

# ***Route 1/208***

## ***CORRIDOR STUDY FINAL REPORT***

**SPOTSYLVANIA COUNTY, VIRGINIA**

**December 2018**





Route 1 and Route 208 in Spotsylvania County, Virginia have seen a substantial increase in traffic during recent years. The traffic added to the area causes operational and safety issues, and with continuous development in the area, more traffic related issues are expected. In an attempt to address these challenges, the County conducted this corridor study (Rte. 1/208 Corridor Study) to evaluate the existing conditions of the corridor, identify any issues and study potential solutions. Recommended scenarios will be selected in terms of cost and support to the economic growth in the area, at the same time improve the overall travel experience for all modes of transportation (motorized and non-motorized). One of the possible solutions is including the roadway connection between Germanna Point Dr. and Spotsylvania Ave. to determine its potential for reducing traffic on US-1.

The first task of the study is evaluating the existing conditions of the roadways and intersections within the vicinity of the study corridor. Table 1 lists the roadways included in the study with the corresponding roadway characteristics. The existing condition evaluations consist of conducting traffic turning movement counts, crash analysis, access management assessment, evaluation of public transit and pedestrian/bicyclist facilities, traffic control device assessment, sensitive environmental identification, and assessment of the existing bridges and culverts along the corridor. The microsimulation traffic model, VISSIM, was used to determine the capacity analysis of the roadways and the intersections in terms of Levels of Service (LOS) and the overall network (corridor) performance.

#	Roadway Section	From	To	Roadway Classifications	AADT 2016 (VDOT)	CoSS <sup>15</sup> (Y/N)	Speed Limit (mph)	Thru Lane Width	Lane Configurations	Direction
1	US-17	Cosner Dr.	US-17 Split	Other Principal Arterial	25,000	Y	45	12'	2 lanes	W-E
2	US-17 (small section to US-1 NB)	US-17 Split	US-1 NB	Minor Arterial	12,000	N	35	13'	1 lane <sup>1</sup>	W-E
3	US-1 (Jefferson Davis Highway)	US-17	I-95	Other Principal Arterial	54,000	Y	35	11'	6 lanes <sup>2</sup>	N-S
4	US-1 (Jefferson Davis Highway)	I-95	Courthouse Rd./Lafayette Blvd.	Other Principal Arterial	27,000	Y	35	11'	4 lanes <sup>3</sup>	N-S
5	US-1 (Jefferson Davis Highway)	Courthouse Rd./Lafayette Blvd.	Harrison Rd. (US 620)	Other Principal Arterial	28,000	Y	45	11'	4 lanes <sup>4</sup>	N-S
6	Germanna Point Dr.	Lee Hill School Dr.	Dead end	Minor Collector	3,000	N	25	11'	2 lanes <sup>5</sup>	N-S
7	Market St.	US-1	Spotsylvania Ave.	Major Collector	12,000	N	35	11'	4 lanes <sup>6</sup>	W-E
8	Mine Rd.	US-1	Landsdowne Rd.	Major Collector	16,000	N	35	11'	4 lanes <sup>7</sup>	W-E
9	Falcon Dr.	Lafayette Blvd.	Clay St	Major Collector	6,300	N	35	10'	4 lanes <sup>8</sup>	N-S
10	Falcon Dr.	Clay St	Mine Rd.	Major Collector	11,000	N	35	11'	4 lanes <sup>8</sup>	N-S
11	Spotsylvania Ave.	Mine Rd.	Dead end	Major Collector	12,000	N	35	12'	4 lanes <sup>9</sup>	N-S
12	Hood Dr.	Courthouse Rd.	Mine Rd.	Major Collector	12,000	N	35	10'	2 lanes <sup>10</sup>	W-E
13	Courthouse Rd.	Southpoint Pkwy	US-1	Minor Arterial	42,000	N	40	12'	4 lanes <sup>11</sup>	W-E
14	Lafayette Blvd.	US-1	Falcon Dr.	Minor Arterial	24,000	N	40	11'	4 lanes <sup>12</sup>	W-E
15	Southpoint Pkwy	Courthouse Rd.	Ballantraye Dr.	Major Collector	21,000	N	25	12'	4 lanes <sup>13</sup>	N-S
16	Southpoint Pkwy	Ballantraye Dr.	US-1	Major Collector	18,000	N	40	12'	4 lanes <sup>14</sup>	N-S

<sup>1</sup> Ramp starts as one lane in NB direction, then turns into two lanes halfway down the ramp. Lane width begins at 13' and tapers down to 12'.  
<sup>2</sup> Three lanes in each direction turns into two lanes in each direction at the southern-most I-95 ramps. There are several turn lanes throughout the segment that serve businesses, Southpoint Pkwy, and I-95.  
<sup>3</sup> There are turn lanes at Market St. and to/from I-95. There is a TWLTL north of Market St. that runs to Hood Dr.  
<sup>4</sup> There are several turn lanes along this segment that serve Courthouse Rd., Harrison Rd., and frontage roads along US-1.  
<sup>5</sup> There are two NB lanes until just north of Papilion Ct. There's a left turn lane onto Lee Hill School Dr. and a left and right turn lane onto US-17.  
<sup>6</sup> There is a left turn lane onto US-1 and Spotsylvania Ave.  
<sup>7</sup> There is a channelized right turn onto Spotsylvania Ave. and a left turn lane onto Falcon Dr. There is a left turn lane onto Stoner Dr. and left turn lanes into businesses. There is a right turn lane onto US-1.  
<sup>8</sup> There are left and right turn lanes into businesses along this segment. There is a left turn lane onto Mine Rd.  
<sup>9</sup> There is a left turn lane serving businesses north of Market St. The SB inside lane turns into a left turn lane onto Market St. South of Market St. is a two lane roadway with a TWLTL and a left turn lane onto Market St.  
<sup>10</sup> There is a right turn lane onto US-1.  
<sup>11</sup> There are several right and left turn lanes serving businesses and side streets along this segment. The left turn lanes are 10' wide.  
<sup>12</sup> There are two NB lanes, one of which turns into a right turn lane onto Falcon Dr. There is a left turn lane onto US-1 and a channelized right turn onto US-1.  
<sup>13</sup> There is a left turn lane onto Courthouse Rd.  
<sup>14</sup> There are several right and left turn lanes along this segment serving businesses and side streets  
<sup>15</sup> Corridor of Statewide Significance

11/20/2017 8:56:49 AM



DRAWN BY:	BNG	<b>INTRODUCTION</b>	SCALE:	N/A	DATE:	08/30/2017			
CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>		JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1	OF	
				VDOT UPC PROJECT NO.: 107192					



# LEGEND

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Time: 7:30AM-8:30AM
- (xxxx) Weekday PM  
Peak Hour Volume  
Time: 4:30AM-5:30AM
- xxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45AM

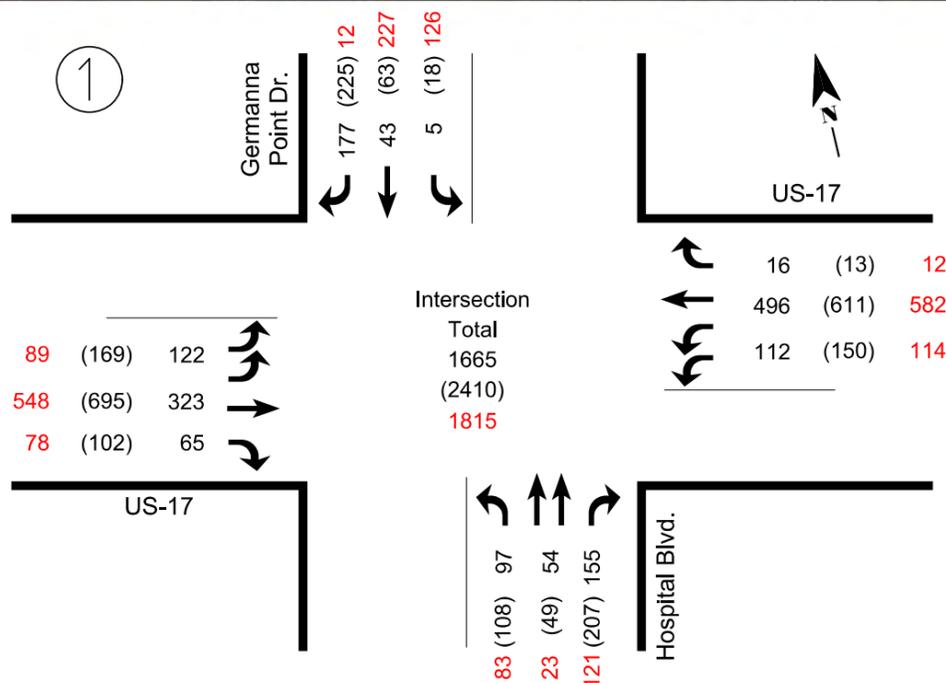
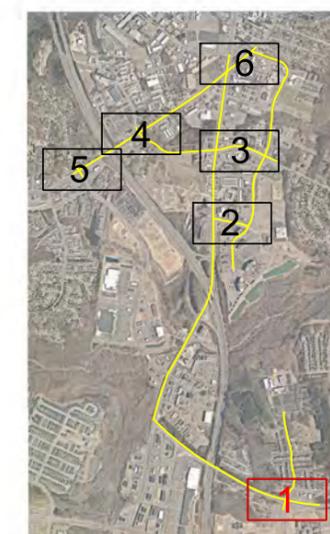


Traffic Movement



Intersection Number

Sheet Locator



Traffic data for this project were collected when the Spotsylvania County schools were in session (May 2017) and it was conducted in two stages. In the first stage, the tube counts were set to collect the bidirectional traffic volumes at strategically selected critical links along the corridor to identify the peak periods at each section/area. The peak periods for the sections were analyzed to determine a universal peak period and the turning movement counts at the studied intersections were collected as the second stage.

The turning movement data during the peak period of each intersection was used to determine the individual peak hours. Total traffic entering each intersection during peak hour was compared to determine the universal peak hour for the corridor during weekday AM and PM, and Weekend (Saturday MIDDAY). Although the traffic was balanced for the modeling purposes, the un-balanced turning movement counts for the corresponding peak hours are shown here.



DRAWN BY:

BNG

CHECKED BY:

KHB

## 2017 EXISTING PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

09/06/2017

JMT PROJECT NO.: 15-0038-003

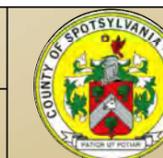
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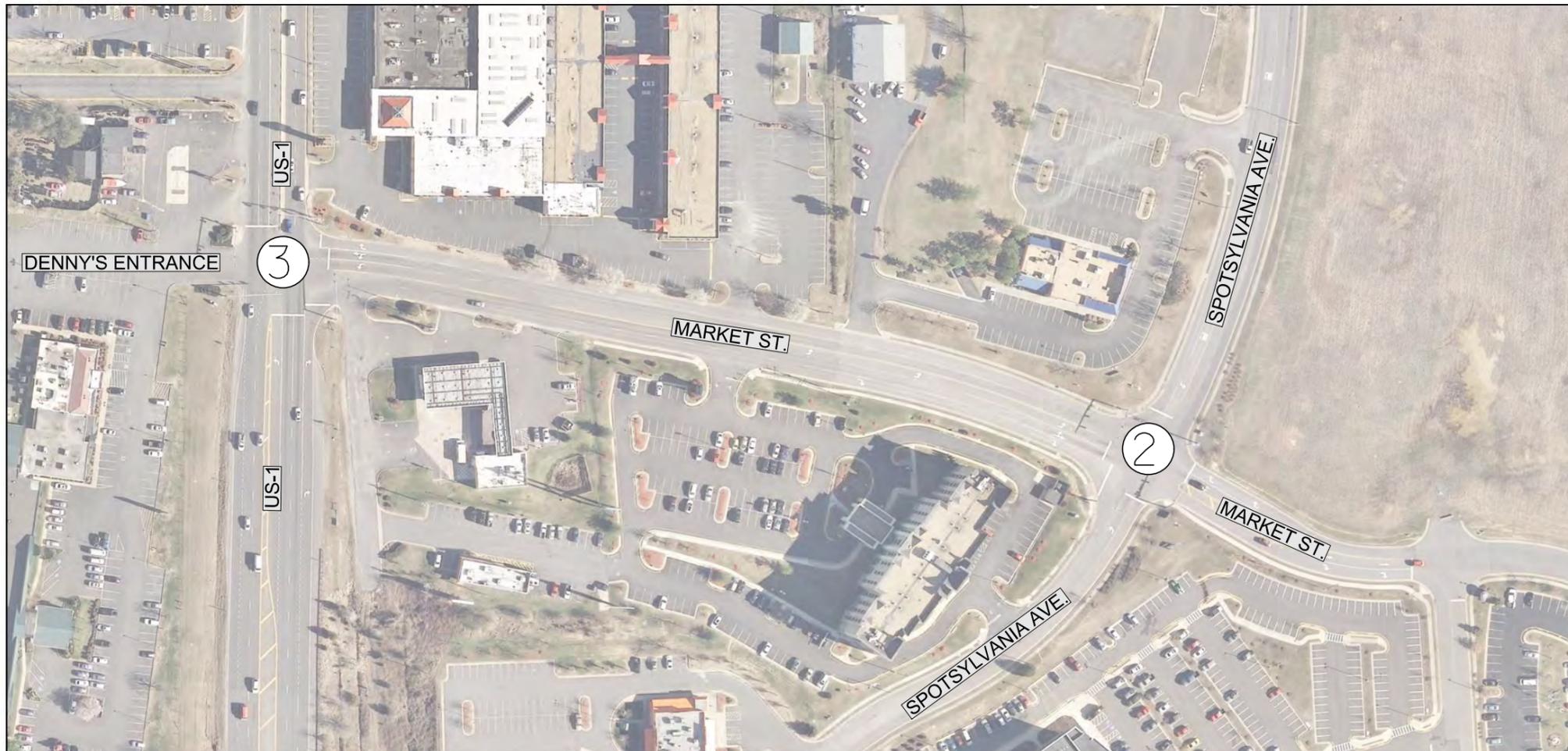
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OF

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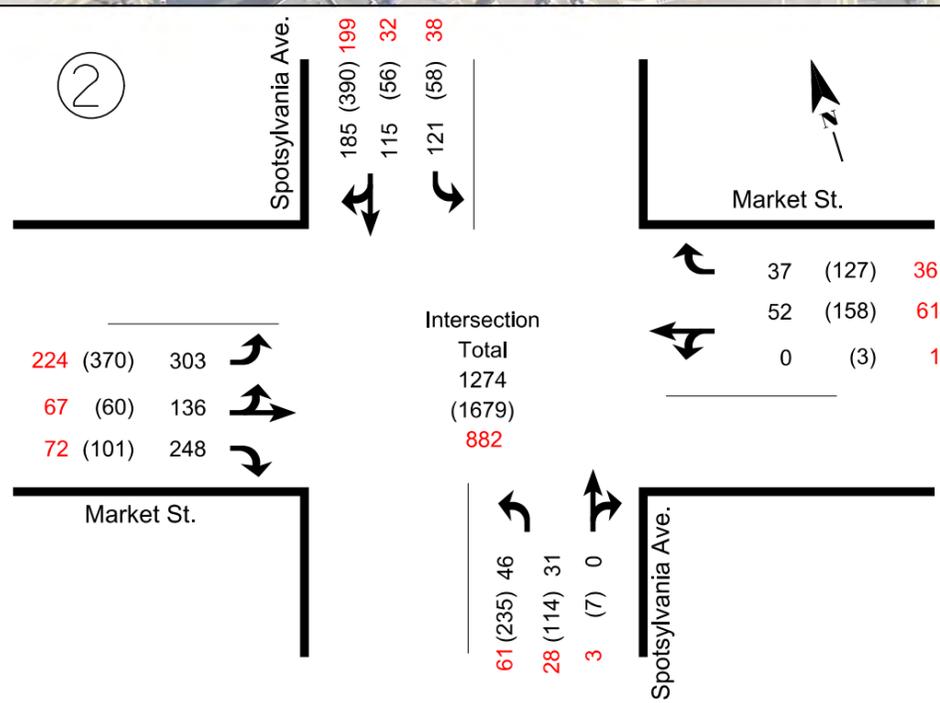
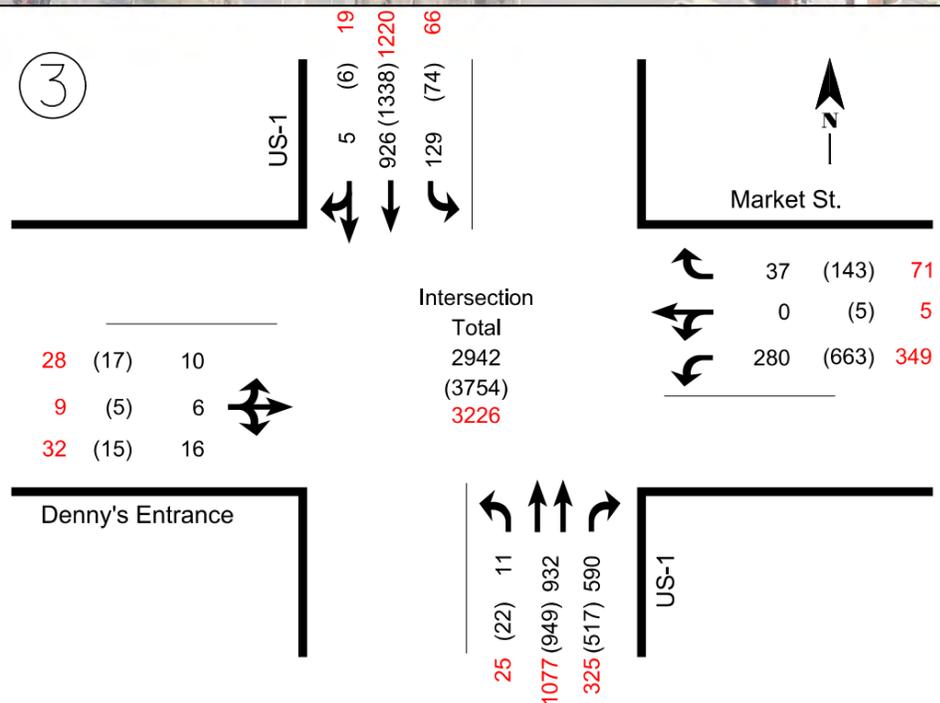
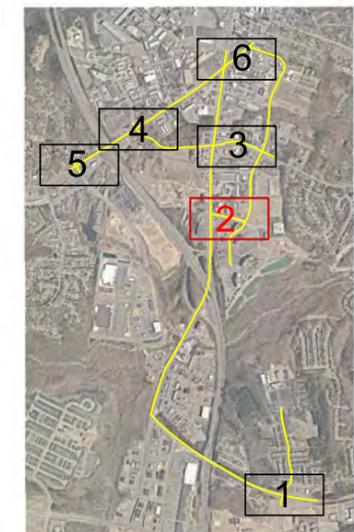


Traffic Movement



Intersection Number

Sheet Locator



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## 2017 EXISTING PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

09/06/2017

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.:

2

OF

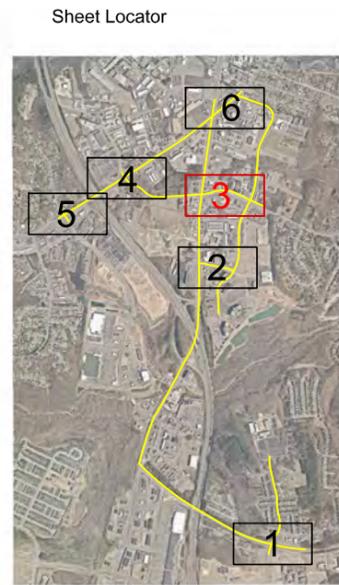
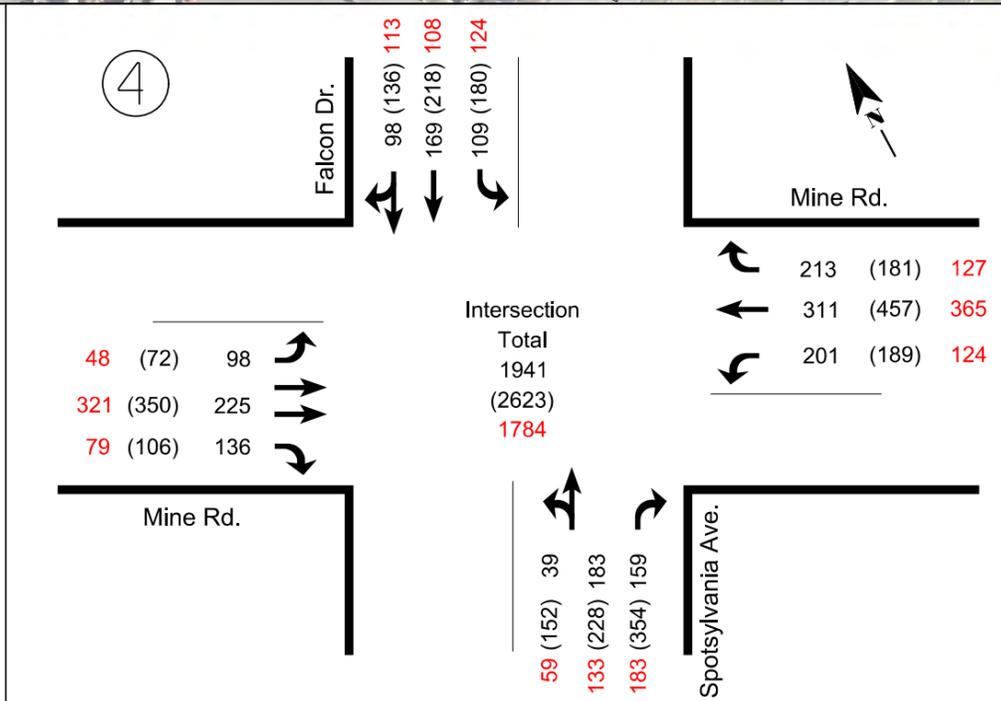
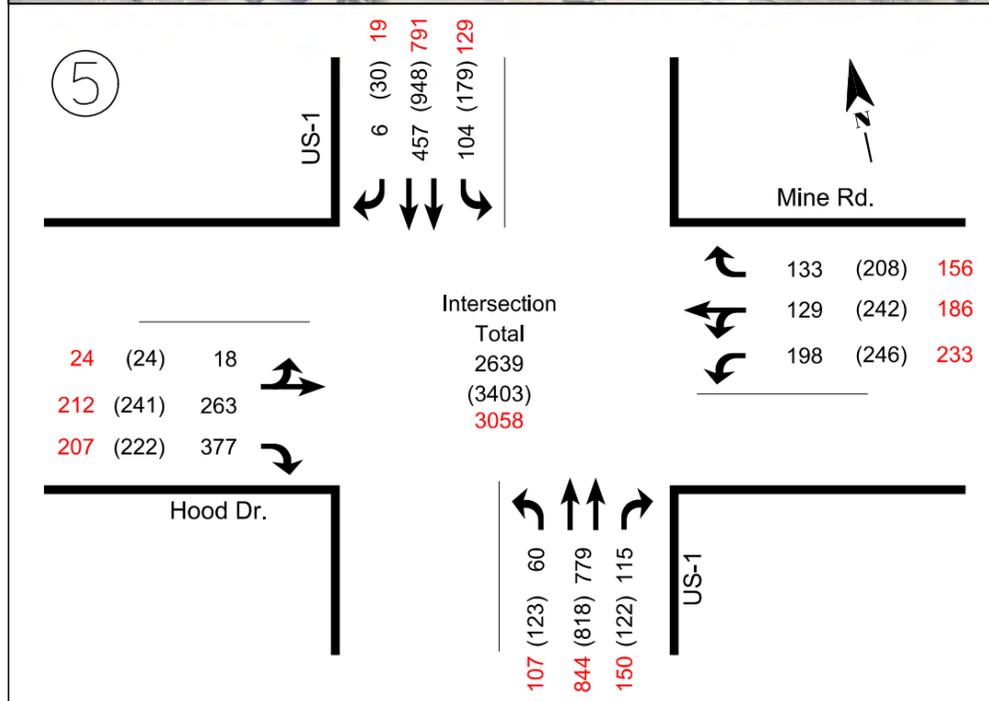
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Peak Hour Volume  
Time: 4:30AM-5:30AM
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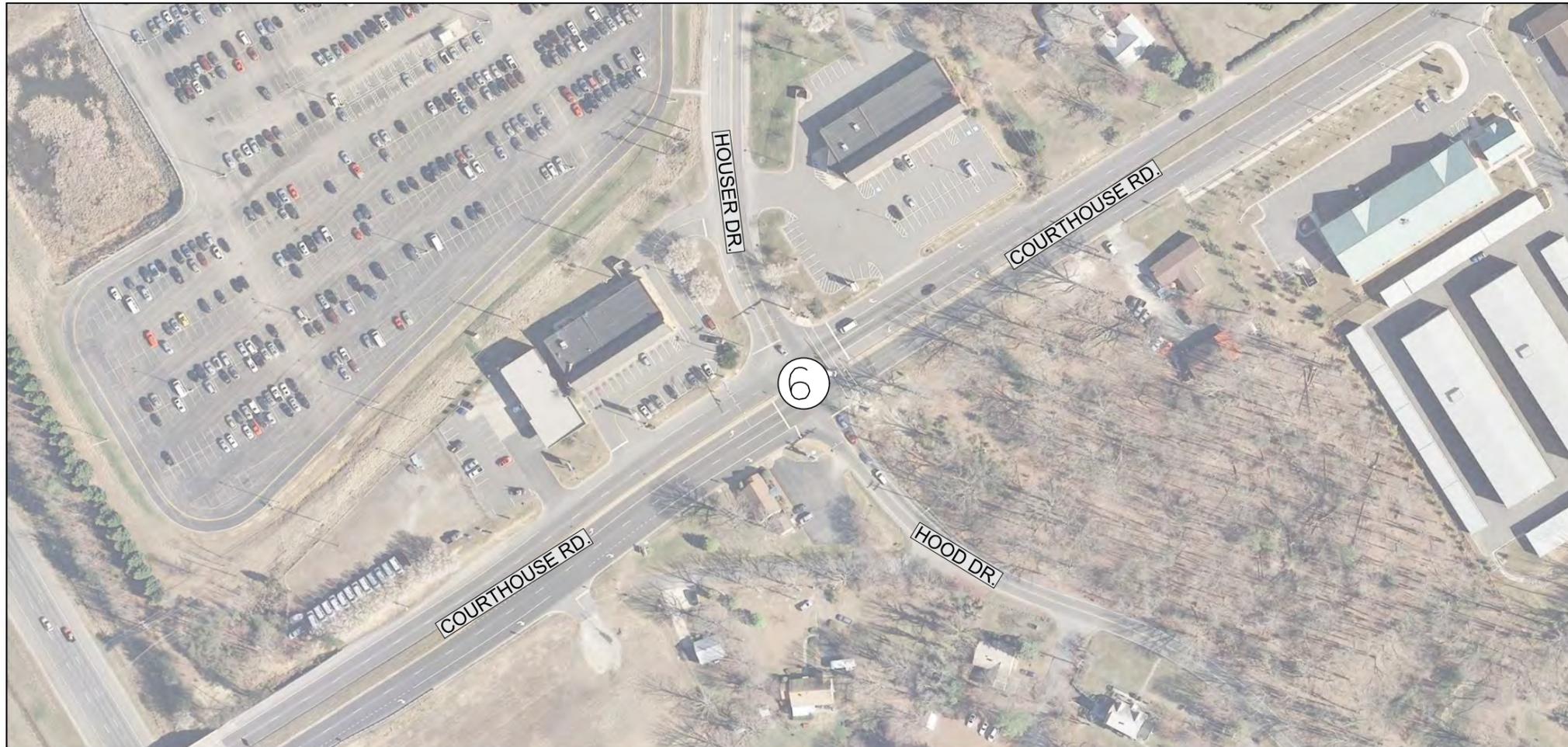
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CHECKED BY:	KHB

## 2017 EXISTING PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

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JMT PROJECT NO.:	15-0038-003	SHEET NO.:	3 OF 6
VDOT UPC PROJECT NO.:	107192		

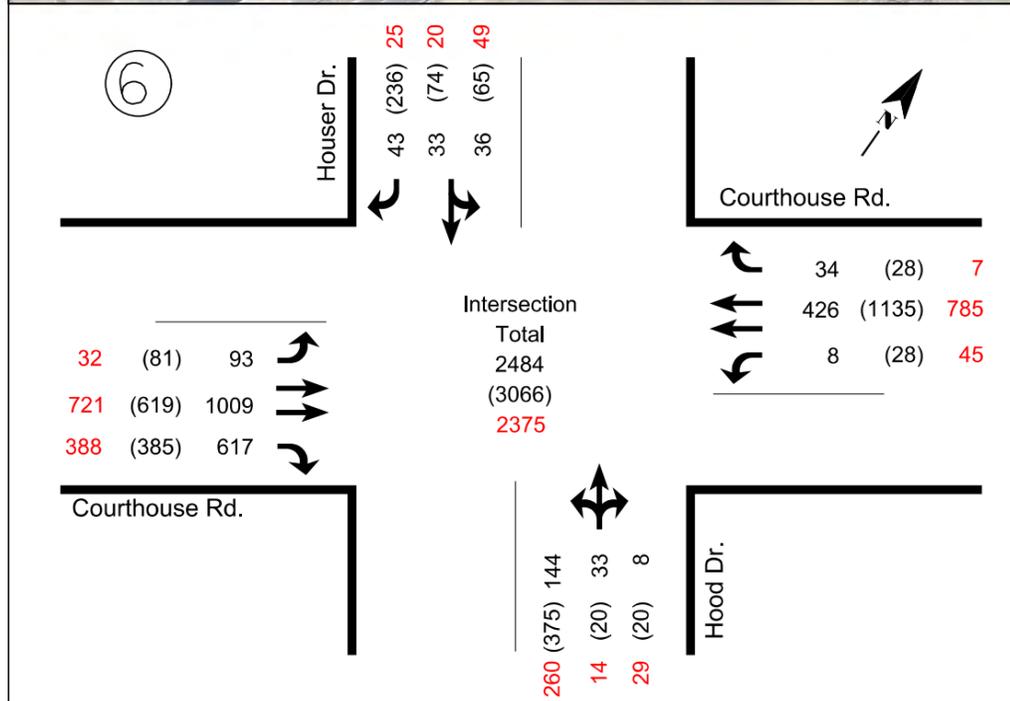




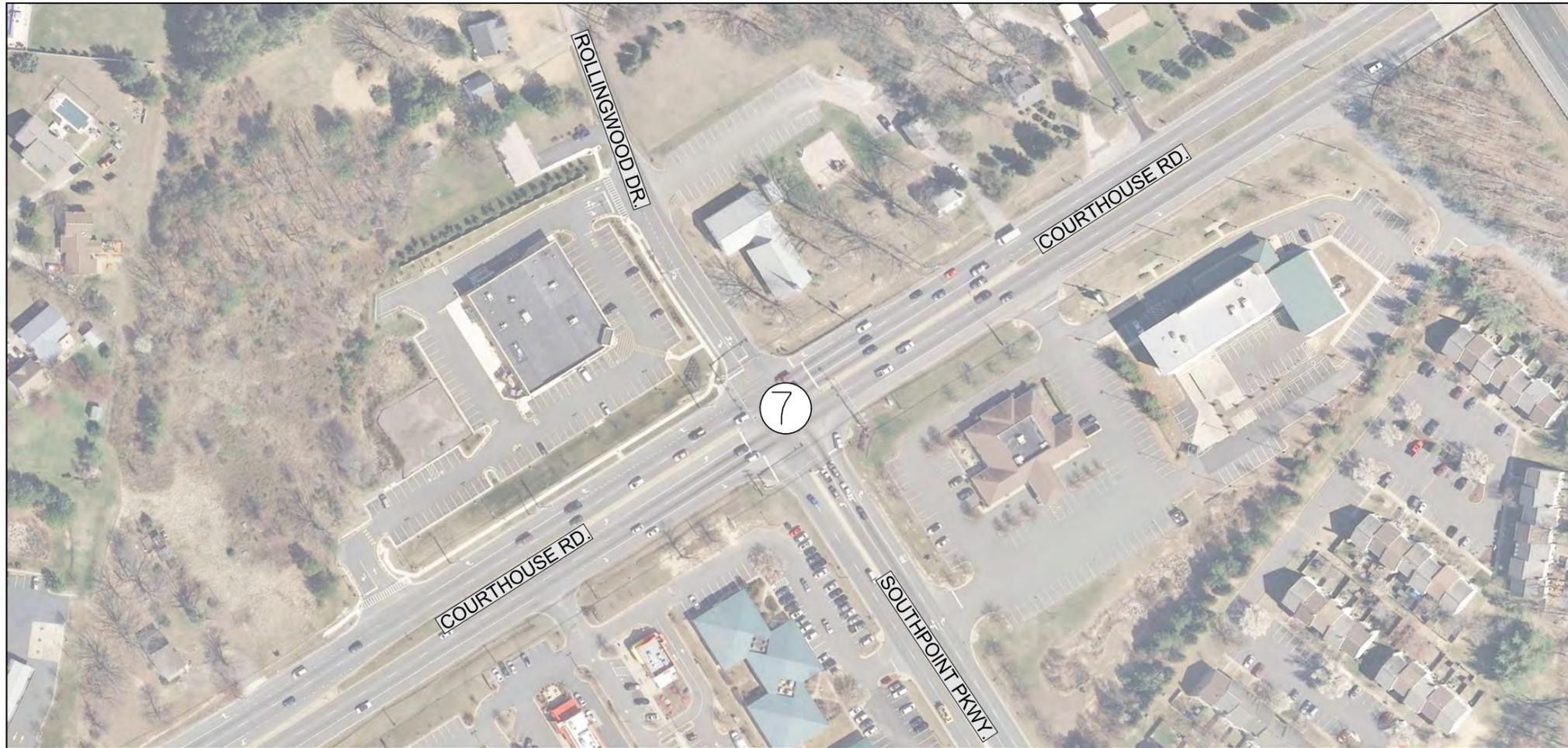
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- xxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45AM
- Traffic Movement
- Intersection Number

Sheet Locator



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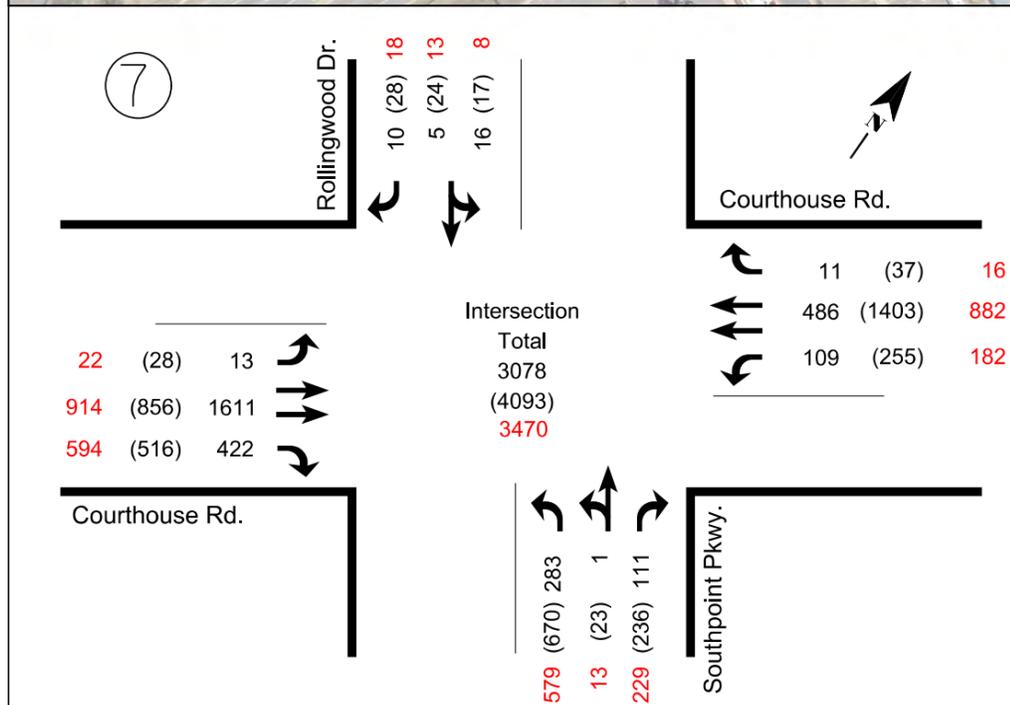


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Peak Hour Volume  
Time: 4:30AM-5:30AM
- xxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45AM

- Traffic Movement
- Intersection Number

Sheet Locator



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CHECKED BY: KHB

## 2017 EXISTING PEAK HOUR VOLUMES

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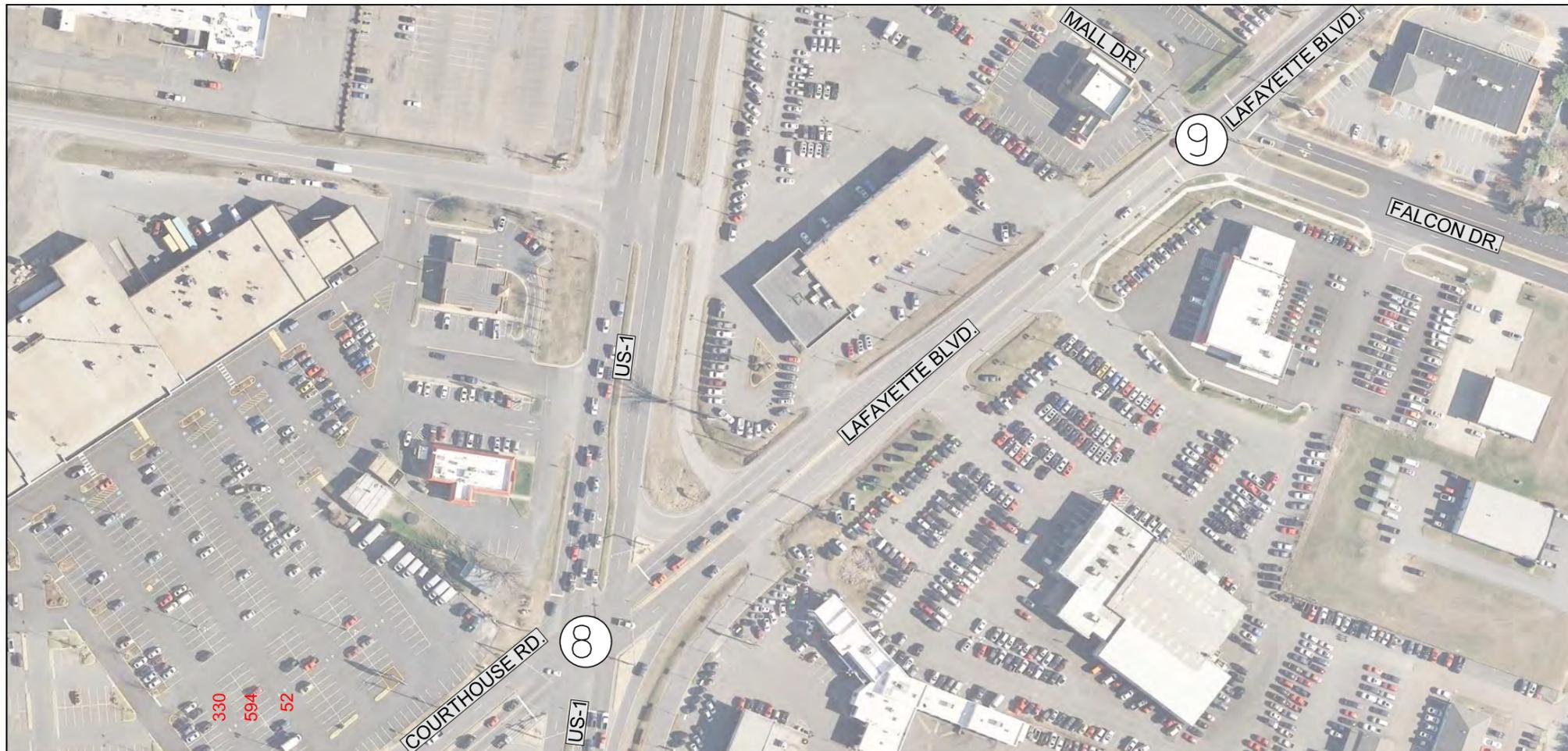
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VDOT UPC PROJECT NO.: 107192

DATE: 9/06/2017

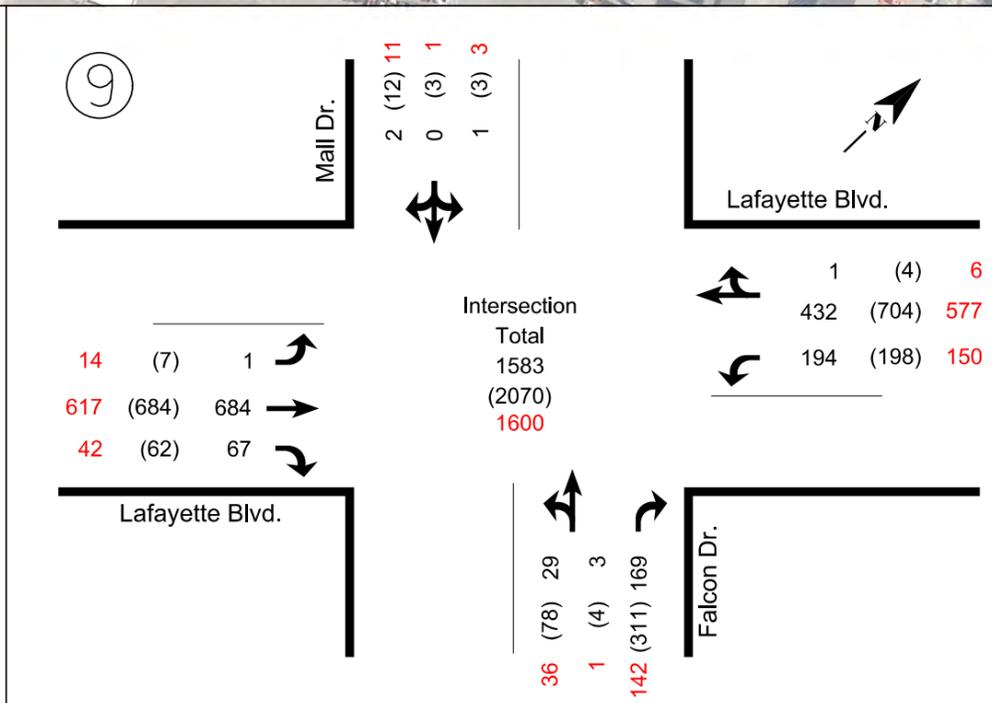
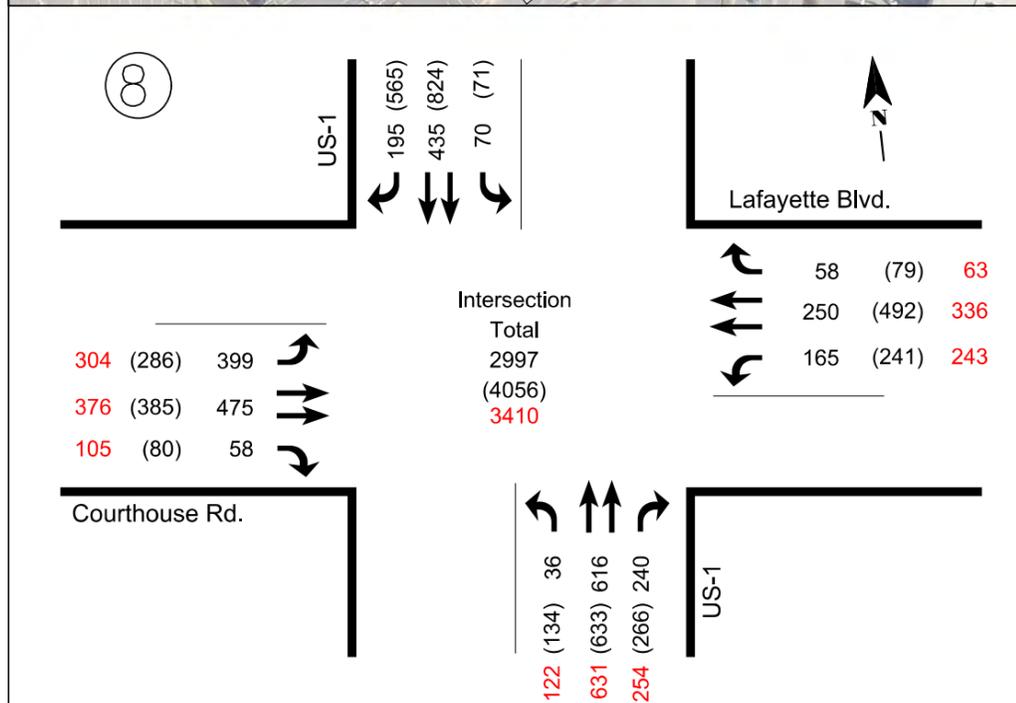
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# LEGEND

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- Traffic Movement
- Intersection Number



Sheet Locator



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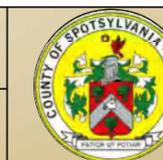


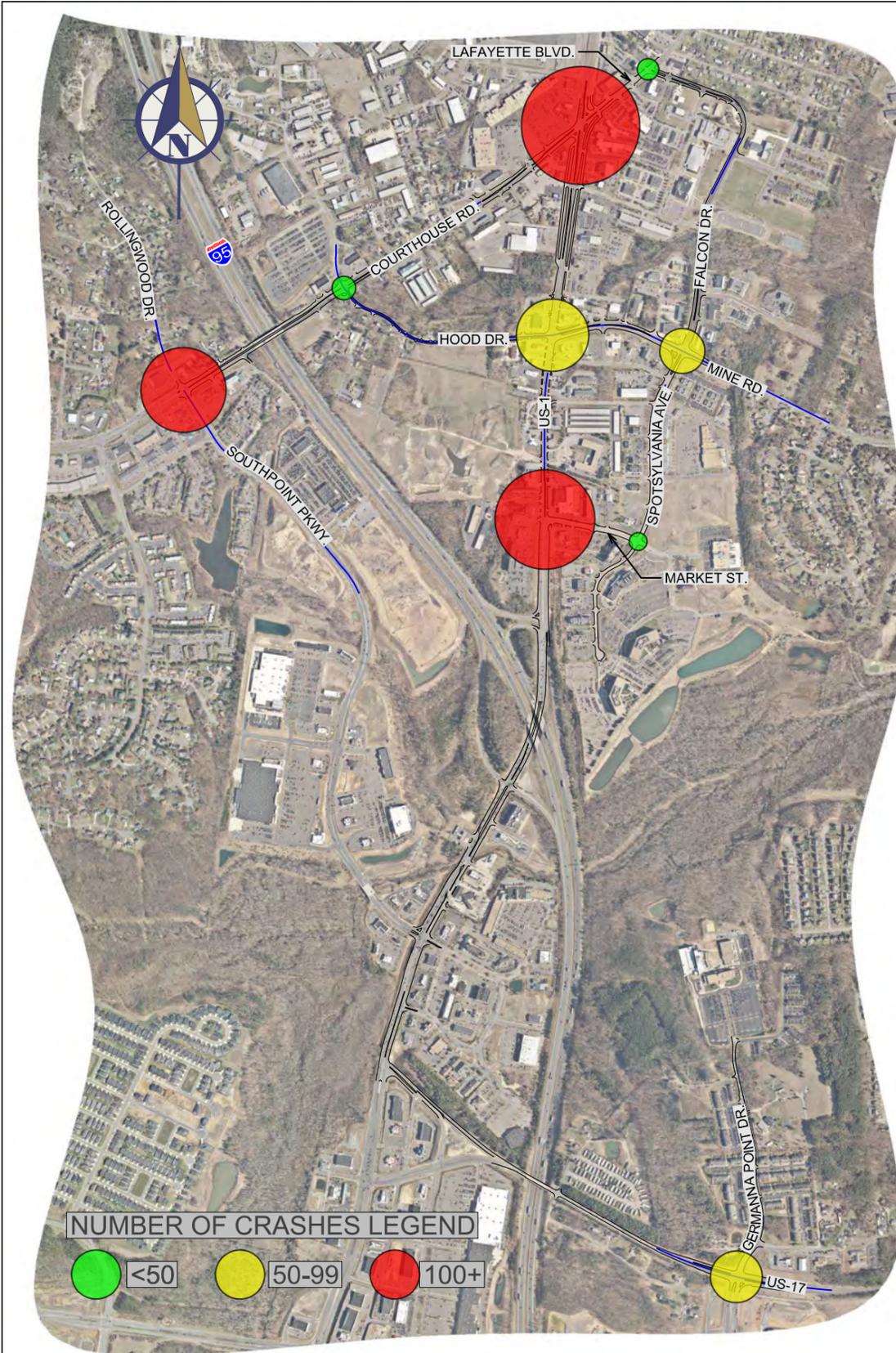
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CHECKED BY: KHB

## 2017 EXISTING PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

SCALE: 1:150  
DATE: 09/06/2017  
JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192  
SHEET NO.: 6 OF 6





## Crashes at the Studied Intersections

The crash history from 2011-2016 recorded a total of 724 crashes at the studied intersections within the study area as shown on the corridor map. The nine intersections shown in the exhibit are considered the significant intersections within the study area.

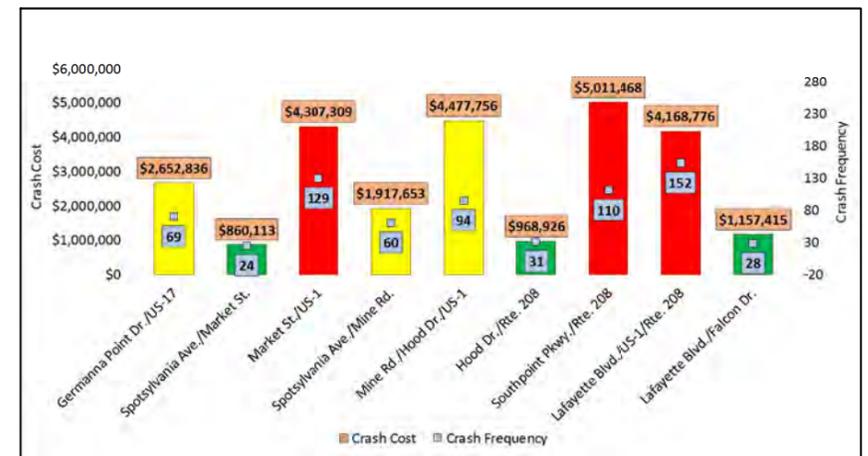
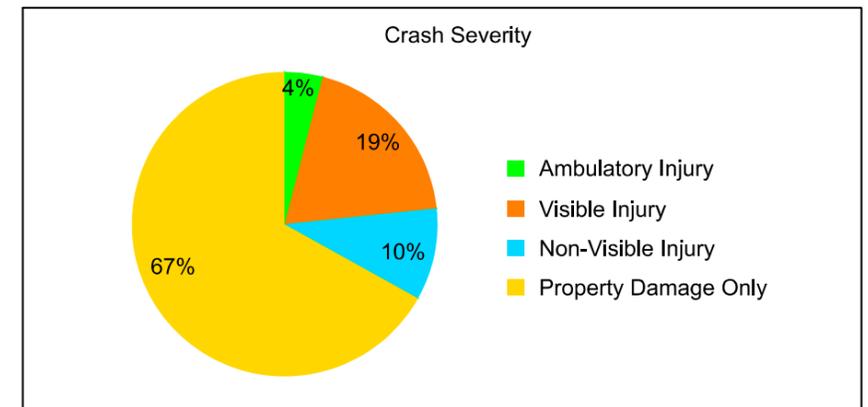
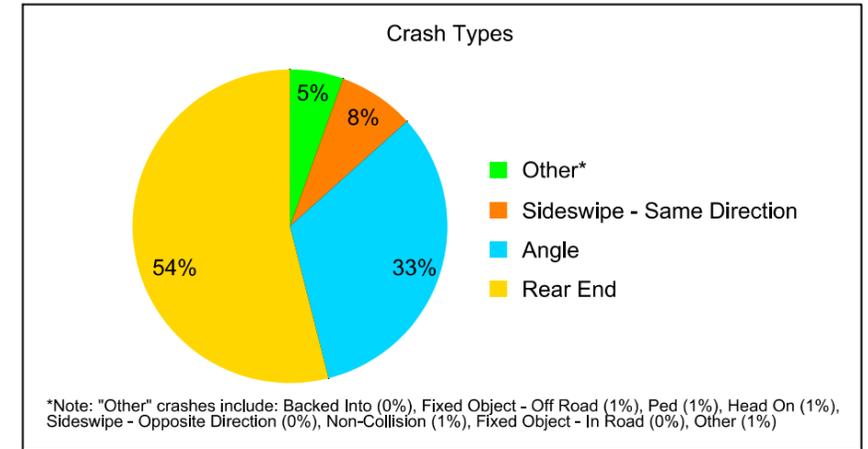
Approximately 3% of all intersection crashes were alcohol related. Speed was a factor for about 4% of all intersection crashes. However, the intersection of Courthouse Rd. and Hood Dr. recorded the highest speed related crashes with the rate of 13%. Driver distractions and young drivers accounted for about 28% and 23% of all intersection crashes, respectively. The intersection of Germanna Point Dr. and US-17 had the highest rate of all intersections at 33% and 30% for distracted and young drivers. This is likely due to the fact that many of the drivers using the intersection are attending the community college on Germanna Point Dr.

