

**TRAFFIC ENGINEERING STUDY
FOR
WINDY HILL ROAD AT DAVIS ROAD EXTENSION

CITY OF SMYRNA, GEORGIA**



Prepared for:

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October 07, 2024
A&R Engineering Project #: 24-164

TRAFFIC ENGINEERING STUDY

Windy Hill Road at Davis Road Extension

City of Smyrna, Georgia

REASON FOR INVESTIGATION:

The reason for this study is to determine if the projected traffic volumes at the proposed intersection of Windy Hill Road at Davis Road Extension will satisfy MUTCD signal warrants for a traffic signal.

LOCATION & DESCRIPTION OF THE INTERSECTION:

The proposed extension of Davis Road will form the southbound approach as a third leg to its intersection with Windy Hill Road, approximately 650 feet east of the existing signalized intersection of Windy Hill Road and Atlanta Road in Smyrna, Georgia. The study intersection currently has a median break on Windy Hill Road with a U-Turn Lane in both eastbound and westbound approaches. Windy Hill Road is a median-divided roadway with a posted speed limit of 30 mph in the vicinity of the site.



COUNTY:

The study intersection is in Cobb County, Georgia.

REQUESTED BY:

This study was requested by WSE Development, LLC.

PEDESTRIAN ACTIVITY:

Sidewalks are present on both sides of Windy Hill Road in the vicinity of the study intersection.

PARKING:

No parking is allowed on Windy Hill Road in the vicinity of the study intersection.

VEHICULAR VOLUMES:

Turning movement counts were collected on Thursday, September 05, 2024, between 07.00 AM - 07.00 PM at the existing median opening on Windy Hill Road, approximately 635 feet east of the existing signalized intersection Windy Hill Road at Atlanta Road. The hourly volumes are shown in Table 1. Detailed traffic counts are included in the Appendix.

TABLE 1 – EXISTING VOLUMES WINDY HILL ROAD AT MEDIAN BREAK												
Time	Northbound -			Southbound -			Eastbound Windy Hill Road			Westbound Windy Hill Road		
	L	T	R	L	T	R	U+L	T	R	L	T	R
7:00 A.M. – 8:00 A.M.	0	0	0	0	0	0	47	1618	0	0	898	0
8:00 A.M. – 9:00 A.M.	0	0	0	0	0	0	36	1815	0	0	902	0
9:00 A.M. – 10:00 A.M.	0	0	0	0	0	0	28	1580	0	0	824	0
10:00 A.M. – 11:00 A.M.	0	0	0	0	0	0	28	1397	0	0	726	0
11:00 A.M. – 12:00 Noon	0	0	0	0	0	0	22	1287	0	0	694	0
12:00 Noon – 1:00 P.M.	0	0	0	0	0	0	27	1300	0	0	782	0
1:00 P.M. – 2:00 P.M.	0	0	0	0	0	0	27	1250	0	0	860	0
2:00 P.M. – 3:00 P.M.	0	0	0	0	0	0	25	1044	0	0	1013	0
3:00 P.M. – 4:00 P.M.	0	0	0	0	0	0	22	1069	0	0	1301	0
4:00 P.M. – 5:00 P.M.	0	0	0	0	0	0	28	1158	0	0	1636	0
5:00 P.M. – 6:00 P.M.	0	0	0	0	0	0	49	1340	0	0	1905	0
6:00 P.M. – 7:00 P.M.	0	0	0	0	0	0	29	1117	0	0	1603	0
7:00 P.M. – 8:00 P.M.	0	0	0	0	0	0	29	898	0	0	1218	0

SITE INFORMATION:

The proposed development located on Windy Hill Road and Dixie Avenue in Cobb County, Georgia. The development will consist of 246-units mid-rise apartment housing and 33,000 sf gym/aquatic center.

Trip generation estimates for the project were based on the rates and equations published in the 11th edition of the Institute of Transportation Engineers (ITE) Trip Generation report. This reference contains traffic volume count data collected at similar facilities nationwide. The trip generation was based on the following ITE *Land Uses: 221 – Multifamily Housing (Mid-Rise) and 493 - Athletic Club*. The calculated total trip generation for the proposed development is shown in Table 2.

TABLE 2 – TRIP GENERATION								
Land Use	Size	AM Peak Hour			PM Peak Hour			24 Hour
		Enter	Exit	Total	Enter	Exit	Total	Two-way
221 – Multifamily Housing (Mid-Rise)	246 units	22	75	97	59	37	96	1,127
493 – Athletic Club	33,000 sf	64	40	104	129	79	208	2,076
New External Trips		86	115	201	188	116	304	3,203

SITE TRIP DISTRIBUTION AND ASSIGNMENT

Total trips in Table 2 were distributed to hours throughout the day according to the hourly distribution rates published in the ITE Trip General Manual. The hourly site generated traffic volume for the proposed development is shown below in Table 3.

TABLE 3 – HOURLY DISTRIBUTION OF SITE TRAFFIC			
TIME	Enter	Exit	Total
7:00 A.M. – 8:00 A.M.	34	119	153
8:00 A.M. – 9:00 A.M.	86	115	201
9:00 A.M. – 10:00 A.M.	61	74	135
10:00 A.M. – 11:00 A.M.	73	70	143
11:00 A.M. – 12:00 noon	94	91	185
12:00 noon – 1:00 P.M.	112	105	217
1:00 P.M. – 2:00 P.M.	105	96	201
2:00 P.M. – 3:00 P.M.	93	105	198
3:00 P.M. – 4:00 P.M.	120	109	229
4:00 P.M. – 5:00 P.M.	145	119	264
5:00 P.M. – 6:00 P.M.	188	116	304
6:00 P.M. – 7:00 P.M.	150	120	270
7:00 P.M. – 8:00 P.M.	124	117	241
TOTAL	1385	1356	2741

The distribution of the proposed site traffic was assumed as below:

- 55% of the new trips will travel to/from the east on Windy Hill Road
- 15% of the new trips will travel to/from the west on Windy Hill Road
- 10% of the new trips will travel to/from the north on Atlanta Road
- 15% of the new trips will travel to/from the south on Atlanta Road
- 5% of the new trips will travel to/from the north on Dixie Avenue

The hourly volumes in Table 3 were assigned to the turning movements at the study intersection based on the above assumed trip distribution. Table 4 shows the site generated traffic from the development at the study intersection. Since the development has other driveways, not all traffic enters and exits from the study intersection.

TABLE 4 – PROPOSED DEVELOPMENT SITE GENERATED TRAFFIC VOLUMES WINDY HILL ROAD AT DAVIS ROAD EXTENSION												
Time	Northbound -			Southbound Davis Road Extension			Eastbound Windy Hill Road			Westbound Windy Hill Road		
Entering Traffic %	0	0	0	0	0	0	40	0	0	0	16.5	38.5
Exiting Traffic %	0	0	0	55	0	28	0	0	0	0	0	0
Time/Movement	L	T	R	L	T	R	L	T	R	L	T	R
7:00 A.M. – 8:00 A.M.	0	0	0	65	0	33	14	0	0	0	6	13
8:00 A.M. – 9:00 A.M.	0	0	0	63	0	32	34	0	0	0	14	33
9:00 A.M. – 10:00 A.M.	0	0	0	41	0	21	24	0	0	0	10	23
10:00 A.M. – 11:00 A.M.	0	0	0	39	0	20	29	0	0	0	12	28
11:00 A.M. – 12:00 Noon	0	0	0	50	0	25	38	0	0	0	16	36
12:00 Noon – 1:00 P.M.	0	0	0	58	0	29	45	0	0	0	18	43
1:00 P.M. – 2:00 P.M.	0	0	0	53	0	27	42	0	0	0	17	40
2:00 P.M. – 3:00 P.M.	0	0	0	58	0	29	37	0	0	0	15	36
3:00 P.M. – 4:00 P.M.	0	0	0	60	0	31	48	0	0	0	20	46
4:00 P.M. – 5:00 P.M.	0	0	0	65	0	33	58	0	0	0	24	56
5:00 P.M. – 6:00 P.M.	0	0	0	64	0	32	75	0	0	0	31	72
6:00 P.M. – 7:00 P.M.	0	0	0	66	0	34	60	0	0	0	25	58
7:00 P.M. – 8:00 P.M.	0	0	0	64	0	33	50	0	0	0	20	48

SHIFTED TRIPS

The Cobb County proposes to extend the Davis Road from Hillside Avenue to the existing median opening on Windy Hill Road just east of Atlanta Road. The proposed southbound leg will be a continuation of Davis Road. The westbound through traffic at the intersection of Hillside Avenue at Park Drive is shifted to the new signalized intersection and shifted trips are shown in Figure 5.

TABLE 5 – SHIFTED TRAFFIC VOLUMES WINDY HILL ROAD AT DAVIS ROAD EXTENSION												
Time	Northbound -			Southbound Davis Road Extension			Eastbound Windy Hill Road			Westbound Windy Hill Road		
Time/Movement	L	T	R	L	T	R	L	T	R	L	T	R
7:00 A.M. – 8:00 A.M.	0	0	0	7	0	7	0	0	0	0	0	0
8:00 A.M. – 9:00 A.M.	0	0	0	2	0	2	0	0	0	0	0	0
9:00 A.M. – 10:00 A.M.	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A.M. – 11:00 A.M.	0	0	0	0	0	0	0	0	0	0	0	0
11:00 A.M. – 12:00 Noon	0	0	0	0	0	0	0	0	0	0	0	0
12:00 Noon – 1:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0
1:00 P.M. – 2:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0
2:00 P.M. – 3:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0
3:00 P.M. – 4:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0
4:00 P.M. – 5:00 P.M.	0	0	0	4	0	4	0	0	0	0	0	0
5:00 P.M. – 6:00 P.M.	0	0	0	2	0	2	0	0	0	0	0	0
6:00 P.M. – 7:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P.M. – 8:00 P.M.	0	0	0	0	0	0	0	0	0	0	0	0

The existing traffic volumes in Table 1 were grown for 2 years at a 1% growth rate and added to the site-generated trips from the proposed development shown in Table 4 and shifted traffic volumes shown in

Table 5 to obtain the future traffic volumes at the study intersection. These future traffic volumes are shown in Table 6.

TABLE 6 – PROJECTED FUTURE TRAFFIC VOLUMES WINDY HILL ROAD AT DAVIS ROAD EXTENSION												
Time	Northbound -			Southbound Davis Road Extension			Eastbound Windy Hill Road			Westbound Windy Hill Road		
	L	T	R	L	T	R	L	T	R	L	T	R
7:00 A.M. – 8:00 A.M.	0	0	0	72	0	40	62	1651	0	0	922	13
8:00 A.M. – 9:00 A.M.	0	0	0	70	0	39	71	1851	0	0	934	33
9:00 A.M. – 10:00 A.M.	0	0	0	41	0	21	53	1612	0	0	851	23
10:00 A.M. – 11:00 A.M.	0	0	0	39	0	20	58	1425	0	0	753	28
11:00 A.M. – 12:00 Noon	0	0	0	50	0	25	60	1313	0	0	724	36
12:00 Noon – 1:00 P.M.	0	0	0	58	0	29	73	1326	0	0	816	43
1:00 P.M. – 2:00 P.M.	0	0	0	53	0	27	70	1275	0	0	894	40
2:00 P.M. – 3:00 P.M.	0	0	0	58	0	29	63	1065	0	0	1048	36
3:00 P.M. – 4:00 P.M.	0	0	0	60	0	31	70	1090	0	0	1347	46
4:00 P.M. – 5:00 P.M.	0	0	0	69	0	37	87	1181	0	0	1693	56
5:00 P.M. – 6:00 P.M.	0	0	0	68	0	36	123	1376	0	0	1971	72
6:00 P.M. – 7:00 P.M.	0	0	0	66	0	34	90	1139	0	0	1660	52
7:00 P.M. – 8:00 P.M.	0	0	0	64	0	33	80	926	0	0	1262	48

SIGNAL WARRANT ANALYSIS:

A signal warrant analysis was performed for the study intersection per MUTCD (2023 Edition) using a main street approach speed limit of 30 mph with the intersection geometry of a four-lane major street approach and a two-lane minor street approach. Results of the analysis show that Traffic signal warrants 1 and 2 were not met for the major and minor Street volumes; however, Peak Hour Warrant 3 was satisfied for Standard A. Results of the analysis are given below and attached in the Appendix.

