7.9	A	7.7

The no-build analysis shows a slight deterioration in operations due to anticipated growth in this area. However, operations and delays will continue to be acceptable and no mitigation is necessary for the no-build condition.

Project Traffic Characteristics

This section describes the anticipated traffic characteristics of the proposed subdivision, including a site description, how much traffic the project will generate, and where that traffic will travel.

Project Description

The proposed development will consist of 196 detached single family homes and 128 attached townhomes for a total of 324 homes. The project will be served by one vehicular access on JM Turk Road at the current location of its intersection with Stanley Road. A second access will be provided which will be gated for emergency use only. The site plan is presented in Figure 4.

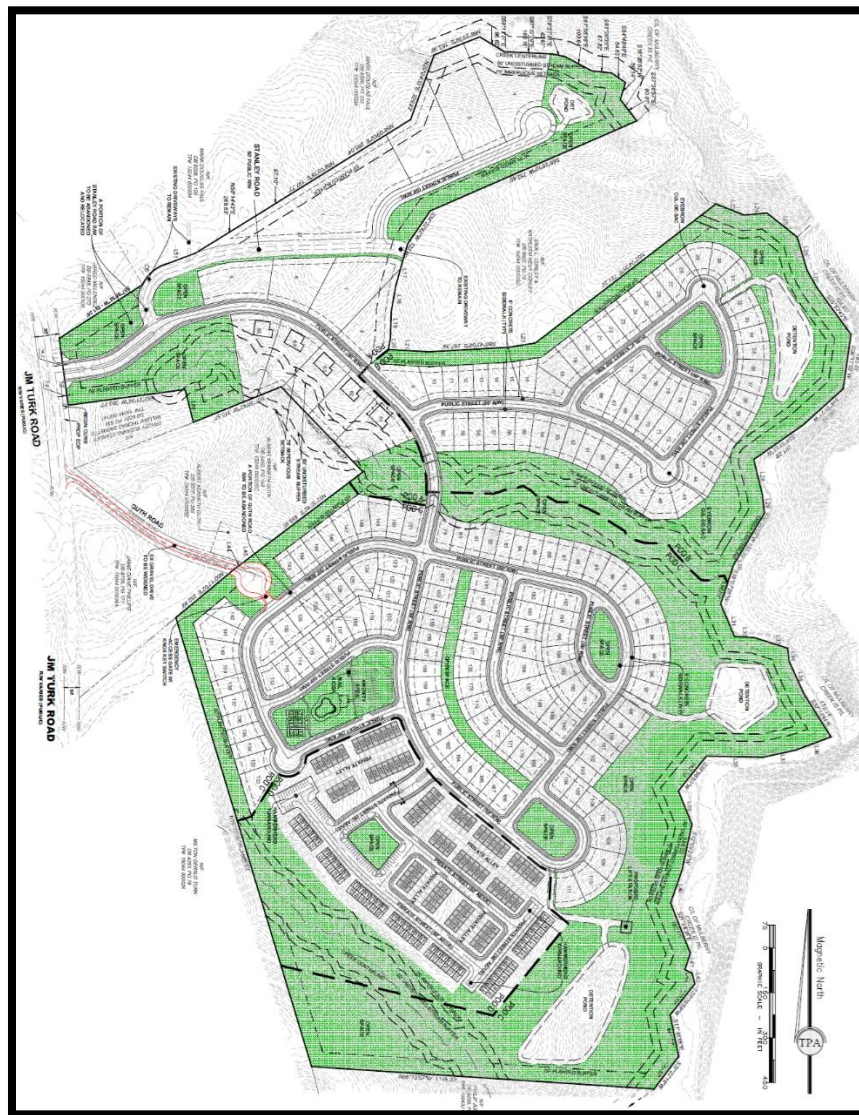


Figure 4 – Site Plan for Proposed Subdivision

Trip Generation

Trip generation is an estimate of the number of entering and exiting vehicular trips that will be generated by the proposed development. The volume of traffic that will be generated by the subdivision was calculated using the equations in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* (the current edition). ITE Land Use 210 – Single Family Detached Housing was chosen as representative of the detached houses and ITE Land Use 215 – Single Family Attached Housing was chosen for the townhomes. The trip generation is summarized in Table 4.

Table 4 – Proposed Subdivision Trip Generation

Land Use	ITE Code	Size	A.M. Peak Hour			P.M. Peak Hour			24-Hour		
			In	Out	2-Way	In	Out	2-Way	In	Out	2-Way
Detached Houses	210	196 homes	34	103	127	118	69	187	937	937	1,874
Townhomes	215	<u>128 homes</u>	<u>15</u>	<u>46</u>	<u>61</u>	<u>43</u>	<u>30</u>	<u>73</u>	<u>463</u>	<u>463</u>	<u>926</u>
<i>Total</i>		<i>324 homes</i>	<i>49</i>	<i>149</i>	<i>188</i>	<i>161</i>	<i>99</i>	<i>260</i>	<i>1,400</i>	<i>1,400</i>	<i>2,800</i>

The proposed subdivision will generate 188 trips in the morning peak hour, 260 trips in the evening peak hour, and 2,800 daily trips.

Trip Distribution and Assignment

The trip distribution percentages indicate what proportion of the project's trips will travel to and from various directions. The trip distribution percentages for the subdivision were developed based on the locations and proximity of likely trip origins and destinations including regional employment centers, retail and offices in the area, nearby schools, other regional trip attractors, and the major routes of travel in the area, notably Interstate 985, Spout Springs Road, and SR 53. The new project trips, shown in Table 4, were assigned to the roadway network based on the distribution percentages. The trip distribution percentages and the a.m. and p.m. peak hour trips expected to be generated by the proposed subdivision are shown in Figure 5.

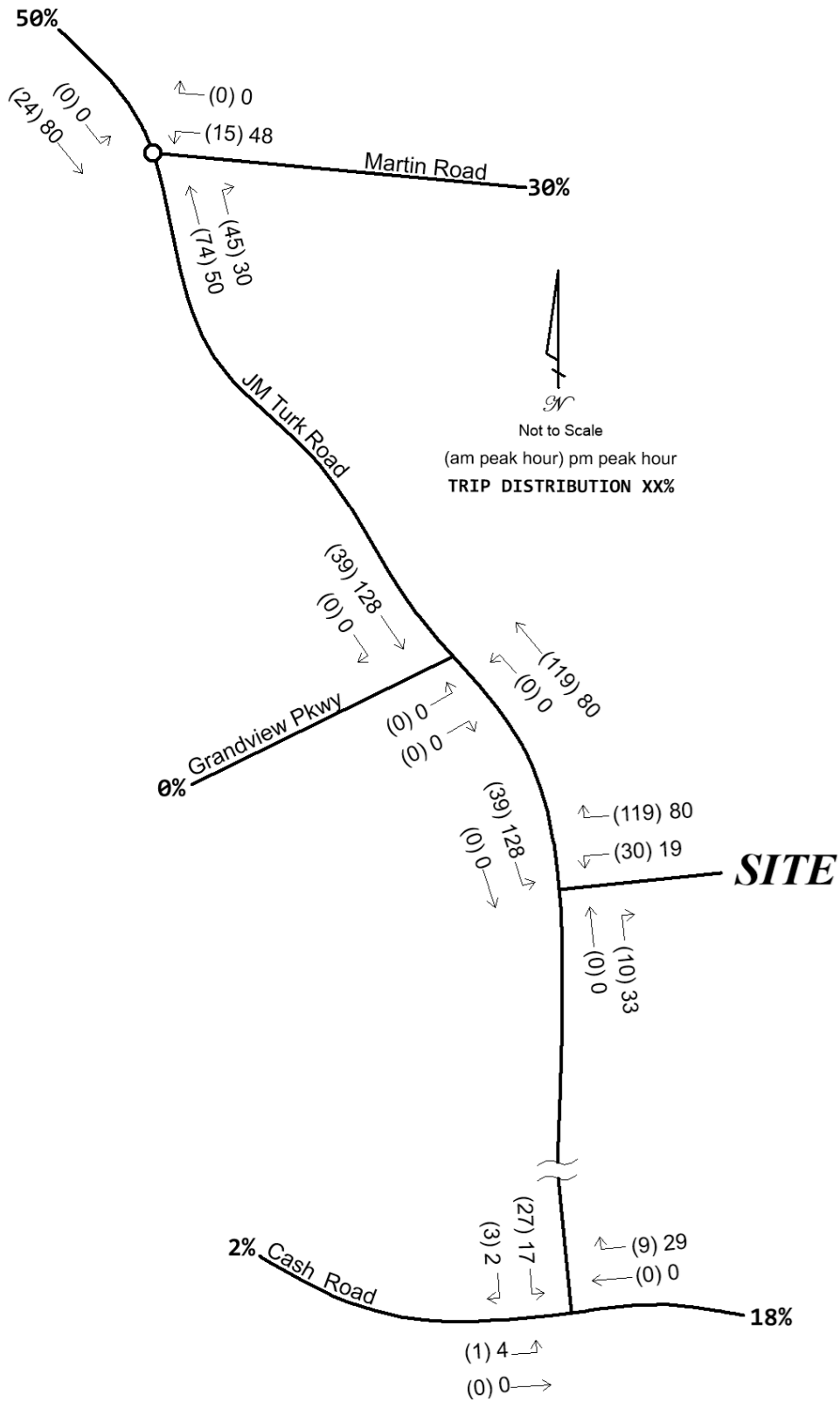


Figure 5 – Weekday A.M. and P.M. Peak Hour Project Trips and Distribution Percentages

Future Traffic Conditions

The future volumes consist of the no-build volumes plus the trips that will be generated by the proposed subdivision. The future volumes are shown in Figure 6.

