Virginia Department of Transportation

February 2015

ACCESS MANAGEMENT EXCEPTION REQUEST: AM-E

ACCESS MANAGEMENT REGULATIONS 24 VAC 30-73

SECTION 120

Submitted by: Chris Hornung, P.E. - Silver Companies		**Date:** 05-30-2017
Email Address: chornung@silverco.com		**Phone:** (540) 785-3378
Address: 1201 Central Park Boulevard, Fredericksburg, VA 22401		
Project Name: Spotswood Furnace Road C-Store	**Rte #** 620	**Locality:** Spotsylvania County
Description of Project: Proposed C-store with up to 12 fueling positions in the northwest quadrant of the Route 3 at Route 620 (Spotswood Furnace Road) / Big Ben Boulevard intersection. The proposed access plan includes one full-movement driveway on Spotswood Furnace Road, and one right-in / right-out driveway on Route 3. This AME request is related to the spacing of the proposed driveway on Spotswood Furnace Road.		
VDOT District: Fredericksburg	**Area Land Use Engineer:** David Beale, P.E.	

NOTES:
(1). Submit this form and any attachments to one of the District's Area Land Use Engineers.
(2). See Section 120 of the Regulations for details on the requirements, exceptions, and exception request review process.
(3). Attach additional information as necessary to justify the exception request(s).
(4). If a traffic engineering study is required, the decision on the request will be based on VDOT engineering judgment.
(5). Use the LD-440 Design Exception or the LD-448 Design Waiver forms for *design and engineering standards*, e.g. radius, grade, sight distance. See IIM-LD-227 on VDOT web site for additional instructions.

Select the Exception(s) Being Requested

☐ **Exception to the shared commercial entrance requirement.** (Access M. Regulations Section 120 C.2)

Reason for exception:

☐ **A. An agreement to share the entrance could not be reached with adjoining property owner.**

☐ **Attached:** Written evidence that adjoining property owner will not share the entrance.

☐ **B. Physical constraints: topography, adjacent hazardous land use, stream, wetland, other.**

☐ **Specify constraint:** _____

☐ **Attached:** Documentation of constraint such as aerial photo or topographic map.

☐ **Exception to the vehicular connection to adjoining undeveloped property requirement.** (Section 120 C.4)

Reason for exception:

☐ **A. Physical constraints: topography, adjacent hazardous land use, stream, wetland, other.**

☐ **Specify constraint:** _____

☐ **Attached:** Documentation of constraint such as aerial photo or topographic map.

☐ **B. Other reason:** _____

☐ **Exception to the commercial entrance shall not be located within the functional area of an intersection requirement.** (See Regulation Section 120 C. 1; Appendix F, Rd Design Manual)

☐ **Attached:** A traffic engineering study documenting that the operation of the intersection and public safety will not be adversely impacted.

☑ **EXCEPTION TO THE SPACING STANDARDS FOR:**

- **Commercial entrances; intersections/median crossovers (Table 2-2);**
- **Commercial entrances/intersections near interchange ramps (Tables 2-3, 2-4);** or
- **Corner clearance (Figure 4-4).** Appendix F, Road Design Manual

Information on the Exception Request

☑ **ON A STATE HIGHWAY**

Functional classification: Principal Arterial: ☐ Minor Arterial: ☐ Collector: ☑ Local: ☐

Posted speed limit: 35 mph

☐ **NEAR AN INTERCHANGE RAMP** (Submittal of a traffic engineering study required)

☐ **CORNER CLEARANCE** (Submittal of a traffic engineering study required)

Type of intersection/entrance: Signalized ☐ Unsignalized ☑ Full Access ☑ Partial Access ☐

Required spacing distance 335 **ft**

Proposed spacing distance 170 **ft**

Requested exception: Reduction in required spacing 165 **ft**

REASON FOR EXCEPTION:

☐ **A. To be located on an older, established business corridor along a highway where existing spacing did not meet the standards prior to 7/1/08 or 10/14/09.** (Regulation Section 120 C.3.c)

☐ **Attached:** Dated aerial photo of corridor identifying proposed entrance/intersection location.

☑ **B. Not enough property frontage to meet spacing standard, but the applicant does not want a partial access right-in/right-out entrance.** (Section 120 C.3.f)

☑ **Attached:** A traffic engineering study documenting that left turn movements at the entrance will not have a negative impact on highway operation or safety.

☐ **C. To be located within a new urbanism mixed use type development.** (Section 120 C.3.d)

☐ **Attached:** The design of the development and compliance with intersection sight distance.

☐ **D. The proposed entrance meets the signal warrants but does not meet the signalized intersection spacing standard. The applicant requests an exception to the spacing standard.**

☐ **Attached:** A traffic engineering study that (i) evaluates the location's suitability for a roundabout and (ii) provides documentation that the proposed signal will not impact safety and traffic flow. (Section 120 C.5)

☐ **E. The development's 2nd (or additional) entrance does not meet the spacing standards but is necessary for the streets to be accepted into the secondary system.** (Section 120 C.3.e)

☐ **Attached:** Information on the development that identifies the location of entrances.

☐ **F. To be located within the limits of a VDOT and locality approved access management corridor plan.**

☐ **Attached:** Aerial photo of corridor identifying proposed entrance/intersection location. (Sect 120 C.3.b)

FOR VDOT USE ONLY

Recommendation on Exception Request: Approve ☐ **Deny** ☐	**Date:**
Area Land Use Engineer or: _____ **Name** _____	
Remarks:	

Exception Request Action: Approved ☐ **Denied** ☐	**Date:**
District Administrator or Designee: _____ **Name (and position if Designee)** _____	
Remarks:	

District Staff: Please email copy to Bradley.Shelton@VDOT.Virginia.gov

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

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www.rameykemp.com

May 30, 2017

Mr. Leon Hughes, AICP
Spotsylvania County – Development Services
9019 Old Battlefield Boulevard
Suite 320
Spotsylvania, Virginia 22553
Phone: (540) 507-7220

Reference: Spotswood Furnace Road C-Store – ***Revised*** Access Management Exception (AME) Request
Spotsylvania County, Virginia

Dear Mr. Hughes,

Ramey Kemp & Associates, Inc. (RKA) has performed a Traffic Impact Analysis (TIA) to support an Access Management Exception (AME) request for a proposed convenience store in the northwest quadrant of the intersection of Route 3 (Plank Road) at Spotswood Furnace Road / Big Ben Boulevard. The property currently contains one single-family home.

The conceptual site plan includes redeveloping the property with a convenience store with 12 fueling positions. The access plan includes one full-movement driveway on Spotswood Furnace Road approximately 400 feet north of Route 3 and 170 feet south of the high school access road. The horizontal alignment of Spotswood Furnace Road limits sight distance for drivers exiting the site, but the driveway is located as far away from Route 3 as possible. The proposed right-in / right-out driveway on Route 3 is approximately 315 feet west of Spotswood Furnace Road. If approved, the store is expected to be built-out by 2018.

The purpose of this letter report is to provide the following:

- Trip generation calculations
- Evaluation of turn lane warrants for both driveways
- Capacity analysis of study intersections
- Access Management Exception request

This is an update to our TIA dated April 3. Based on our meeting with the County and VDOT on May 16, the following changes were made to the analysis:

- Adjusted the primary trip distribution to / from the west on Route 3 from 30% to 20%
- Adjusted the AM peak hour pass-by trip distribution to / from eastbound Route 3 from 50% to 20% to be consistent with the mid-day and PM peak hours
- Based on historical traffic count data, adjusted the growth rate for the movements on Spotswood Furnace Road from 5.0% to 2.5%

Existing Roadway Conditions
Route 3 is a four-lane divided Principal Arterial with an average daily traffic (ADT) volume of approximately 35,000 vehicles per day, and a posted speed limit of 45 mph.

Spotswood Furnace Road is a two-lane minor collector with an ADT volume of approximately 6,500 vehicles per day, and a posted speed limit of 35 mph.

Big Ben Boulevard is a two-lane local residential collector with an ADT volume of approximately 1,700 vehicles per day, and a posted speed limit of 25 mph.

Existing Traffic Volumes
The AM peak hour (6:30 to 9:00 AM), mid-day peak hour (1:30 to 4:00 PM), and PM peak hour (4:00 to 6:00 PM) turning movement counts were conducted by Technical Traffic Services. The AM and PM peak hours were conducted during the week of October 10, and the mid-day peak hour was conducted during the week of November 28. Figure 3 shows the existing peak hour volumes.

The traffic counts included school buses, which were used to input the correct heavy vehicle percentages for each movement. For the analysis, the peak hour factor (PHF) was calculated by approach, which is a requirement of VDOT's *Traffic Operations and Safety Analysis Manual* (TOSAM). The traffic count data is included in the appendix.

Background Traffic Growth
Based on discussion with the County and VDOT, the existing volumes on Route 3 were grown by an annual rate of 2.0% for two years, and the existing volumes on Spotswood Furnace Road were grown by an annual rate of 2.5% for two years to estimate the 2018 no-build traffic volumes, which are shown in Figure 4.

We understand there are no approved developments near the site that will generate a significant amount of traffic; however, the developer of a nearby project has committed to connect the existing High School Access Road to Route 3 as a right-in / right-out access. This construction is expected to be complete by the year 2018 and was analyzed in the no-build and build scenarios.

Trip Generation
The trip generation potential of the proposed convenience store during a typical weekday, AM peak hour, mid-day peak hour, and PM peak hour was estimated using the methodologies published by the Institute of Transportation Engineers (ITE) *Trip Generation Manual – 9th Edition*. Table 1 shows the trip generation potential of the site.

Table 1
ITE Trip Generation – 9th Edition – Weekday

Land Use (ITE Land Use Code)	Size	Weekday Daily Traffic (vpd)		AM Peak Hour (vph)		Mid-day Peak Hour[1] (vph)		PM Peak Hour (vph)	
		Enter	Exit	Enter	Exit	Enter	Exit	Enter	Exit
Convenience Market with Gasoline Pumps (853)	12 f.p.	1,433[2]	1,433[2]	100	100	115	115	115	115
Convenience Market with Gasoline Pumps (853)	5,650 s.f.	2,389	2,389	116	116	144	144	144	144
Average Trips		1,911	1,911	108	108	130	130	130	130
ITE Pass-by Trips: 63% AM / 66% Mid-day[1] / 66% PM		-1,232	-1,232	-68	-68	-85	-85	-85	-85
Primary Trips		**679**	**679**	**40**	**40**	**45**	**45**	**45**	**45**

1. ITE does not provide weekday mid-day peak hour values. To be conservative, PM peak hour volumes were applied to the mid-day peak hour.
2. ITE publishes a daily trip rate of 542.60 trips per fueling position, which is more than 32 times the AM peak hour rate of 16.57 trips per fueling position, and more than 28 times the PM peak rate of 19.07 trips per fueling position. This is mathematically impossible. The AM and PM peak hour trip rates for Land Use Codes 944 and 945 are approximately 15% of the daily trip rate, so it is assumed that the same ratio applies to Land Use Code 853.

Convenience stores attract pass-by trips, which are made by drivers who are already driving by the site today and will visit the center in the future because it is convenient. The ITE pass-by rates are shown in Table 1.

Site Traffic Distribution
The following primary site traffic distribution was applied based on a review of the existing traffic volumes, the adjacent roadway network, and engineering judgment:

- 45% to / from the east on Route 3
- 25% to / from the south on Big Ben Boulevard
- 20% to / from the west on Route 3
- 10% to / from the north on Spotswood Furnace Road

Based on the existing peak hour volumes and discussion with VDOT, it was assumed that 70% of the total pass-by trips will originate from Route 3, and 30% of the total pass-by trips will originate from Spotswood Furnace Road. It is reasonable to assume that most pass-by customers will prefer to divert from westbound Route 3 because that involves two right-turn movements. Therefore, the following directional distributions were applied to the pass-by trips on Route 3:

- AM Peak – 20% eastbound / 80% westbound
- Mid-day Peak – 20% eastbound / 80% westbound
- PM Peak – 20% eastbound / 80% westbound

The following directional distributions were applied to the pass-by trips on Spotswood Furnace Road:

- AM Peak – 60% northbound / 40% southbound
- Mid-day Peak – 35% northbound / 65% southbound
- PM Peak – 55% northbound / 45% southbound

Figures 5 and 6 show the primary and pass-by site traffic distributions, respectively. Figure 7 shows the primary site trip assignment, and Figure 8 shows the pass-by site trip assignment. Figure 9 shows the total site trips, and Figure 10 shows the build peak hour traffic volumes**.**

VDOT Turn Lane Warrant Analysis
The projected build-out AM, mid-day, and PM peak hour traffic volumes at the proposed driveways were compared to the turn lane warrants in the Virginia Department of Transportation (VDOT) *Access Management Design Standards for Entrances and Intersections*:

Spotswood Furnace Road at Full-Movement Driveway:

- A northbound left-turn lane on Spotswood Furnace Road is warranted in the AM, mid-day, and PM peak hours

Route 3 at Right-in / Right-out Driveway:

- A westbound right-turn lane on Route 3 is warranted in the mid-day and PM peak hour

The turn lane warrant diagrams are enclosed for reference, and Figure 11 shows the recommended lanes.

Intersection Spacing Standards
VDOT requires at least 335 feet of separation between full-movement access driveways and other intersections on Collector roads posted 35 mph. The proposed full-movement driveway on Spotswood Furnace Road is approximately 400 feet north of Route 3, which exceeds VDOT minimum spacing standards, but 170 feet south of the high school access road. An AME request form is enclosed for the proposed driveway on Spotswood Furnace Road.

VDOT requires at least 305 feet of separation between traffic signals and partial access driveways on Principal Arterial roadways posted 45 mph. The proposed right-in / right-out driveway on Route 3 is approximately 315 feet west of Spotswood Furnace Road, which exceeds VDOT minimum spacing standards.

Traffic Capacity Analysis
Traffic capacity analysis for the study intersections was performed using Synchro 9, which is a comprehensive software package that allows the user to model signalized and unsignalized intersections to determine levels-of-service based on the thresholds specified in the 2010 Highway Capacity Manual (HCM).

For movements with LOS F, the reported queue was determined using SimTraffic. The SimTraffic maximum queues shown in the tables are the average of ten simulation runs.

Table 3 summarizes the capacity analysis results for the signalized intersection of Route 3 at Spotswood Furnace Road / Big Ben Boulevard, and all of the Synchro / SimTraffic outputs are enclosed for reference.

Table 3
Level-of-Service Summary for Route 3 at Spotswood Furnace Road / Big Ben Boulevard

CONDITION	LANE GROUP	AM PEAK HOUR				MID-DAY PEAK HOUR				PM PEAK HOUR			
		Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)
Existing 2016 Traffic Conditions	EBL	E	75.6	490	E (71.0 sec)	F	120.7	94	D (51.2 sec)	C	30.8	57	C (23.3 sec)
	EBT	C	24.4	898		C	32.4	506		B	12.8	346	
	EBR	A	0.0	0		A	0.0	0		A	0.0	0	
	WBL	E	72.3	28		F	109.0	259		A	6.8	37	
	WBT	E	66.5	518		D	45.5	1,158		C	23.2	1,021	
	WBR	B	11.5	90		A	0.4	6		A	0.5	8	
	NBL/T	F	148.5	660		F	101.4	68		E	79.8	31	
	NBR	A	0.8	0		A	1.5	0		A	1.4	0	
	SBL	F	187.3	410		F	88.3	434		F	97.2	198	
	SBL/T/R	F	174.6	418		F	87.8	440		E	77.9	221	
No-Build 2018 Traffic Conditions	EBL	F	83.1	487	E (73.4 sec)	F	124.8	151	D (52.8 sec)	D	38.8	66	C (24.6 sec)
	EBT	C	24.2	1,080		C	30.3	510		B	12.8	360	
	EBR	A	0.0	0		A	0.0	0		A	0.0	0	
	WBL	E	73.1	30		F	110.1	272		A	6.9	37	
	WBT	F	88.8	513		D	48.5	1,253		C	24.8	1,110	
	WBR	A	8.4	53		A	0.4	6		A	0.6	9	
	NBL/T	F	165.7	703		F	102.0	68		E	79.8	31	
	NBR	A	0.8	0		A	1.5	0		A	1.5	0	
	SBL	F	152.9	427		F	94.3	433		F	101.3	204	
	SBL/T/R	F	14.5	422		F	93.0	457		F	84.4	213	
Build 2018 Traffic Conditions **(Southbound Left, Left-Through, Right)**	EBL	F	102.2	653	E (74.8 sec)	F	132.4	186	D (49.9 sec)	D	49.7	107	C (28.1 sec)
	EBT	C	23.1	1,060		C	27.5	477		B	15.4	433	
	EBR	A	0.0	0		A	0.0	0		A	0.0	0	
	WBL	E	65.0	28		F	110.1	281		A	9.0	48	
	WBT	E	78.5	627		D	46.2	1,217		C	31.8	1,396	
	WBR	A	7.7	40		A	0.5	8		A	0.7	10	
	NBL/T	F	188.7	690		F	113.1	108		F	82.6	74	
	NBR	A	0.8	0		A	1.5	0		A	1.3	0	
	SBL	F	150.7	344		F	93.1	341		F	82.2	194	
	SBL/T	F	155.8	349		F	93.5	342		F	82.6	197	
	SBR	A	0.9	0		C	20.7	8		A	4.5	16	
Build 2018 Traffic Conditions **(Southbound Dual Lefts, Through-Right)**	EBL	F	102.2	645	E (68.0 sec)	F	123.9	170	D (45.7 sec)	D	47.9	101	C (26.8 sec)
	EBT	C	23.1	1,060		C	23.5	437		B	14.2	403	
	EBR	A	0.0	0		A	0.0	0		A	0.0	0	
	WBL	E	65.0	28		F	110.1	298		A	8.1	44	
	WBT	E	78.5	627		D	39.3	1,129		C	30.4	1,396	
	WBR	A	7.9	40		A	0.5	9		A	0.7	11	
	NBL/T	F	158.5	678		F	113.1	111		F	82.6	70	
	NBR	A	0.8	0		A	1.5	0		A	1.3	0	
	SBL	F	124.6	348		F	84.6	340		E	76.9	179	
	SBT/R	D	54.3	104		E	72.1	292		D	38.6	109	

Capacity analysis indicates this intersection currently operates at LOS E during the AM peak hour, LOS D during the mid-day peak hour, and LOS C during the PM peak hour. Under no-build conditions, this intersection is expected to continue to operate at LOS E during the AM peak hour, LOS D during the mid-day peak hour, and LOS C during the PM peak hour.

The applicant is planning to construct a third lane on the southbound Spotswood Furnace Road approach. The intersection is projected to operate at LOS E during the AM peak hour, LOS D during the mid-day peak hour, and LOS C during the PM peak hour with either of the following configurations:

- One left-turn lane, one shared left-through lane, and one right-turn lane
- Dual left-turn lanes, one shared through-right lane

The dual left-turn lane / shared through-right lane configuration is recommended for the following reasons:

- The overall average delay is projected to be shorter during all three peak hours
- The average delay on the southbound Spotswood Furnace Road approach is projected to be shorter during all three peak hours

We understand the high school access road will be extended to Route 3, providing a right-in / right-out access. For the purposes of this study, it was assumed that one third of the vehicles entering the school from the east, and exiting the school to the west, will use this connection instead of Spotswood Furnace Road.

Table 4 summarizes the capacity analysis results for the unsignalized intersection of Spotswood Furnace Road at High School Access Road, and all of the Synchro / SimTraffic outputs are enclosed for reference.

Table 4
Level-of-Service Summary for Spotswood Furnace Road at High School Access Road

CONDITION	LANE GROUP	AM PEAK HOUR				MID-DAY PEAK HOUR				PM PEAK HOUR			
		Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)
Existing 2016 Traffic Conditions	WBL/R[1] NBT/R SBL[2] SBT	F - B -	350.8 - 13.2 -	546 - 3 -	N/A[3]	F - A -	67.9 - 8.9 -	210 - 0 -	N/A[3]	B - A -	14.0 - 8.3 -	5 - 0 -	N/A[3]
No-Build 2018 Traffic Conditions	WBL/R[1] NBT/R SBL[2] SBT	F - B -	142.1 - 12.2 -	233 - 3 -	N/A[3]	F - A -	57.6 - 8.9 -	145 - 0 -	N/A[3]	B - A -	14.0 - 8.3 -	3 - 0 -	N/A[3]
Build 2018 Traffic Conditions	WBL/R[1] NBT/R SBL[2] SBT	F - B -	149.0 - 12.2 -	186 - 3 -	N/A[3]	E - A -	40.7 - 8.6 -	113 - 0 -	N/A[3]	B - A -	14.1 - 8.3 -	3 - 0 -	N/A[3]

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

The capacity analysis indicates that the westbound left-turn movement currently operates with long delays (greater than 50 seconds) during the AM and mid-day peak hours, and with short delays (less than 25 seconds) during the PM peak hour. The westbound left-turn movement is expected to continue to operate with long delays (greater than 50 seconds) during the AM and mid-day peak hours, and with short delays (less than 25 seconds) during the PM peak hour for the no-build condition. The westbound left-turn movement is expected to continue to operate with long delays (greater than 50 seconds) during the AM peak hour, with moderate delays (between 25 and 50 seconds) during the mid-day peak hour, and with short delays (less than 25 seconds) during the PM peak hour for the build condition. Long delays are typical for minor street left-turn movements at intersections with major thoroughfares. The projected traffic volumes at this intersection do not meet traffic signal warrants.