MUTCD Signal Warrant Analysis (Left turn option):

For Warrant 1 to be satisfied, either Standard 1 or Standard 2 criteria has to be satisfied.

- Warrant 1 – Eight-hour vehicular volume – **NOT SATISFIED**
 - Standard 1 (Condition A): 0 Hours
 - Standard 1 (Condition B): 0 Hours

(Criteria for satisfaction of Warrant 1, Standard 1: Criteria must be met for 8 hours for either Condition A, or Condition B.)

- Standard 2 (Condition A): 0 Hours
- Standard 2 (Condition B): 7 Hours

(Criteria for satisfaction of Warrant 1, Standard 2: Criteria must be met for 8 hours for both Condition A and Condition B.)

- Warrant 2 – Four-hour vehicular volume – **NOT SATISFIED**
- Warrant 3 – Peak hour vehicular volume – **SATISFIED**

As per Section 4C.01 (13) of MUTCD, we also analyzed signal warrants considering the higher of the major street left-turn volumes as the “minor street” volume and the corresponding single direction of opposing traffic on the major street as the “major street” volume using the “Build” volumes. Results of the signal warrant analysis indicate that signal warrant 2 and 3 are satisfied for 100% standard and signal warrants 1, were not satisfied. Results of the analysis are given below and attached in the Appendix.

For Warrant 1 to be satisfied, either Standard 1 or Standard 2 criteria has to be satisfied.

- Warrant 1 – Eight-hour vehicular volume – **NOT SATISFIED**
 - Standard 1 (Condition A): 0 Hours
 - Standard 1 (Condition B): 4 Hours

(Criteria for satisfaction of Warrant 1, Standard 1: Criteria must be met for 8 hours for either Condition A, or Condition B.)

- Standard 2 (Condition A): 1 Hours
- Standard 2 (Condition B): 11 Hours

(Criteria for satisfaction of Warrant 1, Standard 2: Criteria must be met for 8 hours for both Condition A and Condition B.)

- Warrant 2 – Four-hour vehicular volume – **SATISFIED**
- Warrant 3 – Peak hour vehicular volume – **SATISFIED**

FUTUTE INTERSECTION CAPACITY ANALYSIS:

The intersection delay and level-of-service was determined for the study intersection for the future build conditions. The methodology used for evaluating traffic operations at the study intersection is based on the criteria set forth in the Transportation Research Board’s Highway Capacity Manual (HCM 6). Synchro Software, which emulates the HCM methodology, was used for conducting the analysis. The future intersection operation analyses are shown in Table 7 for signalized condition and stop control condition. Detailed analyses are included in Appendix.

TABLE 7 – FUTURE INTERSECTION OPERATIONS				
Intersection	Conventional (Minor) Stop		Traffic Signal	
	AM Peak	PM Peak	AM Peak	PM Peak
<u>Windy Hill Road at Davis Road Extension</u>			<u>A (6.3)</u>	<u>B (10.0)</u>
-Eastbound Approach/Left (Windy Hill Road.)	C (15.2)	F (237.0)	A (3.3)	A (3.5)
-Westbound Approach	-	-	A (5.5)	B (11.9)
-Southbound Approach (Davis Road Extension)	F (225.5)	F (*)	E (64.6)	E (65.2)

* Delay exceeds 300 seconds

As shown in Table 7 above, with a Minor Stop control, the southbound approach will operate at LOS “F” in both the AM and PM peak with huge delays. The future intersection volumes satisfy the threshold for installation of a traffic signal during the AM and PM peak hours. After installation of a signal, the intersection will operate at an overall level-of-service “B” or better in both the AM and PM peak hours.

LEFT-TURN PHASE ANALYSIS:

The results of a left-turn phase analysis indicated that a “protected+permissive” is warranted for the eastbound left-turn movements. Results of the analysis are included in the Appendix.

Windy Hill Rd @ Davis Rd Ext

Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} \div N_o$)	Cross-Product Warrant?	Peak Volume Warrant?	Turn Phase Recommended?
NBL & SBT	0	0	1	0	NO	NO	NO
SBL & NBT	0	70	1	0	NO	NO	NO
EBL & WBT	934	71	2	33,157	Lagging Phase	NO	YES, Lagging
WBL & EBT	1,851	0	3	0	NO	NO	NO

LEFT TURN CRITERIA - AM PEAK HOUR

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Windy Hill Rd @ Davis Rd Ext

Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} \div N_o$)	Cross-Product Warrant?	Peak Volume Warrant?	Turn Phase Recommended?
NBL & SBT	0	0	1	0	NO	NO	NO
SBL & NBT	0	68	1	0	NO	NO	NO
EBL & WBT	1,971	123	2	121,217	YES	Lagging Phase	YES, Leading
WBL & EBT	1,376	0	3	0	NO	NO	NO

LEFT TURN CRITERIA - PM PEAK HOUR

A&R Engineering Inc.

CRASH HISTORY:

We reviewed last five years' crash history at the study intersection from GEARS portal, and it indicated that only two crashes were reported during 2019 and 2023 and the manner of collision of both crashes was "Not A Collision with Motor Vehicle" and none involved any injuries or fatalities. One crash was on February 26, 2021 and the second was on October 4, 2023.

CONCLUSIONS & RECOMMENDATIONS:

The results of the signal warrant analysis indicate that the future traffic volumes at the intersection of Windy Hill Road at Davis Road Extension meet the warrant 3 (using the major street and minor street volumes) and warrants 2 and 3 (using the major street left/U-turn volumes as minor street and the opposing approach major street volumes as major street), for installation of a signal at the study intersection of Windy Hill Road and Davis Road Extension. Since the study intersection will operate at an unsatisfactory level of service without a traffic signal, we recommend the following, if City of Smyrna approves a traffic signal considering the short distance from the existing traffic signal at Windy Hill Road and Atlanta Road.

- Install a traffic signal with 'protected-permissive' phasing for eastbound left-turn movements.
- Coordinate the signal with the traffic signal at Windy Hill Road and Atlanta Road.
- Construct a westbound right-turn lane on Windy Hill Road
- Southbound Davis Road Extension approach to have a shared left/right-turn lane.



PREPARED BY: _____
A&R Engineering, Inc.

DATE: 10-07-2024

APPENDIX

- A. Location Map
- B. Warrant Analysis Sheets
- C. Traffic Count Information
- D. Future Capacity Analysis (With and without signal)
- E. Volumes Worksheet
- F. Left-Turn Phase Analysis.
- G. Crash Report

