

Honorable Council Members,

My name is Aaron Dickenson and I'm with JMB Investment Company, the developer associated with the proposed Dollar General project on Springhill Rd. Mayor Dull asked me to forward you the traffic analysis as soon as it was available (I believe she is out of pocket this evening and/or tomorrow before the meeting) -- it is attached for your reference. Please note, this information was not available to the Planning Commission at our meeting a couple of weeks ago.

I've tried to summarize a few of the highlights from the analysis/study below.

1. The study explains that with the anticipated trips associated with the development of the Dollar General we will have less than a 3% impact on the background traffic condition, thereby a minimal impact on the transportation network as a whole. Background traffic is simply the projected traffic within the study area without the proposed development.
2. In regards to the northbound Springhill Rd approach, "...the Dollar General may add some delay to the northbound approach, but the analysis found that traffic queues only increased from approximately 2-3 vehicles for the background condition to 3-4 vehicles with the Dollar General Development."
3. In regards to the North and South bound Springhill Rd. Approaches "...The Dollar General does not impact the levels of service of the Woodrow Wilson Parkway and Springhill Rd. intersection"....
4. The study found that neither north or south bound turn lanes on Springhill were warranted turning into the Dollar General
5. The study found that the spacing from our proposed access to the intersection of Springhill and Woodrow Wilson (246') was acceptable.
6. With the projected Northbound queue on Springhill only 3.7 vehicles, the study found that our proposed access was outside the stopped controlled intersection's functional area.
7. The study concluded that the proposed access location should not have an adverse impact on the adjacent traffic operations and the impacts from developing a Dollar General should be manageable.

I realize all of you are getting this information extremely late and since traffic safety was overwhelmingly the largest public concern during the last meeting I've asked Rodney to table our agenda item so you all can have time to review this study as well as the additional information we sent this week. You may have time to review before the meeting tomorrow, but I wanted to be sure to give everyone ample time before this item is put to a vote.

Feel free to contact me with any questions or if additional information is needed.

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May 8, 2019

Mr. Aaron Dickenson
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RE: DOLLAR GENERAL, STAUNTON, VA.

Dear Mr. Dickenson:

In response to your request, CDM Smith has completed its review of the proposed Dollar General in Staunton, Virginia. The proposed site is illustrated in **Figure 1**. The proposed site is located adjacent to the intersection of Woodrow Wilson Parkway (VA Rt 262) and Spring Hill Road (VA Rt 613). The proposed site access is to Spring Hill Road. The proposed site location is illustrated in **Figure 2**. Woodrow Wilson Parkway, adjacent to site, is a 2-lane undivided Principal Arterial highway with shoulders and a posted speed limit of 55mph. Woodrow Wilson Parkway is a VDOT classified Major Arterial, and Spring Hill Road is a VDOT classified Minor Arterial adjacent to the site and a Major Collector north of Woodrow Wilson Parkway. Woodrow Wilson Parkway is a circumference arterial serving traffic north and west of Staunton. Interstate 81 access from Woodrow Wilson Parkway is to the east of the site. Spring Hill Road a radial arterial extends south into Staunton. Spring Hill Road is a 2-lane facility without paved shoulders and has a posted speed limit of 35mph. The Spring Hill Road approach to Woodrow Wilson Parkway is STOP controlled with an intersection flashing beacon.

Peak-hour turning movements conducted in 2016 were provided by the VDOT and the average daily traffic (ADT) is 8,400 on Woodrow Wilson Parkway west of Spring Hill Road and 9,700 east of Spring Hill Road. Spring Hill Road has an ADT of 2,500 adjacent to the site. **Figure 3** illustrates the 2016 turning movements for the intersection of Woodrow Wilson Parkway (VA Rt 262) and Spring Hill Road (VA Rt 613).

Project traffic was estimated using the data and methodologies of the publication, **Trip Generation, 10th Edition**. This reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential and commercial uses. It is an essential tool in estimating the volume of traffic likely to be generated by a proposed development. Several land uses were reviewed for this site including Shopping Center (LUC 820), Discount Store (LUC 815), and a Variety Store (LUC 814). As the use is a single store, the shopping center was excluded. Both the variety store and discount store seem to be reasonable descriptions for a Dollar General store, but the variety retail use was more conservative than the discount store.

The trip generation for the evaluation was adjusted for pass-by traffic. Studies conducted for pass-by traffic have found that a percentage of the traffic generated by commercial retail may originate from the existing traffic flow; therefore, the proposed retail use does not necessarily introduce all new traffic to the adjacent transportation system but may divert trips from the



adjacent traffic flow. Pass-by trips varies relative to specific land uses and their densities. For small retail developments, pass-by trips can be as much as 60-percent.

The trip generation for the proposed 9,100 square foot store is less than 580 daily trips and less than 65 trips peak hour trips. The trip generation of this site assumed a 35-percent reduction for pass-by trips. With the site trip generation adjusted for pass-by trips, the primary trip generation for the site is approximately 376 daily trips and 41 peak-hour trips.

Table 1
TRIP GENERATION

Land Use	LUC	Density (sqft)	Weekday				
			Daily	AM PEAK		PM PEAK	
				Enter	Exit	Enter	Exit
Variety Store	814	9,100	578	16	12	32	30
Primary Trips	65%		376	10	8	21	20
Pass-By Trips	35%		202	6	4	11	10

REFERENCE: Trip Generation, 10th Edition

Traffic from Figure 3 was increased by 11.0 percent to reflect a 1.0-percent annual growth rate assumed for the purpose of this study for 2027 background condition, a 6-year horizon from a buildout year of 2021. Background traffic is the projected traffic within the study area without the proposed development. **Figure 4** illustrates the 2027 background traffic. Trips generated were distributed to the driveway and adjacent intersection of Woodrow Wilson Parkway and Spring Hill Road. This retail use generally has an area of influence of a few miles and from pass-by traffic. Primary and pass-by trips were distributed and assigned using existing traffic patterns and a review of the residential development in the site vicinity. Pass-by or intercepted trips reflected an approximate 70- to 80-percent from Woodrow Wilson Parkway and 20- to 25-percent from Spring Hill Road adjacent to the site. Primary and pass-by trips are illustrated in **Figures 5A and 5B**. **Figure 6** illustrates the total site assigned trips, and **Figure 7** illustrates the 2027 projected traffic with the proposed Dollar General.

With the assigned trips from the Dollar General for the proposed access and the adjacent intersection, the Dollar General has less than a 3-percent impact on the background traffic condition, thereby a minimal impact on the transportation network. The peak-hour level of service for the proposed site access is B for both the AM and PM peak hours and is presented in **Table 2**. The Spring Hill Road approaches to the intersection with Woodrow Wilson Parkway is currently operating at a LOS E and approaching failure. The Spring Hill Road approaches to Woodrow Wilson Parkway fail for the background traffic conditions during the peak hours. The northbound approach failure is limited to the PM peak hour. The Dollar General may add some delay to the northbound approach, but the analysis found that traffic queues only increased from approximately 2-3 vehicles for the background condition to 3-4 vehicles with the Dollar General development. This projected failing LOS is currently being studied by VDOT.