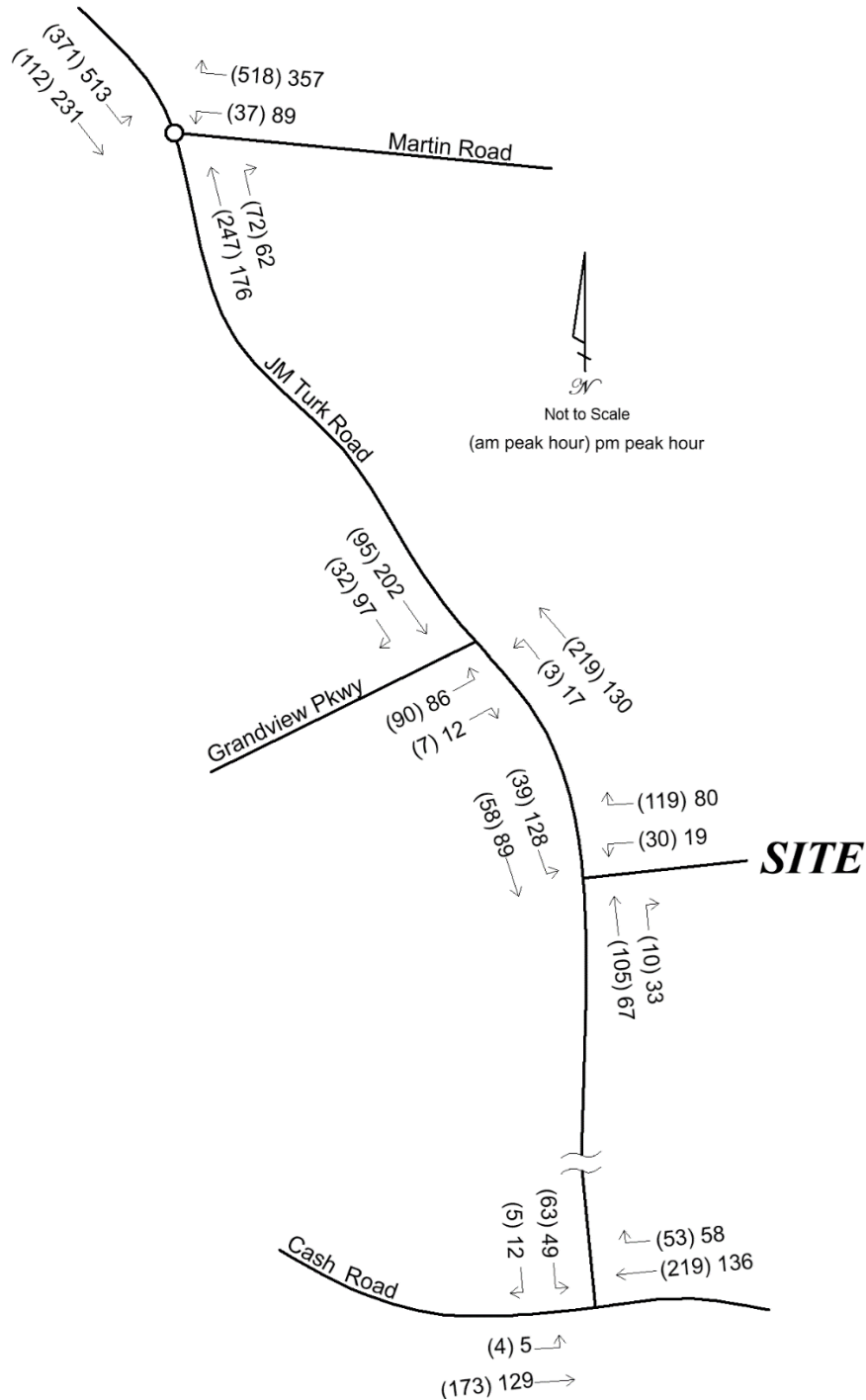


Figure 6 – Future Weekday A.M. and P.M. Peak Hour Volumes

Auxiliary Lane Requirements at Project Access

The Hall County Code was reviewed to determine auxiliary turn lane requirements at the project access on JM Turk Road. Code Section 16.60.290. – Deceleration lanes and left-turn lanes states:

- A. Subdivisions with greater than 24 lots will be required to have a deceleration lane constructed in accordance with current Hall County Engineering and Traffic Engineering specifications. The Hall County Traffic Engineer may waive or require the installation of a deceleration lane for subdivisions regardless of lot number based upon traffic and safety considerations.
- B. Left-turn lanes will be constructed in accordance with current Hall County Engineering and Traffic Engineering when warranted by the following table:

Table 5 – Hall County Turn Lane Thresholds

Average Daily Traffic (ADT)	Number of Lots (equal to or greater than the following)
>6,000	100
4,001—6,000	125
2,001—4,000	150
1,000—2,000	175
<1,000	200

- C. The Hall County Traffic Engineer may waive or require the installation of a left-turn lane, regardless of average daily traffic (ADT) or number of lots, based upon traffic and safety considerations.
- D. For those developments that a turn lane is required and the development is proposed in phases, construction of the turn lane is required prior to platting 100 lots or more.
- E. Additional right-of-way and/or easements necessary for the installation of decel and/or left-turn lanes will be acquired by and will be the financial responsibility of the developer.
- F. A signed and recorded frontage and/or radius encroachment agreement with applicable property owners will be required if any portion of the access extends beyond the development's road frontage.

Based on 324 proposed homes, a northbound right turn lane is required on JM Turk Road at the project access and this study agrees with that requirement.

The counted 24-hour volume on JM Turk Road is 1,385 vehicles, so the number of lots above which a left turn lane is required is 175 lots. The proposed subdivision will include 324 homes with one access. Therefore, a southbound left turn lane will be required at the project access and this study agrees with that requirement.

One entering lane and one exiting lane should be provided in the project access. The exiting approach should be controlled by side street stop sign and accompanying stop bar.

Future Intersection Operations

An operational analysis was performed for the anticipated future project build-out at the study intersections and the project access using Synchro 12 software in accordance with the HCM 7 methodology. Table 6 presents the results of the future analysis. Computer printouts containing detailed results of the future analysis are located in Appendix E. Levels of service and delays are provided for each overall intersection and for each controlled approach or movement. Locations that operate unacceptably (LOS E or LOS F) are presented in bold type.

Table 6 – Future Intersection Operations

Intersection / Approach	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay (s/veh)	LOS	Delay (s/veh)
1. Martin Road at JM Turk Road (roundabout)	B	10.2	A	9.9
northbound approach	B	10.7	A	9.6
southbound approach	A	8.3	B	10.9
westbound approach	B	12.0	A	8.4
2. JM Turk Road at Grandview Parkway (side street stop sign)	A	2.7	A	2.8
northbound left turn	A	7.6	A	8.0
eastbound approach	B	12.3	B	12.7
3. Cash Road at JM Turk Road (side street stop sign)	A	2.6	A	1.8
southbound approach	B	14.2	B	11.3
eastbound left turn	A	8.0	A	7.8
4. JM Turk Road at Project Access (side street stop sign)	A	5.5	A	5.1
southbound left turn (entering project)	A	7.6	A	7.7
westbound approach (exiting project)	B	10.6	B	10.2

The future analysis with the addition of the proposed subdivision's trips reveals continued acceptable traffic operations and delays at the three study intersections, as well as the project access.

The project civil/site engineer should comply with all applicable design standards including sight distances, driveway spacing, turn lane storage and taper lengths, turn radii, driveway widths, islands, angles with the adjacent roadways, and grades.

Conclusions and Recommendations

This study assesses the traffic impact of a proposed residential subdivision in Hall County. The site is located along the east side of JM Turk Road at Stanley Road and the development will consist of 196 detached single family homes and 128 attached townhomes for a total of 324 homes. The project will be served by one vehicular access on JM Turk Road at the current location of its intersection with Stanley Road. A second access will be provided which will be gated for emergency use only. The following are the findings and recommendations of this study:

1. Existing traffic operations and delays are acceptable at the three study intersections. No mitigation is identified for the existing condition.
2. Traffic volume growth in this area has been positive and modest and this is expected to continue into the future. It is noted that JM Turk Road experienced a decrease in the counted 24-hour volumes for this study, from 2023 to 2024, of -2.2%
3. No programmed or planned roadway improvement projects were identified in this vicinity.
4. With the growth in background traffic volumes, delays will increase moderately in the no-build condition. However, all delays will continue to be acceptable and no mitigation is identified for the no-build condition.
5. The proposed subdivision will generate 188 trips in the morning peak hour, 260 trips in the evening peak hour, and 2,800 daily trips.
6. The future analysis with the addition of the proposed subdivision's trips reveals modest increases in delays at the study intersections. The three study intersections will continue to operate acceptably. Therefore, no off-site mitigation is identified for the future build condition as a result of the proposed subdivision.
7. A northbound right turn lane and a southbound left turn lane are required on JM Turk Road at the project access and this study agrees with those requirements.
8. One entering lane and one exiting lane should be provided in the project access. The exiting approach should be controlled by side street stop sign and accompanying stop bar.
9. The project civil/site engineer should comply with all applicable design standards including sight distances, driveway spacing, turn lane storage and taper lengths, turn radii, driveway widths, islands, angles with the adjacent roadways, and grades.

Appendix A

Traffic Count Data and Volume Worksheets

JM Turk Road Subdivision Traffic Impact Study

Hall County, Georgia

May 2023, revised January 2024

Intersection: 1. Martin Road at JM Turk Road

Weekday A.M. Peak Hour	Northbound JM Turk Road			Southbound Martin Road				Westbound Martin Road		
	T	R	Tot	L	T	Tot		L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 7:15-8:15)	149	23	172	320	76	396		19	447	466
Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%			15.9%	15.9%	
2029 No-Build Volumes	173	27	199	371	88	459		22	518	540
Proposed JM Turk Road Subdivision Trips	74	45	119	0	24	24		15	0	15
Build Volumes	247	72	318	371	112	483		37	518	555

Weekday P.M. Peak Hour	Northbound JM Turk Road			Southbound Martin Road				Westbound Martin Road		
	T	R	Tot	L	T	Tot		L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 4:45-5:45)	109	28	137	443	130	573		35	308	343
Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%			15.9%	15.9%	
2029 No-Build Volumes	126	32	159	513	151	664		41	357	398
Proposed JM Turk Road Subdivision Trips	50	30	80	0	80	80		48	0	48
Build Volumes	176	62	239	513	231	744		89	357	446

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Intersection: 2. JM Turk Road at Grandview Parkway

Weekday A.M. Peak Hour	Northbound JM Turk Road			Southbound JM Turk Road			Eastbound Grandview Parkway		
	L	T	Tot	T	R	Tot	L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 7:15-8:15)	3	86	89	48	28	76	78	6	84
Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%		15.9%	15.9%	
2029 No-Build Volumes	3	100	103	56	32	88	90	7	97
Proposed JM Turk Road Subdivision Trips	0	119	119	39	0	39	0	0	0
Build Volumes	3	219	222	95	32	127	90	7	97