The peak periods for this study area are from 7:00AM-9:00AM and 4:30PM-6:30PM on weekdays and 11:30AM-3:30PM on weekends. Approximately half of all crashes occurred during peak hours for both weekend and weekday with the exception of Market St. At the intersection of Market St. at US-1, 84% of weekend crashes occurred during off-peak hours.

Rear-end and angle crashes are the common types of crashes, with 54% and 33%, respectively as shown in the "Crash Type" chart on this sheet. The severity of the crashes were varied and no fatalities were recorded, majority of the crashes were property damage only with more than half of the total crashes, as shown in the chart titled "Crash Severity".

Crash levels at studied intersections are likely high due to higher traffic volumes, congestion, access management issues and lane configurations. Crashes at these intersections cost the County millions of dollars each year as it is shown in the chart titled "Crash Details". For example, from 2011-2016, crashes at the intersection of Southpoint Parkway and Rte. 208 estimated to have more than \$5M economical impact.

The cost of crashes was based on the Highway Safety Manual crash cost estimates by Injury Severity Levels for year 2009. The Cost of crashes were projected to reflect the corresponding years analyzed due to inflation in the cost for the studied years.

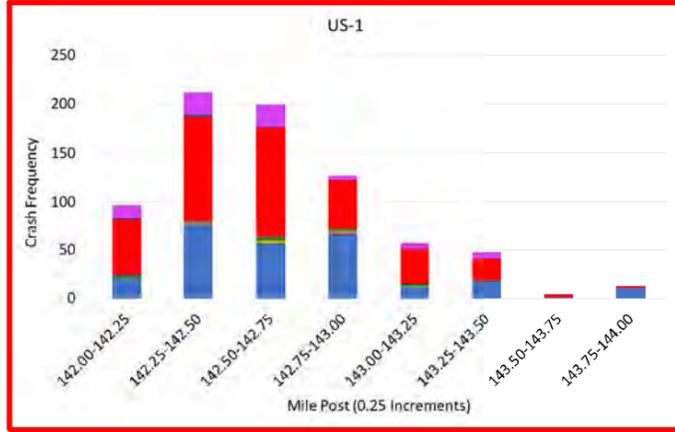
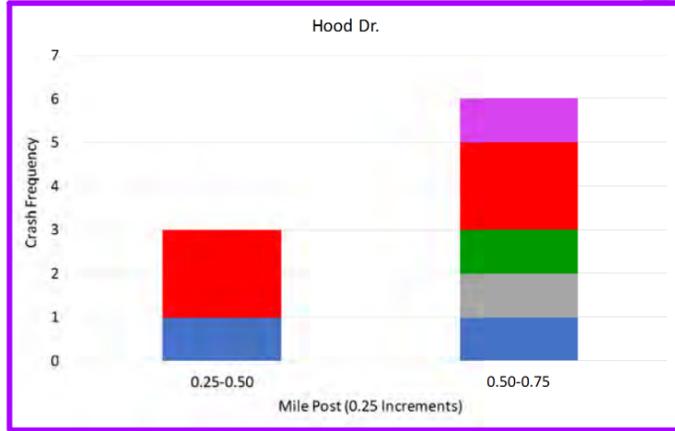
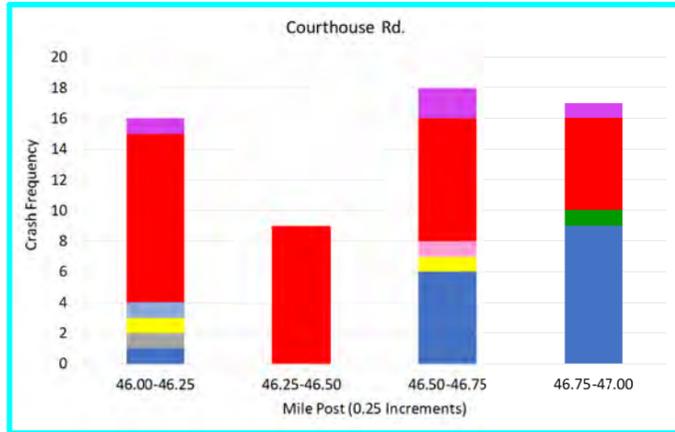


Crash data was obtained using VDOT's Tableau Crashtool.

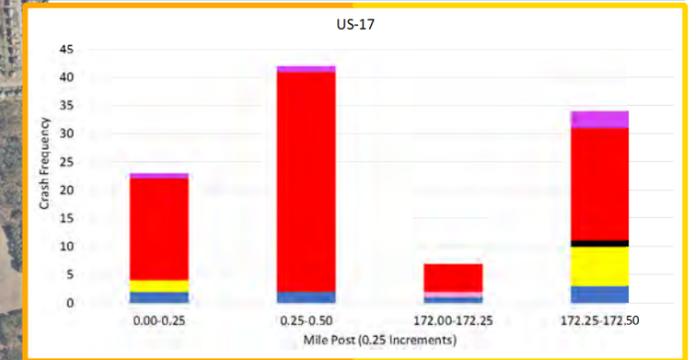
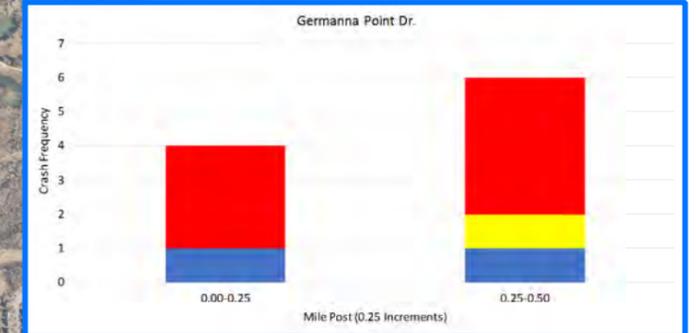
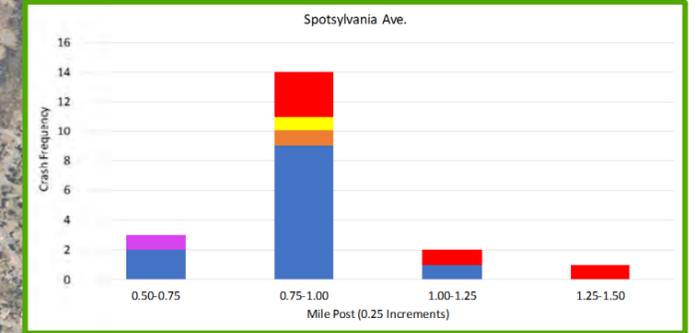
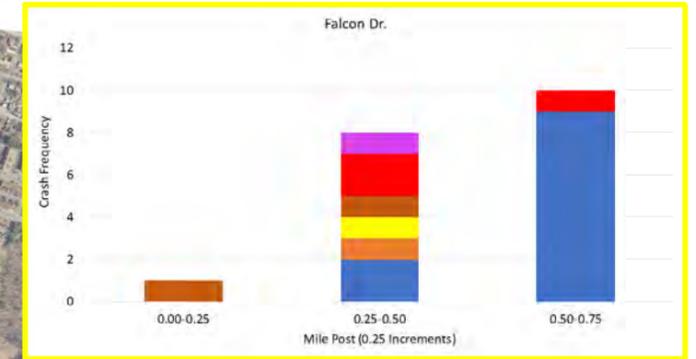
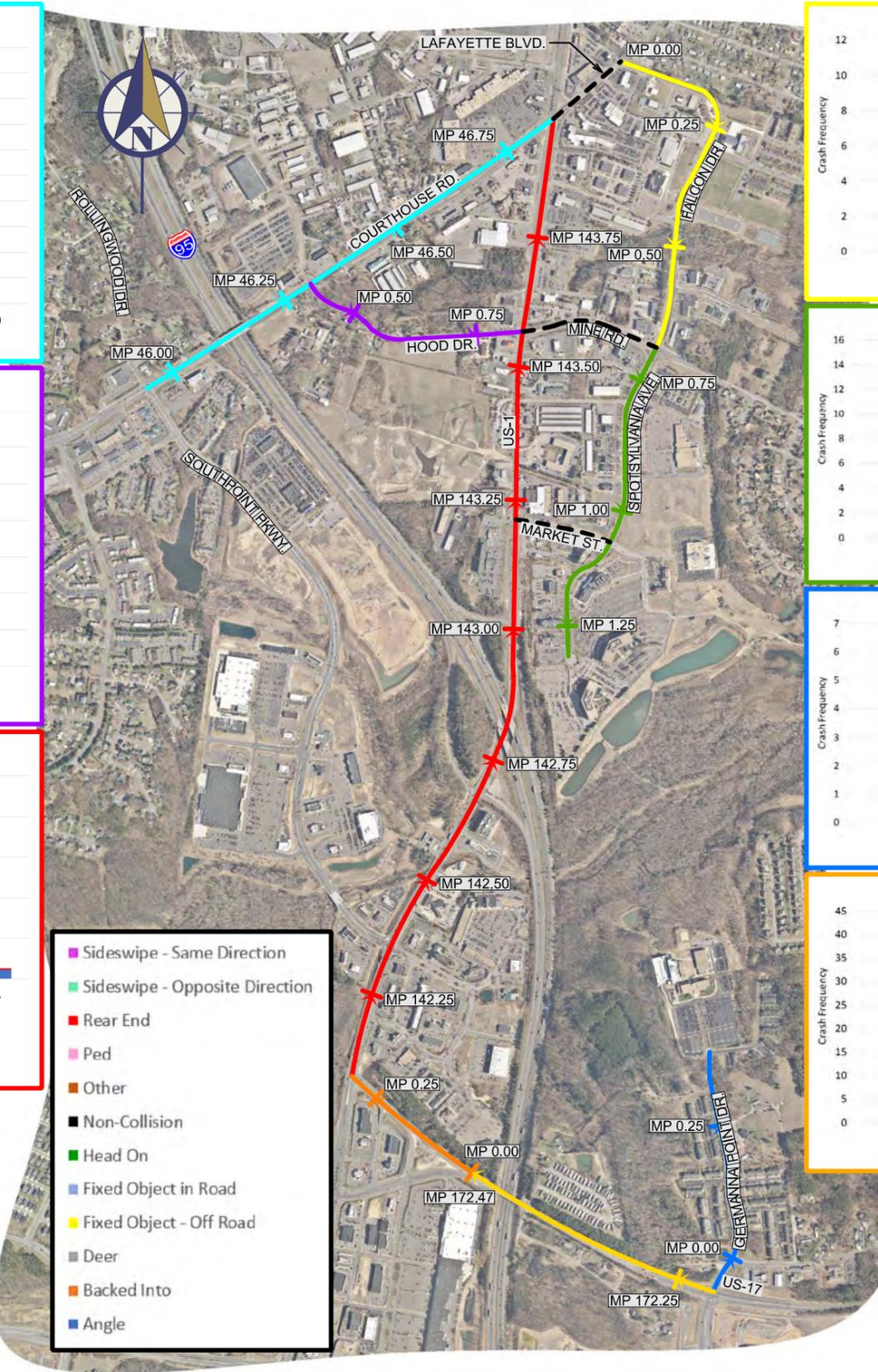
# Segment Crashes

A total of 1,109 crashes were recorded from 2011 - 2016 within the vicinity of the project that were considered to be segment crashes not occurring at significant intersections. About 38% of all segment crashes occurred within or near an insignificant intersection that were not included in the studied intersections. About 54% of all segment crashes are rear end collisions and 32% are angle collisions. All the segment crashes on Hood Dr. occurred outside of significant intersections which can be attributed to the very low volume on the side streets. About 53% of segment crashes on Falcon Dr. occurred at the insignificant intersections along the road; Falcon Dr. has the highest rate of insignificant intersection-related (segment) crashes among the other roads within the corridor. There are several side streets along this roadway serving a neighborhood and a school which may account for the higher percentage of intersection crashes.

About 3% of crashes were alcohol related. However, Falcon Dr. and Hood Dr. had a relatively high percentage of alcohol related crashes both at 11%. Speed was a factor in 8% of all crashes, but Hood Dr. had a highest rate of 33% of crashes. Driver distractions and young drivers accounted for 23% and 26% of all segment crashes, respectively. However, Germanna Point Dr. had extremely high distracted and young driver percentages at 60% and 70%, respectively. This is due to the fact that most of the traffic on this roadway is attributed to the community college students with higher rates of young drivers.



About 19% of all segment crashes occurred along dark roadways (unlighted, dusk and dawn). At 33%, Hood Dr. had the highest rate of dark roadway crashes. Approximately half of all crashes occurred during weekday and weekend peak hours except for Falcon Dr. which had a higher percentage of crashes during weekend peak hours and weekday off-peak hours.



Note: Market St., Mine Rd., and Lafayette Blvd. are short segments and therefore, crashes are split between adjacent intersections and included in crashes totals shown on Sheet 1 of 2.

12/1/2017 2:29:00 PM



DRAWN BY: BNG  
CHECKED BY: KHB

CRASH HISTORY (2011 - 2016)  
RTE. 1/208 CORRIDOR STUDY

SCALE: NTS  
JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192

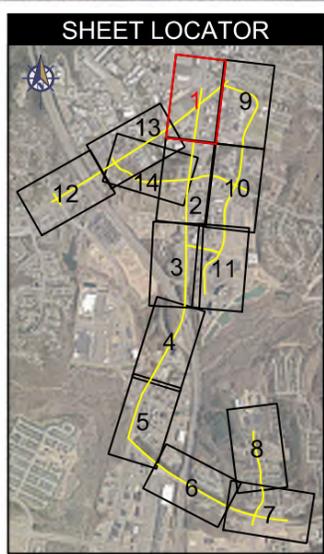
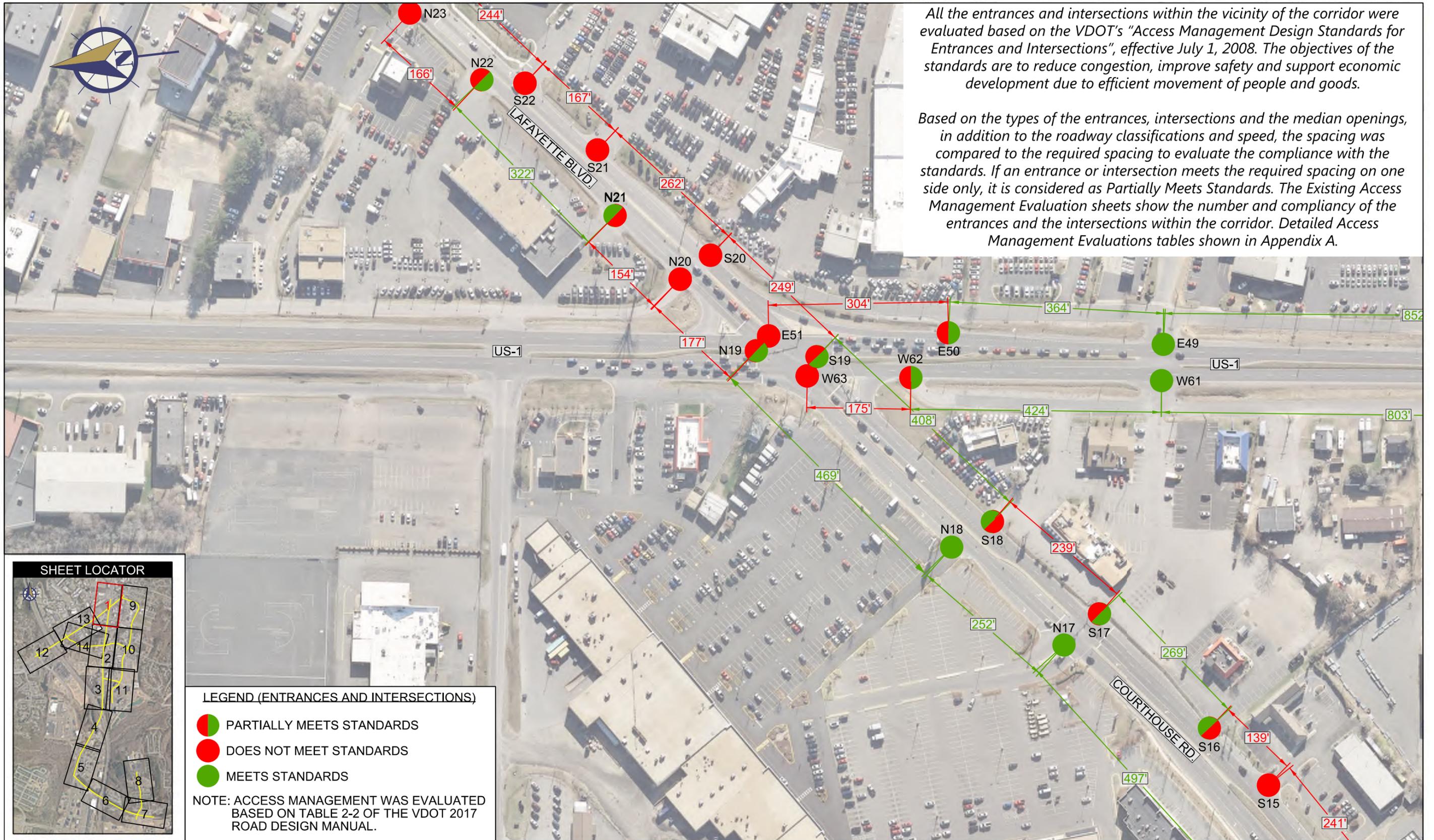
DATE: 08/30/2017  
SHEET NO.: 2 OF 2





All the entrances and intersections within the vicinity of the corridor were evaluated based on the VDOT's "Access Management Design Standards for Entrances and Intersections", effective July 1, 2008. The objectives of the standards are to reduce congestion, improve safety and support economic development due to efficient movement of people and goods.

Based on the types of the entrances, intersections and the median openings, in addition to the roadway classifications and speed, the spacing was compared to the required spacing to evaluate the compliance with the standards. If an entrance or intersection meets the required spacing on one side only, it is considered as Partially Meets Standards. The Existing Access Management Evaluation sheets show the number and compliancy of the entrances and the intersections within the corridor. Detailed Access Management Evaluations tables shown in Appendix A.

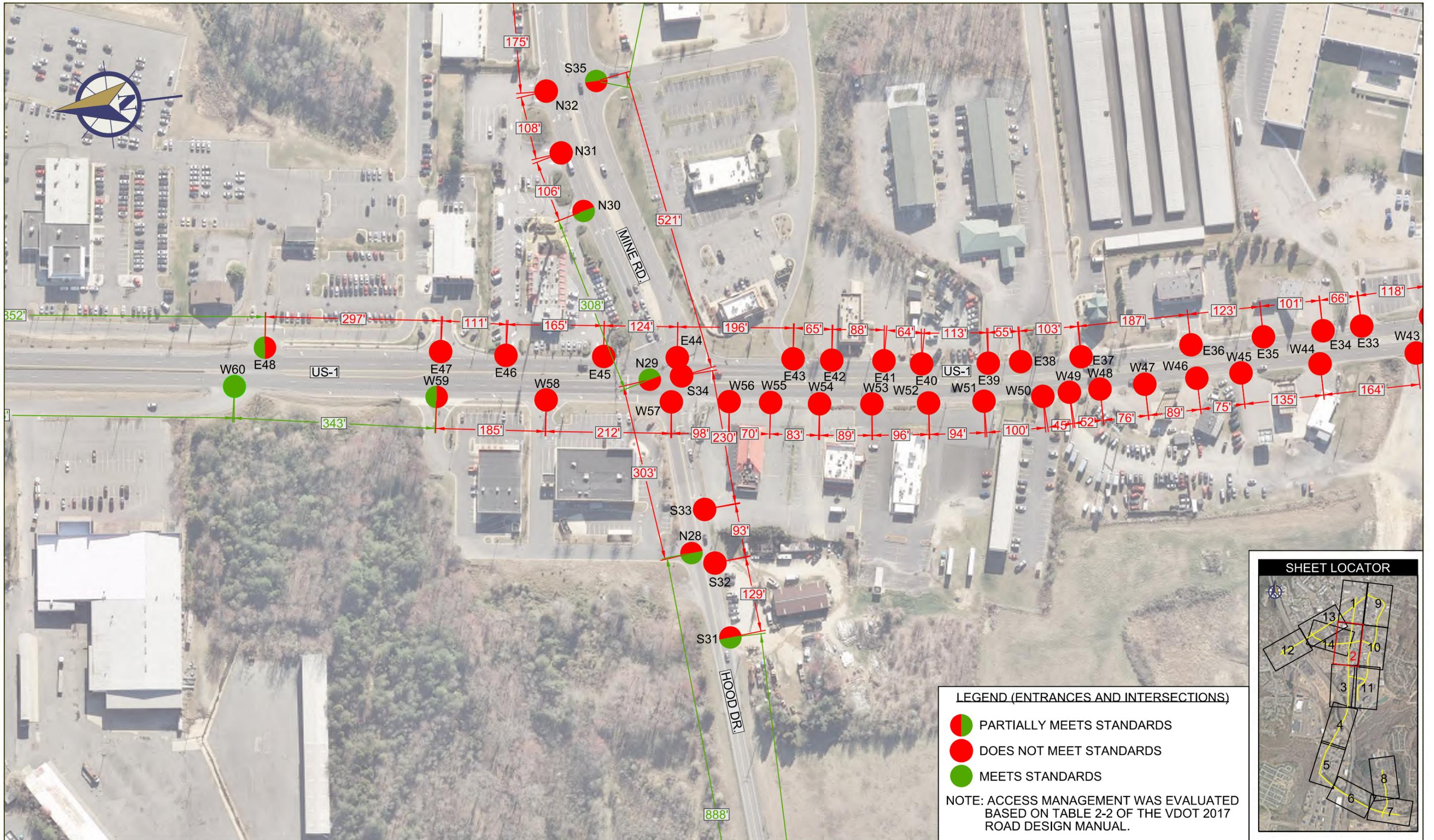


**LEGEND (ENTRANCES AND INTERSECTIONS)**

- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.

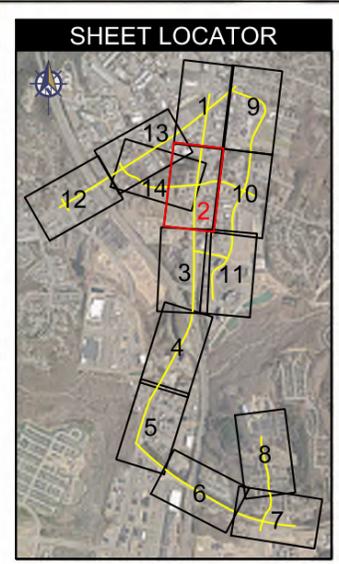
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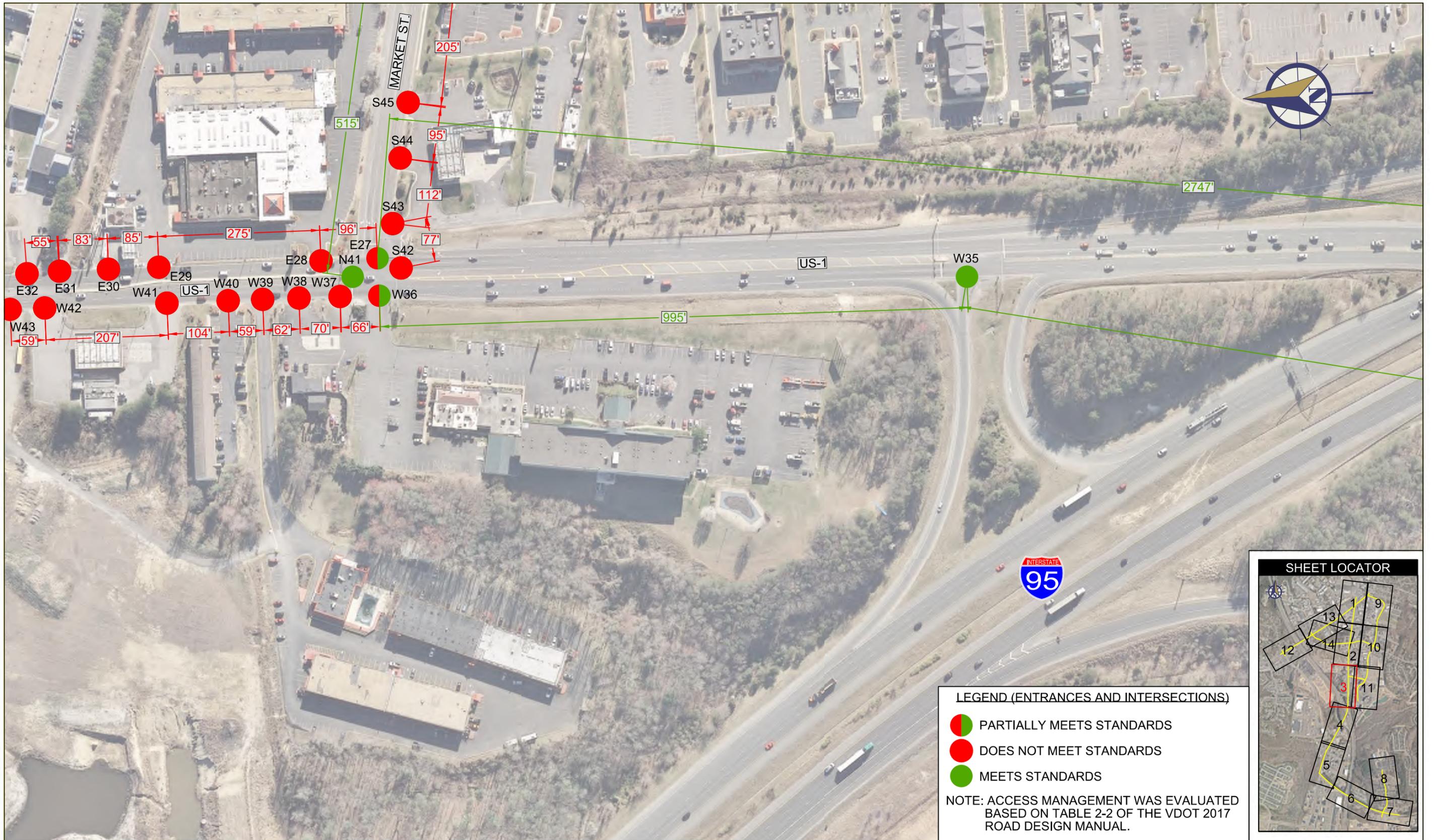
**LEGEND (ENTRANCES AND INTERSECTIONS)**

- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



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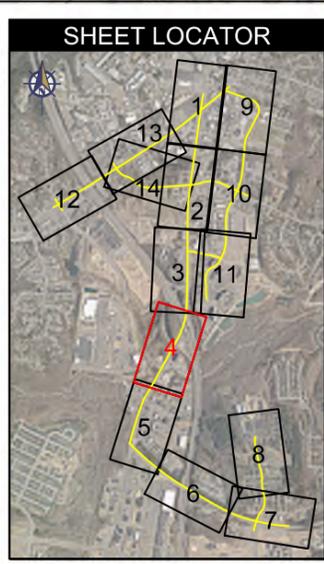


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CHECKED BY: KHB

**EXISTING ACCESS MANAGEMENT EVALUATION**  
**RTE. 1/208 CORRIDOR STUDY**

SCALE: 1:150  
DATE: 08/23/2017  
JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192  
SHEET NO.: 3 OF 14





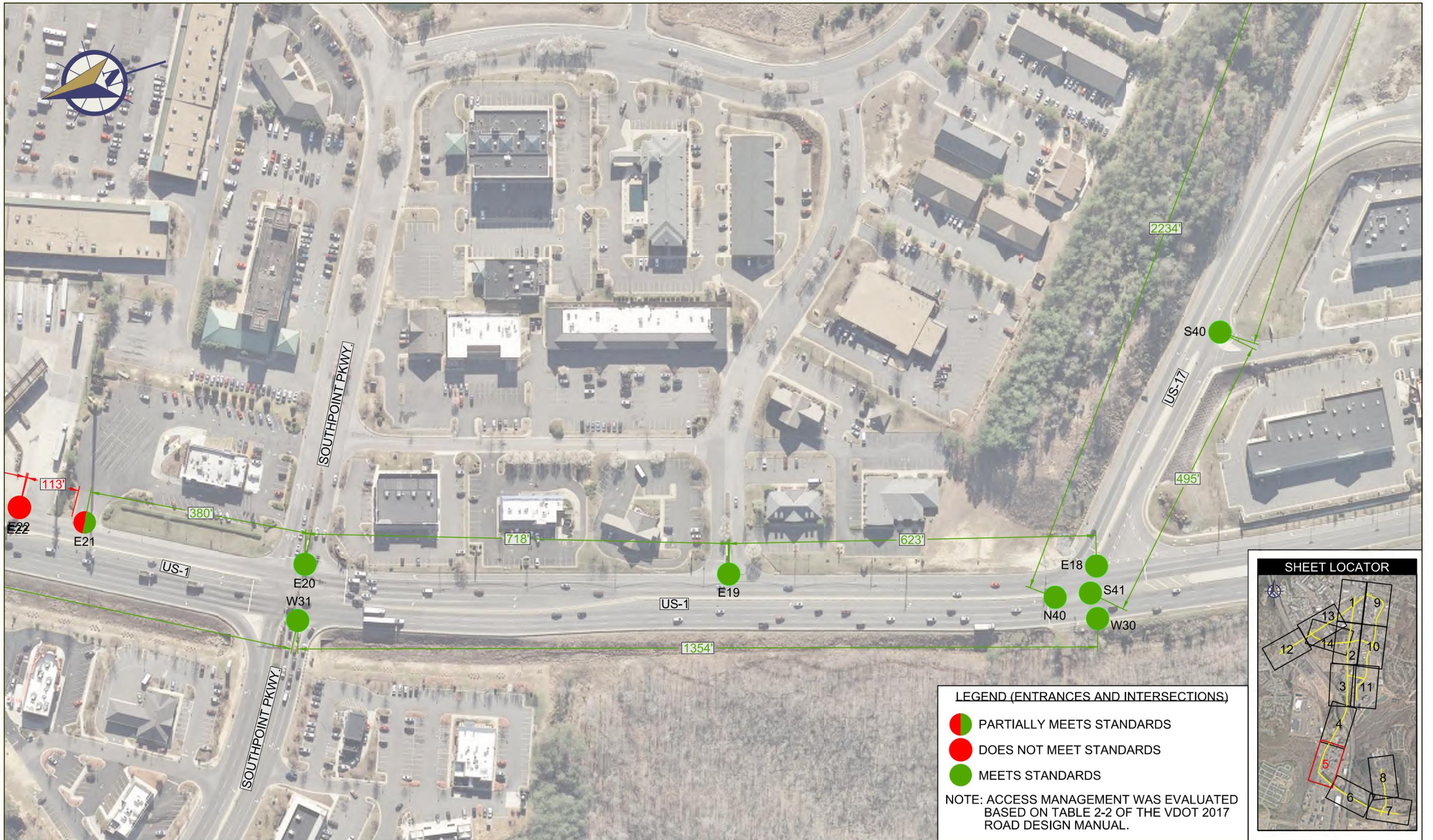
**LEGEND (ENTRANCES AND INTERSECTIONS)**

- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.

	DRAWN BY:	BNG	<b>EXISTING ACCESS MANAGEMENT EVALUATION</b>	SCALE:	1:150	DATE:	08/23/2017			
	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	4	OF	14	

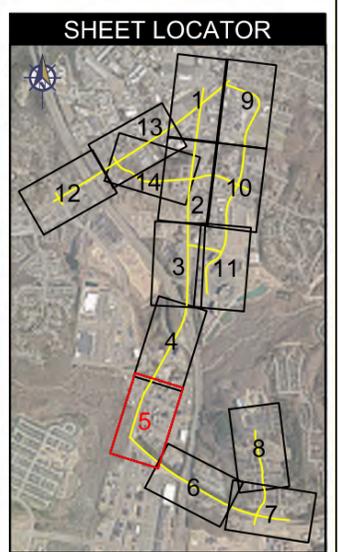
11/22/2017 10:01:05 AM



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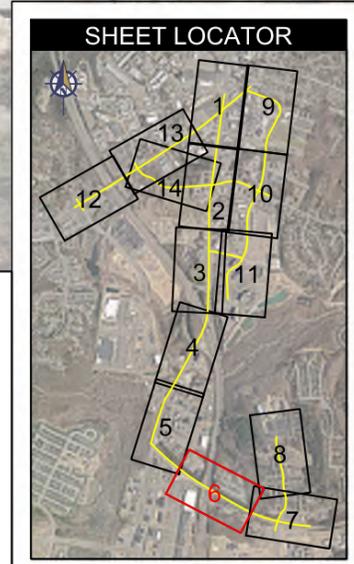
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- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



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	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	5 OF 14	

12/1/2017 8:57:54 AM



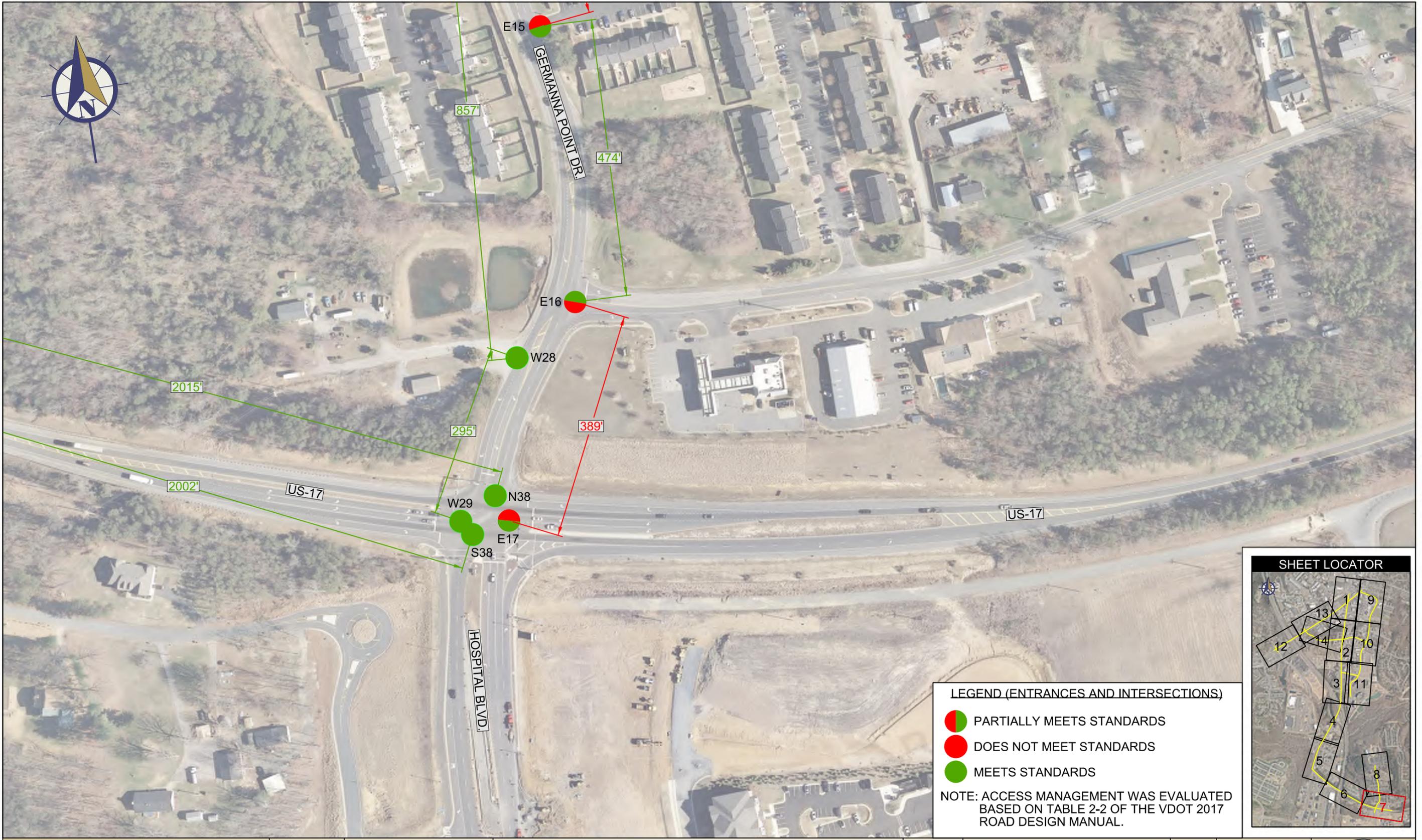
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- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.

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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	6 OF 14	

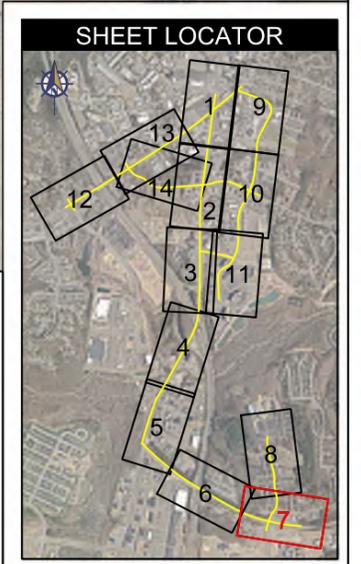
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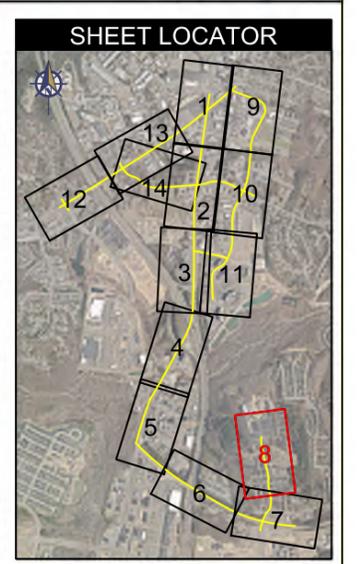
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- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



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	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	7	
				VDOT UPC PROJECT NO.: 107192				

11/22/2017 10:57:07 AM



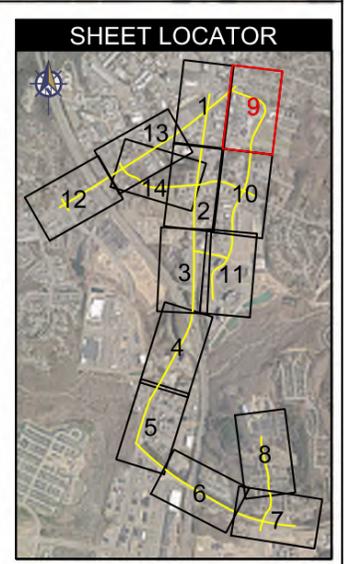
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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	SHEET NO.:	8	OF	
				VDOT UPC PROJECT NO.:	107192			



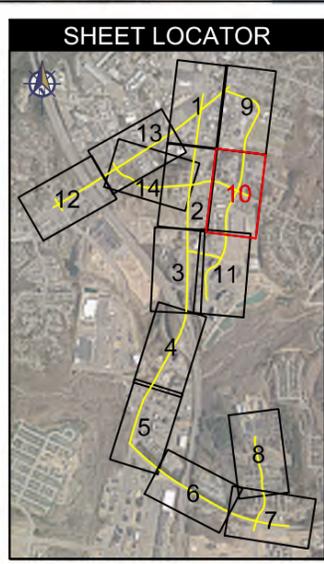
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- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	9	



**LEGEND (ENTRANCES AND INTERSECTIONS)**

- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.

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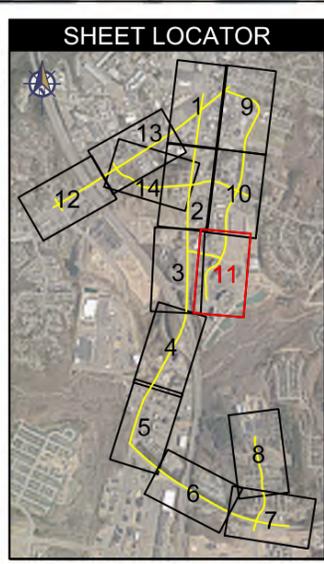
11/22/2017 11:25:56 AM



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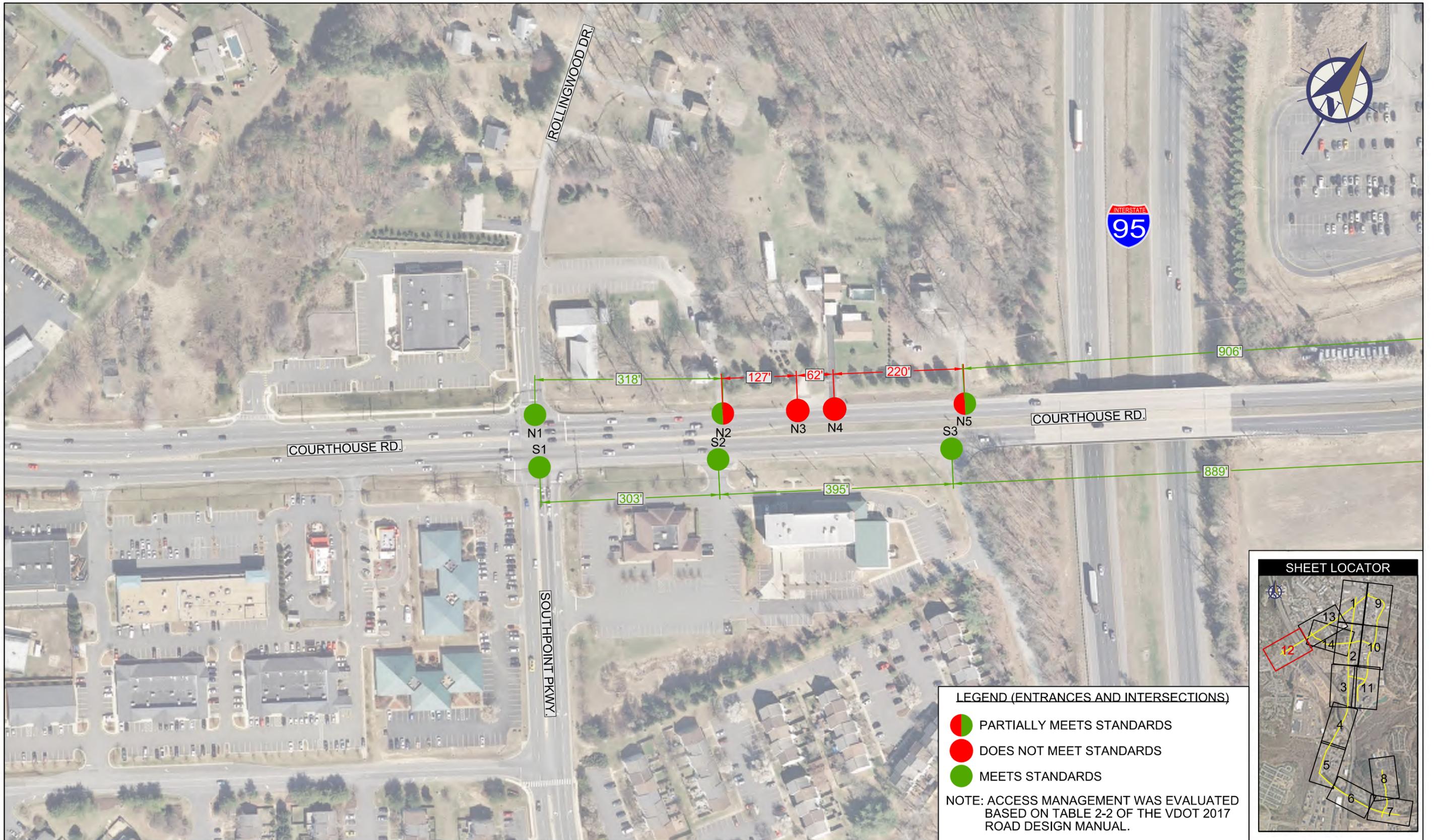
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- PARTIALLY MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	11	

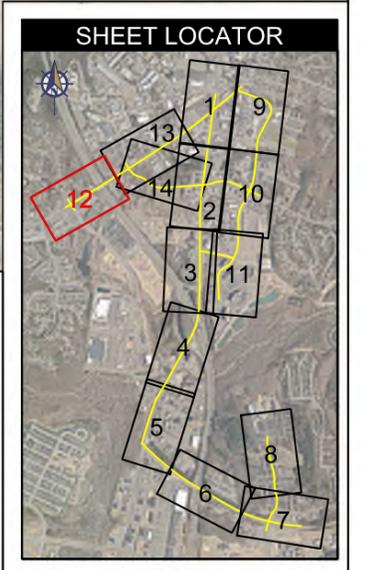
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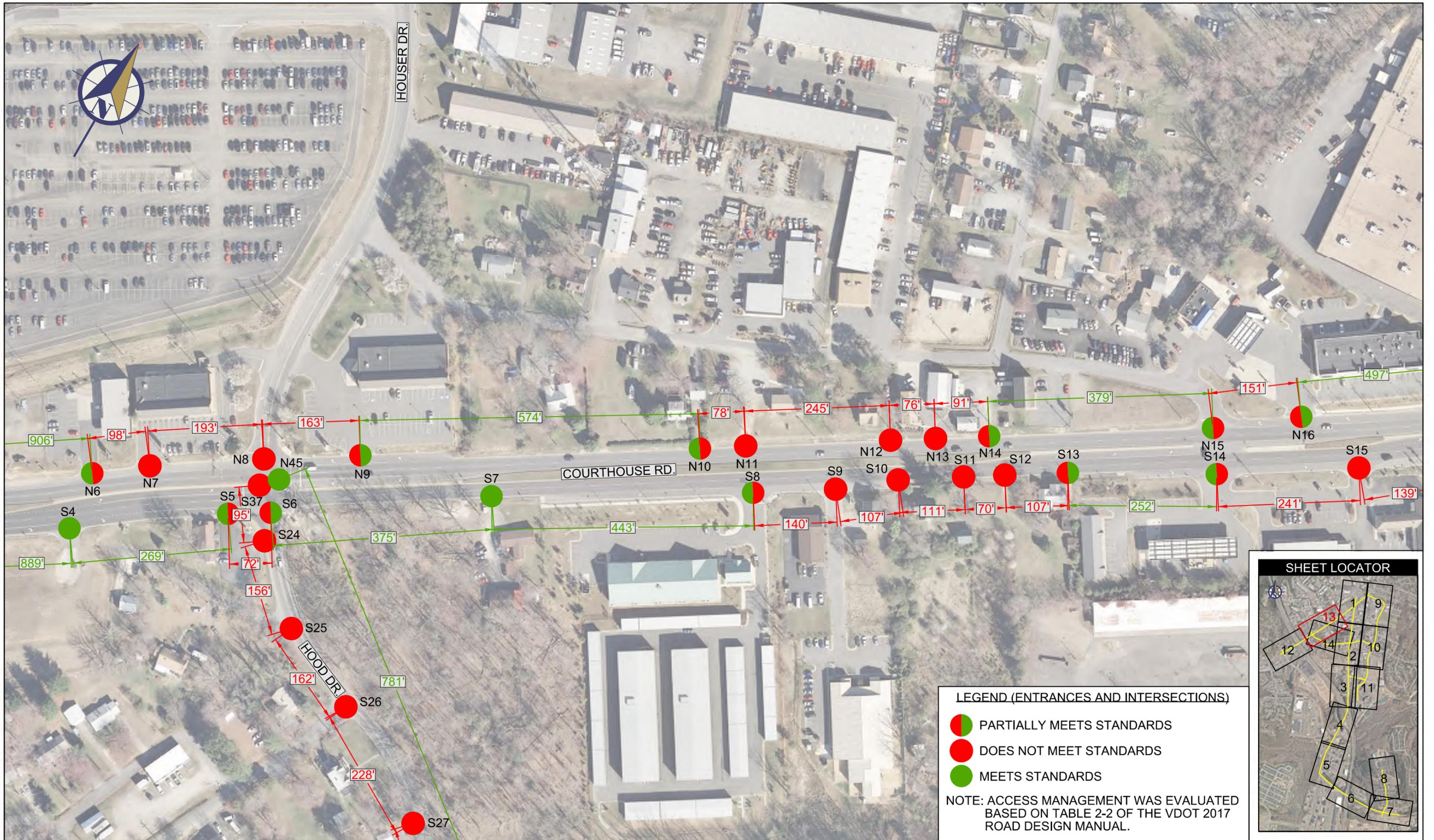
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- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



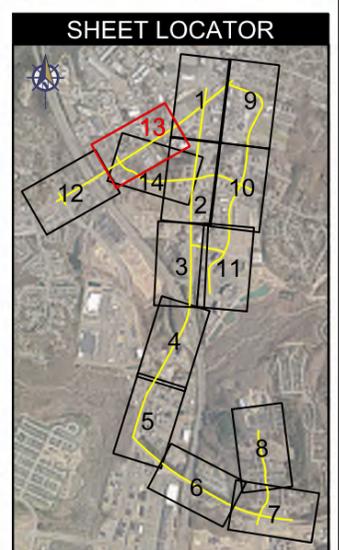
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	CHECKED BY:	KHB	<b>RTE. 1/208 CORRIDOR STUDY</b>		JMT PROJECT NO.:	15-0038-003	SHEET NO.:	12	OF 14	
					VDOT UPC PROJECT NO.:	107192				



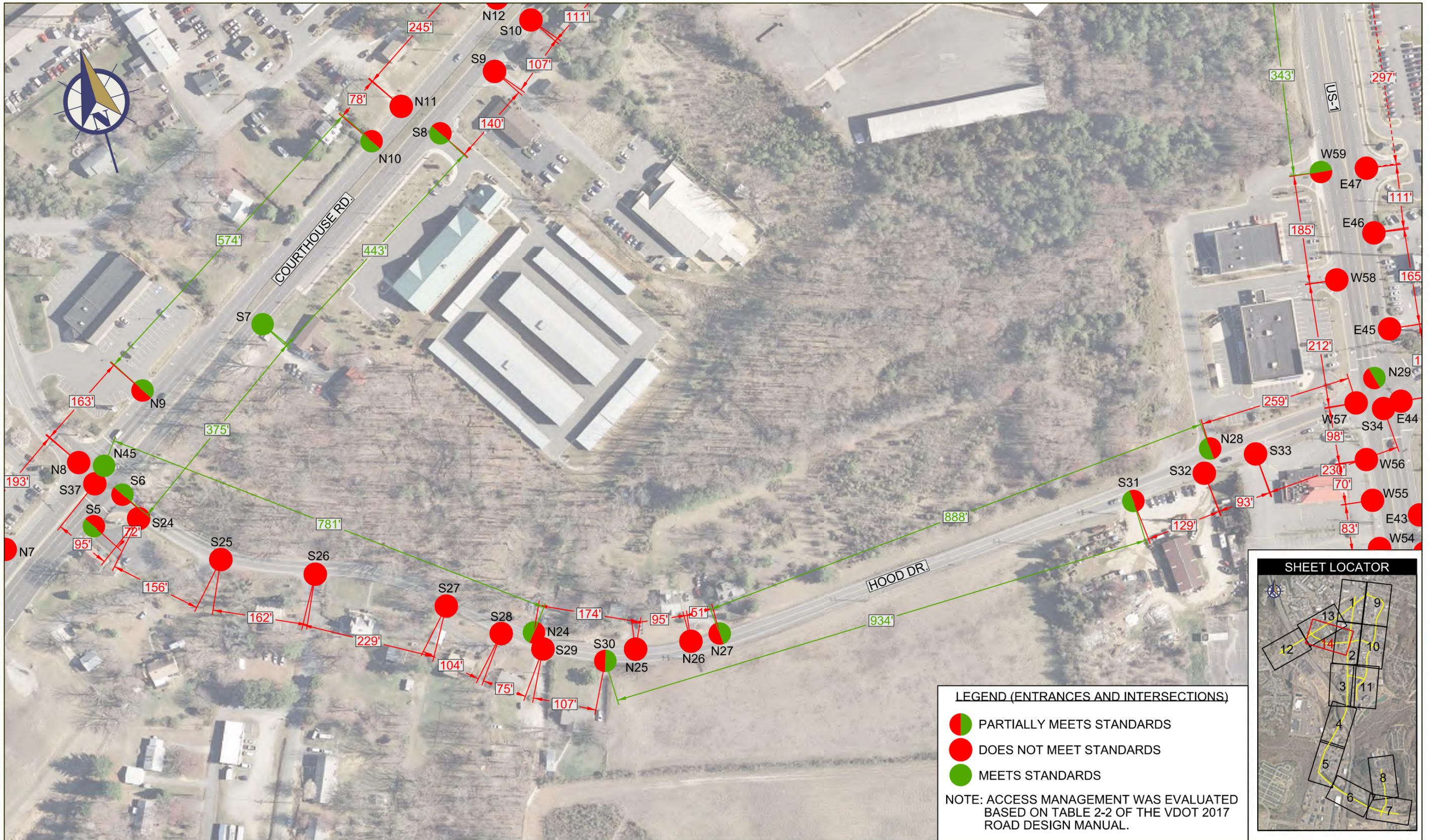
**LEGEND (ENTRANCES AND INTERSECTIONS)**

- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



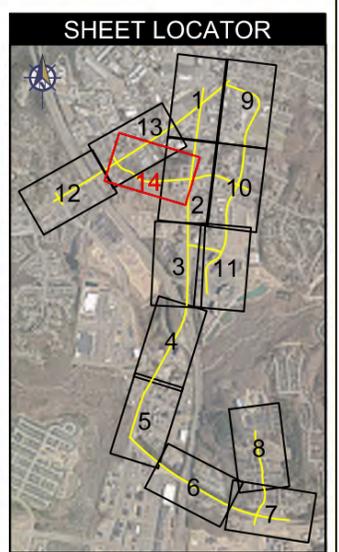
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	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	13 OF 14	



**LEGEND (ENTRANCES AND INTERSECTIONS)**

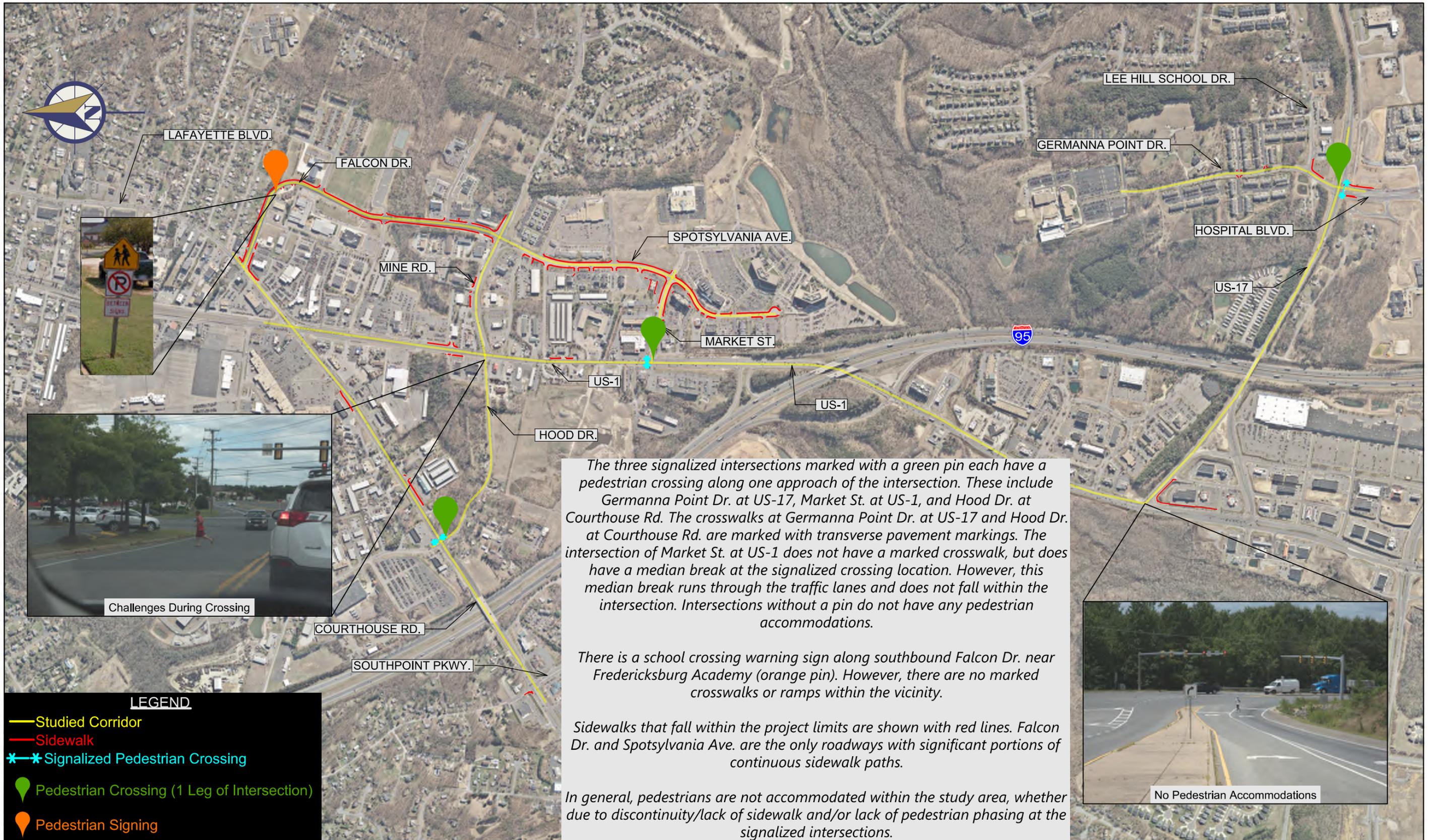
- PARTIALLY MEETS STANDARDS
- DOES NOT MEET STANDARDS
- ◐ MEETS STANDARDS

NOTE: ACCESS MANAGEMENT WAS EVALUATED BASED ON TABLE 2-2 OF THE VDOT 2017 ROAD DESIGN MANUAL.