Table 2
STOP APPROACH LEVELS OF SERVICE and QUEUES

TRAFFIC CONDITION	PEAK HOUR		WOODROW WILSON PKWY & SPRING HILL RD				SPRING HILL RD & DOLLAR GENERAL	
			NORTHBOUND		SOUTHBOUND		EASTBOUND	
			LEFT/THRU	RIGHT	LEFT/THRU	RIGHT	LEFT	RIGHT
2016 EXISTING	AM	DELAY (sec)	24	16	49.4	9.3		
		LOS	C	C	E	A		
		95TH% QUEUE	0.4	1.1	2.3	0.1		
	PM	DELAY (sec)	40.7	10.2	45.3	11.9		
		LOS	E	B	E	B		
		95TH% QUEUE	1.2	0.3	2	0.2		
2027 BACK- GROUND	AM	DELAY (sec)	29.5	18.2	92.2	9.4		
		LOS	D	C	F	A		
		95TH% QUEUE	0.6	1.4	3.9	0.1		
	PM	DELAY (sec)	70.2	10.4	74.5	12.5		
		LOS	F	B	F	B		
		95TH% QUEUE	2.1	0.4	3.2	0.2		
2027 BACK- GROUND with GENERAL DOLLAR	AM	DELAY (sec)	31.3	18.2	99.4	9.4	10.0	8.7
		LOS	D	C	F	A	B	A
		95TH% QUEUE	0.7	1.5	4.1	0.1	0.0	0.0
	PM	DELAY (sec)	110.1	10.5	85.7	12.5	11.0	9.5
		LOS	F	B	F	B	B	A
		95TH% QUEUE	3.7	0.4	3.6	0.2	0.1	0.0

REFERENCE: Highway Capacity Manual, 6th Edition

Figures 8A, 8B, and 8C illustrate the unsignalized levels of service for the proposed site access and the adjacent intersection of Woodrow Wilson Parkway and Spring Hill Road for 2016, 2027 background, and 2027 projected traffic conditions, respectively. The failing LOS for the Spring Hill Road approaches is associated with the shared left/thru movements, and the right-turn movements from these approaches will operate with a LOS B. The General Dollar does not impact the levels of service of the Woodrow Wilson Parkway and Spring Hill Road intersection and increases the shared northbound left/thru movement by 15 vehicles during the PM peak hour which equates to one vehicle every 4 minutes.



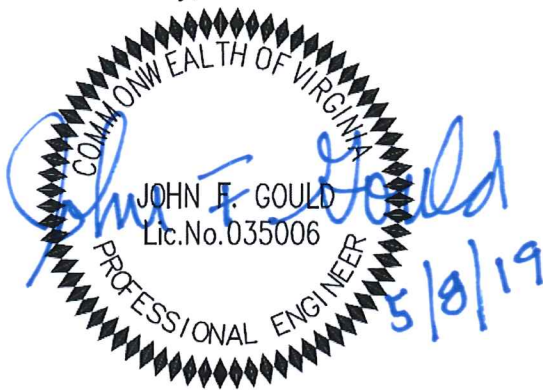
Mr. Aaron Dickenson
May 8, 2019
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The projected left- and right-turn volumes from Spring Hill Road to the proposed Dollar General site access are minimal and were not found warranting turn lanes. Turning movements from Spring Hill Road are minimal and the conflicting traffic is not significant.

The Dollar General access was limited to the lower functional street classification and located nearly 250 feet from the intersection of Woodrow Wilson Parkway and Spring Hill Road. The corner distance of the proposed access from the adjacent intersection of Woodrow Wilson Parkway and Spring Hill Road is thereby acceptable. With the projected northbound queue of 3.7 vehicles, approximately 100 feet, the access location is outside the stopped controlled intersection's functional area. **Figure 9** illustrates the corner distance and the northbound queues from Woodrow Wilson Parkway. The proposed site access location and the minimal driveway turning movements should, therefore, not have an adverse impact on the adjacent traffic operations.

Because the low projected traffic volumes to and from the site, the Dollar General store's impact is minimal and should not adversely impact the traffic background conditions determined in this evaluation. A northbound F LOS, limited to the PM peak hour, may develop with or without the Dollar General development, and queues from Woodrow Wilson Parkway should remain less than 100 feet with the development. The increased shared northbound left/thru movement is projected as 15 vehicles during the PM peak hour which equates to one vehicle every 4 minutes. The site impact should, thereby, be manageable.

If you have any questions regarding this report, please call me.
Sincerely,



John F. Gould, P.E.
Senior Transportation Engineer

Enclosures: Figures 1-9
 Capacity and LOS Analyses
 Turn Lane Warrants

Project No. 237930



Figure 1

Insert

Woodrow Wilson Pkwy (Rt 262)

Spring Hill Rd (Rt 613)

A map of the Staunton, Virginia area. A black box highlights the location of the Staunton Correctional Center, with an arrow pointing to it and the text "See Insert" below. The map shows major roads including I-64, I-81, and US-11, and labels for Staunton, Jolivue, Fishersville, and Verona. The Middle River is also visible.