Weekday P.M. Peak Hour	Northbound JM Turk Road			Southbound JM Turk Road			Eastbound Grandview Parkway		
	L	T	Tot	T	R	Tot	L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 4:45-5:45)	15	43	58	64	84	148	74	10	84
Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%		15.9%	15.9%	
2029 No-Build Volumes	17	50	67	74	97	172	86	12	97
Proposed JM Turk Road Subdivision Trips	0	80	80	128	0	128	0	0	0
Build Volumes	17	130	147	202	97	300	86	12	97

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Intersection: 3. Cash Road at JM Turk Road

Weekday A.M. Peak Hour		Southbound JM Turk Road			Eastbound Cash Road			Westbound Cash Road		
		L	R	Tot	L	T	Tot	T	R	Tot
	Counted Volumes (Tuesday, May 16, 2023 7:15-8:15)	31	2	33	3	149	152	189	38	227
	Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%		15.9%	15.9%	
	2029 No-Build Volumes	36	2	38	3	173	176	219	44	263
	Proposed JM Turk Road Subdivision Trips	27	3	30	1	0	1	0	9	9
	Build Volumes	63	5	68	4	173	177	219	53	272

Weekday P.M. Peak Hour		Southbound JM Turk Road			Eastbound Cash Road			Westbound Cash Road		
		L	R	Tot	L	T	Tot	T	R	Tot
	Counted Volumes (Tuesday, May 16, 2023 5:00-6:00)	28	9	37	1	111	112	117	25	142
	Total Annual Background Growth	15.9%	15.9%		15.9%	15.9%		15.9%	15.9%	
	2029 No-Build Volumes	32	10	43	1	129	130	136	29	165
	Proposed JM Turk Road Subdivision Trips	17	2	19	4	0	4	0	29	29
	Build Volumes	49	12	62	5	129	134	136	58	194

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Intersection: 4. JM Turk Road at Project Access

Weekday A.M. Peak Hour	Northbound JM Turk Road			Southbound JM Turk Road			Westbound Project Access		
	T	R	Tot	L	T	Tot	L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 7:00-8:00)	91		91		50	50			
Total Annual Background Growth	15.9%			15.9%					
2029 No-Build Volumes	105		105		58	58			
Proposed JM Turk Road Subdivision Trips	0	10	10	39	0	39	30	119	149
Build Volumes	105	10	115	39	58	97	30	119	149

Weekday P.M. Peak Hour	Northbound JM Turk Road			Southbound JM Turk Road			Westbound Project Access		
	T	R	Tot	L	T	Tot	L	R	Tot
Counted Volumes (Tuesday, May 16, 2023 4:45-5:45)	58		58		77	77			
Total Annual Background Growth	15.9%			15.9%					
2029 No-Build Volumes	67		67		89	89			
Proposed JM Turk Road Subdivision Trips	0	33	33	128	0	128	19	80	99
Build Volumes	67	33	100	128	89	217	19	80	99

**JM Turk Road at project access location
Peak Hour Calculation**

Tuesday, May 16, 2023

Begin Time	NB		SB		2-Way	
	15 min	Hourly	15 min	Hourly	15 min	Hourly
7:00 AM	21		10		31	
7:15 AM	21		13		34	
7:30 AM	20		16		36	
7:45 AM	29	91	11	50	40	141
8:00 AM	14	84	15	55	29	139
8:15 AM	24	87	5	47	29	134
8:30 AM	8	75	6	37	14	112
8:45 AM	13	59	8	34	21	93
4:00 PM	13		25		38	
4:15 PM	12		22		34	
4:30 PM	14		13		27	
4:45 PM	11	50	19	79	30	129
5:00 PM	9	46	20	74	29	120
5:15 PM	18	52	19	71	37	123
5:30 PM	20	58	19	77	39	135
5:45 PM	8	55	16	74	24	129
6:00 PM	7	53	22	76	29	129
6:15 PM	14	49	17	74	31	123
24-Hour	692		724		1416	

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TMC Data
 Martin Rd @ J M Turk Rd (Roundabout)
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830001
 Site Code : 47830001
 Start Date : 5/16/2023
 Page No : 1

Groups Printed- Cars, Buses and Trucks

Start Time	J M Turk Rd Northbound					Martin Rd Southbound					Eastbound					Martin Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	33	2	0	35	58	7	0	0	65	0	0	0	0	0	5	0	94	0	99	199
07:15 AM	0	38	5	0	43	95	17	0	0	112	0	0	0	0	0	6	0	93	0	99	254
07:30 AM	0	37	2	0	39	110	25	0	0	135	0	0	0	0	0	4	0	109	0	113	287
07:45 AM	0	40	9	0	49	59	17	0	0	76	0	0	0	0	0	7	0	120	0	127	252
Total	0	148	18	0	166	322	66	0	0	388	0	0	0	0	0	22	0	416	0	438	992
08:00 AM	0	34	7	0	41	56	17	0	0	73	0	0	0	0	0	2	0	125	0	127	241
08:15 AM	0	28	6	0	34	54	15	0	0	69	0	0	0	0	0	3	0	75	0	78	181
08:30 AM	0	15	7	0	22	61	17	0	0	78	0	0	0	0	0	6	0	77	0	83	183
08:45 AM	0	18	2	0	20	35	27	0	0	62	0	0	0	0	0	7	0	72	0	79	161
Total	0	95	22	0	117	206	76	0	0	282	0	0	0	0	0	18	0	349	0	367	766
*** BREAK ***																					
04:00 PM	0	16	5	0	21	116	33	0	0	149	0	0	0	0	0	6	0	55	0	61	231
04:15 PM	0	13	5	0	18	125	35	0	0	160	0	0	0	0	0	3	0	82	0	85	263
04:30 PM	0	16	2	0	18	114	29	0	0	143	0	0	0	0	0	13	0	72	0	85	246
04:45 PM	0	20	8	0	28	115	28	0	0	143	0	0	0	0	0	10	0	77	0	87	258
Total	0	65	20	0	85	470	125	0	0	595	0	0	0	0	0	32	0	286	0	318	998
05:00 PM	0	27	6	0	33	112	34	0	0	146	0	0	0	0	0	9	0	75	0	84	263
05:15 PM	0	36	8	0	44	101	37	0	0	138	0	0	0	0	0	8	0	73	0	81	263
05:30 PM	0	26	6	0	32	115	31	0	0	146	0	0	0	0	0	8	0	83	0	91	269
05:45 PM	0	16	2	0	18	107	34	0	0	141	0	0	0	0	0	6	0	75	0	81	240
Total	0	105	22	0	127	435	136	0	0	571	0	0	0	0	0	31	0	306	0	337	1035
Grand Total	0	413	82	0	495	1433	403	0	0	1836	0	0	0	0	0	103	0	1357	0	1460	3791
Apprch %	0	83.4	16.6	0		78.1	21.9	0	0		0	0	0	0		7.1	0	92.9	0		
Total %	0	10.9	2.2	0	13.1	37.8	10.6	0	0	48.4	0	0	0	0	0	2.7	0	35.8	0	38.5	

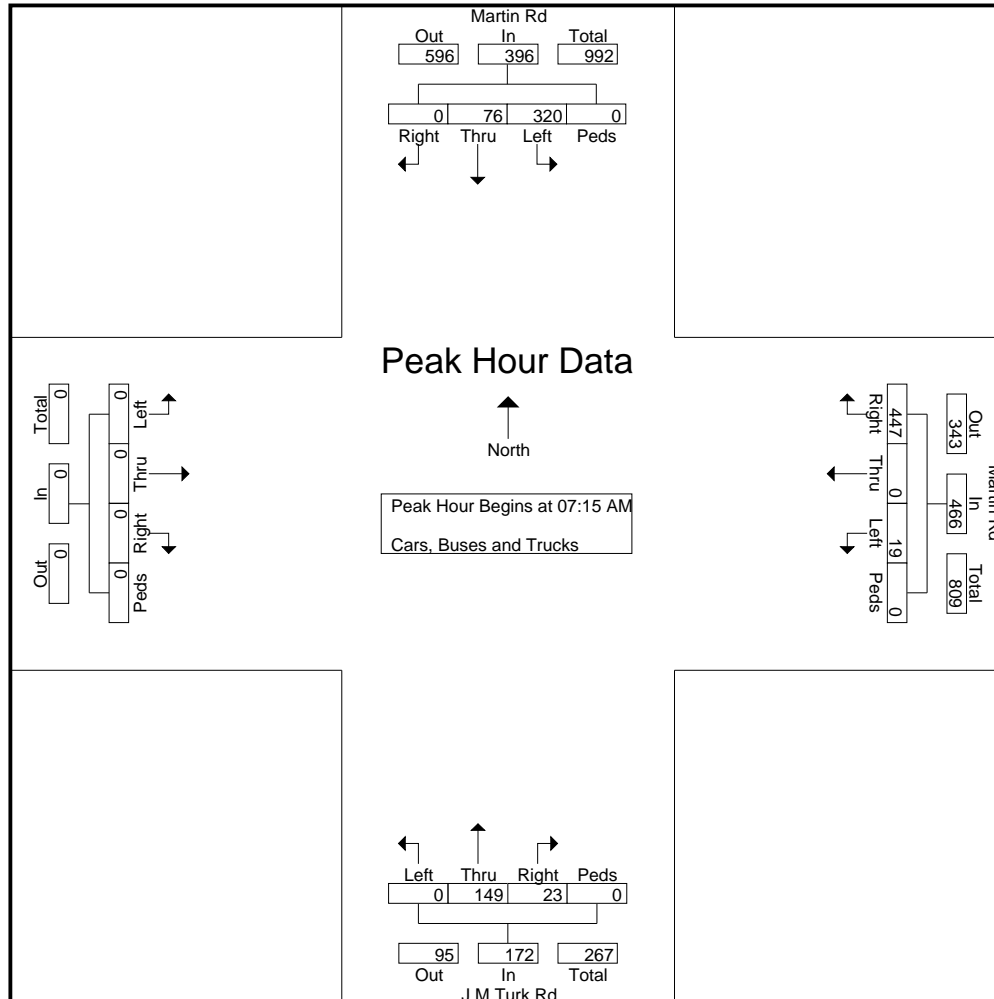
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TMC Data
 Martin Rd @ J M Turk Rd (Roundabout)
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830001
 Site Code : 47830001
 Start Date : 5/16/2023
 Page No : 2