Table 5 summarizes the capacity analysis results for the unsignalized intersection of Spotswood Furnace Road at Full-movement Driveway, and all of the Synchro outputs are enclosed for reference.

Table 5
Level-of-Service Summary for Spotswood Furnace Road at Full-movement Driveway

CONDITION	LANE GROUP	AM PEAK HOUR				MID-DAY PEAK HOUR				PM PEAK HOUR			
		Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)
Build 2018 Traffic Conditions	EBL/R[1]	C	21.9	23	N/A[3]	B	14.7	15	N/A[3]	B	12.5	13	N/A[3]
	NBL[2]	A	8.7	5		A	9.4	5		A	8.1	5	
	NBT	-	-	-		-	-	-		-	-	-	
	SBT/R	-	-	-		-	-	-		-	-	-	

1. Level of service for minor approach
2. Level of service for major street left-turn movement
3. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

The projected traffic volumes at this intersection warrant a northbound left-turn lane on Spotswood Furnace Road. With this improvement in place, the capacity analysis indicates that the eastbound left-turn movement is projected to operate with short delays (less than 25 seconds) during the AM, mid-day, and PM peak hours at build-out, and the queue lengths are expected to be two vehicles or less.

Table 6 summarizes the capacity analysis results for the unsignalized intersection of Route 3 at Right-in / Right-out Driveway, and all of the Synchro outputs are enclosed for reference.

Table 6
Level-of-Service Summary for Route 3 at Right-in / Right-out Driveway

CONDITION	LANE GROUP	AM PEAK HOUR				MID-DAY PEAK HOUR				PM PEAK HOUR			
		Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)	Lane LOS	Lane Delay (sec)	Queue (ft)	Overall LOS (Delay)
Build 2018 Traffic Conditions	EBT	-	-	-	N/A[2]	-	-	-	N/A[2]	-	-	-	N/A[2]
	WBT	-	-	-		-	-	-		-	-	-	
	WBR	-	-	-		-	-	-		-	-	-	
	SBR[1]	B	12.1	8		C	21.8	20		D	29.1	28	

1. Level of service for minor approach
2. HCM methodology does not provide lane group or overall LOS, delay, and queue lengths for major street through movements or right turns at unsignalized intersections.

The projected traffic volumes at this intersection warrant a westbound right-turn lane on Route 3. With this improvement in place, the capacity analysis indicates that the southbound right-turn movement is projected to operate with short delays (less than 25 seconds) during the AM and mid-day peak hours, and with moderate delays (between 25 and 50 seconds) during the PM peak hour at build-out, and the queue lengths are expected to be two vehicles or less.

Recommendations
Based on the trip generation potential of the proposed convenience store, the following off-site roadway improvements are recommended:

Route 3 at Spotswood Furnace Road / Big Ben Boulevard:

- Configure the southbound Spotswood Furnace Road approach with dual left-turn lanes and one shared through-right lane
- Extend the eastbound left-turn lane on Route 3 back to the existing median break that is 700 feet west of Spotswood Furnace Road

Spotswood Furnace Road at Full-Movement Driveway

- Construct one northbound left-turn lane on Spotswood Furnace Road with 100 feet of storage. The widening for the left-turn lane will be done on the west side of Spotswood Furnace Road and will not impact the available storage for traffic approaching the Route 3 intersection.
- Construct the site driveway with one ingress lane and one egress lane

Route 3 at Right-in / Right-out Driveway

- Construct one westbound right-turn lane on Route 3 with 100 feet of storage
- Construct the site driveway with one ingress lane and one egress lane

Based on the results of the traffic capacity analysis, we recommend approval of the AME request because the queues from the existing traffic signal are not expected to block the proposed driveways during the peak hours. Also, most of the site trips will be pass-by trips, which are already driving by the site today, so the number of new trips is relatively small.

We appreciate your attention to this matter. Please contact me at (804) 217-8560 if you have any questions about this report.

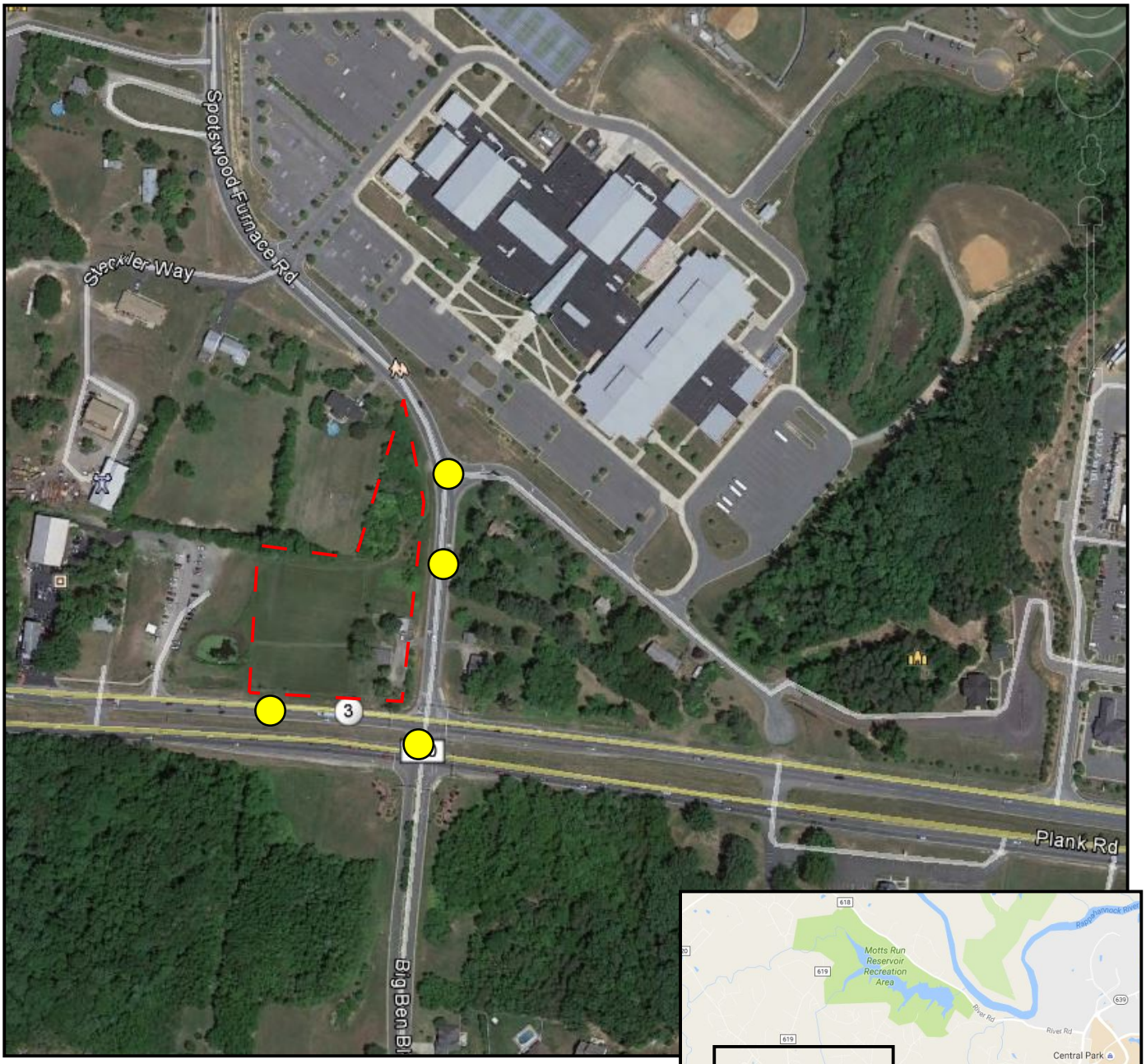
Sincerely yours,
Ramey Kemp & Associates, Inc.

COMMONWEALTH OF VIRGINIA
CARL A. HULTGREN
Lic. No. 049624
5-30-17
PROFESSIONAL ENGINEER

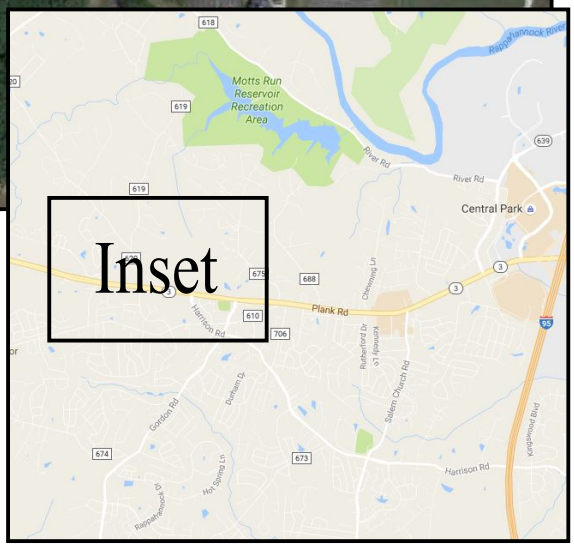
Carl Hultgren, P.E., PTOE
Regional Manager

Enclosures: AME request form, Figures, Traffic count data, Synchro output, SimTraffic output, VDOT turn lane warrant diagrams

Copy to: Mr. David Beale, P.E., VDOT
Mr. Peter Hedrich, P.E., PTOE, VDOT
Mr. Chris Hornung, P.E., Silver Companies
Mr. Justin Franklin, P.E., Fairbanks & Franklin



Inset



Overview

LEGEND

N

Study Intersection

Site Boundary

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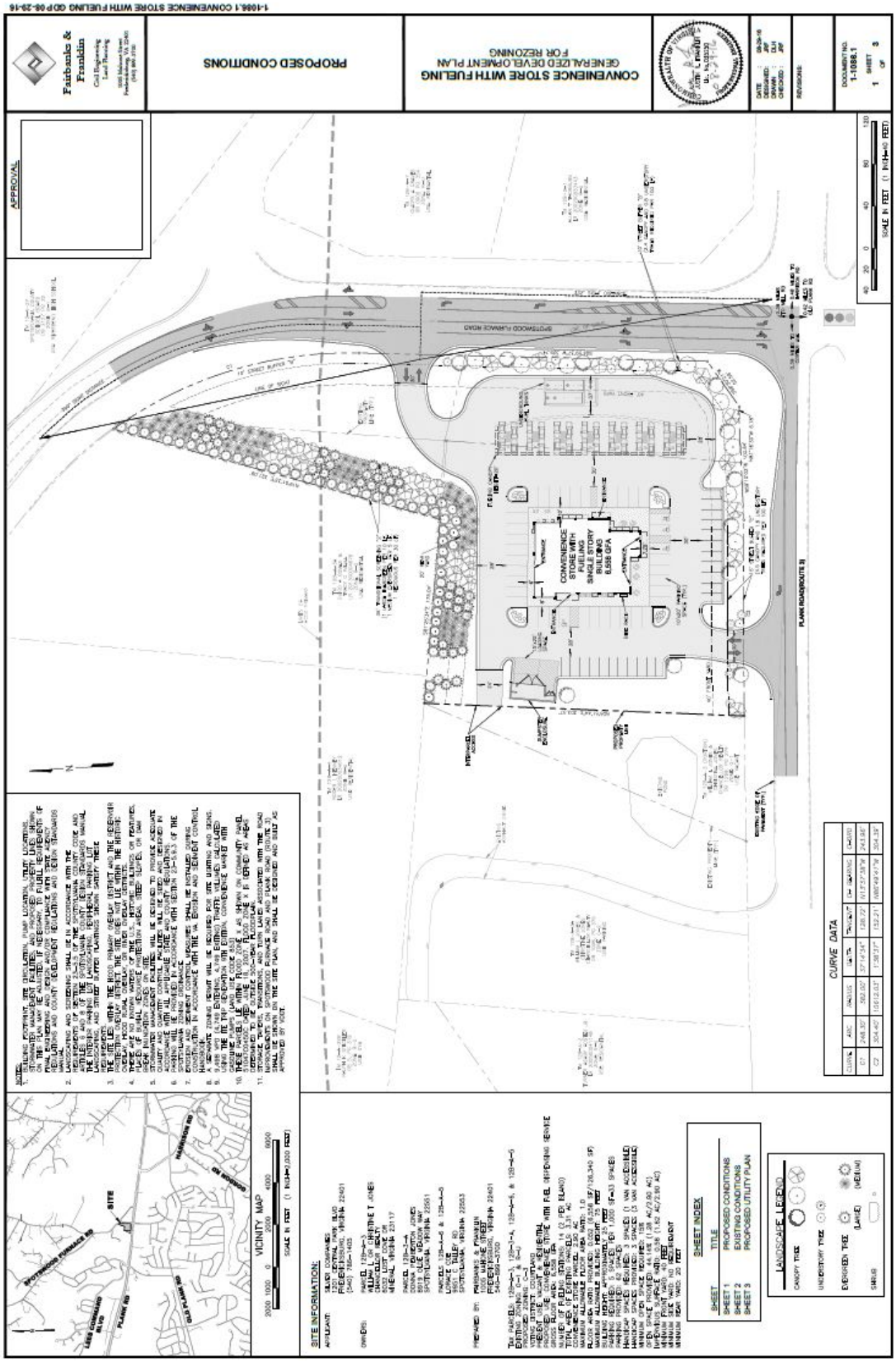
TRANSPORTATION ENGINEERS

Spotswood Furnace Road
C-Store
Spotsylvania County, Virginia

Site Location and Study Intersections

Scale: Not to Scale | Figure 1



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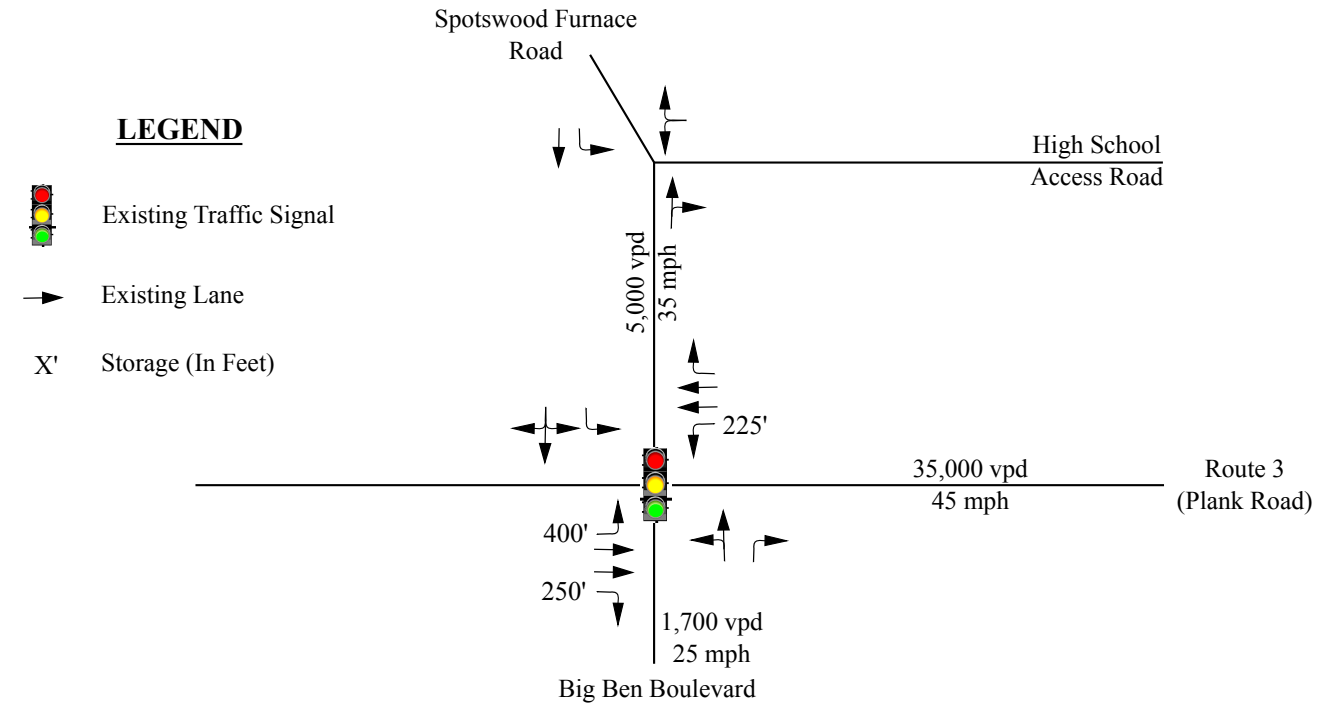
C-Store
Spotsylvania County, Virginia