Figure 2

2016 TRAFFIC Staunton, VA Dollar General

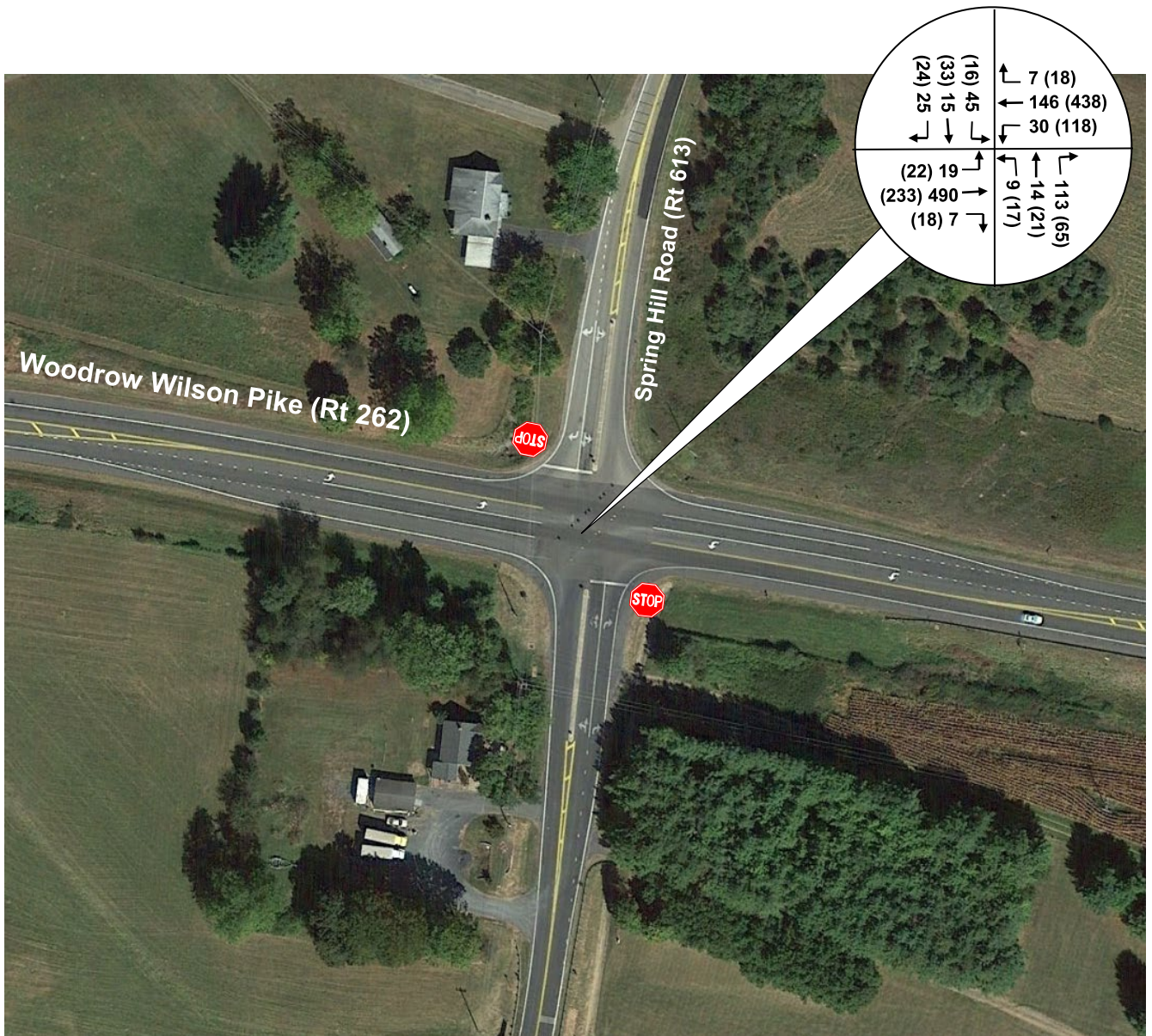
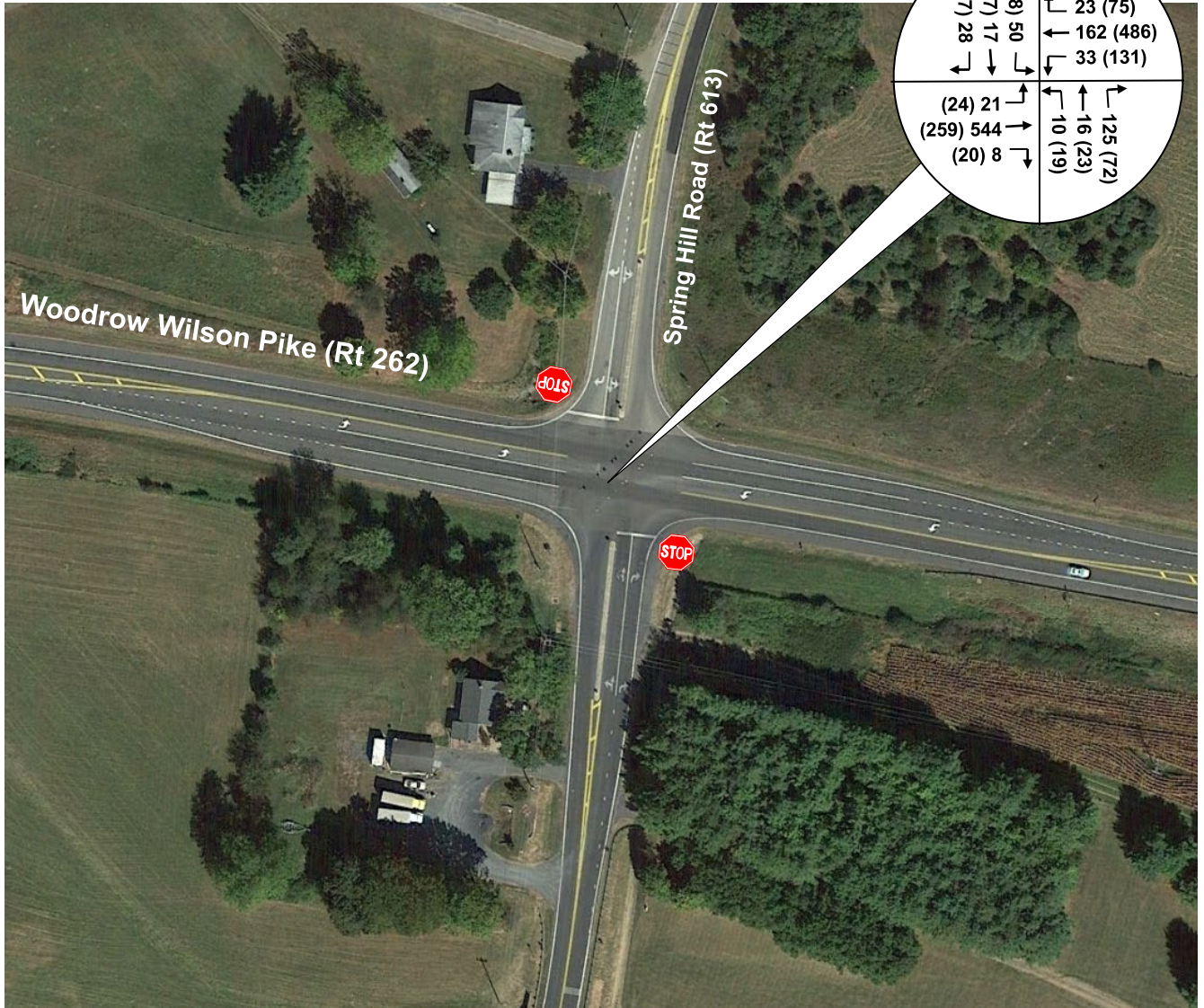