	DRAWN BY:	BNG	<b>EXISTING ACCESS MANAGEMENT EVALUATION</b> <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	08/23/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	14	

11/22/2017 11:27:25 AM



The three signalized intersections marked with a green pin each have a pedestrian crossing along one approach of the intersection. These include Germanna Point Dr. at US-17, Market St. at US-1, and Hood Dr. at Courthouse Rd. The crosswalks at Germanna Point Dr. at US-17 and Hood Dr. at Courthouse Rd. are marked with transverse pavement markings. The intersection of Market St. at US-1 does not have a marked crosswalk, but does have a median break at the signalized crossing location. However, this median break runs through the traffic lanes and does not fall within the intersection. Intersections without a pin do not have any pedestrian accommodations.

There is a school crossing warning sign along southbound Falcon Dr. near Fredericksburg Academy (orange pin). However, there are no marked crosswalks or ramps within the vicinity.

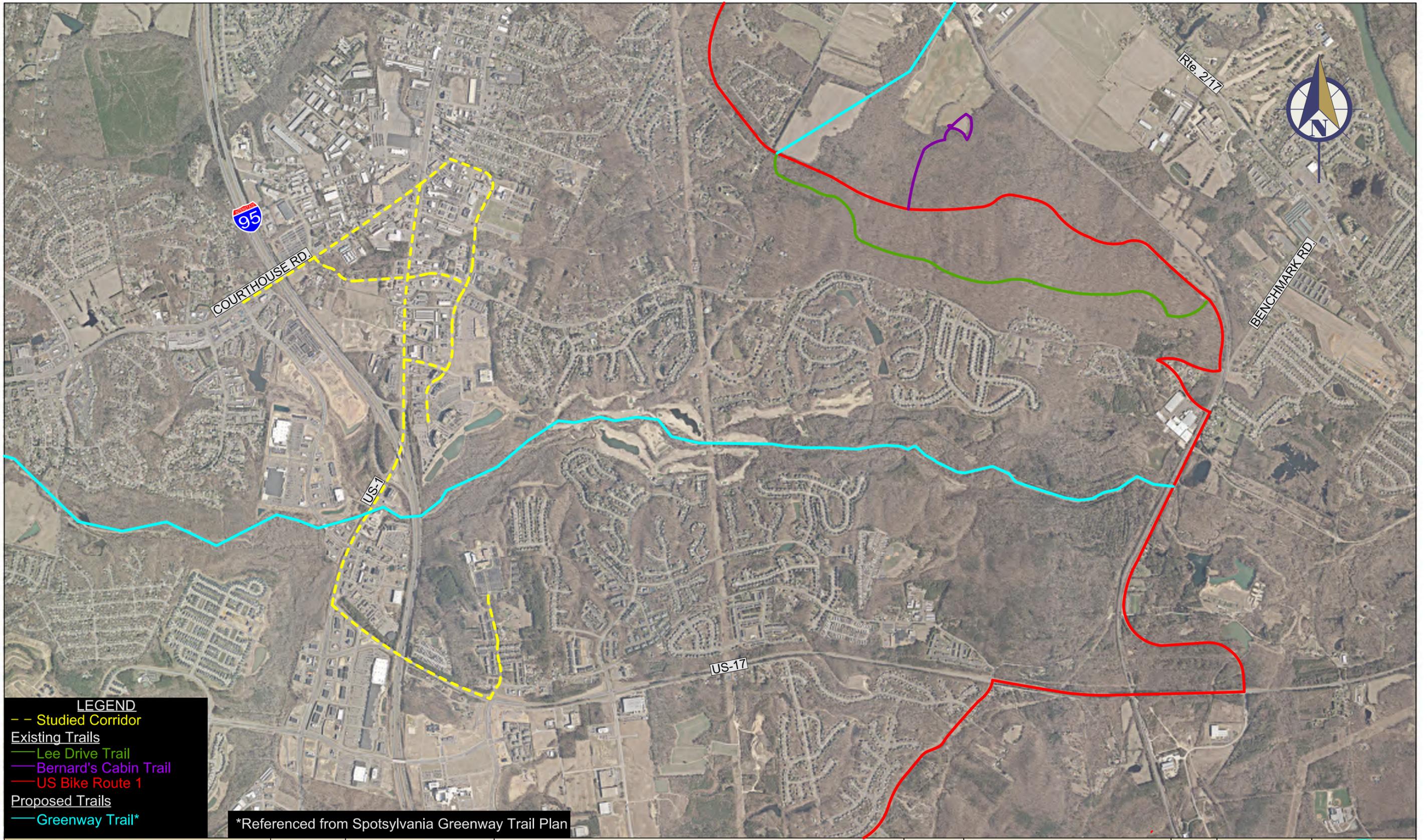
Sidewalks that fall within the project limits are shown with red lines. Falcon Dr. and Spotsylvania Ave. are the only roadways with significant portions of continuous sidewalk paths.

In general, pedestrians are not accommodated within the study area, whether due to discontinuity/lack of sidewalk and/or lack of pedestrian phasing at the signalized intersections.

**LEGEND**

- Studied Corridor
- Sidewalk
- ✖ Signalized Pedestrian Crossing
- 📍 Pedestrian Crossing (1 Leg of Intersection)
- 📍 Pedestrian Signing

	DRAWN BY:	BNG	<b>PEDESTRIAN ACCOMMODATIONS</b> <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:3000	DATE:	08/30/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	1 OF 1	



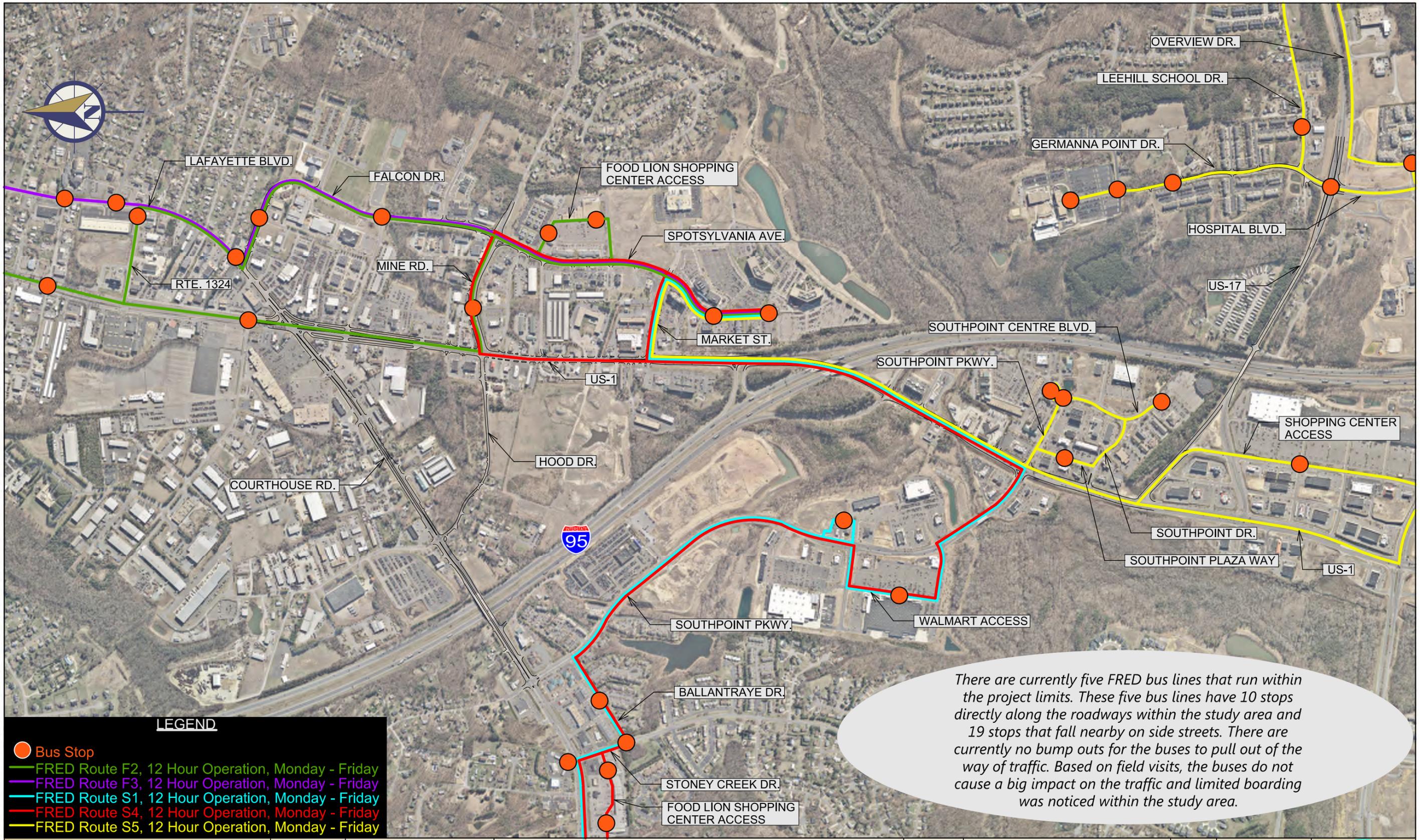
**LEGEND**

- Studied Corridor
- Existing Trails
- Lee Drive Trail
- Bernard's Cabin Trail
- US Bike Route 1
- Proposed Trails
- Greenway Trail\*

\*Referenced from Spotsylvania Greenway Trail Plan

	DRAWN BY:	BNG	<b>BICYCLE ROUTE MAPS</b> <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:2000	DATE:	09/05/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	VDOT UPC PROJECT NO.: 107192	SHEET NO.:	1	

11/22/2017 9:44:44 AM



*There are currently five FRED bus lines that run within the project limits. These five bus lines have 10 stops directly along the roadways within the study area and 19 stops that fall nearby on side streets. There are currently no bump outs for the buses to pull out of the way of traffic. Based on field visits, the buses do not cause a big impact on the traffic and limited boarding was noticed within the study area.*

**LEGEND**

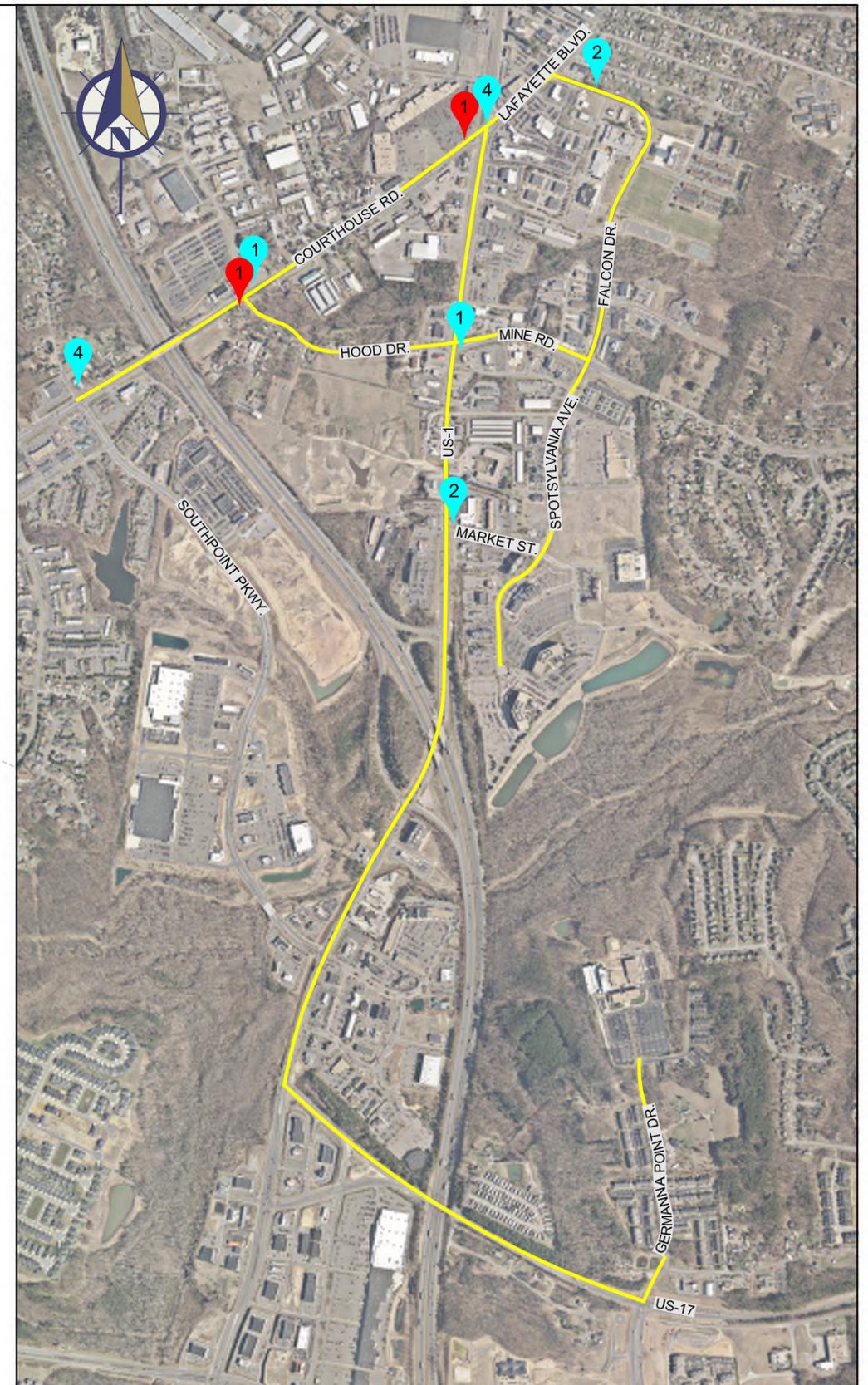
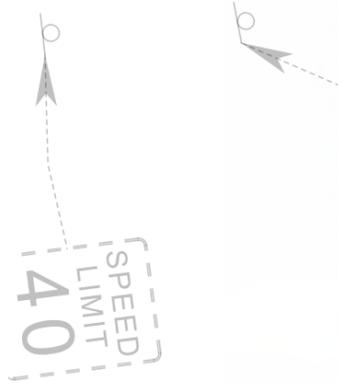
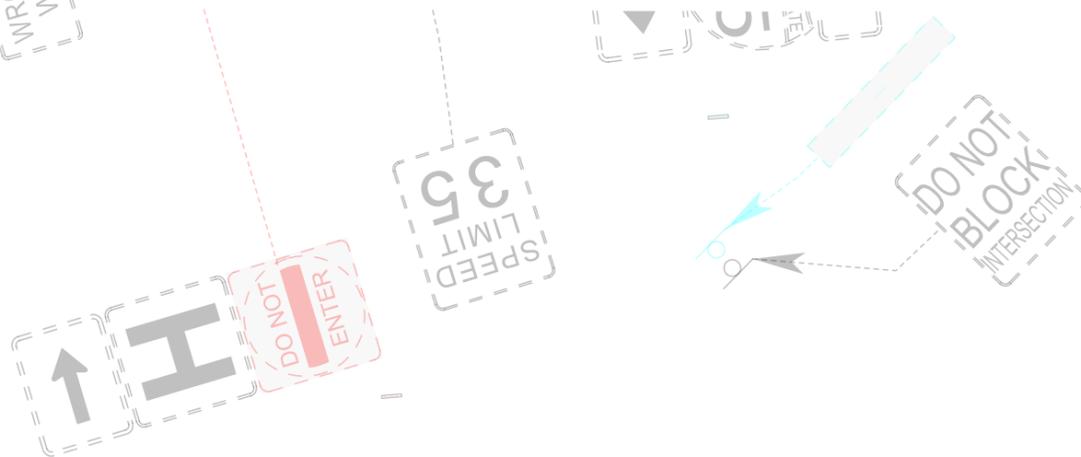
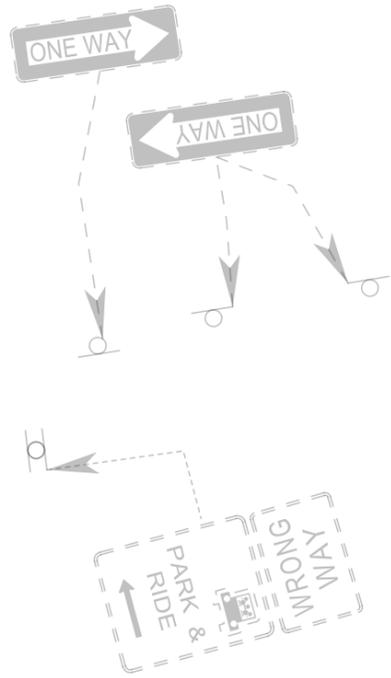
- Bus Stop
- FRED Route F2, 12 Hour Operation, Monday - Friday
- FRED Route F3, 12 Hour Operation, Monday - Friday
- FRED Route S1, 12 Hour Operation, Monday - Friday
- FRED Route S4, 12 Hour Operation, Monday - Friday
- FRED Route S5, 12 Hour Operation, Monday - Friday

	DRAWN BY:	BNG	<b>TRANSIT ROUTES</b>	SCALE:	1:3000	DATE:	08/30/2017	
	CHECKED BY:	KHB	<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1	OF	
				VDOT UPC PROJECT NO.: 107192				



All the roadway signs within the vicinity of the corridor were evaluated to check the compliance with Manual on Uniform Traffic Control Devices (MUTCD-2009), Virginia Standard Highway Signs Book, Revision 1 (2011) and the Supplement to the 2004 Edition of the Standard Highway Signs Book (2012). The roadway signs that need replacement are identified. The red colored marks are signs that need to be replaced immediately, while the blue colored marks are signs that need to be replaced with any roadway improvements. Detailed sign evaluation sheets for the entire corridor are shown in the Appendix B.

Sheet No.	No. of Signs to be Replaced Immediately	No. of Signs to be Replaced with Improvements
1	1	4
2	-	1
3	-	2
4	-	-
5	-	-
6	-	2
7	-	-
8	-	-
9	-	4
10	1	1
<b>Total</b>	<b>2</b>	<b>14</b>



DRAWN BY: BNG  
 CHECKED BY: KHB

TRAFFIC CONTROL DEVICES ASSESSMENT  
 RTE. 1/208 CORRIDOR STUDY

SCALE: NTS  
 DATE: 12/07/2017  
 JMT PROJECT NO.: 15-0038-003  
 VDOT UPC PROJECT NO.: 107192  
 SHEET NO.: 1 OF 1

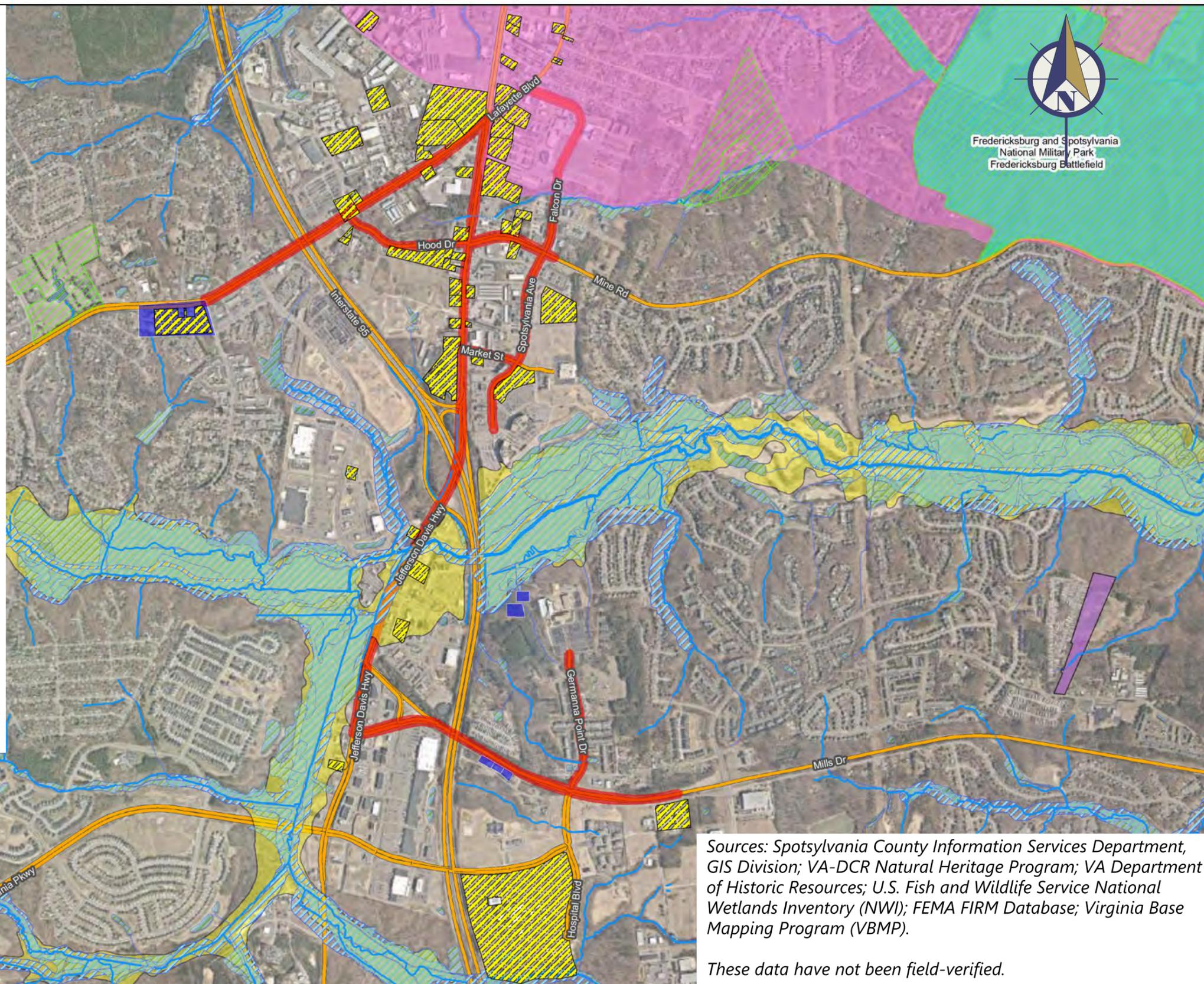


**Hazardous Materials Sites** - Includes areas that could require additional studies to further evaluate possible issues and the extent of the contamination. VDOT will require a Phase I Environmental Site Assessment (ESA) of the corridor to comply with the EQ121 requirements. The Phase I ESA includes limited fieldwork and research to identify potential or existing environmental contamination liabilities of sites that may be impacted by the proposed improvements.

**Historic Resources** - Includes both historic structures and archaeological sites. The resources identified in the project area could require additional studies to identify and evaluate the resources within the project area. Given the rich cultural resources in the area, it is possible that a Phase II survey could be required. A Phase II investigation involves a complete, subsurface survey and testing of identified sites sufficient to determine their boundaries, their cultural and scientific importance, and the sites' eligibility for listing on the National Register of Historic Places. These studies can be expensive and time consuming.

**Natural Resources** - Includes wetlands, streams, Resource Protection Areas, floodplains, and parks/conservation easements. Environmental permits and regulatory coordination could be required if these resources are located within or adjacent to the project's limits of disturbance, depending on the proposed improvements.

**Note:** Historic areas that were not evaluated have been surveyed, but have not officially evaluated by the Department of Historic Resources. Typically, these sites are not eligible for Listing on the Register of Historic Places



**Legend**

- Project Corridor
- Hazardous Materials**
- Hazardous Materials Sites
- Historic Areas Evaluation Status**
- Not Evaluated
- Potentially Eligible for National Register of Historic Places (NRHP) Listing
- Natural Resources**
- Stream
- Wetland
- Resource Protection Area
- 100-Year Flood/Zone A
- Virginia Conservation Lands
- National Park Service Lands (Battlefields)
- State Parks
- County Parks

Sources: Spotsylvania County Information Services Department, GIS Division; VA-DCR Natural Heritage Program; VA Department of Historic Resources; U.S. Fish and Wildlife Service National Wetlands Inventory (NWI); FEMA FIRM Database; Virginia Base Mapping Program (VBMP).

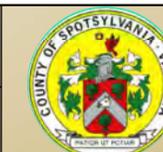
These data have not been field-verified.



DRAWN BY: ADW  
CHECKED BY: CMT

EXISTING SENSITIVE ENVIRONMENTAL FEATURES  
RTE. 1/208 CORRIDOR STUDY

SCALE: NTS  
DATE: 09/18/2017  
JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192  
SHEET NO.: 1 OF 1



Structure #	Route	Crossing	VA Structure No.	Type	Structure Length (ft)	General Condition Rating	Structurally Deficient	Year Built	Load Rating Factor	Sufficiency Rating
1	US-17/ Mills Dr. *	I-95	1033	Bridge	262.5	4	Yes	1962	1.74	54
2	US-1/Jeff. Davis Hwy. **	Massaponax Creek	1003	Culvert	59.1	6	No	1979	1.00 ***	70
3	Rte. 208/ Courthouse Rd.	I-95	1026	Bridge	88.9	6	No	1984	1.82	83

Information compiled from VDOT Individual Bridge Inspection Reports and VDOT's Fredericksburg District Bridge Maintenance Report.

**DEFINITIONS**

**General Condition Rating** - condition ratings are used to describe an existing bridge or culvert compared with its condition if it were new. The ratings are based on the materials, physical condition of the deck (riding surface), the superstructure (beams immediately beneath the driving surface) and the substructure (foundation and supporting caps and piers). General condition ratings range from 0 (failed condition) to 9 (excellent).

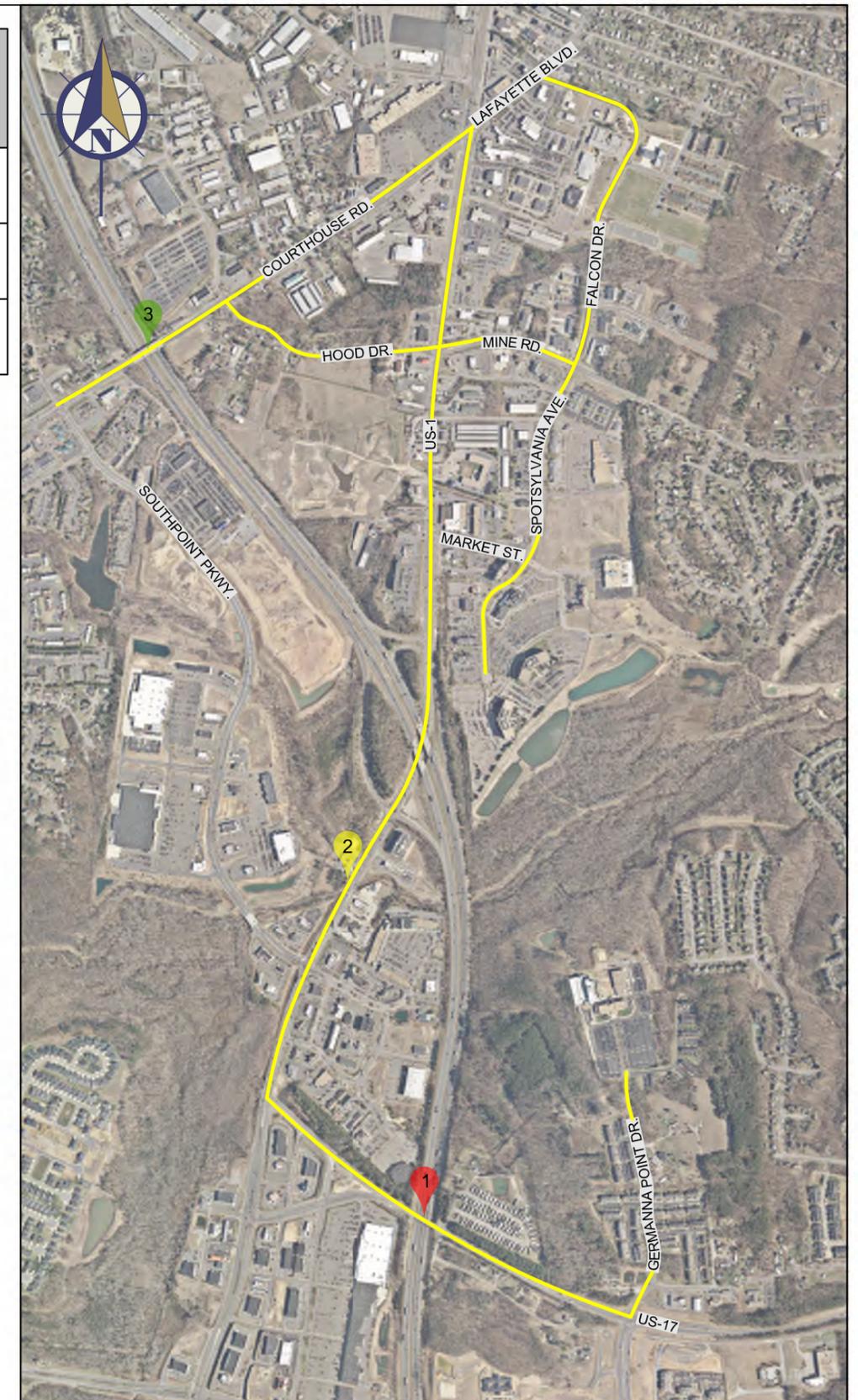
**Structurally Deficient** Bridges have elements that need to be monitored and/or repaired. A Structurally Deficient bridge may be restricted to light vehicles, closed to traffic or require rehabilitation. The fact that a bridge is "structurally deficient" does not imply that it is likely to collapse or that it is unsafe.

**Load Rating Factor** the calculated vehicle weight that the bridge is capable of carrying divided by the weight of the Virginia Legal Load Single Unit Truck (27 tons). If the rating factor is greater than 1 then the bridge can support the Virginia Legal Load vehicle.

**Sufficiency Rating** summarizes several indicators including condition, safety, importance, and how well the bridge geometry and carrying capacity meet current needs. The rating varies from 0 percent (failing) to 100 percent (very good). Sufficiency ratings serve as a prioritization tool to allocate funds.

- NOTES \* Bridge is structurally deficient and scheduled to be replaced with a wider structure (UPC 107140)  
 \*\* There is a planned upstream extension of existing box culvert (UPC 110914)  
 \*\*\* If the structure has been carrying highway traffic and shows no signs of distress, it can be assumed that the structure can carry legal loads (VDOT II&M 86).

LEGEND	CRITERIA			
	Age of Structure	General Condition Rating	Sufficiency Rating	Structurally Deficient
Green=good, no significant problems	-	7 or more	81 or more	No
Yellow=fair, needs some repairs	-	5 or 6	51 to 80	No
Red=poor, needs replacement	Over 50 years	4 or less	50 or less	Yes



DRAWN BY:

BNG

**BRIDGES/CULVERTS ASSESSMENT**

SCALE:

NTS

DATE:

07/27/2017

CHECKED BY:

KHB

**RTE. 1/208 CORRIDOR STUDY**

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.:

1

OF

1



## Existing Operational Capacity

**The Capacity analysis** for the corridor was evaluated using the microsimulation program, VISSIM. The process of building the corridor model in VISSIM up to the extractions of the results in terms of Levels of Service (LOS), density and speed involved multiple stages, as follows:

**Roadway geometry** was modeled using the built-in Bing map in VISSIM, other publicly available sources (Google Maps®) and the County's GIS. Multiple areas were verified during the field visits to model the updated roadway geometry. The geometry of the roadway network in the model includes the number of lanes, lane width, and lane configurations for all the traffic movements.

**Traffic counts** were conducted at the key intersections and balanced for modeling purposes. The balancing process accounts for the traffic gained/lost between these intersections. Traffic Operations and Safety Analysis Manual 1.0 (TOSAM) requires traffic balancing if the volume difference is greater than 10 percent between two adjacent intersections, however, in this study and due to the capability of VISSIM, traffic was balanced up to a single vehicle. The total entering and exiting traffic at two adjacent intersections were calculated and the difference was assigned to the roadways and driveways in between to balance the vehicles entering and exiting the network. The volume assigned based on filed observations, land use and the movements. The balanced traffic was then coded into the VISSIM model for each peak hour.

**Traffic characteristics** were modeled per TOSAM guidelines such as, reduced speed areas for left and right-turn movements, speed distributions, driver behavior parameters, arrival type, priority rules, conflict areas, etc. Additionally, the traffic signal timing (for each peak hour) were obtained from VDOT. Other traffic controls, such as stop signs, yield signs and no lane changes were also coded in the VISSIM to replicate the existing condition.

**The number of model runs** required was determined from the results of the test simulation run (10 iterations). During the test run, speed, the selected Measure of Effectiveness (MOE), was collected to check for adequacy of the sample size using VDOT's Sample Size Determination Tool, Version 2.0. The results showed that with 10 iterations the averaged value of the Speed was within  $\pm 10\%$  or less of the mean value with a 95% Confidence Level. For that reason, all the models were run for at least 11 runs.

**Calibration** was conducted for the model by collecting queue lengths, travel times and speeds at selected key intersections/segments along the corridor from field visits during AM & PM peak hours. The VISSIM model was run, the volumes and queues extracted at these locations to compare with the field measured data (the simulated traffic volume and queue lengths are the MOEs required for calibration by TOSAM for intersections and arterial sections). Proper adjustments on speed distributions and driver behaviors were made to calibrate the model and new results were collected. The process was repeated until similar values were achieved (within the allowable thresholds in TOSAM) and the model was considered calibrated. The calibrated model is used as the base for the existing conditions capacity analyses.

**Operational Capacity** for the existing condition at the corridor was determined from the data collected at the key intersections from running the calibrated models for each peak hour. The delay at these intersections were used to determine the operating LOS for each movement as well as the entire intersection, using the threshold values from Highway Capacity Manual (HCM) 2000.

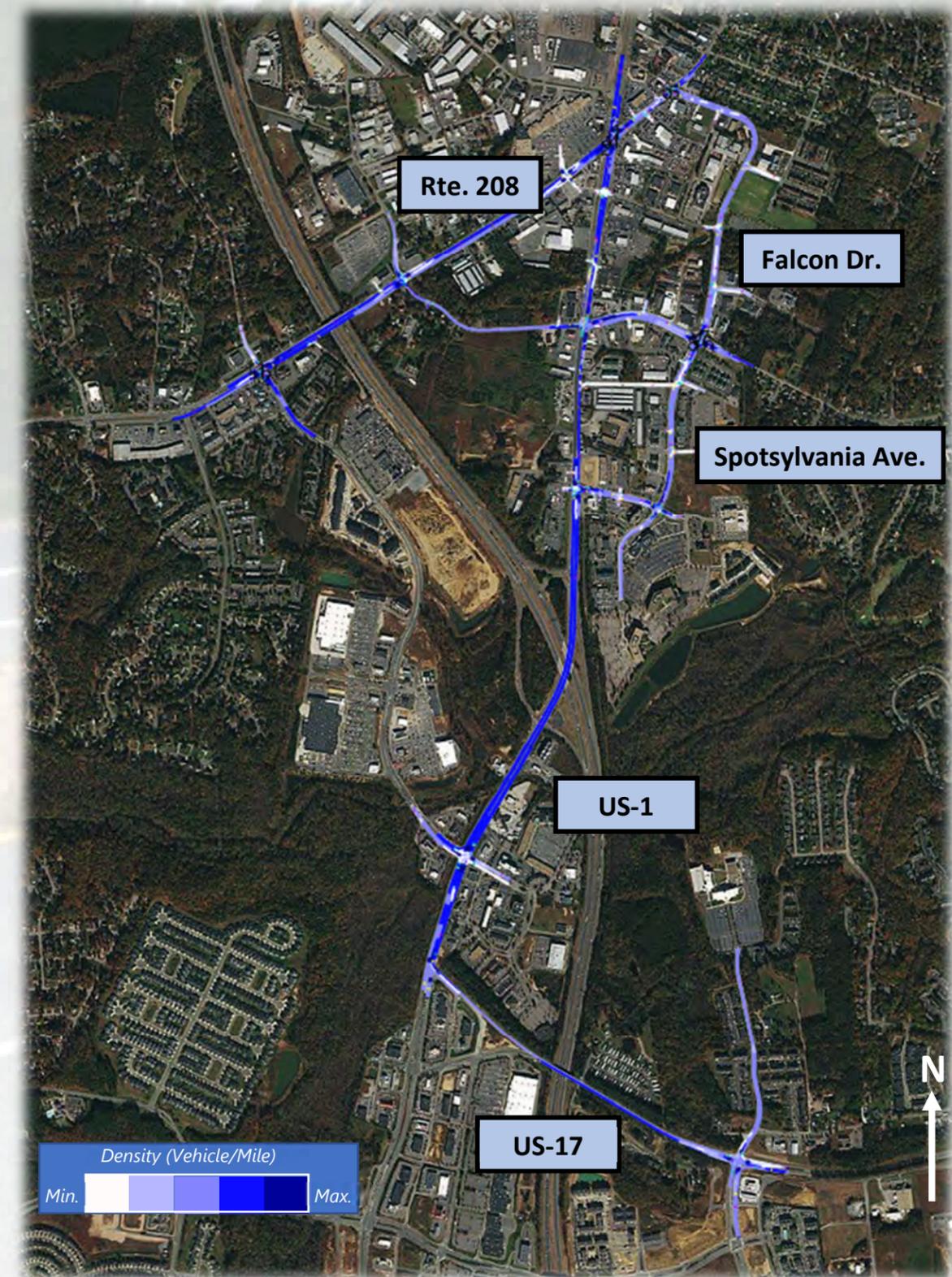
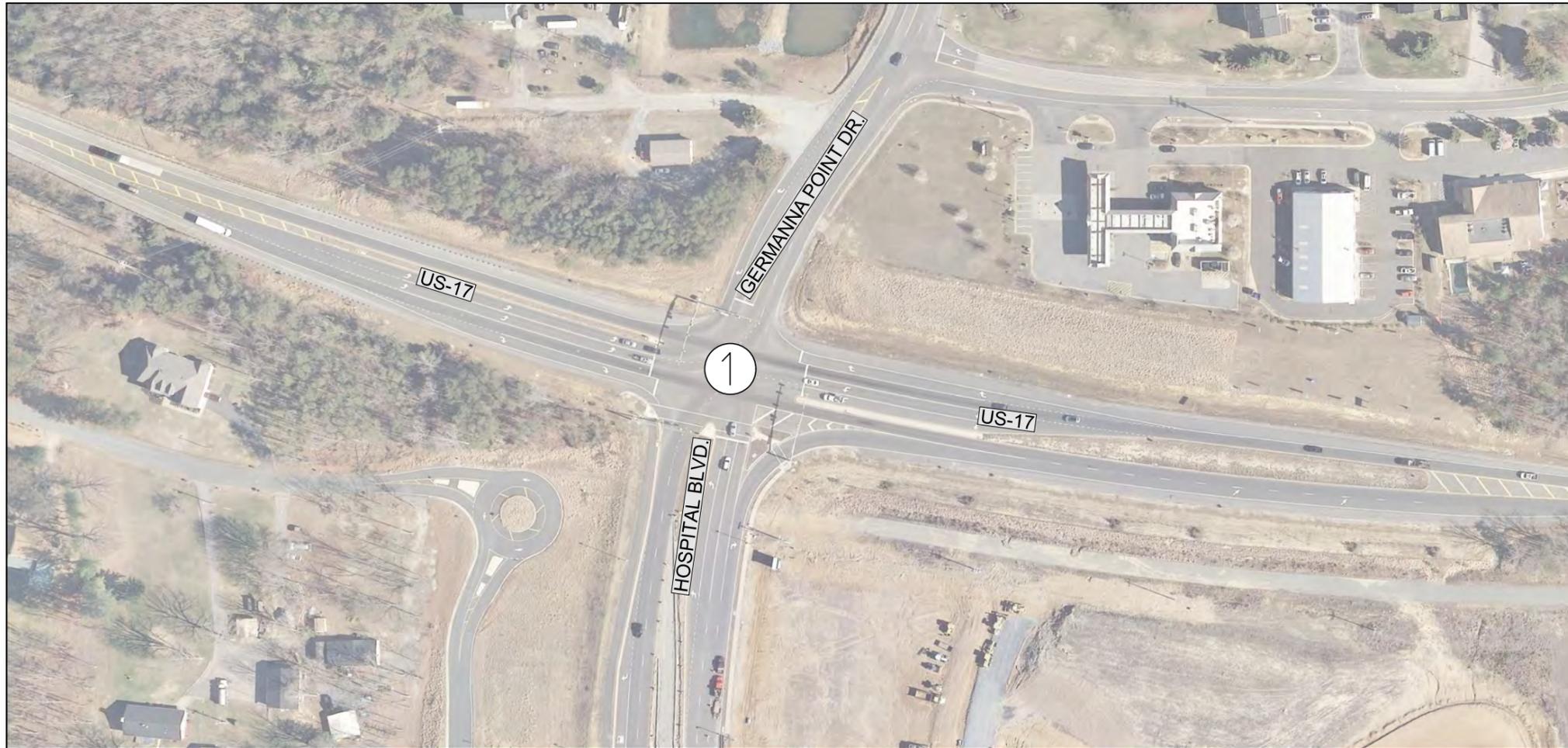


Figure 1: Rte. 1/208 Corridor Density - PM Peak Hour

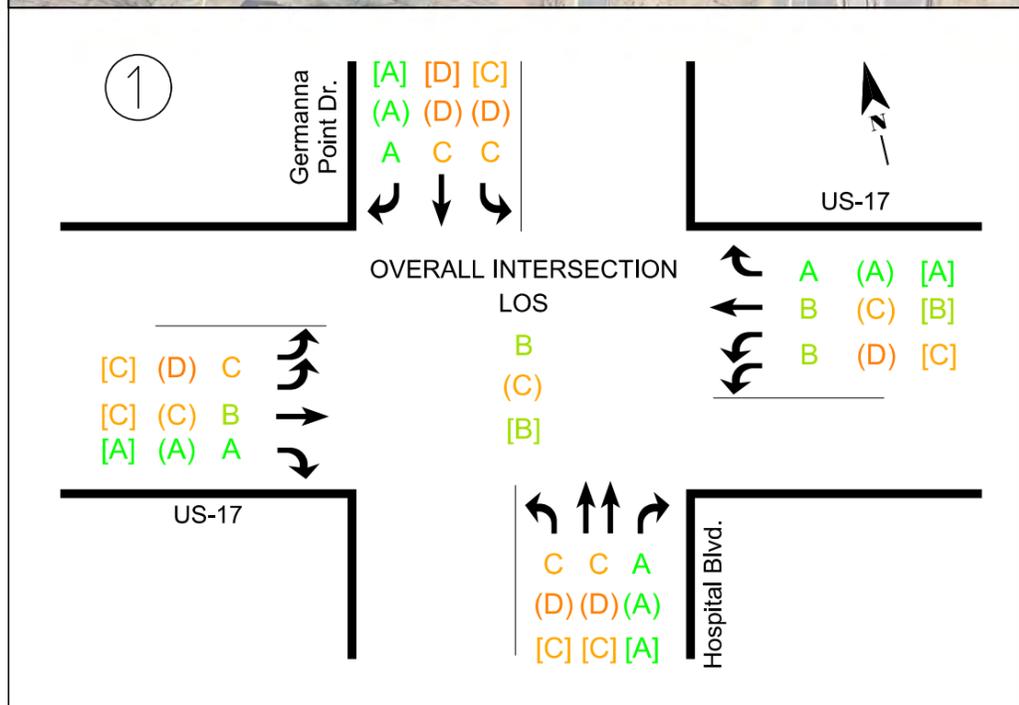
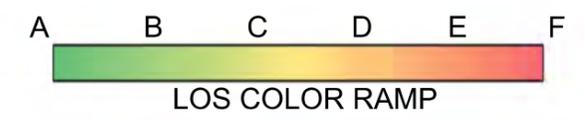


# LEGEND

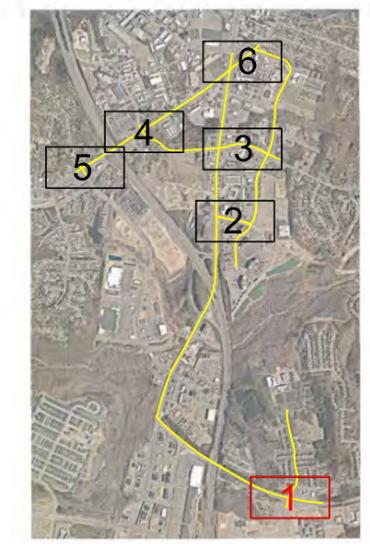
X (X) [X] AM (PM) [SAT] Level of Service (LOS)