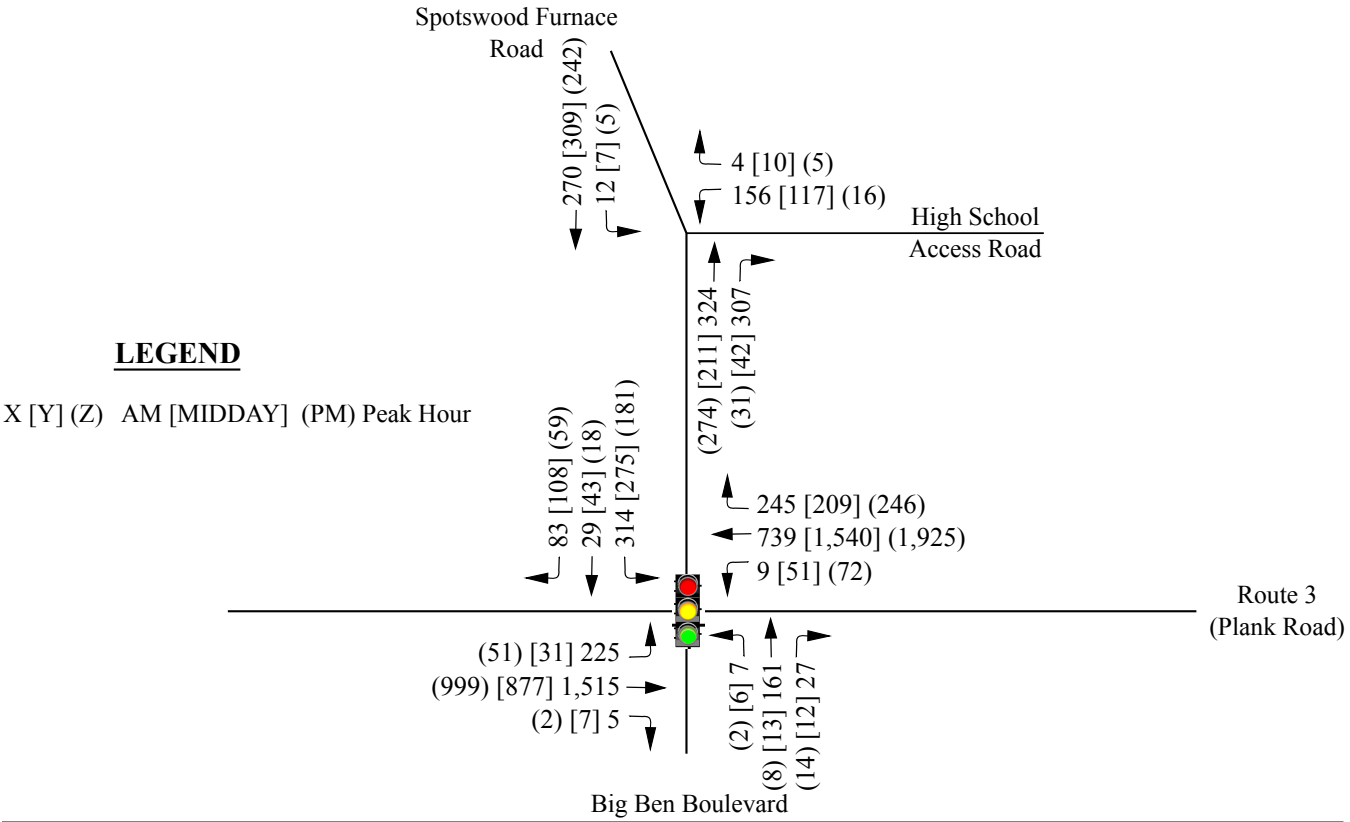
Conceptual Site Plan

Scale: Not to Scale | Figure 2

Existing Lane Configurations



Existing (2016) Peak Hour Traffic



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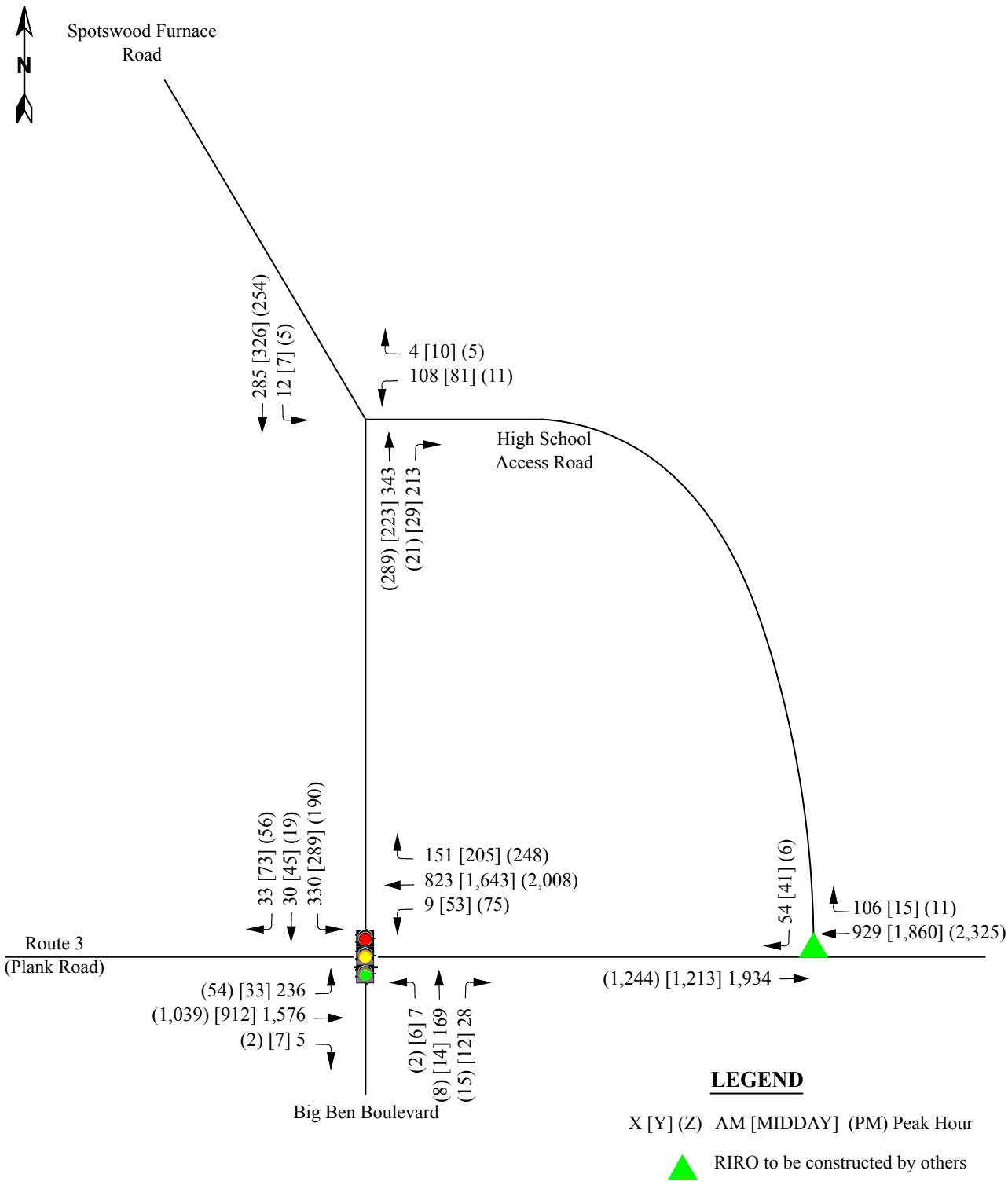
C-Store
Spotsylvania County, Virginia

Existing Conditions

Scale: Not to Scale | Figure 3



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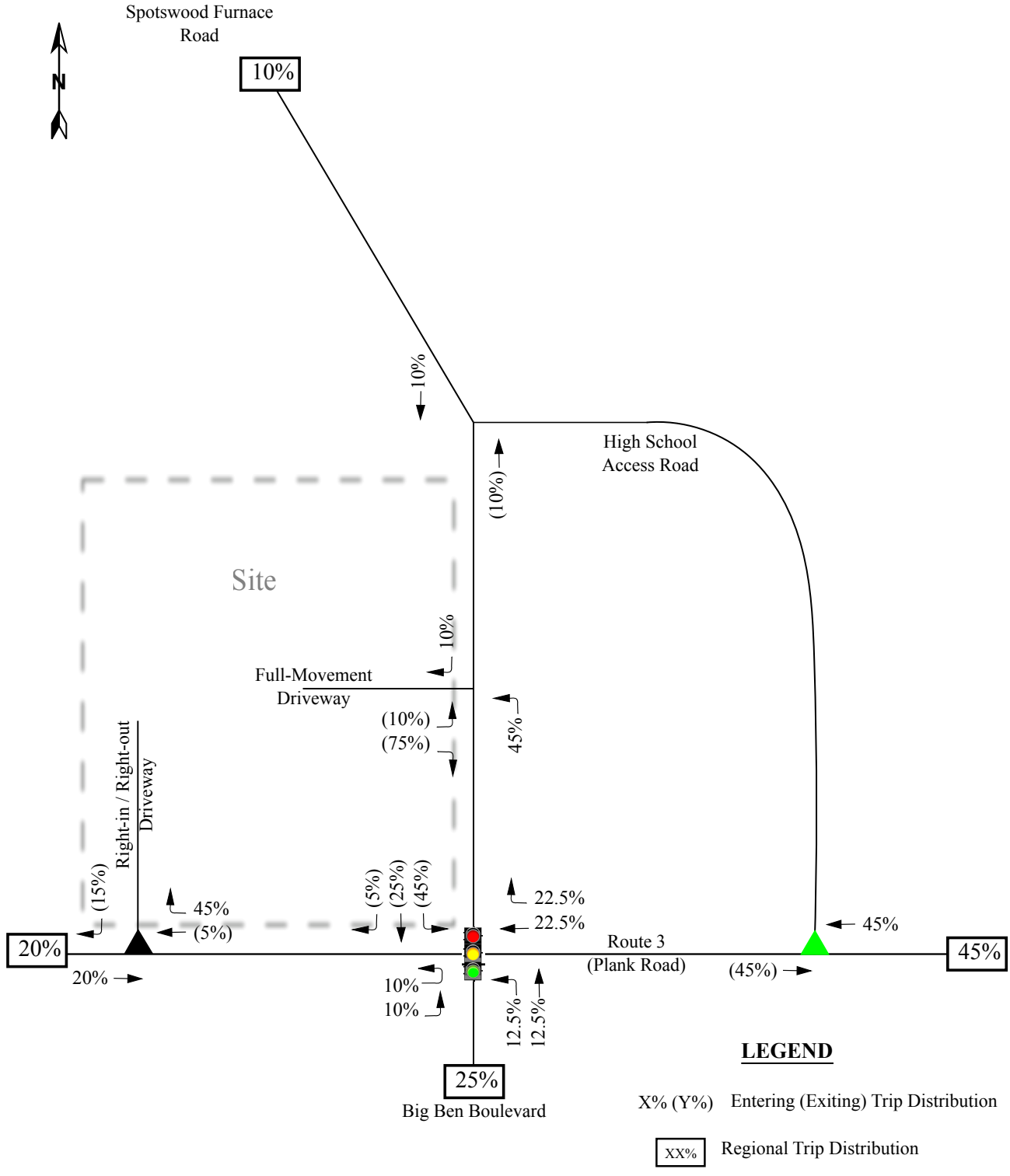
Spotswood Furnace Road C-Store

Spotsylvania County, Virginia

No Build (2018) Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 4



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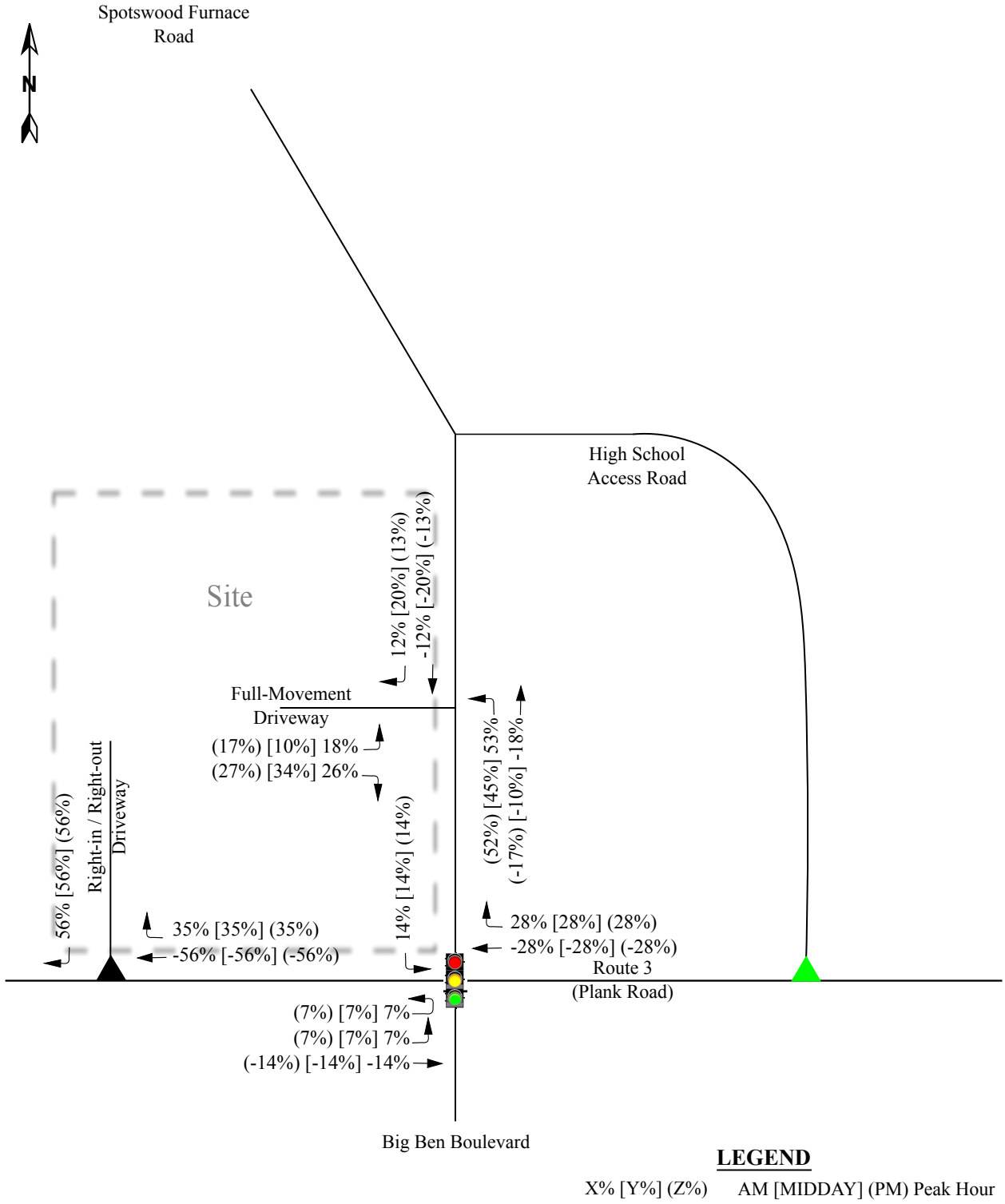
Spotswood Furnace Road
C-Store
Spotsylvania County, Virginia

Primary Site Trip Distribution

Scale: Not to Scale | Figure 5



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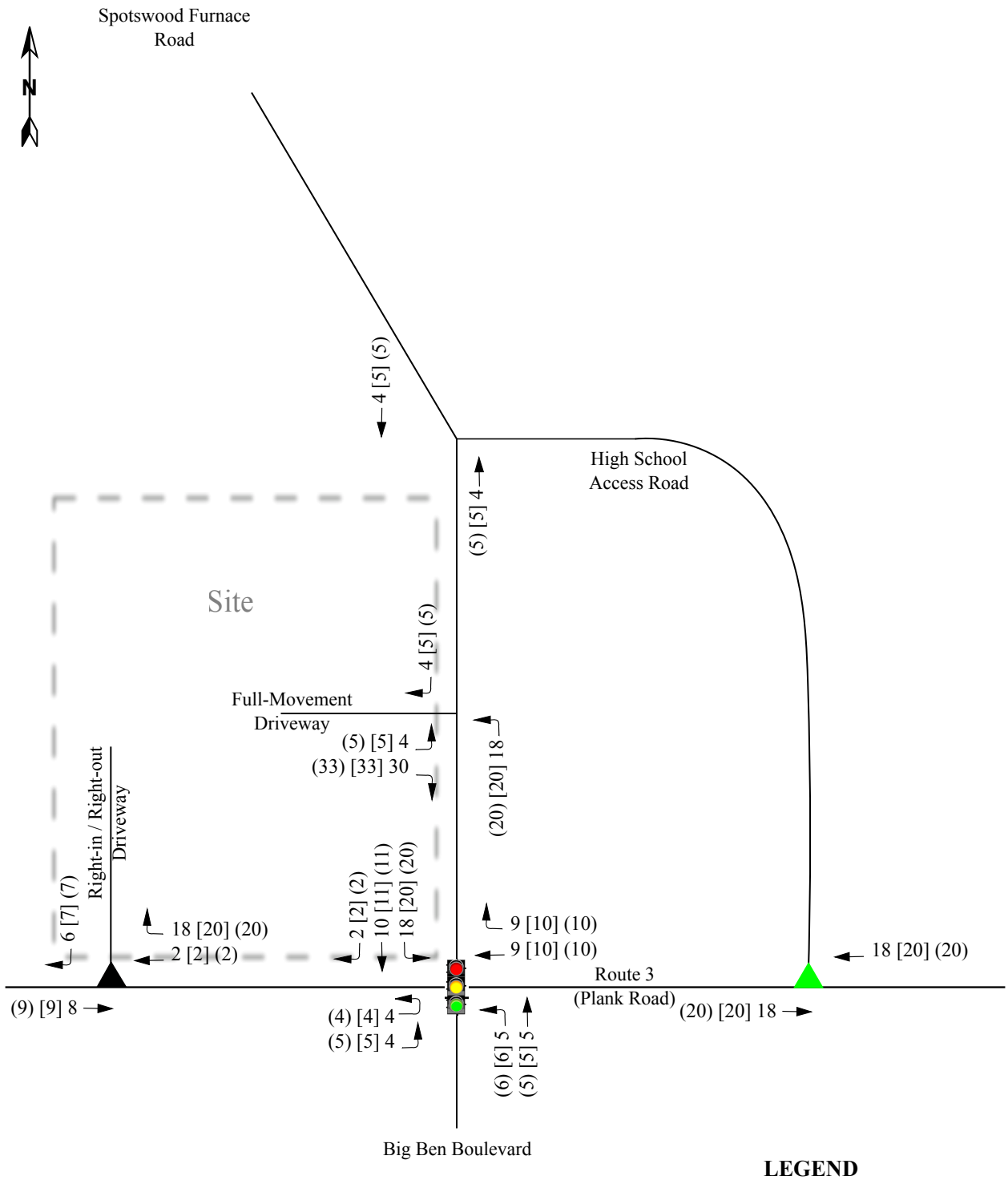
Spotswood Furnace Road C-Store

Spotsylvania County, Virginia

Pass-By Site Trip Distribution

Scale: Not to Scale

Figure 6



LEGEND

X [Y] (Z) AM [MIDDAY] (PM) Peak Hour

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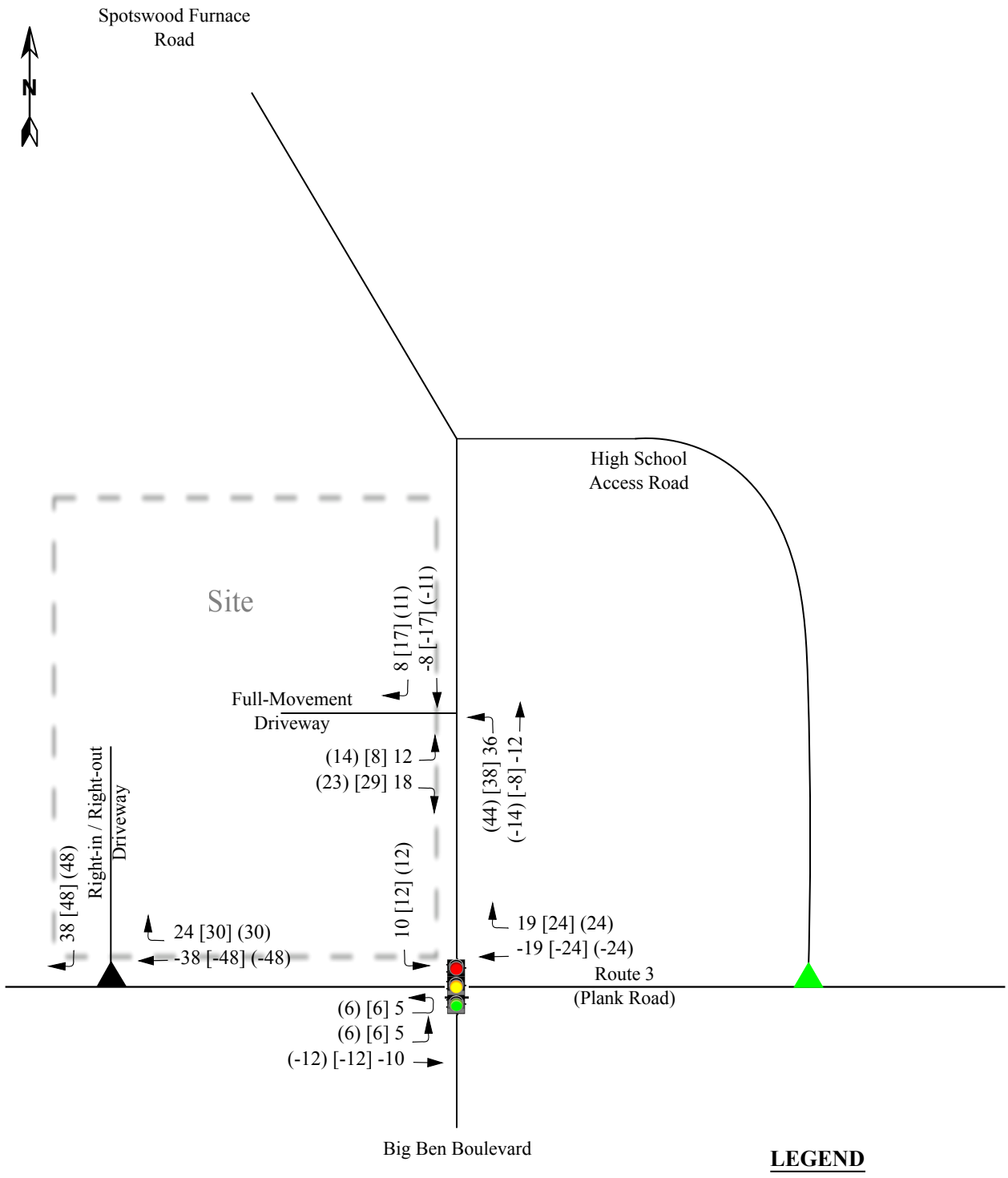
Spotswood Furnace Road
C-Store
Spotsylvania County, Virginia