Figure 3

2027 BACKGROUND TRAFFIC Staunton, VA Dollar General



LEGEND

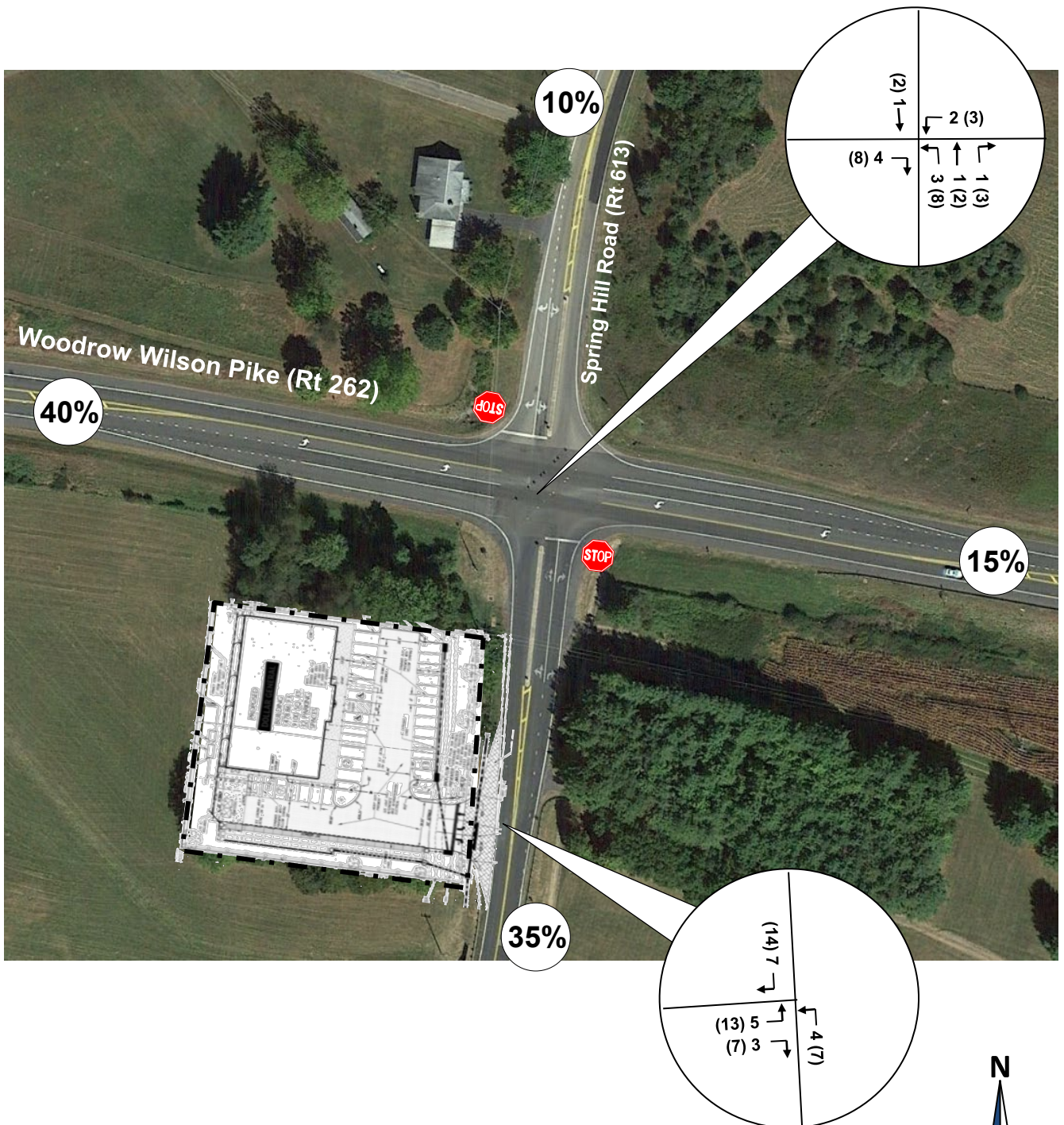
XXX AM PEAK
(XXX) PM PEAK



Figure 4

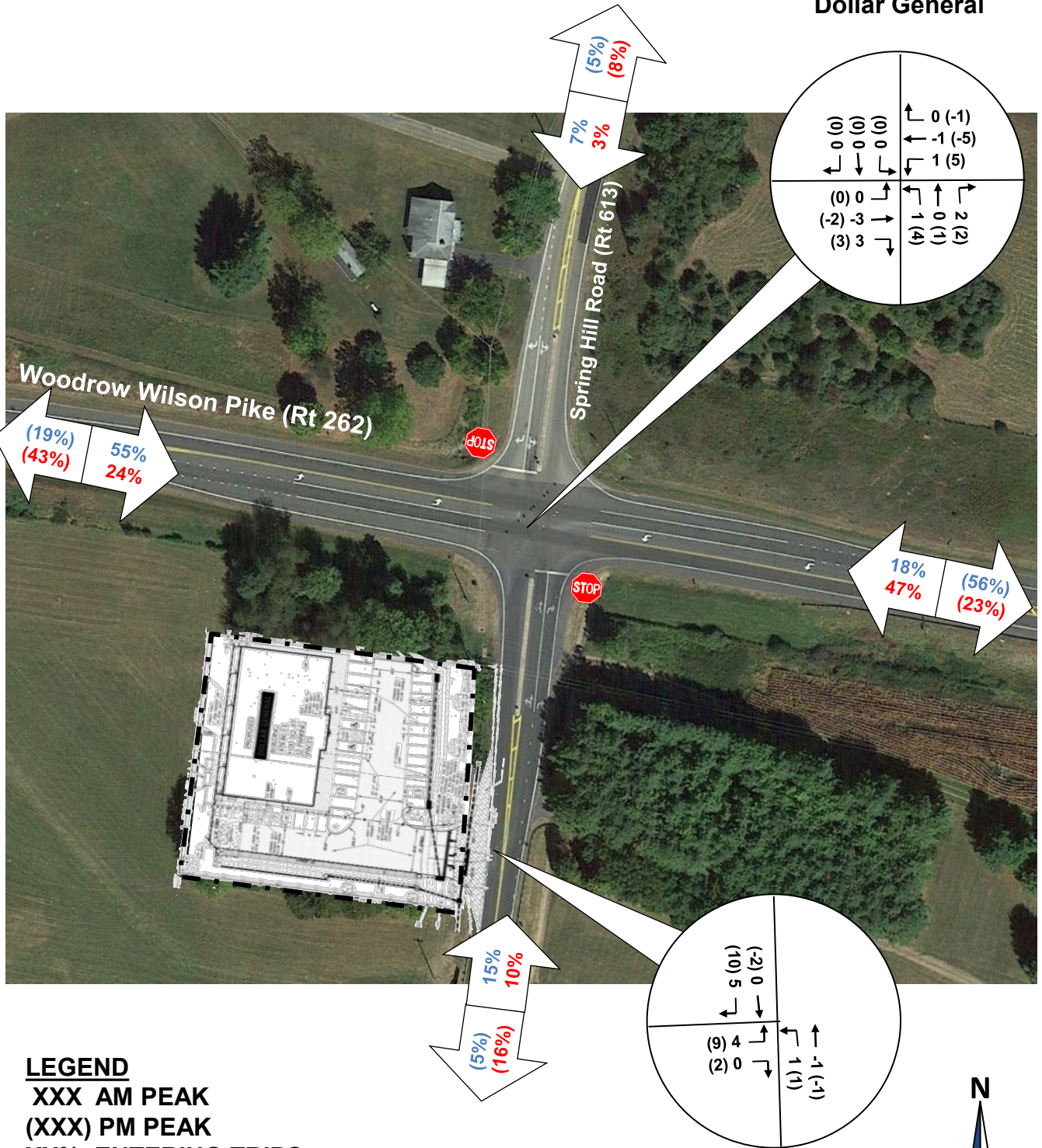
PRIMARY PEAK-HOUR TRIPS

Staunton, VA
Dollar General



PASS-BY PEAK-HOUR TRIPS

Staunton, VA
Dollar General



LEGEND

XXX AM PEAK

(XXX) PM PEAK

XX% ENTERING TRIPS

(XX%) EXITING TRIPS

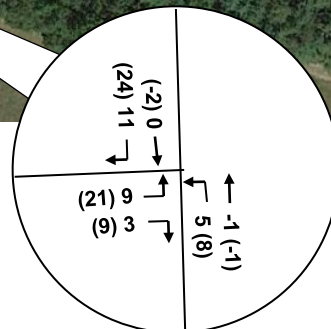
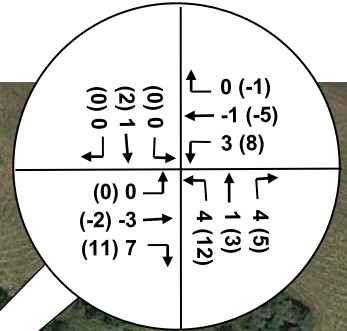
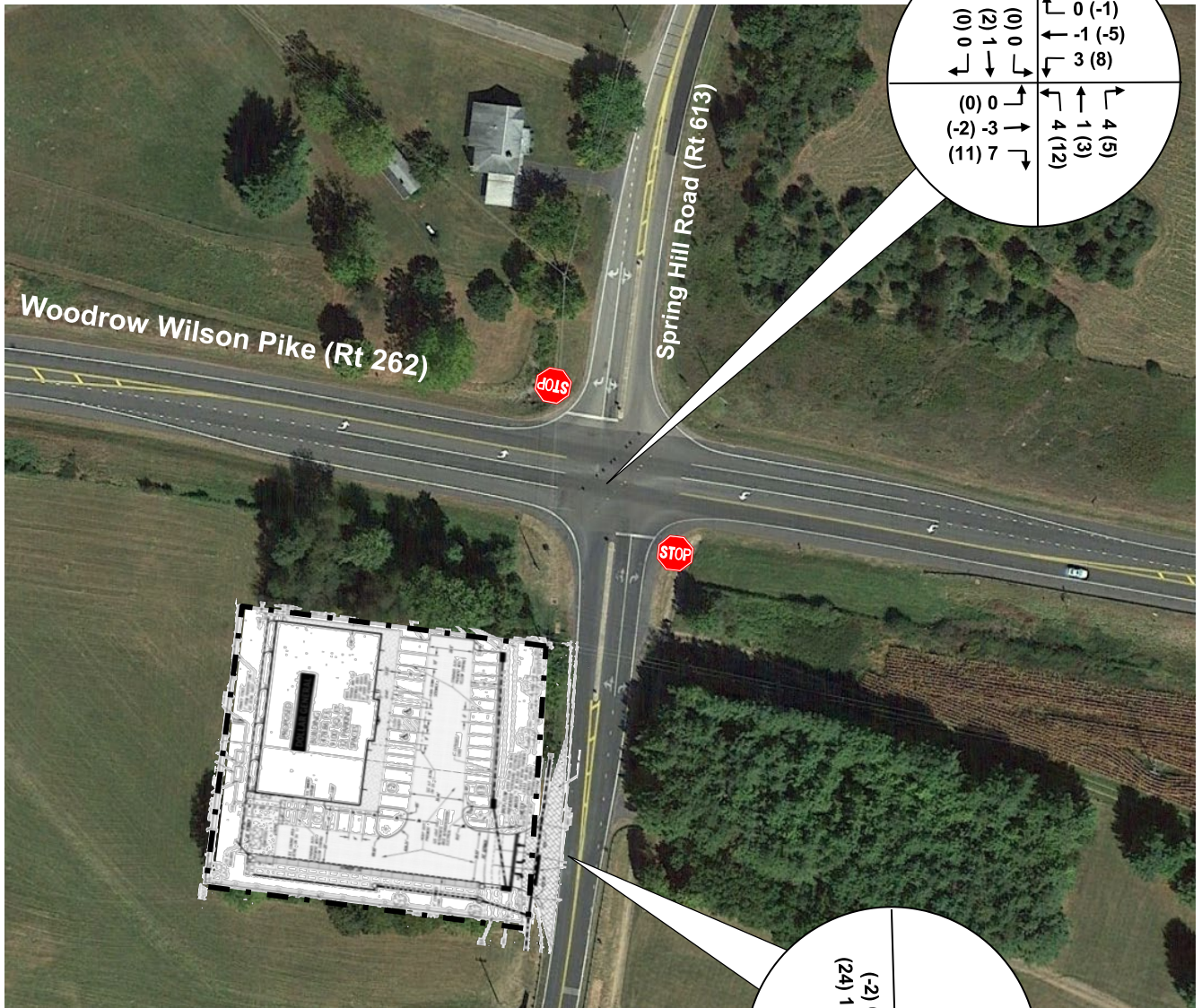
AM PM PASS-BY DISTRIBUTION