Start Time	J M Turk Rd Northbound					Martin Rd Southbound					Eastbound					Martin Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	38	5	0	43	95	17	0	0	112	0	0	0	0	0	6	0	93	0	99	254
07:30 AM	0	37	2	0	39	110	25	0	0	135	0	0	0	0	0	4	0	109	0	113	287
07:45 AM	0	40	9	0	49	59	17	0	0	76	0	0	0	0	0	7	0	120	0	127	252
08:00 AM	0	34	7	0	41	56	17	0	0	73	0	0	0	0	0	2	0	125	0	127	241
Total Volume	0	149	23	0	172	320	76	0	0	396	0	0	0	0	0	19	0	447	0	466	1034
% App. Total		86.6	13.4			80.8	19.2											95.9			
PHF	.000	.931	.639	.000	.878	.727	.760	.000	.000	.733	.000	.000	.000	.000	.000	.679	.000	.894	.000	.917	.901



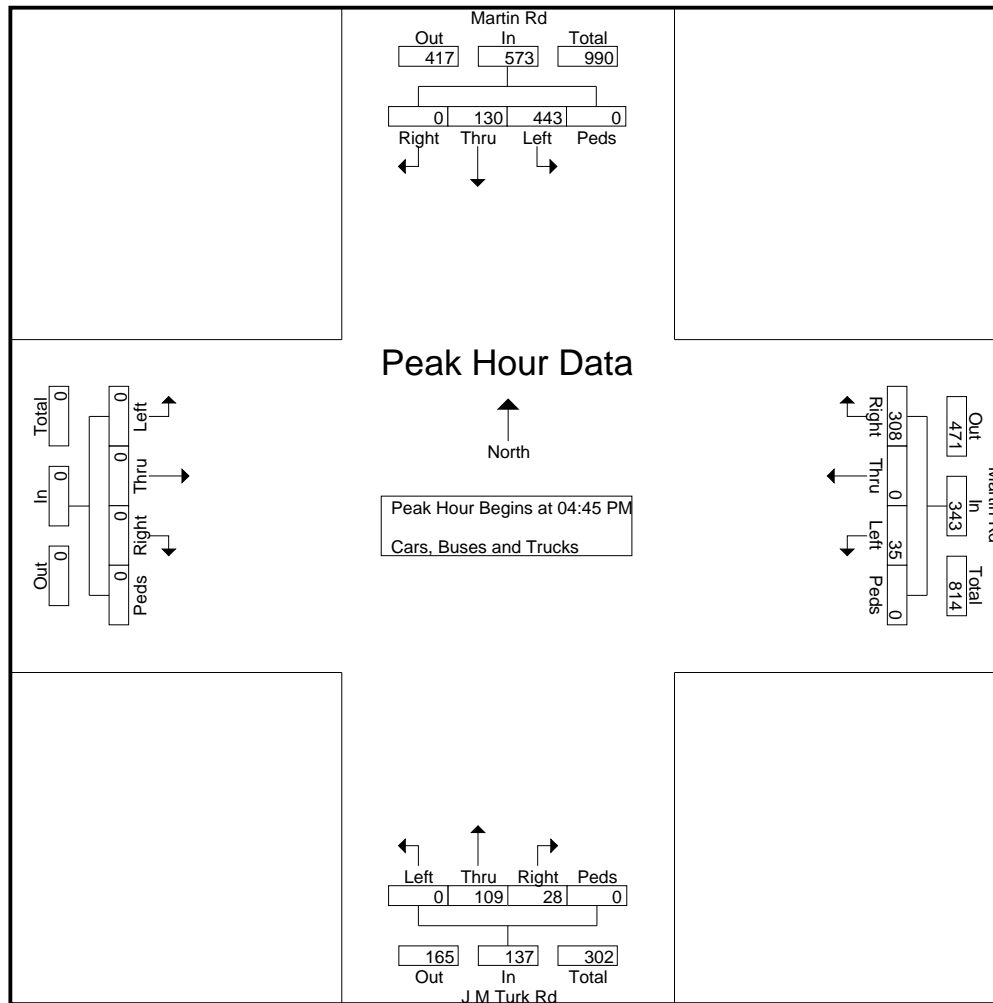
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TMC Data
 Martin Rd @ J M Turk Rd (Roundabout)
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830001
 Site Code : 47830001
 Start Date : 5/16/2023
 Page No : 3

Start Time	J M Turk Rd Northbound					Martin Rd Southbound					Eastbound					Martin Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	20	8	0	28	115	28	0	0	143	0	0	0	0	0	10	0	77	0	87	258
05:00 PM	0	27	6	0	33	112	34	0	0	146	0	0	0	0	0	9	0	75	0	84	263
05:15 PM	0	36	8	0	44	101	37	0	0	138	0	0	0	0	0	8	0	73	0	81	263
05:30 PM	0	26	6	0	32	115	31	0	0	146	0	0	0	0	0	8	0	83	0	91	269
Total Volume	0	109	28	0	137	443	130	0	0	573	0	0	0	0	0	35	0	308	0	343	1053
% App. Total		79.6	20.4			77.3	22.7									10.2		89.8			
PHF	.000	.757	.875	.000	.778	.963	.878	.000	.000	.981	.000	.000	.000	.000	.000	.875	.000	.928	.000	.942	.979



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TMC Data
 J M Turk Rd @ Grandview Pkwy
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830002
 Site Code : 47830002
 Start Date : 5/16/2023
 Page No : 1

Groups Printed- Cars, Buses and Trucks

Start Time	J M Turk Rd Northbound					J M Turk Rd Southbound					Grandview Pkwy Eastbound					Private Drwy Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	18	0	0	18	0	6	3	0	9	17	0	5	0	22	0	0	0	0	0	49
07:15 AM	2	21	0	0	23	0	11	4	0	15	16	0	0	0	16	0	0	0	0	0	54
07:30 AM	1	21	0	0	22	0	15	10	0	25	23	0	4	0	27	0	0	0	0	0	74
07:45 AM	0	28	0	0	28	0	8	8	0	16	19	0	1	0	20	0	0	0	0	0	64
Total	3	88	0	0	91	0	40	25	0	65	75	0	10	0	85	0	0	0	0	0	241
08:00 AM	0	16	0	0	16	0	14	6	0	20	20	0	1	0	21	0	0	0	0	0	57
08:15 AM	4	21	0	0	25	0	3	7	0	10	11	0	2	0	13	0	0	0	0	0	48
08:30 AM	0	8	0	0	8	0	5	9	0	14	8	0	2	0	10	0	0	0	0	0	32
08:45 AM	1	13	0	0	14	0	6	5	0	11	7	0	1	0	8	0	0	1	0	1	34
Total	5	58	0	0	63	0	28	27	0	55	46	0	6	0	52	0	0	1	0	1	171
*** BREAK ***																					
04:00 PM	2	12	0	0	14	0	22	17	0	39	9	0	2	0	11	0	0	0	0	0	64
04:15 PM	2	7	0	0	9	0	18	17	0	35	8	0	4	0	12	1	0	0	0	1	57
04:30 PM	6	9	0	0	15	0	14	18	0	32	9	0	1	0	10	0	0	0	0	0	57
04:45 PM	1	10	0	0	11	0	13	27	0	40	14	0	2	0	16	0	0	0	0	0	67
Total	11	38	0	0	49	0	67	79	0	146	40	0	9	0	49	1	0	0	0	1	245
05:00 PM	5	8	0	0	13	0	21	21	0	42	19	0	2	0	21	0	0	0	0	0	76
05:15 PM	3	14	0	0	17	0	17	20	0	37	26	0	2	0	28	0	0	0	0	0	82
05:30 PM	6	11	0	0	17	1	13	16	0	30	15	0	4	0	19	0	0	0	0	0	66
05:45 PM	0	6	0	0	6	0	12	15	0	27	14	0	4	0	18	0	0	0	0	0	51
Total	14	39	0	0	53	1	63	72	0	136	74	0	12	0	86	0	0	0	0	0	275
Grand Total	33	223	0	0	256	1	198	203	0	402	235	0	37	0	272	1	0	1	0	2	932
Apprch %	12.9	87.1	0	0		0.2	49.3	50.5	0		86.4	0	13.6	0		50	0	50	0		
Total %	3.5	23.9	0	0	27.5	0.1	21.2	21.8	0	43.1	25.2	0	4	0	29.2	0.1	0	0.1	0	0.2	