→ Traffic Movement

⊗ Intersection Number



Sheet Locator



11/21/2017 11:07:42 AM

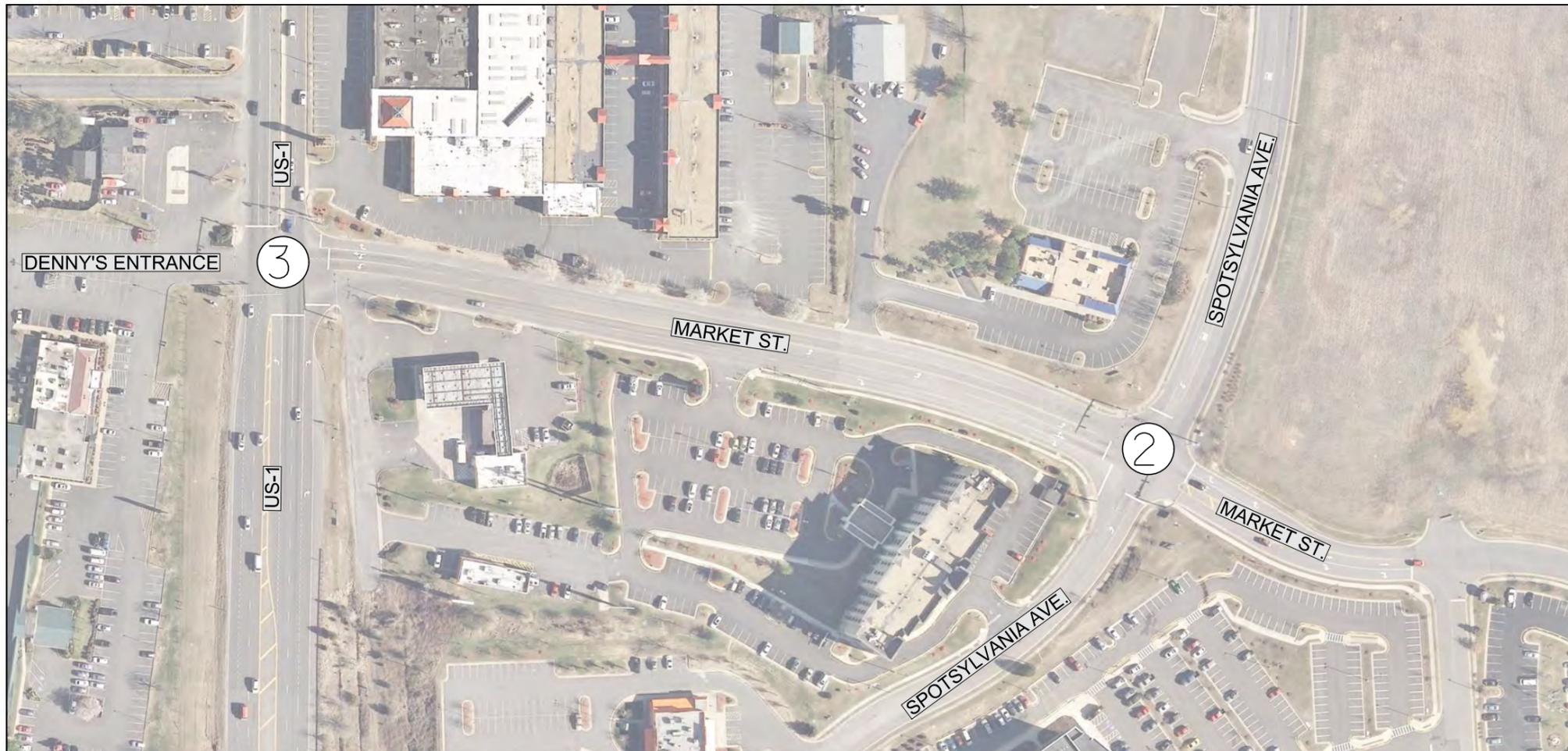


DRAWN BY:	RAM
CHECKED BY:	KHB

2017 EXISTING LEVELS OF SERVICE
RTE. 1/208 CORRIDOR STUDY

SCALE:	1:150	DATE:	10/23/2017
JMT PROJECT NO.:	15-0038-003	SHEET NO.:	1 OF 6
VDOT UPC PROJECT NO.:	107192		



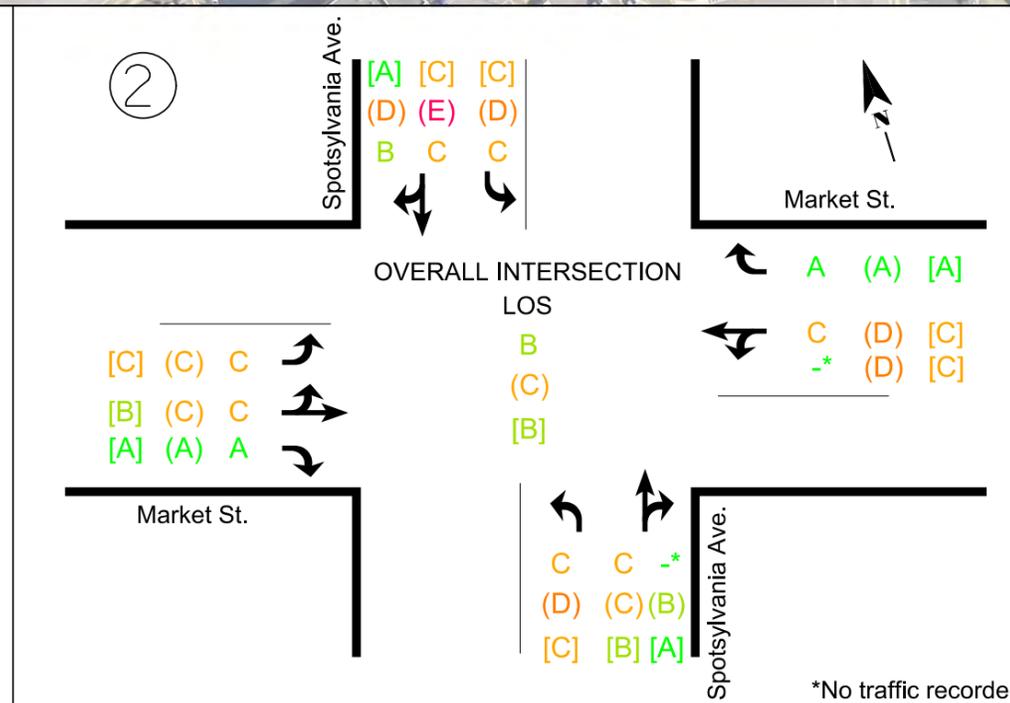
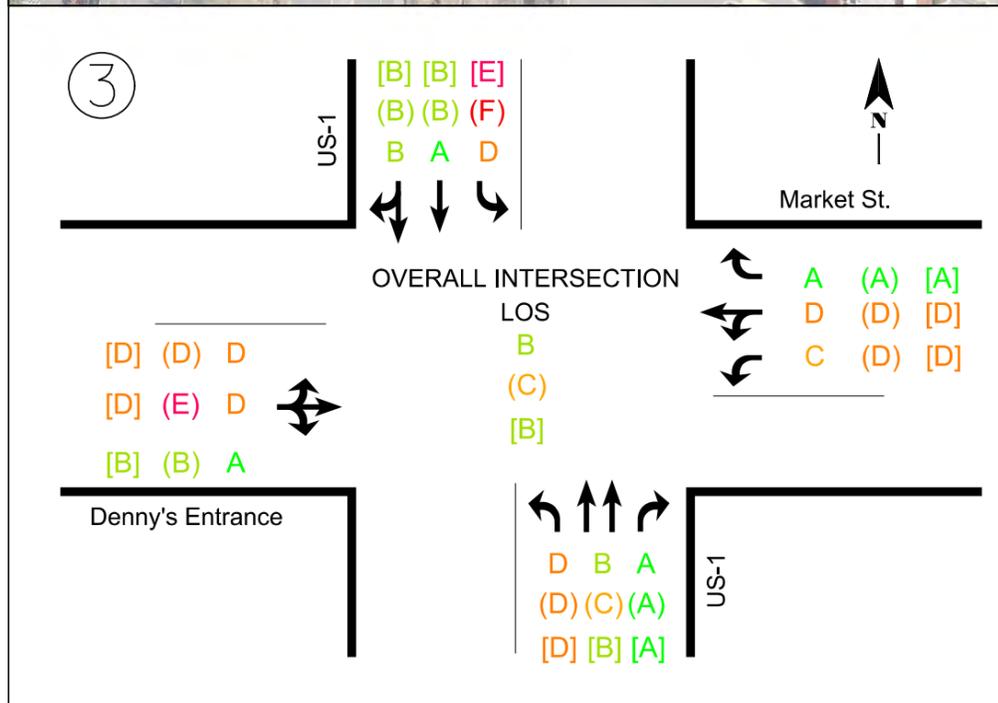
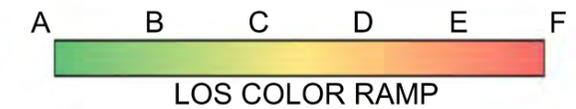


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↔ Traffic Movement

⊗ Intersection Number



\*No traffic recorded



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CHECKED BY:	KHB

**2017 EXISTING LEVELS OF SERVICE**

**RTE. 1/208 CORRIDOR STUDY**

SCALE:	1:150	DATE:	10/23/2017
JMT PROJECT NO.:	15-0038-003	SHEET NO.:	2 OF 6
VDOT UPC PROJECT NO.:	107192		





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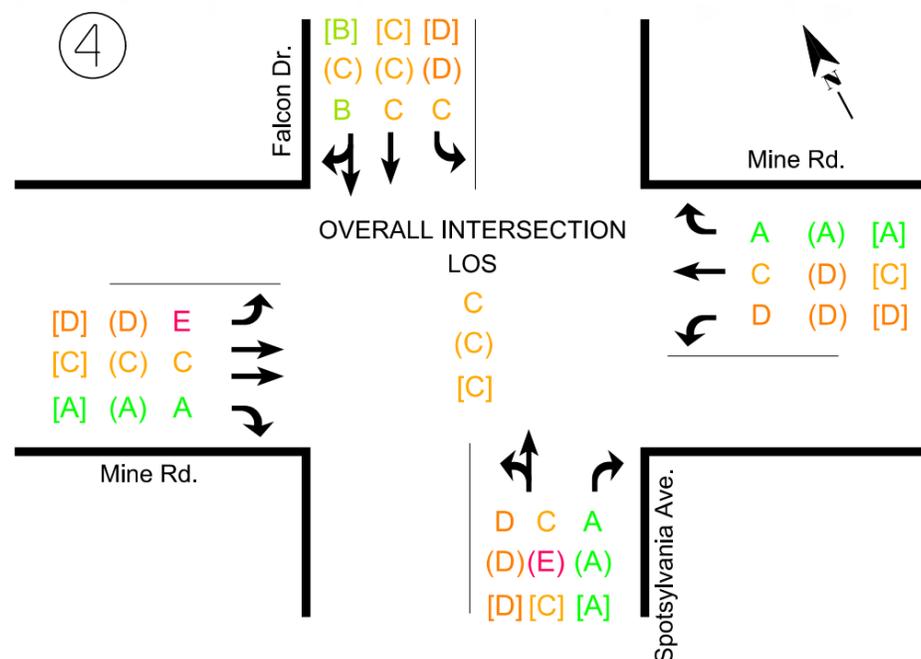
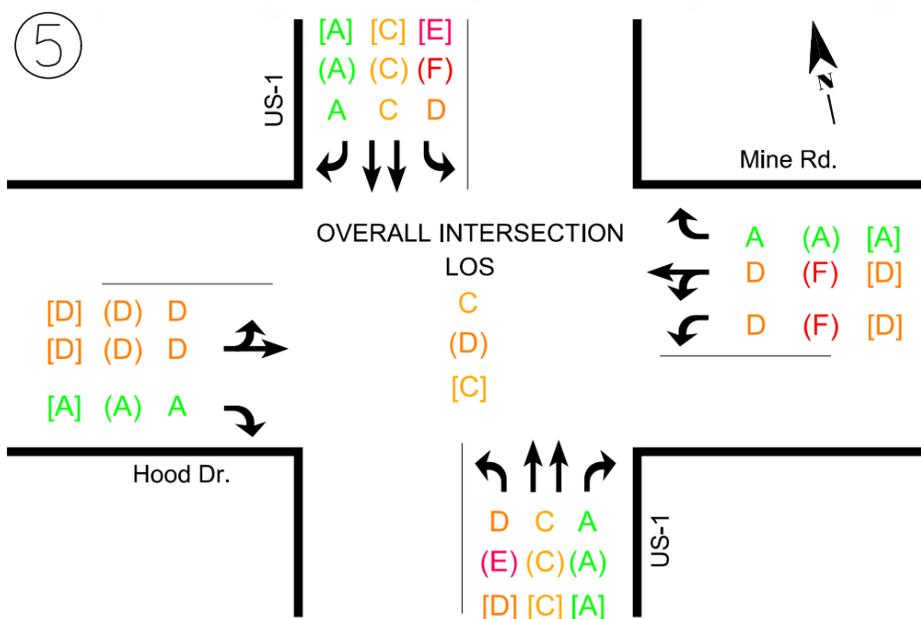
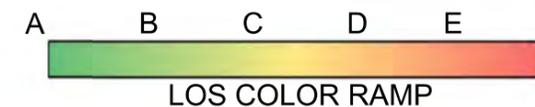
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2017 EXISTING LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

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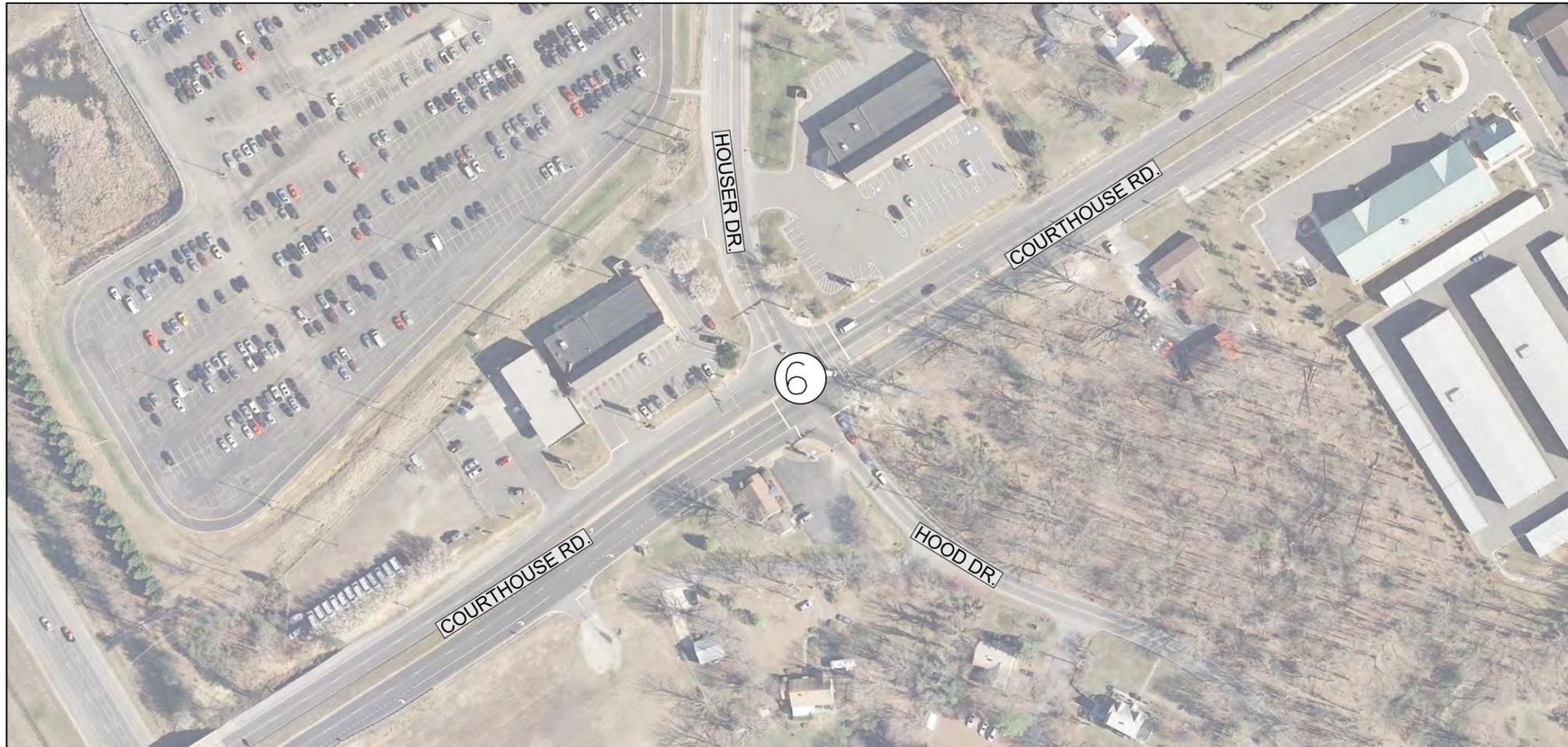
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JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 3 OF 6



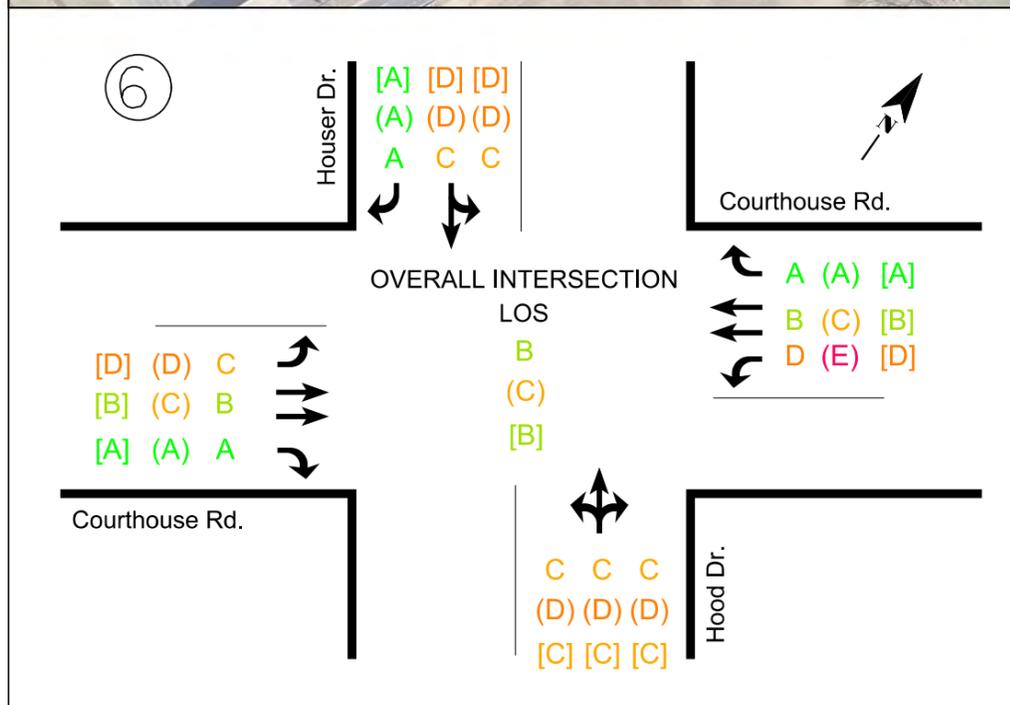
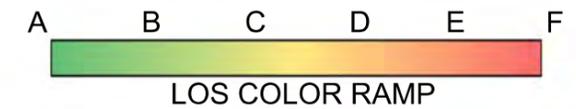


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⊗ Intersection Number



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2017 EXISTING LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

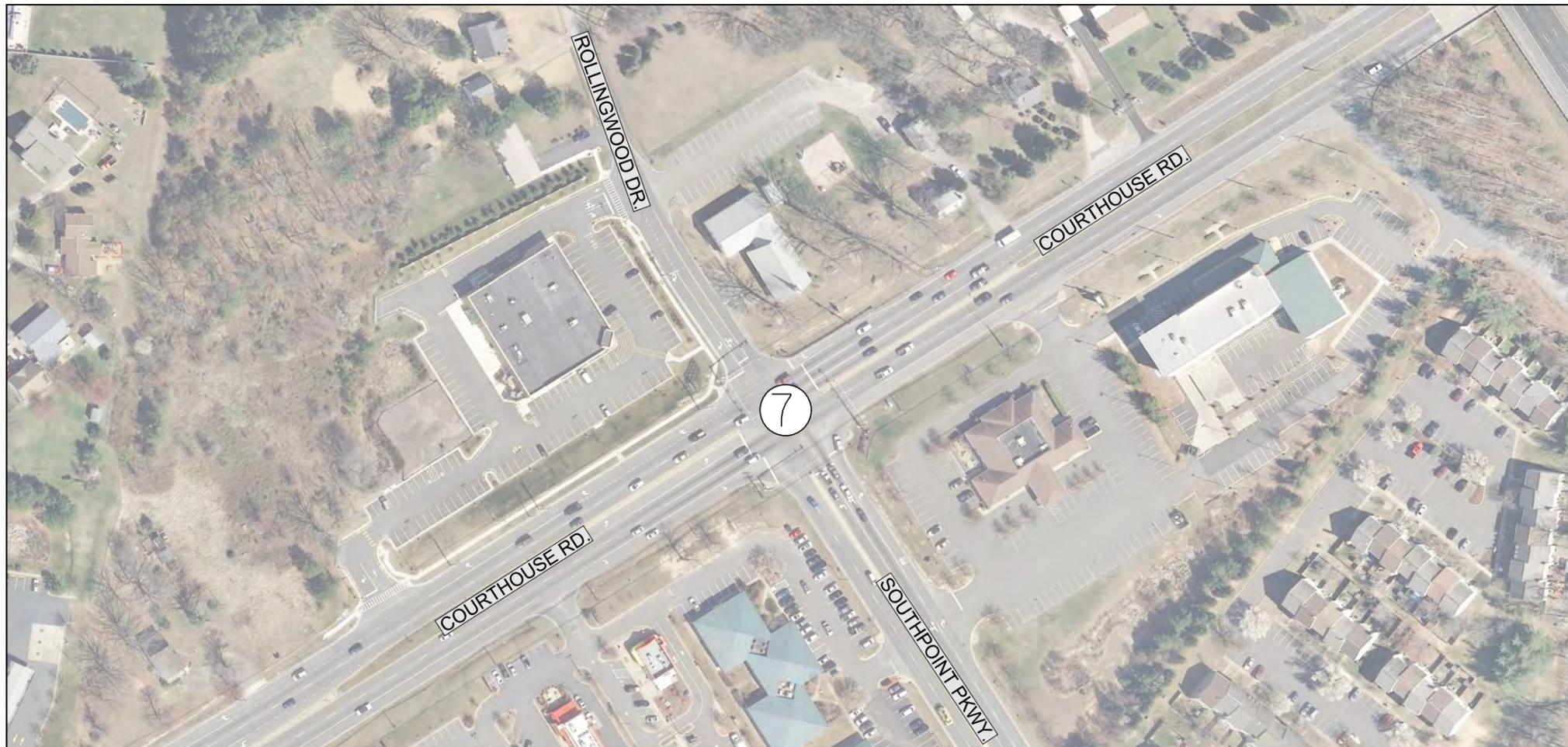
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JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192

DATE: 10/23/2017

SHEET NO.: 4 OF 6



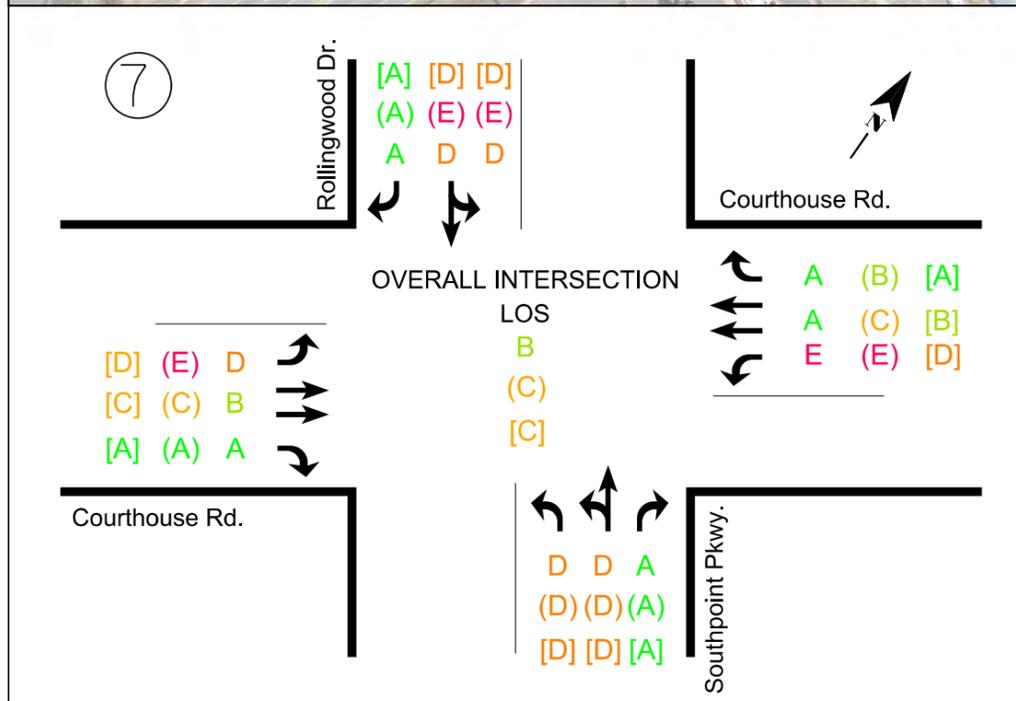


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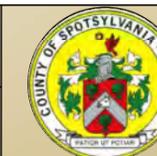
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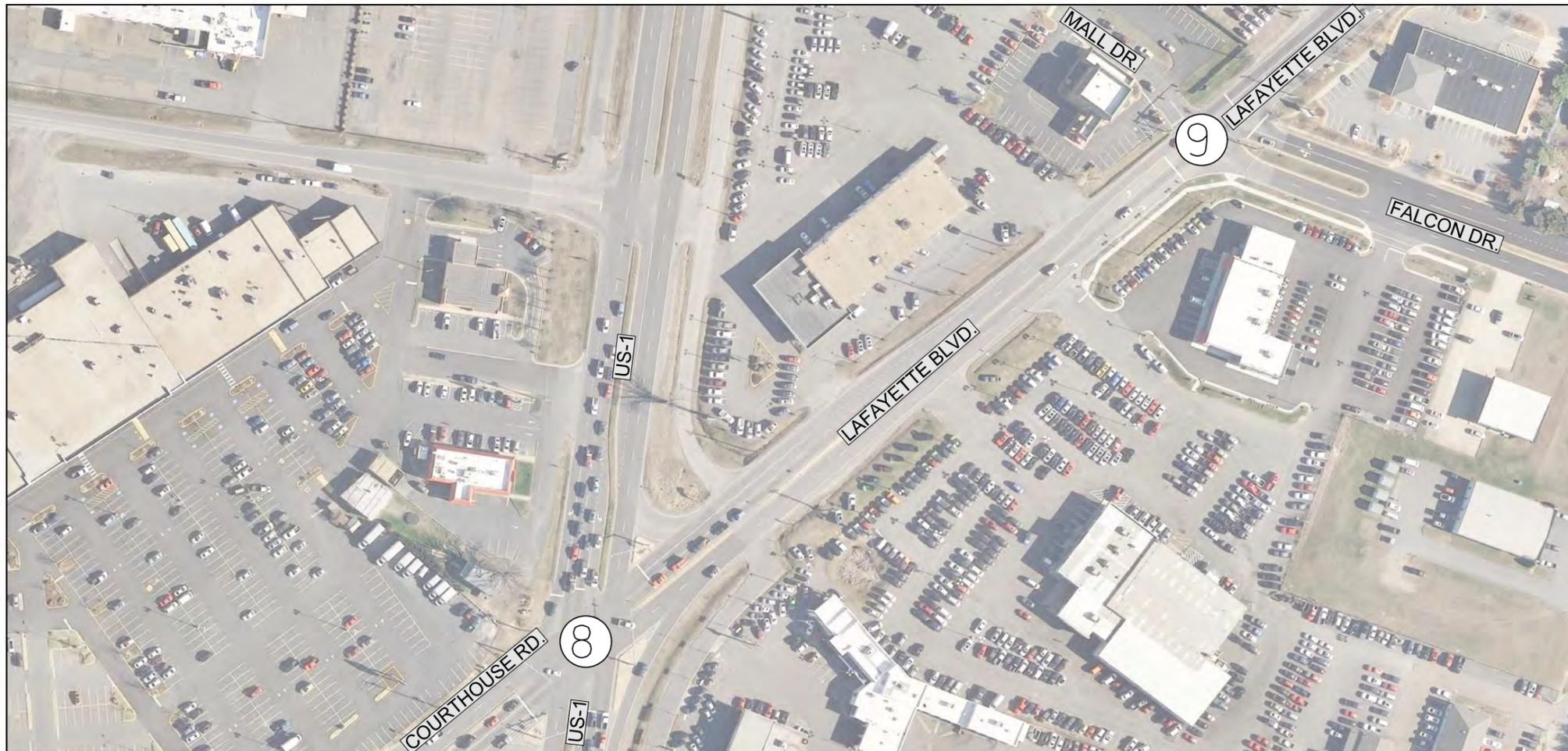
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VDOT UPC PROJECT NO.: 107192

DATE: 10/23/2017

SHEET NO.: 5 OF 6



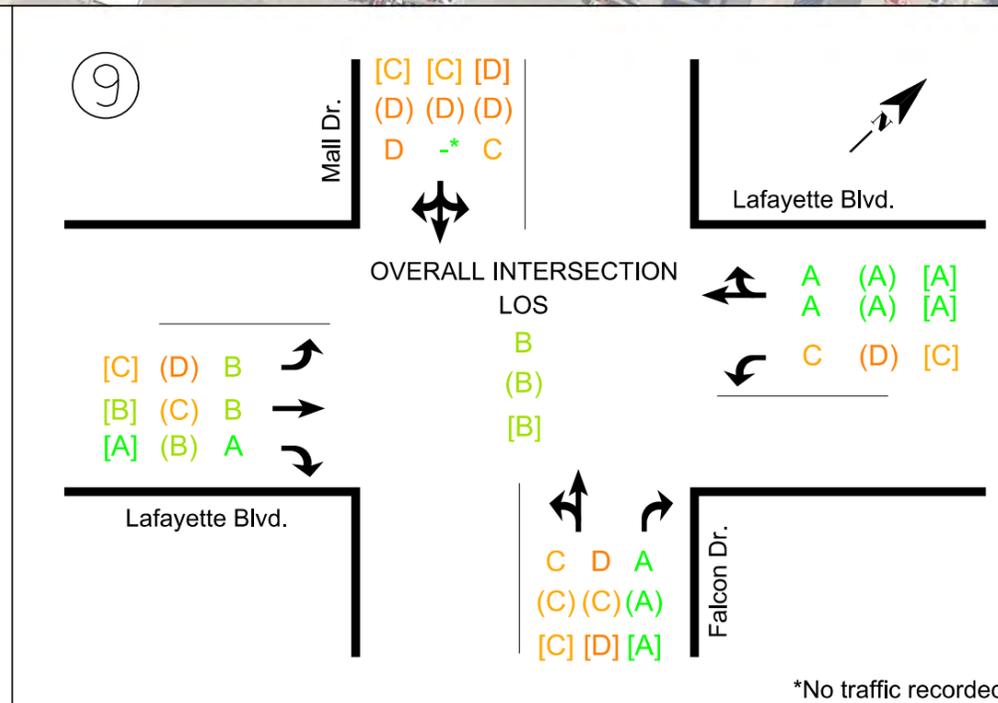
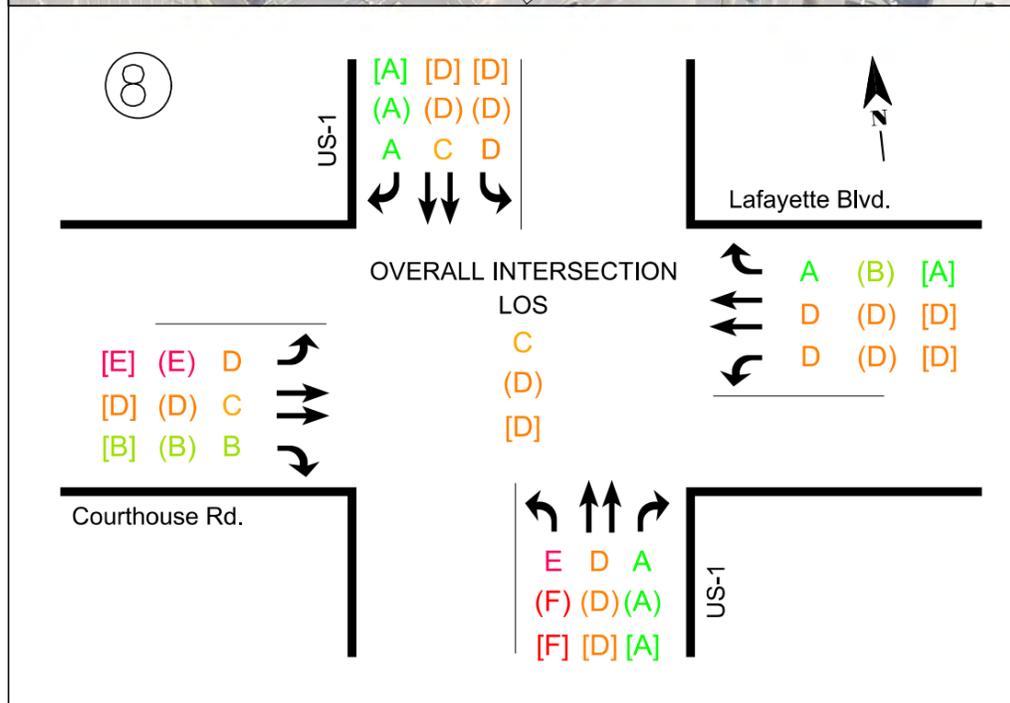
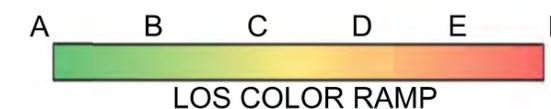


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\*No traffic recorded

Sheet Locator



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## 2017 EXISTING LEVELS OF SERVICE

### RTE. 1/208 CORRIDOR STUDY

SCALE: 1:150

JMT PROJECT NO.: 15-0038-003  
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**List of Identified Issues from Existing Conditions Evaluations**

Existing conditions of the corridor were evaluated based on the traffic operations, roadway geometry, lane configurations, crash data, traffic control devices, access management, public transit, pedestrian and bicyclist facilities and accommodations, environmental assessment, and bridges and culverts evaluations. The following is a list of identified issues that might be considered for any future improvements:

**1. Volume:** relatively high traffic demand along the whole corridor, in general.

**2. Lane configurations:**

a. Weaving occurs for traffic movements at Spotsylvania Ave. northbound toward the intersection with Mine Rd. which affects the progression to the intersection. Additionally, the southbound right and through movements share a lane which impacts the efficiency of the right-turn movement<sup>1</sup>.



Figure 2: Spotsylvania Ave. and Mine Rd. Density

b. Lane drops at Lafayette Blvd. eastbound at the intersection with Mall Dr./Falcon Dr. requires lane change from right-lane to left-lane to proceed through the intersection.



Figure 3: Rte. 208 and Falcon Dr. Density

c. No storage lane for right-turn traffic on eastbound Courthouse Rd. at the intersection with US-1 which impacts the efficiency of the right-turn movement.



Figure 4: US-1 and Rte. 208 SW Quadrant Density

d. No storage lane for right-turn traffic on westbound Courthouse Rd. at the intersection with US-1 which impacts the efficiency of the right-turn movement.

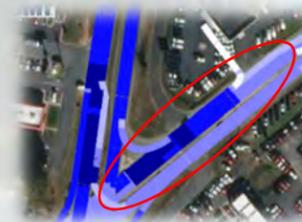


Figure 5: US-1 and Rte. 208 NE Quadrant Density

e. Weaving occurs from the right-lane to the left-lane in the eastbound direction because the right-lane is a dedicated right-turn to Clarke St. The vehicles needing to change lanes to the left are mainly the traffic turning right from Southpoint Pkwy. northbound heading westbound at the intersection of Courthouse Rd. and Southpoint Pkwy. (the 2 through lanes are controlled by the bridge).



Figure 6: Rte. 208 at Clark St. Density

f. Traffic from the northern part of the corridor must use US-1 to get to the southern part as no alternative north-south route for internal trips exists.

**3. Crashes:**

a. Crashes at key intersections: Relatively high crashes especially at the following intersections

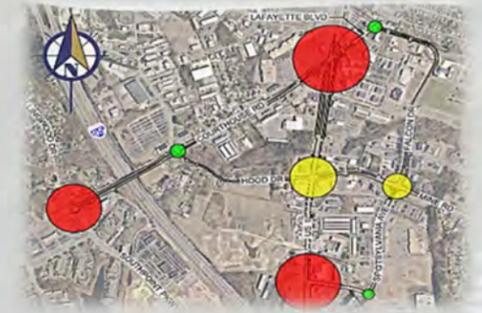


Figure 7: Intersection Crashes

- i. US-1 at Courthouse Rd.
- ii. Courthouse Rd. at Southpoint Pkwy.
- iii. US-1 at Market St.
- iv. US-1 at Mine Rd./Hood Dr.

b. Other crashes: crashes along the corridor outside of key intersection's influence zone

- i. US-1 (especially between US-17 and I-95 northbound on-ramp).

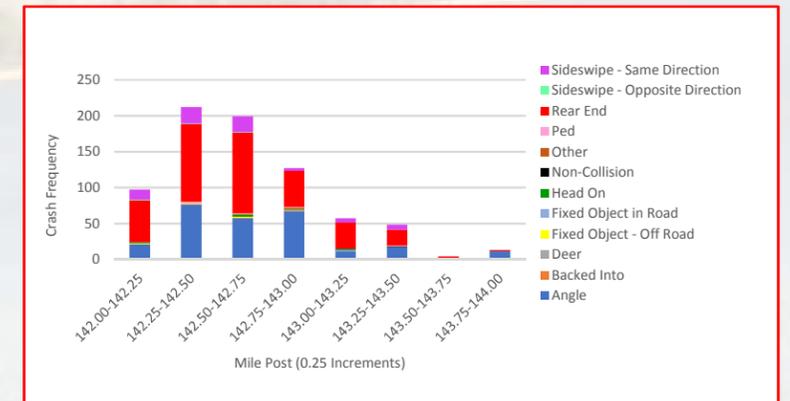


Figure 8: Crashes along US-1

<sup>1</sup> Refer to the heat map shown on the Capacity Analysis sheet.

**4. Access Management:** numerous noncompliant access points along the corridor, especially the following roadways:

- a. US-1 from Mine Rd./Hood Dr. to Market St.
- b. Falcon Dr. from Lafayette Blvd. to Clay St.
- c. Spotsylvania Ave. from Mine Rd. to the southern end.
- d. Mine Rd. from US-1 to the intersection of Spotsylvania Ave./Falcon Dr.
- e. Hood Dr. from US-1 to Courthouse Rd.
- f. Courthouse Rd. from Hood Dr. to Four Mile Fork Center.



Figure 9: Access Management Evaluations

**5. Pedestrian & Bicyclists accommodations:** In general, the following was observed:

- a. Limited pedestrian phasing, crossing or push-buttons at the signalized intersections.
- b. Limited sidewalk presence and continuity.
- c. No bike routes within the vicinity of the corridor.
- d. Limited ridership for public transit.
- e. Predominately car-dependent trips within the corridor.

**6. Traffic control devices:**

- a. Multiple signs need replacement within the vicinity of the corridor.
- b. The existence of the signal at Four Mile Fork Center affects the progression of traffic along Courthouse Rd. between the intersection



Figure 10: Example of a Deficient

of US-1 at Courthouse Rd./Lafayette Blvd. and the intersection of Courthouse Rd. at Hood Dr.

- c. The existence of the traffic signal at the intersection of Lafayette Blvd. at Falcon Dr./Mall Dr. affects the LOS at all approaches in general, Courthouse Rd. (thru) and Falcon Dr. (left), specifically.

**7. Environmental assessment:**

- a. No issues for existing conditions; potential issues for future improvements from Hazardous Materials Sites, Historic Resources and Natural Resources will be assessed further based on the recommended alternatives.



Figure 11: Environmental Assessment

**8. Bridges & Culverts:**

- a. The bridge on US-17 crossing I-95 is deficient (scheduled to be replaced with a wider structure by VDOT).



Figure 12: Deficient Bridge

- b. The culvert on US-1 crossing Massaponax Creek is in fair condition. This structure could be considered outside of the influence of the key intersections.

**9. LOS:** based on the results from the simulation model, the operational LOS for the key intersections can be summarized as follows:

- a. The PM peak hour operates at the worst (lower LOS) for most of the movements and overall intersections. The Saturday peak hour has the second worse operations for the corridor.
- b. The overall intersection LOS during the PM peak hour was considered for evaluating the corridor. A total of six intersections operated at LOS C, two intersections at LOS D and only one intersection at LOS B.
- c. The three intersections with LOS D are the US-1 at Courthouse Rd./Lafayette Blvd., and US-1 at Mine Rd./Hood Dr. The signal timing and lane configurations favor the through movements causing LOS E or F for turning movements and/or crossing traffic.
- d. Similarly, the six intersections with LOS C have turning movements (especially left-turn and shared lanes – through/right or through/left – operating at worse LOS than the through movements at LOS D or E).

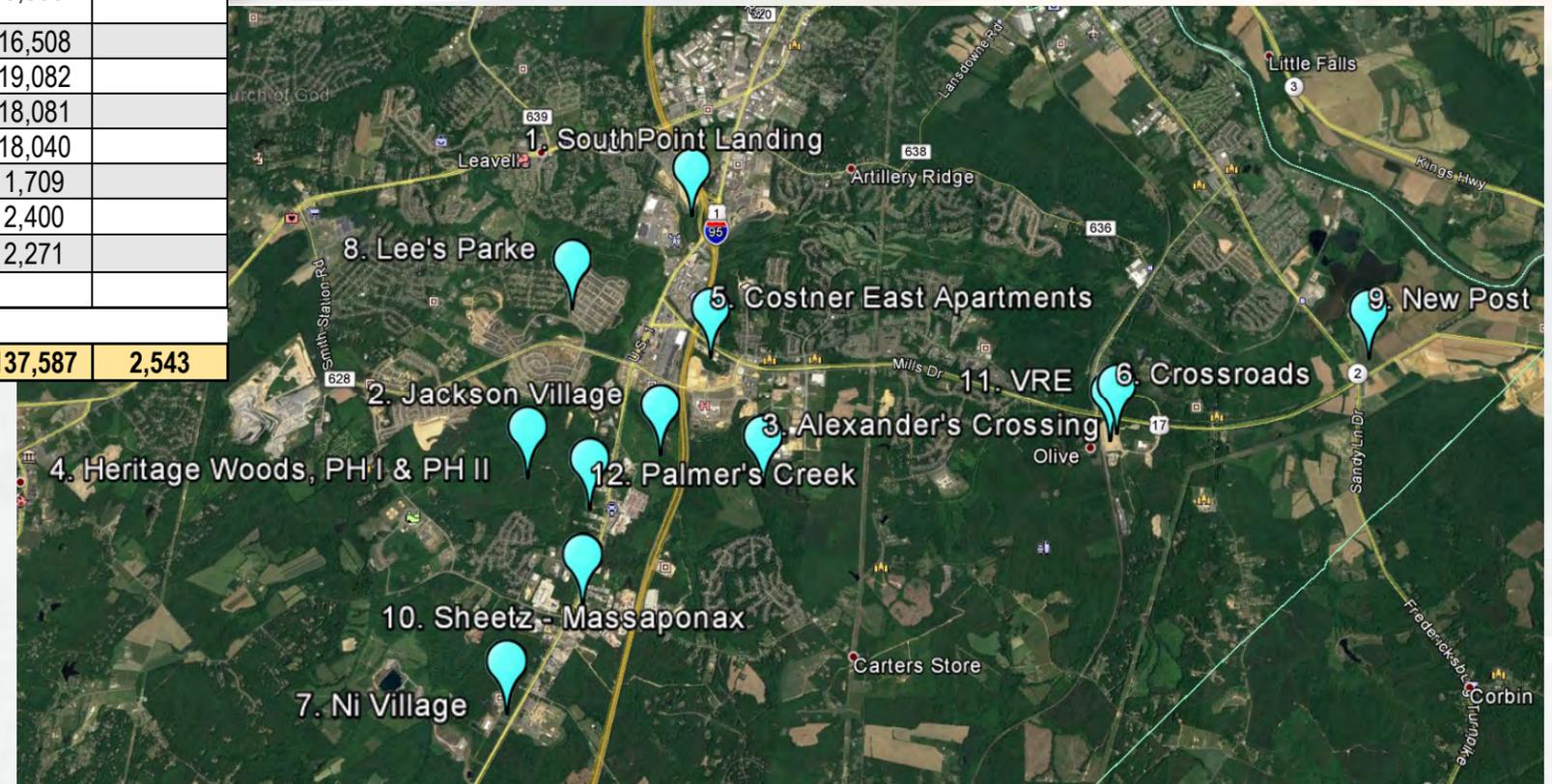
Table 1: LOS Summary

Intersection	Peak Period		
	AM 7:30 - 8:30	PM 4:30 - 5:30	SAT 11:45AM - 12:45PM
US-17 at Germanna Point Dr./Hospital Blvd.	B	C	B
Spotsylvania Ave. at Market St.	B	C	B
US-1 at Market St./Denny's Ent.	B	C	B
Mine Rd. at Spotsylvania Ave./Falcon Dr.	C	C	C
US-1 at Hood Dr./Mine Rd.	C	D	C
Rte. 208 at Hood Dr./Houser Dr.	B	C	B
Rte. 208 at Rollingwood Dr./South Point Pkwy.	B	C	C
US-1 at Rte. 208/Lafayette Blvd.	C	D	D
Lafayette Blvd. at Falcon Dr./Mall Dr.	B	B	B

- e. The intersection of Lafayette Blvd. at Falcon Dr./Mall Dr. is operating at LOS B. It is recommended to re-evaluate the need for a signal at this intersection in the future evaluations.
- f. It can be concluded that the critical intersections along this corridor are operating near capacity and any additional traffic from normal growth and trips from approved developments will cause failures and bottlenecks along the corridor that will impact the key intersections.

**10. Developments:** Approved developments in the area are expected to continue to add significant traffic to the roadways of this corridor. Adding capacity to handle this traffic is challenging due to the high costs associated with right of way and construction. The following table shows the approved developments in the area, which is estimated to generate over 100,000 new trips per day.

Major approved developments that affect the traffic for the Rte. 1/208 Corridor Study									
Site #	Name of Development	Multi-Family Residential Units	Retail Space (SF)	Office Space (SF)	Full Build-out year	New Trips Expected			
						Weekday			Weekend
						AM	PM	Daily	Midday
1	Southpoint Landing	830	450,000	700,000	2020	1,712	2,995	29,090	
2	Jackson Village	2,270	236,800	61,200	2026	973	1,584	17,688	1,688
3	Alexander's Crossing	2,607	1,558,600		2031	2,775	3,468	0	
4	Heritage Woods, PH I & PH II	1,072	--	--	2020	705	935	9,150	855
5	Costner East Apartments	600				283	331	3,568	
6	Crossroads	610	114,426	1,021,268		1,433	1,906	16,508	
7	Ni Village	950	96,000	835,000		1,683	2,069	19,082	
8	Lee's Parke	729	200,000	75,000		896	1,695	18,081	
9	New Post	658	35,000	20,000		1,157	1,237	18,040	
10	Sheetz - Massaponax				2021	106	140	1,709	
11	VRE				2021		512	2,400	
12	Palmer's Creek	400	40,000		2020	259	366	2,271	
<b>Totals</b>		<b>10,726</b>	<b>5,443,294</b>			<b>11,982</b>	<b>17,238</b>	<b>137,587</b>	<b>2,543</b>



## Future Conditions Analysis

The future year for this study was determined by the County to be (2035). The future conditions traffic analysis included forecasting the growth of traffic for 2035, evaluating the existing roadway systems' ability to accommodate the 2035 volumes, and developing/evaluating alternative solutions for any deficiencies. For this study, two alternatives were evaluated. Alternative 1 proposed a new connection between Spotsylvania Ave. and Germanna Point Dr. (Germanna Connector) to alleviate traffic from sections of Route 1, and included proposed improvements at the nine study intersections to accommodate the new traffic pattern. Alternative 2 included proposed improvements at the nine study intersections without the Germanna Connector. It is recommended to re-evaluate the ped/bike activities after the full build-out of the shared use path to determine the need for pedestrian crossings within the corridor (mid-block and/or intersections). The following are brief descriptions about the steps conducted to build and evaluate these two alternatives. Detailed exhibits and discussions about the future no-build scenario and Alternatives 1 and 2 shown in separate sheets.

**Future Traffic Volumes** for the year 2035 were determined from 2017 counts multiplied by average growth rates calculated from the comparison of the 2017 (Base Year) and the 2035 (Future Year) Travel Demand Models. The Base Year model was developed from the County's model and validated using VDOT published ADTs, 2017 directional counts, and turning movement counts. The validation was conducted according to the guidelines of the VDOT's Travel Demand Modeling Policies and Procedures, June 2014 version. The Future Year model was developed from the Base Year model by adding the planned residential and commercial developments and land use changes at each Transportation Analysis Zone (TAZs).

**Operational Capacity** of the corridor for future year (2035) was analyzed using VISSIM. Total vehicle delays at the intersections were used to determine the operating Level of Service (LOS) at the study intersections. Also, the density and speeds were considered for evaluating the performance of the roadway segments between the intersections within the limits of the study corridor. Two alternatives were evaluated, in addition to the future no-build scenario.

**Future No-Build** scenario was considered to be the base scenario for comparison with proposed alternatives as well as to identify problematic roadway sections and intersections within the corridor boundary. The scenario consisted of loading the existing (2017) roadways and intersections with the projected future traffic volumes (2035). The analysis was conducted for the weekday AM, PM, and weekend peak hours.

**Alternative 1** included a new roadway that connects Spotsylvania Avenue to Germanna Point Drive (Germanna Connector). This connector will alleviate some traffic on Route 1 and creates a new traffic pattern in the area. Alternative 1 also included the required improvements at the study intersections to accommodate this new pattern, as well as the growth of traffic. The Germanna Connector is proposed to be two 12' lanes and a 10' shared use path throughout its length and included a 150' long bridge over Massaponax Creek. The Germanna Connector alignment and the proposed cross section is shown in Figure F 1.

**Alternative 2** addressed the capacity issues identified from the no-build analysis by improving the study intersections without adding new roadway(s). The intersection improvements included adding more capacity (through and/or turn lanes) at the intersections based on the traffic distributions and movements. Figure F 2 is an example of the proposed improvements for the intersection of Route 1 at Route 208/Lafayette Boulevard.



Figure F 1: Alternative 1 - Proposed Germanna Connector



Figure F 2: Alternative 2 - Proposed Improvements at the Intersection of Rte. 1 at Rte. 208/Lafayette Blvd.

## **Future No-Build Scenario**

Future Year (2035) traffic volumes used for this scenario were determined from the County's Travel Demand Model. Capacity analysis was conducted in VISSIM using the projected future traffic volumes and the existing (2017) roadway/intersection geometry. Additionally, traffic signal timings were kept unchanged from the existing signal timings. The purpose of this analysis was to identify the issues that will occur if no roadway improvements are implemented by 2035. This scenario will help in determining problematic areas within the corridor, in general, and for each of the study intersections, specifically. Additionally, it was used as a base scenario for comparison with the proposed alternatives.

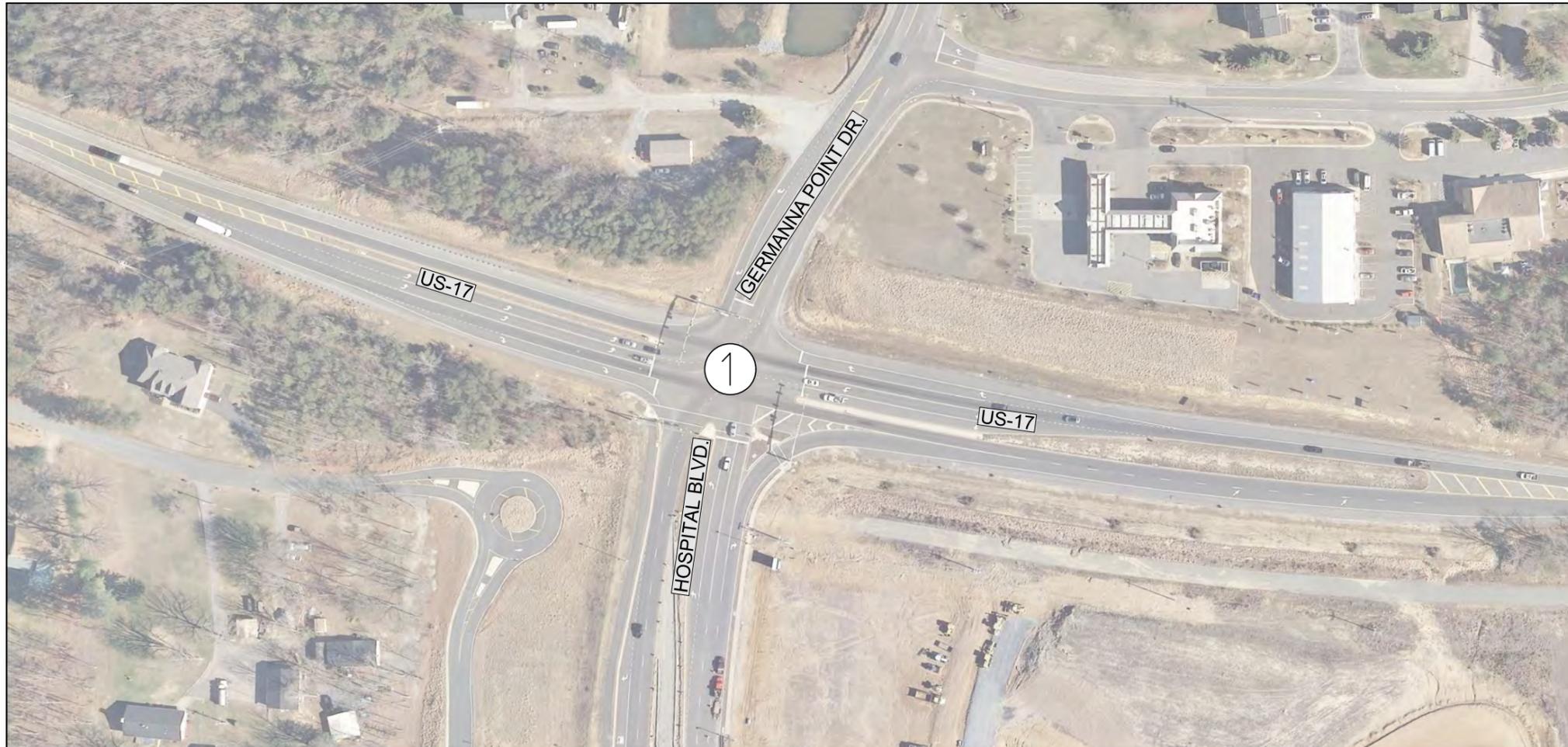
Capacity analyses were conducted for the weekday AM, PM, and Weekend (Saturday) peak hours. Operational LOS of the nine study intersections were identified from simulation results of 12 runs using VISSIM. The number of runs was based on VDOT's Traffic Operations and Safety Analysis (TOSAM) manual. The average delays of all 12 runs, for the entire intersection as well as individual movements, were compared with Exhibit 18-4 of the 2010 Highway Capacity Manual (HCM), to determine the corresponding LOS. The overall intersection LOS are shown in Table F 1 and the single movements LOS details are shown on the individual sheets.