Figure 5B

TOTAL PEAK-HOUR TRIPS

Staunton, VA
Dollar General



LEGEND

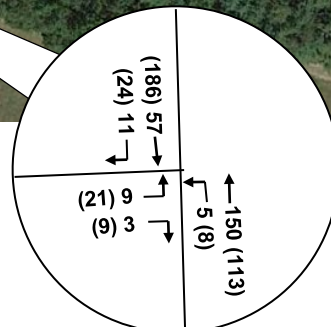
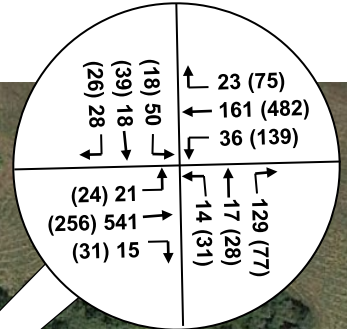
XXX AM PEAK
(XXX) PM PEAK



Figure 6

2027 PROJECTED TRAFFIC

Staunton, VA
Dollar General



LEGEND

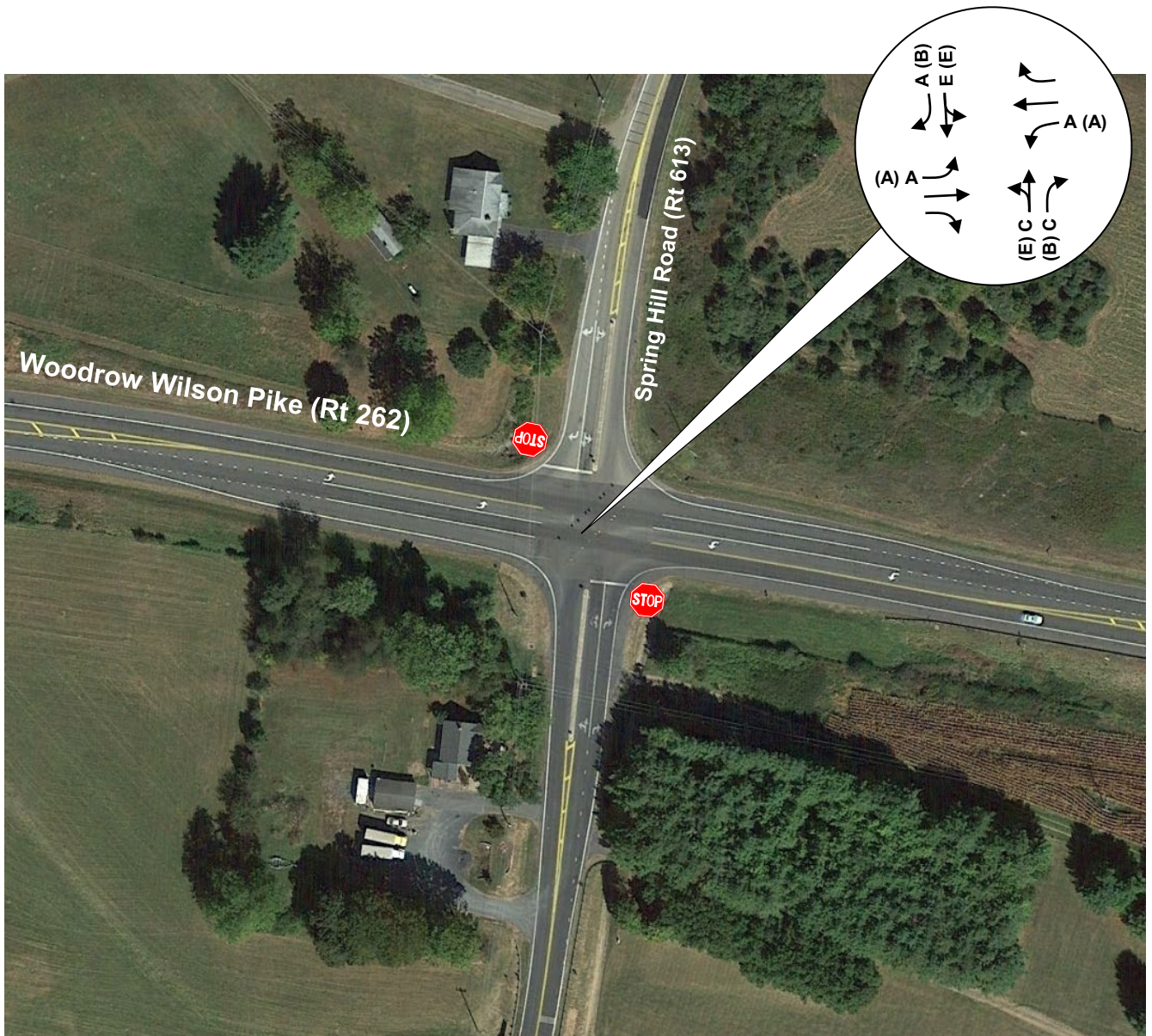
XXX AM PEAK
(XXX) PM PEAK



Figure 7

2016 LEVELS of SERVICE

Staunton, VA
Dollar General



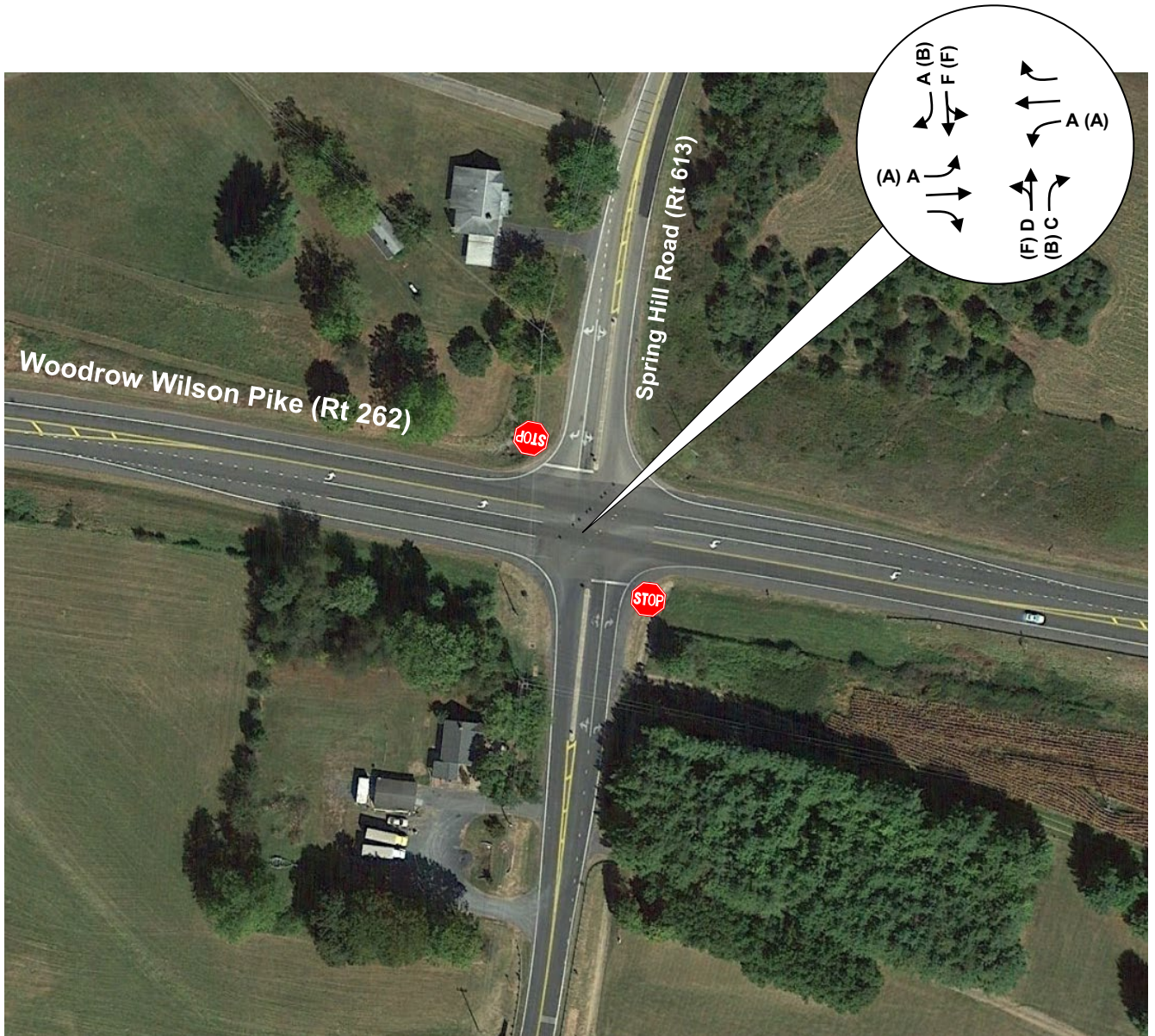
LEGEND

C- AM PEAK LOS
(C)- PM PEAK LOS



Figure 8A

**2027
BACKGROUND
LEVELS of SERVICE**
Staunton, VA
Dollar General



LEGEND

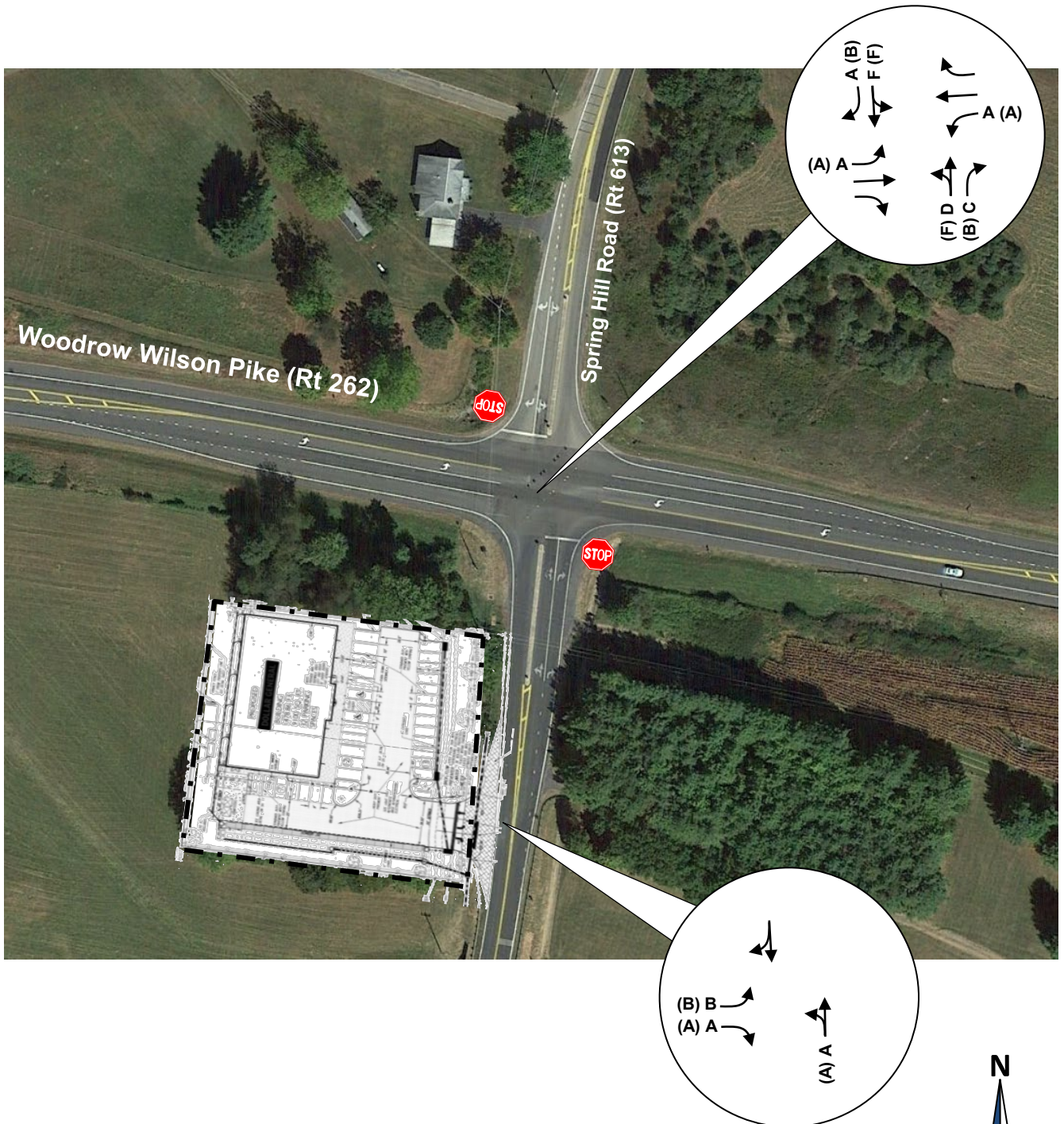
C- AM PEAK LOS
(C)- PM PEAK LOS



Figure 8B

2027 PROJECTED LEVELS of SERVICE

Staunton, VA
Dollar General



LEGEND

C- AM PEAK LOS
(C)- PM PEAK LOS



Figure 8C

CORNER DISTANCE Staunton, VA Dollar General

WOODROW WILSON PARKWAY

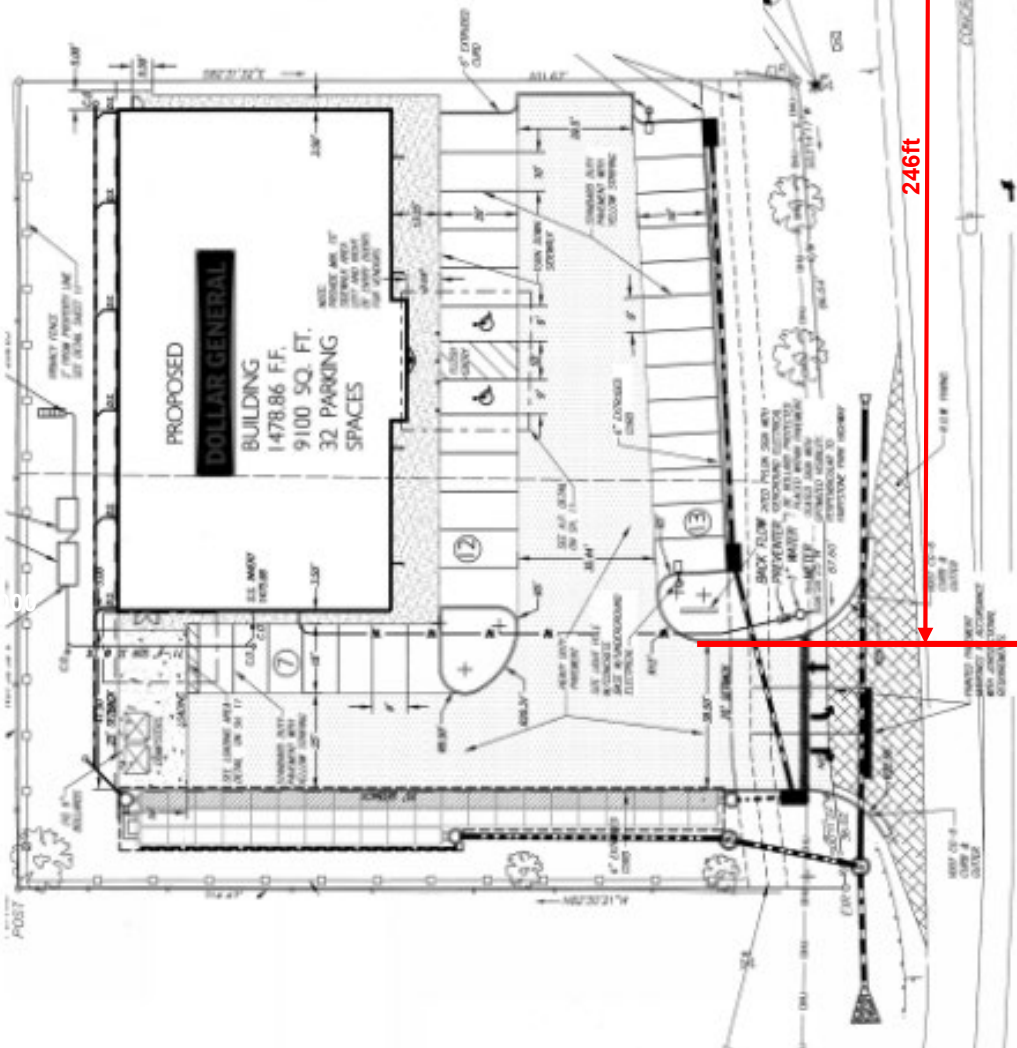
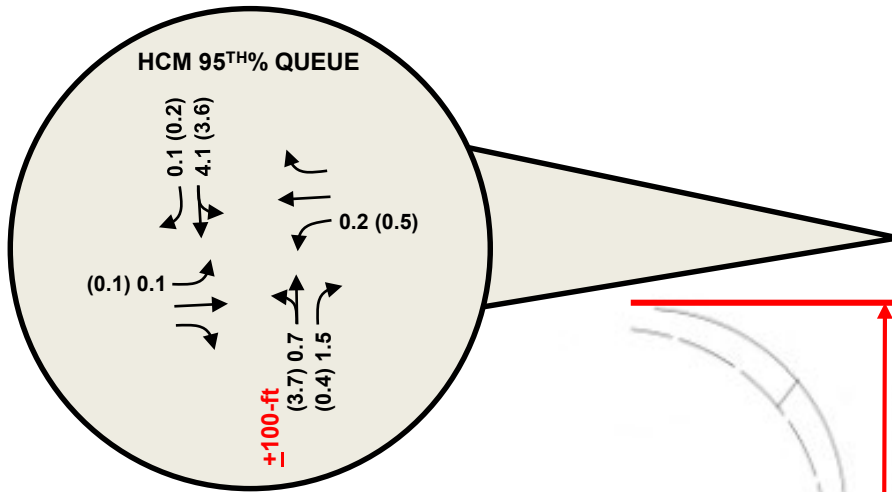


Figure 9

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	5.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	490	7	30	146	7	9	14	113	45	15	25
Future Vol, veh/h	19	490	7	30	146	7	9	14	113	45	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	83	83	83	92	92	92	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	681	10	36	176	8	10	15	123	55	18	30