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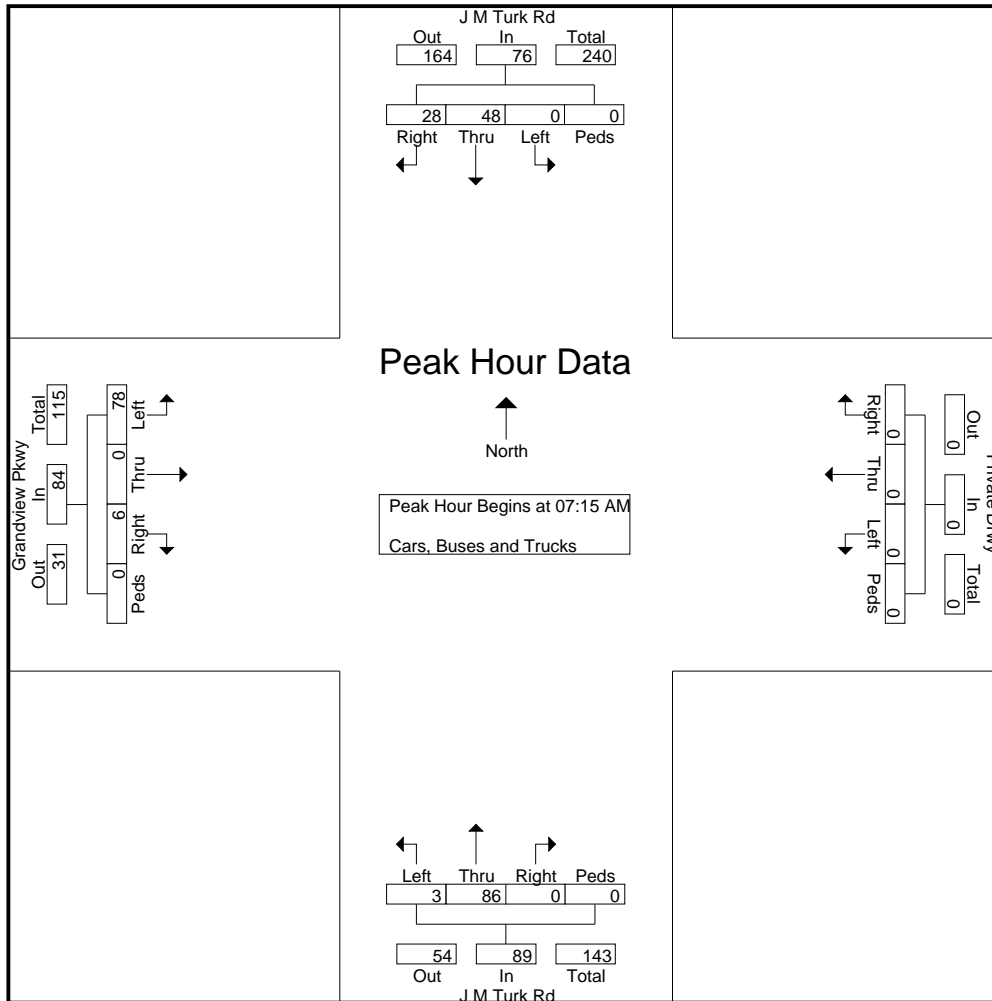
TMC Data
 J M Turk Rd @ Grandview Pkwy
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830002
 Site Code : 47830002
 Start Date : 5/16/2023
 Page No : 2

Start Time	J M Turk Rd Northbound					J M Turk Rd Southbound					Grandview Pkwy Eastbound					Private Drwy Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:15 AM	2	21	0	0	23	0	11	4	0	15	16	0	0	0	16	0	0	0	0	0	54
07:30 AM	1	21	0	0	22	0	15	10	0	25	23	0	4	0	27	0	0	0	0	0	74
07:45 AM	0	28	0	0	28	0	8	8	0	16	19	0	1	0	20	0	0	0	0	0	64
08:00 AM	0	16	0	0	16	0	14	6	0	20	20	0	1	0	21	0	0	0	0	0	57
Total Volume	3	86	0	0	89	0	48	28	0	76	78	0	6	0	84	0	0	0	0	0	249
% App. Total	96.6					63.2					36.8					92.9					
PHF	.375	.768	.000	.000	.795	.000	.800	.700	.000	.760	.848	.000	.375	.000	.778	.000	.000	.000	.000	.000	.841

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:15 AM



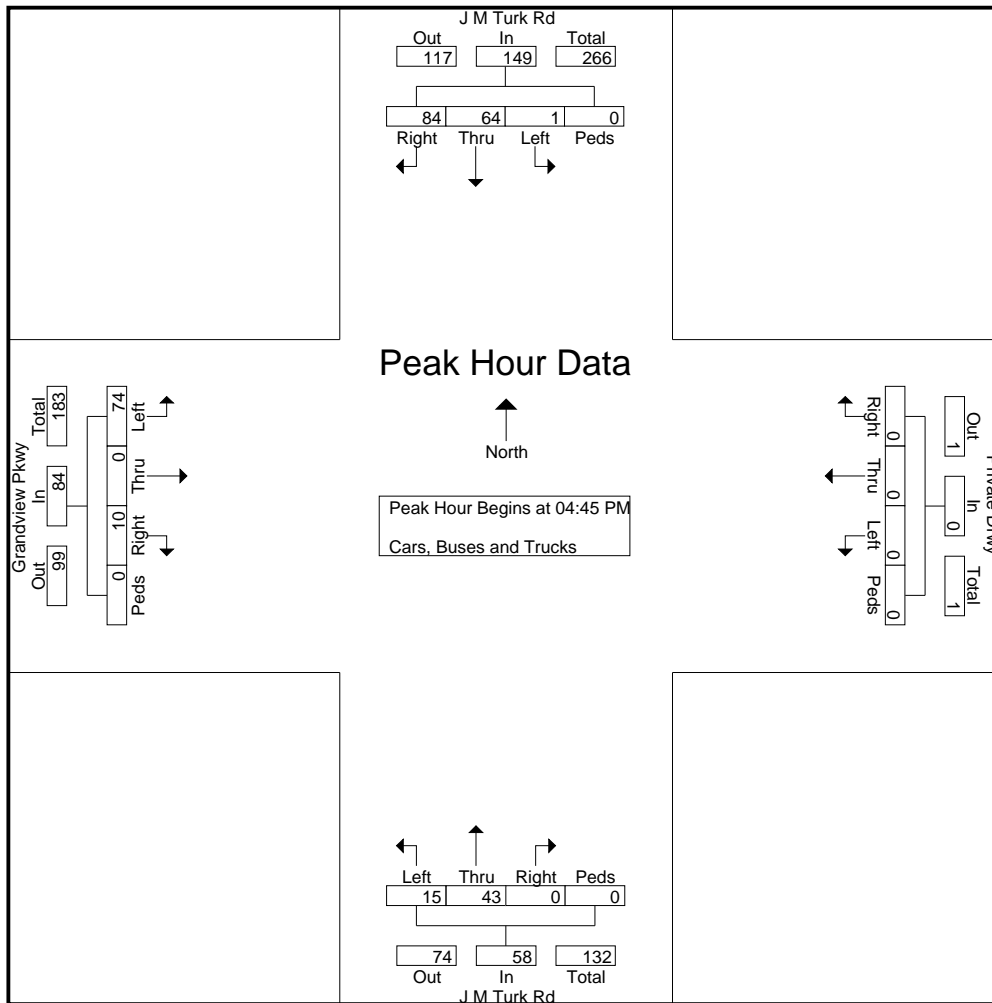
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TMC Data
 J M Turk Rd @ Grandview Pkwy
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830002
 Site Code : 47830002
 Start Date : 5/16/2023
 Page No : 3

Start Time	J M Turk Rd Northbound					J M Turk Rd Southbound					Grandview Pkwy Eastbound					Private Drwy Westbound					Int. Total	
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 04:45 PM																						
04:45 PM	1	10	0	0	11	0	13	27	0	40	14	0	2	0	16	0	0	0	0	0	67	
05:00 PM	5	8	0	0	13	0	21	21	0	42	19	0	2	0	21	0	0	0	0	0	76	
05:15 PM	3	14	0	0	17	0	17	20	0	37	26	0	2	0	28	0	0	0	0	0	82	
05:30 PM	6	11	0	0	17	1	13	16	0	30	15	0	4	0	19	0	0	0	0	0	66	
Total Volume	15	43	0	0	58	1	64	84	0	149	74	0	10	0	84	0	0	0	0	0	291	
% App. Total	25.9	74.1					56.4					88.1					11.9					
PHF	.625	.768	.000	.000	.853	.250	.762	.778	.000	.887	.712	.000	.625	.000	.750	.000	.000	.000	.000	.000	.887	



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TMC Data
 J M Turk Rd @ Cash Rd
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830003
 Site Code : 47830003
 Start Date : 5/16/2023
 Page No : 1

Groups Printed- Cars, Buses and Trucks

Start Time	Northbound					J M Turk Rd Southbound					Cash Rd Eastbound					Cash Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	0	0	0	0	4	0	0	0	4	1	22	0	0	23	0	15	9	0	24	51
07:15 AM	0	0	0	0	0	5	0	1	0	6	1	46	0	0	47	0	34	13	0	47	100
07:30 AM	0	0	0	0	0	14	0	1	0	15	1	48	0	0	49	0	56	14	0	70	134
07:45 AM	0	0	0	0	0	8	0	0	0	8	1	28	0	0	29	0	45	7	0	52	89
Total	0	0	0	0	0	31	0	2	0	33	4	144	0	0	148	0	150	43	0	193	374
08:00 AM	0	0	0	0	0	4	0	0	0	4	0	27	0	0	27	0	54	4	0	58	89
08:15 AM	0	0	0	0	0	5	0	0	0	5	1	34	0	0	35	0	32	11	0	43	83
08:30 AM	0	0	0	0	0	1	0	0	0	1	0	15	0	0	15	0	12	0	0	12	28
08:45 AM	0	0	0	0	0	5	0	1	0	6	4	14	0	0	18	0	17	6	0	23	47
Total	0	0	0	0	0	15	0	1	0	16	5	90	0	0	95	0	115	21	0	136	247
*** BREAK ***																					
04:00 PM	0	0	0	0	0	15	0	0	0	15	2	27	0	0	29	0	34	5	0	39	83
04:15 PM	0	0	0	0	0	9	0	1	0	10	0	23	0	0	23	0	25	5	0	30	63
04:30 PM	0	0	0	0	0	5	0	1	0	6	2	24	0	0	26	0	16	7	0	23	55
04:45 PM	0	0	0	0	0	7	0	4	0	11	0	17	0	0	17	0	26	9	0	35	63
Total	0	0	0	0	0	36	0	6	0	42	4	91	0	0	95	0	101	26	0	127	264
05:00 PM	0	0	0	0	0	5	0	2	0	7	0	31	0	0	31	0	25	5	0	30	68
05:15 PM	0	0	0	0	0	8	0	3	0	11	0	36	0	0	36	0	28	5	0	33	80
05:30 PM	0	0	0	0	0	8	0	2	0	10	0	22	0	0	22	0	37	9	0	46	78
05:45 PM	0	0	0	0	0	7	0	2	0	9	1	22	0	0	23	0	27	6	0	33	65
Total	0	0	0	0	0	28	0	9	0	37	1	111	0	0	112	0	117	25	0	142	291
Grand Total	0	0	0	0	0	110	0	18	0	128	14	436	0	0	450	0	483	115	0	598	1176
Apprch %	0	0	0	0	0	85.9	0	14.1	0	100.0	3.1	96.9	0	0	100.0	0	80.8	19.2	0	100.0	
Total %	0	0	0	0	0	9.4	0	1.5	0	10.9	1.2	37.1	0	0	38.3	0	41.1	9.8	0	50.9	