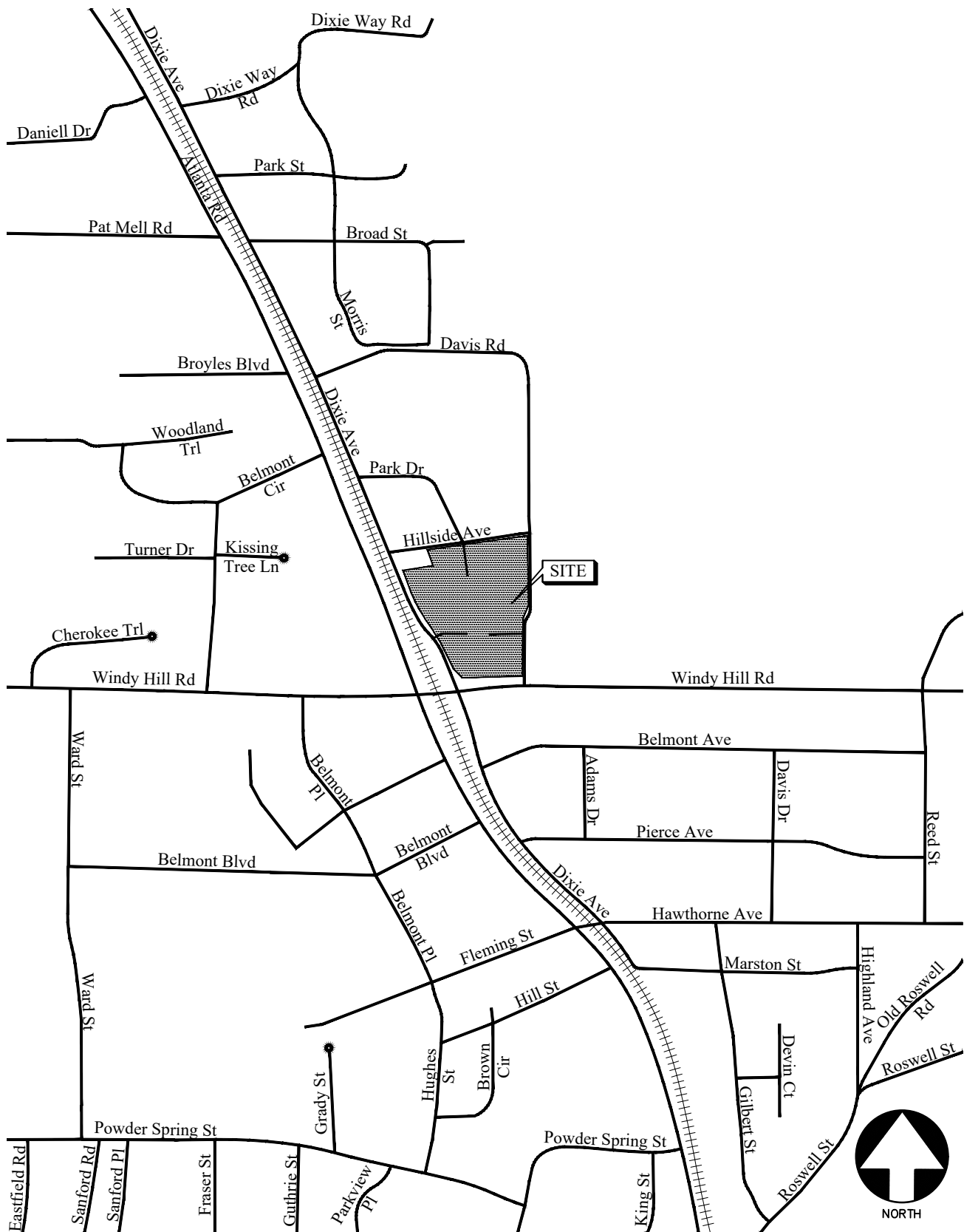


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Smyrna, Georgia



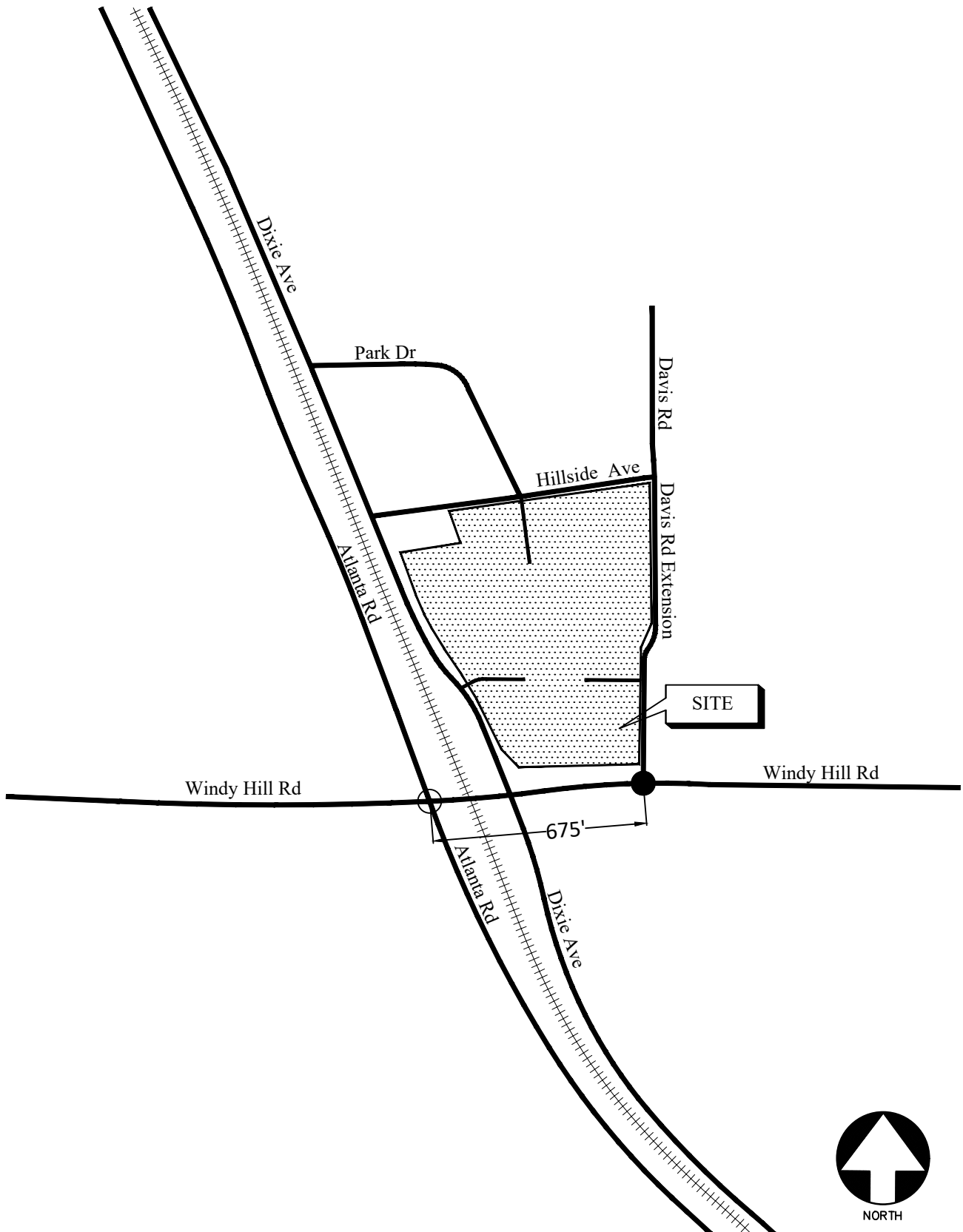
A - LOCATION MAP



LOCATION MAP

LEGEND

- - SIGNALIZED INTERSECTION WITHIN 1 MILE OF STUDY INTERSECTION
- - STUDY INTERSECTION



ADJACENT SIGNALIZED INTERSECTIONS

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**B - WARRANT ANALYSIS SHEETS
MAJOR AND MINOR STREET VOLUMES &
LEFT-TURNS AT MAJOR STREET**

A&R ENGINEERING, INC.

SIGNAL WARRANT ANALYSIS SUMMARY REPORT - Windy Hill Road @ Davis Road Extension

Project Number : 24-164

Report Date : October 7, 2024

Counts Date : September 5, 2024

Major Street : Windy Hill Road

Lanes @ Intersection : Major Street - 2

Minor Street : Davis Road Extension

Minor Street - 1

Speed on Major Street : 30

Analyst : PRI

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Minor Street				Minor Street			
	Northbound				Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 100% RT Turn Reduction
12:00 AM	0	0	0	0	1	0	0	1
1:00 AM	0	0	0	0	1	0	0	1
2:00 AM	0	0	0	0	1	0	0	1
3:00 AM	0	0	0	0	1	0	0	1
4:00 AM	0	0	0	0	3	1	33	2
5:00 AM	0	0	0	0	10	3	30	7
6:00 AM	0	0	0	0	45	15	33	30
7:00 AM	0	0	0	0	112	40	36	72
8:00 AM	0	0	0	0	109	39	36	70
9:00 AM	0	0	0	0	62	21	34	41
10:00 AM	0	0	0	0	59	20	34	39
11:00 AM	0	0	0	0	75	25	33	50
12:00 PM	0	0	0	0	87	29	33	58
1:00 PM	0	0	0	0	80	27	34	53
2:00 PM	0	0	0	0	87	29	33	58
3:00 PM	0	0	0	0	91	31	34	60
4:00 PM	0	0	0	0	106	37	35	69
5:00 PM	0	0	0	0	104	36	35	68
6:00 PM	0	0	0	0	100	34	34	66
7:00 PM	0	0	0	0	97	33	34	64
8:00 PM	0	0	0	0	74	25	34	49
9:00 PM	0	0	0	0	44	15	34	29
10:00 PM	0	0	0	0	18	6	33	12
11:00 PM	0	0	0	0	6	2	33	4
Total				0				905

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24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Major Street				Major Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	3	0	0	3	4	3	75	4
1:00 AM	1	0	0	1	1	1	100	1
2:00 AM	1	0	0	1	1	1	100	1
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	1	0	0	1	1	1	100	1
5:00 AM	1	0	0	1	1	1	100	1
6:00 AM	6	0	0	6	8	6	75	8
7:00 AM	1713	0	0	1713	935	13	1	935
8:00 AM	1922	0	0	1922	967	33	3	967
9:00 AM	1665	0	0	1665	874	23	3	874
10:00 AM	1483	0	0	1483	781	28	4	781
11:00 AM	1373	0	0	1373	760	36	5	760
12:00 PM	1399	0	0	1399	859	43	5	859
1:00 PM	1345	0	0	1345	934	40	4	934
2:00 PM	1128	0	0	1128	1084	36	3	1084
3:00 PM	1160	0	0	1160	1393	46	3	1393
4:00 PM	1268	0	0	1268	1749	56	3	1749
5:00 PM	1499	0	0	1499	2043	72	4	2043
6:00 PM	1229	0	0	1229	1718	58	3	1718
7:00 PM	996	0	0	996	1310	48	4	1310
8:00 PM	35	0	0	35	47	33	70	47
9:00 PM	22	0	0	22	31	22	71	31
10:00 PM	11	0	0	11	16	11	69	16
11:00 PM	5	0	0	5	7	5	71	7
Total				18266				15524

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WARRANT ANALYSIS RESULTS - Windy Hill Road @ Davis Road Extension

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

WARRANT 1 NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	0	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	7	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

TABLE 3

HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	7	1	0	0	0	0
1:00 AM	2	1	0	0	0	0
2:00 AM	2	1	0	0	0	0
3:00 AM	0	1	0	0	0	0
4:00 AM	2	2	0	0	0	0
5:00 AM	2	7	0	0	0	0
6:00 AM	14	30	0	0	0	0
7:00 AM	2648	72	MAJOR	MAJOR	MAJOR	BOTH
8:00 AM	2889	70	MAJOR	MAJOR	MAJOR	BOTH
9:00 AM	2539	41	MAJOR	MAJOR	MAJOR	MAJOR
10:00 AM	2264	39	MAJOR	MAJOR	MAJOR	MAJOR
11:00 AM	2133	50	MAJOR	MAJOR	MAJOR	MAJOR
12:00 PM	2258	58	MAJOR	MAJOR	MAJOR	MAJOR
1:00 PM	2279	53	MAJOR	MAJOR	MAJOR	MAJOR
2:00 PM	2212	58	MAJOR	MAJOR	MAJOR	MAJOR
3:00 PM	2553	60	MAJOR	MAJOR	MAJOR	BOTH
4:00 PM	3017	69	MAJOR	MAJOR	MAJOR	BOTH
5:00 PM	3542	68	MAJOR	MAJOR	MAJOR	BOTH
6:00 PM	2947	66	MAJOR	MAJOR	MAJOR	BOTH
7:00 PM	2306	64	MAJOR	MAJOR	MAJOR	BOTH
8:00 PM	82	49	0	0	0	0
9:00 PM	53	29	0	0	0	0
10:00 PM	27	12	0	0	0	0
11:00 PM	12	4	0	0	0	0
TOTAL	33790	905				

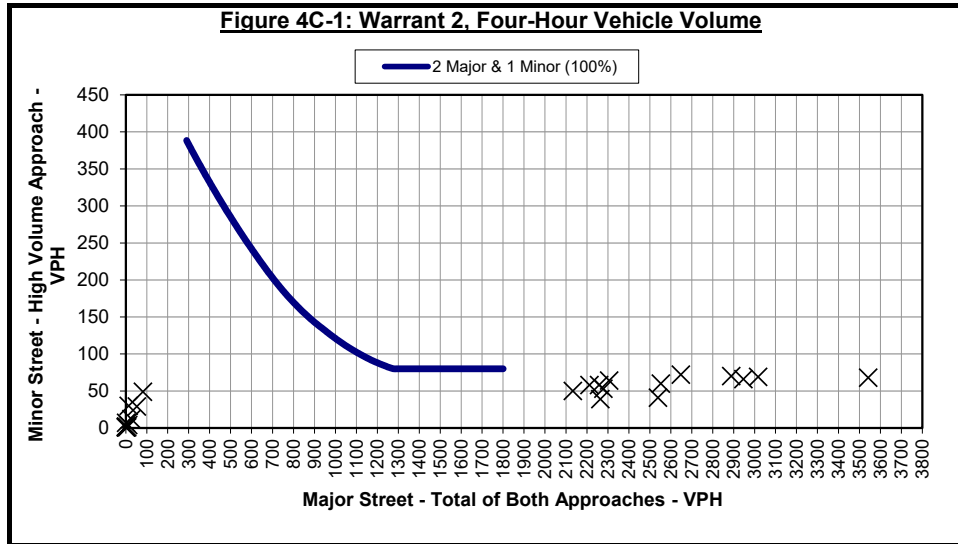
CRITERIA**	STANDARD 1 - 100%		STANDARD 2 - 80%	
	CONDITION A	CONDITION B	CONDITION A	CONDITION B
MAJOR ST	600	900	480	720
MINOR ST	150	75	120	60
NO. OF HOURS MET	0	0	0	7

A&R ENGINEERING, INC.

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

WARRANT 2* NOT SATISFIED

0 HOURS



WARRANT 3, PEAK HOUR

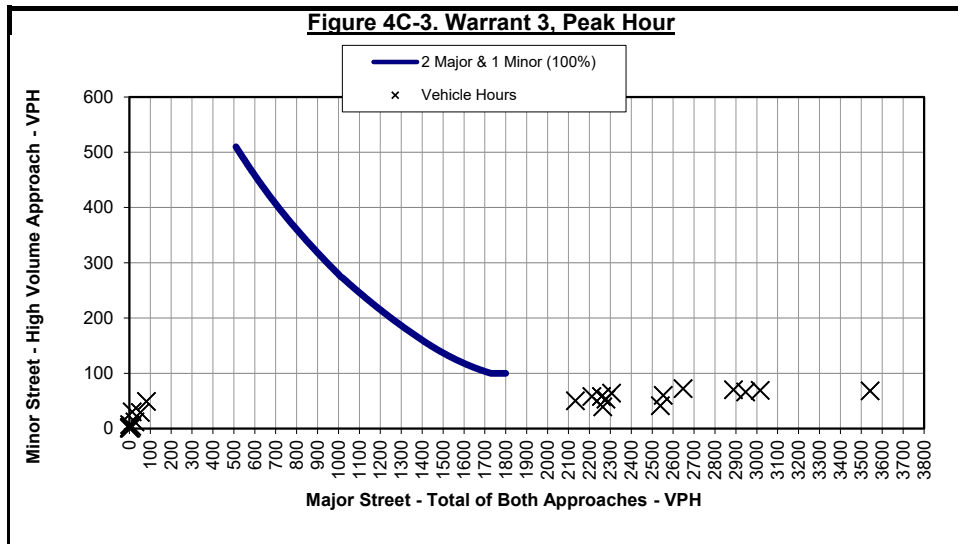
STANDARD A SATISFIED

7 VEHICLE HOURS

- 112 Peak Hour Minor-Street Volume
- 226 Average Minor-Street Delay (seconds)
- 1 Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED

0 HOURS



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, Page 4C-7 for WARRANT 2, and FIGURES 4C-3 & 4C-4, Page 4C-9 in section C of the MUTCD 2009 edition for WARRANT 3.

A&R ENGINEERING, INC.

WARRANT 4, PEDESTRIAN VOLUME

WARRANT 4	NOT EVALUATED		
STANDARD A	NOT SATISFIED	0	HOURS
STANDARD B	NOT SATISFIED	0	HOURS

WARRANT 5, SCHOOL CROSSING

WARRANT 5 NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 NOT SATISFIED

WARRANT 8, ROADWAY NETWORK

WARRANT 8 NOT EVALUATED

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 NOT EVALUATED

A&R ENGINEERING, INC.

SIGNAL WARRANT ANALYSIS SUMMARY REPORT - Windy Hill Road @ Davis Road Extension

OPTIONAL ANALYSIS: At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major-street" volume.