Primary Site
Trip Assignment

Scale: Not to Scale | Figure 7



LEGEND

X [Y] (Z) AM [MIDDAY] (PM) Peak Hour

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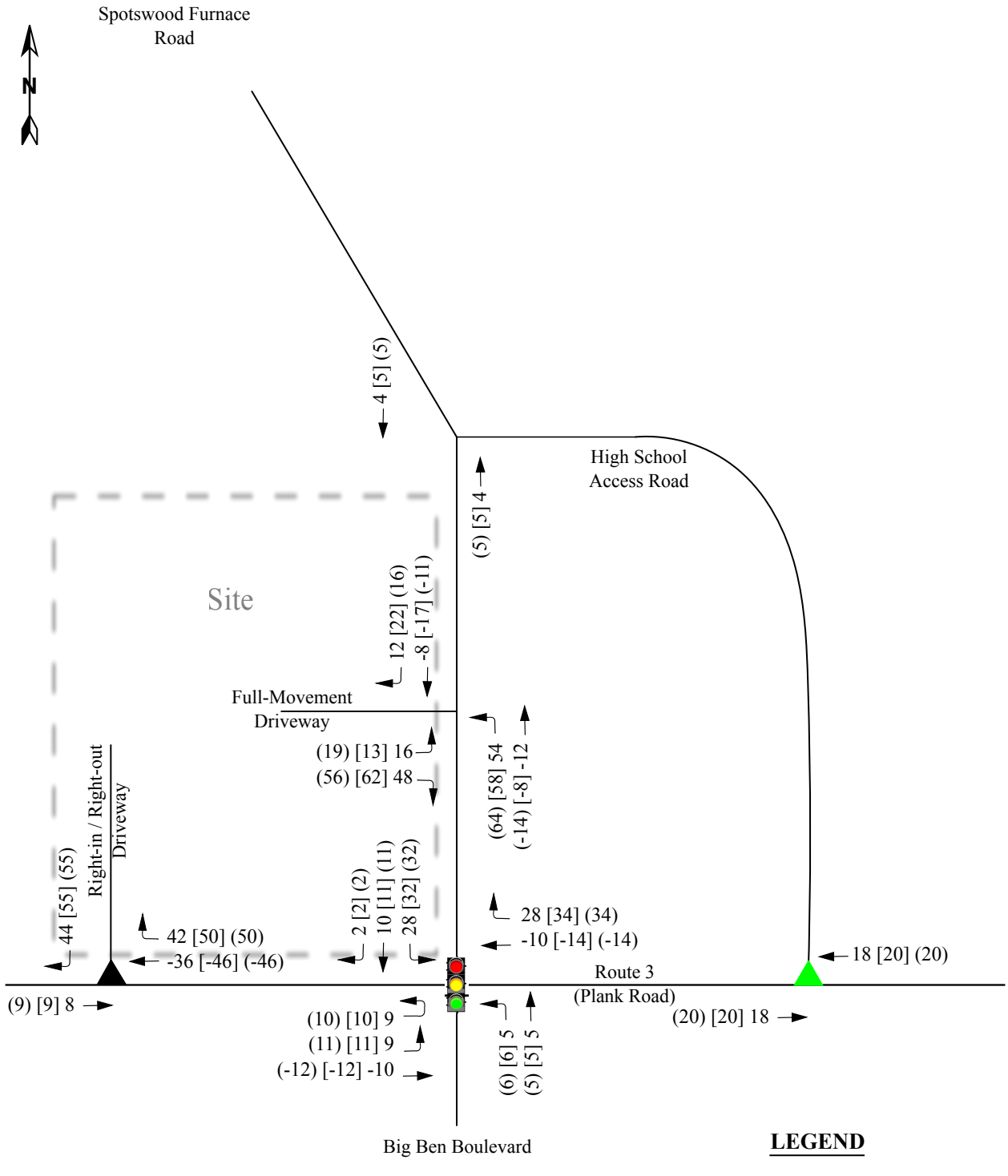
Spotswood Furnace Road
C-Store
Spotsylvania County, Virginia

Pass-By Site Trip Assignment

Scale: Not to Scale | Figure 8



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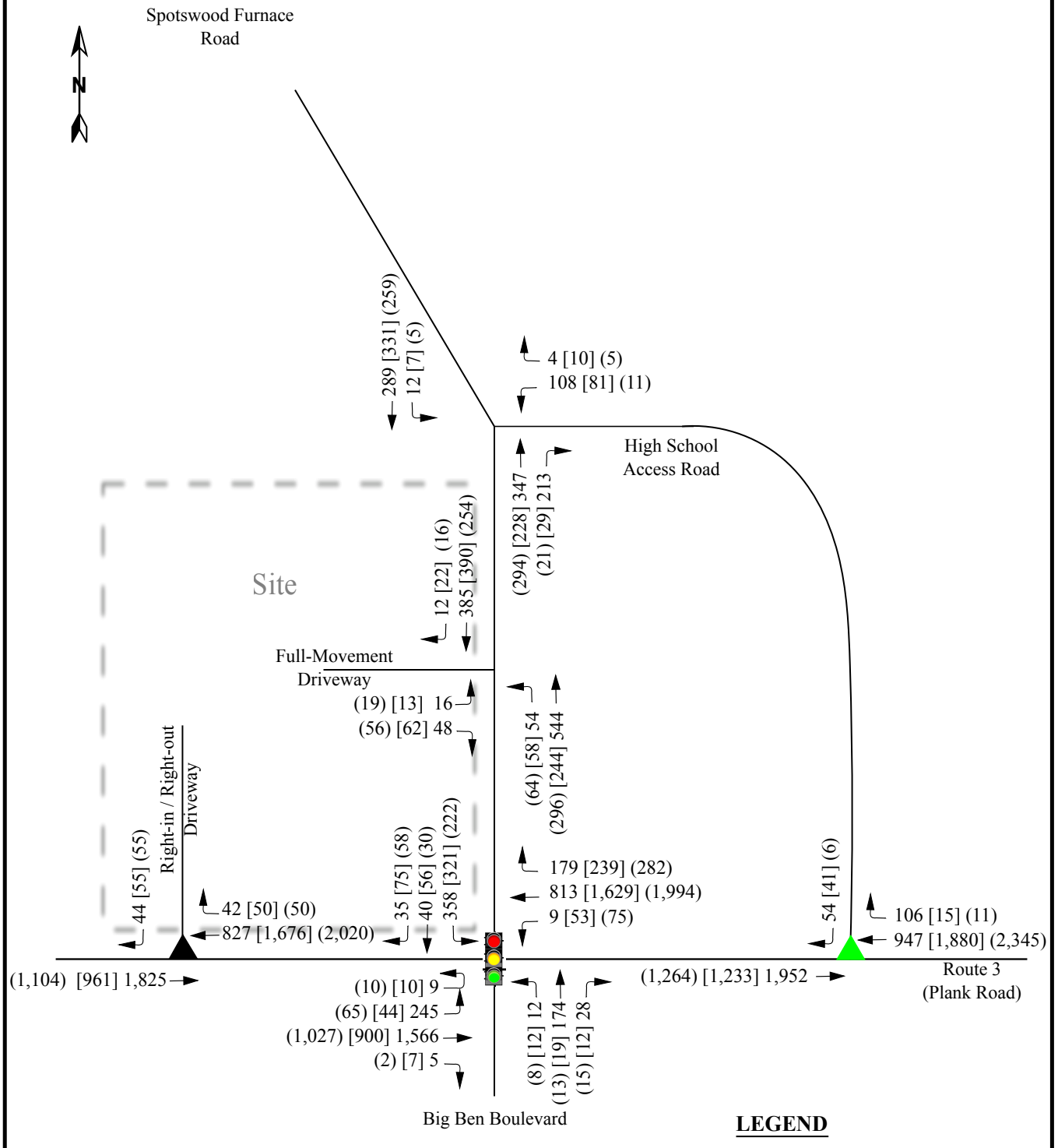
Spotswood Furnace Road
C-Store
Spotsylvania County, Virginia

Total Site Trips

Scale: Not to Scale

Figure 9



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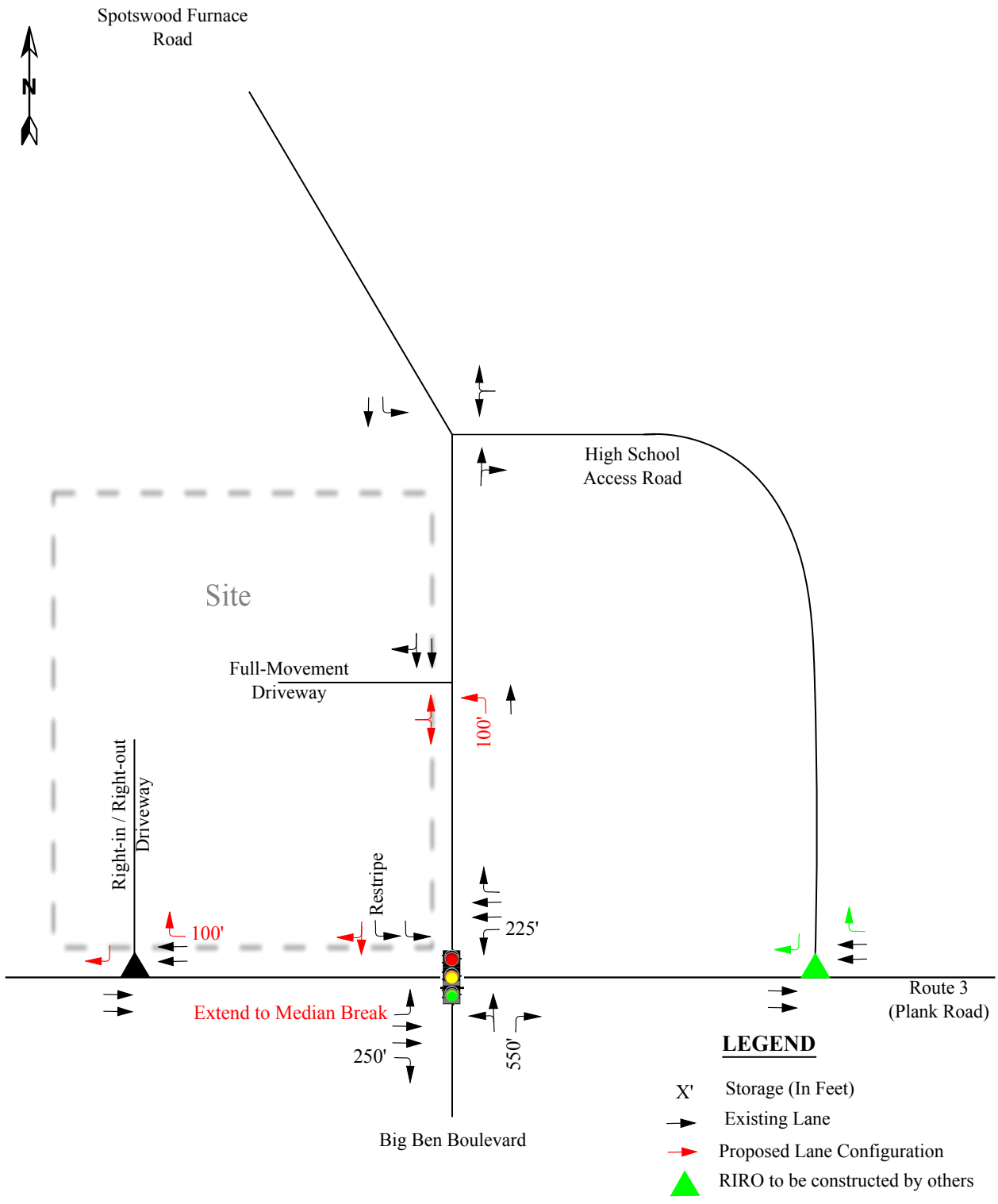
Spotswood Furnace Road C-Store

Spotsylvania County, Virginia

Build (2018) Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 10



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Spotswood Furnace Road C-Store

Spotsylvania County, Virginia

Recommended Lane Configuration

Scale: Not to Scale

Figure 11

Directional Turning Movement Study (7 AM - 9 AM)

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	Left	Thru	Right	Ped's Across N Leg	Left	Thru	Right	Ped's Across S Leg	Left	Thru	Right	Ped's Across E Leg	Left	Thru	Right	Ped's Across W Leg	Int. Total
7:15	60	5	11	0	2	42	2	0	2	131	72	0	96	328	3	0	754
7:30	80	11	30	0	1	79	8	0	0	176	84	0	73	355	1	0	898
7:45	112	10	27	0	2	9	13	0	3	211	22	0	8	377	1	0	795
8:00	36	1	8	0	2	1	4	0	4	221	20	0	7	455	0	0	759
8:15	27	2	3	0	2	0	5	0	2	205	18	0	6	387	1	0	658
8:30	31	0	15	0	0	1	4	0	6	233	9	0	2	362	2	0	665
8:45	25	0	10	0	5	4	4	0	4	187	21	0	17	392	2	0	671
9:00	50	7	9	0	1	2	9	0	3	172	22	1	15	288	1	0	579
Total	421	36	113	0	15	138	49	0	24	1536	268	1	224	2944	11	0	5779
% Appr Total	73.9%	6.3%	19.8%		7.4%	68.3%	24.3%		1.3%	84.0%	14.7%		7.0%	92.6%	0.3%		
School Buses	30	5	15		0	6	0		0	2	27		28	4	1		118
% School Buses	7.1%	13.9%	13.3%		0.0%	4.3%	0.0%		0.0%	0.1%	10.1%		12.5%	0.1%	9.1%		2.0%

School Buses

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	Left	Thru	Right		Left	Thru	Right		Left	Thru	Right		Left	Thru	Right		Int. Total
7:15	7	1	3		0	4	0		0	0	7		12	0	0		34
7:30	10	1	8		0	1	0		0	0	0		1	0	0		21
7:45	7	1	1		0	1	0		0	1	1		0	1	0		13
8:00	2	0	2		0	0	0		0	1	1		0	0	0		6
8:15	0	2	0		0	0	0		0	0	1		0	0	0		3
8:30	1	0	1		0	0	0		0	0	1		0	1	1		5
8:45	1	0	0		0	0	0		0	0	13		10	2	0		26
9:00	2	0	0		0	0	0		0	0	3		5	0	0		10
Total	30	5	15		0	6	0		0	2	27		28	4	1		118

Directional Turning Movement Study (4 PM - 6 PM)

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	**Left**	**Thru**	**Right**	**Ped's Across N Leg**	**Left**	**Thru**	**Right**	**Ped's Across S Leg**	**Left**	**Thru**	**Right**	**Ped's Across E Leg**	**Left**	**Thru**	**Right**	**Ped's Across W Leg**	**Int. Total**
16:15	33	2	16	0	0	4	3	0	13	462	36	0	10	274	1	1	854
16:30	49	1	8	0	2	6	3	0	16	470	40	2	10	245	1	0	851
16:45	45	2	16	0	2	1	2	0	11	408	49	0	17	300	1	0	854
17:00	41	3	6	0	1	1	1	0	13	479	57	1	16	287	1	0	906
17:15	48	6	18	2	0	2	2	0	28	504	64	0	13	219	0	0	904
17:30	52	3	13	0	0	2	7	0	13	480	74	0	12	250	1	0	907
17:45	40	6	22	0	1	3	4	0	18	462	51	1	10	243	0	0	860
18:00	26	5	24	0	1	5	5	0	19	456	38	2	15	280	2	0	876
Total	334	28	123	2	7	24	27	0	131	3721	409	6	103	2098	7	1	7012
% Appr Total	68.9%	5.8%	25.4%		12.1%	41.4%	46.6%		3.1%	87.3%	9.6%		4.7%	95.0%	0.3%		
School Buses	1	0	1		0	4	0		1	1	21		16	2	1		48
% School Buses	0.3%	0.0%	0.8%		0.0%	16.7%	0.0%		0.8%	0.03%	5.1%		15.5%	0.1%	14.3%		0.7%

School Buses

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Int. Total**
16:15	0	0	0		0	0	0		1	0	8		7	0	0		16
16:30	0	0	1		0	3	0		0	0	6		3	0	0		13
16:45	1	0	0		0	1	0		0	1	3		6	1	1		14
17:00	0	0	0		0	0	0		0	0	2		0	1	0		3
17:15	0	0	0		0	0	0		0	0	0		0	0	0		0
17:30	0	0	0		0	0	0		0	0	1		0	0	0		1
17:45	0	0	0		0	0	0		0	0	0		0	0	0		0
18:00	0	0	0		0	0	0		0	0	1		0	0	0		1
Total	1	0	1		0	4	0		1	1	21		16	2	1		48

Directional Turning Movement Study (1:30 PM - 4 PM)

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania
Date Surveyed: November 29, 2016 **Weather:** Cloudy/Showers

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	**Left**	**Thru**	**Right**	**Ped's Across N Leg**	**Left**	**Thru**	**Right**	**Ped's Across S Leg**	**Left**	**Thru**	**Right**	**Ped's Across E Leg**	**Left**	**Thru**	**Right**	**Ped's Across W Leg**	**Int. Total**
13:45	25	2	2	0	0	2	4	0	4	295	40	0	7	214	0	0	595
14:00	16	0	6	0	1	0	2	0	5	250	32	0	10	214	0	0	536
14:15	28	0	1	0	0	5	1	0	11	283	43	0	31	226	2	0	631
14:30	49	11	24	0	0	7	6	2	3	220	57	3	10	187	0	0	574
14:45	118	21	69	0	0	4	6	0	7	324	54	0	9	238	2	0	852
15:00	56	8	7	0	2	3	2	0	15	427	38	0	4	197	2	0	761
15:15	41	5	13	0	2	2	2	0	15	364	40	1	5	216	2	0	707
15:30	41	6	12	0	2	1	2	0	14	425	32	0	6	226	1	0	768
15:45	33	3	9	0	0	2	3	0	15	457	28	0	6	259	4	0	819
16:00	50	4	12	0	1	1	4	0	13	388	32	1	8	250	1	0	764
Total	457	60	155	0	8	27	32	2	102	3433	396	5	96	2227	14	0	7007
% Appr Total	68.0%	8.9%	23.1%		11.9%	40.3%	47.8%		2.6%	87.3%	10.1%		4.1%	95.3%	0.6%		
School Buses	25	5	26		0	0	0		3	3	16		14	7	0		99
% School Buses	5.5%	8.3%	16.8%		0.0%	0.0%	0.0%		2.9%	0.1%	4.0%		14.6%	0.3%	0.0%		1.4%

School Buses

Location: Route 3/Big Ben Blvd. & SR 620 (Spotswood Furnace Rd.) **County/Area:** Spotsylvania
Date Surveyed: November 29, 2016 **Weather:** Cloudy/Showers

	Spotswood Furnace Rd. From North				Big Ben Blvd. From South				Route 3 From East				Route 3 From West				
End Time	**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Int. Total**
13:45	0	0	1		0	0	0		0	0	0		0	1	0		2
14:00	2	0	0		0	0	0		0	0	3		1	0	0		6
14:15	4	0	0		0	0	0		1	0	2		7	0	0		14
14:30	10	4	6		0	0	0		0	1	4		0	0	0		25
14:45	5	0	17		0	0	0		0	0	1		0	0	0		23
15:00	2	1	0		0	0	0		0	1	1		0	1	0		6
15:15	1	0	0		0	0	0		0	1	1		0	3	0		6
15:30	1	0	0		0	0	0		0	0	1		1	1	0		4
15:45	0	0	1		0	0	0		2	0	2		0	0	0		5
16:00	0	0	1		0	0	0		0	0	1		5	1	0		8
Total	25	5	26		0	0	0		3	3	16		14	7	0		99

Directional Turning Movement Study (6:30 AM - 9 AM)

Location: SR 620 (Spotswood Furnace Rd.) & South Entrance to Riverbend HS — **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 — **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Spotswood Furnace Rd. From South				South Entr. River Bend HS From East				NA From West				
End Time	Left	Thru	Right	Ped's Across N Leg	Left	Thru	Right	Ped's Across S Leg	Left	Thru	Right	Ped's Across E Leg	Left	Thru	Right	Ped's Across W Leg	Int. Total
6:45	0	44		0		22	15	0	1		0	0					82
7:00	2	42		0		52	46	0	4		0	0					146
7:15	5	59		0		93	122	0	39		2	0					320
7:30	5	75		0		158	123	0	68		0	0					429
7:45	0	94		0		21	16	0	45		2	0					178
8:00	0	37		0		21	7	0	8		0	0					73
8:15	1	37		0		21	6	0	1		1	0					67
8:30	0	45		0		15	4	0	1		0	0					65
8:45	0	37		0		41	6	0	1		0	0					85
9:00	0	64		0		31	15	0	6		0	0					116
Total	13	534		0		475	360	0	174		5	0					1561
% Appr Total	2.4%	97.6%				56.9%	43.1%		97.2%		2.8%						
School Buses	8	32				36	31		43		4						154
% School Buses	61.5%	6.0%				7.6%	8.6%		24.7%		80.0%						9.9%

School Buses

Location: SR 620 (Spotswood Furnace Rd.) & S. Entrance to Riverbend HS — **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 — **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Spotswood Furnace Rd. From South				South Entr. River Bend HS From East				NA From West				
End Time	Left	Thru	Right		Left	Thru	Right		Left	Thru	Right		Left	Thru	Right		Int. Total
6:45	0	9				2	0		0		0						11
7:00	2	9				1	3		2		0						17
7:15	5	6				1	23		11		2						48
7:30	0	4				1	2		17		0						24
7:45	0	0				1	1		8		1						11
8:00	0	0				1	0		4		0						5
8:15	1	1				0	1		1		1						5
8:30	0	1				0	0		0		0						1
8:45	0	0				23	1		0		0						24
9:00	0	2				6	0		0		0						8
Total	8	32				36	31		43		4						154

Directional Turning Movement Study (4 PM - 7 PM)

Location: SR 620 (Spotswood Furnace Rd.) & S. Entrance to Riverbend HS — **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 — **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North	Spotswood Furnace Rd. From South	South Entr. River Bend HS From East	NA From West	