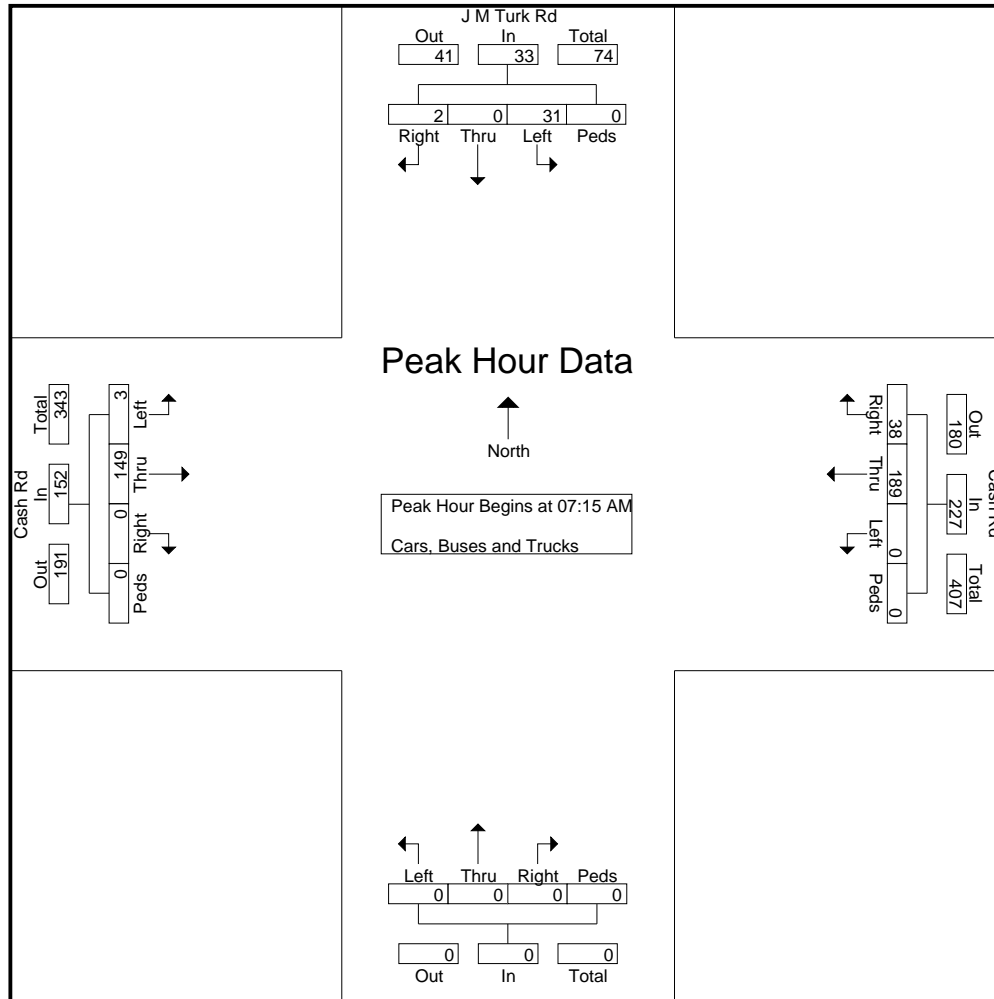
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TMC Data
 J M Turk Rd @ Cash Rd
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830003
 Site Code : 47830003
 Start Date : 5/16/2023
 Page No : 2

Start Time	Northbound					J M Turk Rd Southbound					Cash Rd Eastbound					Cash Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	5	0	1	0	6	1	46	0	0	47	0	34	13	0	47	100
07:30 AM	0	0	0	0	0	14	0	1	0	15	1	48	0	0	49	0	56	14	0	70	134
07:45 AM	0	0	0	0	0	8	0	0	0	8	1	28	0	0	29	0	45	7	0	52	89
08:00 AM	0	0	0	0	0	4	0	0	0	4	0	27	0	0	27	0	54	4	0	58	89
Total Volume	0	0	0	0	0	31	0	2	0	33	3	149	0	0	152	0	189	38	0	227	412
% App. Total						93.9										83.3	16.7				
PHF	.000	.000	.000	.000	.000	.554	.000	.500	.000	.550	.750	.776	.000	.000	.776	.000	.844	.679	.000	.811	.769



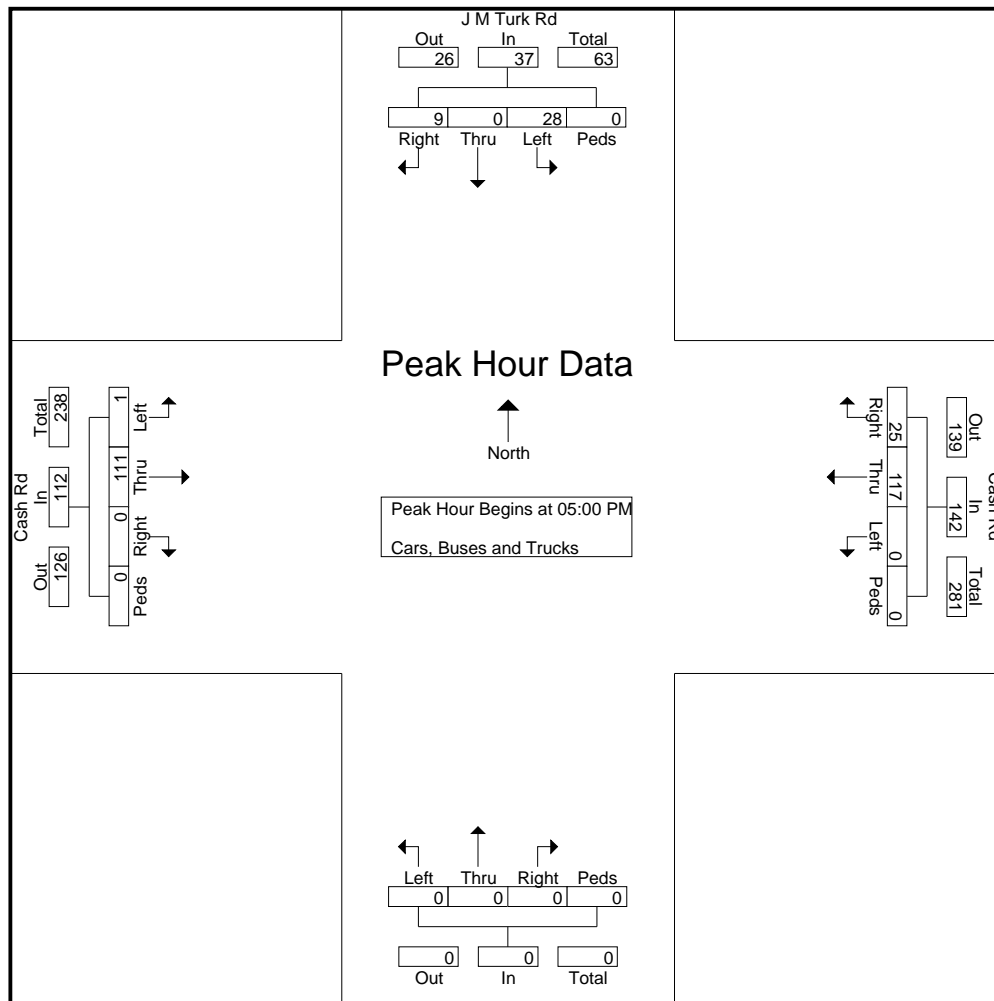
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TMC Data
 J M Turk Rd @ Cash Rd
 Flowery Branch, GA
 7-9 AM | 4-6 PM

File Name : 47830003
 Site Code : 47830003
 Start Date : 5/16/2023
 Page No : 3

Start Time	Northbound					J M Turk Rd Southbound					Cash Rd Eastbound					Cash Rd Westbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	5	0	2	0	7	0	31	0	0	31	0	25	5	0	30	68
05:15 PM	0	0	0	0	0	8	0	3	0	11	0	36	0	0	36	0	28	5	0	33	80
05:30 PM	0	0	0	0	0	8	0	2	0	10	0	22	0	0	22	0	37	9	0	46	78
05:45 PM	0	0	0	0	0	7	0	2	0	9	1	22	0	0	23	0	27	6	0	33	65
Total Volume	0	0	0	0	0	28	0	9	0	37	1	111	0	0	112	0	117	25	0	142	291
% App. Total						75.7		24.3			99.1					82.4	17.6				
PHF	.000	.000	.000	.000	.000	.875	.000	.750	.000	.841	.250	.771	.000	.000	.778	.000	.791	.694	.000	.772	.909



Reliable Traffic Data Services

Tel: (770) 578-8158 | Fax: (770) 578-8159
 Info@reliabletraffic.org | www.reliabletraffic.org

ADT Data

Site Code: 47830101
 J M Turk Rd south of Grandview Pkwy
 Flowery Branch, GA

Start Time	16-May-23 Tue	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	6			0	11				
12:15		1	9			0	14				
12:30		0	10			0	6				
12:45		0	10	1	35	0	7	0	38	1	73
01:00		0	14			2	16				
01:15		0	12			0	6				
01:30		0	7			0	5				
01:45		0	9	0	42	0	8	2	35	2	77
02:00		0	7			0	16				
02:15		0	10			0	16				
02:30		0	17			2	16				
02:45		1	14	1	48	1	12	3	60	4	108
03:00		0	6			0	17				
03:15		0	10			0	14				
03:30		0	19			0	18				
03:45		2	16	2	51	0	26	0	75	2	126
04:00		0	13			0	25				
04:15		1	12			0	22				
04:30		2	14			1	13				
04:45		1	11	4	50	2	19	3	79	7	129
05:00		3	9			1	20				
05:15		2	18			0	19				
05:30		2	20			2	19				
05:45		8	8	15	55	1	16	4	74	19	129
06:00		2	7			3	22				
06:15		4	14			1	17				
06:30		10	6			2	14				
06:45		22	7	38	34	1	8	7	61	45	95
07:00		21	11			10	16				
07:15		21	11			13	8				
07:30		20	10			16	4				
07:45		29	6	91	38	11	7	50	35	141	73
08:00		14	3			15	7				
08:15		24	2			5	10				
08:30		8	4			6	5				
08:45		13	5	59	14	8	7	34	29	93	43
09:00		9	5			10	7				
09:15		15	2			6	5				
09:30		11	3			9	4				
09:45		13	2	48	12	9	3	34	19	82	31
10:00		4	1			6	4				
10:15		8	1			11	2				
10:30		9	2			11	1				
10:45		5	0	26	4	10	2	38	9	64	13
11:00		2	1			8	0				
11:15		8	1			10	4				
11:30		3	0			9	0				
11:45		7	2	20	4	3	1	30	5	50	9
Total		305	387			205	519			510	906
Percent		44.1%	55.9%			28.3%	71.7%			36.0%	64.0%
Grand Total		305	387			205	519			510	906
Percent		44.1%	55.9%			28.3%	71.7%			36.0%	64.0%