As noted from Table F 1, most of the intersections within the corridor are performing at poor LOS (LOS E or F), especially during weekday AM and PM peak hours. In general, the following can be concluded from the capacity analysis results of the no-build scenario:

1. Most of the intersections performed at LOS F during the AM peak hour, ex The intersection of Spotsylvania Ave. at Market St., and Lafayette Blvd. at Falcon Dr./Mall Dr. performed at LOS C, and the intersection of US-1 at Market St./Denny's Entrance performed at LOS E.
2. Most of the intersections performed at LOS E or F during the PM peak hour, except the intersections of Spotsylvania Ave. at Market St., and Mine Rd. at Spotsylvania Ave./Falcon Dr. which performed at LOS D.
3. Nearly half of the intersections performed at LOS E or F during Saturday peak hour; the remainder of intersections performed at an acceptable LOS (D or better).
4. The severity of congestion at some of the intersections created bottlenecks that prohibited the flow of traffic to the adjacent intersections resulting in acceptable LOS (LOS D or better) at some of these intersections. Improvements at the problematic intersections will increase the flow of traffic and may cause the intersections to perform worse than what is shown herein as acceptable.

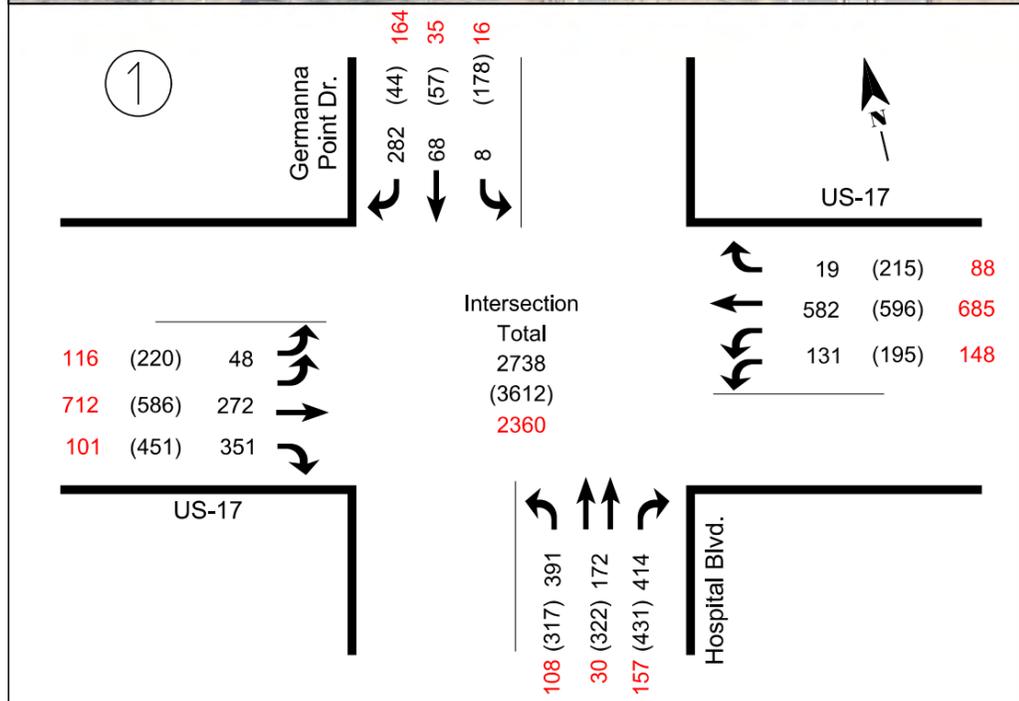
Table F 1: Future No-Build Intersection LOS

#	Intersection	Peak Hour		
		AM 7:30 - 8:30	PM 4:30 - 5:30	SAT 11:45AM - 12:45PM
1	US-17 at Germanna Point Dr./Hospital Blvd.	F	E	D
2	Spotsylvania Ave. at Market St.	C	D	B
3	US-1 at Market St./Denny's Entrance	E	E	C
4	Mine Rd. at Spotsylvania Ave./Falcon Dr.	F	D	C
5	US-1 at Hood Dr./Mine Rd.	F	F	E
6	Courthouse Rd. at Hood Dr.	F	F	F
7	Courthouse Rd. at Southpoint Pkwy/Rollingwood Dr.	F	E	E
8	US-1 at Courthouse Rd./Lafayette Blvd.	F	F	F
9	Lafayette Blvd. at Falcon Dr./Mall Dr.	C	E	C

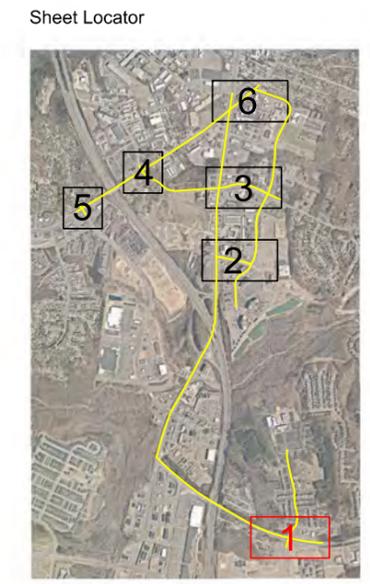


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- (xxxx) Weekday PM  
Peak Hour Volume  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45PM
- Traffic Movement
- Intersection Number

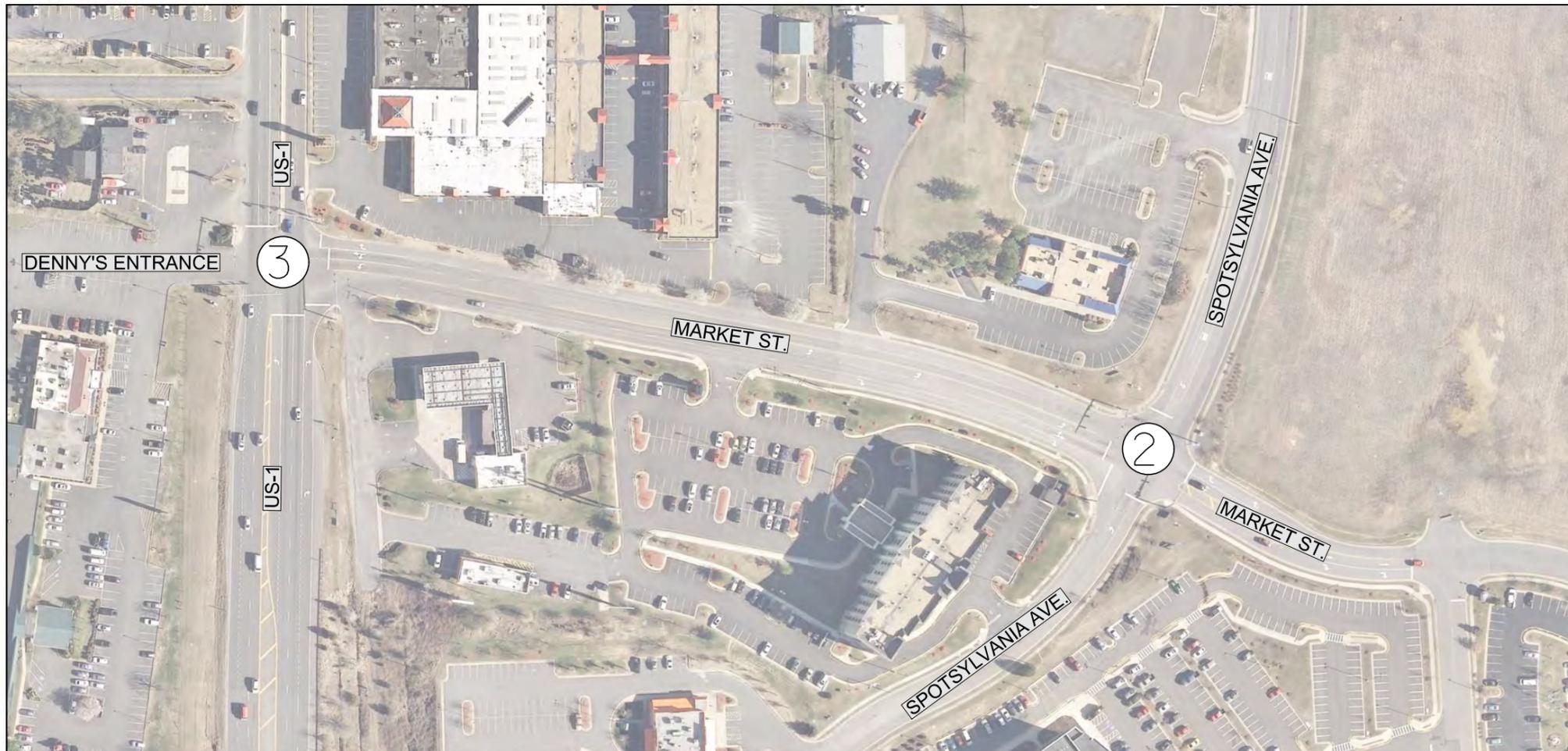


Future traffic volumes for the 2035 no-build scenario were determined from the 2035 Traffic Demand Model that included socioeconomic information, planned residential and commercial developments, and land use changes at each Transportation Analysis Zone.



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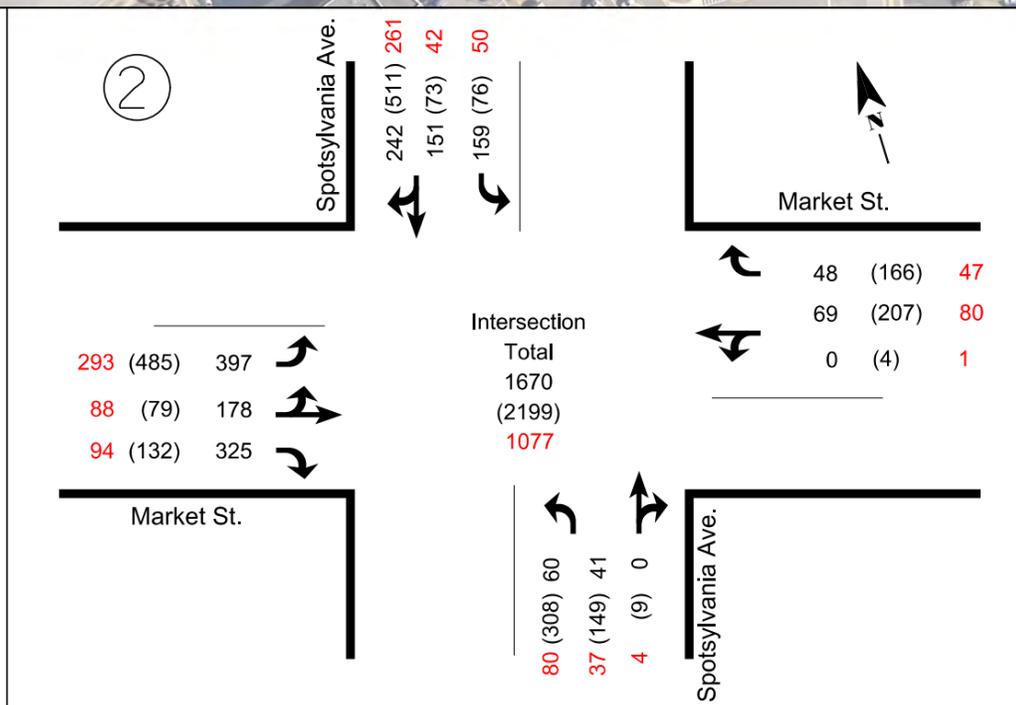
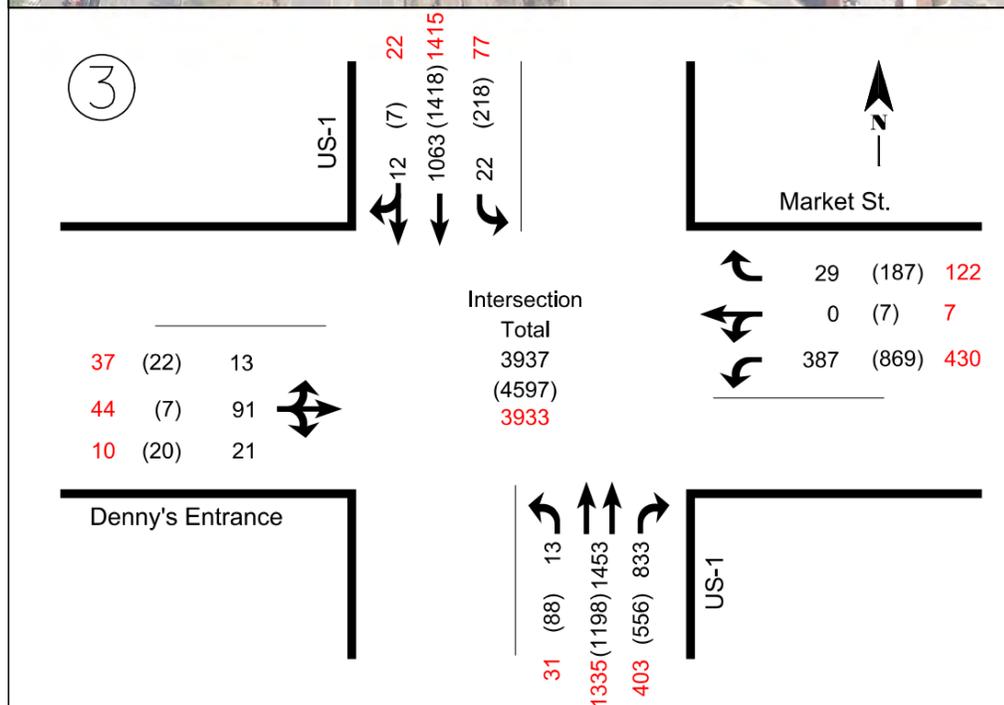
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Peak Hour Volume  
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Traffic Movement

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2035 NO-BUILD PEAK HOUR VOLUMES  
RTE. 1/208 CORRIDOR STUDY

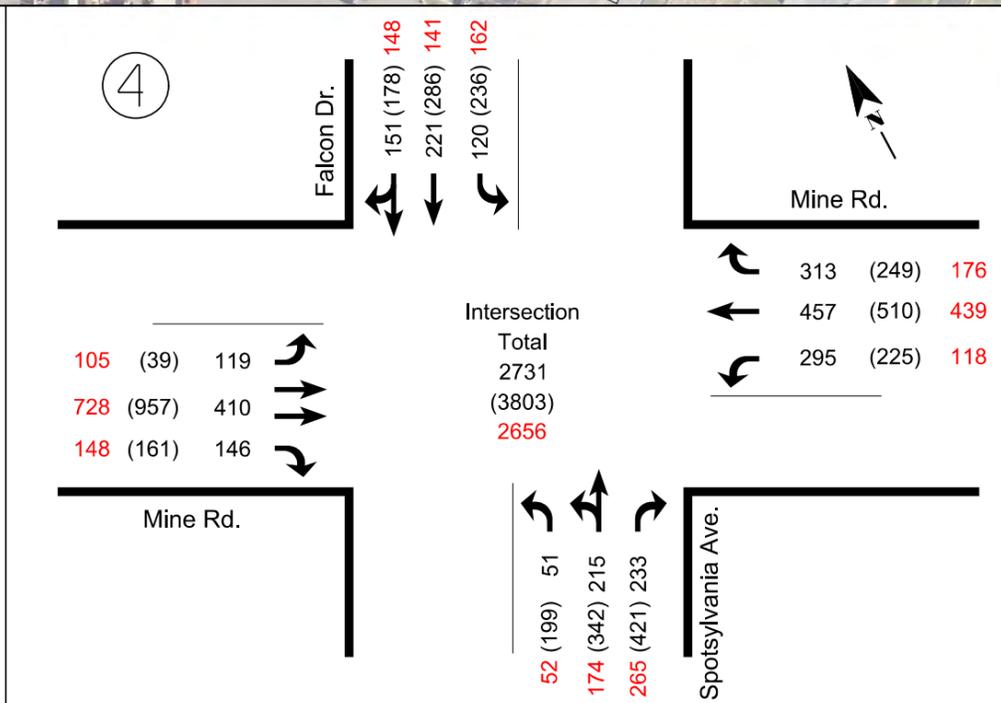
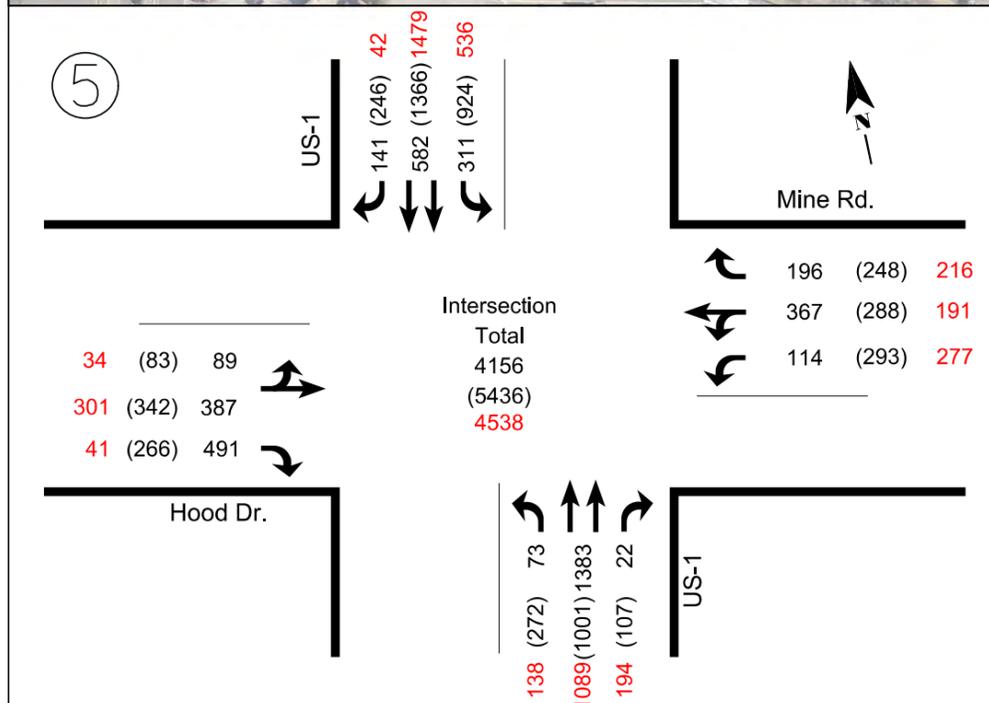
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VDOT UPC PROJECT NO.: 107192  
SHEET NO.: 2 OF 6





# LEGEND

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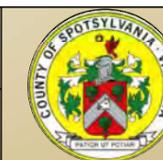
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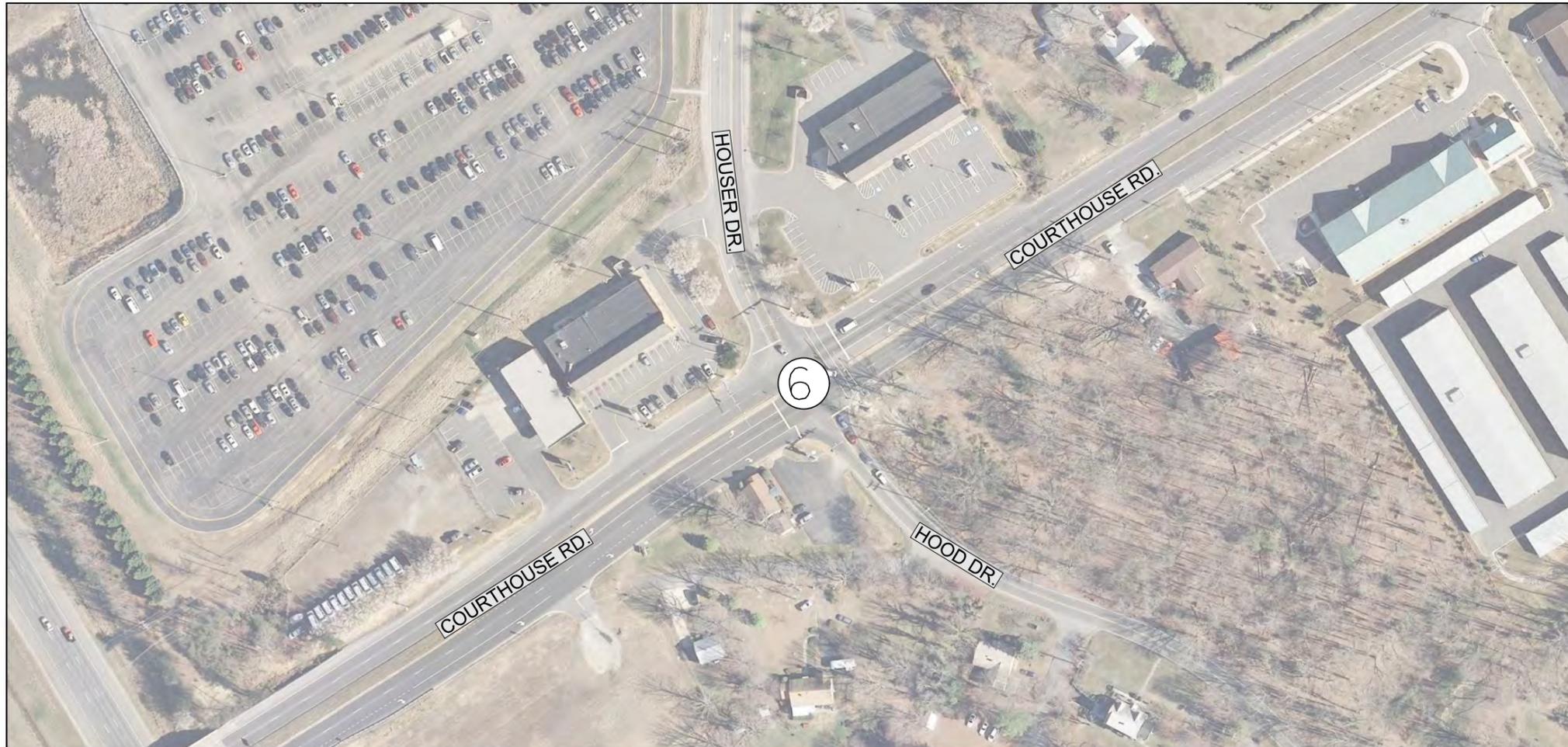


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2035 NO-BUILD PEAK HOUR VOLUMES  
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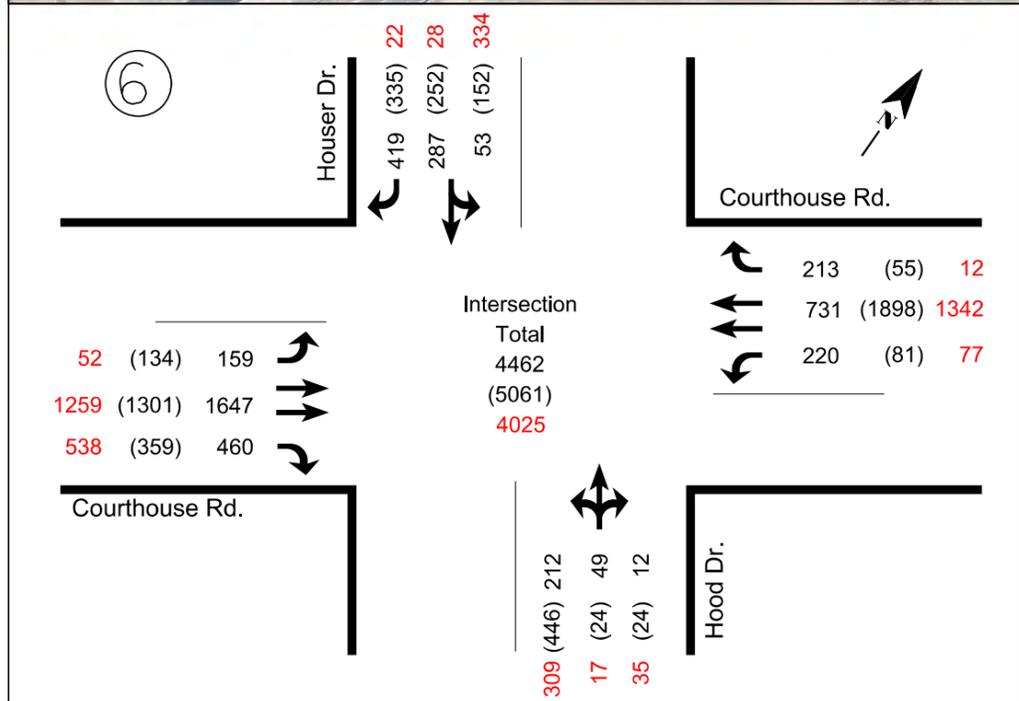
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Peak Hour Volume  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday)  
Peak Hour Volume  
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- Traffic Movement
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CHECKED BY: KHB

## 2035 NO-BUILD PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.:

4

OF

6





# LEGEND

- xxxx Weekday AM  
Peak Hour Volume  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM  
Peak Hour Volume  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45PM

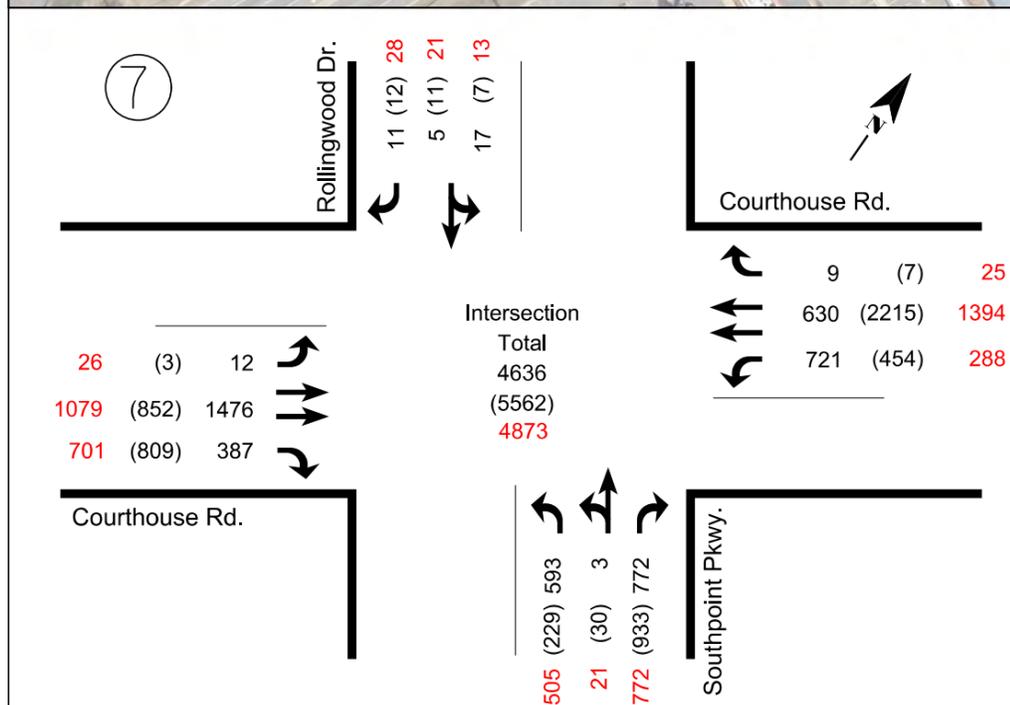


Traffic Movement



Intersection Number

Sheet Locator



10/8/2018 8:52:42 AM



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RAM

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KHB

2035 NO-BUILD PEAK HOUR VOLUMES

RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

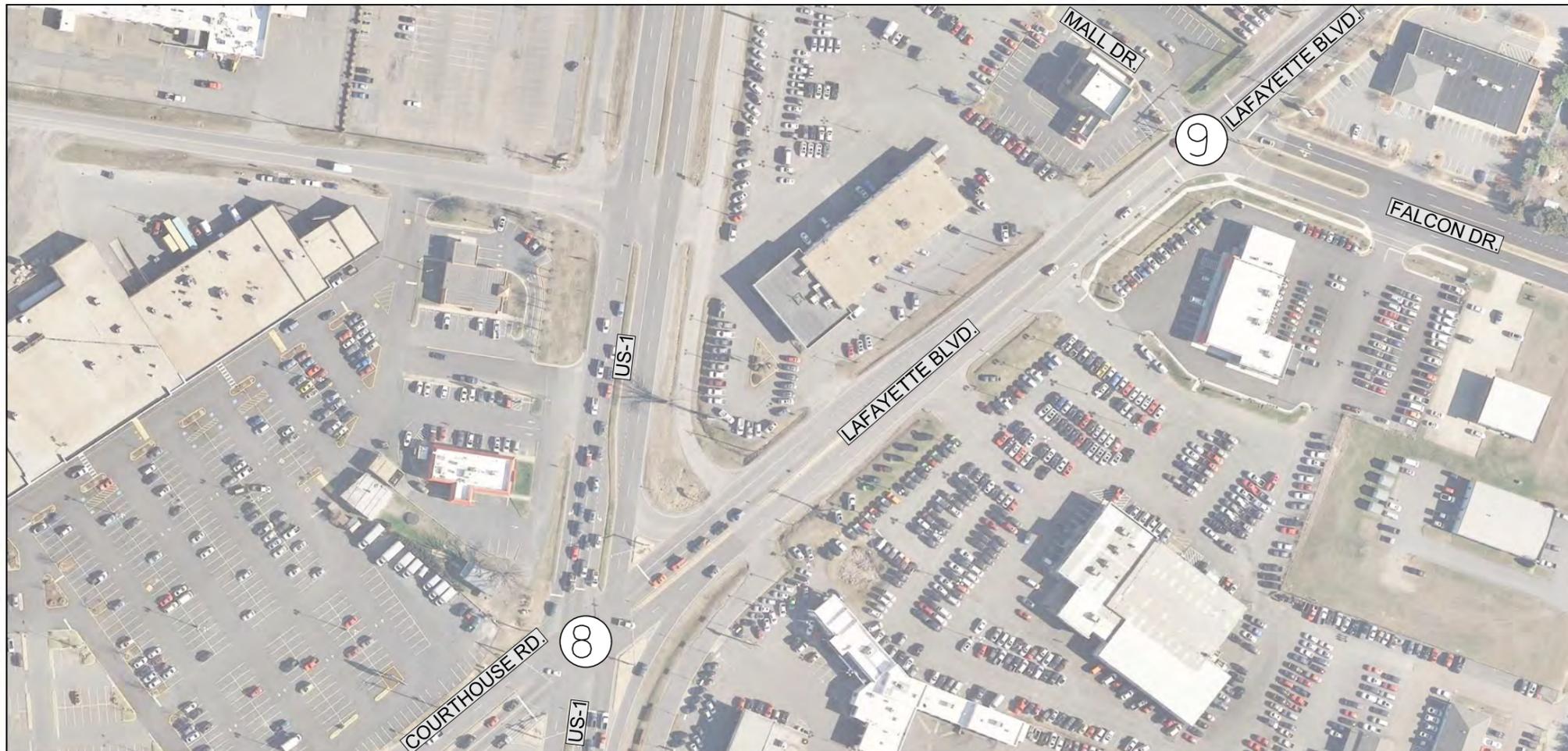
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OF

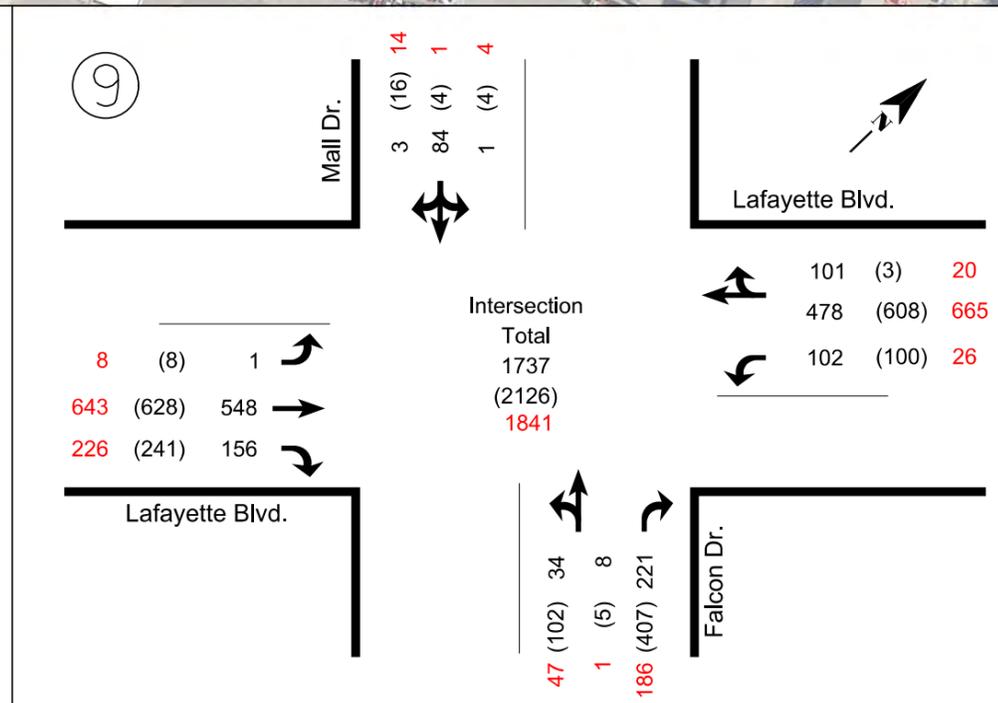
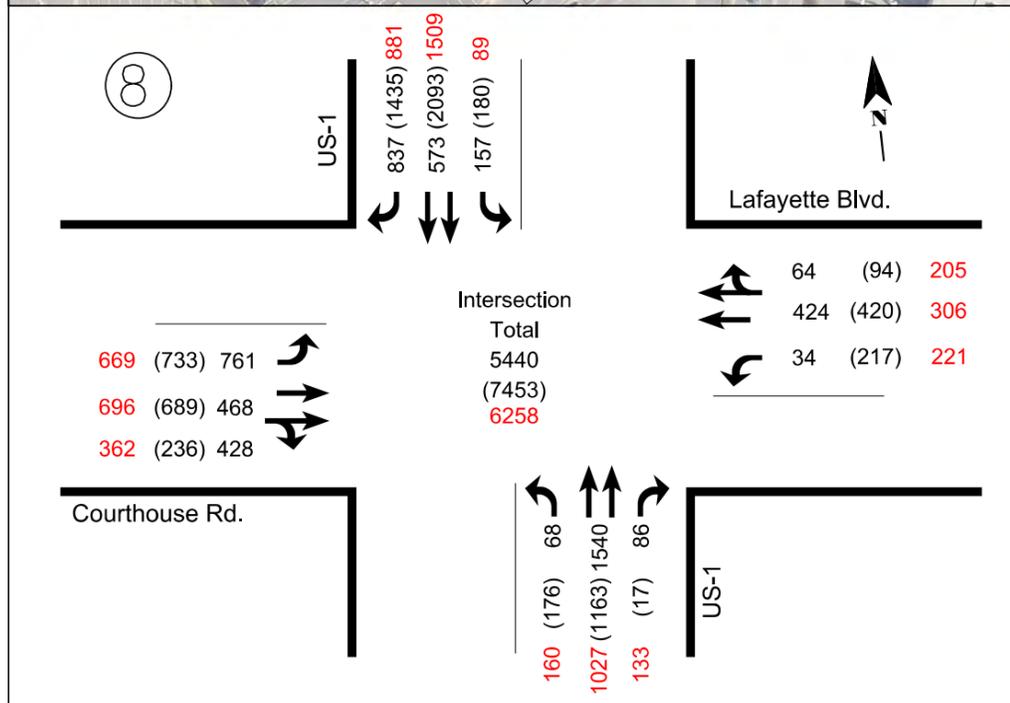
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# LEGEND

- xxxx Weekday AM  
Peak Hour Volume  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM  
Peak Hour Volume  
Time: 4:30PM-5:30PM
- xxxxx Weekend (Saturday)  
Peak Hour Volume  
Time: 11:45AM-12:45PM
- Traffic Movement
- Intersection Number



Sheet Locator



10/8/2018 8:54:44 AM



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## 2035 NO-BUILD PEAK HOUR VOLUMES

### RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

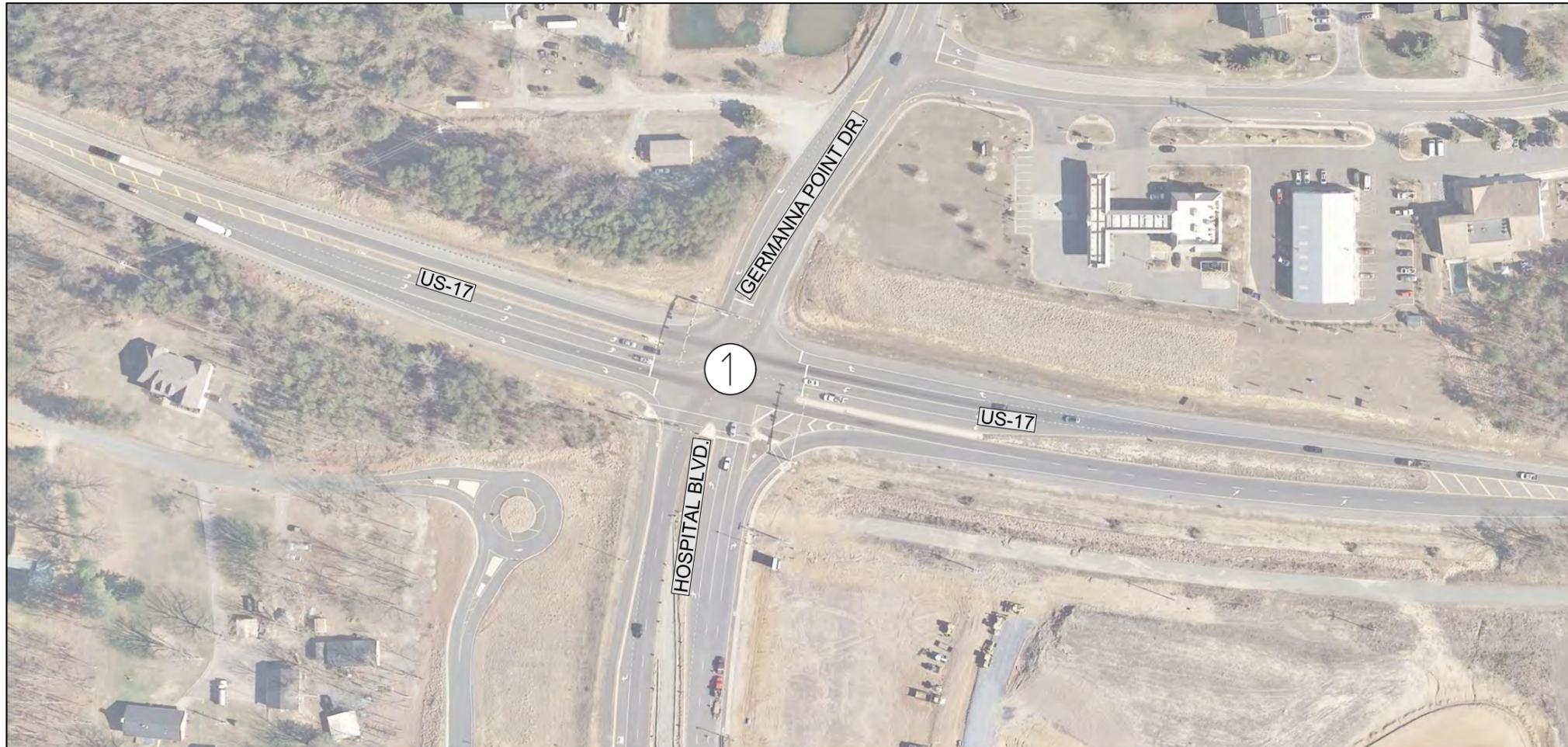
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OF

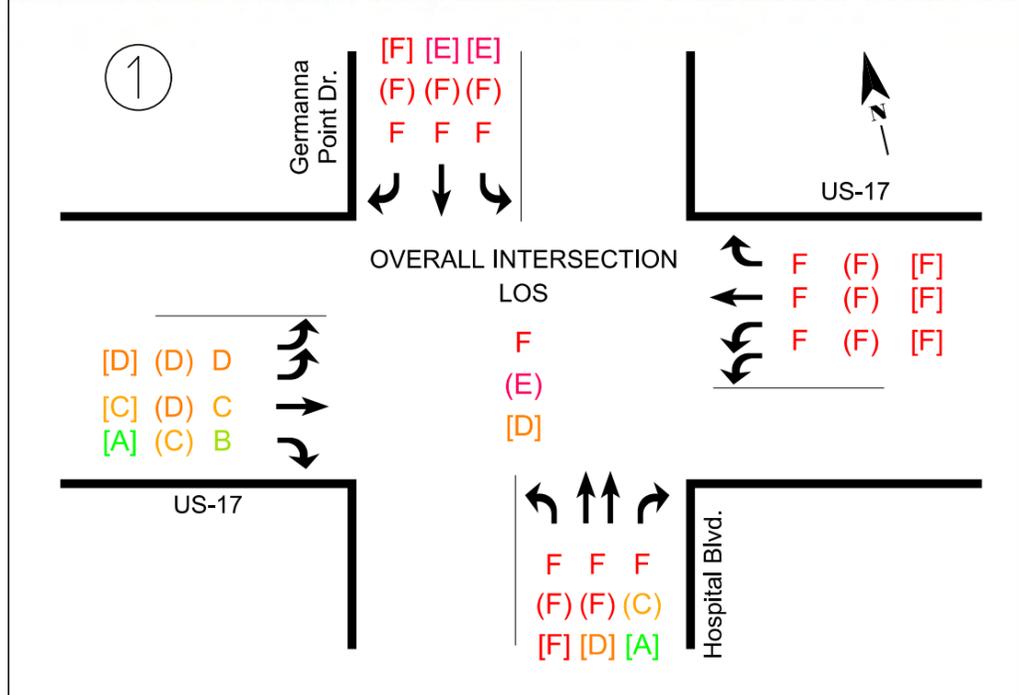
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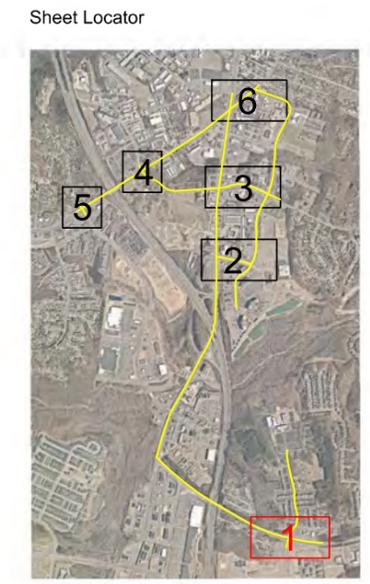


# LEGEND

- X (X) [X] AM (PM) [SAT] Level of Service (LOS)
- ↶ ↷ ↘ ↙ ↻ Traffic Movement
- ⊗ Intersection Number
- A B C D E F  
  
LOS COLOR RAMP



Operational capacity of the corridor for the future year (2035) no-build scenario was analyzed in VISSIM for AM, PM, and Saturday peak hours. Delays were used to determine the operating Level of Service for individual movements and intersections.

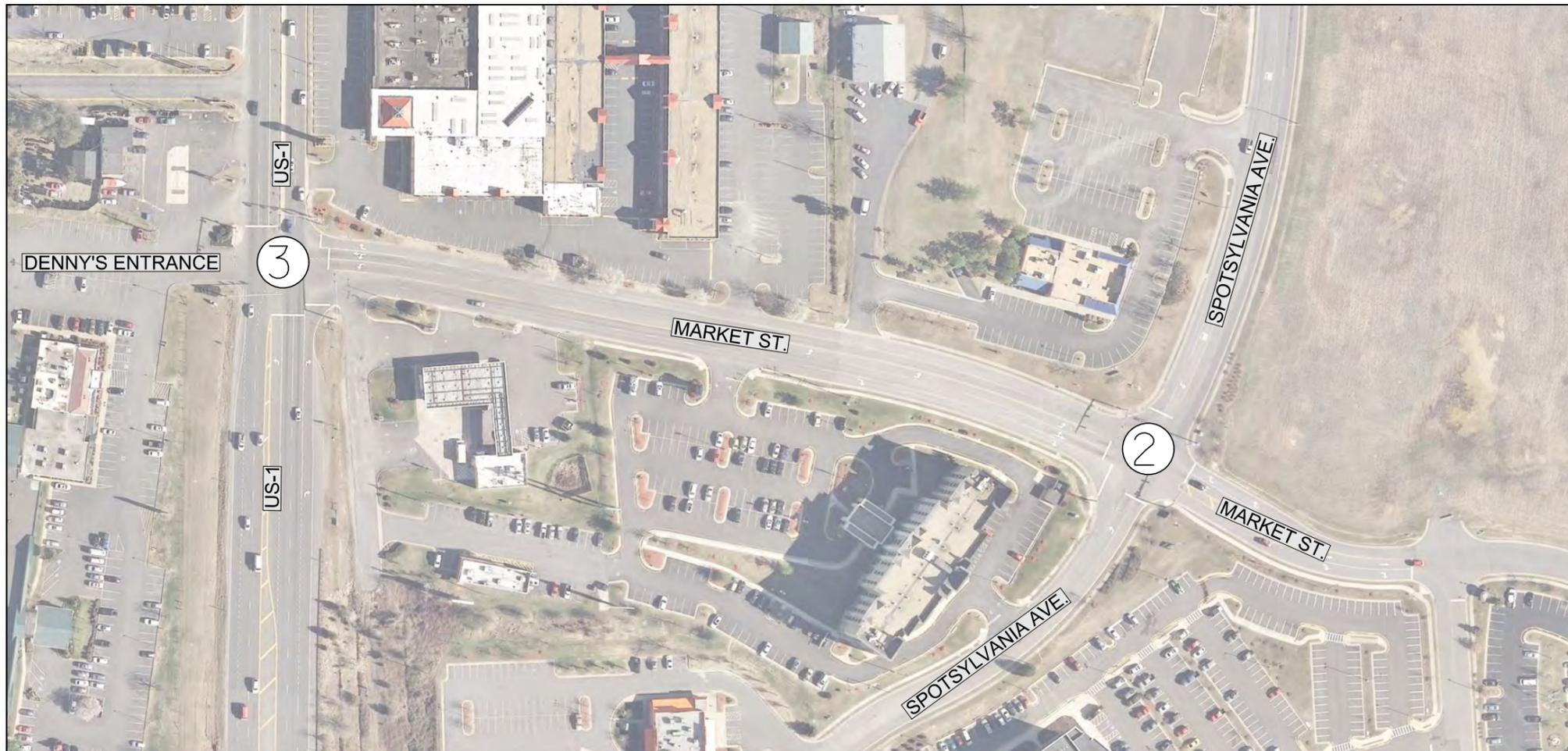


10/8/2018 8:56:39 AM



DRAWN BY:	RAM	2035 NO-BUILD LEVELS OF SERVICE	SCALE:	1:150	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1 OF 6
			VDOT UPC PROJECT NO.:	107192		



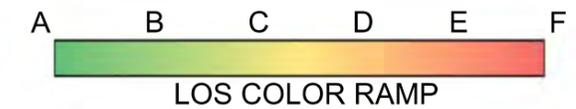


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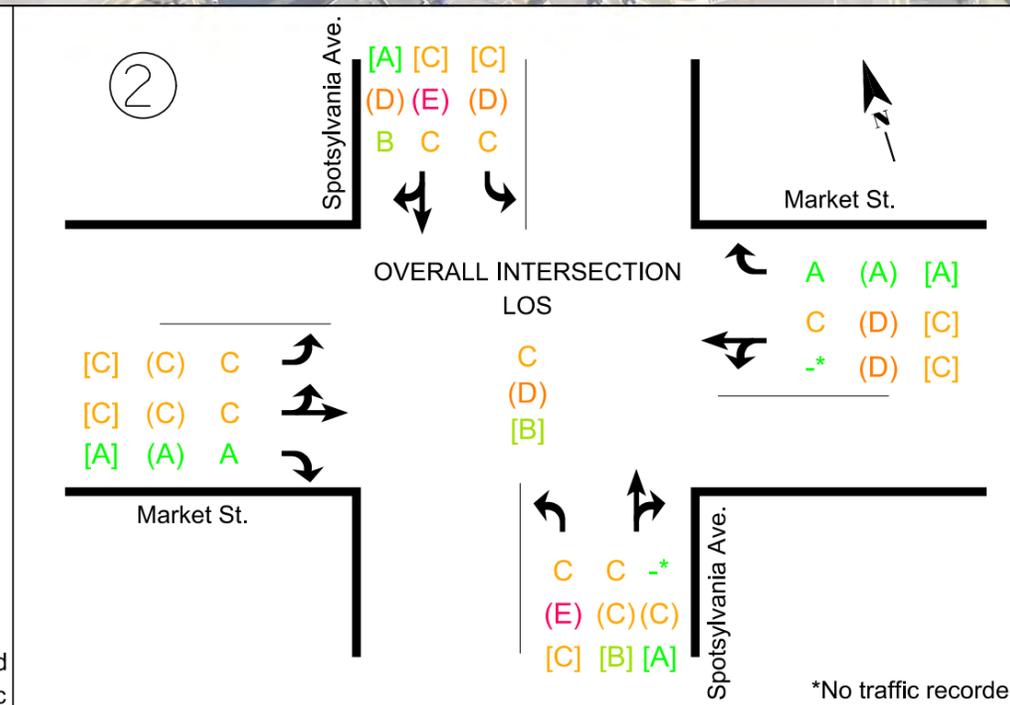
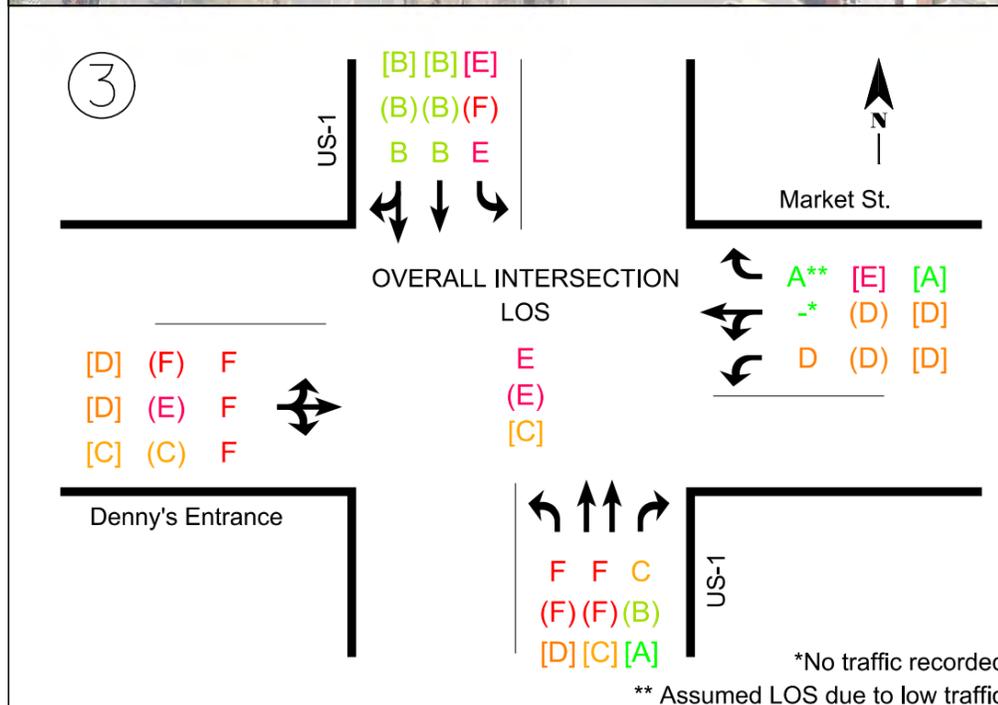
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↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