End Time	Left	Thru	Right	Ped's Across N Leg	Left	Thru	Right	Ped's Across S Leg	Left	Thru	Right	Ped's Across E Leg	Left	Thru	Right	Ped's Across W Leg	Int. Total
16:15	2	49		0		54	7	0	5		1	0					118
16:30	1	54		0		50	7	0	6		0	0					118
16:45	1	58		0		61	8	0	5		0	0					133
17:00	1	47		0		73	9	0	3		2	0					135
17:15	2	72		0		75	10	0	7		1	0					167
17:30	2	57		0		89	8	0	5		0	0					161
17:45	0	72		0		69	4	0	1		2	0					148
18:00	1	48		0		68	8	0	2		2	1					129
Total	10	457		0		539	61	0	34		8	1					1109
% Appr Total	2.1%	97.9%				89.8%	10.2%		81.0%		19.0%						
School Buses	2	2				37	3		1		1						46
% School Buses	20.0%	0.4%				6.9%	4.9%		2.9%		12.5%						4.1%

School Buses

Location: SR 620 (Spotswood Furnace Rd.) & S. Entrance to Riverbend HS **County/Area:** Spotsylvania

Date Surveyed: October 11, 2016 **Weather:** Sunny/Dry

	Spotswood Furnace Rd. From North				Spotswood Furnace Rd. From South				South Entr. River Bend HS From East				NA From West				
End	**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Left**	**Thru**	**Right**		**Int.**
16:15	1	0				15	1		1		1						19
16:30	1	1				10	1		0		0						13
16:45	0	1				8	1		0		0						10
17:00	0	0				2	0		0		0						2
17:15	0	0				0	0		0		0						0
17:30	0	0				1	0		0		0						1
17:45	0	0				0	0		0		0						0
18:00	0	0				1	0		0		0						1
Total	2	2				37	3		1		1						46

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	1515	5	9	739	245	7	161	27	314	29	83
Future Volume (vph)	225	1515	5	9	739	245	7	161	27	314	29	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1687	3539	1583	1770	3374	1538	0	1808	1583	1573	1471	0
Flt Permitted	0.950			0.950				0.998		0.950	0.977	
Satd. Flow (perm)	1687	3539	1583	1770	3374	1538	0	1808	1583	1573	1471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			61			112			143		18	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		2051			2510			936			571	
Travel Time (s)		31.1			38.0			25.5			11.1	
Peak Hour Factor	0.48	0.92	0.92	0.91	0.91	0.91	0.47	0.47	0.47	0.66	0.66	0.66
Heavy Vehicles (%)	7%	2%	2%	2%	7%	5%	2%	5%	2%	9%	11%	18%
Shared Lane Traffic (%)										31%		
Lane Group Flow (vph)	469	1647	5	10	812	269	0	358	57	328	318	0
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases			2			6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	16.0	13.0	13.0	16.0	16.0	13.0	13.0	13.0	16.0	16.0	
Total Split (s)	51.0	84.0	32.0	13.0	46.0	31.0	32.0	32.0	32.0	31.0	31.0	
Total Split (%)	31.9%	52.5%	20.0%	8.1%	28.8%	19.4%	20.0%	20.0%	20.0%	19.4%	19.4%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	46.4	87.8	119.8	8.3	42.6	69.6		28.0	28.0	27.0	27.0	
Actuated g/C Ratio	0.29	0.55	0.75	0.05	0.27	0.44		0.18	0.18	0.17	0.17	
v/c Ratio	0.96	0.85	0.00	0.11	0.91	0.37		1.13	0.14	1.24	1.21	
Control Delay	75.6	24.4	0.0	72.3	66.5	11.5		148.5	0.8	187.3	174.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	75.6	24.4	0.0	72.3	66.5	11.5		148.5	0.8	187.3	174.6	
LOS	E	C	A	E	E	B		F	A	F	F	
Approach Delay		35.6			53.0			128.2			181.0	
Approach LOS		D			D			F			F	
Queue Length 50th (ft)	445	442	0	10	276	41		~433	0	~445	~409	
Queue Length 95th (ft)	241	#898	m0	m28	#518	90		240	0	#404	#372	
Internal Link Dist (ft)		1971			2430			856			491	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	495	1942	1200	99	897	731		316	395	265	263	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.95	0.85	0.00	0.10	0.91	0.37		1.13	0.14	1.24	1.21	

Intersection Summary

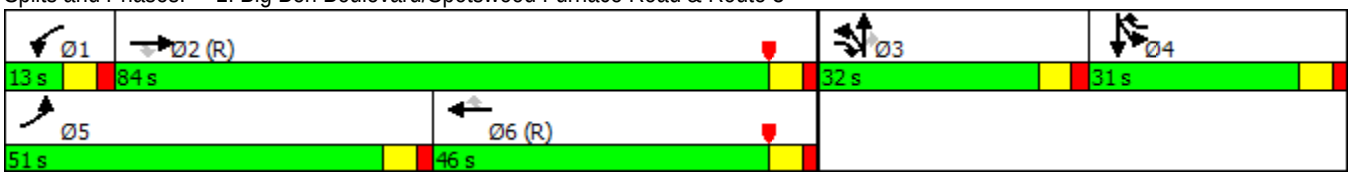
Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 48 (30%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 71.0 Intersection LOS: E
Intersection Capacity Utilization 80.2% ICU Level of Service D
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	490	697	612	38	41	450	435	193	660	295	410	418
Average Queue (ft)	281	268	246	3	9	281	276	81	308	62	264	295
95th Queue (ft)	531	667	571	50	33	458	446	169	686	323	429	452
Link Distance (ft)		1980	1980			2395	2395	2395	864		434	434
Upstream Blk Time (%)									1		1	2
Queuing Penalty (veh)									0		1	4
Storage Bay Dist (ft)	400			250	225					550		
Storage Blk Time (%)	16	1	8			25			10			
Queuing Penalty (veh)	130	2	0			2			3			

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	546	6	55	21
Average Queue (ft)	224	0	12	3
95th Queue (ft)	585	6	46	25
Link Distance (ft)	840	434	753	753
Upstream Blk Time (%)	2			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection

Int Delay, s/veh 53.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	156	4	324	307	12	270
Future Vol, veh/h	156	4	324	307	12	270
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	59	59	56	56	75	75
Heavy Vehicles, %	25	75	2	10	58	7
Mvmt Flow	264	7	579	548	16	360

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1245	853	0	0	1127	0
Stage 1	853	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.65	6.95	-	-	4.68	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.975	-	-	2.722	-
Pot Cap-1 Maneuver	~ 172	269	-	-	454	-
Stage 1	381	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 166	269	-	-	454	-
Mov Cap-2 Maneuver	~ 166	-	-	-	-	-
Stage 1	381	-	-	-	-	-
Stage 2	613	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 350.8	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 168	454	-
HCM Lane V/C Ratio	-	- 1.614	0.035	-
HCM Control Delay (s)	-	-$ 350.8	13.2	-
HCM Lane LOS	-	- F	B	-
HCM 95th %tile Q(veh)	-	- 18.4	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

1: Big Ben Boulevard/Spotswood Furnace Road & Plank Road

Timing Plan: Default

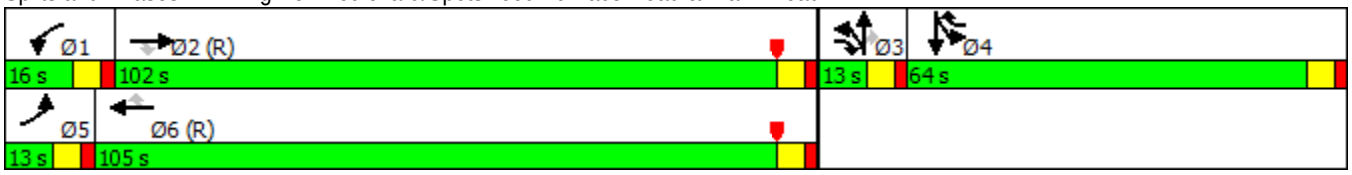
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	877	7	51	1540	209	6	13	12	275	43	108
Future Volume (vph)	31	877	7	51	1540	209	6	13	12	275	43	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1736	3539	1583	1770	3539	1583	0	1833	1583	1649	1485	0
Flt Permitted	0.950			0.950				0.984		0.950	0.986	
Satd. Flow (perm)	1736	3539	1583	1770	3539	1583	0	1833	1583	1649	1485	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50			230			84		29	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		844			768			936			620	
Travel Time (s)		12.8			11.6			25.5			12.1	
Peak Hour Factor	0.64	0.91	0.91	0.91	0.91	0.91	0.70	0.70	0.70	0.48	0.48	0.48
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%	2%	2%	2%	4%	3%	17%
Shared Lane Traffic (%)										21%		
Lane Group Flow (vph)	48	964	8	56	1692	230	0	28	17	453	435	0
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases			2			6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	12.0	6.0	5.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	18.5	13.0	13.0	18.5	13.5	13.0	13.0	13.0	13.5	13.5	
Total Split (s)	13.0	102.0	13.0	16.0	105.0	64.0	13.0	13.0	13.0	64.0	64.0	
Total Split (%)	6.7%	52.3%	6.7%	8.2%	53.8%	32.8%	6.7%	6.7%	6.7%	32.8%	32.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	8.9	102.3	115.2	11.4	107.3	167.8		8.9	8.9	58.9	58.9	
Actuated g/C Ratio	0.05	0.52	0.59	0.06	0.55	0.86		0.05	0.05	0.30	0.30	
v/c Ratio	0.61	0.52	0.01	0.55	0.87	0.16		0.34	0.11	0.91	0.93	
Control Delay	120.7	32.4	0.0	109.0	45.5	0.4		101.4	1.5	88.3	87.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	120.7	32.4	0.0	109.0	45.5	0.4		101.4	1.5	88.3	87.8	
LOS	F	C	A	F	D	A		F	A	F	F	
Approach Delay		36.3			42.0			63.7			88.0	
Approach LOS		D			D			E			F	
Queue Length 50th (ft)	62	441	0	71	1043	0		36	0	589	540	
Queue Length 95th (ft)	80	506	0	128	1158	6		59	0	330	288	
Internal Link Dist (ft)		764			688			856			540	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	80	1857	956	108	1947	1394		84	153	507	477	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.60	0.52	0.01	0.52	0.87	0.16		0.33	0.11	0.89	0.91	

Intersection Summary

Area Type: Other
Cycle Length: 195
Actuated Cycle Length: 195
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 51.2 Intersection LOS: D
Intersection Capacity Utilization 67.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Plank Road



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Plank Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	94	383	343	23	259	713	626	106	68	26	434	440
Average Queue (ft)	39	183	152	2	74	347	295	19	23	8	197	226
95th Queue (ft)	89	364	329	15	196	697	629	155	63	28	400	439
Link Distance (ft)		809	809			721	721	721	869		510	510
Upstream Blk Time (%)						1	1	0			0	0
Queuing Penalty (veh)						0	0	0			1	1
Storage Bay Dist (ft)	400			250	225					550		
Storage Blk Time (%)		0	3			19						
Queuing Penalty (veh)		0	0			10						

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	166	2	48	33
Average Queue (ft)	69	0	5	2
95th Queue (ft)	141	3	31	32
Link Distance (ft)	739	510	759	759
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 12

Intersection	
Int Delay, s/veh	15.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	117	10	211	42	7	309
Future Vol, veh/h	117	10	211	42	7	309
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	47	47	78	78	56	56
Heavy Vehicles, %	27	30	2	7	71	4
Mvmt Flow	249	21	271	54	13	552

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	874	297	0	0	324	0
Stage 1	297	-	-	-	-	-
Stage 2	577	-	-	-	-	-
Critical Hdwy	6.67	6.5	-	-	4.81	-
Critical Hdwy Stg 1	5.67	-	-	-	-	-
Critical Hdwy Stg 2	5.67	-	-	-	-	-
Follow-up Hdwy	3.743	3.57	-	-	2.839	-
Pot Cap-1 Maneuver	290	681	-	-	932	-
Stage 1	700	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	286	681	-	-	932	-
Mov Cap-2 Maneuver	286	-	-	-	-	-
Stage 1	700	-	-	-	-	-
Stage 2	508	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	67.9	0	0.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	300	932	-
HCM Lane V/C Ratio	-	-	0.901	0.013	-
HCM Control Delay (s)	-	-	67.9	8.9	-
HCM Lane LOS	-	-	F	A	-
HCM 95th %tile Q(veh)	-	-	8.4	0	-

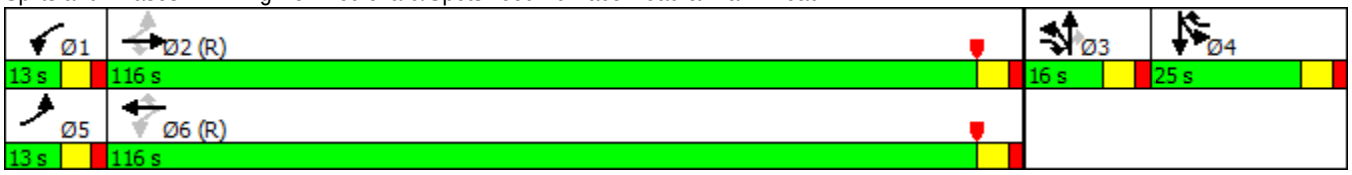
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	999	2	72	1925	246	2	8	14	181	18	59
Future Volume (vph)	51	999	2	72	1925	246	2	8	14	181	18	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	0	1844	1583	1681	1613	0
Flt Permitted	0.037			0.200				0.990		0.950	0.981	
Satd. Flow (perm)	69	3539	1583	373	3539	1583	0	1844	1583	1681	1613	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			58			260			96		22	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		844			768			936			620	
Travel Time (s)		12.8			11.6			25.5			12.1	
Peak Hour Factor	0.80	0.87	0.87	0.94	0.94	0.94	0.67	0.67	0.67	0.90	0.90	0.90
Shared Lane Traffic (%)										27%		
Lane Group Flow (vph)	64	1148	2	77	2048	262	0	15	21	147	140	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases	2		2	6		6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	16.0	16.0	13.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Total Split (s)	13.0	116.0	16.0	13.0	116.0	25.0	16.0	16.0	16.0	25.0	25.0	
Total Split (%)	7.6%	68.2%	9.4%	7.6%	68.2%	14.7%	9.4%	9.4%	9.4%	14.7%	14.7%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	127.7	119.1	132.2	127.9	119.2	139.5		9.1	9.1	19.5	19.5	
Actuated g/C Ratio	0.75	0.70	0.78	0.75	0.70	0.82		0.05	0.05	0.11	0.11	
v/c Ratio	0.46	0.46	0.00	0.22	0.83	0.19		0.15	0.12	0.76	0.69	
Control Delay	30.8	12.8	0.0	6.8	23.2	0.5		79.8	1.4	97.2	77.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	30.8	12.8	0.0	6.8	23.2	0.5		79.8	1.4	97.2	77.9	
LOS	C	B	A	A	C	A		E	A	F	E	
Approach Delay		13.7			20.2			34.1			87.8	
Approach LOS		B			C			C			F	
Queue Length 50th (ft)	17	303	0	20	867	0		16	0	168	133	
Queue Length 95th (ft)	57	346	0	37	1021	8		31	0	#269	221	
Internal Link Dist (ft)		764			688			856			540	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	142	2479	1269	355	2480	1356		130	200	207	218	
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.45	0.46	0.00	0.22	0.83	0.19		0.12	0.10	0.71	0.64	

Intersection Summary

Area Type: Other
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 23.3 Intersection LOS: C
Intersection Capacity Utilization 80.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Plank Road



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Plank Road

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	100	224	197	147	435	407	48	34	36	198	215
Average Queue (ft)	43	108	76	35	226	188	13	9	11	116	130
95th Queue (ft)	86	215	178	110	433	385	41	29	33	187	209
Link Distance (ft)		809	809		721	721	721	869		510	510
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	400			225					550		
Storage Blk Time (%)			0		8						
Queuing Penalty (veh)			0		5						

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	32	15
Average Queue (ft)	14	1
95th Queue (ft)	39	10
Link Distance (ft)	739	759
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 5

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	16	5	274	31	5	242
Future Vol, veh/h	16	5	274	31	5	242
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	87	87	66	66	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	6	415	47	6	285

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	735	439	0	0	462	0
Stage 1	439	-	-	-	-	-
Stage 2	296	-	-	-	-	-
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	387	618	-	-	1099	-
Stage 1	650	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	385	618	-	-	1099	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	751	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	423	1099	-
HCM Lane V/C Ratio	-	-	0.057	0.005	-
HCM Control Delay (s)	-	-	14	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

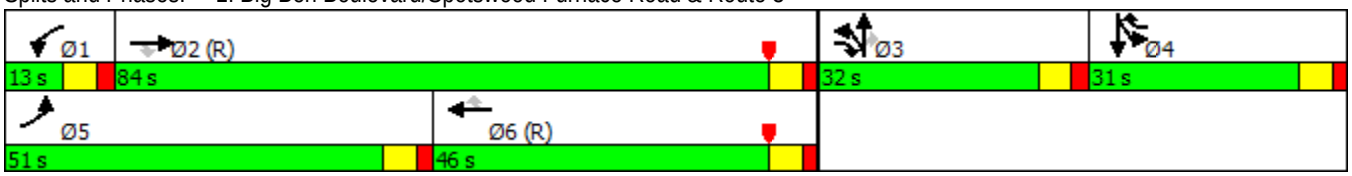
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	1576	5	9	823	151	7	169	28	330	30	33
Future Volume (vph)	236	1576	5	9	823	151	7	169	28	330	30	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1687	3539	1583	1770	3374	1538	0	1808	1583	1573	1535	0
Flt Permitted	0.950			0.950				0.998		0.950	0.967	
Satd. Flow (perm)	1687	3539	1583	1770	3374	1538	0	1808	1583	1573	1535	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			61			102			143		6	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		2051			758			936			571	
Travel Time (s)		31.1			11.5			25.5			11.1	
Peak Hour Factor	0.48	0.92	0.92	0.91	0.91	0.91	0.47	0.47	0.47	0.66	0.66	0.66
Heavy Vehicles (%)	7%	2%	2%	2%	7%	5%	2%	5%	2%	9%	11%	18%
Shared Lane Traffic (%)										40%		
Lane Group Flow (vph)	492	1713	5	10	904	166	0	375	60	300	295	0
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases			2			6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	16.0	13.0	13.0	16.0	16.0	13.0	13.0	13.0	16.0	16.0	
Total Split (s)	51.0	84.0	32.0	13.0	46.0	31.0	32.0	32.0	32.0	31.0	31.0	
Total Split (%)	31.9%	52.5%	20.0%	8.1%	28.8%	19.4%	20.0%	20.0%	20.0%	19.4%	19.4%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	None	
Act Effct Green (s)	47.0	87.8	119.8	8.3	42.0	69.0		28.0	28.0	27.0	27.0	
Actuated g/C Ratio	0.29	0.55	0.75	0.05	0.26	0.43		0.18	0.18	0.17	0.17	
v/c Ratio	0.99	0.88	0.00	0.11	1.02	0.23		1.19	0.15	1.13	1.12	
Control Delay	83.1	24.2	0.0	73.1	88.8	8.4		165.7	0.8	152.9	147.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	83.1	24.2	0.0	73.1	88.8	8.4		165.7	0.8	152.9	147.5	
LOS	F	C	A	E	F	A		F	A	F	F	
Approach Delay		37.3			76.3			142.9			150.2	
Approach LOS		D			E			F			F	
Queue Length 50th (ft)	488	466	0	11	~359	14		~470	0	~382	~367	
Queue Length 95th (ft)	257	#1080	m0	m30	#627	53		250	0	#351	#338	
Internal Link Dist (ft)		1971			678			856			491	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	495	1942	1200	99	885	721		316	395	265	264	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.99	0.88	0.00	0.10	1.02	0.23		1.19	0.15	1.13	1.12	

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 48 (30%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 73.2 Intersection LOS: E
Intersection Capacity Utilization 81.3% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	487	770	683	79	152	512	513	162	703	418	427	422
Average Queue (ft)	287	340	314	5	18	315	320	48	338	69	262	270
95th Queue (ft)	541	816	747	71	114	536	541	144	757	354	462	460
Link Distance (ft)		1980	1980			673	673	673	864		434	434
Upstream Blk Time (%)						0	0		3		5	4
Queuing Penalty (veh)						0	1		0		9	9
Storage Bay Dist (ft)	400			250	225					550		
Storage Blk Time (%)	18	2	12			31			14			
Queuing Penalty (veh)	145	5	1			3			6			

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	SB	SB
Directions Served	LR	L	T
Maximum Queue (ft)	214	47	65
Average Queue (ft)	95	7	14
95th Queue (ft)	224	34	80
Link Distance (ft)	818	753	753
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection

Int Delay, s/veh 17.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	108	4	343	213	12	285
Future Vol, veh/h	108	4	343	213	12	285
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	59	59	56	56	75	75
Heavy Vehicles, %	25	75	2	10	58	7
Mvmt Flow	183	7	613	380	16	380