Project Number : 24-164

Report Date : October 7, 2024

Counts Date : September 5, 2024

Major Street : Windy Hill Road

Minor Street : Davis Road Extension

Speed on Major Street : 30

Lanes @ Intersection : Major Street - 2

Minor Street - 1

Analyst : PRI

WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

WARRANT 1 NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	4	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	11	HOURS

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

WARRANT 2 SATISFIED 4 HOURS

WARRANT 3, PEAK HOUR

WARRANT 3	SATISFIED		
STANDARD A	SATISFIED	7	VEHICLE HOURS
STANDARD B	SATISFIED	1	HOURS

WARRANT 4, PEDESTRIAN VOLUME

WARRANT 4	NOT EVALUATED		
STANDARD A	NOT SATISFIED	0	HOURS
STANDARD B	NOT SATISFIED	0	HOURS

WARRANT 5, SCHOOL CROSSING

WARRANT 5 NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 SATISFIED

WARRANT 8, ROADWAY NETWORK

WARRANT 8 NOT EVALUATED

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 NOT EVALUATED

A&R ENGINEERING, INC.

SIGNAL WARRANT ANALYSIS SUMMARY REPORT - Windy Hill Road @ Davis Road Extension

Project Number : 24-164

Report Date : October 7, 2024

Counts Date : September 5, 2024

Major Street : Windy Hill Road

Minor Street : Davis Road Extension

Speed on Major Street : 30

Lanes @ Intersection : Major Street - 2

Minor Street - 1

Analyst : PRI

WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

WARRANT 1 NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	0	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	7	HOURS

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

WARRANT 2 NOT SATISFIED 0 HOURS

WARRANT 3, PEAK HOUR

WARRANT 3	SATISFIED		
STANDARD A	SATISFIED	7	VEHICLE HOURS
STANDARD B	NOT SATISFIED	0	HOURS

WARRANT 4, PEDESTRIAN VOLUME

WARRANT 4	NOT EVALUATED		
STANDARD A	NOT SATISFIED	0	HOURS
STANDARD B	NOT SATISFIED	0	HOURS

WARRANT 5, SCHOOL CROSSING

WARRANT 5 NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 NOT SATISFIED

WARRANT 8, ROADWAY NETWORK

WARRANT 8 NOT EVALUATED

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 NOT EVALUATED

A&R ENGINEERING, INC.

SIGNAL WARRANT ANALYSIS SUMMARY REPORT - Windy Hill Road @ Davis Road Extension

Project Number : 24-164 Report Date : October 7, 2024
 Counts Date : September 5, 2024
 Major Street : Windy Hill Road Lanes @ Intersection : Major Street - 2
 Minor Street : Davis Road Extension Minor Street - 1
 Speed on Major Street : 30 Analyst : PRI

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

WARRANT 1 NOT SATISFIED

STANDARD 1	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	4	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	1	HOURS
		CONDITION B	11	HOURS

HOURLY TRAFFIC VOLUME EVALUATION

HOUR OF DAY	MAJOR ST OPPOSING (MAJOR MOVEMENT)	MAJOR ST LEFT TURN VOLUME (MINOR MOVEMENT)	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	1	3	0	0	0	0
1:00 AM	0	1	0	0	0	0
2:00 AM	0	1	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	1	0	0	0	0
5:00 AM	0	1	0	0	0	0
6:00 AM	2	6	0	0	0	0
7:00 AM	935	62	MAJOR	MAJOR	MAJOR	BOTH
8:00 AM	967	71	MAJOR	MAJOR	MAJOR	BOTH
9:00 AM	874	53	MAJOR	0	MAJOR	MAJOR
10:00 AM	781	58	MAJOR	0	MAJOR	MAJOR
11:00 AM	760	60	MAJOR	0	MAJOR	BOTH
12:00 PM	859	73	MAJOR	0	MAJOR	BOTH
1:00 PM	934	70	MAJOR	MAJOR	MAJOR	BOTH
2:00 PM	1084	63	MAJOR	MAJOR	MAJOR	BOTH
3:00 PM	1393	70	MAJOR	MAJOR	MAJOR	BOTH
4:00 PM	1749	87	MAJOR	BOTH	MAJOR	BOTH
5:00 PM	2043	123	MAJOR	BOTH	BOTH	BOTH
6:00 PM	1718	90	MAJOR	BOTH	MAJOR	BOTH
7:00 PM	1310	80	MAJOR	BOTH	MAJOR	BOTH
8:00 PM	14	35	0	0	0	0
9:00 PM	9	22	0	0	0	0
10:00 PM	5	11	0	0	0	0
11:00 PM	2	5	0	0	0	0
TOTAL	15440	1046				

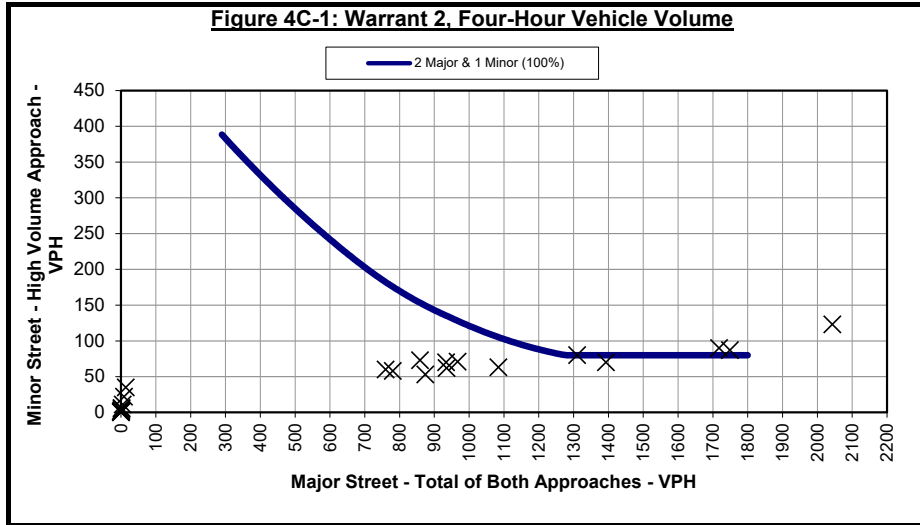
CRITERIA**	STANDARD 1 - 100%		STANDARD 2 - 80%		
	CONDITION A	CONDITION B	CONDITION A	CONDITION B	
	MAJOR ST	600	900	480	720
	MINOR ST	150	75	120	60
NO. OF HOURS MET	0	4	1	11	

A&R ENGINEERING, INC.

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

WARRANT 2 SATISFIED

4 HOURS



WARRANT 3, PEAK HOUR

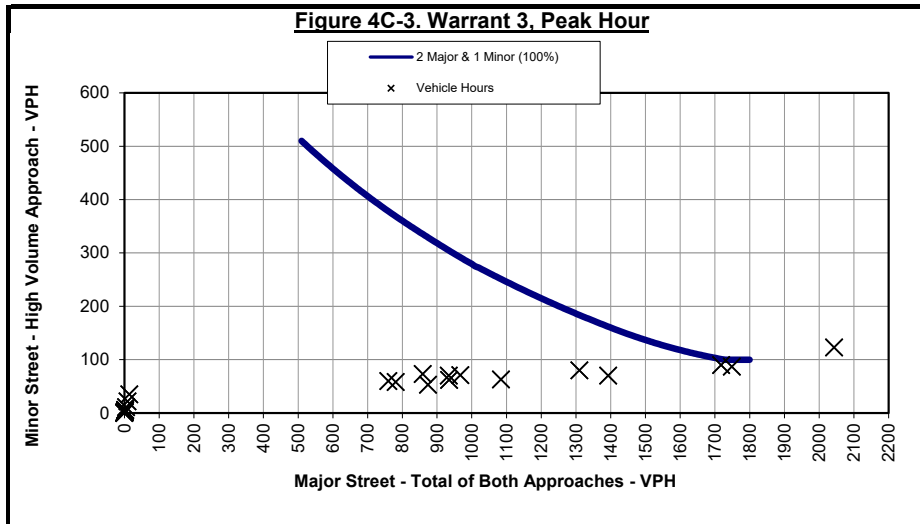
STANDARD A SATISFIED

7 VEHICLE HOURS

- 112 Peak Hour Minor-Street Volume
- 237 Average Minor-Street Delay (seconds)
- 1 Number of Approach Lanes (Minor Street)

STANDARD B SATISFIED

1 HOURS



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, Page 4C-7 for WARRANT 2, and FIGURES 4C-3 & 4C-4, Page 4C-9 in section C of the MUTCD 2009 edition for WARRANT 3.

A&R ENGINEERING, INC.

WARRANT 4, PEDESTRIAN VOLUME

WARRANT 4	NOT EVALUATED		
	STANDARD A	NOT SATISFIED	0 HOURS
	STANDARD B	NOT SATISFIED	0 HOURS

WARRANT 5, SCHOOL CROSSING

WARRANT 5 NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 SATISFIED

WARRANT 8, ROADWAY NETWORK

WARRANT 8 NOT EVALUATED

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 NOT EVALUATED

C – TRAFFIC COUNT INFORMATION

A & R Engineering, Inc.

2160 Kingston Court, Suite 'O'
Marietta, GA 30067

TMC Data
Median Break on Windy Hill Rd East of
Dixie Avenue
7am - 8pm

File Name : 20240348
Site Code : 20240348
Start Date : 09-05-2024
Page No : 1

Groups Printed- Cars, Buses & Trucks

Start Time	Northbound				Southbound				Windy Hill Road Eastbound					Windy Hill Road Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	343	0	8	351	0	190	0	190	541
07:15 AM	0	0	0	0	0	0	0	0	0	429	0	11	440	0	223	0	223	663
07:30 AM	0	0	0	0	0	0	0	0	0	454	0	16	470	0	259	0	259	729
07:45 AM	0	0	0	0	0	0	0	0	0	392	0	12	404	0	226	0	226	630
Total	0	0	0	0	0	0	0	0	0	1618	0	47	1665	0	898	0	898	2563
08:00 AM	0	0	0	0	0	0	0	0	0	443	0	7	450	0	212	0	212	662
08:15 AM	0	0	0	0	0	0	0	0	0	462	0	9	471	0	234	0	234	705
08:30 AM	0	0	0	0	0	0	0	0	0	472	0	9	481	0	237	0	237	718
08:45 AM	0	0	0	0	0	0	0	0	0	438	0	11	449	0	219	0	219	668
Total	0	0	0	0	0	0	0	0	0	1815	0	36	1851	0	902	0	902	2753
09:00 AM	0	0	0	0	0	0	0	0	0	412	0	8	420	0	207	0	207	627
09:15 AM	0	0	0	0	0	0	0	0	0	406	0	4	410	0	213	0	213	623
09:30 AM	0	0	0	0	0	0	0	0	0	388	0	9	397	0	206	0	206	603
09:45 AM	0	0	0	0	0	0	0	0	0	374	0	7	381	0	198	0	198	579
Total	0	0	0	0	0	0	0	0	0	1580	0	28	1608	0	824	0	824	2432
10:00 AM	0	0	0	0	0	0	0	0	0	367	0	9	376	0	191	0	191	567
10:15 AM	0	0	0	0	0	0	0	0	0	341	0	6	347	0	183	0	183	530
10:30 AM	0	0	0	0	0	0	0	0	0	349	0	8	357	0	187	0	187	544
10:45 AM	0	0	0	0	0	0	0	0	0	340	0	5	345	0	165	0	165	510
Total	0	0	0	0	0	0	0	0	0	1397	0	28	1425	0	726	0	726	2151
11:00 AM	0	0	0	0	0	0	0	0	0	333	0	6	339	0	173	0	173	512
11:15 AM	0	0	0	0	0	0	0	0	0	315	0	4	319	0	166	0	166	485
11:30 AM	0	0	0	0	0	0	0	0	0	319	0	6	325	0	174	0	174	499
11:45 AM	0	0	0	0	0	0	0	0	0	320	0	6	326	0	181	0	181	507
Total	0	0	0	0	0	0	0	0	0	1287	0	22	1309	0	694	0	694	2003
12:00 PM	0	0	0	0	0	0	0	0	0	307	0	8	315	0	189	0	189	504
12:15 PM	0	0	0	0	0	0	0	0	0	318	0	7	325	0	193	0	193	518
12:30 PM	0	0	0	0	0	0	0	0	0	334	0	7	341	0	195	0	195	536
12:45 PM	0	0	0	0	0	0	0	0	0	341	0	5	346	0	205	0	205	551
Total	0	0	0	0	0	0	0	0	0	1300	0	27	1327	0	782	0	782	2109
01:00 PM	0	0	0	0	0	0	0	0	0	327	0	9	336	0	209	0	209	545
01:15 PM	0	0	0	0	0	0	0	0	0	319	0	5	324	0	213	0	213	537
01:30 PM	0	0	0	0	0	0	0	0	0	307	0	8	315	0	218	0	218	533
01:45 PM	0	0	0	0	0	0	0	0	0	297	0	5	302	0	220	0	220	522
Total	0	0	0	0	0	0	0	0	0	1250	0	27	1277	0	860	0	860	2137
02:00 PM	0	0	0	0	0	0	0	0	0	283	0	7	290	0	226	0	226	516
02:15 PM	0	0	0	0	0	0	0	0	0	262	0	9	271	0	247	0	247	518
02:30 PM	0	0	0	0	0	0	0	0	0	241	0	4	245	0	259	0	259	504
02:45 PM	0	0	0	0	0	0	0	0	0	258	0	5	263	0	281	0	281	544
Total	0	0	0	0	0	0	0	0	0	1044	0	25	1069	0	1013	0	1013	2082

A & R Engineering, Inc.