## 2035 NO-BUILD LEVELS OF SERVICE

### RTE. 1/208 CORRIDOR STUDY

SCALE: 1:150

JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192

DATE: 10/05/2018

SHEET NO.: 2 OF 6





# LEGEND

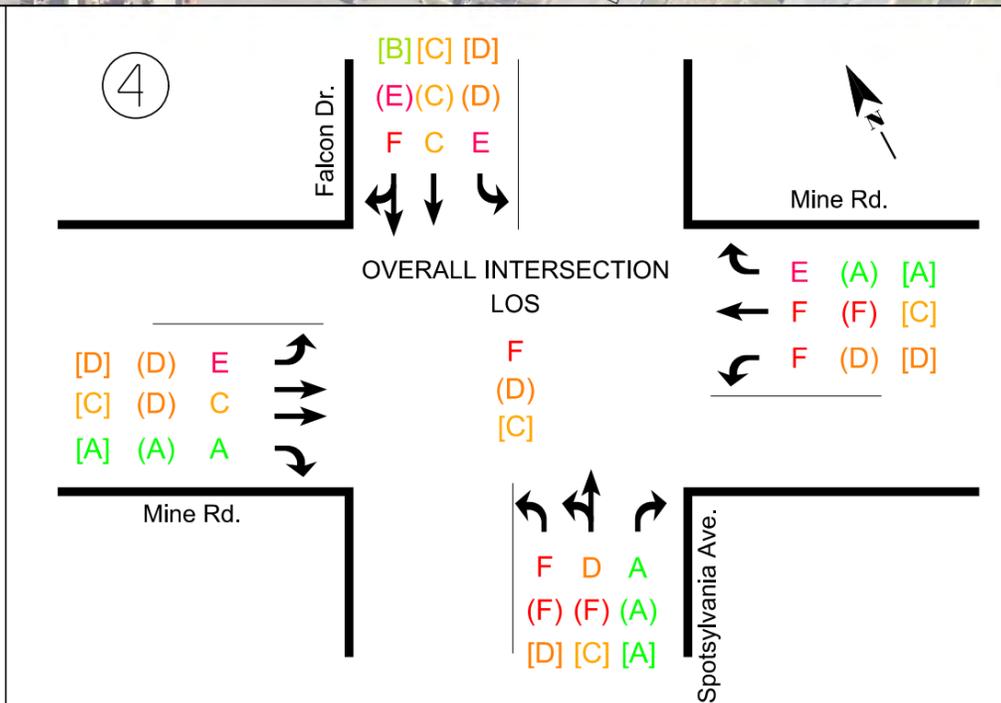
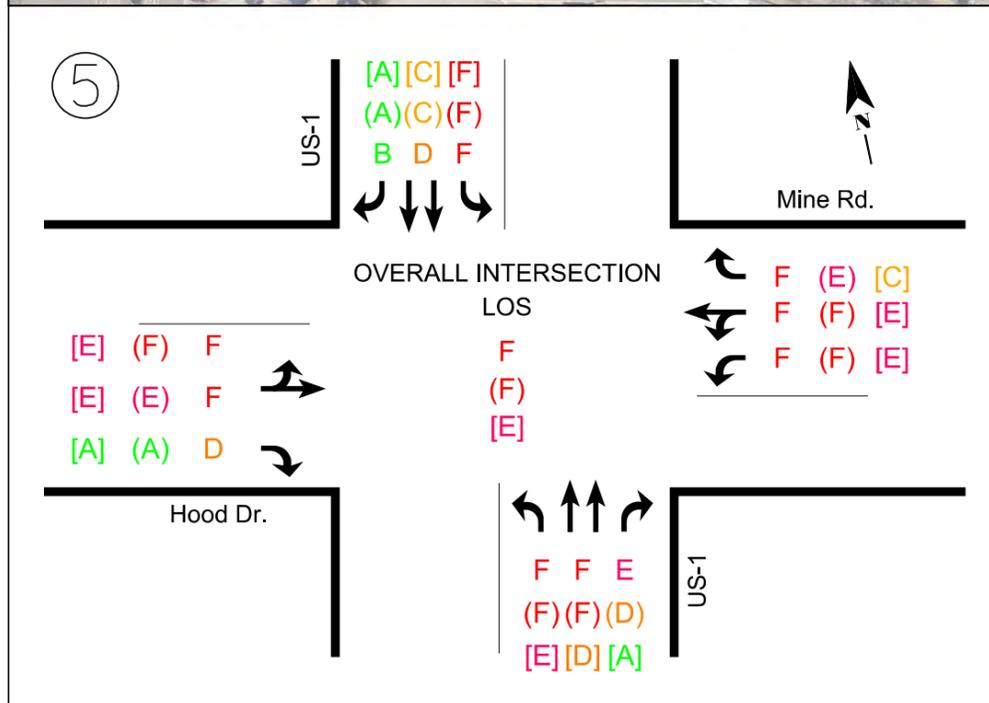
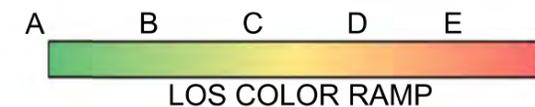
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Traffic Movement



Intersection Number



Sheet Locator



10/8/2018 8:57:58 AM



DRAWN BY: RAM

CHECKED BY: KHB

2035 NO-BUILD LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

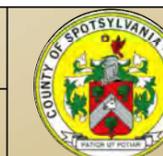
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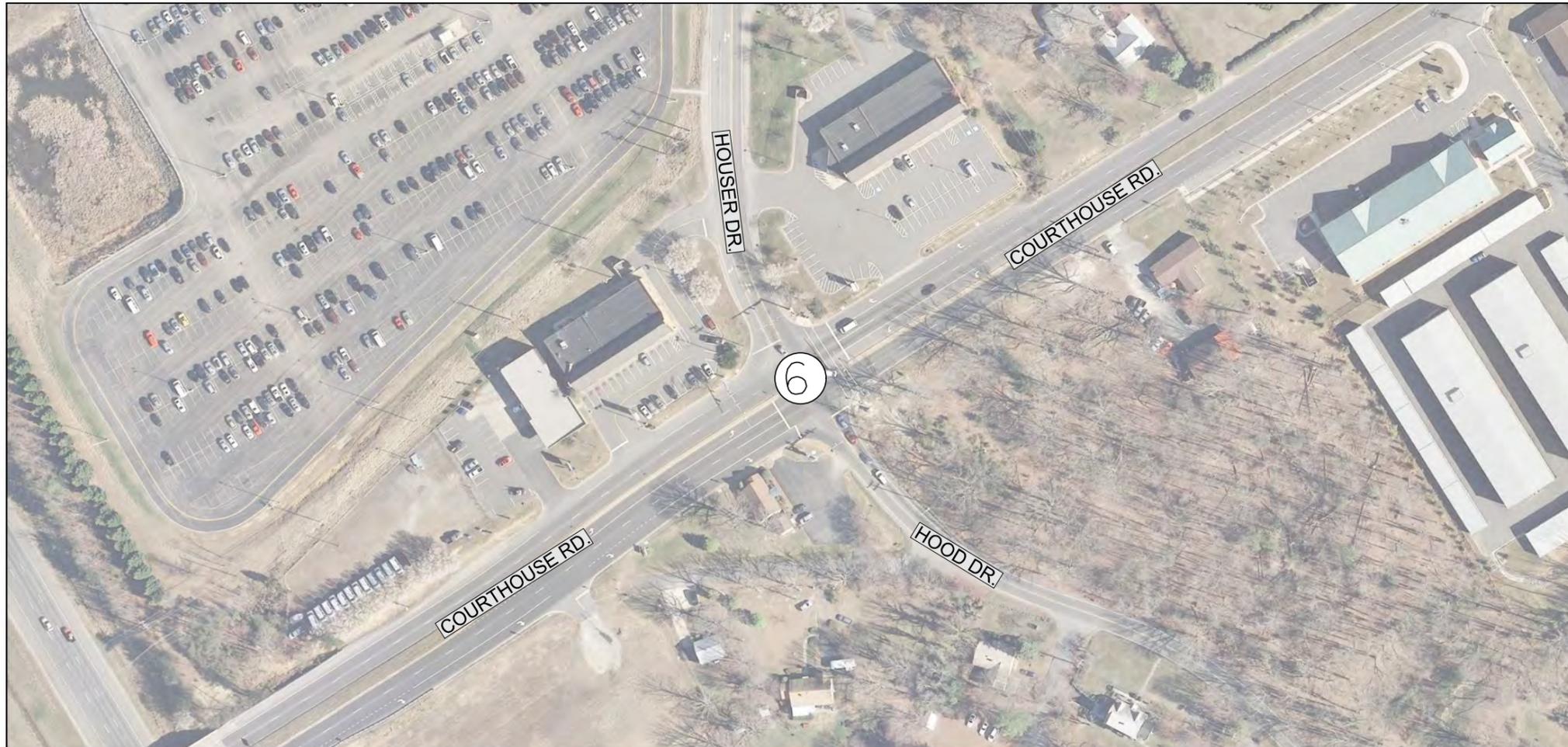
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 3 OF 6



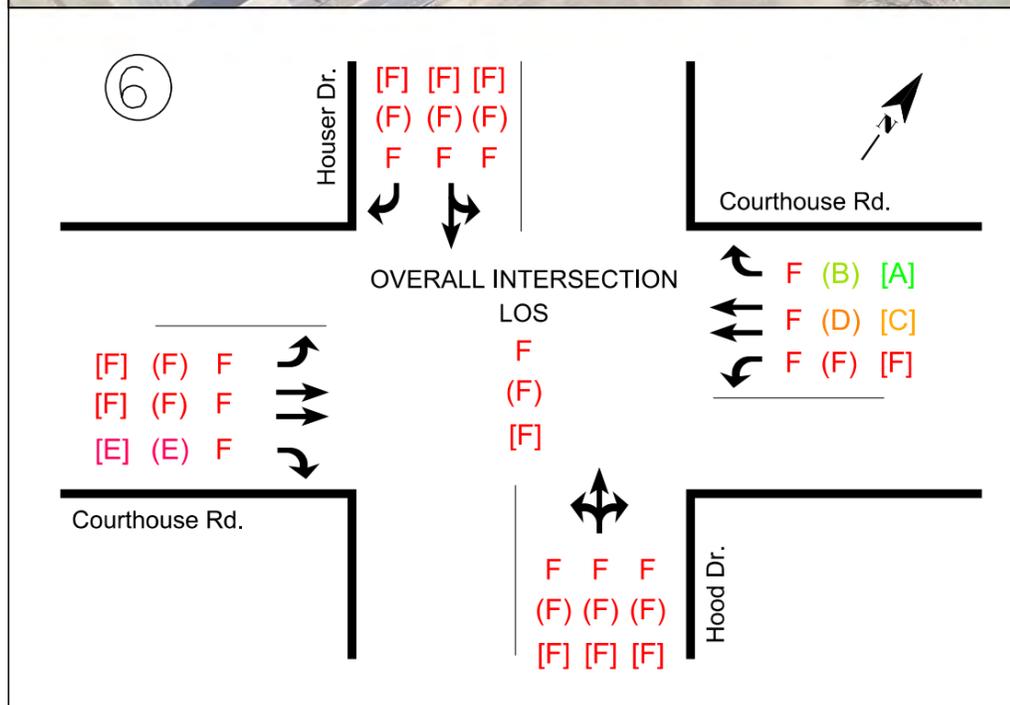
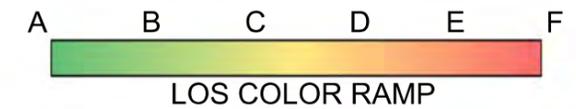


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



10/8/2018 8:56:35 AM



DRAWN BY: RAM

CHECKED BY: KHB

2035 NO-BUILD LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE:

10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.:

4

OF

6



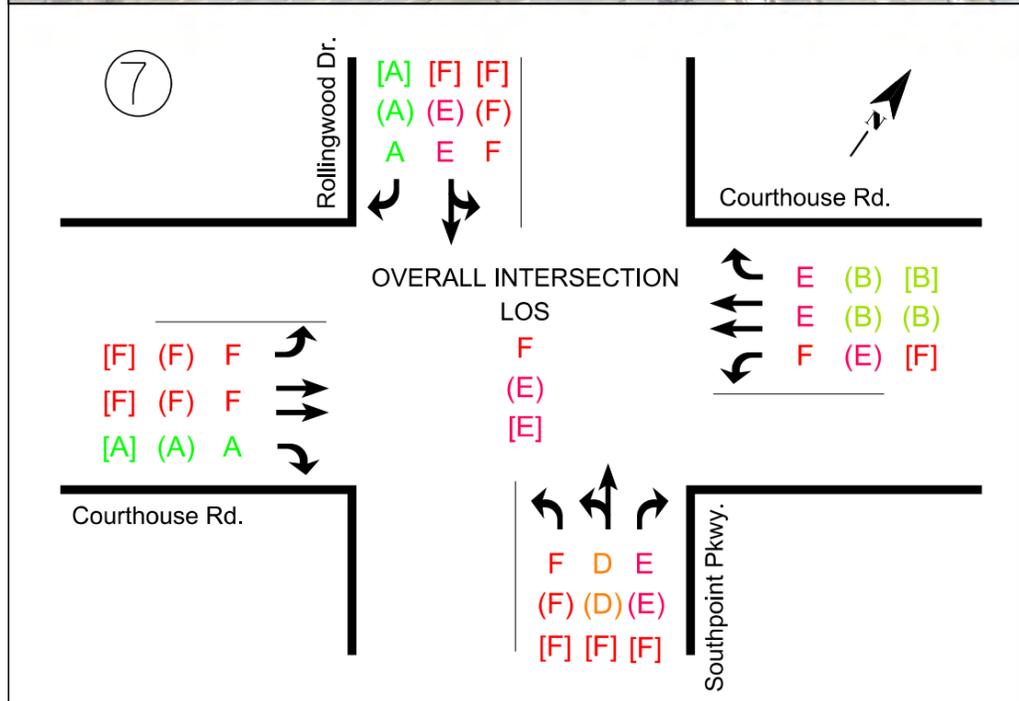
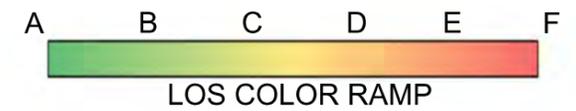


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator

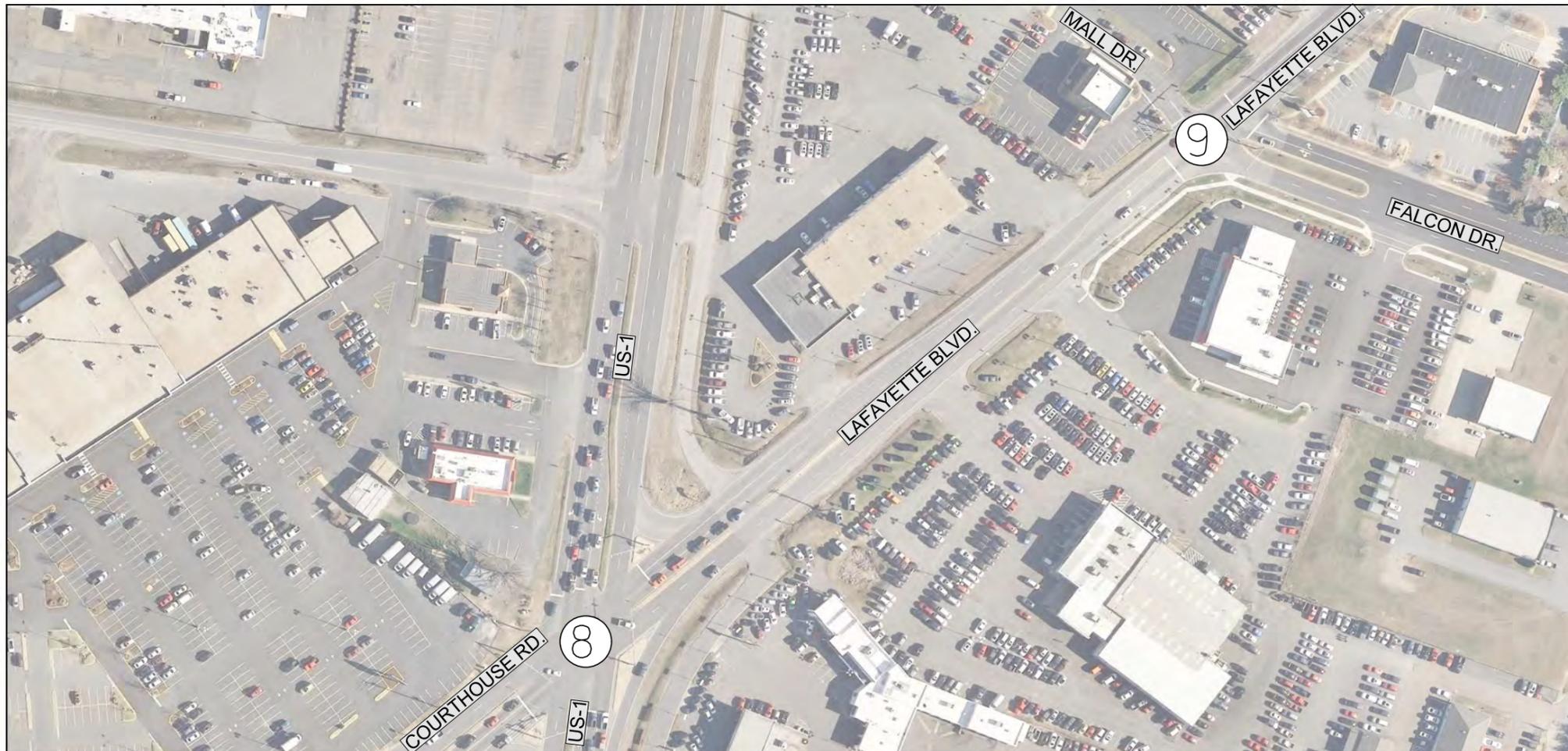


10/8/2018 8:59:47 AM



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			VDOT UPC PROJECT NO.: 107192			



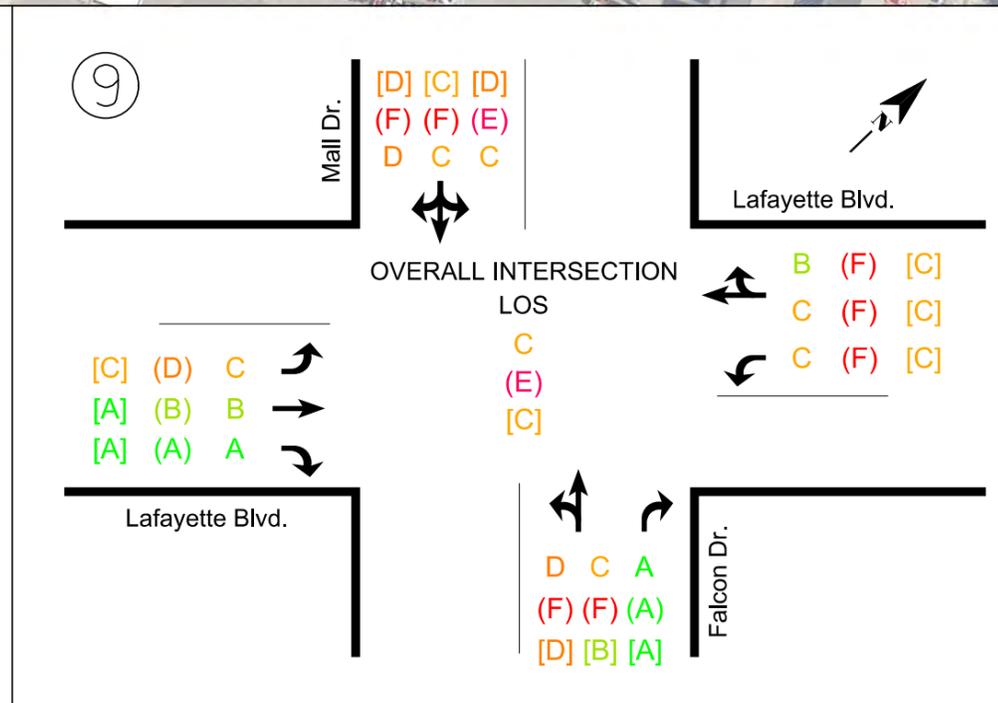
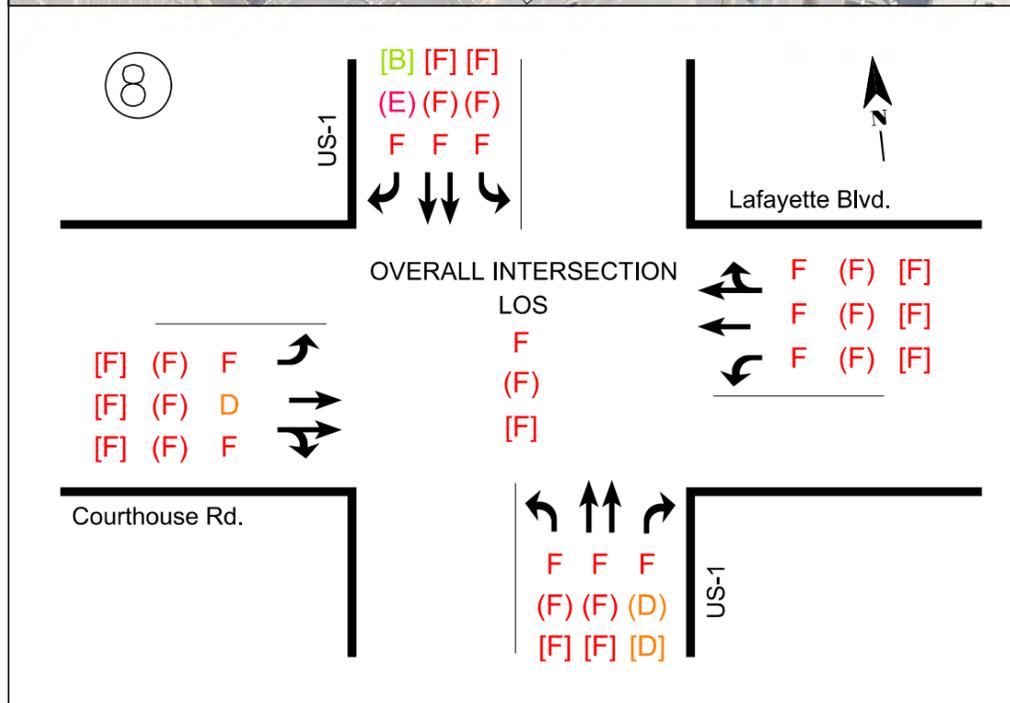
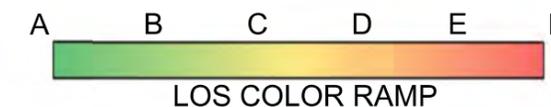


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



10/8/2018 9:00:11 AM



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2035 NO-BUILD LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

1:150

DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 6 OF 6



## Alternative 1

Alternative 1 was mainly derived from the deficiencies identified at the nine study intersections in the future no-build scenario. However, the County's plan to build parallel roads to Rte. 1 in an attempt to alleviate some of the heavy traffic from Rte. 1 was also considered as part of this alternative. The Germanna Connector is a proposed roadway that connects Germanna Point Drive and Spotsylvania Avenue. This connector is expected to impact the overall corridor's traffic pattern since it will act as an alternate north-south route in the area. The connector was coded in the travel demand model to determine the traffic volume that will use the proposed roadway, as well as, the traffic pattern changes at the study intersections. The no-build VISSIM model was updated to reflect the Germanna Connector and the new traffic patterns. Additionally, updates were made in the model regarding intersection improvements, in terms of adding capacity and/or lane configurations, and providing optimized and coordinated signal timings to achieve the best possible LOS at each intersection. The overall intersection LOS for both AM and PM peak hours are shown in Table F 2 and the single movements LOS details are shown on individual sheets. The following can be concluded from the capacity analysis results of Alternative 1:

1. All the intersections performed at acceptable LOS D or better during AM and PM peak hours, except the intersection of Rte. 208 at Rollingwood Dr./Southpoint Pkwy. and the intersection of US-1 at Rte. 208/Lafayette Blvd. which performed at LOS E during one peak hour.
2. The improvements proposed at the study intersections prevent having to widen Rte. 1 and Rte. 208 to six lanes.

Table F 2: Alternative 1 Intersection LOS

#	Intersection	Peak Hour	
		AM 7:30 - 8:30	PM 4:30 - 5:30
1	US-17 at Germanna Point Dr./Hospital Blvd.	B	C
2	Spotsylvania Ave. at Market St.	C	C
3	US-1 at Market St./Denny's Ent.	B	D
4	Mine Rd. at Spotsylvania Ave./Falcon Dr.	C	D
5	US-1 at Hood Dr./Mine Rd.	C	D
6	Rte. 208 at Hood Dr./Houser Dr.	D	D
7	Rte. 208 at Rollingwood Dr./Southpoint Pkwy.	E	B
8	US-1 at Rte. 208/Lafayette Blvd.	D	E
9	Lafayette Blvd. at Falcon Dr./Mall Dr.	A	B

**Alternative 1 Cost:**

A high-level cost estimate was prepared for Alternative 1 for the comparison purposes with Alternative 2. The cost estimates were broken down into three main categories; (1) structural, (2) construction, and (3) environmental. The cost estimates of the three categories were based on the typical cross-section proposed for this alternative, shown in Figure F 3. Although the cross section shown herein is for the proposed bridge over Massaponax Creek, it was also used for determining the quantities and cost estimates throughout the entire length of the connector as shown in Table F 3.

The proposed shared use path (SUP) was considered to continue along the existing Germanna Point Drive from the proposed connector to the intersection at US-17. Additionally, the cost estimates include the improvements at the nine study intersections proposed based on the capacity analysis results for both AM and PM peak hours.

VDOT Transportation and Mobility Planning Division (TMPD) provided unit costs, inflated to year (2018), were used in determining the planning level cost estimate for this alternative, which includes the low and high ranges. Cost estimates provided herein are not for construction purposes. Detailed engineering design and cost estimates are required to identify the budget needed for implementing Alternative 1. In general, the cost estimate of this alternative is impacted by the following:

- a. Requires a 150' long bridge.
- b. Requires significant earthwork due to the crossing.
- c. Anticipated high cost for ROW acquisition (~36% of the construction cost).
- d. Relatively, high impact on the environment due to crossing the Massaponax Creek.
- e. Improvements proposed at intersection to keep both Rte. 1 and Rte. 208 as 4-lane roadways.

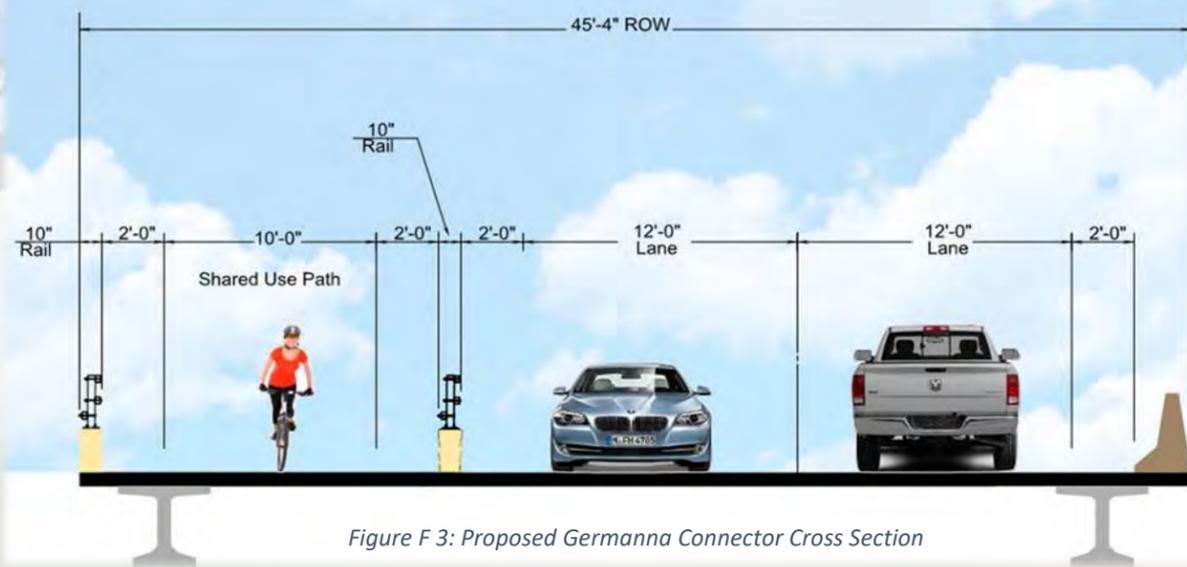
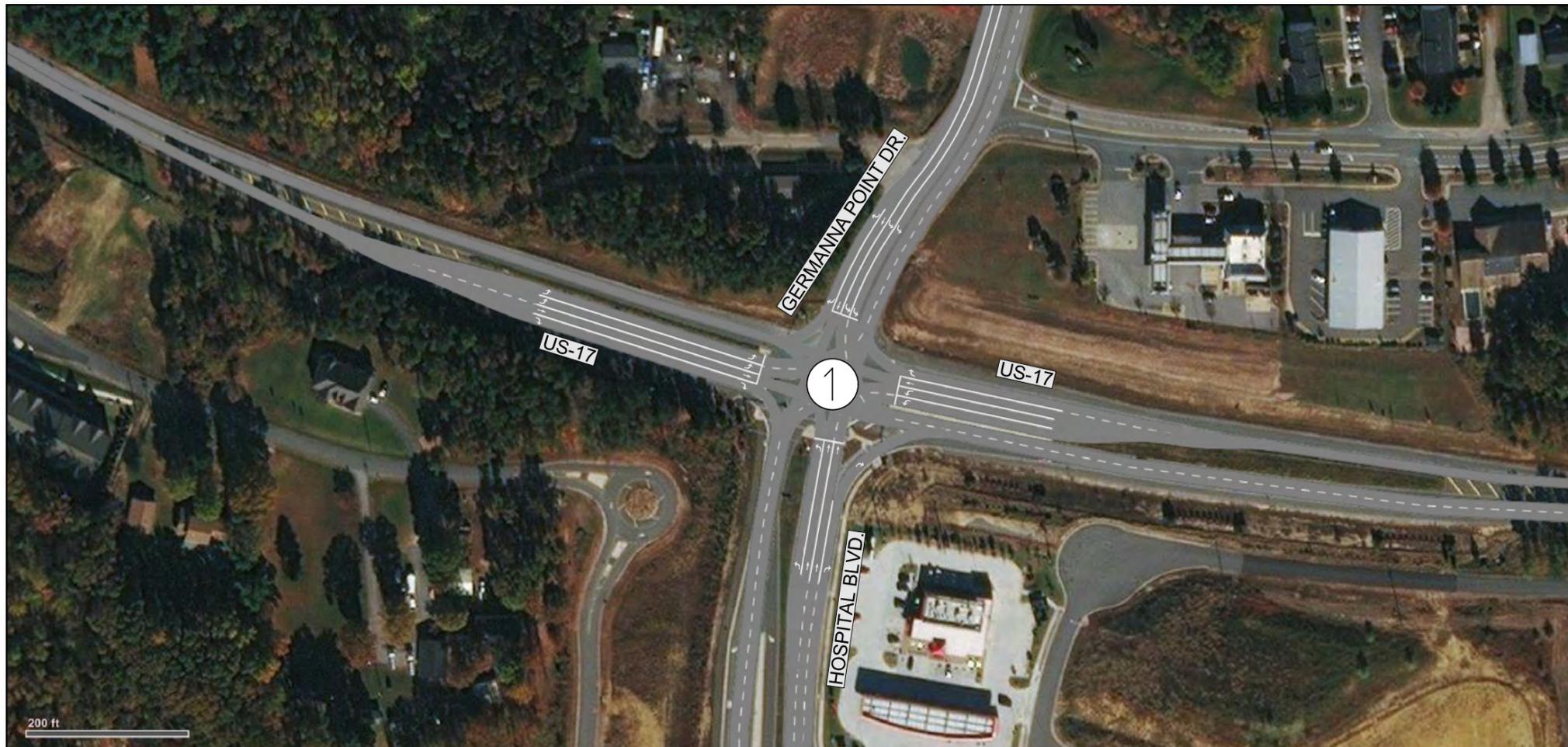


Figure F 3: Proposed Germanna Connector Cross Section

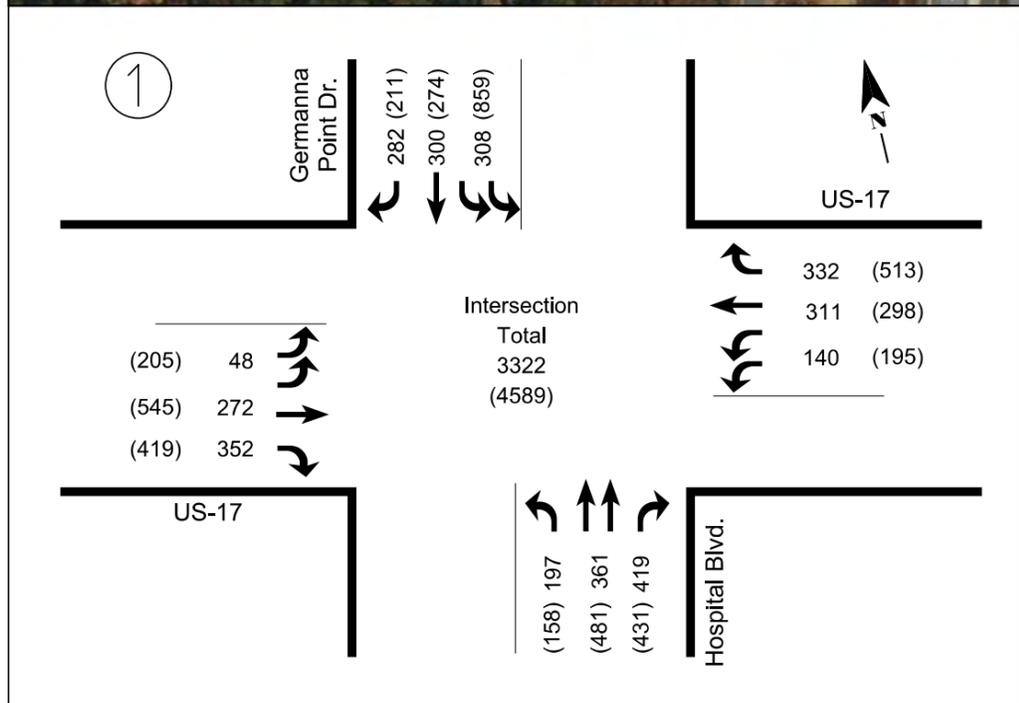
Table F 3: Alternative 1 Planning Level Construction Cost Estimate

Item	Quantity	Unit Cost		Unit	Costs	
		Low	High		Low	High
<b>Structural Cost</b>						
Bridge	1.00	\$1,700,000		Each	\$1,700,000	
Bus Pullout Shelter	5.00	\$30,000		Each	\$150,000	
<b>Subtotal</b>					<b>\$1,850,000</b>	
<b>Construction Cost</b>						
<b>Signal</b>						
Modify Existing Signal	8.00	\$142,000	\$306,000	Per Intersection	\$1,136,000	\$2,448,000
Improve phasing for signalized intersection	9.00	\$11,000	\$16,000	Per Intersection	\$99,000	\$144,000
Provide pedestrian signal phase	3.00	\$50,000	\$70,000	Per Intersection	\$150,000	\$210,000
<b>Pavement</b>						
Right turn lane	34.00	\$60,000	\$130,000	Per 100'	\$2,040,000	\$4,420,000
Right turn Taper	11.00	\$40,000	\$87,000	Per 100'	\$440,000	\$957,000
Left turn lane	104.75	\$58,000	\$73,000	Per 100'	\$6,075,500	\$7,646,750
Left turn taper	25.00	\$75,000	\$97,000	Per 100'	\$1,875,000	\$2,425,000
1 lane	0.54	\$390,000	\$600,000	CPM*	\$210,600	\$324,000
2 lanes (26'-30' pavement )	1.00	\$3,413,000	\$5,175,000	CPM	\$3,413,000	\$5,175,000
<b>Pedestrians</b>						
Provide pedestrian crosswalk	1.00	\$20,000	\$30,000	Each	\$20,000	\$30,000
Provide 5' sidewalk (Based on Exist.)	0.65	\$322,000	\$1,044,000	CPM	\$209,300	\$678,600
Provide 10' paved SUP - off road	1.00	\$940,000	\$940,000	CPM	\$940,000	\$940,000
<b>Earthwork</b>						
Cut/Fill	1.00	\$1,200,000	\$1,400,000	Each	\$1,200,000	\$1,400,000
Clearing	1.00	\$350,000	\$350,000	Each	\$350,000	\$350,000
Landscaping	1.00	\$150,000	\$200,000	Each	\$150,000	\$200,000
<b>Construction Subtotal</b>					<b>\$18,309,000</b>	<b>\$27,349,000</b>
<b>Structural &amp; Construction Subtotal</b>					<b>\$20,159,000</b>	<b>\$29,199,000</b>
<b>Right-of-Way (36% of ST &amp; CN)</b>					<b>\$7,257,240</b>	<b>\$10,511,460</b>
<b>Subtotal (Structural &amp; Construction)</b>					<b>\$27,420,000</b>	<b>\$39,720,000</b>
<b>Environmental Cost</b>						
Wetland/Stream Mitigation Estimate	1.00	\$254,000		Each	\$254,000	
NEPA Environmental Documentation	1.00	\$50,000		Each	\$50,000	
Phase 1 Cultural Resource	1.00	\$6,000		Each	\$6,000	
Phase 1 Cultural Survey	1.00	\$8,000		Each	\$8,000	
Permitting	1.00	\$30,000		Each	\$30,000	
Air/Noise Studies	1.00	\$50,000		Each	\$50,000	
<b>Subtotal</b>					<b>\$400,000</b>	
<b>Grand Total</b>					<b>\$28,000,000</b>	<b>\$40,500,000</b>
*CPM: Cost Per Mile						



# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- Traffic Movement
- Intersection Number



### Proposed Improvements\*:

- Northbound Approach:**
  - extend existing left-turn lane by ~100'
- Westbound Approach:**
  - extend existing dual left-turn lanes by ~50'
- Southbound Approach:**
  - add second left-turn lane to be ~600'
  - extend existing left-turn lane by ~200'

\*In addition to signal optimization and coordination, as applicable

Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

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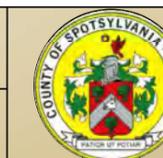
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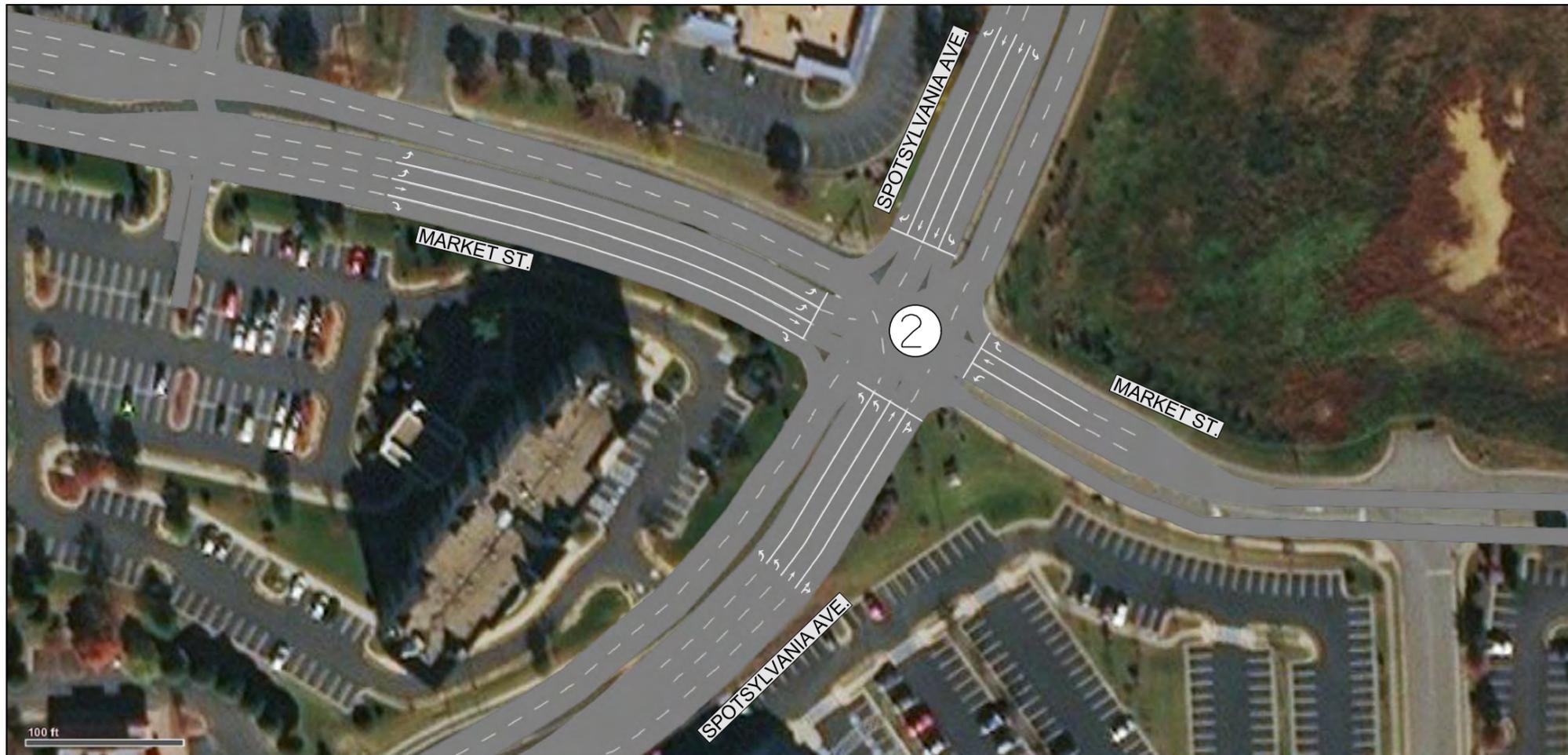
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JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 1 OF 9





# LEGEND

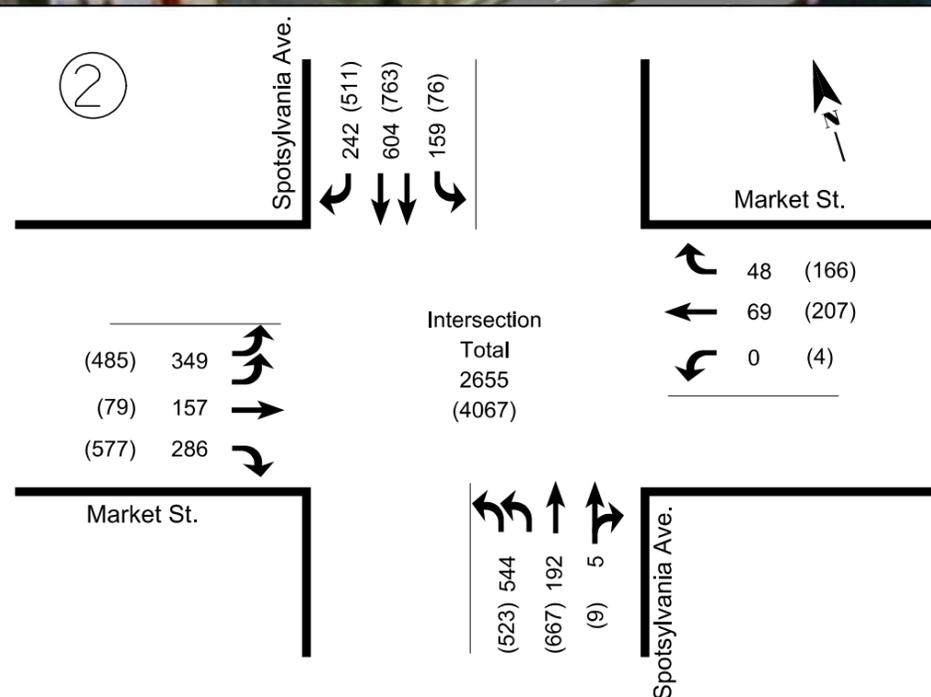
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Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

Traffic Movement

Intersection Number

Sheet Locator



**PROPOSED IMPROVEMENTS\*:**

**Northbound Approach:**

- add second left-turn lane to be ~250'
- add second through lane to be ~1,030'

**Westbound Approach:**

- extend right-turn lane to be ~150'
- add an exclusive left-turn lane to be ~50'
- convert shared through/left-turn lane to be exclusive through lane

**Southbound Approach:**

- convert left-turn lane to be exclusive through lane
- add a left-turn lane to be ~150'
- convert shared through/right-turn lane to be exclusive through lane
- add an exclusive right-turn lane to be ~250'

**Eastbound Approach:**

- add a left-turn lane to be ~425'
  - convert shared through/left-turn lane to be exclusive through lane
- \*In addition to signal optimization and coordination, as applicable



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CHECKED BY: KHB

ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

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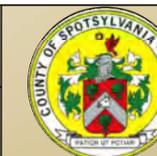
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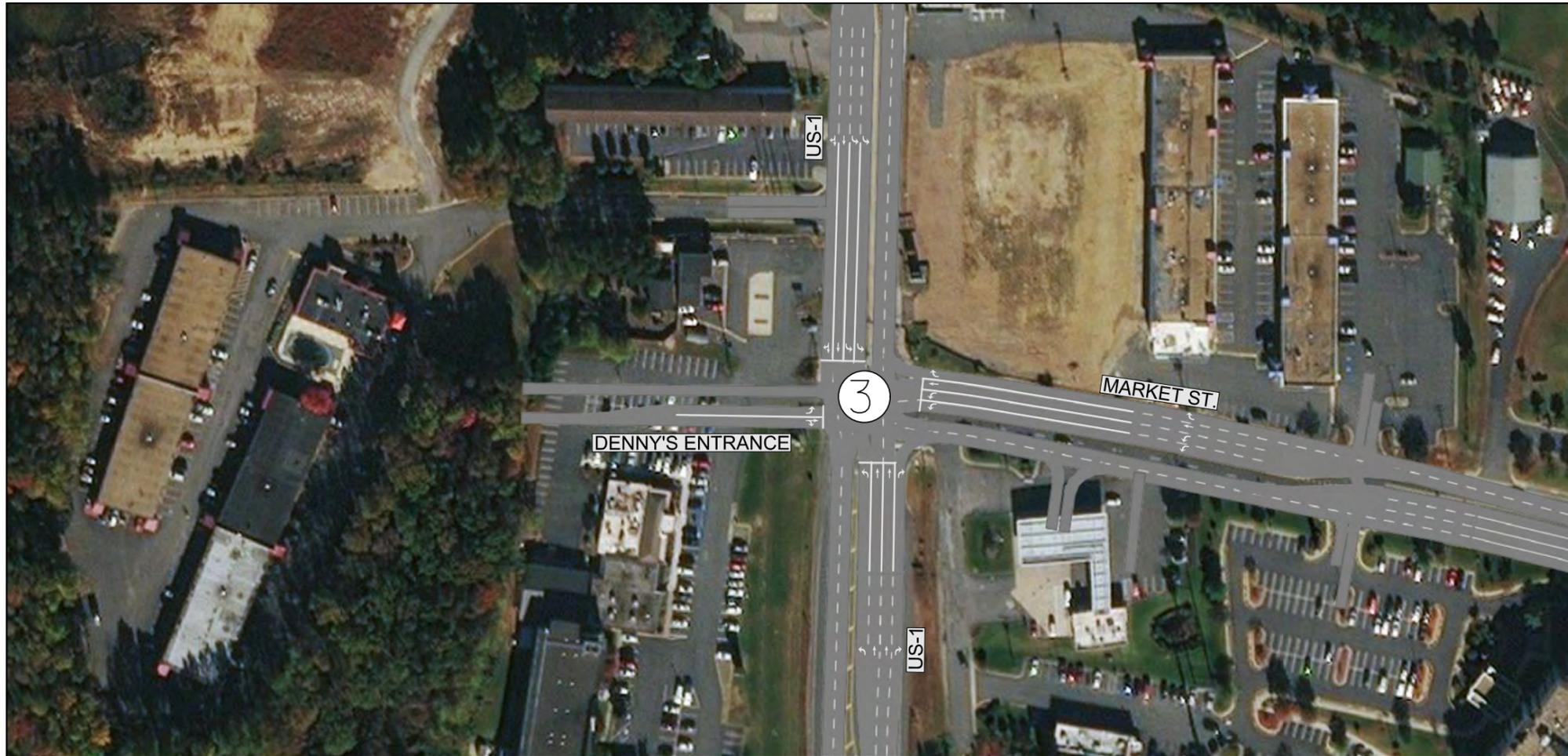
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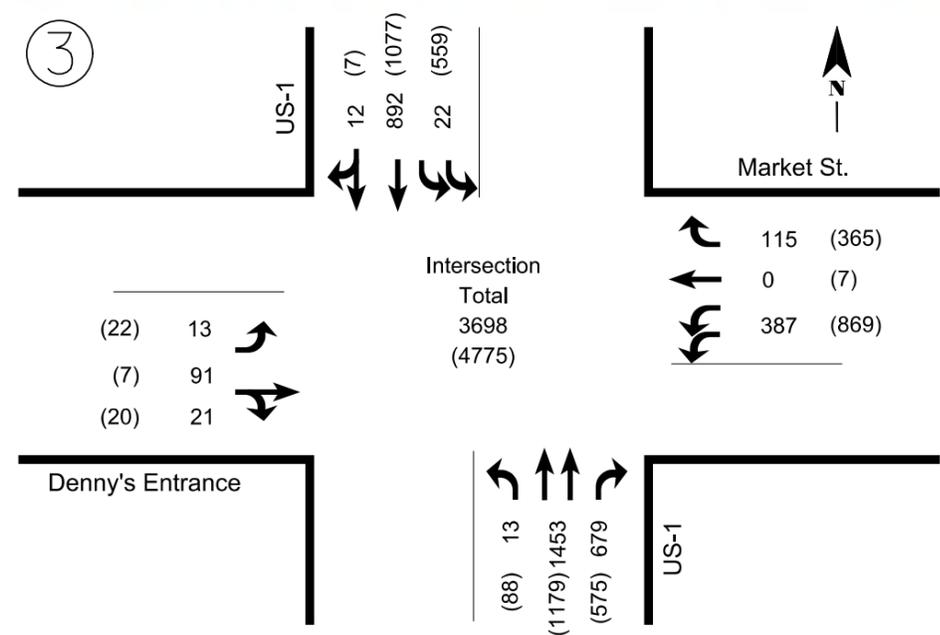
SHEET NO.: 2 OF 9





# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- Traffic Movement
- Intersection Number

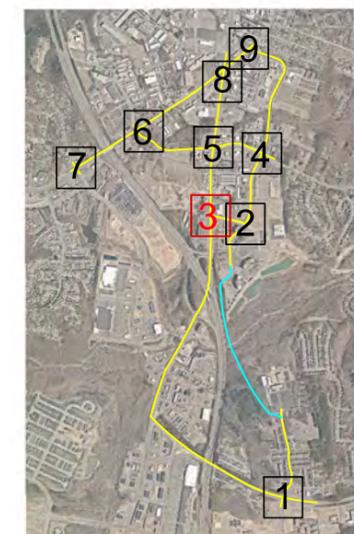


### PROPOSED IMPROVEMENTS\*:

- Westbound Approach:**
  - add second left-turn lane to be ~400'
  - convert shared through/left lane to be exclusive through lane
- Southbound Approach:**
  - add second left-turn lane to be ~350'
- Eastbound Approach:**
  - add left-turn lane to be ~150'
  - convert shared through/left-/right-turn lane to be through/right-turn lane