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	691	0	0	1009	989	681	1055	991	176
Stage 1	-	-	-	-	-	-	733	733	-	248	248	-
Stage 2	-	-	-	-	-	-	276	256	-	807	743	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1391	-	-	904	-	-	219	247	450	204	246	867
Stage 1	-	-	-	-	-	-	412	426	-	756	701	-
Stage 2	-	-	-	-	-	-	730	696	-	375	422	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1391	-	-	904	-	-	190	233	450	135	232	867
Mov Cap-2 Maneuver	-	-	-	-	-	-	190	233	-	135	232	-
Stage 1	-	-	-	-	-	-	404	418	-	742	673	-
Stage 2	-	-	-	-	-	-	658	668	-	258	414	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.5			17.4			37.6		
HCM LOS							C			E		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	214	450	1391	-	-	904	-	-	151	867		
HCM Lane V/C Ratio	0.117	0.273	0.019	-	-	0.04	-	-	0.485	0.035		
HCM Control Delay (s)	24	16	7.6	-	-	9.1	-	-	49.4	9.3		
HCM Lane LOS	C	C	A	-	-	A	-	-	E	A		
HCM 95th %tile Q(veh)	0.4	1.1	0.1	-	-	0.1	-	-	2.3	0.1		

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	6.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	233	18	118	438	18	17	21	65	16	33	24