2160 Kingston Court, Suite 'O'
Marietta, GA 30067

TMC Data
Median Break on Windy Hill Rd East of
Dixie Avenue
7am - 8pm

File Name : 20240348
Site Code : 20240348
Start Date : 09-05-2024
Page No : 2

Groups Printed- Cars, Buses & Trucks

Start Time	Northbound				Southbound				Windy Hill Road Eastbound					Windy Hill Road Westbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	App. Total	
03:00 PM	0	0	0	0	0	0	0	0	0	254	0	4	258	0	307	0	307	565
03:15 PM	0	0	0	0	0	0	0	0	0	266	0	6	272	0	323	0	323	595
03:30 PM	0	0	0	0	0	0	0	0	0	271	0	8	279	0	315	0	315	594
03:45 PM	0	0	0	0	0	0	0	0	0	278	0	4	282	0	356	0	356	638
Total	0	0	0	0	0	0	0	0	0	1069	0	22	1091	0	1301	0	1301	2392
04:00 PM	0	0	0	0	0	0	0	0	0	282	0	6	288	0	392	0	392	680
04:15 PM	0	0	0	0	0	0	0	0	0	273	0	9	282	0	389	0	389	671
04:30 PM	0	0	0	0	0	0	0	0	0	289	0	5	294	0	410	0	410	704
04:45 PM	0	0	0	0	0	0	0	0	0	314	0	8	322	0	445	0	445	767
Total	0	0	0	0	0	0	0	0	0	1158	0	28	1186	0	1636	0	1636	2822
05:00 PM	0	0	0	0	0	0	0	0	0	345	0	13	358	0	464	0	464	822
05:15 PM	0	0	0	0	0	0	0	0	0	341	0	15	356	0	516	0	516	872
05:30 PM	0	0	0	0	0	0	0	0	0	349	0	11	360	0	477	0	477	837
05:45 PM	0	0	0	0	0	0	0	0	0	305	0	10	315	0	448	0	448	763
Total	0	0	0	0	0	0	0	0	0	1340	0	49	1389	0	1905	0	1905	3294
06:00 PM	0	0	0	0	0	0	0	0	0	299	0	8	307	0	421	0	421	728
06:15 PM	0	0	0	0	0	0	0	0	0	285	0	8	293	0	406	0	406	699
06:30 PM	0	0	0	0	0	0	0	0	0	273	0	6	279	0	392	0	392	671
06:45 PM	0	0	0	0	0	0	0	0	0	260	0	7	267	0	384	0	384	651
Total	0	0	0	0	0	0	0	0	0	1117	0	29	1146	0	1603	0	1603	2749
07:00 PM	0	0	0	0	0	0	0	0	0	245	0	8	253	0	339	0	339	592
07:15 PM	0	0	0	0	0	0	0	0	0	229	0	7	236	0	314	0	314	550
07:30 PM	0	0	0	0	0	0	0	0	0	215	0	6	221	0	296	0	296	517
07:45 PM	0	0	0	0	0	0	0	0	0	209	0	8	217	0	269	0	269	486
Total	0	0	0	0	0	0	0	0	0	898	0	29	927	0	1218	0	1218	2145
Grand Total	0	0	0	0	0	0	0	0	0	16873	0	397	17270	0	14362	0	14362	31632
Apprch %	0	0	0		0	0	0		0	97.7	0	2.3		0	100	0		
Total %	0	0	0	0	0	0	0	0	0	53.3	0	1.3	54.6	0	45.4	0	45.4	

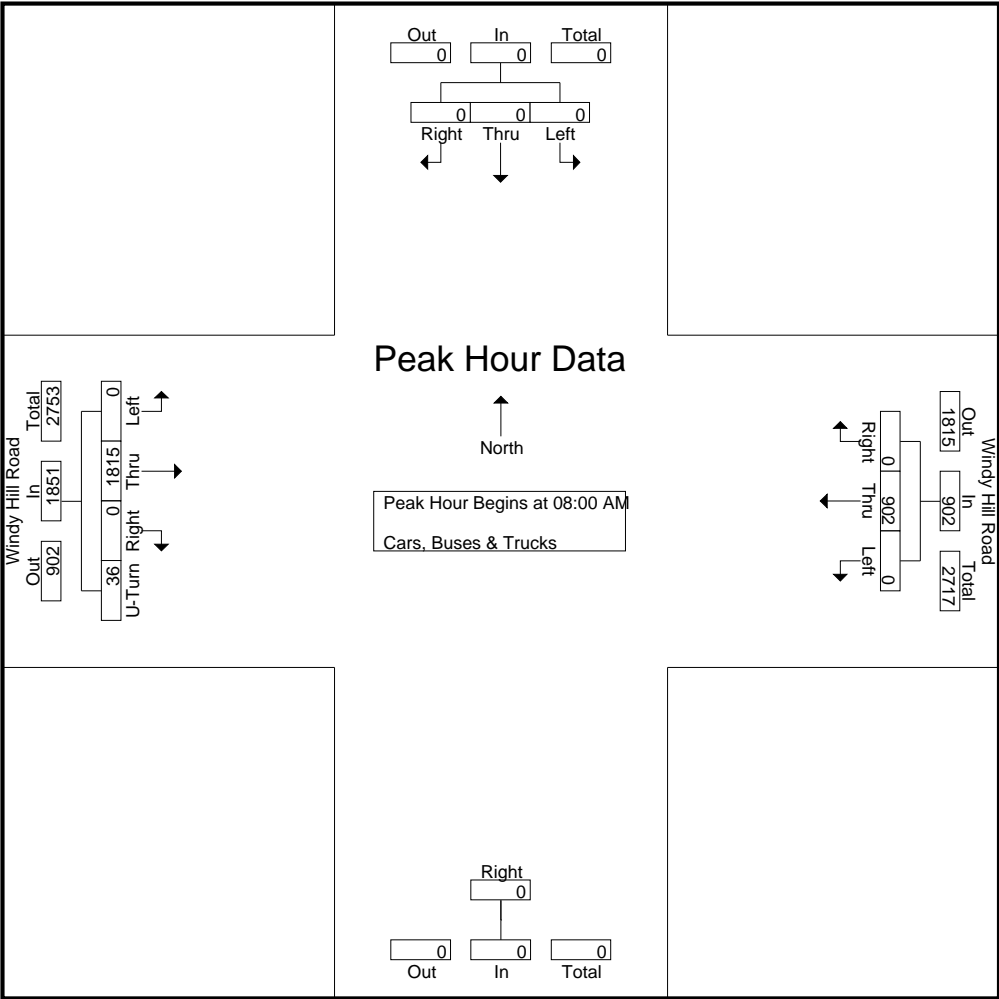
A & R Engineering, Inc.

2160 Kingston Court, Suite 'O'
Marietta, GA 30067

TMC Data
Median Break on Windy Hill Rd East of
Dixie Avenue
7am - 8pm

File Name : 20240348
Site Code : 20240348
Start Date : 09-05-2024
Page No : 3

	Northbound				Southbound				Windy Hill Road Eastbound					Windy Hill Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 08:00 AM																		
08:00 AM	0	0	0	0	0	0	0	0	0	443	0	7	450	0	212	0	212	662
08:15 AM	0	0	0	0	0	0	0	0	0	462	0	9	471	0	234	0	234	705
08:30 AM	0	0	0	0	0	0	0	0	0	472	0	9	481	0	237	0	237	718
08:45 AM	0	0	0	0	0	0	0	0	0	438	0	11	449	0	219	0	219	668
Total Volume	0	0	0	0	0	0	0	0	0	1815	0	36	1851	0	902	0	902	2753
% App. Total	0	0	0		0	0	0		0	98.1	0	1.9		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.961	.000	.818	.962	.000	.951	.000	.951	.959



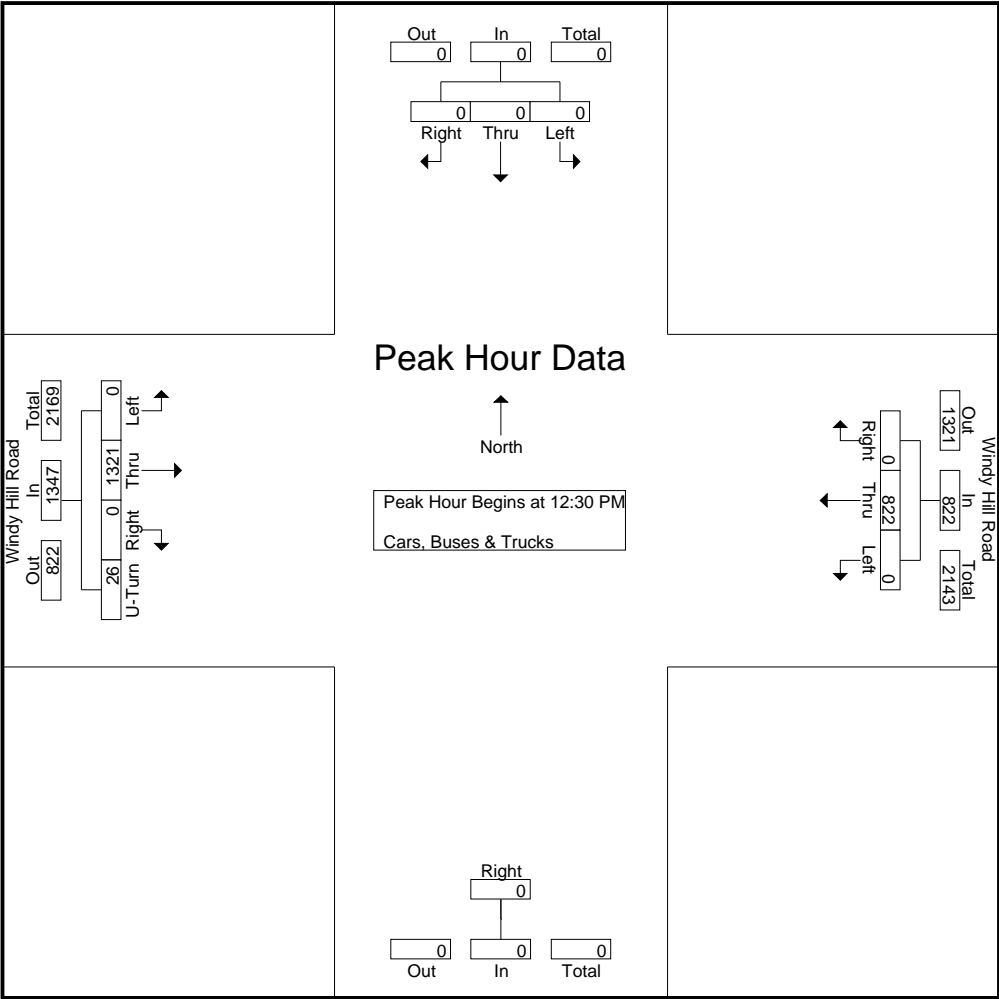
A & R Engineering, Inc.