\*In addition to signal optimization and coordination, as applicable

Sheet Locator



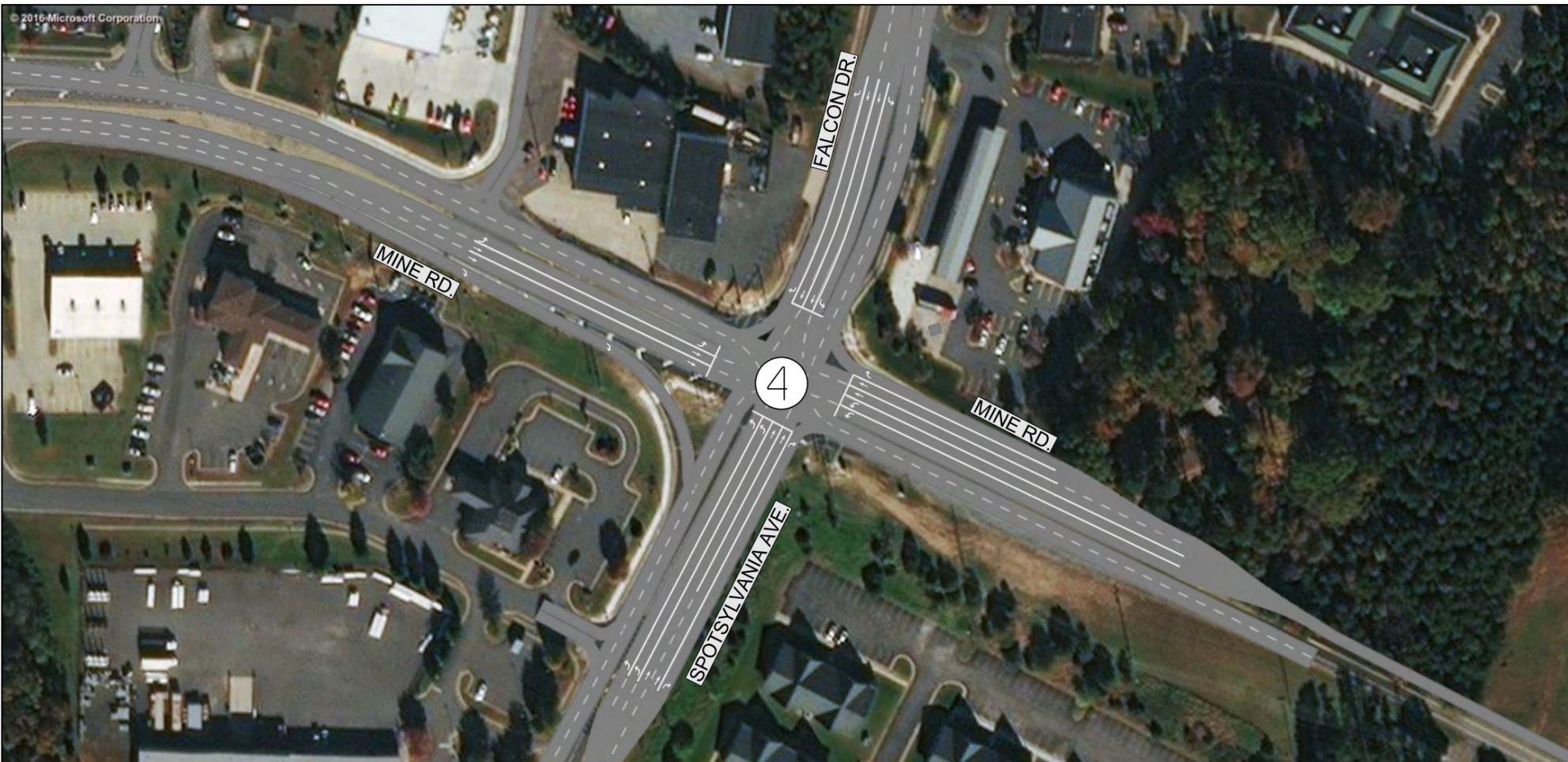
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		VDOT UPC PROJECT NO.: 107192		





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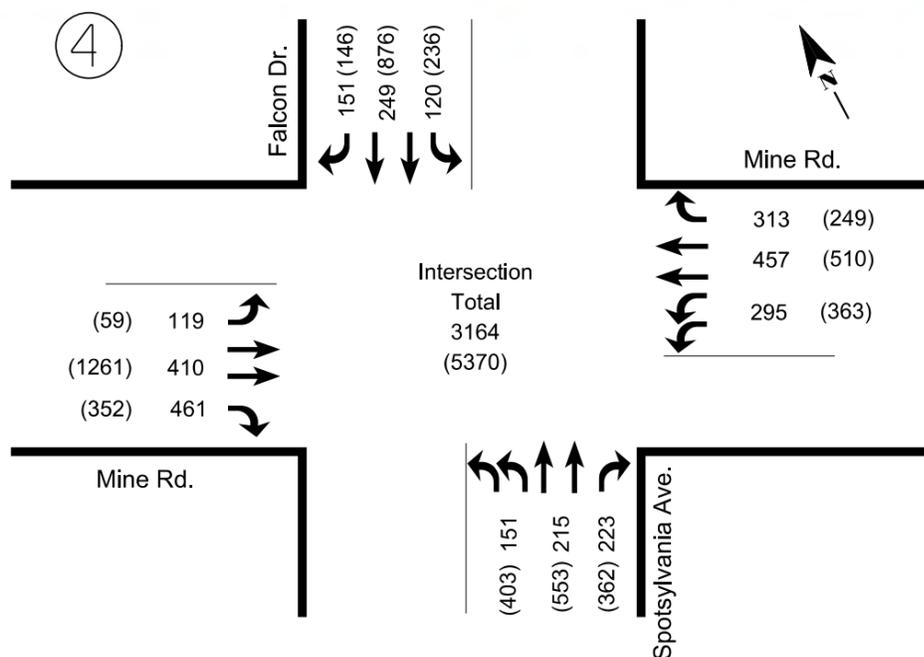
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Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

Traffic Movement

Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add second through lane
- add second left-turn lane to be ~450'
- convert shared through/left-turn lane to be exclusive through lane

#### Westbound Approach:

- add a second through lane and extend storage lengths by ~325'
- add second left-turn lane to be ~400'
- extend right-turn lane to be ~225'

#### Southbound Approach:

- convert shared through/right-turn lane to be exclusive through lane
- extend left-turn lane to be ~300'
- add right-turn lane to be ~250'

\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

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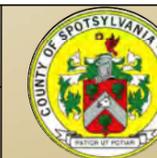
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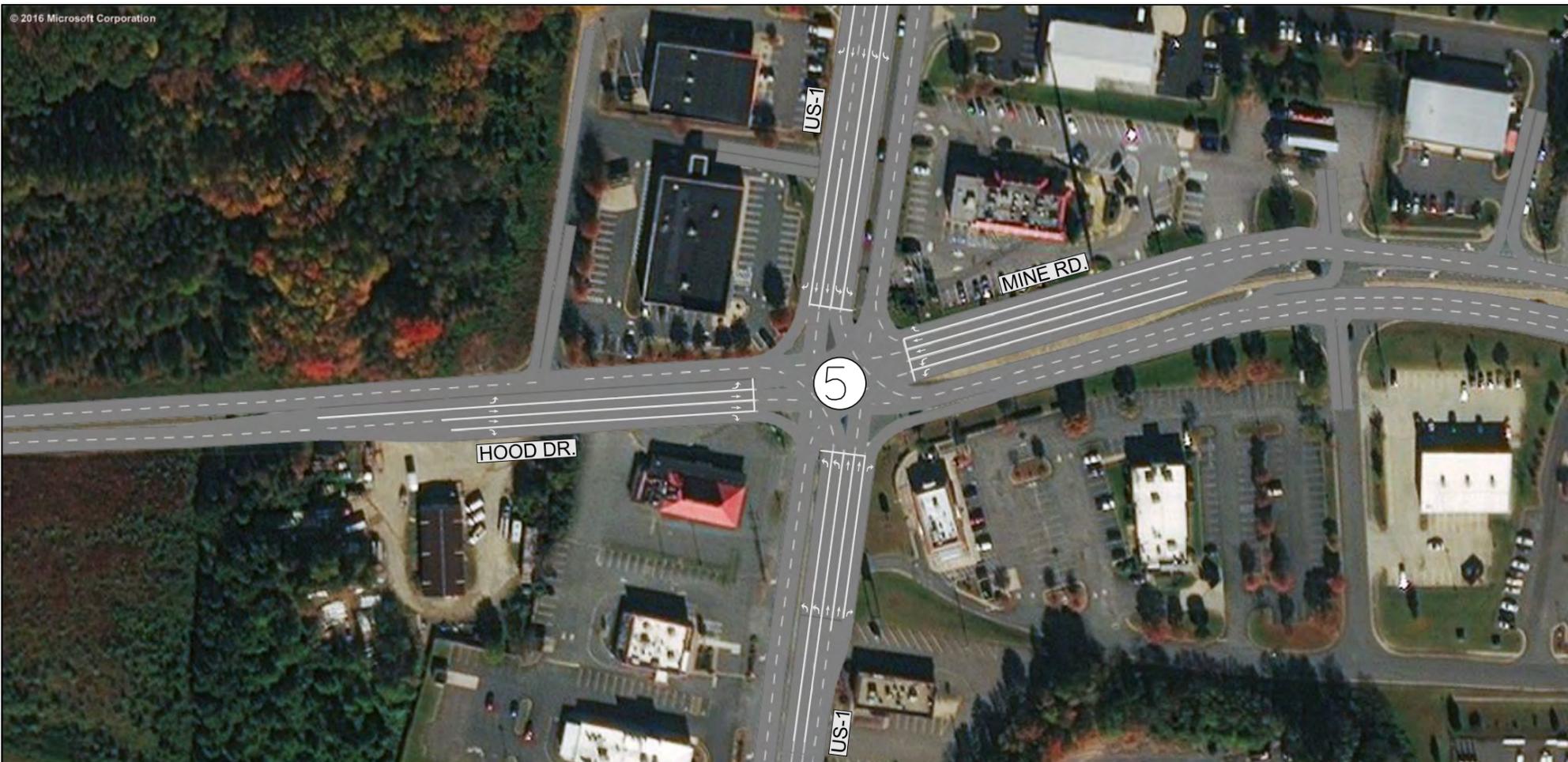
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VDOT UPC PROJECT NO.: 107192

DATE: 10/05/2018

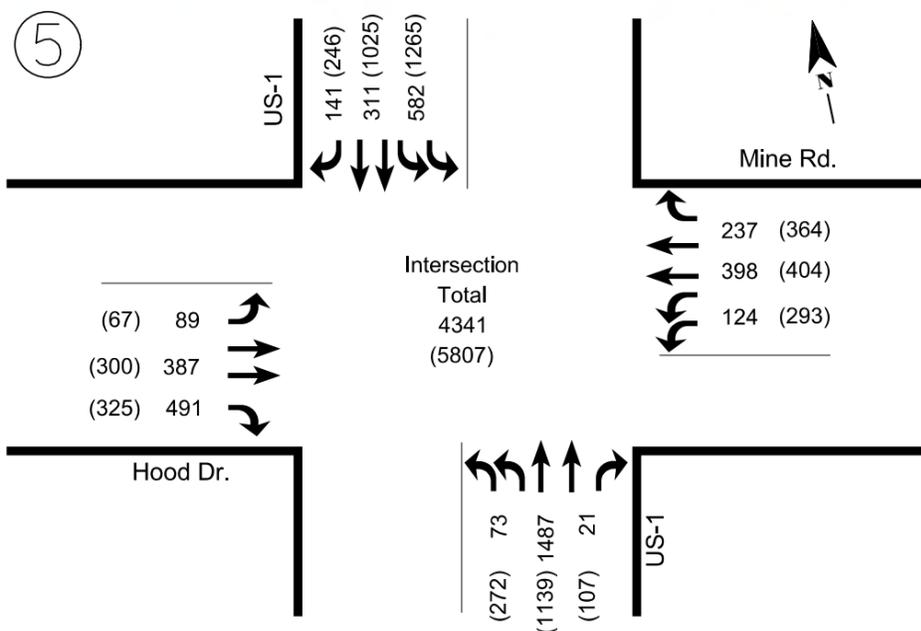
SHEET NO.: 4 OF 9





# LEGEND

- xxxx Weekday AM Peak Hour Volume (PHV) Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV Time: 4:30PM-5:30PM
- Traffic Movement
- Intersection Number



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add second left-turn lane to be ~400'

#### Westbound Approach:

- extend right-turn lane to be ~450'
- add second left-turn lane to be ~300'
- add second through lane
- convert shared through/left-turn lane to be exclusive through lane

#### Southbound Approach:

- add second left-turn lane to be ~600'
- extend existing left-turn lane by ~200'

#### Eastbound Approach:

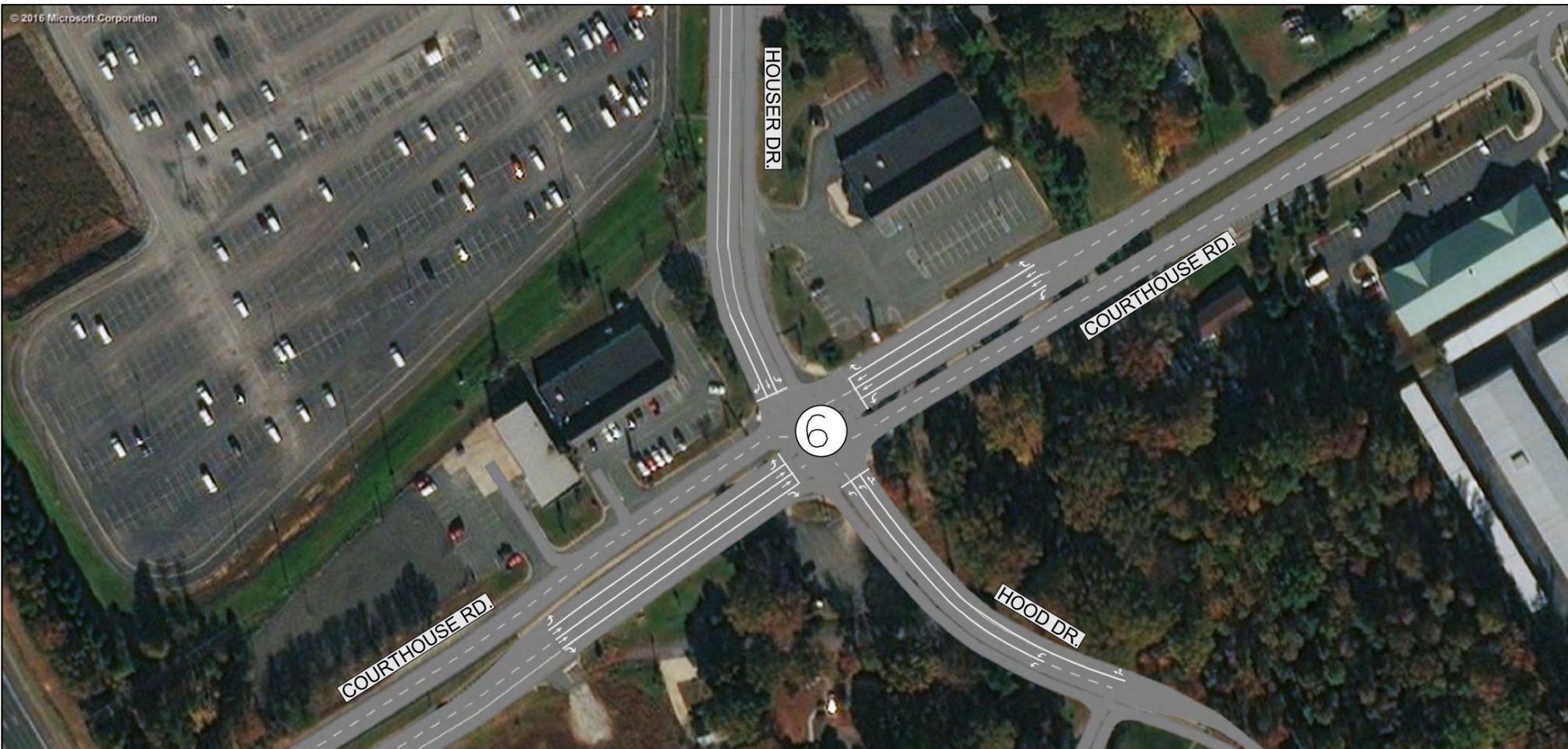
- add second through lane to be ~900'
- add left-turn lane to be ~450'
- convert shared through/left-turn lane to be exclusive through lane
- extend right-turn lane to be ~325'

Sheet Locator



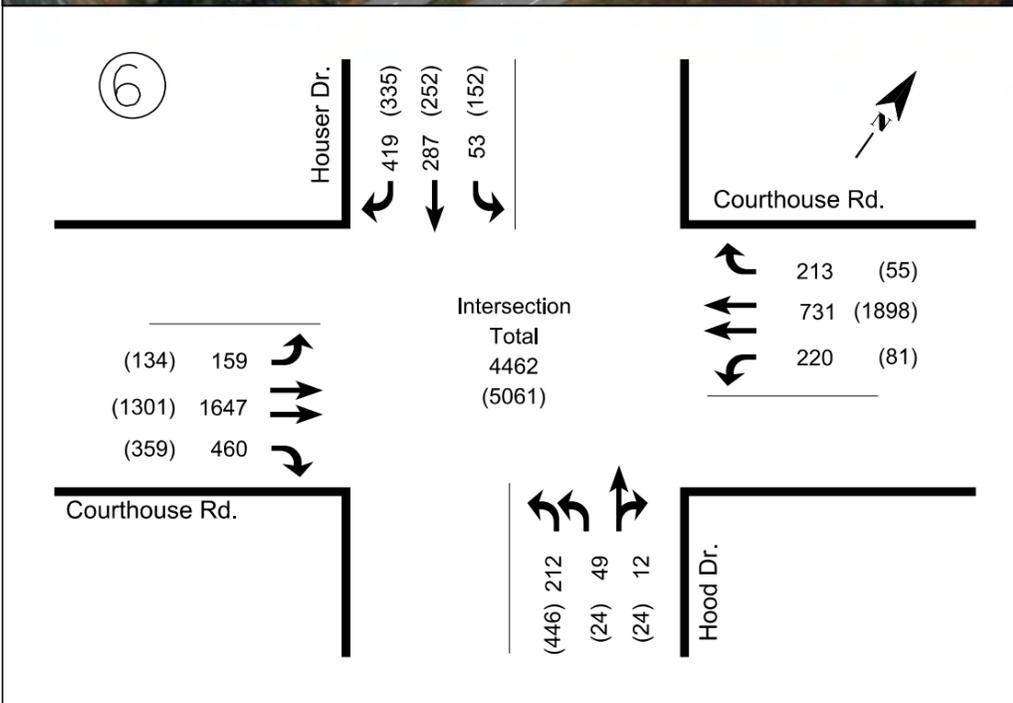
\*In addition to signal optimization and coordination, as applicable

	DRAWN BY:	RAM	ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS	SCALE:	NOT TO SCALE	DATE:	10/05/2018	
	CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	5	
				VDOT UPC PROJECT NO.:	107192			



# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- Traffic Movement
- Intersection Number



### PROPOSED IMPROVEMENTS\*:

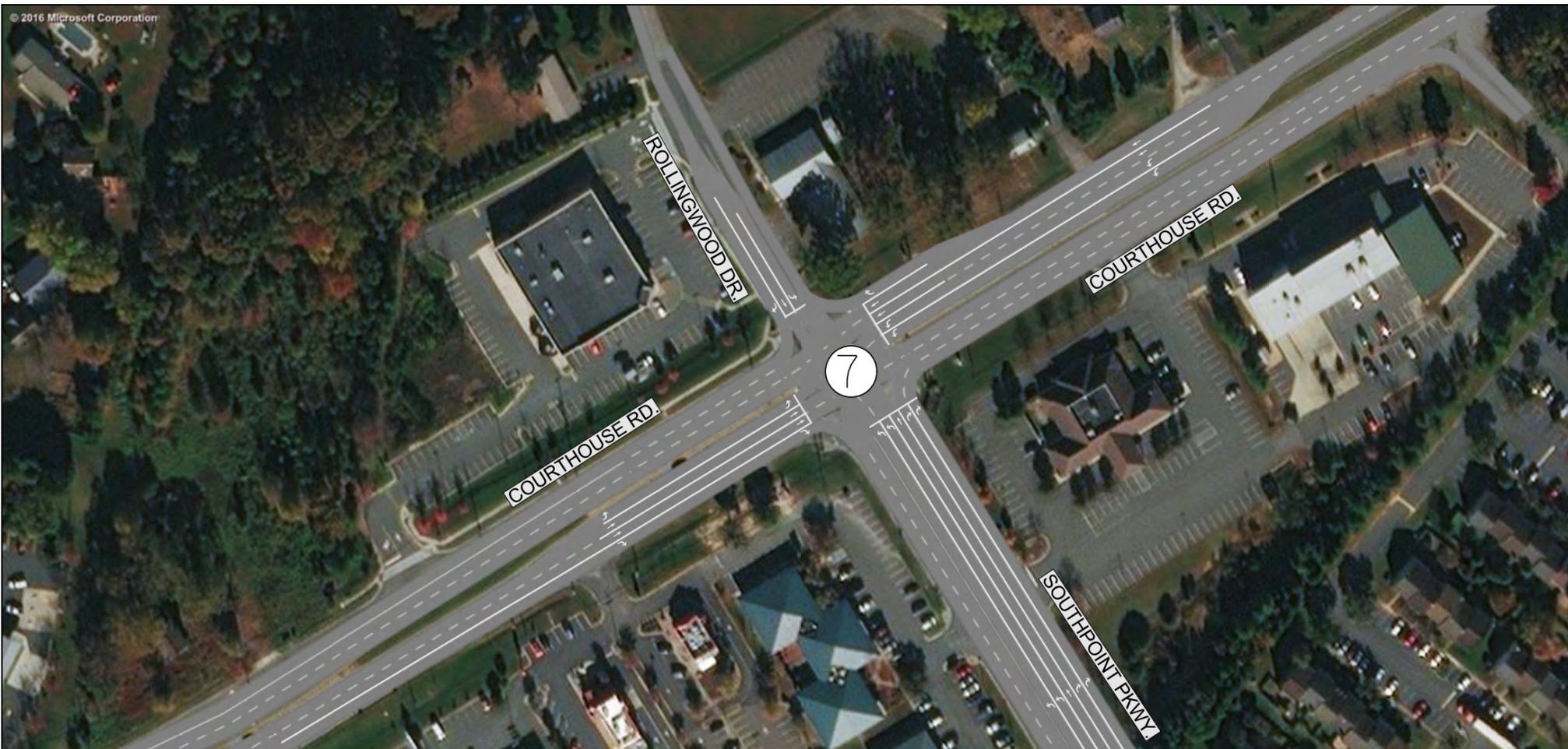
- Northbound Approach:**
  - add dual left-turn lanes to be ~365'
  - convert shared through/left-/right-turn lane to be shared through/right-turn lane
- Southbound Approach:**
  - add a left-turn lane to be ~350'
  - convert shared through/left-turn lane to be exclusive through lane
- Eastbound Approach:**
  - extend left-turn lane to be ~350'

Sheet Locator



\*In addition to signal optimization and coordination, as applicable

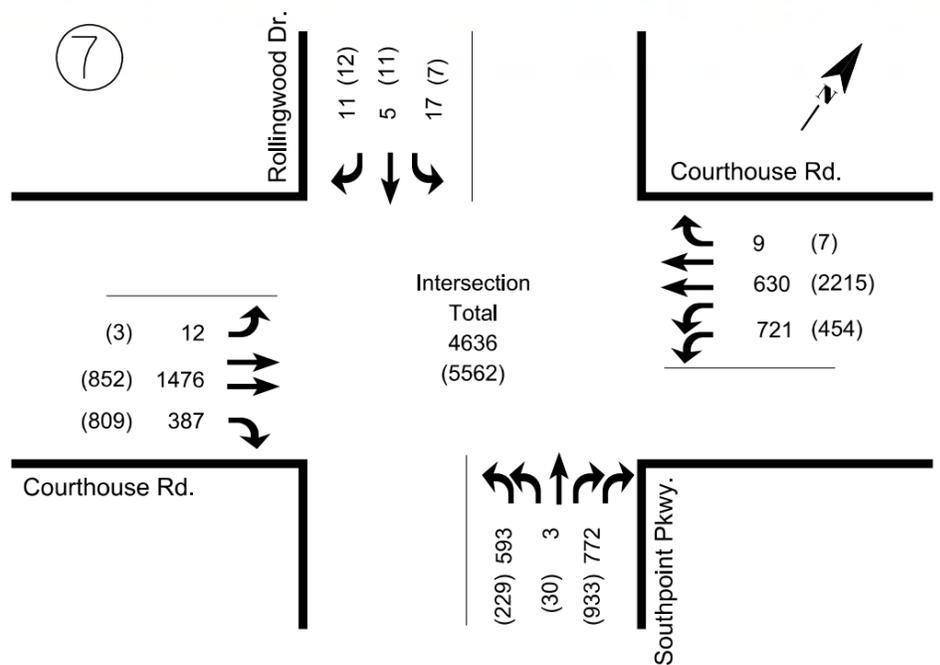
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	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	6	OF	9		
				VDOT UPC PROJECT NO.: 107192							



# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
-  Traffic Movement
-  Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add second left-turn lane to be ~430'
- add second right-turn lane to be ~500'
- convert shared through/left-turn lane to be exclusive through lane

#### Westbound Approach:

- add second left turn lane to be ~400'
- extend existing left-turn lane by ~200'

#### Southbound Approach:

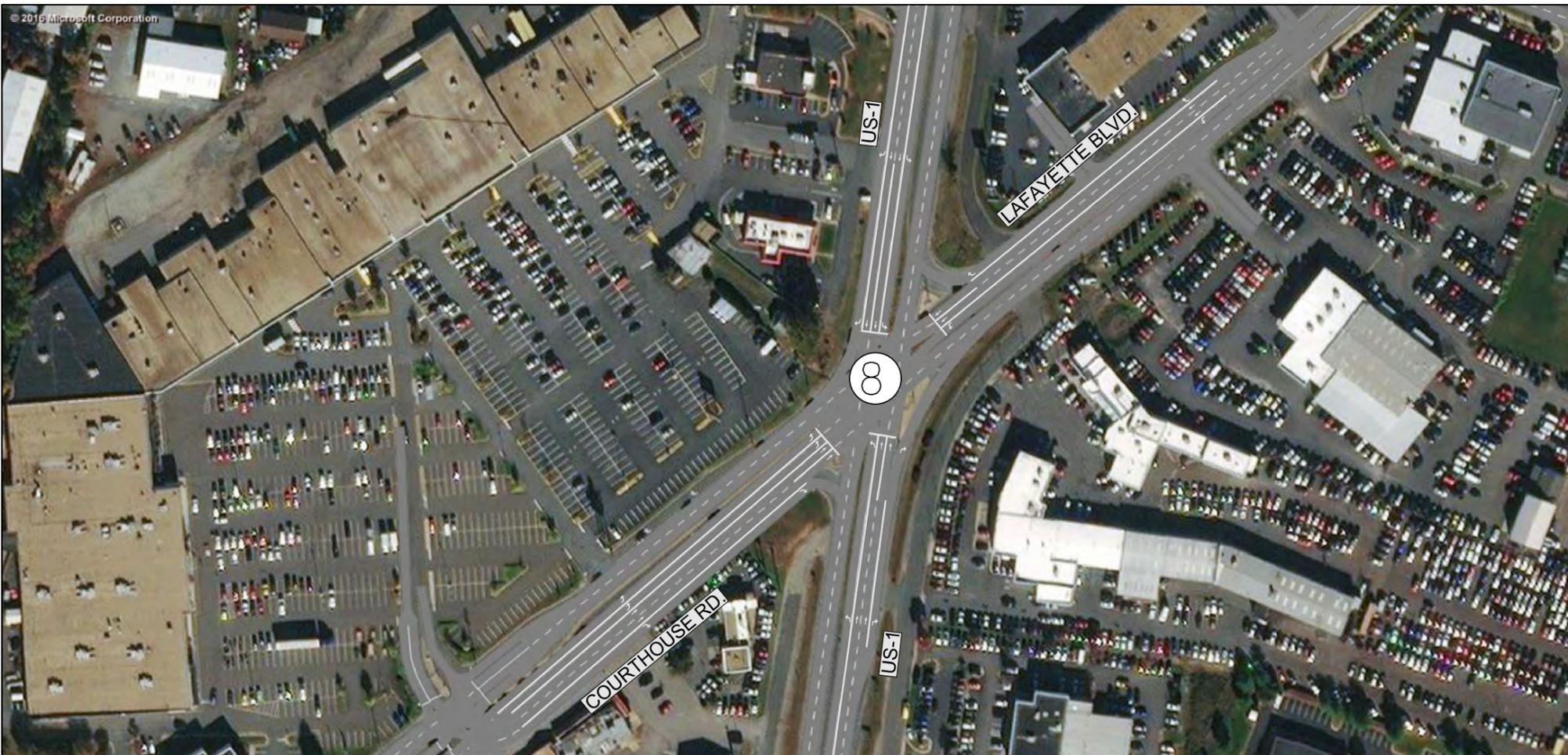
- add a left-turn lane to be ~100'
- convert shared through/left-turn lane to be exclusive through lane

\*In addition to signal optimization and coordination, as applicable



DRAWN BY:	RAM	ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS	SCALE:	NOT TO SCALE	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	7
			VDOT UPC PROJECT NO.: 107192			

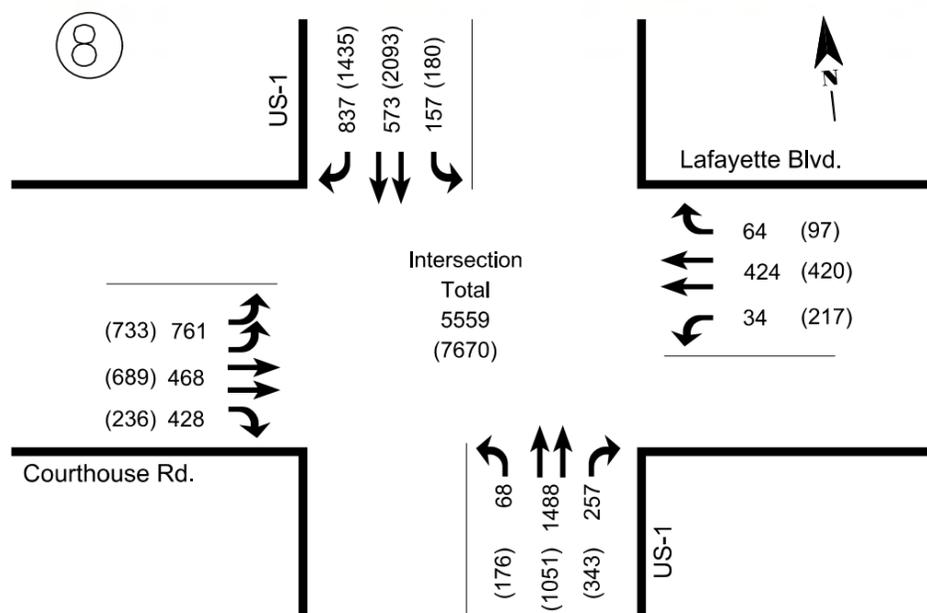




# LEGEND

- xxxx Weekday AM Peak Hour Volume (PHV) Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV Time: 4:30PM-5:30PM
- Traffic Movement
- Intersection Number

Sheet Locator



**PROPOSED IMPROVEMENTS\*:**

**Northbound Approach:**

- extend existing left-turn lane to be ~530'

**Westbound Approach:**

- extend existing left-turn lane to be ~600'
- add a right-turn lane to be ~400'
- convert shared through/right-turn lane to be exclusive through lane

**Southbound Approach:**

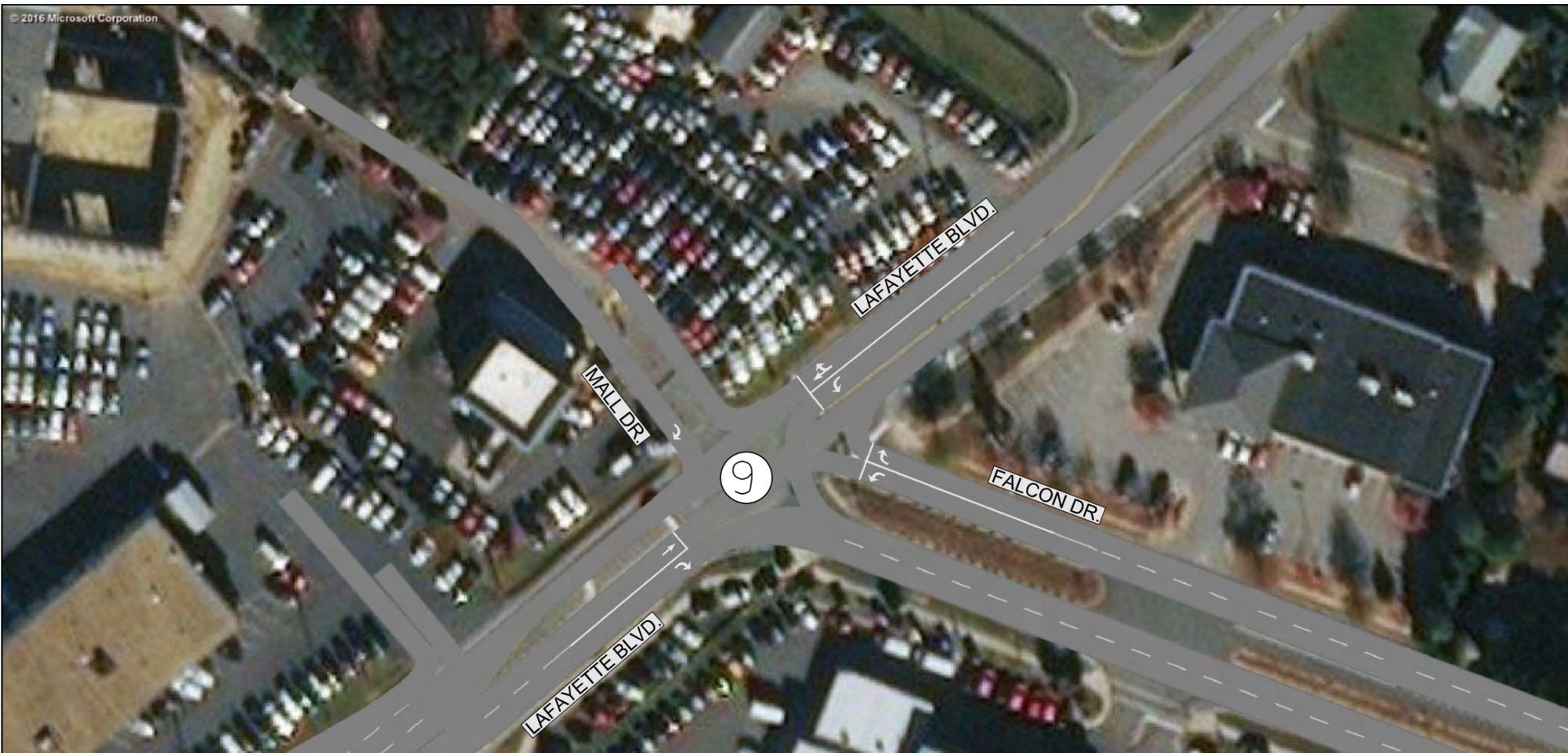
- extend existing left-turn lane to be ~380'
- extend existing right-turn lane to be ~380'

**Eastbound Approach:**

- add second left-turn lane to be ~500'
- extend existing left-turn lane to be ~500'
- add a right-turn lane to be ~500'
- convert shared through/right-turn lane to be exclusive through lane

\*In addition to signal optimization and coordination, as applicable

	DRAWN BY:	RAM	<b>ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS</b>	SCALE:	NOT TO SCALE		DATE:	10/05/2018		
	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	8	OF	9	



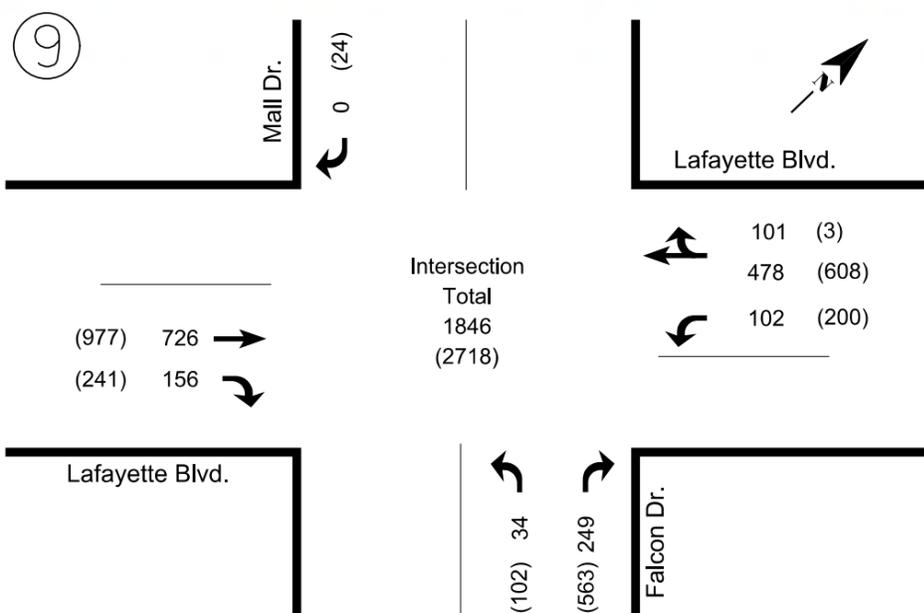
# LEGEND

xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

 Traffic Movement

 Intersection Number



### PROPOSED IMPROVEMENTS\*:

*This intersection to operate as a 3-leg intersection. Access to Mall Dr. will be limited to right-in/right-out only.*

#### Northbound Approach:

- convert shared through/left-turn lane to be exclusive left-turn lane

#### Eastbound Approach:

- remove left-turn lane into Mall Dr.

\*In addition to signal optimization and coordination, as applicable

Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 1 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

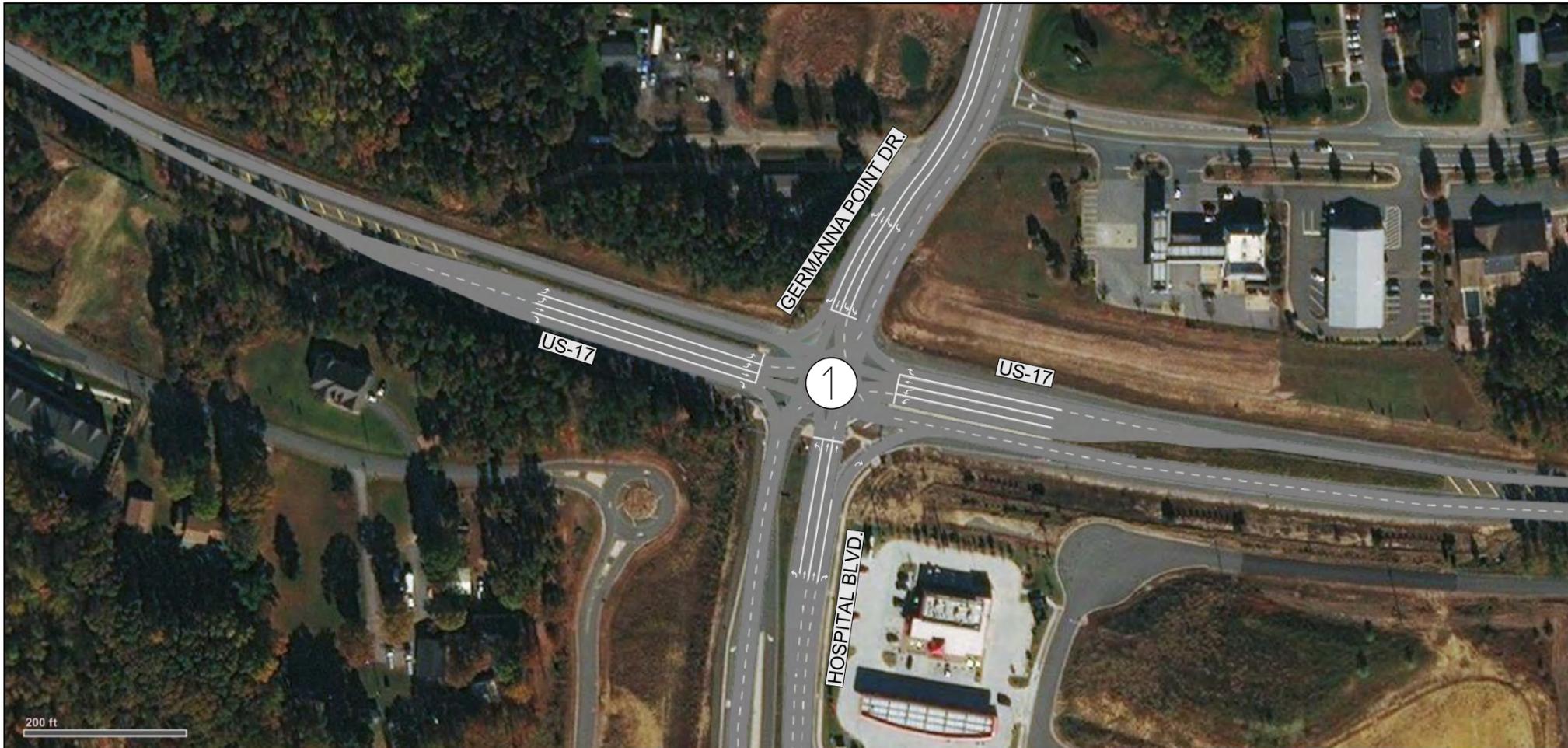
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

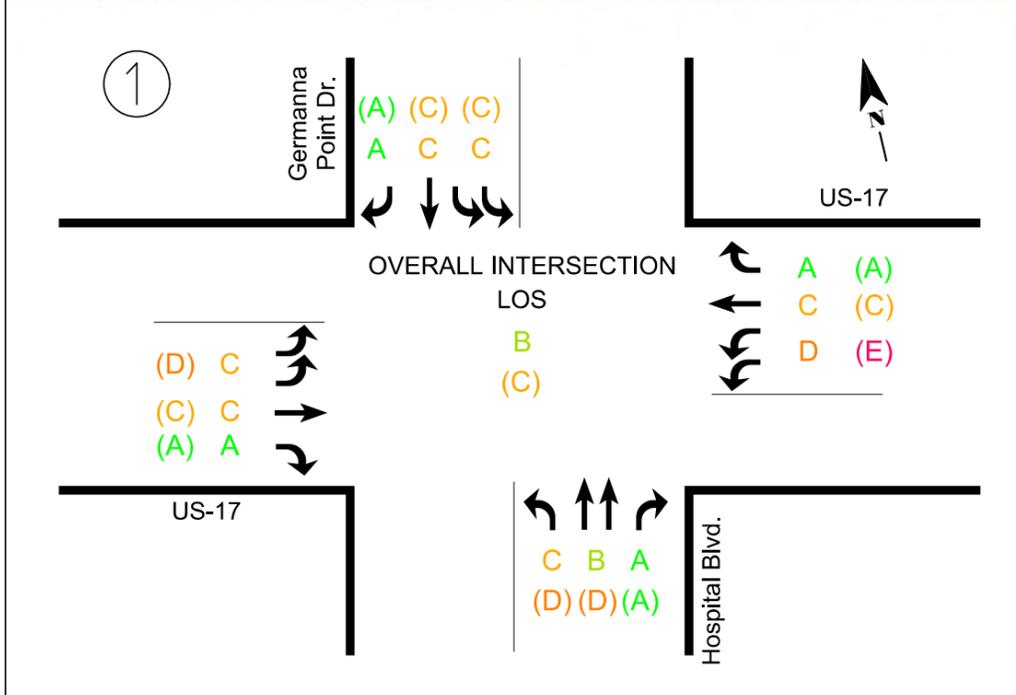
SHEET NO.: 9 OF 9



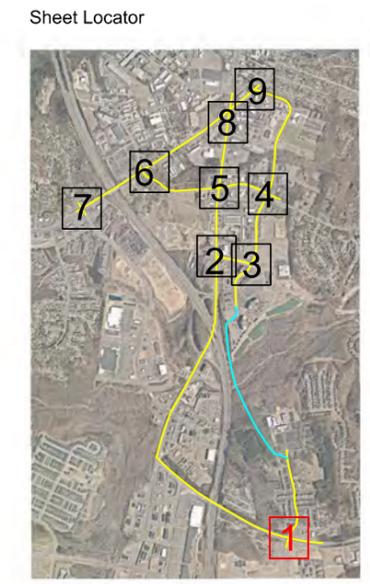


# LEGEND

- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP



Operational capacity of the corridor for the future year (2035) Alternative 1 scenario was analyzed in VISSIM for AM and PM peak hours. Delays were used to determine the operating Level of Service for individual movements and intersections.

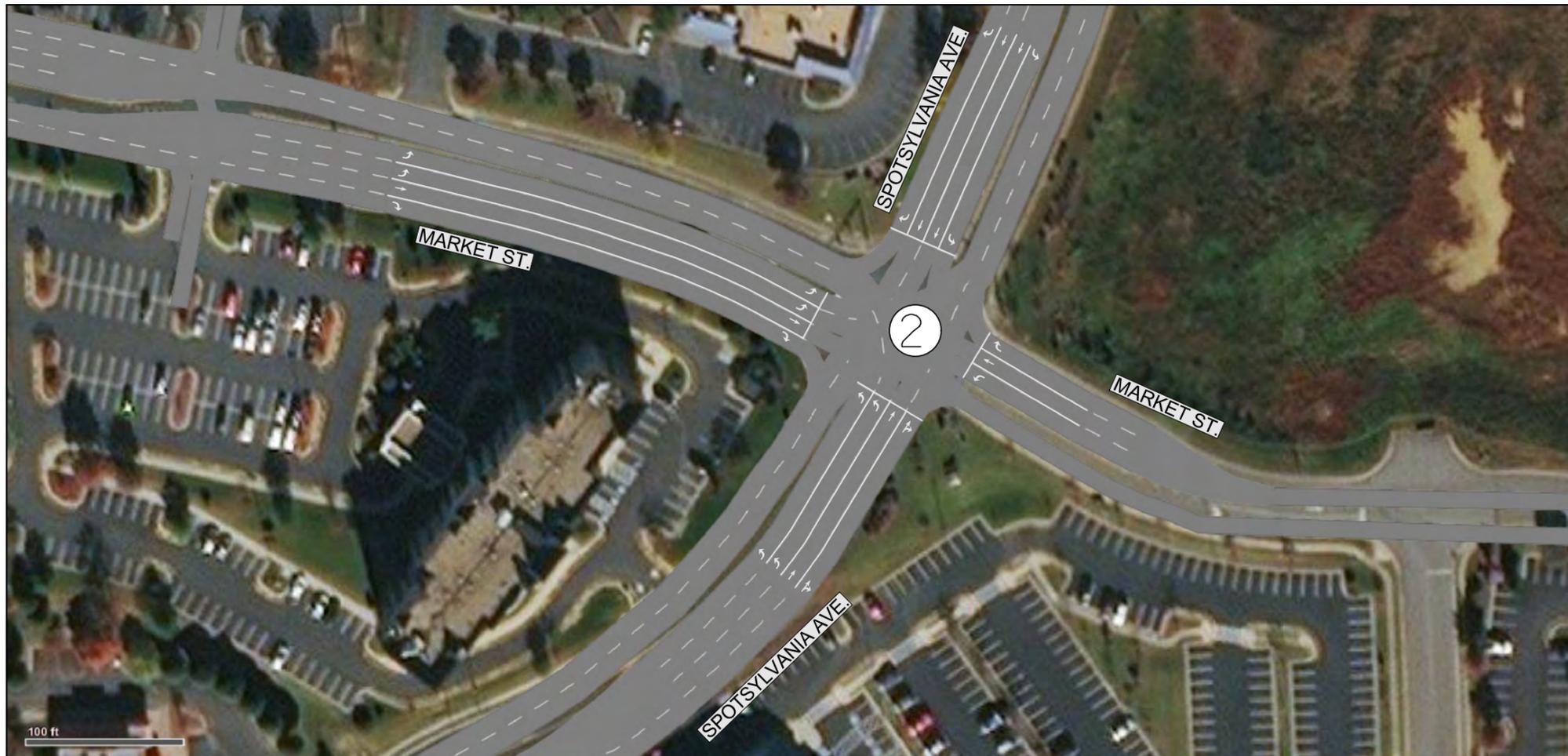


10/8/2018  
9:02:23 AM



DRAWN BY:	RAM	2035 ALTERNATIVE 1 - LEVELS OF SERVICE	SCALE:	NOT TO SCALE	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1
			VDOT UPC PROJECT NO.: 107192			



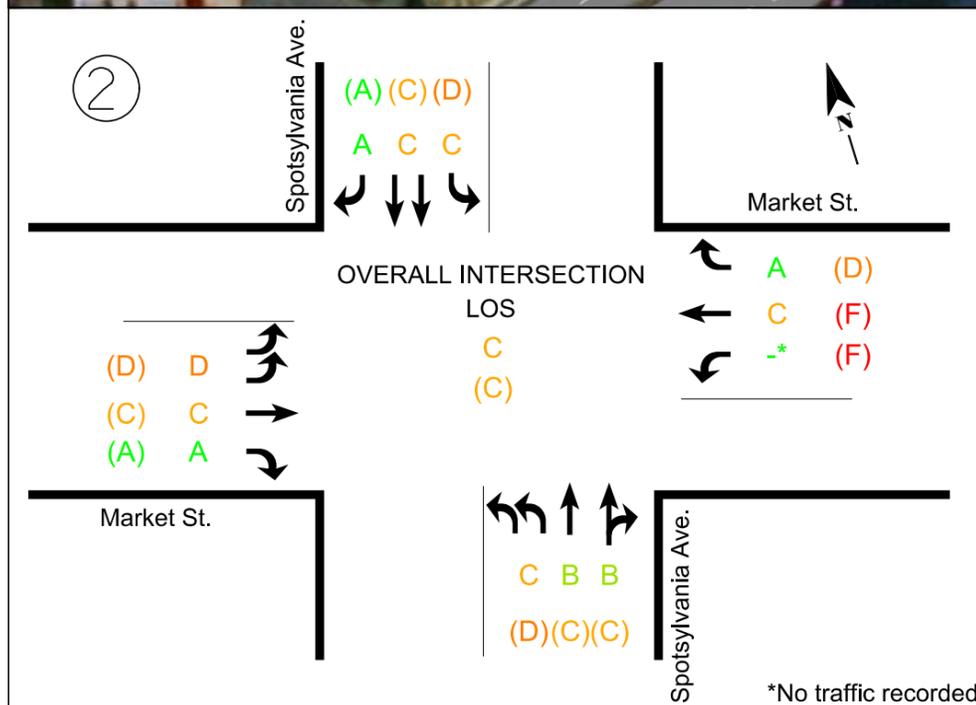
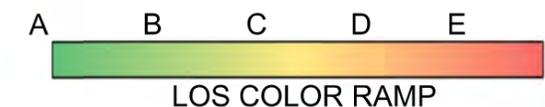


# LEGEND

X (X) AM (PM) Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 1 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

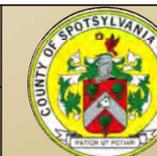
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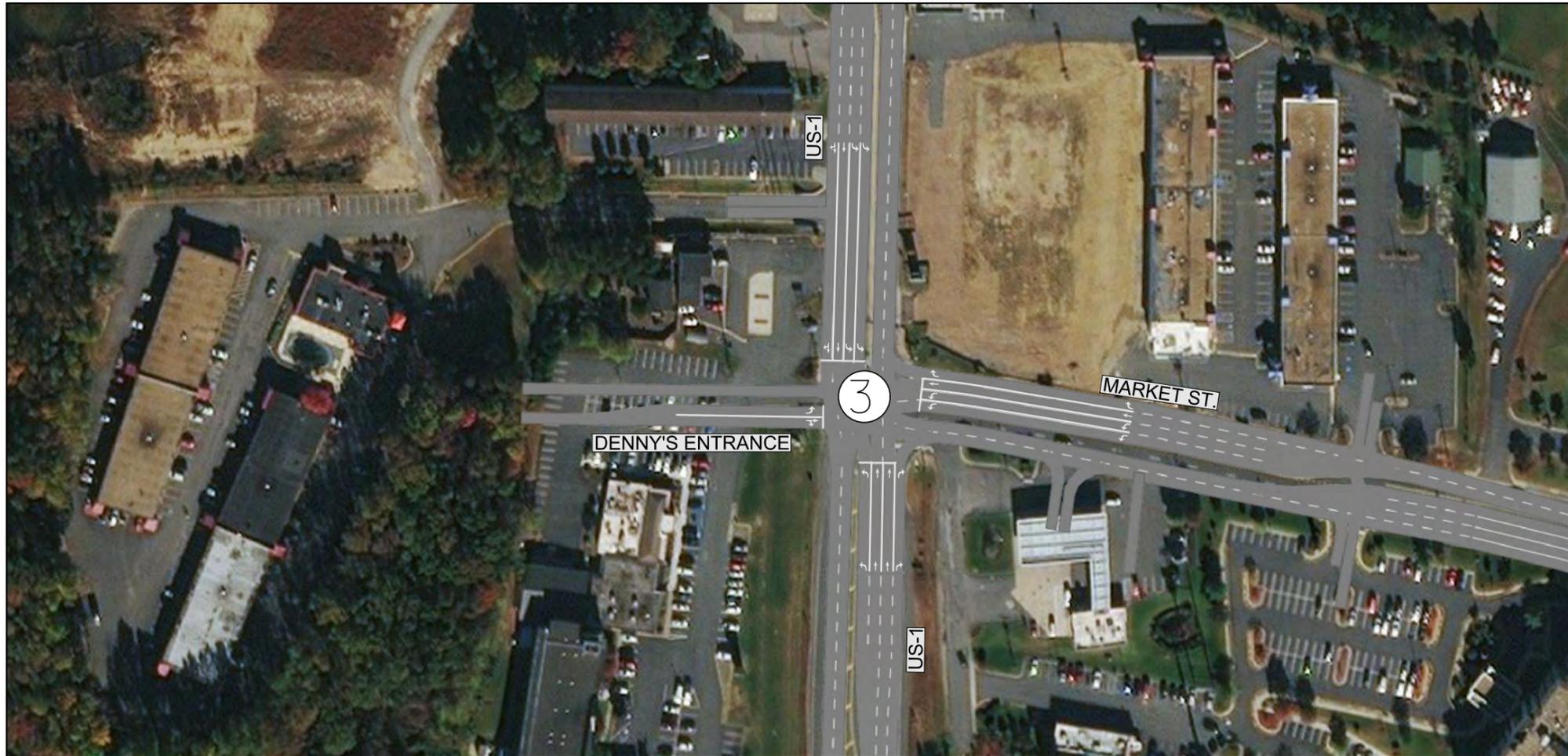
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