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1215	803	0	0	993	0
Stage 1	803	-	-	-	-	-
Stage 2	412	-	-	-	-	-
Critical Hdwy	6.65	6.95	-	-	4.68	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.975	-	-	2.722	-
Pot Cap-1 Maneuver	~ 180	290	-	-	517	-
Stage 1	404	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 174	290	-	-	517	-
Mov Cap-2 Maneuver	~ 174	-	-	-	-	-
Stage 1	404	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	142.1	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	177	517	-
HCM Lane V/C Ratio	-	-	1.072	0.031	-
HCM Control Delay (s)	-	-	142.1	12.2	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	9.3	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

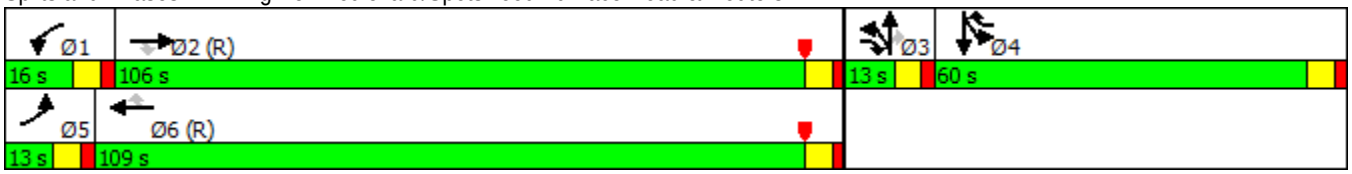
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	912	7	53	1643	205	6	14	12	289	45	73
Future Volume (vph)	33	912	7	53	1643	205	6	14	12	289	45	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1736	3539	1583	1770	3539	1583	0	1835	1583	1649	1540	0
Flt Permitted	0.950			0.950				0.985		0.950	0.980	
Satd. Flow (perm)	1736	3539	1583	1770	3539	1583	0	1835	1583	1649	1540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			50			225			84		15	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		844			810			936			620	
Travel Time (s)		12.8			12.3			25.5			12.1	
Peak Hour Factor	0.64	0.91	0.91	0.91	0.91	0.91	0.70	0.70	0.70	0.48	0.48	0.48
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%	2%	2%	2%	4%	3%	17%
Shared Lane Traffic (%)										28%		
Lane Group Flow (vph)	52	1002	8	58	1805	225	0	29	17	433	415	0
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases			2			6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	12.0	6.0	5.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	18.5	13.0	13.0	18.5	13.5	13.0	13.0	13.0	13.5	13.5	
Total Split (s)	13.0	106.0	13.0	16.0	109.0	60.0	13.0	13.0	13.0	60.0	60.0	
Total Split (%)	6.7%	54.4%	6.7%	8.2%	55.9%	30.8%	6.7%	6.7%	6.7%	30.8%	30.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	9.0	106.0	118.9	11.4	108.4	164.4		8.9	8.9	55.2	55.2	
Actuated g/C Ratio	0.05	0.54	0.61	0.06	0.56	0.84		0.05	0.05	0.28	0.28	
v/c Ratio	0.65	0.52	0.01	0.56	0.92	0.16		0.35	0.11	0.93	0.93	
Control Delay	124.8	30.3	0.0	110.1	48.5	0.4		102.0	1.5	94.3	93.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	124.8	30.3	0.0	110.1	48.5	0.4		102.0	1.5	94.3	93.0	
LOS	F	C	A	F	D	A		F	A	F	F	
Approach Delay		34.7			45.0			64.9			93.7	
Approach LOS		C			D			E			F	
Queue Length 50th (ft)	67	444	0	74	1131	0		37	0	570	531	
Queue Length 95th (ft)	86	510	0	132	1253	6		60	0	325	296	
Internal Link Dist (ft)		764			730			856			540	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	80	1923	985	108	1967	1375		84	153	473	452	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.65	0.52	0.01	0.54	0.92	0.16		0.35	0.11	0.92	0.92	

Intersection Summary

Area Type: Other
Cycle Length: 195
Actuated Cycle Length: 195
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 52.8 Intersection LOS: D
Intersection Capacity Utilization 70.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	151	404	347	25	272	700	686	55	68	21	433	457
Average Queue (ft)	52	198	161	3	79	355	331	12	20	6	206	221
95th Queue (ft)	142	376	326	16	206	720	691	40	58	19	420	451
Link Distance (ft)		809	809			720	720	720	868		502	502
Upstream Blk Time (%)						0	0				0	1
Queuing Penalty (veh)						2	2				1	3
Storage Bay Dist (ft)	400			250	225					550		
Storage Blk Time (%)		0	3			19						
Queuing Penalty (veh)		0	0			11						

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	169	2	48	32
Average Queue (ft)	62	0	4	3
95th Queue (ft)	158	3	29	42
Link Distance (ft)	873	502	752	752
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Route 3 & High School Access Road

Movement	WB	WB	SB
Directions Served	T	T	R
Maximum Queue (ft)	71	28	76
Average Queue (ft)	8	3	28
95th Queue (ft)	57	34	63
Link Distance (ft)	453	453	90
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 19

Intersection						
Int Delay, s/veh	10.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	81	10	223	29	7	326
Future Vol, veh/h	81	10	223	29	7	326
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	47	47	78	78	56	56
Heavy Vehicles, %	27	30	2	7	71	4
Mvmt Flow	172	21	286	37	13	582

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	911	304	0	0	323	0
Stage 1	304	-	-	-	-	-
Stage 2	607	-	-	-	-	-
Critical Hdwy	7.37	6.5	-	-	4.81	-
Critical Hdwy Stg 1	6.37	-	-	-	-	-
Critical Hdwy Stg 2	6.37	-	-	-	-	-
Follow-up Hdwy	3.743	3.57	-	-	2.839	-
Pot Cap-1 Maneuver	231	675	-	-	933	-
Stage 1	655	-	-	-	-	-
Stage 2	443	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	229	675	-	-	933	-
Mov Cap-2 Maneuver	229	-	-	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	437	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	57.6	0	0.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	247	933	-
HCM Lane V/C Ratio	-	-	0.784	0.013	-
HCM Control Delay (s)	-	-	57.6	8.9	-
HCM Lane LOS	-	-	F	A	-
HCM 95th %tile Q(veh)	-	-	5.8	0	-

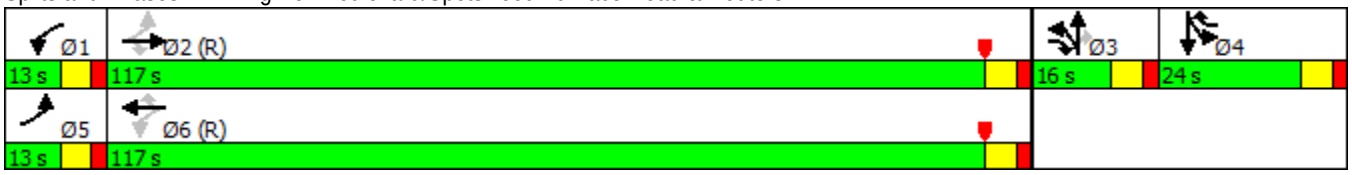
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	1039	2	75	2008	248	2	8	15	190	19	56
Future Volume (vph)	54	1039	2	75	2008	248	2	8	15	190	19	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400		250	225		0	0		550	0		0
Storage Lanes	1		1	1		1	0		1	1		0
Taper Length (ft)	100			100			100			100		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	0	1844	1583	1681	1620	0
Flt Permitted	0.034			0.189				0.990		0.950	0.979	
Satd. Flow (perm)	63	3539	1583	352	3539	1583	0	1844	1583	1681	1620	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			58			251			96		18	
Link Speed (mph)		45			45			25			35	
Link Distance (ft)		844			840			936			647	
Travel Time (s)		12.8			12.7			25.5			12.6	
Peak Hour Factor	0.80	0.87	0.87	0.94	0.94	0.94	0.67	0.67	0.67	0.90	0.90	0.90
Shared Lane Traffic (%)										29%		
Lane Group Flow (vph)	68	1194	2	80	2136	264	0	15	22	150	144	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA	
Protected Phases	5	2	3	1	6	4	3	3		4	4	
Permitted Phases	2		2	6		6			3			
Detector Phase	5	2	3	1	6	4	3	3	3	4	4	
Switch Phase												
Minimum Initial (s)	5.0	9.5	6.0	5.0	9.5	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	13.0	16.0	16.0	13.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	
Total Split (s)	13.0	117.0	16.0	13.0	117.0	24.0	16.0	16.0	16.0	24.0	24.0	
Total Split (%)	7.6%	68.8%	9.4%	7.6%	68.8%	14.1%	9.4%	9.4%	9.4%	14.1%	14.1%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max	None	None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	128.1	119.5	132.5	128.2	119.5	139.5		9.1	9.1	19.2	19.2	
Actuated g/C Ratio	0.75	0.70	0.78	0.75	0.70	0.82		0.05	0.05	0.11	0.11	
v/c Ratio	0.51	0.48	0.00	0.24	0.86	0.20		0.15	0.13	0.79	0.73	
Control Delay	38.8	12.8	0.0	6.9	24.8	0.6		79.8	1.5	101.3	84.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	38.8	12.8	0.0	6.9	24.8	0.6		79.8	1.5	101.3	84.4	
LOS	D	B	A	A	C	A		E	A	F	F	
Approach Delay		14.2			21.7			33.2			93.0	
Approach LOS		B			C			C			F	
Queue Length 50th (ft)	23	314	0	20	942	1		16	0	173	145	
Queue Length 95th (ft)	66	360	0	37	1110	9		31	0	#291	#244	
Internal Link Dist (ft)		764			760			856			567	
Turn Bay Length (ft)	400		250	225					550			
Base Capacity (vph)	137	2486	1273	341	2488	1350		130	200	197	206	
Starvation Cap Reductn	0	0	0	0	0	0		0	0	0	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0		0	0	0	0	
Reduced v/c Ratio	0.50	0.48	0.00	0.23	0.86	0.20		0.12	0.11	0.76	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 24.6 Intersection LOS: C
Intersection Capacity Utilization 83.1% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	LTR
Maximum Queue (ft)	101	257	232	6	179	435	453	54	43	31	204	213
Average Queue (ft)	50	127	100	0	38	217	216	12	14	11	119	127
95th Queue (ft)	98	252	217	6	132	412	416	41	40	34	195	210
Link Distance (ft)		809	809			743	743	743	869		542	542
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	400			250	225					550		
Storage Blk Time (%)			0			8						
Queuing Penalty (veh)			0			6						

Intersection: 2: Spotswood Furnace Road & Hgih School Access Road

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	29	12
Average Queue (ft)	11	1
95th Queue (ft)	34	9
Link Distance (ft)	883	755
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Route 3 & High School Access Road

Movement	WB	WB	SB
Directions Served	T	T	R
Maximum Queue (ft)	141	69	36
Average Queue (ft)	9	5	7
95th Queue (ft)	143	97	28
Link Distance (ft)	692	692	123
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 6

Intersection						
Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	5	289	21	5	254
Future Vol, veh/h	11	5	289	21	5	254
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	87	87	66	66	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	6	438	32	6	299

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	765	454	0	0	470	0
Stage 1	454	-	-	-	-	-
Stage 2	311	-	-	-	-	-
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	371	606	-	-	1092	-
Stage 1	640	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	369	606	-	-	1092	-
Mov Cap-2 Maneuver	369	-	-	-	-	-
Stage 1	640	-	-	-	-	-
Stage 2	739	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	420	1092	-
HCM Lane V/C Ratio	-	-	0.044	0.005	-
HCM Control Delay (s)	-	-	14	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	9	245	1566	5	9	813	179	12	174	28	358	40
Future Volume (vph)	9	245	1566	5	9	813	179	12	174	28	358	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	1	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1690	3539	1583	1770	3374	1538	0	1807	1583	1573	1587
Flt Permitted		0.950			0.950				0.997		0.950	0.962
Satd. Flow (perm)	0	1690	3539	1583	1770	3374	1538	0	1807	1583	1573	1587
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				61			102			143		
Link Speed (mph)			45			45			25			35
Link Distance (ft)			850			828			936			471
Travel Time (s)			12.9			12.5			25.5			9.2
Peak Hour Factor	0.48	0.48	0.92	0.92	0.91	0.91	0.91	0.47	0.47	0.47	0.66	0.66
Heavy Vehicles (%)	2%	7%	2%	2%	2%	7%	5%	2%	5%	2%	9%	11%
Shared Lane Traffic (%)											45%	
Lane Group Flow (vph)	0	529	1702	5	10	893	197	0	396	60	298	305
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases				2			6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	10.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	16.0	13.0	13.0	16.0	16.0	13.0	13.0	13.0	16.0	16.0
Total Split (s)	51.0	51.0	84.0	32.0	13.0	46.0	31.0	32.0	32.0	32.0	31.0	31.0
Total Split (%)	31.9%	31.9%	52.5%	20.0%	8.1%	28.8%	19.4%	20.0%	20.0%	20.0%	19.4%	19.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None	C-Min	None	None	None	None	None	None
Act Effct Green (s)		47.0	87.8	119.8	8.3	42.0	69.0		28.0	28.0	27.0	27.0
Actuated g/C Ratio		0.29	0.55	0.75	0.05	0.26	0.43		0.18	0.18	0.17	0.17
v/c Ratio		1.07	0.88	0.00	0.11	1.01	0.27		1.25	0.15	1.12	1.14
Control Delay		102.2	23.1	0.0	65.0	78.5	7.7		188.7	0.8	150.7	155.8
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		102.2	23.1	0.0	65.0	78.5	7.7		188.7	0.8	150.7	155.8
LOS		F	C	A	E	E	A		F	A	F	F
Approach Delay			41.8			65.7			164.0			141.0
Approach LOS			D			E			F			F
Queue Length 50th (ft)		~604	398	0	10	~301	18		~516	0	~376	~390
Queue Length 95th (ft)		281	#1060	m0	m28	#627	40		264	0	#349	#357
Internal Link Dist (ft)			770			748			856			391
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		496	1942	1200	99	885	721		316	395	265	267

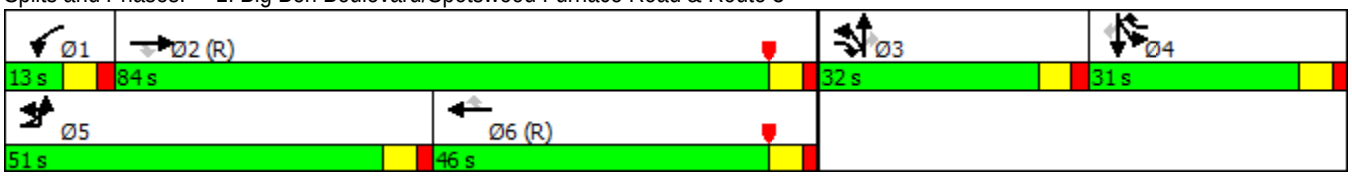
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	35
Future Volume (vph)	35
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Satd. Flow (prot)	1369
Flt Permitted	
Satd. Flow (perm)	1369
Right Turn on Red	Yes
Satd. Flow (RTOR)	143
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.66
Heavy Vehicles (%)	18%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	53
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	16.0
Total Split (s)	31.0
Total Split (%)	19.4%
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	27.0
Actuated g/C Ratio	0.17
v/c Ratio	0.15
Control Delay	0.9
Queue Delay	0.0
Total Delay	0.9
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	349

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		1.07	0.88	0.00	0.10	1.01	0.27		1.25	0.15	1.12	1.14

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 48 (30%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 74.8 Intersection LOS: E
Intersection Capacity Utilization 81.6% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.15

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	653	678	565	3	32	468	465	154	690	422	344	349
Average Queue (ft)	371	303	257	0	7	291	296	54	311	61	246	251
95th Queue (ft)	712	699	556	3	26	495	500	148	682	309	391	401
Link Distance (ft)		771	771			732	732	732	865		331	331
Upstream Blk Time (%)		4	0						1		13	16
Queuing Penalty (veh)		41	4						0		19	23
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)	12	1	9			26			10			
Queuing Penalty (veh)	97	1	0			2			4			

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	R
Maximum Queue (ft)	53
Average Queue (ft)	18
95th Queue (ft)	47
Link Distance (ft)	331
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	186	14	53	62
Average Queue (ft)	83	1	10	9
95th Queue (ft)	175	12	43	59
Link Distance (ft)	888	131	753	753
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	9	245	1566	5	9	813	179	12	174	28	358	40
Future Volume (vph)	9	245	1566	5	9	813	179	12	174	28	358	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	2	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1690	3539	1583	1770	3374	1538	0	1807	1583	3213	1547
Flt Permitted		0.950			0.950				0.997		0.950	
Satd. Flow (perm)	0	1690	3539	1583	1770	3374	1538	0	1807	1583	3213	1547
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				61			102			143		23
Link Speed (mph)			45			45			25			35
Link Distance (ft)			883			828			936			471
Travel Time (s)			13.4			12.5			25.5			9.2
Peak Hour Factor	0.48	0.48	0.92	0.92	0.91	0.91	0.91	0.47	0.47	0.47	0.66	0.66
Heavy Vehicles (%)	2%	7%	2%	2%	2%	7%	5%	2%	5%	2%	9%	11%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	529	1702	5	10	893	197	0	396	60	542	114
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases				2			6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	10.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	16.0	13.0	13.0	16.0	16.0	13.0	13.0	13.0	16.0	16.0
Total Split (s)	51.0	51.0	84.0	34.0	13.0	46.0	29.0	34.0	34.0	34.0	29.0	29.0
Total Split (%)	31.9%	31.9%	52.5%	21.3%	8.1%	28.8%	18.1%	21.3%	21.3%	21.3%	18.1%	18.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None	C-Min	None	None	None	None	None	None
Act Effct Green (s)		47.0	87.8	121.8	8.3	42.0	67.0		30.0	30.0	25.0	25.0
Actuated g/C Ratio		0.29	0.55	0.76	0.05	0.26	0.42		0.19	0.19	0.16	0.16
v/c Ratio		1.07	0.88	0.00	0.11	1.01	0.28		1.17	0.15	1.08	0.44
Control Delay		102.2	23.1	0.0	65.0	78.5	7.9		158.5	0.8	124.6	54.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		102.2	23.1	0.0	65.0	78.5	7.9		158.5	0.8	124.6	54.3
LOS		F	C	A	E	E	A		F	A	F	D
Approach Delay			41.8			65.7			137.8			112.4
Approach LOS			D			E			F			F
Queue Length 50th (ft)		~604	398	0	10	~301	18		~491	0	~325	87
Queue Length 95th (ft)		281	#1060	m0	m28	#627	40		260	0	259	104
Internal Link Dist (ft)			803			748			856			391
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		496	1942	1219	99	885	703		338	413	502	261

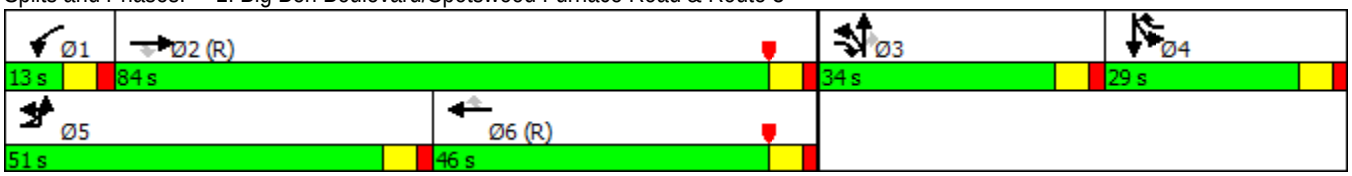
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	35
Future Volume (vph)	35
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.66
Heavy Vehicles (%)	18%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		1.07	0.88	0.00	0.10	1.01	0.28		1.17	0.15	1.08	0.44

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 48 (30%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 68.0 Intersection LOS: E
Intersection Capacity Utilization 80.8% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
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: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	L
Maximum Queue (ft)	645	702	634	5	112	513	511	180	678	337	348	350
Average Queue (ft)	363	304	276	0	14	303	310	61	311	58	253	252
95th Queue (ft)	717	702	588	6	87	527	539	162	682	295	389	398
Link Distance (ft)		810	810			726	726	726	864		332	332
Upstream Blk Time (%)		3	0						0		15	14
Queuing Penalty (veh)		27	1						0		22	22
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)	11	0	11			29			10			
Queuing Penalty (veh)	92	1	1			3			4			

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	TR
Maximum Queue (ft)	170
Average Queue (ft)	70
95th Queue (ft)	163
Link Distance (ft)	332
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	228	19	54	54
Average Queue (ft)	104	2	11	7
95th Queue (ft)	255	17	42	54
Link Distance (ft)	888	131	753	753
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection

Int Delay, s/veh 17.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	108	4	347	213	12	289
Future Vol, veh/h	108	4	347	213	12	289
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	59	59	56	56	75	75
Heavy Vehicles, %	25	75	2	10	58	7
Mvmt Flow	183	7	620	380	16	385