ADT ADT 1,416 AADT 1,416

Reliable Traffic Data Services

Tel: (770) 578-8158 | Fax: (770) 578-8159

ADT Data

Site Code: 48570101
 J M Turk Rd south of Stanley Rd
 Flowery Branch, GA

Start Time	18-Jan-24 Thu	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	2			0	9				
12:15		0	13			0	9				
12:30		0	4			1	15				
12:45		1	11	1	30	0	2	1	35	2	65
01:00		0	13			2	5				
01:15		0	6			0	8				
01:30		0	11			0	7				
01:45		0	8	0	38	0	10	2	30	2	68
02:00		0	11			0	18				
02:15		0	10			0	11				
02:30		0	8			0	20				
02:45		0	20	0	49	1	18	1	67	1	116
03:00		0	10			1	14				
03:15		0	8			0	27				
03:30		1	15			0	17				
03:45		0	15	1	48	0	18	1	76	2	124
04:00		1	12			0	21				
04:15		0	13			0	11				
04:30		3	10			0	23				
04:45		1	6	5	41	1	17	1	72	6	113
05:00		3	9			1	14				
05:15		3	14			3	23				
05:30		5	16			2	18				
05:45		4	9	15	48	0	12	6	67	21	115
06:00		4	17			3	19				
06:15		4	6			1	8				
06:30		22	9			3	8				
06:45		20	9	50	41	4	10	11	45	61	86
07:00		14	7			4	11				
07:15		16	12			11	8				
07:30		25	12			20	8				
07:45		34	6	89	37	15	11	50	38	139	75
08:00		17	6			13	12				
08:15		14	3			15	14				
08:30		13	4			6	6				
08:45		12	5	56	18	3	1	37	33	93	51
09:00		11	4			4	2				
09:15		14	2			3	18				
09:30		9	1			8	5				
09:45		13	1	47	8	11	3	26	28	73	36
10:00		11	0			6	0				
10:15		5	2			2	1				
10:30		8	0			12	0				
10:45		2	4	26	6	7	3	27	4	53	10
11:00		5	0			12	2				
11:15		8	1			7	0				
11:30		6	0			8	1				
11:45		10	1	29	2	12	0	39	3	68	5
Total		319	366			202	498			521	864
Percent		46.6%	53.4%			28.9%	71.1%			37.6%	62.4%
Grand Total		319	366			202	498			521	864
Percent		46.6%	53.4%			28.9%	71.1%			37.6%	62.4%
ADT		ADT 1,385		AADT 1,385							

Appendix B

Intersection Analysis Methodology

Intersection Analysis Methodology

The methodology used for evaluating traffic operations at intersections is presented in the Transportation Research Board's 2022 *Highway Capacity Manual*, 7th Edition (HCM 7). Synchro 12 software, which emulates the HCM 7 methodology, was used for all analyses. The following is an overview of the methodology employed for the analysis of signalized intersections and roundabouts and stop-sign controlled (unsignalized) intersections. Levels of service (LOS) are assigned letters A through F. LOS A indicates operations with very low control delay while LOS F describes operations with high control delay. LOS F is considered to be unacceptable by most drivers, while LOS E is typically considered to be the limit of acceptable delay.

Signalized Intersections and Roundabouts – Level of service for a signalized intersection and a roundabout is defined in terms of control delay per vehicle. For signalized intersections and roundabouts, a composite intersection level of service is determined. The thresholds for each level of service are higher for signalized intersections and roundabouts than for unsignalized intersections. This is attributable to a variety of factors including expectation and acceptance of higher delays at signals/roundabouts, and the fact that drivers can relax when waiting at a signal as opposed to having to remain attentive as they proceed through the unsignalized intersection. The level of service criteria for signalized intersections and roundabouts are shown in Table A.

Table A – Level of Service Criteria for Signalized Intersections and Roundabouts

Control Delay (s/veh)	LOS
≤ 10	A
> 10 and ≤ 20	B
> 20 and ≤ 35	C
> 35 and ≤ 55	D
> 55 and ≤ 80	E
> 80	F

Source: Highway Capacity Manual 7

Unsignalized Intersections – Level of service for an unsignalized intersection is defined in terms of control delay per vehicle. Control delay is that portion of delay attributable to the control device and includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The delays at unsignalized intersections are based on gap acceptance theory, factoring in availability of gaps, usefulness of the gaps, and the priority of right-of-way given to each traffic stream. The level of service criteria for unsignalized intersections are presented in Table B.

Table B – Level of Service Criteria for Unsignalized Intersections

Control Delay (s/veh)	LOS
0 – 10	A
> 10 and ≤ 15	B
> 15 and ≤ 25	C
> 25 and ≤ 35	D
> 35 and ≤ 50	E
> 50	F

Source: Highway Capacity Manual 7

Appendix C

Existing Intersection Operational Analysis

Intersection			
Intersection Delay, s/veh	7.3		
Intersection LOS	A		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	507	195	542
Demand Flow Rate, veh/h	523	201	558
Vehicles Circulating, veh/h	174	451	22
Vehicles Exiting, veh/h	478	129	675
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.1	6.7	6.7
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	523	201	558
Cap Entry Lane, veh/h	1155	871	1349
Entry HV Adj Factor	0.969	0.970	0.971
Flow Entry, veh/h	507	195	542
Cap Entry, veh/h	1120	845	1310
V/C Ratio	0.453	0.231	0.414
Control Delay, s/veh	8.1	6.7	6.7
LOS	A	A	A
95th %tile Queue, veh	2	1	2

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	78	6	3	86	48	28
Future Vol, veh/h	78	6	3	86	48	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	80	80	76	76
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	100	8	4	108	63	37

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	178	63	100	0	0
Stage 1	63	-	-	-	-
Stage 2	115	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	811	1001	1493	-	-
Stage 1	959	-	-	-	-
Stage 2	910	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	809	1001	1493	-	-
Mov Cap-2 Maneuver	809	-	-	-	-
Stage 1	957	-	-	-	-
Stage 2	910	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v10.05		0.25	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	61	-	821	-	-
HCM Lane V/C Ratio	0.003	-	0.131	-	-
HCM Control Delay (s/veh)	7.4	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	3	149	189	38	31	2
Future Vol, veh/h	3	149	189	38	31	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	81	81	55	55
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	4	191	233	47	56	4

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	280	0	-	0	456 257
Stage 1	-	-	-	-	257 -
Stage 2	-	-	-	-	199 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1277	-	-	-	561 779
Stage 1	-	-	-	-	784 -
Stage 2	-	-	-	-	832 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1277	-	-	-	559 779
Mov Cap-2 Maneuver	-	-	-	-	559 -
Stage 1	-	-	-	-	781 -
Stage 2	-	-	-	-	832 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.15	0	12.07
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	36	-	-	-	569
HCM Lane V/C Ratio	0.003	-	-	-	0.105
HCM Control Delay (s/veh)	7.8	0	-	-	12.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection			
Intersection Delay, s/veh	6.8		
Intersection LOS	A		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	365	176	585
Demand Flow Rate, veh/h	376	181	603
Vehicles Circulating, veh/h	144	466	38
Vehicles Exiting, veh/h	503	175	482
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	6.1	6.5	7.4
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	376	181	603
Cap Entry Lane, veh/h	1191	858	1327
Entry HV Adj Factor	0.971	0.971	0.970
Flow Entry, veh/h	365	176	585
Cap Entry, veh/h	1157	833	1288
V/C Ratio	0.316	0.211	0.454
Control Delay, s/veh	6.1	6.5	7.4
LOS	A	A	A
95th %tile Queue, veh	1	1	2

2: JM Turk Road & Grandview Parkway

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	10	15	43	65	84
Future Vol, veh/h	74	10	15	43	65	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	85	85	89	89
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	99	13	18	51	73	94

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	159	73	167	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	86	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	832	989	1410	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	937	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	821	989	1410	-	-	-
Mov Cap-2 Maneuver	821	-	-	-	-	-
Stage 1	938	-	-	-	-	-
Stage 2	937	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.96	1.96	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	466	-	838	-	-
HCM Lane V/C Ratio	0.013	-	0.134	-	-
HCM Control Delay (s/veh)	7.6	0	10	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Vol, veh/h	1	111	117	25	28	9
Future Vol, veh/h	1	111	117	25	28	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	77	77	84	84
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	1	142	152	32	33	11

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	184	0	-	0	313
Stage 1	-	-	-	-	168
Stage 2	-	-	-	-	145
Critical Hdwy	4.13	-	-	-	6.43
Critical Hdwy Stg 1	-	-	-	-	5.43
Critical Hdwy Stg 2	-	-	-	-	5.43
Follow-up Hdwy	2.227	-	-	-	3.527
Pot Cap-1 Maneuver	1384	-	-	-	678
Stage 1	-	-	-	-	859
Stage 2	-	-	-	-	880
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1384	-	-	-	677
Mov Cap-2 Maneuver	-	-	-	-	677
Stage 1	-	-	-	-	858
Stage 2	-	-	-	-	880

Approach	EB	WB	SB
HCM Control Delay, s/v	0.07	0	10.36
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	16	-	-	-	716
HCM Lane V/C Ratio	0.001	-	-	-	0.062
HCM Control Delay (s/veh)	7.6	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Appendix D

No-Build Intersection Operational Analysis

Intersection			
Intersection Delay, s/veh	8.6		
Intersection LOS	A		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	587	228	629
Demand Flow Rate, veh/h	605	235	648
Vehicles Circulating, veh/h	203	523	25
Vehicles Exiting, veh/h	555	150	783
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	9.8	7.9	7.7
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	605	235	648
Cap Entry Lane, veh/h	1122	809	1345
Entry HV Adj Factor	0.970	0.971	0.971
Flow Entry, veh/h	587	228	629
Cap Entry, veh/h	1088	786	1306
V/C Ratio	0.539	0.290	0.482
Control Delay, s/veh	9.8	7.9	7.7
LOS	A	A	A
95th %tile Queue, veh	3	1	3