Future Vol, veh/h	22	233	18	118	438	18	17	21	65	16	33	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	86	86	86	73	73	73
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	265	20	140	521	21	20	24	76	22	45	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	542	0	0	285	0	0	1166	1137	265	1176	1136	521
Stage 1	-	-	-	-	-	-	315	315	-	801	801	-
Stage 2	-	-	-	-	-	-	851	822	-	375	335	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1027	-	-	1277	-	-	171	202	774	168	202	555
Stage 1	-	-	-	-	-	-	696	656	-	378	397	-
Stage 2	-	-	-	-	-	-	355	388	-	646	643	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1027	-	-	1277	-	-	117	176	774	122	176	555
Mov Cap-2 Maneuver	-	-	-	-	-	-	117	176	-	122	176	-
Stage 1	-	-	-	-	-	-	679	640	-	369	353	-
Stage 2	-	-	-	-	-	-	259	345	-	547	628	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.7			21.5			34.3		
HCM LOS							C			D		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	144	774	1027	-	-	1277	-	-	154	555
HCM Lane V/C Ratio	0.307	0.098	0.024	-	-	0.11	-	-	0.436	0.059
HCM Control Delay (s)	40.7	10.2	8.6	-	-	8.2	-	-	45.3	11.9
HCM Lane LOS	E	B	A	-	-	A	-	-	E	B
HCM 95th %tile Q(veh)	1.2	0.3	0.1	-	-	0.4	-	-	2	0.2