2160 Kingston Court, Suite 'O'
Marietta, GA 30067

TMC Data
Median Break on Windy Hill Rd East of
Dixie Avenue
7am - 8pm

File Name : 20240348
Site Code : 20240348
Start Date : 09-05-2024
Page No : 4

	Northbound				Southbound				Windy Hill Road Eastbound					Windy Hill Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 12:30 PM																		
12:30 PM	0	0	0	0	0	0	0	0	0	334	0	7	341	0	195	0	195	536
12:45 PM	0	0	0	0	0	0	0	0	0	341	0	5	346	0	205	0	205	551
01:00 PM	0	0	0	0	0	0	0	0	0	327	0	9	336	0	209	0	209	545
01:15 PM	0	0	0	0	0	0	0	0	0	319	0	5	324	0	213	0	213	537
Total Volume	0	0	0	0	0	0	0	0	0	1321	0	26	1347	0	822	0	822	2169
% App. Total	0	0	0		0	0	0		0	98.1	0	1.9		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.968	.000	.722	.973	.000	.965	.000	.965	.984



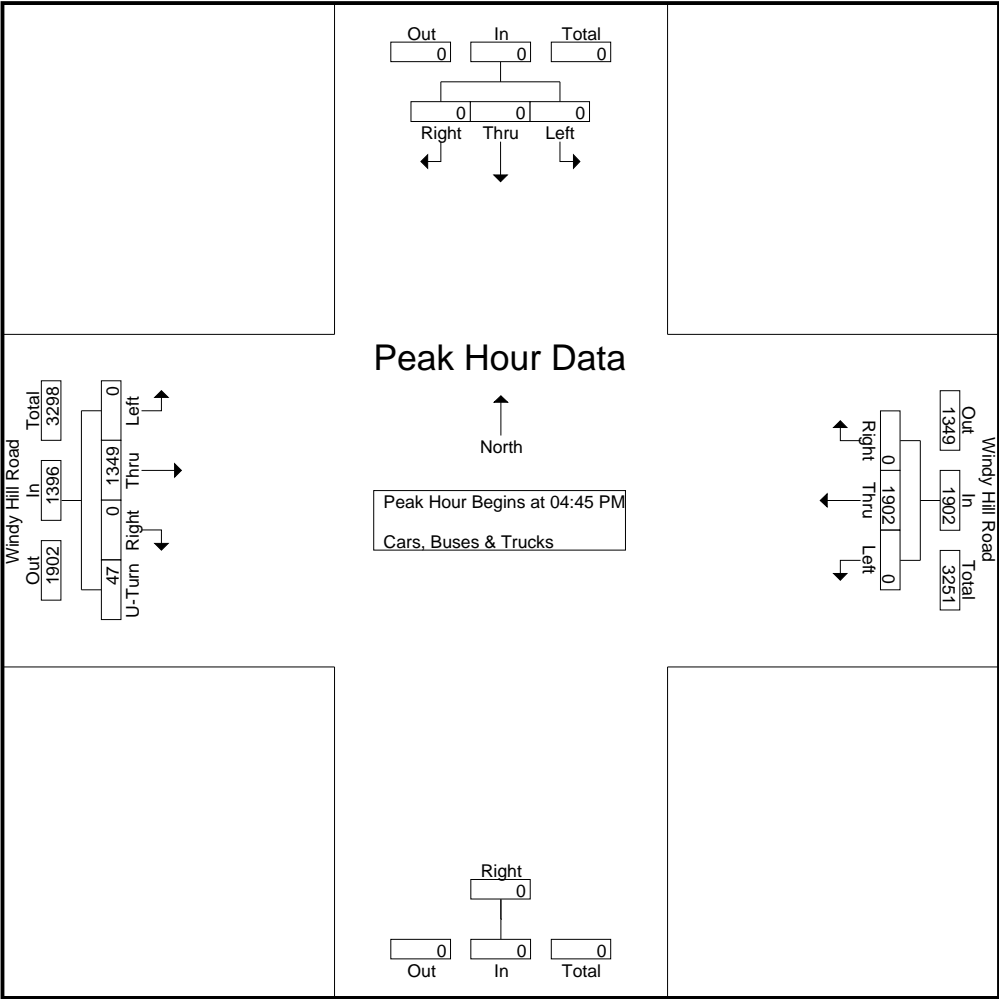
A & R Engineering, Inc.

2160 Kingston Court, Suite 'O'
Marietta, GA 30067







TMC Data
Median Break on Windy Hill Rd East of
Dixie Avenue
7am - 8pm







File Name : 20240348
Site Code : 20240348
Start Date : 09-05-2024
Page No : 5

	Northbound				Southbound				Windy Hill Road Eastbound					Windy Hill Road Westbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	App. Total	Int. 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	0	0	0	0	0	0	0	0	314	0	8	322	0	445	0	445	767
05:00 PM	0	0	0	0	0	0	0	0	0	345	0	13	358	0	464	0	464	822
05:15 PM	0	0	0	0	0	0	0	0	0	341	0	15	356	0	516	0	516	872
05:30 PM	0	0	0	0	0	0	0	0	0	349	0	11	360	0	477	0	477	837
Total Volume	0	0	0	0	0	0	0	0	0	1349	0	47	1396	0	1902	0	1902	3298
% App. Total	0	0	0		0	0	0		0	96.6	0	3.4		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.966	.000	.783	.969	.000	.922	.000	.922	.946



**D - FUTURE CAPACITY ANALYSIS
(WITH AND WITHOUT SIGNAL)**

Intersection								
Int Delay, s/veh	8.6							
Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Vol, veh/h	37	34	1851	0	934	33	70	39
Future Vol, veh/h	37	34	1851	0	934	33	70	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	None
Storage Length	-	145	-	165	-	75	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	92	96	96	92	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	40	35	1928	0	973	34	73	41
Major/Minor	Major1		Major2		Minor2			
Conflicting Flow All	973	973	0	1408	-	0	1894	487
Stage 1	-	-	-	-	-	-	973	-
Stage 2	-	-	-	-	-	-	921	-
Critical Hdwy	6.44	4.14	-	5.64	-	-	6.29	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.04	-
Follow-up Hdwy	2.52	2.22	-	2.32	-	-	3.67	3.32
Pot Cap-1 Maneuver	346	704	-	260	-	-	81	526
Stage 1	-	-	-	-	-	-	319	-
Stage 2	-	-	-	-	-	-	323	-
Platoon blocked, %			-		-	-		
Mov Cap-1 Maneuver	430	430	-	260	-	-	~ 67	526
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 67	-
Stage 1	-	-	-	-	-	-	263	-
Stage 2	-	-	-	-	-	-	323	-
Approach	EB		WB		SB			
HCM Control Delay, s	0.6		0		225.5			
HCM LOS	F							
Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1		
Capacity (veh/h)	430	-	260	-	-	97		
HCM Lane V/C Ratio	0.176	-	-	-	-	1.171		
HCM Control Delay (s)	15.2	-	0	-	-	225.5		
HCM Lane LOS	C	-	A	-	-	F		
HCM 95th %tile Q(veh)	0.6	-	0	-	-	7.6		
Notes								
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon		

Intersection								
Int Delay, s/veh	9.1							
Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Traffic Vol, veh/h	48	75	1376	0	1971	72	68	36
Future Vol, veh/h	48	75	1376	0	1971	72	68	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	None
Storage Length	-	145	-	165	-	75	0	-
Veh in Median Storage, #	-	-	0	-	0	-	0	-
Grade, %	-	-	0	-	0	-	0	-
Peak Hour Factor	92	95	95	92	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	52	79	1448	0	2075	76	72	38
Major/Minor	Major1		Major2		Minor2			
Conflicting Flow All	2075	2075	0	1057	-	0	2916	1038
Stage 1	-	-	-	-	-	-	2075	-
Stage 2	-	-	-	-	-	-	841	-
Critical Hdwy	6.44	4.14	-	5.64	-	-	6.29	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.04	-
Follow-up Hdwy	2.52	2.22	-	2.32	-	-	3.67	3.32
Pot Cap-1 Maneuver	66	264	-	408	-	-	~ 19	228
Stage 1	-	-	-	-	-	-	81	-
Stage 2	-	-	-	-	-	-	356	-
Platoon blocked, %			-		-	-		
Mov Cap-1 Maneuver	107	107	-	408	-	-	0	228
Mov Cap-2 Maneuver	-	-	-	-	-	-	0	-
Stage 1	-	-	-	-	-	-	0	-
Stage 2	-	-	-	-	-	-	356	-
Approach	EB		WB		SB			
HCM Control Delay, s	19.7		0		34.6			
HCM LOS	D							
Minor Lane/Major Mvmt	EBL	EBT	WBU	WBT	WBR	SBLn1		
Capacity (veh/h)	107	-	408	-	-	228		
HCM Lane V/C Ratio	1.225	-	-	-	-	0.48		
HCM Control Delay (s)	237	-	0	-	-	34.6		
HCM Lane LOS	F	-	A	-	-	D		
HCM 95th %tile Q(veh)	8.7	-	0	-	-	2.4		
Notes								
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon		

Timings 5: Windy Hill Rd & Davis Rd Extension

3a. Build AM 2026
10/24/2024



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL
Lane Configurations		↔	↔↔↔	↔↔	↔	↔
Traffic Volume (vph)	37	34	1851	934	33	70
Future Volume (vph)	37	34	1851	934	33	70
Lane Group Flow (vph)	0	75	1928	973	34	114
Turn Type	pm+pt	pm+pt	NA	NA	Perm	Prot
Protected Phases	5	5	2	6		4
Permitted Phases	2	2			6	
Detector Phase	5	5	2	6	6	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	15.0	15.0	15.0	6.0
Minimum Split (s)	15.0	15.0	23.5	23.5	23.5	23.5
Total Split (s)	19.0	19.0	90.0	71.0	71.0	30.0
Total Split (%)	15.8%	15.8%	75.0%	59.2%	59.2%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	
Recall Mode	None	None	C-Min	C-Min	C-Min	None
v/c Ratio		0.17	0.47	0.38	0.03	0.60
Control Delay		3.4	3.2	7.6	4.0	54.7
Queue Delay		0.0	0.0	0.0	0.0	0.0
Total Delay		3.4	3.2	7.6	4.0	54.7
Queue Length 50th (ft)		9	87	141	3	70
Queue Length 95th (ft)		m13	m110	214	15	126
Internal Link Dist (ft)			158	555		383
Turn Bay Length (ft)		145			75	
Base Capacity (vph)		525	4114	2572	1155	367
Starvation Cap Reductn		0	392	0	0	0
Spillback Cap Reductn		0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0
Reduced v/c Ratio		0.14	0.52	0.38	0.03	0.31

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTU, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Windy Hill Rd & Davis Rd Extension



HCM 6th Signalized Intersection Summary

5: Windy Hill Rd & Davis Rd Extension

3a. Build AM 2026

10/24/2024



Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations		↩	↑↑↑	↩	↑↑	↗	↘	
Traffic Volume (veh/h)	37	34	1851	0	934	33	70	39
Future Volume (veh/h)	37	34	1851	0	934	33	70	39
Initial Q (Qb), veh		0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00				1.00	1.00	1.00
Parking Bus, Adj		1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach			No		No		No	
Adj Sat Flow, veh/h/ln		1870	1870		1870	1870	1870	1870
Adj Flow Rate, veh/h		35	1928		973	0	73	41
Peak Hour Factor		0.96	0.96		0.96	0.96	0.96	0.96
Percent Heavy Veh, %		2	2		2	2	2	2
Cap, veh/h		491	4214		2668		90	51
Arrive On Green		0.03	0.83		0.75	0.00	0.08	0.08
Sat Flow, veh/h		1781	5274		3647	1585	1083	608
Grp Volume(v), veh/h		35	1928		973	0	115	0
Grp Sat Flow(s),veh/h/ln		1781	1702		1777	1585	1707	0
Q Serve(g_s), s		0.5	12.7		11.3	0.0	7.9	0.0
Cycle Q Clear(g_c), s		0.5	12.7		11.3	0.0	7.9	0.0
Prop In Lane		1.00				1.00	0.63	0.36
Lane Grp Cap(c), veh/h		491	4214		2668		142	0
V/C Ratio(X)		0.07	0.46		0.36		0.81	0.00
Avail Cap(c_a), veh/h		640	4214		2668		348	0
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00		1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh		3.3	2.9		5.1	0.0	54.1	0.0
Incr Delay (d2), s/veh		0.1	0.4		0.4	0.0	10.5	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.1	3.2		3.8	0.0	3.9	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		3.4	3.3		5.5	0.0	64.6	0.0
LnGrp LOS		A	A		A		E	A
Approach Vol, veh/h			1963		973		115	
Approach Delay, s/veh			3.3		5.5		64.6	
Approach LOS			A		A		E	
Timer - Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		104.5		15.5	8.9	95.6		
Change Period (Y+Rc), s		5.5		5.5	5.5	5.5		
Max Green Setting (Gmax), s		84.5		24.5	13.5	65.5		
Max Q Clear Time (g_c+I1), s		14.7		9.9	2.5	13.3		
Green Ext Time (p_c), s		52.0		0.2	0.0	18.5		

Intersection Summary

HCM 6th Ctrl Delay	6.3
HCM 6th LOS	A

Notes

User approved volume balancing among the lanes for turning movement.