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	90	7	3	100	56	32
Future Vol, veh/h	90	7	3	100	56	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	80	80	76	76
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	115	9	4	125	74	42

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	206	74	116	0	0
Stage 1	74	-	-	-	-
Stage 2	133	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	782	988	1473	-	-
Stage 1	949	-	-	-	-
Stage 2	894	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	780	988	1473	-	-
Mov Cap-2 Maneuver	780	-	-	-	-
Stage 1	947	-	-	-	-
Stage 2	894	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v10.39		0.22	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	52	-	792	-	-
HCM Lane V/C Ratio	0.003	-	0.157	-	-
HCM Control Delay (s/veh)	7.5	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	3	173	219	44	36	2
Future Vol, veh/h	3	173	219	44	36	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	81	81	55	55
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	4	222	270	54	65	4

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	325	0	-	0	527 298
Stage 1	-	-	-	-	298 -
Stage 2	-	-	-	-	229 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1229	-	-	-	510 740
Stage 1	-	-	-	-	751 -
Stage 2	-	-	-	-	806 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1229	-	-	-	508 740
Mov Cap-2 Maneuver	-	-	-	-	508 -
Stage 1	-	-	-	-	749 -
Stage 2	-	-	-	-	806 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.14	0	13.04
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	31	-	-	-	516
HCM Lane V/C Ratio	0.003	-	-	-	0.134
HCM Control Delay (s/veh)	7.9	0	-	-	13
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection			
Intersection Delay, s/veh	7.9		
Intersection LOS	A		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	424	203	677
Demand Flow Rate, veh/h	436	209	698
Vehicles Circulating, veh/h	167	539	45
Vehicles Exiting, veh/h	581	204	558
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	6.9	7.6	8.6
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	436	209	698
Cap Entry Lane, veh/h	1164	796	1318
Entry HV Adj Factor	0.972	0.972	0.970
Flow Entry, veh/h	424	203	677
Cap Entry, veh/h	1132	774	1279
V/C Ratio	0.375	0.262	0.530
Control Delay, s/veh	6.9	7.6	8.6
LOS	A	A	A
95th %tile Queue, veh	2	1	3

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	86	12	17	50	74	97
Future Vol, veh/h	86	12	17	50	74	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	85	85	89	89
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	115	16	20	59	83	109

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	182	83	192	0	-
Stage 1	83	-	-	-	-
Stage 2	99	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	807	976	1381	-	-
Stage 1	940	-	-	-	-
Stage 2	925	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	795	976	1381	-	-
Mov Cap-2 Maneuver	795	-	-	-	-
Stage 1	926	-	-	-	-
Stage 2	925	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v10.27		1.94	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	457	-	814	-	-
HCM Lane V/C Ratio	0.014	-	0.161	-	-
HCM Control Delay (s/veh)	7.6	0	10.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	1	129	136	29	32	10
Future Vol, veh/h	1	129	136	29	32	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	77	77	84	84
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	1	165	177	38	38	12

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	214	0	-	0	363 195
Stage 1	-	-	-	-	195 -
Stage 2	-	-	-	-	168 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1350	-	-	-	634 843
Stage 1	-	-	-	-	835 -
Stage 2	-	-	-	-	859 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1350	-	-	-	633 843
Mov Cap-2 Maneuver	-	-	-	-	633 -
Stage 1	-	-	-	-	834 -
Stage 2	-	-	-	-	859 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.06	0	10.78
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	14	-	-	-	673
HCM Lane V/C Ratio	0.001	-	-	-	0.074
HCM Control Delay (s/veh)	7.7	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Appendix E

Future Intersection Operational Analysis

Intersection			
Intersection Delay, s/veh	10.2		
Intersection LOS	B		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	603	363	661
Demand Flow Rate, veh/h	621	373	681
Vehicles Circulating, veh/h	289	523	41
Vehicles Exiting, veh/h	607	199	869
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	12.0	10.7	8.3
Approach LOS	B	B	A
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	621	373	681
Cap Entry Lane, veh/h	1028	809	1323
Entry HV Adj Factor	0.971	0.972	0.971
Flow Entry, veh/h	603	363	661
Cap Entry, veh/h	998	787	1285
V/C Ratio	0.604	0.461	0.515
Control Delay, s/veh	12.0	10.7	8.3
LOS	B	B	A
95th %tile Queue, veh	4	2	3

Intersection						
Int Delay, s/veh	2.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	90	7	3	219	95	32
Future Vol, veh/h	90	7	3	219	95	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	80	80	76	76
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	115	9	4	274	125	42

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	406	125	167	0	0
Stage 1	125	-	-	-	-
Stage 2	281	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	601	926	1411	-	-
Stage 1	901	-	-	-	-
Stage 2	766	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	599	926	1411	-	-
Mov Cap-2 Maneuver	599	-	-	-	-
Stage 1	898	-	-	-	-
Stage 2	766	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v12.34		0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	24	-	615	-	-
HCM Lane V/C Ratio	0.003	-	0.202	-	-
HCM Control Delay (s/veh)	7.6	0	12.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	4	173	219	53	63	5
Future Vol, veh/h	4	173	219	53	63	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	81	81	55	55
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	5	222	270	65	115	9

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	336	0	-	0	535 303
Stage 1	-	-	-	-	303 -
Stage 2	-	-	-	-	232 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1218	-	-	-	504 734
Stage 1	-	-	-	-	747 -
Stage 2	-	-	-	-	804 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1218	-	-	-	502 734
Mov Cap-2 Maneuver	-	-	-	-	502 -
Stage 1	-	-	-	-	743 -
Stage 2	-	-	-	-	804 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.18	0	14.21
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	41	-	-	-	514
HCM Lane V/C Ratio	0.004	-	-	-	0.241
HCM Control Delay (s/veh)	8	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.9

Intersection						
Int Delay, s/veh	5.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↑	↗	↘	↑
Traffic Vol, veh/h	30	119	105	10	39	58
Future Vol, veh/h	30	119	105	10	39	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	80	80	76	76
Heavy Vehicles, %	2	2	3	2	2	3
Mvmt Flow	43	170	131	13	51	76

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	310	131	0	0	144
Stage 1	131	-	-	-	-
Stage 2	179	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	682	918	-	-	1439
Stage 1	895	-	-	-	-
Stage 2	852	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	658	918	-	-	1439
Mov Cap-2 Maneuver	658	-	-	-	-
Stage 1	895	-	-	-	-
Stage 2	822	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v10.64		0	3.05
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	850	1439
HCM Lane V/C Ratio	-	-	0.25	0.036
HCM Control Delay (s/veh)	-	-	10.6	7.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1	0.1

Intersection			
Intersection Delay, s/veh	9.9		
Intersection LOS	A		
Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	475	305	759
Demand Flow Rate, veh/h	489	314	782
Vehicles Circulating, veh/h	233	539	98
Vehicles Exiting, veh/h	620	341	624
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.4	9.6	10.9
Approach LOS	A	A	B
Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
A (Intercept)	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	489	314	782
Cap Entry Lane, veh/h	1088	796	1249
Entry HV Adj Factor	0.971	0.972	0.970
Flow Entry, veh/h	475	305	759
Cap Entry, veh/h	1057	774	1212
V/C Ratio	0.449	0.394	0.626
Control Delay, s/veh	8.4	9.6	10.9
LOS	A	A	B
95th %tile Queue, veh	2	2	5

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	86	12	17	130	202	97
Future Vol, veh/h	86	12	17	130	202	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	180
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	85	85	89	89
Heavy Vehicles, %	2	2	2	3	3	2
Mvmt Flow	115	16	20	153	227	109

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	420	227	336	0	-	0
Stage 1	227	-	-	-	-	-
Stage 2	193	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	590	812	1223	-	-	-
Stage 1	811	-	-	-	-	-
Stage 2	840	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	579	812	1223	-	-	-
Mov Cap-2 Maneuver	579	-	-	-	-	-
Stage 1	796	-	-	-	-	-
Stage 2	840	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	12.65	0.92	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	208	-	601	-	-
HCM Lane V/C Ratio	0.016	-	0.218	-	-
HCM Control Delay (s/veh)	8	0	12.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Vol, veh/h	5	129	136	58	49	12
Future Vol, veh/h	5	129	136	58	49	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	78	78	77	77	84	84
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	165	177	75	58	14

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	252	0	-	0	392 214
Stage 1	-	-	-	-	214 -
Stage 2	-	-	-	-	178 -
Critical Hdwy	4.13	-	-	-	6.43 6.23
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.227	-	-	-	3.527 3.327
Pot Cap-1 Maneuver	1308	-	-	-	610 823
Stage 1	-	-	-	-	819 -
Stage 2	-	-	-	-	850 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1308	-	-	-	607 823
Mov Cap-2 Maneuver	-	-	-	-	607 -
Stage 1	-	-	-	-	815 -
Stage 2	-	-	-	-	850 -

Approach	EB	WB	SB
HCM Control Delay, s/v	0.29	0	11.35
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	67	-	-	-	640
HCM Lane V/C Ratio	0.005	-	-	-	0.114
HCM Control Delay (s/veh)	7.8	0	-	-	11.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection						
Int Delay, s/veh	5.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↑	↗	↘	↑
Traffic Vol, veh/h	19	80	67	33	128	89
Future Vol, veh/h	19	80	67	33	128	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	150	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	85	85	89	89
Heavy Vehicles, %	2	2	3	2	2	3
Mvmt Flow	27	114	79	39	144	100

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	466	79	0	0	118
Stage 1	79	-	-	-	-
Stage 2	388	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	555	982	-	-	1471
Stage 1	944	-	-	-	-
Stage 2	686	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	500	982	-	-	1471
Mov Cap-2 Maneuver	500	-	-	-	-
Stage 1	944	-	-	-	-
Stage 2	619	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v10.24		0	4.55
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	829	1471
HCM Lane V/C Ratio	-	-	0.171	0.098
HCM Control Delay (s/veh)	-	-	10.2	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.6	0.3