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	8.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	544	8	33	162	23	10	16	125	50	17	28
Future Vol, veh/h	21	544	8	33	162	23	10	16	125	50	17	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	83	83	83	92	92	92	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	756	11	40	195	28	11	17	136	61	21	34
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	223	0	0	767	0	0	1131	1117	756	1171	1100	195
Stage 1	-	-	-	-	-	-	814	814	-	275	275	-
Stage 2	-	-	-	-	-	-	317	303	-	896	825	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1346	-	-	847	-	-	181	207	408	170	212	846
Stage 1	-	-	-	-	-	-	372	391	-	731	683	-
Stage 2	-	-	-	-	-	-	694	664	-	335	387	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1346	-	-	847	-	-	152	193	408	100	198	846
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	193	-	100	198	-
Stage 1	-	-	-	-	-	-	364	382	-	715	651	-
Stage 2	-	-	-	-	-	-	614	633	-	209	378	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.4			20.1			67.8		
HCM LOS							C			F		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	175	408	1346	-	-	847	-	-	114	846		
HCM Lane V/C Ratio	0.161	0.333	0.022	-	-	0.047	-	-	0.717	0.04		
HCM Control Delay (s)	29.5	18.2	7.7	-	-	9.5	-	-	92.2	9.4		
HCM Lane LOS	D	C	A	-	-	A	-	-	F	A		
HCM 95th %tile Q(veh)	0.6	1.4	0.1	-	-	0.1	-	-	3.9	0.1		

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	8.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	259	20	131	486	75	19	23	72	18	37	27
Future Vol, veh/h	24	259	20	131	486	75	19	23	72	18	37	27
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	86	86	86	73	73	73
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	294	23	156	579	89	22	27	84	25	51	37
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	668	0	0	317	0	0	1328	1328	294	1306	1262	579
Stage 1	-	-	-	-	-	-	348	348	-	891	891	-
Stage 2	-	-	-	-	-	-	980	980	-	415	371	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	922	-	-	1243	-	-	132	155	745	137	170	515
Stage 1	-	-	-	-	-	-	668	634	-	337	361	-
Stage 2	-	-	-	-	-	-	301	328	-	615	620	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	922	-	-	1243	-	-	79	132	745	91	144	515
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	132	-	91	144	-
Stage 1	-	-	-	-	-	-	649	616	-	327	316	-
Stage 2	-	-	-	-	-	-	205	287	-	507	602	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.6			32.4			54.1		
HCM LOS							D			F		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	101	745	922	-	-	1243	-	-	121	515		
HCM Lane V/C Ratio	0.484	0.112	0.03	-	-	0.125	-	-	0.623	0.072		
HCM Control Delay (s)	70.2	10.4	9	-	-	8.3	-	-	74.5	12.5		
HCM Lane LOS	F	B	A	-	-	A	-	-	F	B		
HCM 95th %tile Q(veh)	2.1	0.4	0.1	-	-	0.4	-	-	3.2	0.2		

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	9.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	541	15	36	161	23	14	17	129	50	18	28
Future Vol, veh/h	21	541	15	36	161	23	14	17	129	50	18	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	83	83	83	92	92	92	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	751	21	43	194	28	15	18	140	61	22	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	222	0	0	772	0	0	1131	1117	751	1179	1110	194
Stage 1	-	-	-	-	-	-	809	809	-	280	280	-
Stage 2	-	-	-	-	-	-	322	308	-	899	830	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1347	-	-	843	-	-	181	207	411	167	209	847
Stage 1	-	-	-	-	-	-	374	394	-	727	679	-
Stage 2	-	-	-	-	-	-	690	660	-	334	385	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1347	-	-	843	-	-	150	192	411	96	194	847
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	192	-	96	194	-
Stage 1	-	-	-	-	-	-	366	385	-	711	644	-
Stage 2	-	-	-	-	-	-	607	626	-	205	377	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			1.6			20.7			73.1		
HCM LOS							C			F		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	170	411	1347	-	-	843	-	-	111	847
HCM Lane V/C Ratio	0.198	0.341	0.022	-	-	0.051	-	-	0.747	0.04
HCM Control Delay (s)	31.3	18.2	7.7	-	-	9.5	-	-	99.4	9.4
HCM Lane LOS	D	C	A	-	-	A	-	-	F	A
HCM 95th %tile Q(veh)	0.7	1.5	0.1	-	-	0.2	-	-	4.1	0.1

HCM 6th TWSC
6: Spring Hill Rd (Rt 613) & General Dollar

05/07/2019

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	3	5	150	57	11
Future Vol, veh/h	9	3	5	150	57	11
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	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	83	83
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	3	5	163	69	13

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	249	76	82	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	173	-	-	-	-	-
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	739	985	1515	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	857	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	736	985	1515	-	-	-
Mov Cap-2 Maneuver	736	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	857	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1515	-	736	985	-	-
HCM Lane V/C Ratio	0.004	-	0.013	0.003	-	-
HCM Control Delay (s)	7.4	0	10	8.7	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

HCM 6th TWSC

4: Spring Hill Rd (Rt 613) & Woodrow Wilson Pkwy (Rt 262)/Woodrow Wilson Pkwy (Rt 262)

Intersection												
Int Delay, s/veh	11.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱		↰	↱		↰	↱
Traffic Vol, veh/h	24	256	31	139	482	75	31	28	77	18	39	26
Future Vol, veh/h	24	256	31	139	482	75	31	28	77	18	39	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	175	-	175	200	-	175	-	-	125	-	-	125
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	84	84	84	86	86	86	73	73	73
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	291	35	165	574	89	36	33	90	25	53	36
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	663	0	0	326	0	0	1338	1338	291	1328	1284	574
Stage 1	-	-	-	-	-	-	345	345	-	904	904	-
Stage 2	-	-	-	-	-	-	993	993	-	424	380	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	926	-	-	1234	-	-	130	153	748	132	165	518
Stage 1	-	-	-	-	-	-	671	636	-	331	356	-
Stage 2	-	-	-	-	-	-	296	323	-	608	614	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	926	-	-	1234	-	-	75	129	748	83	139	518
Mov Cap-2 Maneuver	-	-	-	-	-	-	75	129	-	83	139	-
Stage 1	-	-	-	-	-	-	652	618	-	321	308	-
Stage 2	-	-	-	-	-	-	197	280	-	492	596	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			1.7			53.7			62.8		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1 NBLn2		EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	94	748	926	-	-	1234	-	-	115	518		
HCM Lane V/C Ratio	0.73	0.12	0.029	-	-	0.134	-	-	0.679	0.069		
HCM Control Delay (s)	110.1	10.5	9	-	-	8.4	-	-	85.7	12.5		
HCM Lane LOS	F	B	A	-	-	A	-	-	F	B		
HCM 95th %tile Q(veh)	3.7	0.4	0.1	-	-	0.5	-	-	3.6	0.2		

HCM 6th TWSC
6: Spring Hill Rd (Rt 613) & General Dollar

05/07/2019

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	21	9	8	113	186	24
Future Vol, veh/h	21	9	8	113	186	24
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	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	10	9	131	216	28
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	379	230	244	0	-	0
Stage 1	230	-	-	-	-	-
Stage 2	149	-	-	-	-	-
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	623	809	1322	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	619	809	1322	-	-	-
Mov Cap-2 Maneuver	619	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.5	0.5		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1322	-	619	809	-	-
HCM Lane V/C Ratio	0.007	-	0.037	0.012	-	-
HCM Control Delay (s)	7.7	0	11	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0	-	-

VPH OPPOSING VOLUME	8/121 ADVANCING VOLUME 7%			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
35mph	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2004 AASHTO
Green Book, Page 685, Exhibit 9-75

* USE DESIGN SPEED IF AVAILABLE,
IF NOT USE LEGAL SPEED LIMIT.