User approved ignoring U-Turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Timings 5: Windy Hill Rd & Davis Rd Extension

3b. Build PM 2026
10/24/2024



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL
Lane Configurations		↔	↔↔↔	↔↔	↔	↔
Traffic Volume (vph)	48	75	1376	1971	72	68
Future Volume (vph)	48	75	1376	1971	72	68
Lane Group Flow (vph)	0	131	1448	2075	76	110
Turn Type	pm+pt	pm+pt	NA	NA	Perm	Prot
Protected Phases	5	5	2	6		4
Permitted Phases	2	2			6	
Detector Phase	5	5	2	6	6	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	15.0	15.0	23.5	23.5	23.5	23.5
Total Split (s)	15.0	15.0	95.0	80.0	80.0	25.0
Total Split (%)	12.5%	12.5%	79.2%	66.7%	66.7%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lead		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	
Recall Mode	None	None	C-Min	C-Min	C-Min	None
v/c Ratio		0.66	0.35	0.85	0.07	0.59
Control Delay		55.0	0.4	20.2	5.8	55.2
Queue Delay		0.0	0.0	0.0	0.0	0.0
Total Delay		55.0	0.4	20.2	5.8	55.2
Queue Length 50th (ft)		73	6	582	12	68
Queue Length 95th (ft)		m101	m9	#965	35	124
Internal Link Dist (ft)			158	555		383
Turn Bay Length (ft)		145			75	
Base Capacity (vph)		215	4121	2430	1094	295
Starvation Cap Reductn		0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0
Reduced v/c Ratio		0.61	0.35	0.85	0.07	0.37

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTU, Start of Green

Natural Cycle: 100

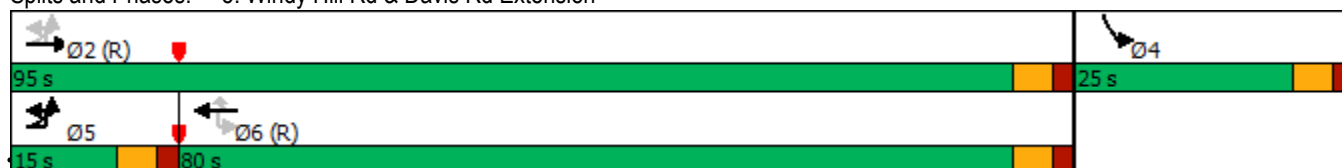
Control Type: Actuated-Coordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Windy Hill Rd & Davis Rd Extension



HCM 6th Signalized Intersection Summary

5: Windy Hill Rd & Davis Rd Extension

3b. Build PM 2026

10/24/2024



Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations		↩	↑↑↑	↩	↑↑	↗	↘	
Traffic Volume (veh/h)	48	75	1376	0	1971	72	68	36
Future Volume (veh/h)	48	75	1376	0	1971	72	68	36
Initial Q (Qb), veh		0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00				1.00	1.00	1.00
Parking Bus, Adj		1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach			No		No		No	
Adj Sat Flow, veh/h/ln		1870	1870		1870	1870	1870	1870
Adj Flow Rate, veh/h		79	1448		2075	0	72	38
Peak Hour Factor		0.95	0.95		0.95	0.95	0.95	0.95
Percent Heavy Veh, %		2	2		2	2	2	2
Cap, veh/h		206	4230		2643		89	47
Arrive On Green		0.04	0.83		0.74	0.00	0.08	0.08
Sat Flow, veh/h		1781	5274		3647	1585	1109	585
Grp Volume(v), veh/h		79	1448		2075	0	111	0
Grp Sat Flow(s),veh/h/ln		1781	1702		1777	1585	1710	0
Q Serve(g_s), s		1.1	8.2		43.1	0.0	7.7	0.0
Cycle Q Clear(g_c), s		1.1	8.2		43.1	0.0	7.7	0.0
Prop In Lane		1.00				1.00	0.65	0.34
Lane Grp Cap(c), veh/h		206	4230		2643		137	0
V/C Ratio(X)		0.38	0.34		0.79		0.81	0.00
Avail Cap(c_a), veh/h		278	4230		2643		278	0
HCM Platoon Ratio		1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00		1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh		16.6	2.5		9.5	0.0	54.3	0.0
Incr Delay (d2), s/veh		1.2	0.2		2.4	0.0	10.9	0.0
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		1.3	2.0		15.0	0.0	3.7	0.0
Unsig. Movement Delay, s/veh								
LnGrp Delay(d),s/veh		17.7	2.7		11.9	0.0	65.2	0.0
LnGrp LOS		B	A		B		E	A
Approach Vol, veh/h			1527		2075		111	
Approach Delay, s/veh			3.5		11.9		65.2	
Approach LOS			A		B		E	
Timer - Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		104.9		15.1	10.1	94.8		
Change Period (Y+Rc), s		5.5		5.5	5.5	5.5		
Max Green Setting (Gmax), s		89.5		19.5	9.5	74.5		
Max Q Clear Time (g_c+I1), s		10.2		9.7	3.1	45.1		
Green Ext Time (p_c), s		17.2		0.2	0.1	21.7		

Intersection Summary

HCM 6th Ctrl Delay	10.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

User approved ignoring U-Turning movement.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

E - VOLUME WORKSHEETS

24-164 - Res & Fitness Center Development on Windy Hill Road, Smyrna, GA
Existing Counts

Traffic Volumes

A&R Engineering
Oct-24

	Northbound			Southbound			U+Left	Eastbound			Left	Westbound		
	Left	Through	Right	Left	Through	Right		Through	Right	Total		Through	Right	Total
12:00 Midnight - 1:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 a.m. - 2:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 a.m. - 3:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 a.m. - 4:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 a.m. - 5:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 a.m. - 6:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 a.m. - 7:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 a.m. - 8:00 a.m.	0	0	0	0	0	0	47	1618	0	1665	0	898	0	898
8:00 a.m. - 9:00 a.m.	0	0	0	0	0	0	36	1815	0	1851	0	902	0	902
9:00 a.m. - 10:00 a.m.	0	0	0	0	0	0	28	1580	0	1608	0	824	0	824
10:00 a.m. - 11:00 a.m.	0	0	0	0	0	0	28	1397	0	1425	0	726	0	726
11:00 a.m. - 12:00 Noon	0	0	0	0	0	0	22	1287	0	1309	0	694	0	694
12:00 a.m. - 1:00 p.m.	0	0	0	0	0	0	27	1300	0	1327	0	782	0	782
1:00 p.m. - 2:00 p.m.	0	0	0	0	0	0	27	1250	0	1277	0	860	0	860
2:00 p.m. - 3:00 p.m.	0	0	0	0	0	0	25	1044	0	1069	0	1013	0	1013
3:00 p.m. - 4:00 p.m.	0	0	0	0	0	0	22	1069	0	1091	0	1301	0	1301
4:00 p.m. - 5:00 p.m.	0	0	0	0	0	0	28	1158	0	1186	0	1636	0	1636
5:00 p.m. - 6:00 p.m.	0	0	0	0	0	0	49	1340	0	1389	0	1905	0	1905
6:00 p.m. - 7:00 p.m.	0	0	0	0	0	0	29	1117	0	1146	0	1603	0	1603
7:00 p.m. - 8:00 p.m.	0	0	0	0	0	0	29	898	0	927	0	1218	0	1218
8:00 p.m. - 9:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 p.m. - 10:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 p.m. - 11:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 p.m. - 12:00 Midnight	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Check	0	0	0	0	0	0	397	16873	0	17270	0	14362	0	14362

24-164 - Res & Fitness Center Development on Windy Hill Road, Smyrna, GA
Traffic Volumes

Base Counts

A&R Engineering
Oct-24

	Northbound			Southbound				Eastbound			Westbound		
	Left	Through	Right	Total	Left	Through	Right	Total	U+Left	Through	Right	Total	Left
12:00 Midnight - 1:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 a.m. - 2:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 a.m. - 3:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 a.m. - 4:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 a.m. - 5:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 a.m. - 6:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 a.m. - 7:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 a.m. - 8:00 a.m.	0	0	0	0	0	0	0	1651	48	1651	0	1699	0
8:00 a.m. - 9:00 a.m.	0	0	0	0	0	0	0	1851	37	1851	0	1888	0
9:00 a.m. - 10:00 a.m.	0	0	0	0	0	0	0	1612	29	1612	0	1641	0
10:00 a.m. - 11:00 a.m.	0	0	0	0	0	0	0	1425	29	1425	0	1454	0
11:00 a.m. - 12:00 Noon	0	0	0	0	0	0	0	1313	22	1313	0	1335	0
12:00 a.m. - 1:00 p.m.	0	0	0	0	0	0	0	1326	28	1326	0	1354	0
1:00 p.m. - 2:00 p.m.	0	0	0	0	0	0	0	1275	28	1275	0	1303	0
2:00 p.m. - 3:00 p.m.	0	0	0	0	0	0	0	1065	26	1065	0	1091	0
3:00 p.m. - 4:00 p.m.	0	0	0	0	0	0	0	1090	22	1090	0	1112	0
4:00 p.m. - 5:00 p.m.	0	0	0	0	0	0	0	1181	29	1181	0	1210	0
5:00 p.m. - 6:00 p.m.	0	0	0	0	0	0	0	1367	50	1367	0	1417	0
6:00 p.m. - 7:00 p.m.	0	0	0	0	0	0	0	1139	30	1139	0	1169	0
7:00 p.m. - 8:00 p.m.	0	0	0	0	0	0	0	916	30	916	0	946	0
8:00 p.m. - 9:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 p.m. - 10:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 p.m. - 11:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 p.m. - 12:00 Midnight	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Check	0	0	0	0	0	0	0	17211	408	17211	0	17619	0
	0	0	0	0	0	0	0	14650	0	14650	0	14650	0

24-164 - Res & Fitness Center Development on Windy Hill Road, Smyrna, GA
 Traffic Volumes
 Site Generated

A&R Engineering
 Oct-24

	Northbound			Southbound Davis Road Extension			U+Left	Eastbound Windy Hill Road			Left	Westbound Windy Hill Road		
	Left	Through	Right	Total	Left	Through	Right	Total	Through	Right	Total	Through	Right	Total
12:00 Midnight - 1:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 a.m. - 2:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 a.m. - 3:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 a.m. - 4:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 a.m. - 5:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 a.m. - 6:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 a.m. - 7:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 a.m. - 8:00 a.m.	0	0	0	0	7	0	7	14	0	0	0	0	0	0
8:00 a.m. - 9:00 a.m.	0	0	0	0	2	0	2	4	0	0	0	0	0	0
9:00 a.m. - 10:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 a.m. - 11:00 a.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 a.m. - 12:00 Noon	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 a.m. - 1:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 p.m. - 2:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 p.m. - 3:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 p.m. - 4:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 p.m. - 5:00 p.m.	0	0	0	0	4	0	4	8	0	0	0	0	0	0
5:00 p.m. - 6:00 p.m.	0	0	0	0	2	0	2	4	0	0	0	0	0	0
6:00 p.m. - 7:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 p.m. - 8:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 p.m. - 9:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 p.m. - 10:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 p.m. - 11:00 p.m.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 p.m. - 12:00 Midnight	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume Check	0	0	0	0	15	0	15	30	0	0	0	0	0	0

A&R Engineering
Oct-24

Volume Check

24-164 - Res & Fitness Center Development on Windy Hill Road, Smyrna, GA
Traffic Volumes
Future Volumes Adjusted