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1227	810	0	0	1000	0
Stage 1	810	-	-	-	-	-
Stage 2	417	-	-	-	-	-
Critical Hdwy	6.65	6.95	-	-	4.68	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.975	-	-	2.722	-
Pot Cap-1 Maneuver	~ 177	287	-	-	514	-
Stage 1	400	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 171	287	-	-	514	-
Mov Cap-2 Maneuver	~ 171	-	-	-	-	-
Stage 1	400	-	-	-	-	-
Stage 2	599	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	149	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	174	514	-
HCM Lane V/C Ratio	-	-	1.091	0.031	-
HCM Control Delay (s)	-	-	149	12.2	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	9.5	0.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection						
Int Delay, s/veh	1.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	16	48	54	544	385	12
Future Vol, veh/h	16	48	54	544	385	12
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	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	56	75	92
Heavy Vehicles, %	2	2	2	6	12	2
Mvmt Flow	17	52	59	971	513	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1609	263	526	0	-	0
Stage 1	520	-	-	-	-	-
Stage 2	1089	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	105	736	1039	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	322	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	99	736	1039	-	-	-
Mov Cap-2 Maneuver	99	-	-	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	304	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.9	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1039	-	282	-	-
HCM Lane V/C Ratio	0.056	-	0.247	-	-
HCM Control Delay (s)	8.7	-	21.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.9	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1825	827	42	0	44
Future Vol, veh/h	0	1825	827	42	0	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	125	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	91	92	92	92
Heavy Vehicles, %	2	4	15	2	2	2
Mvmt Flow	0	1984	909	46	0	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	454
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	553
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	553
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	553
HCM Lane V/C Ratio	-	-	-	0.086
HCM Control Delay (s)	-	-	-	12.1
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	10	44	900	7	53	1629	239	12	19	12	321	56
Future Volume (vph)	10	44	900	7	53	1629	239	12	19	12	321	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	1	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1742	3539	1583	1770	3539	1538	0	1827	1583	1649	1681
Flt Permitted		0.950			0.950				0.981		0.950	0.966
Satd. Flow (perm)	0	1742	3539	1583	1770	3539	1538	0	1827	1583	1649	1681
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				50			263			84		
Link Speed (mph)			45			45			25			35
Link Distance (ft)			821			828			936			471
Travel Time (s)			12.4			12.5			25.5			9.2
Peak Hour Factor	0.64	0.64	0.91	0.91	0.91	0.91	0.91	0.70	0.70	0.70	0.48	0.48
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	5%	2%	2%	2%	4%	3%
Shared Lane Traffic (%)											42%	
Lane Group Flow (vph)	0	85	989	8	58	1790	263	0	44	17	388	398
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases				2			6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	12.0	6.0	5.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	18.5	13.0	13.0	18.5	34.0	13.0	13.0	13.0	34.0	34.0
Total Split (s)	16.0	16.0	110.0	13.0	16.0	110.0	56.0	13.0	13.0	13.0	56.0	56.0
Total Split (%)	8.2%	8.2%	56.4%	6.7%	8.2%	56.4%	28.7%	6.7%	6.7%	6.7%	28.7%	28.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None	C-Min	None	None	None	None	None	None
Act Effct Green (s)		12.0	110.1	123.1	11.4	109.5	161.4		9.0	9.0	51.1	51.1
Actuated g/C Ratio		0.06	0.56	0.63	0.06	0.56	0.83		0.05	0.05	0.26	0.26
v/c Ratio		0.79	0.50	0.01	0.56	0.90	0.20		0.52	0.11	0.90	0.90
Control Delay		132.4	27.5	0.0	110.1	46.2	0.5		113.1	1.5	93.1	93.5
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		132.4	27.5	0.0	110.1	46.2	0.5		113.1	1.5	93.1	93.5
LOS		F	C	A	F	D	A		F	A	F	F
Approach Delay			35.6			42.2			82.0			81.3
Approach LOS			D			D			F			F
Queue Length 50th (ft)		110	416	0	74	1099	0		56	0	508	522
Queue Length 95th (ft)		125	477	0	132	1217	8		83	0	298	306
Internal Link Dist (ft)			741			748			856			391
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		107	1997	1017	108	1986	1324		84	153	439	448

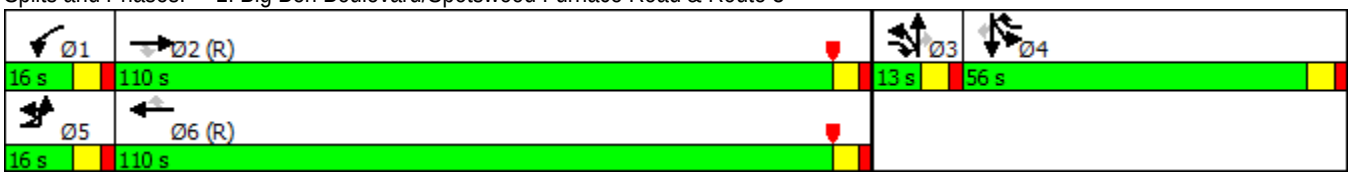
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	75
Future Volume (vph)	75
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Satd. Flow (prot)	1380
Flt Permitted	
Satd. Flow (perm)	1380
Right Turn on Red	Yes
Satd. Flow (RTOR)	109
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.48
Heavy Vehicles (%)	17%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	156
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	34.0
Total Split (s)	56.0
Total Split (%)	28.7%
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	51.1
Actuated g/C Ratio	0.26
v/c Ratio	0.35
Control Delay	20.7
Queue Delay	0.0
Total Delay	20.7
LOS	C
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	46
Queue Length 95th (ft)	8
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	447

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		0.79	0.50	0.01	0.54	0.90	0.20		0.52	0.11	0.88	0.89

Intersection Summary

Area Type: Other
Cycle Length: 195
Actuated Cycle Length: 195
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 49.9 Intersection LOS: D
Intersection Capacity Utilization 68.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.35

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	186	344	302	9	281	695	698	139	108	32	341	342
Average Queue (ft)	77	179	152	1	85	383	374	23	44	9	196	196
95th Queue (ft)	181	336	298	6	226	730	728	127	105	29	366	365
Link Distance (ft)		742	742			732	732	732	864		331	331
Upstream Blk Time (%)						1	1	0			7	7
Queuing Penalty (veh)						5	5	0			14	15
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)			2			22						
Queuing Penalty (veh)			0			12						

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	R
Maximum Queue (ft)	191
Average Queue (ft)	69
95th Queue (ft)	167
Link Distance (ft)	331
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	176	5	37	127
Average Queue (ft)	67	0	3	17
95th Queue (ft)	179	5	24	134
Link Distance (ft)	888	131	753	753
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	10	44	900	7	53	1629	239	12	19	12	321	56
Future Volume (vph)	10	44	900	7	53	1629	239	12	19	12	321	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	2	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1742	3539	1583	1770	3539	1538	0	1827	1583	3367	1565
Flt Permitted		0.950			0.950				0.981		0.950	
Satd. Flow (perm)	0	1742	3539	1583	1770	3539	1538	0	1827	1583	3367	1565
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				50			263			84		32
Link Speed (mph)			45			45			25			35
Link Distance (ft)			837			828			936			471
Travel Time (s)			12.7			12.5			25.5			9.2
Peak Hour Factor	0.64	0.64	0.91	0.91	0.91	0.91	0.91	0.70	0.70	0.70	0.48	0.48
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%	5%	2%	2%	2%	4%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	85	989	8	58	1790	263	0	44	17	669	273
Turn Type	Prot	Prot	NA	pm+ov	Prot	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases				2			6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	12.0	6.0	5.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	18.5	13.0	13.0	18.5	34.0	13.0	13.0	13.0	34.0	34.0
Total Split (s)	17.0	17.0	117.0	13.0	16.0	116.0	49.0	13.0	13.0	13.0	49.0	49.0
Total Split (%)	8.7%	8.7%	60.0%	6.7%	8.2%	59.5%	25.1%	6.7%	6.7%	6.7%	25.1%	25.1%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	C-Max	None	None	C-Max	None	None	None	None	None	None
Act Effct Green (s)		12.8	116.4	129.4	11.4	115.1	160.6		9.0	9.0	44.8	44.8
Actuated g/C Ratio		0.07	0.60	0.66	0.06	0.59	0.82		0.05	0.05	0.23	0.23
v/c Ratio		0.75	0.47	0.01	0.56	0.86	0.20		0.52	0.11	0.87	0.71
Control Delay		123.9	23.5	0.0	110.1	39.3	0.5		113.1	1.5	84.6	72.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		123.9	23.5	0.0	110.1	39.3	0.5		113.1	1.5	84.6	72.1
LOS		F	C	A	F	D	A		F	A	F	E
Approach Delay			31.2			36.4			82.0			81.0
Approach LOS			C			D			F			F
Queue Length 50th (ft)		109	381	0	74	1020	0		56	0	430	290
Queue Length 95th (ft)		124	437	0	132	1129	9		83	0	240	175
Internal Link Dist (ft)			757			748			856			391
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		116	2112	1067	108	2088	1314		84	153	777	385

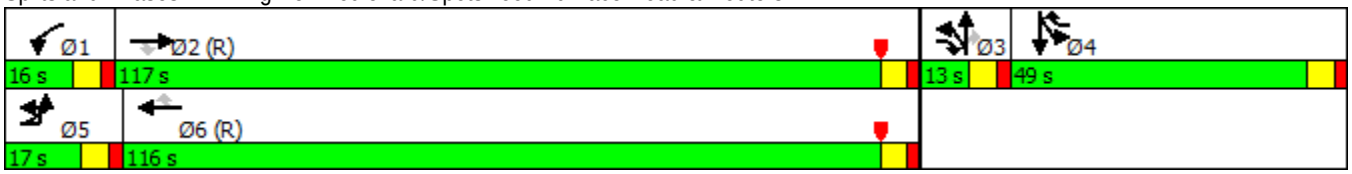
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	75
Future Volume (vph)	75
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.48
Heavy Vehicles (%)	17%
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		0.73	0.47	0.01	0.54	0.86	0.20		0.52	0.11	0.86	0.71

Intersection Summary

Area Type: Other
Cycle Length: 195
Actuated Cycle Length: 195
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 45.7 Intersection LOS: D
Intersection Capacity Utilization 67.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	L
Maximum Queue (ft)	170	353	313	13	298	667	635	57	111	25	339	340
Average Queue (ft)	80	175	140	1	72	332	319	18	45	7	184	179
95th Queue (ft)	178	335	293	11	207	657	635	48	104	24	346	341
Link Distance (ft)		763	763			726	726	726	865		332	332
Upstream Blk Time (%)						0	0				4	3
Queuing Penalty (veh)						1	0				7	5
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)			1			20						
Queuing Penalty (veh)			0			11						

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	TR
Maximum Queue (ft)	292
Average Queue (ft)	125
95th Queue (ft)	279
Link Distance (ft)	332
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	146	5	36	8
Average Queue (ft)	55	0	3	1
95th Queue (ft)	124	5	22	12
Link Distance (ft)	888	131	753	753
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection	
Int Delay, s/veh	7.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	81	10	228	29	7	331
Future Vol, veh/h	81	10	228	29	7	331
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	47	47	78	78	56	56
Heavy Vehicles, %	25	75	2	10	50	4
Mvmt Flow	172	21	292	37	13	591

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	927	311	0	0	329	0
Stage 1	311	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Critical Hdwy	6.65	6.95	-	-	4.6	-
Critical Hdwy Stg 1	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.65	-	-	-	-	-
Follow-up Hdwy	3.725	3.975	-	-	2.65	-
Pot Cap-1 Maneuver	271	587	-	-	1005	-
Stage 1	694	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	268	587	-	-	1005	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	694	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	40.7	0	0.2
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	285	1005	-
HCM Lane V/C Ratio	-	-	0.679	0.012	-
HCM Control Delay (s)	-	-	40.7	8.6	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	4.5	0	-

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	62	58	244	390	22
Future Vol, veh/h	13	62	58	244	390	22
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	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	78	56	92
Heavy Vehicles, %	2	2	2	5	7	2
Mvmt Flow	14	67	63	313	696	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1147	360	720	0	-	0
Stage 1	708	-	-	-	-	-
Stage 2	439	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	206	637	879	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	191	637	879	-	-	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	602	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.7	1.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	879	-	453	-	-
HCM Lane V/C Ratio	0.072	-	0.18	-	-
HCM Control Delay (s)	9.4	-	14.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	961	1676	50	0	55
Future Vol, veh/h	0	961	1676	50	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	125	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	91	91	92	92	92
Heavy Vehicles, %	2	2	3	2	2	2
Mvmt Flow	0	1056	1842	54	0	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	921
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	273
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	273
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	21.8
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	273
HCM Lane V/C Ratio	-	-	-	0.219
HCM Control Delay (s)	-	-	-	21.8
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.8

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	10	65	1027	2	75	1994	282	8	13	15	222	30
Future Volume (vph)	10	65	1027	2	75	1994	282	8	13	15	222	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	1	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1770	3539	1583	1770	3539	1583	0	1827	1583	1681	1704
Flt Permitted		0.035			0.189				0.981		0.950	0.963
Satd. Flow (perm)	0	65	3539	1583	352	3539	1583	0	1827	1583	1681	1704
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				58			288			96		
Link Speed (mph)			45			45			25			35
Link Distance (ft)			785			842			936			456
Travel Time (s)			11.9			12.8			25.5			8.9
Peak Hour Factor	0.80	0.80	0.87	0.87	0.94	0.94	0.94	0.67	0.67	0.67	0.90	0.90
Shared Lane Traffic (%)											44%	
Lane Group Flow (vph)	0	94	1180	2	80	2121	300	0	31	22	138	142
Turn Type	pm+pt	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases	2	2		2	6		6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	13.0	16.0	13.0	16.0	34.0	16.0	16.0	16.0	34.0	34.0
Total Split (s)	13.0	13.0	107.0	16.0	13.0	107.0	34.0	16.0	16.0	16.0	34.0	34.0
Total Split (%)	7.6%	7.6%	62.9%	9.4%	7.6%	62.9%	20.0%	9.4%	9.4%	9.4%	20.0%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None	C-Min	None	None	C-Min	None	None	None	None	None	None
Act Effct Green (s)		125.7	115.4	129.5	122.2	113.4	136.4		10.2	10.2	22.1	22.1
Actuated g/C Ratio		0.74	0.68	0.76	0.72	0.67	0.80		0.06	0.06	0.13	0.13
v/c Ratio		0.61	0.49	0.00	0.25	0.90	0.23		0.28	0.12	0.63	0.64
Control Delay		49.7	15.4	0.0	9.0	31.8	0.7		82.6	1.3	82.2	82.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		49.7	15.4	0.0	9.0	31.8	0.7		82.6	1.3	82.2	82.6
LOS		D	B	A	A	C	A		F	A	F	F
Approach Delay			17.9			27.3			48.9			67.9
Approach LOS			B			C			D			E
Queue Length 50th (ft)		51	334	0	23	1058	1		34	0	155	160
Queue Length 95th (ft)		#107	433	0	48	#1396	10		53	0	227	233
Internal Link Dist (ft)			705			762			856			376
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		156	2401	1236	328	2361	1386		128	200	296	300
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0

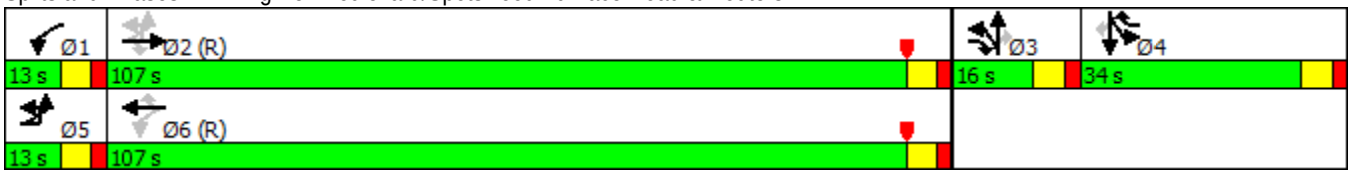
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	58
Future Volume (vph)	58
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	96
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.90
Shared Lane Traffic (%)	
Lane Group Flow (vph)	64
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Detector Phase	4
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	34.0
Total Split (s)	34.0
Total Split (%)	20.0%
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.0
Lead/Lag	Lag
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	22.1
Actuated g/C Ratio	0.13
v/c Ratio	0.22
Control Delay	4.5
Queue Delay	0.0
Total Delay	4.5
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	16
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	358
Starvation Cap Reductn	0

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		0.60	0.49	0.00	0.24	0.90	0.22		0.24	0.11	0.47	0.47

Intersection Summary

Area Type: Other
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 28.1 Intersection LOS: C
Intersection Capacity Utilization 82.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.18

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	LT
Maximum Queue (ft)	132	288	268	1	279	692	701	130	74	28	194	197
Average Queue (ft)	61	143	123	0	77	413	406	23	25	10	120	116
95th Queue (ft)	120	270	248	2	254	722	721	116	65	30	186	187
Link Distance (ft)		699	699			755	755	755	865		323	323
Upstream Blk Time (%)						0	0					
Queuing Penalty (veh)						2	2					
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)			0			21						
Queuing Penalty (veh)			0			16						

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	R
Maximum Queue (ft)	107
Average Queue (ft)	43
95th Queue (ft)	93
Link Distance (ft)	323
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	33	19
Average Queue (ft)	12	3
95th Queue (ft)	36	14
Link Distance (ft)	915	741
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	10	65	1027	2	75	1994	282	8	13	15	222	30
Future Volume (vph)	10	65	1027	2	75	1994	282	8	13	15	222	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		600		250	225		0	0		550	0	
Storage Lanes		1		1	1		1	0		1	2	
Taper Length (ft)		100			100			100			100	
Satd. Flow (prot)	0	1770	3539	1583	1770	3539	1583	0	1827	1583	3433	1678
Flt Permitted		0.034			0.193				0.981		0.950	
Satd. Flow (perm)	0	63	3539	1583	360	3539	1583	0	1827	1583	3433	1678
Right Turn on Red				Yes			Yes			Yes		
Satd. Flow (RTOR)				58			288			96		50
Link Speed (mph)			45			45			25			35
Link Distance (ft)			812			842			936			456
Travel Time (s)			12.3			12.8			25.5			8.9
Peak Hour Factor	0.80	0.80	0.87	0.87	0.94	0.94	0.94	0.67	0.67	0.67	0.90	0.90
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	94	1180	2	80	2121	300	0	31	22	247	97
Turn Type	pm+pt	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Split	NA	Perm	Split	NA
Protected Phases	5	5	2	3	1	6	4	3	3		4	4
Permitted Phases	2	2		2	6		6			3		
Detector Phase	5	5	2	3	1	6	4	3	3	3	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	6.0	5.0	10.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	13.0	13.0	13.0	16.0	13.0	16.0	34.0	16.0	16.0	16.0	34.0	34.0
Total Split (s)	13.0	13.0	107.0	16.0	13.0	107.0	34.0	16.0	16.0	16.0	34.0	34.0
Total Split (%)	7.6%	7.6%	62.9%	9.4%	7.6%	62.9%	20.0%	9.4%	9.4%	9.4%	20.0%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes										
Recall Mode	None	None	C-Max	None	None	C-Min	None	None	None	None	None	None
Act Effct Green (s)		128.4	117.2	131.4	123.2	114.5	135.6		10.2	10.2	20.3	20.3
Actuated g/C Ratio		0.76	0.69	0.77	0.72	0.67	0.80		0.06	0.06	0.12	0.12
v/c Ratio		0.58	0.48	0.00	0.24	0.89	0.23		0.28	0.12	0.60	0.40
Control Delay		47.9	14.2	0.0	8.1	30.4	0.7		82.6	1.3	76.9	38.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay		47.9	14.2	0.0	8.1	30.4	0.7		82.6	1.3	76.9	38.6
LOS		D	B	A	A	C	A		F	A	E	D
Approach Delay			16.7			26.1			48.9			66.1
Approach LOS			B			C			D			E
Queue Length 50th (ft)		52	322	0	21	1020	1		34	0	136	48
Queue Length 95th (ft)		101	403	0	44	#1396	11		53	0	179	109
Internal Link Dist (ft)			732			762			856			376
Turn Bay Length (ft)		600		250	225					550		
Base Capacity (vph)		163	2440	1253	336	2384	1395		128	200	605	337
Starvation Cap Reductn		0	0	0	0	0	0		0	0	0	0