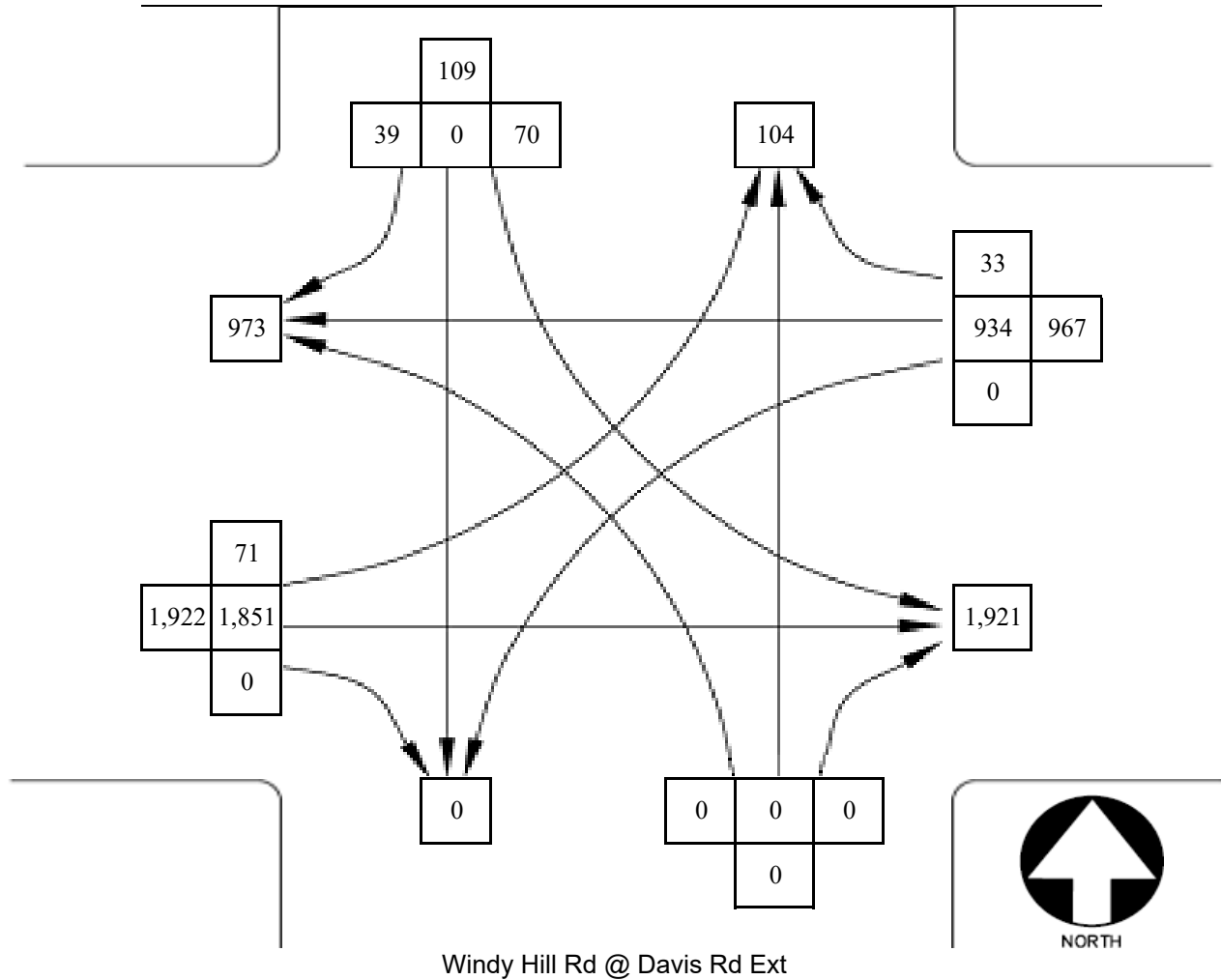
A&R Engineering
Oct-24

	Northbound			Southbound			Eastbound			Westbound		
	Left	Through	Right	Left	Through	Right	Up+Left	Windy Hill Road Through	Right	Left	Windy Hill Road Through	Right
12:00 Midnight - 1:00 a.m.	0	0	0	1	0	0	3	0	0	0	1	3
1:00 a.m. - 2:00 a.m.	0	0	0	1	0	0	1	0	0	0	0	1
2:00 a.m. - 3:00 a.m.	0	0	0	1	0	0	1	0	0	0	0	1
3:00 a.m. - 4:00 a.m.	0	0	0	1	0	0	0	0	0	0	0	0
4:00 a.m. - 5:00 a.m.	0	0	0	2	0	1	1	0	0	0	0	1
5:00 a.m. - 6:00 a.m.	0	0	0	7	0	3	1	0	0	0	0	1
6:00 a.m. - 7:00 a.m.	0	0	0	30	0	15	6	0	0	0	2	6
7:00 a.m. - 8:00 a.m.	0	0	0	72	0	40	62	1651	0	922	13	935
8:00 a.m. - 9:00 a.m.	0	0	0	70	0	39	71	1851	0	934	33	967
9:00 a.m. - 10:00 a.m.	0	0	0	41	0	21	53	1612	0	851	23	874
10:00 a.m. - 11:00 a.m.	0	0	0	39	0	20	58	1425	0	753	28	781
11:00 a.m. - 12:00 Noon	0	0	0	50	0	25	60	1313	0	724	36	760
12:00 a.m. - 1:00 p.m.	0	0	0	58	0	29	73	1326	0	816	43	859
1:00 p.m. - 2:00 p.m.	0	0	0	53	0	27	70	1275	0	894	40	934
2:00 p.m. - 3:00 p.m.	0	0	0	58	0	29	63	1065	0	1048	36	1084
3:00 p.m. - 4:00 p.m.	0	0	0	60	0	31	70	1090	0	1347	46	1393
4:00 p.m. - 5:00 p.m.	0	0	0	69	0	37	87	1181	0	1693	56	1749
5:00 p.m. - 6:00 p.m.	0	0	0	68	0	36	123	1376	0	1971	72	2043
6:00 p.m. - 7:00 p.m.	0	0	0	66	0	34	90	1139	0	1660	58	1718
7:00 p.m. - 8:00 p.m.	0	0	0	64	0	33	80	916	0	1262	48	1310
8:00 p.m. - 9:00 p.m.	0	0	0	49	0	25	35	0	0	0	14	33
9:00 p.m. - 10:00 p.m.	0	0	0	29	0	15	22	0	0	0	9	22
10:00 p.m. - 11:00 p.m.	0	0	0	12	0	6	11	0	0	0	5	11
11:00 p.m. - 12:00 Midnight	0	0	0	4	0	2	5	0	0	0	2	5
Volume Check	0	0	0	905	0	488	1046	17220	0	14908	616	15524

F - LEFT-TURN PHASE ANALYSIS

Future 2026 Traffic Count Summary Sheet

Peak Hour Count (AM)



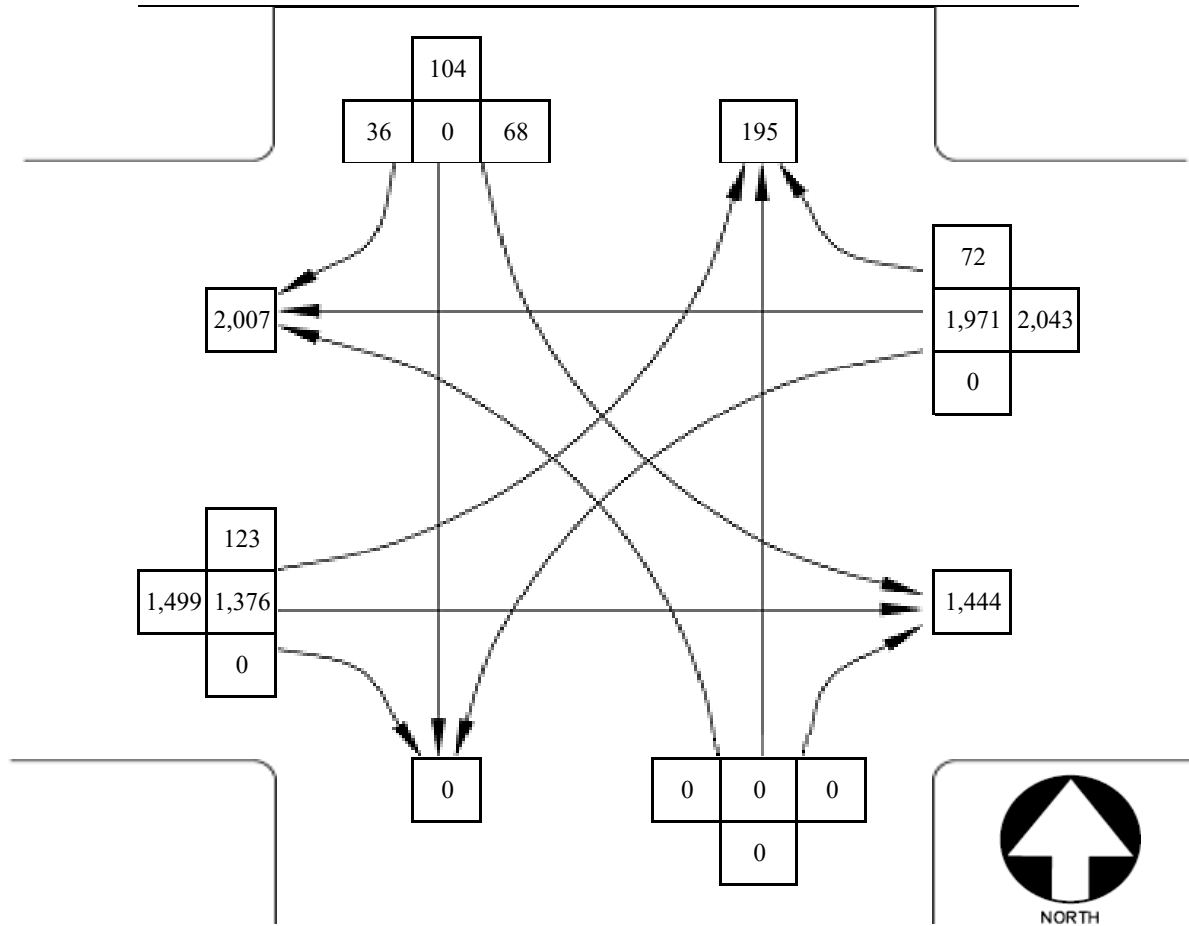
Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} + N_o$)	Cross-Product Warrant?	Peak Volume Warrant?	Turn Phase Recommended?
NBL & SBT	0	0	1	0	NO	NO	NO
SBL & NBT	0	70	1	0	NO	NO	NO
EBL & WBT	934	71	2	33,157	Lagging Phase	NO	YES, Lagging
WBL & EBT	1,851	0	3	0	NO	NO	NO

LEFT TURN CRITERIA - AM PEAK HOUR

A&R Engineering Inc.

Future 2026 Traffic Count Summary Sheet

Peak Hour Count (PM)



Windy Hill Rd @ Davis Rd Ext

Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} \div N_o$)	Cross-Product Warrant?	Peak Volume Warrant?	Turn Phase Recommended?
NBL & SBT	0	0	1	0	NO	NO	NO
SBL & NBT	0	68	1	0	NO	NO	NO
EBL & WBT	1,971	123	2	121,217	YES	Lagging Phase	YES, Leading
WBL & EBT	1,376	0	3	0	NO	NO	NO

LEFT TURN CRITERIA - PM PEAK HOUR

A&R Engineering Inc.

G – CRASH HISTORY

AccidentNo	AccidentNuml	Date	Time	County	Route	Milelog	IntersectingRoute	MannerOfCollision	UtMostHarmfulEvent	Injuries	Fatalities	UtFactors
7972385	7972385	2/26/2021	5:08:00	COBB	WINDY HILL RD SE	2.39	DIXIE AVE SE	Not A Collision with Motor Vehicle	Other - Fixed Object	0	0	0 Changed Lanes Improperly,Misjudged Clearance,Too Fast For Conditions
9173960	9173960	10/4/2023	11:38:00	COBB	WINDY HILL RD SE	0	ATLANTA RD SE	Not A Collision with Motor Vehicle	Embankment	0	0	0 Driver Condition