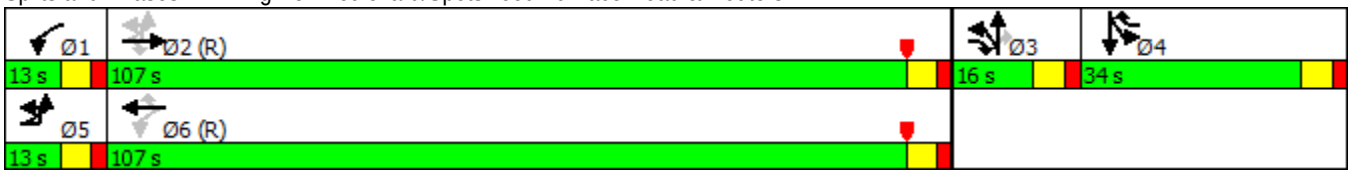
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	58
Future Volume (vph)	58
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	0
Taper Length (ft)	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.90
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Spillback Cap Reductn		0	0	0	0	0	0		0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0		0	0	0	0
Reduced v/c Ratio		0.58	0.48	0.00	0.24	0.89	0.22		0.24	0.11	0.41	0.29

Intersection Summary

Area Type: Other
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 26.8 Intersection LOS: C
Intersection Capacity Utilization 82.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3



Lane Group	SBR
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	UL	T	T	R	L	T	T	R	LT	R	L	L
Maximum Queue (ft)	131	288	270	5	324	642	653	176	70	32	175	165
Average Queue (ft)	58	151	132	0	78	422	417	29	26	10	109	99
95th Queue (ft)	119	275	259	5	258	709	706	151	65	31	166	161
Link Distance (ft)		733	733			750	750	750	865		323	323
Upstream Blk Time (%)						0	1					
Queuing Penalty (veh)						4	5					
Storage Bay Dist (ft)	600			250	225					550		
Storage Blk Time (%)			1			22						
Queuing Penalty (veh)			0			16						

Intersection: 1: Big Ben Boulevard/Spotswood Furnace Road & Route 3

Movement	SB
Directions Served	TR
Maximum Queue (ft)	144
Average Queue (ft)	73
95th Queue (ft)	138
Link Distance (ft)	323
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Spotswood Furnace Road & High School Access Road

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	31	9
Average Queue (ft)	11	1
95th Queue (ft)	33	8
Link Distance (ft)	915	741
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	5	294	21	5	259
Future Vol, veh/h	11	5	294	21	5	259
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	87	87	66	66	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	6	445	32	6	305

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	777	461	0	0	477	0
Stage 1	461	-	-	-	-	-
Stage 2	316	-	-	-	-	-
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	365	600	-	-	1085	-
Stage 1	635	-	-	-	-	-
Stage 2	739	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	363	600	-	-	1085	-
Mov Cap-2 Maneuver	363	-	-	-	-	-
Stage 1	635	-	-	-	-	-
Stage 2	735	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.1	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	414	1085	-
HCM Lane V/C Ratio	-	-	0.044	0.005	-
HCM Control Delay (s)	-	-	14.1	8.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection						
Int Delay, s/veh	1.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	19	56	64	296	254	16
Future Vol, veh/h	19	56	64	296	254	16
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	-	125	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	66	85	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	61	70	448	299	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	896	158	316	0	-	0
Stage 1	308	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Critical Hdwy	6.63	6.93	4.13	-	-	-
Critical Hdwy Stg 1	5.83	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	295	860	1243	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	278	860	1243	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	719	-	-	-	-	-
Stage 2	523	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1243	-	562	-	-
HCM Lane V/C Ratio	0.056	-	0.145	-	-
HCM Control Delay (s)	8.1	-	12.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1104	2020	50	0	55
Future Vol, veh/h	0	1104	2020	50	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	125	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	87	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1269	2196	54	0	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1098
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	208
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	208
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	29.1
HCM LOS			D

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	208
HCM Lane V/C Ratio	-	-	-	0.287
HCM Control Delay (s)	-	-	-	29.1
HCM Lane LOS	-	-	-	D
HCM 95th %tile Q(veh)	-	-	-	1.1

Left-Turn Lane Warrant northbound Spotswood Furnace Road at Full-Movement Site Driveway

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAY

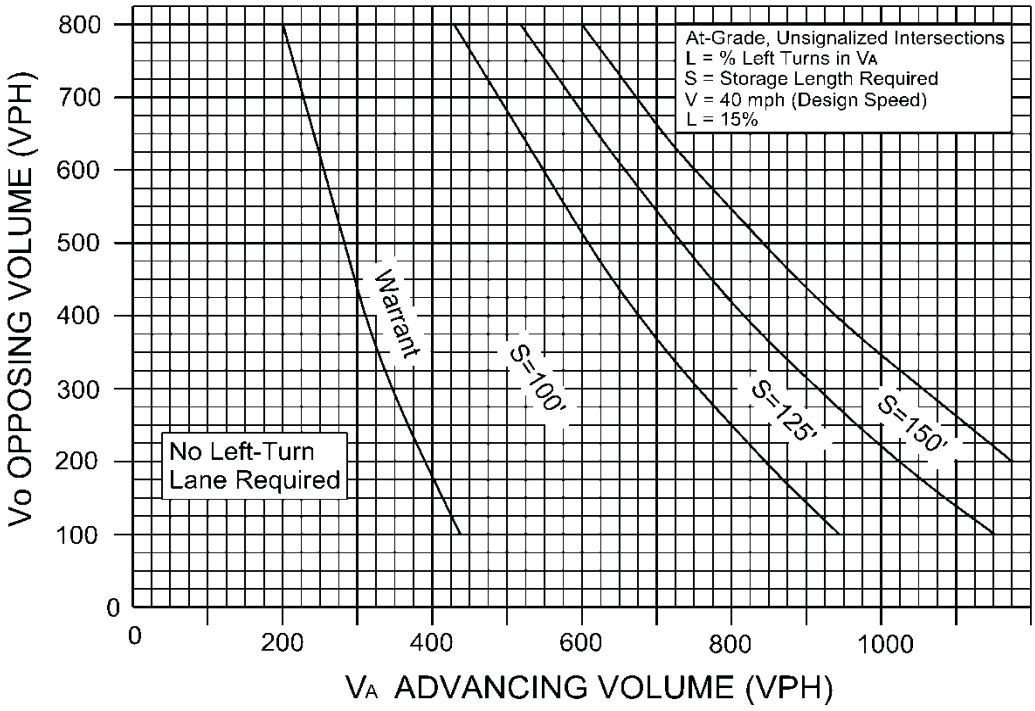


FIGURE 3-7

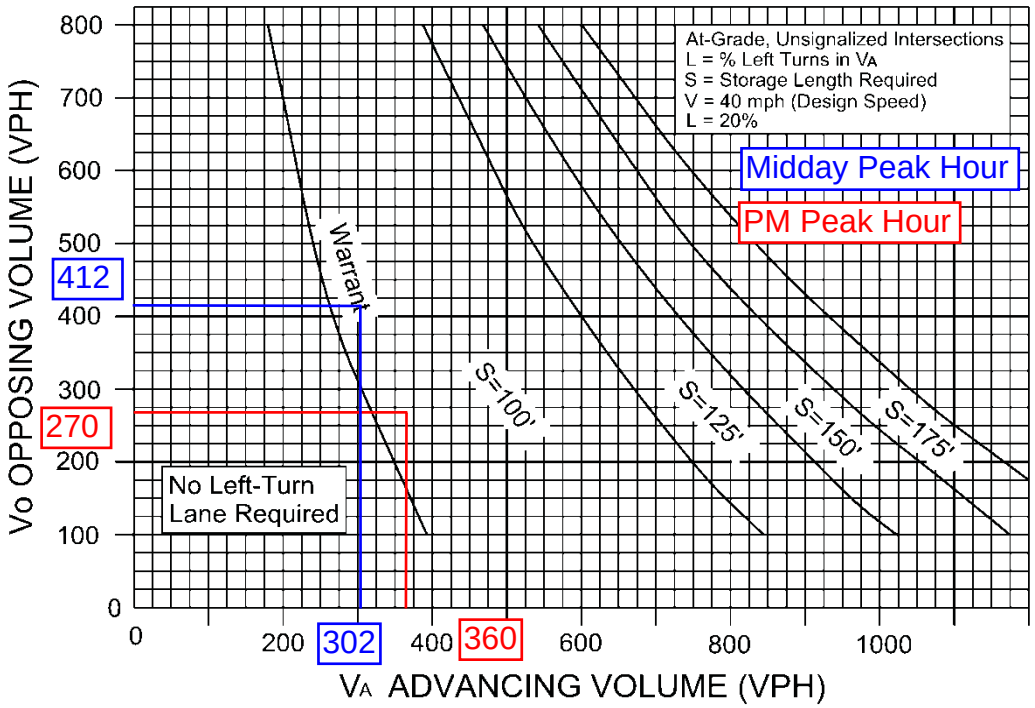


FIGURE 3-8

Left-Turn Lane Warrant northbound Spotswood Furnace Road at Full-Movement Site Driveway

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAY

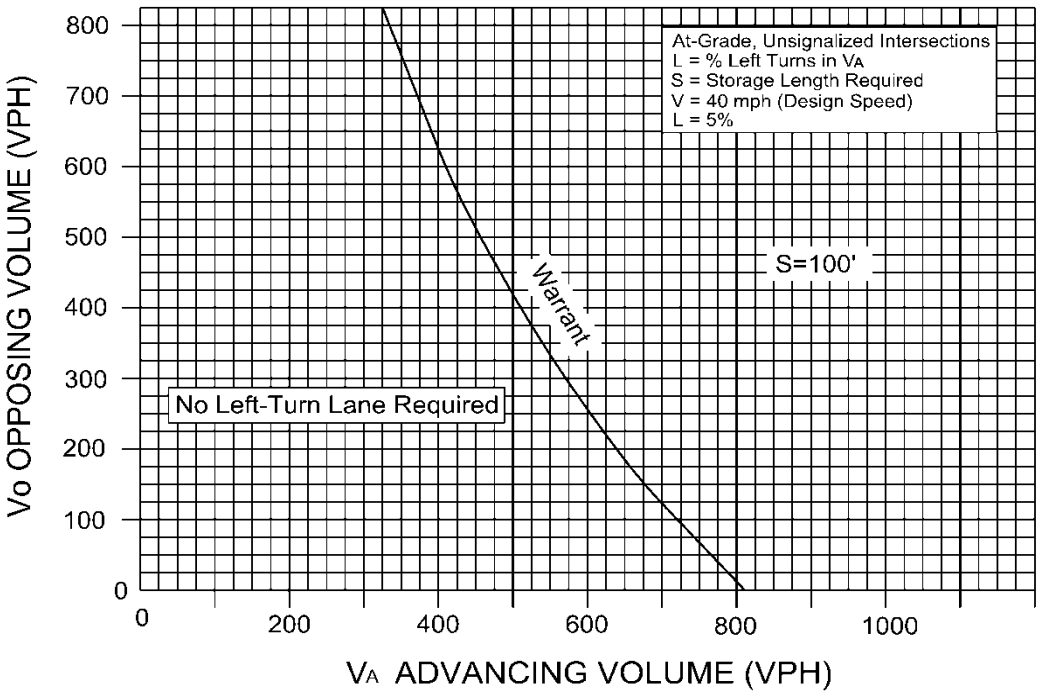


FIGURE 3-5

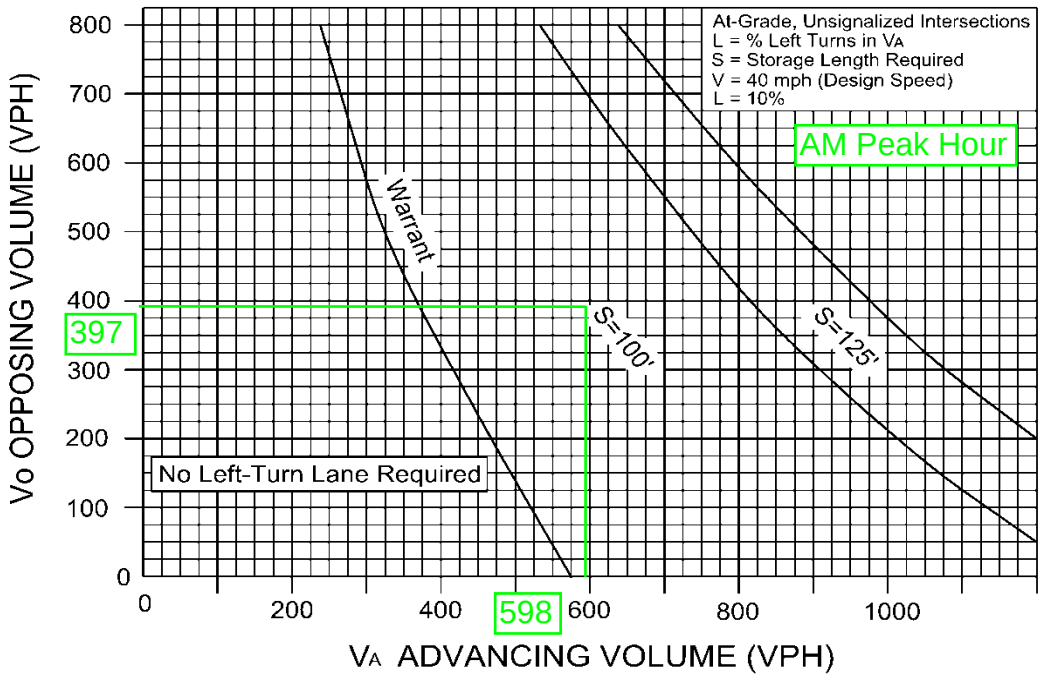
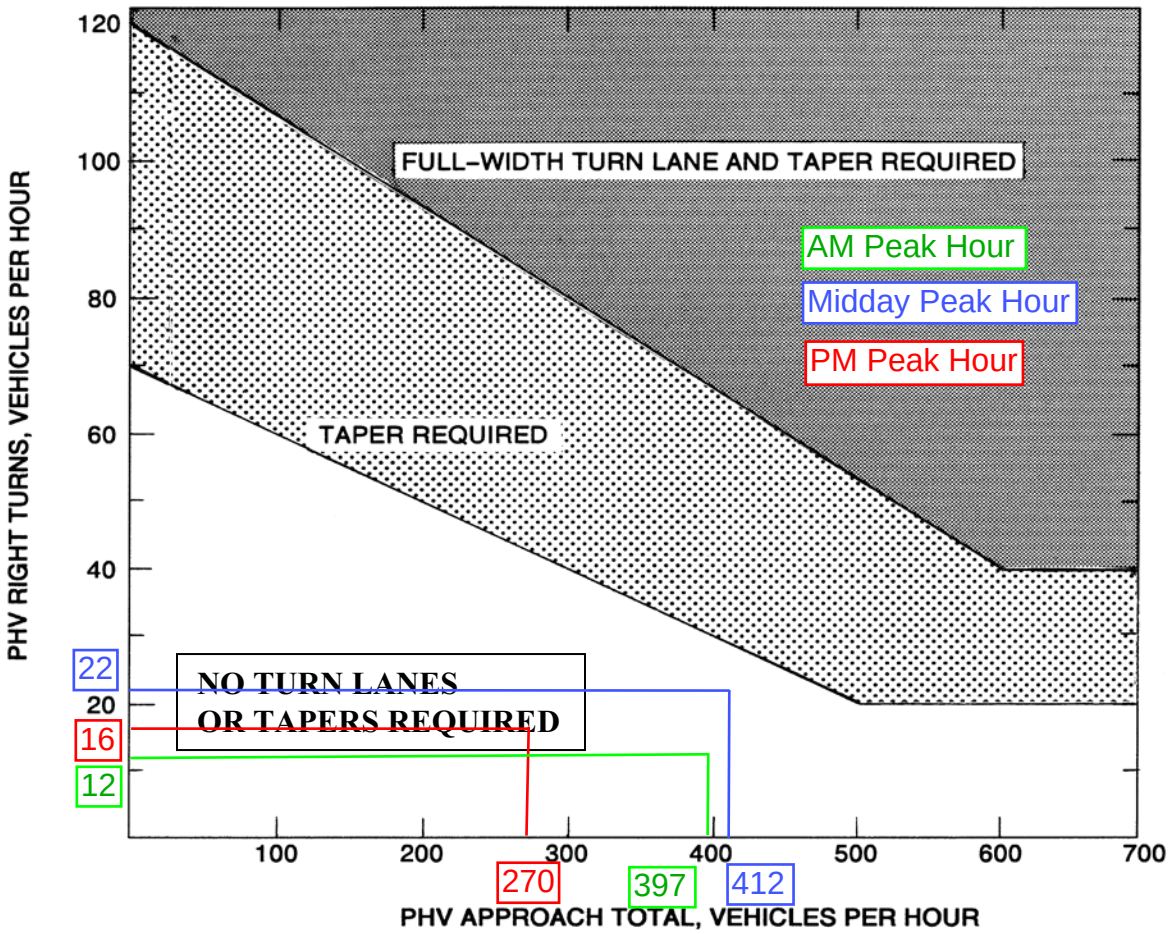


FIGURE 3-6

Right-Turn Lane on southbound Spotswood Furnace Road at Full-Movement Site Driveway



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 45 mph, PHV right turns > 40, and PHV total < 300.
Adjusted right turns = PHV Right Turns - 20
If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

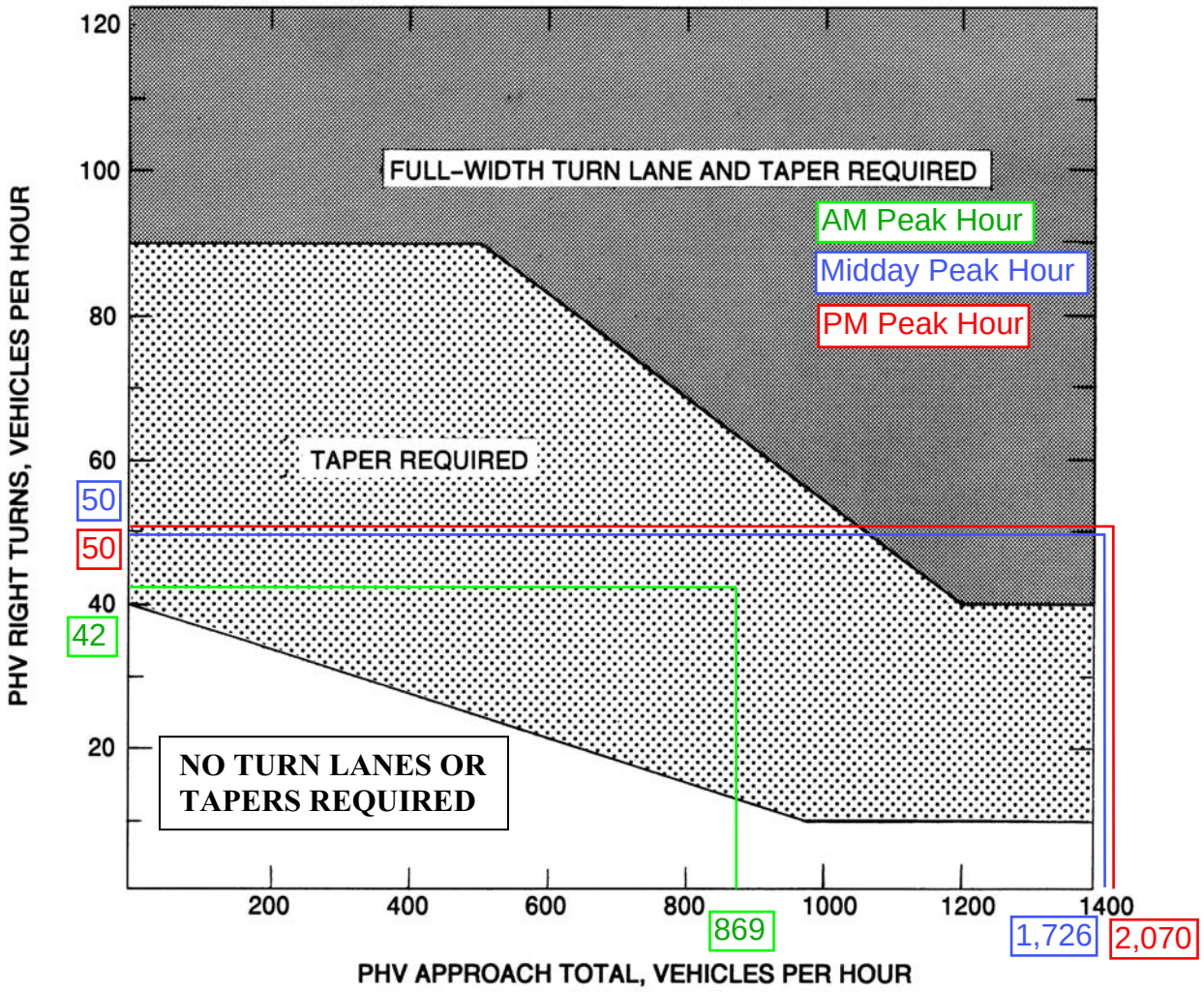
Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-26 WARRANTS FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

* Rev. 1/15

Right-Turn Lane on Westbound Route 3 at
Right-in / Right-out Site Driveway



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV- - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-27 WARRANTS FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

* Rev. 1/15