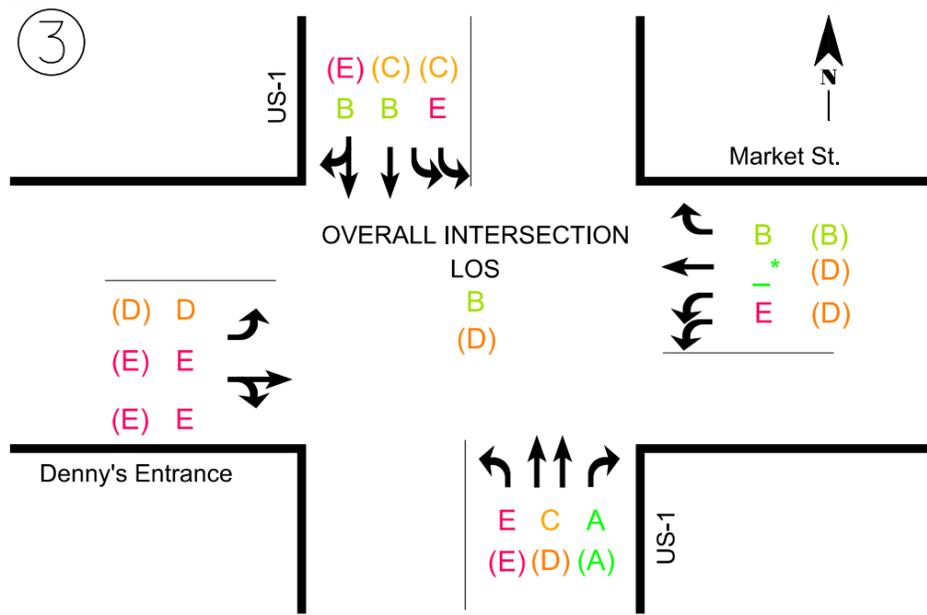
SHEET NO.: 2 OF 9





# LEGEND

- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP



Sheet Locator



10/8/2018 9:36:23 AM



DRAWN BY: RAM  
CHECKED BY: KHB

## 2035 ALTERNATIVE 1 - LEVELS OF SERVICE

## RTE. 1/208 CORRIDOR STUDY

SCALE:

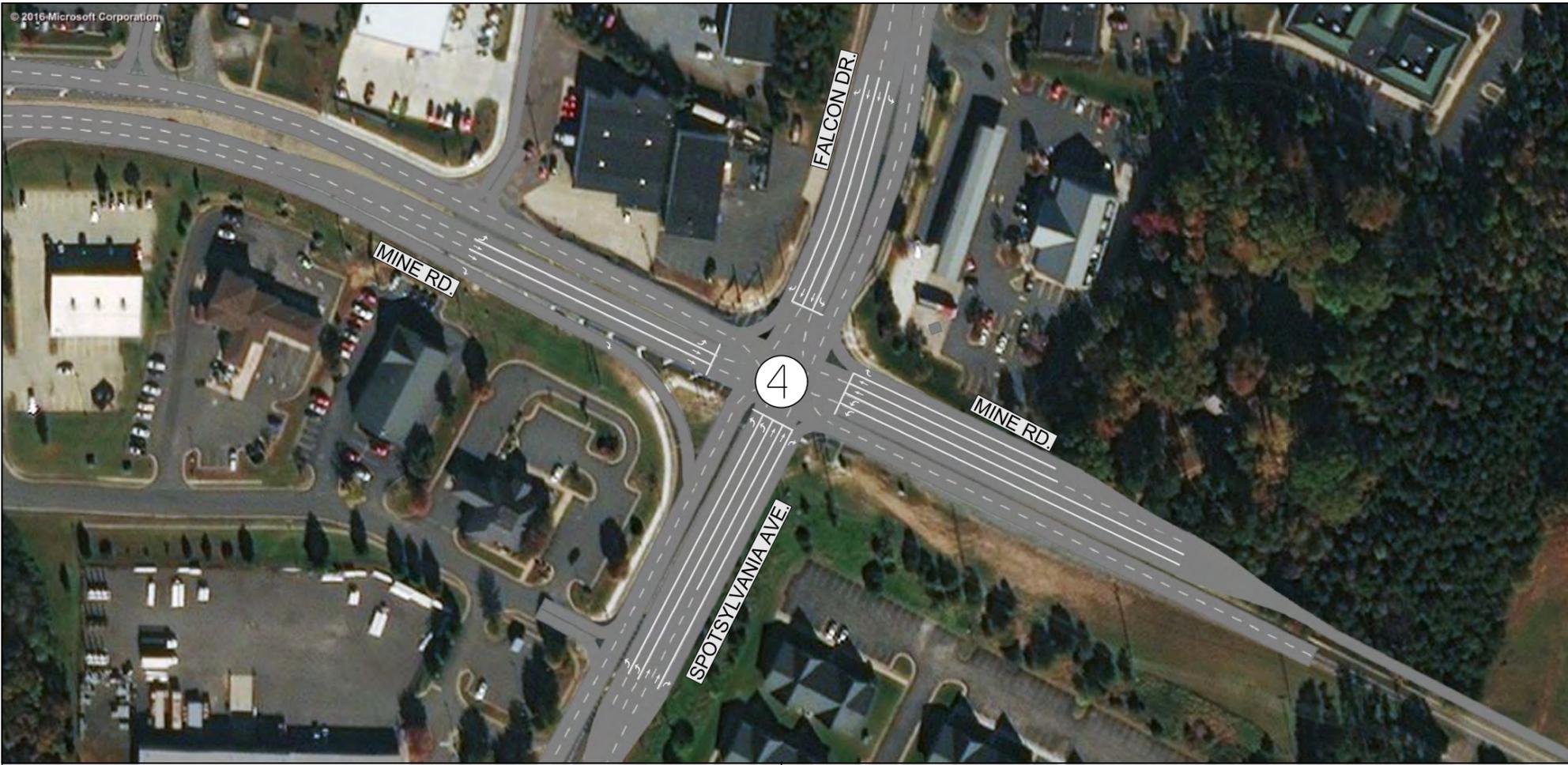
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DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003  
VDOT UPC PROJECT NO.: 107192

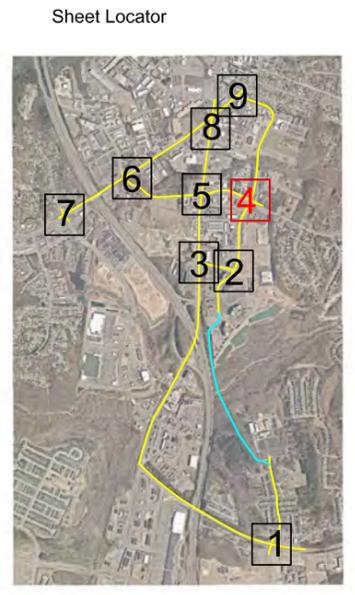
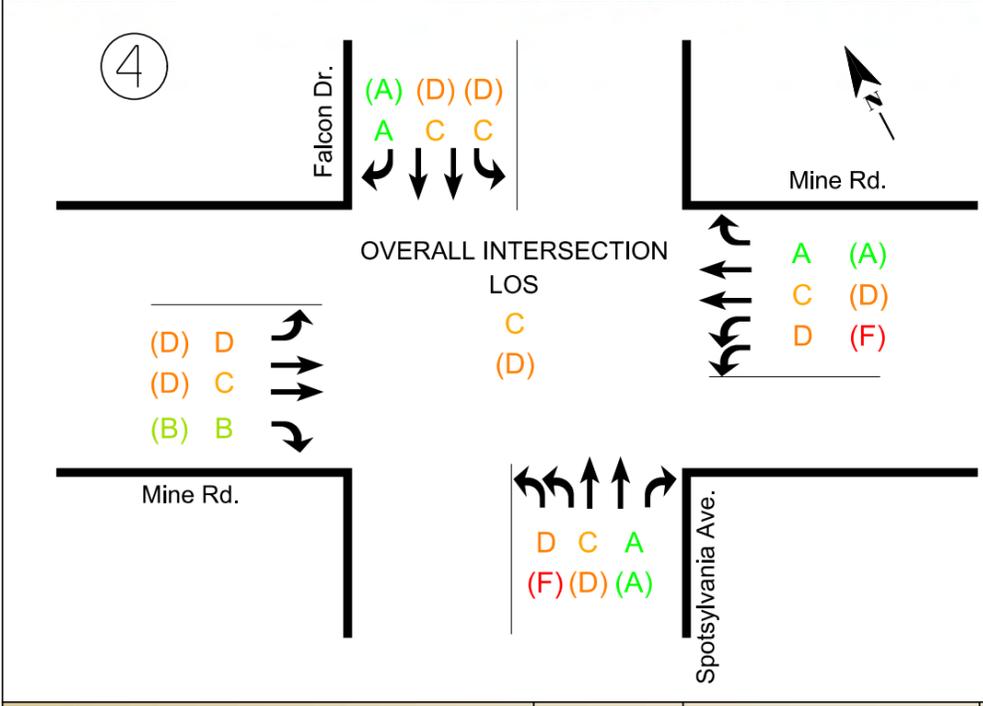
SHEET NO.: 3 OF 9





# LEGEND

- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP

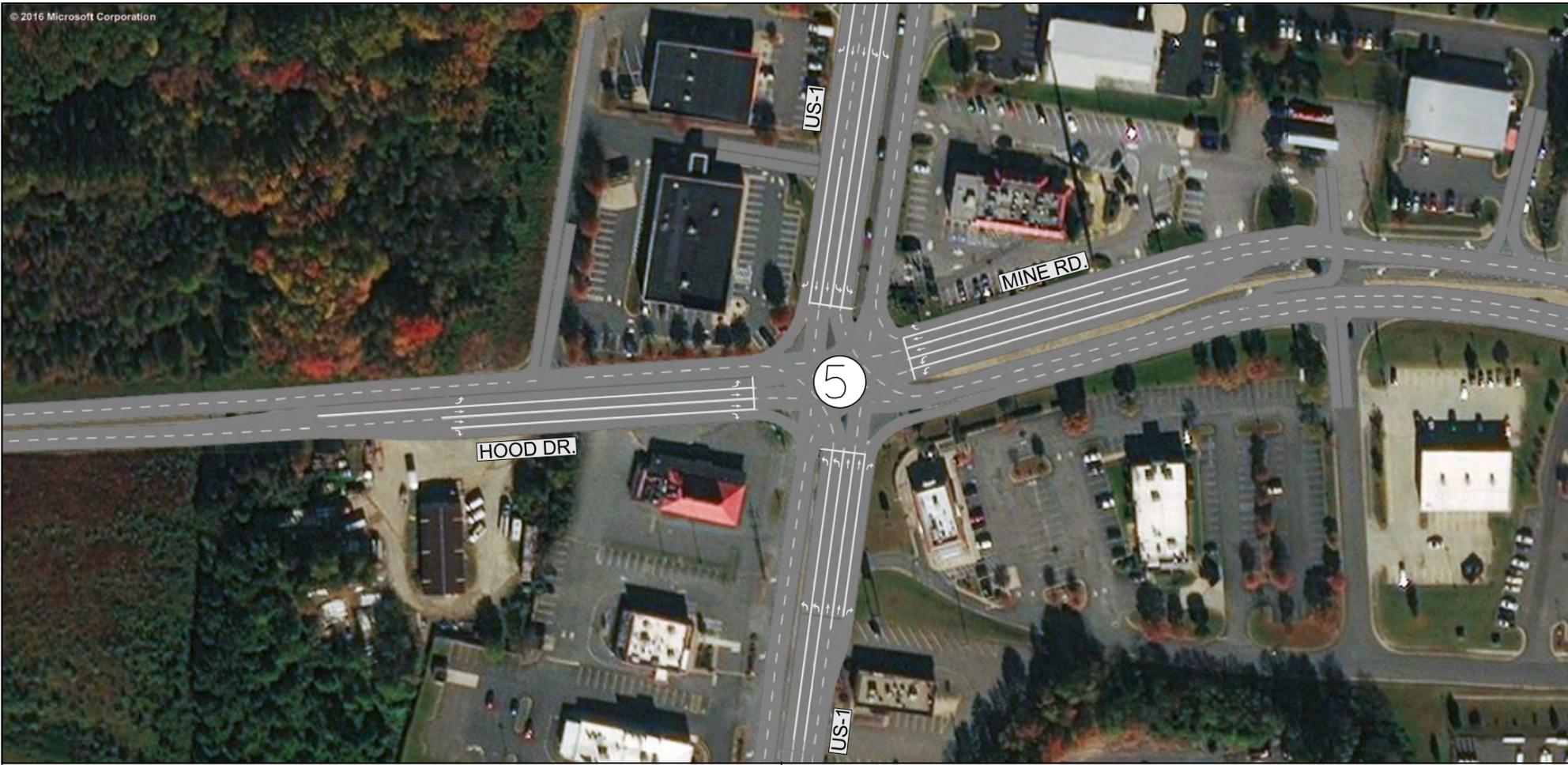


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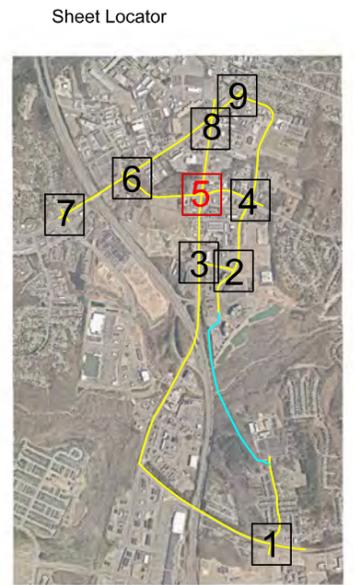
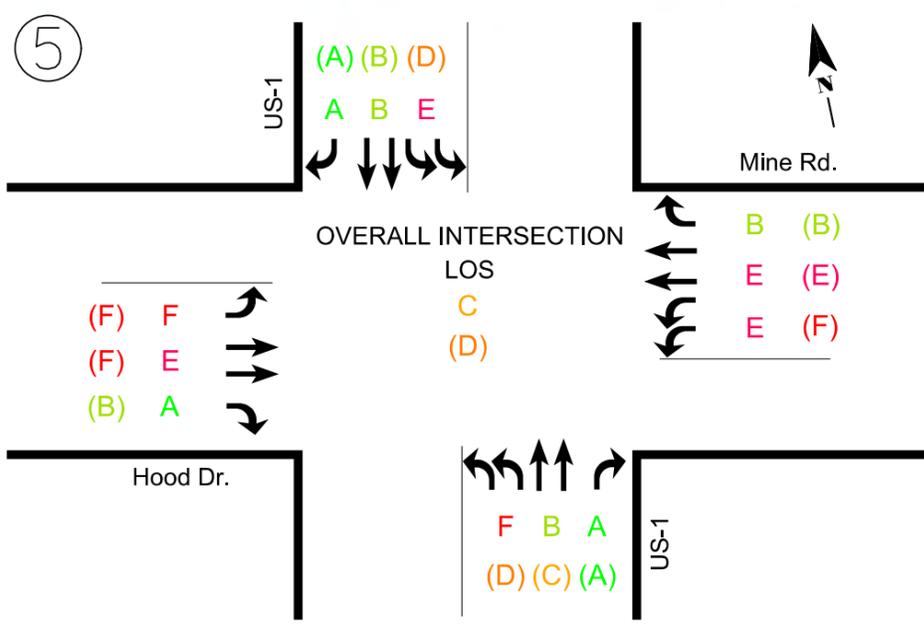
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CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	4
			VDOT UPC PROJECT NO.: 107192			





# LEGEND

- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP

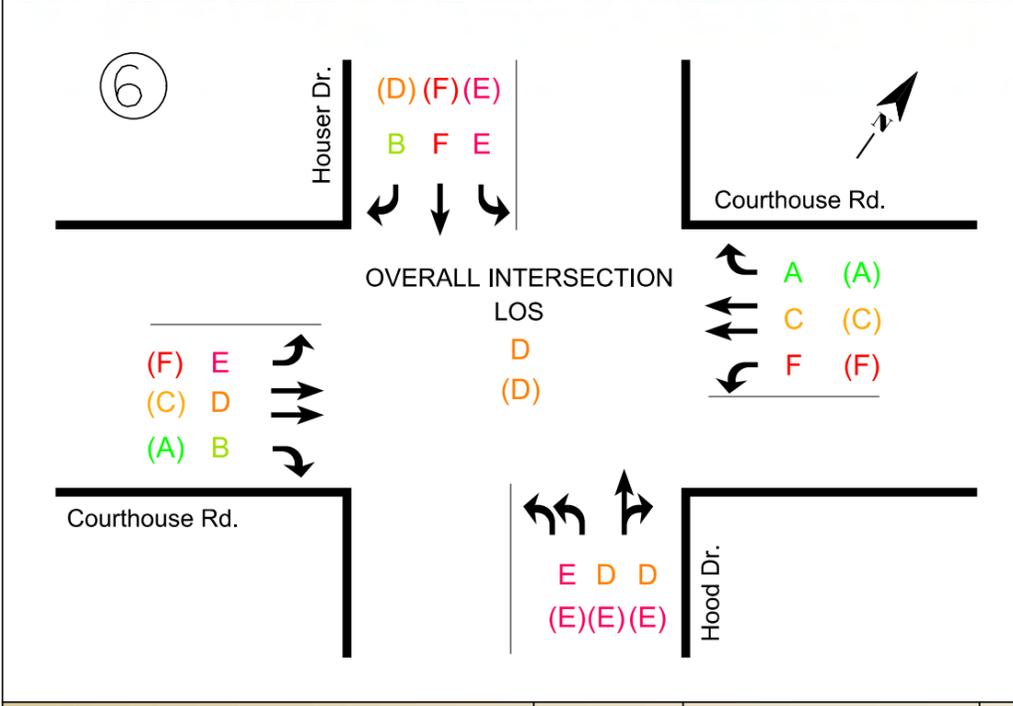


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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	5	OF	

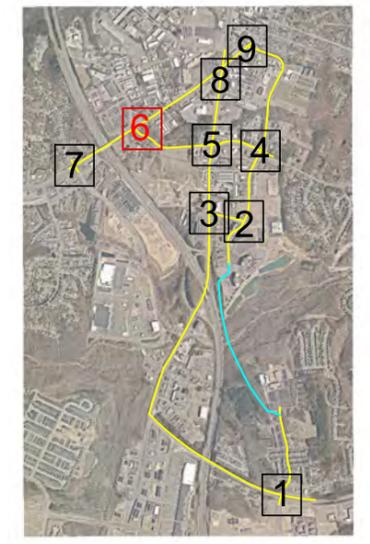


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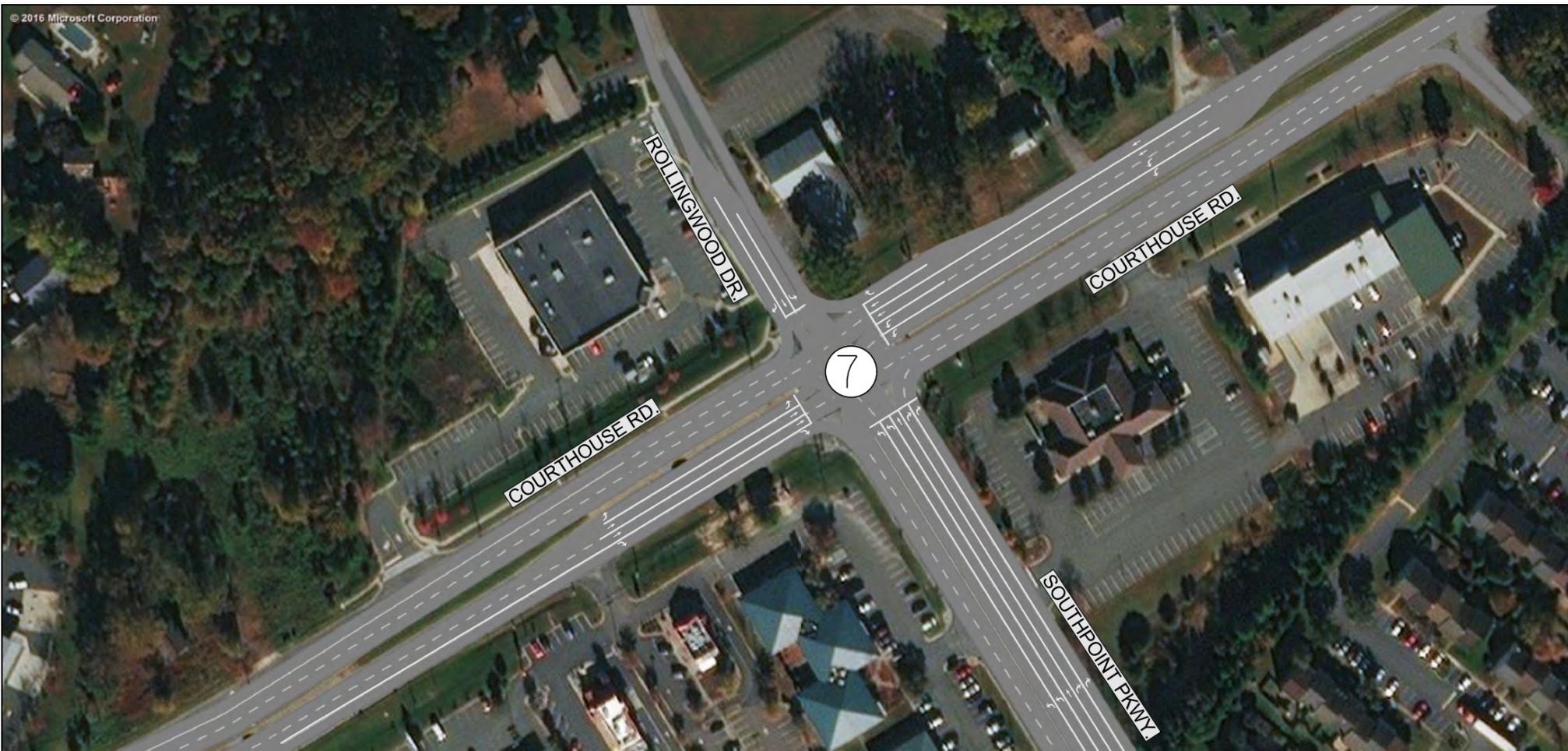
- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP



Sheet Locator



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	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	6	OF	

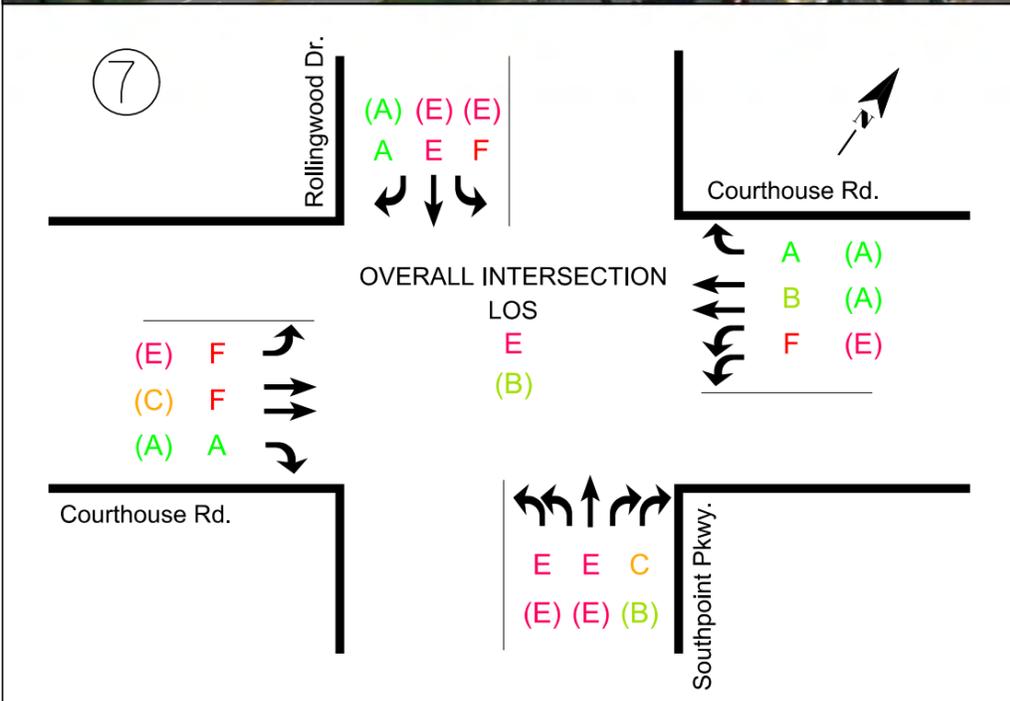
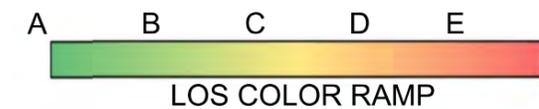


# LEGEND

X (X) AM (PM) Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 1 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

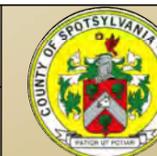
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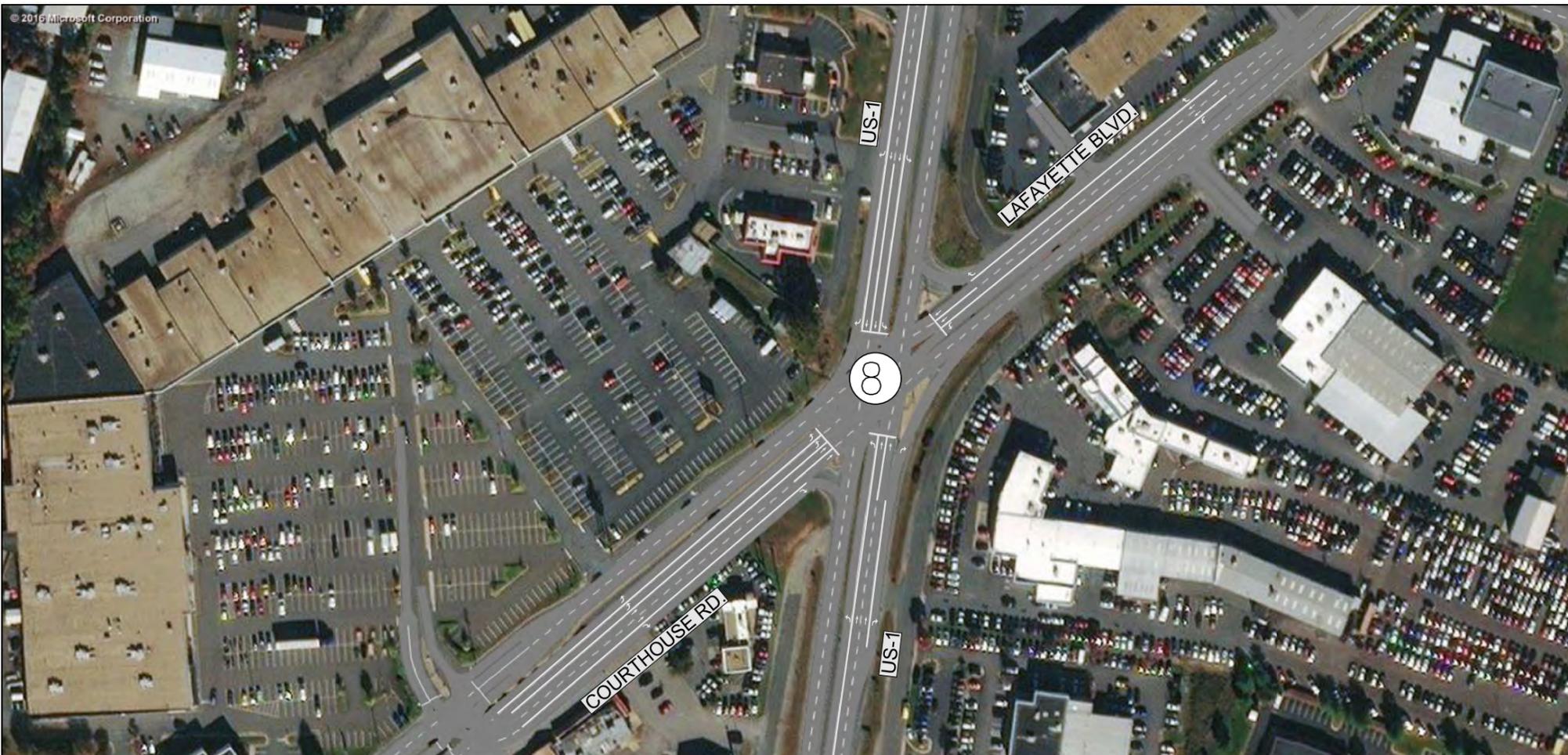
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VDOT UPC PROJECT NO.: 107192

DATE: 10/05/2018

SHEET NO.: 7 OF 9





# LEGEND

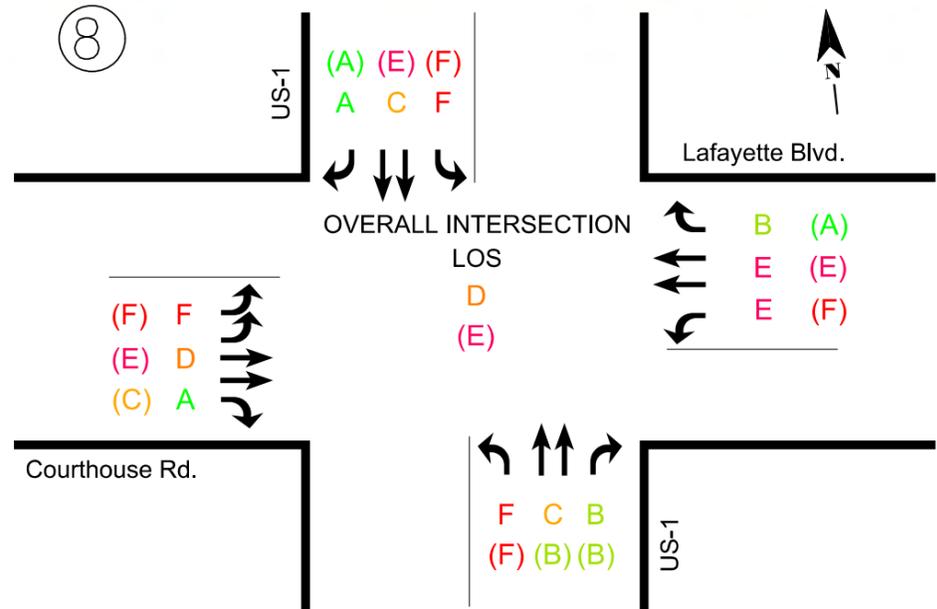
X (X) AM (PM) Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



8



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 1 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

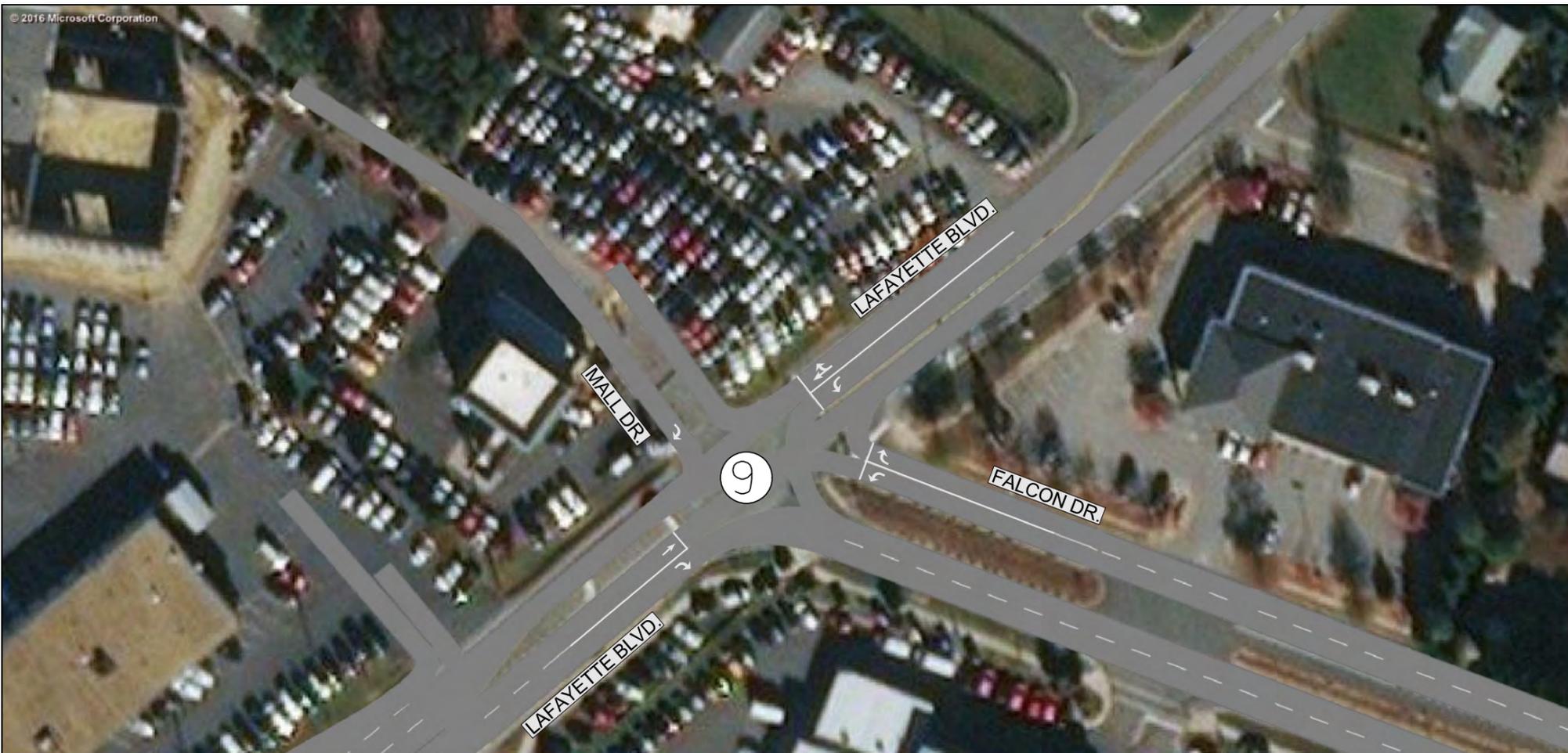
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JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 8 OF 9



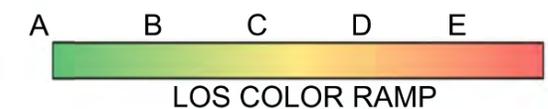


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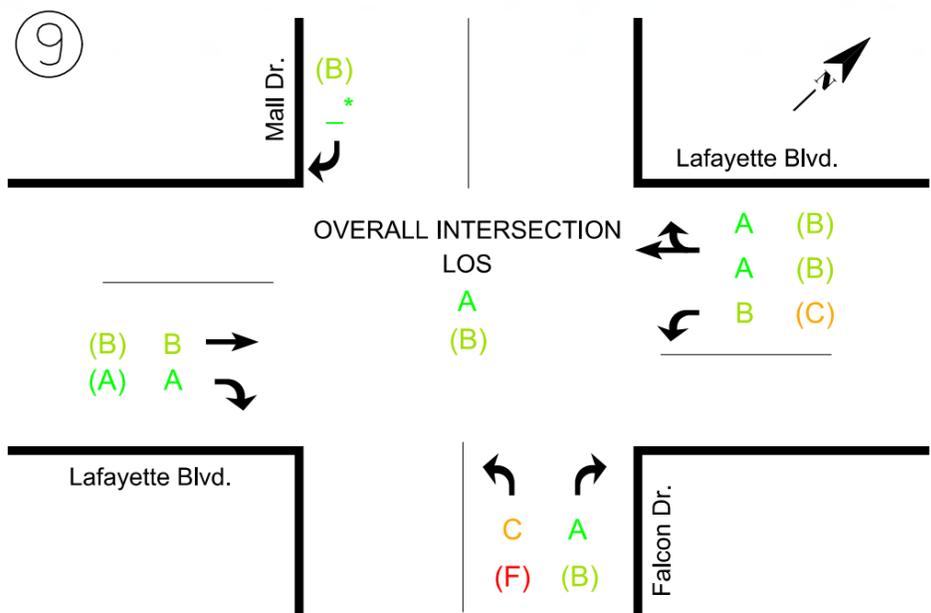
X (X) AM (PM) Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



\*No traffic recorded

	DRAWN BY:	RAM	<b>2035 ALTERNATIVE 1 - LEVELS OF SERVICE</b> <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	NOT TO SCALE	DATE:	10/05/2018	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	9	OF	

## Alternative 2

Alternative 2 was derived from the issues identified in the future no-build scenario. This alternative proposed the improvements (adding thru and/or turn lanes) to the existing study intersections without adding any new roadways within the study corridor. The proposed improvements at the intersections considered the available right-of-way, shown on the County's GIS maps, to avoid costly (and unrealistic) widening at the intersections. Additionally, this alternative considered addressing the issues within the intersections by maintaining both Rte. 1 and Rte. 208 as four-lane roadways.

Traffic data was based on the future conditions of the travel demand model which accounted for the expected growth in the area, in general, and within the limits of the study corridor, specifically. The VISSIM model was updated with these traffic volumes and the proposed improvements at the intersections, in terms of adding capacity and/or lane configurations, in addition to the optimized and coordinated signals to achieve best possible LOS at each intersection. The overall intersection LOS for weekday AM, PM, and Saturday peak hours are shown in Table F 4 and the single movements LOS details are shown on individual sheets. The following can be concluded from the capacity analysis results of Alternative 2:

1. All the intersections perform at acceptable LOS D or better during AM, PM, and Saturday peak hours, except the intersection of Rte. 208 at Rollingwood Dr./Southpoint Pkwy. and the intersection of US-1 at Rte. 208/Lafayette Blvd.

Table F 4: Alternative 2 Intersection LOS

#	Intersection	Peak Hour		
		AM 7:30 - 8:30	PM 4:30 - 5:30	SAT 11:45AM - 12:45PM
1	US-17 at Germanna Point Dr./Hospital Blvd.	B	C	B
2	Spotsylvania Ave. at Market St.	B	B	B
3	US-1 at Market St./Denny's Ent.	C	D	D
4	Mine Rd. at Spotsylvania Ave./Falcon Dr.	C	C	C
5	US-1 at Hood Dr./Mine Rd.	C	C	C
6	Rte. 208 at Hood Dr./Houser Dr.	D	D	C
7	Rte. 208 at Rollingwood Dr./Southpoint Pkwy.	E	B	C
8	US-1 at Rte. 208/Lafayette Blvd.	D	E	D
9	Lafayette Blvd. at Falcon Dr./Mall Dr.	B	C	C

**Alternative 2 Cost:**

Similar to Alternative 1, cost estimate for this alternative was determined for comparison purposes. The cost estimate was also broken down into three main categories; (1) structural, (2) construction, and (3) environmental. However, this alternative does not include any bridges and the structural cost is only the cost of proposed bus pullouts. This will also impact the environmental cost since it does not require wetland/stream mitigations, environmental permitting, and air/noise studies. The cost of this alternative is mainly the improvements proposed at the nine study intersections in terms of adding capacity as shown in Table F 5. The VDOT provided unit costs from the TMPD, inflated to year (2018), was used to determine the planning level cost estimates for this alternative, which includes the low and high ranges. Cost estimates provided herein are not for construction purposes. Detailed engineering design and cost estimates are required to identify the budget needed for implementing Alternative 2. In general, the cost estimate of this alternative is impacted by the following:

- a. Does not include a bridge.
- b. Anticipated high cost for ROW acquisition (~36% of the construction & structural cost).
- c. Relatively, minimal impact on the environmental due to widening within existing intersections only.
- d. Improvements proposed at intersections to keep both Rte. 1 and Rte. 208 as 4-lane roadways.

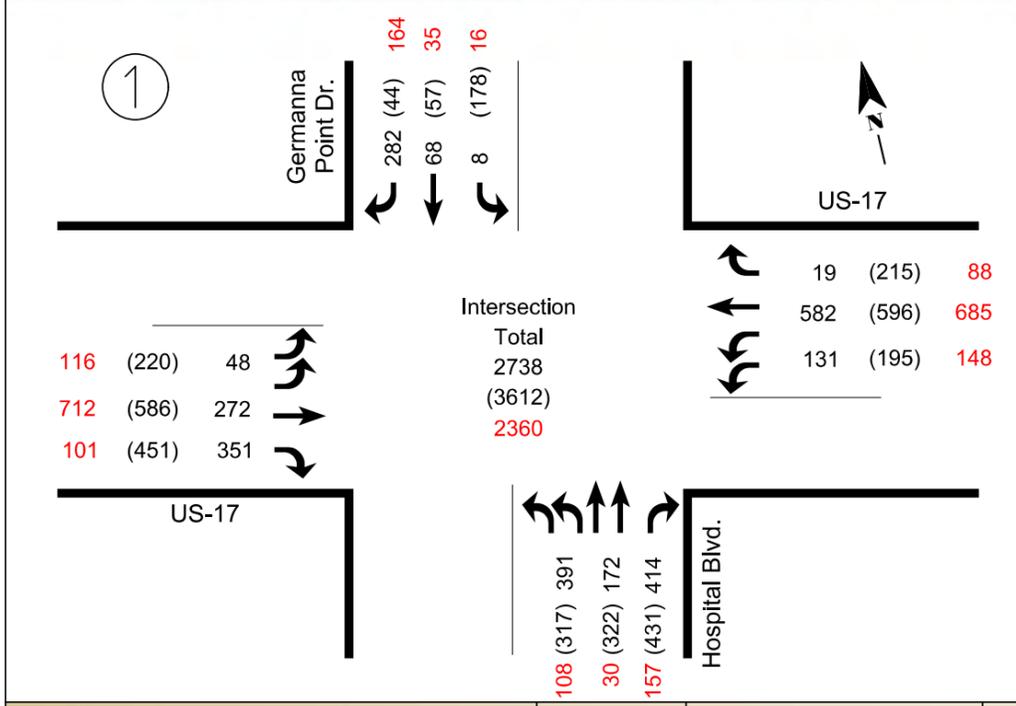
Table F 5: Alternative 2 Planning Level Construction Cost Estimate

Item	Quantity	Unit Cost		Unit	Costs	
		Low	High		Low	High
<b>Structural Cost</b>						
<b>Bus Pullout Subtotal</b>	7.00	\$30,000		Each	<b>\$210,000</b>	
<b>Construction Cost</b>						
<b>Signal</b>						
Modify Existing Signal	8.00	\$142,000	\$306,000	Per Intersection	\$1,136,000	\$2,448,000
Improve phasing for signalized intersection	9.00	\$11,000	\$16,000	Per Intersection	\$99,000	\$144,000
Provide pedestrian signal phase	3.00	\$50,000	\$70,000	Per Intersection	\$150,000	\$210,000
<b>Pavement</b>						
Right turn lane	33.50	\$60,000	\$130,000	Per 100'	\$2,010,000	\$4,355,000
Right turn Taper	10.00	\$40,000	\$87,000	Per 100'	\$400,000	\$870,000
Left turn lane	80.50	\$58,000	\$73,000	Per 100'	\$4,669,000	\$5,876,500
Left turn taper	22.00	\$75,000	\$97,000	Per 200'	\$1,650,000	\$2,134,000
1 lane	0.50	\$390,000	\$600,000	CPM*	\$195,000	\$300,000
<b>Pedestrians</b>						
Provide pedestrian crosswalk	1.00	\$20,000	\$30,000	Each	\$20,000	\$30,000
Provide 5' sidewalk (Based on Exist.)	0.65	\$322,000	\$1,044,000	CPM	\$209,300	\$678,600
<b>Construction Subtotal</b>					<b>\$10,539,000</b>	<b>\$16,747,000</b>
<b>Structural &amp; Construction Subtotal</b>					<b>\$10,749,000</b>	<b>\$16,957,000</b>
<b>Right-of-Way (36% ST &amp; CN)</b>					<b>\$3,869,640</b>	<b>\$6,104,520</b>
<b>Subtotal (Structural &amp; Construction)</b>					<b>\$14,620,000</b>	<b>\$23,070,000</b>
<b>Environmental Cost</b>						
NEPA Environmental Documentation	1.00	\$10,000		Each	\$10,000	
Phase 1 Cultural Resource	1.00	\$6,000		Each	\$6,000	
Phase 1 Cultural Survey	1.00	\$4,000		Each	\$4,000	
<b>Subtotal</b>					<b>\$20,000</b>	
<b>Grand Total</b>					<b>\$15,000,000</b>	<b>\$23,500,000</b>
*CPM: Cost Per Mile						



# LEGEND

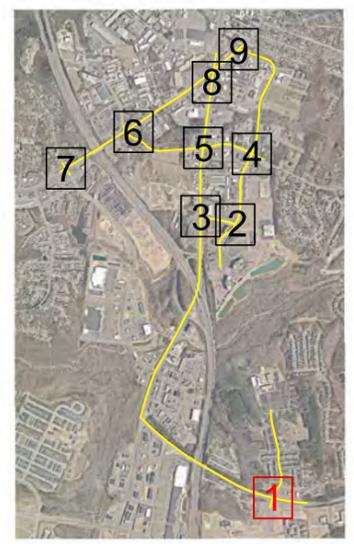
- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM
- Traffic Movement
- Intersection Number



### PROPOSED IMPROVEMENTS\*:

- Northbound Approach:**
  - add a second left-turn lane to be ~275'
  - extend existing left-turn lane to be ~275'
- Westbound Receiving:**
  - add additional receiving lane to be ~750'

Sheet Locator



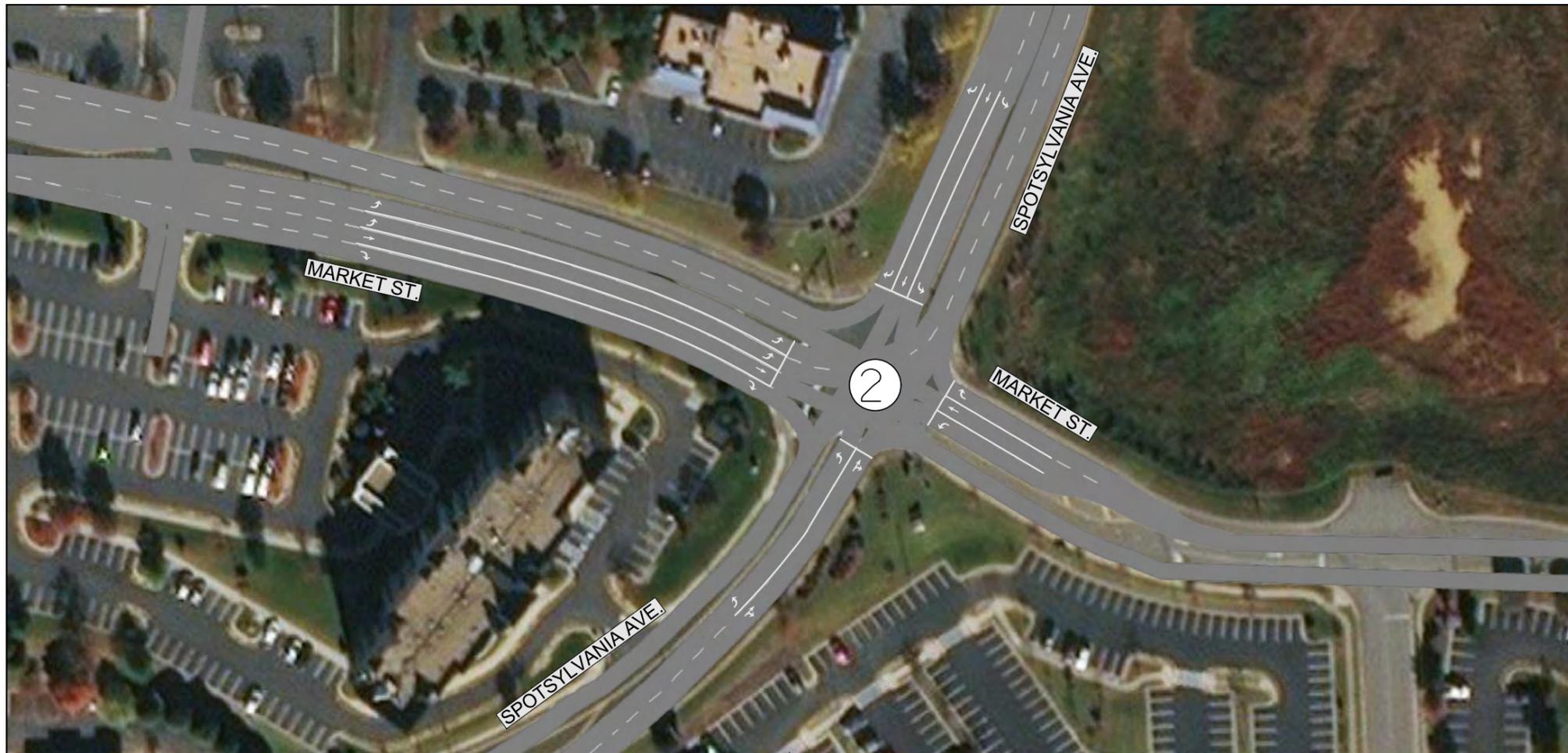
\*In addition to signal optimization and coordination, as applicable

10/8/2018 7:06:35 AM



DRAWN BY:	RAM	ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS	SCALE:	NOT TO SCALE	DATE:	10/05/2018		
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1	OF	9
			VDOT UPC PROJECT NO.: 107192					





## LEGEND

xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM

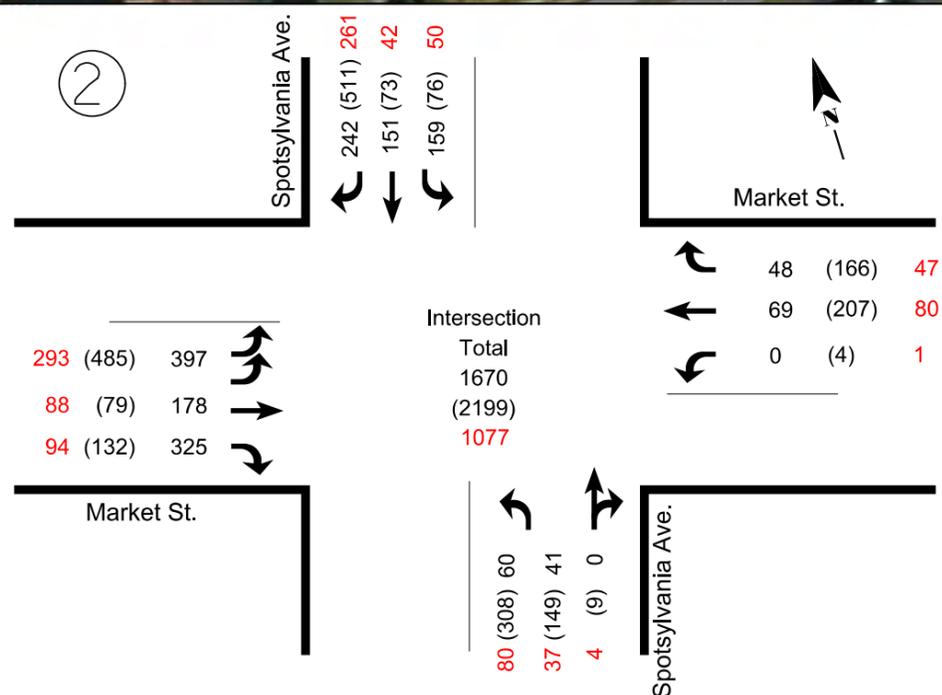


Traffic Movement



Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Westbound Approach:

- add a left-turn lane to be ~100'
- convert shared through/left-turn lane to be exclusive through lane

#### Southbound Approach:

- add a right-turn lane to be ~250'
- convert shared through/right-turn lane to be exclusive through lane

#### Eastbound Approach:

- add second left-turn lane to be ~425'
- convert shared through/left-turn lane to be exclusive through lane

\*In addition to signal optimization and coordination, as applicable



DRAWN BY:

RAM

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

SCALE:

NOT TO SCALE

DATE:

10/05/2018

CHECKED BY:

KHB

RTE. 1/208 CORRIDOR STUDY

JMT PROJECT NO.: 15-0038-003

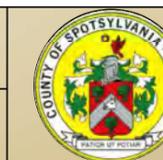
VDOT UPC PROJECT NO.: 107192

SHEET NO.:

2

OF

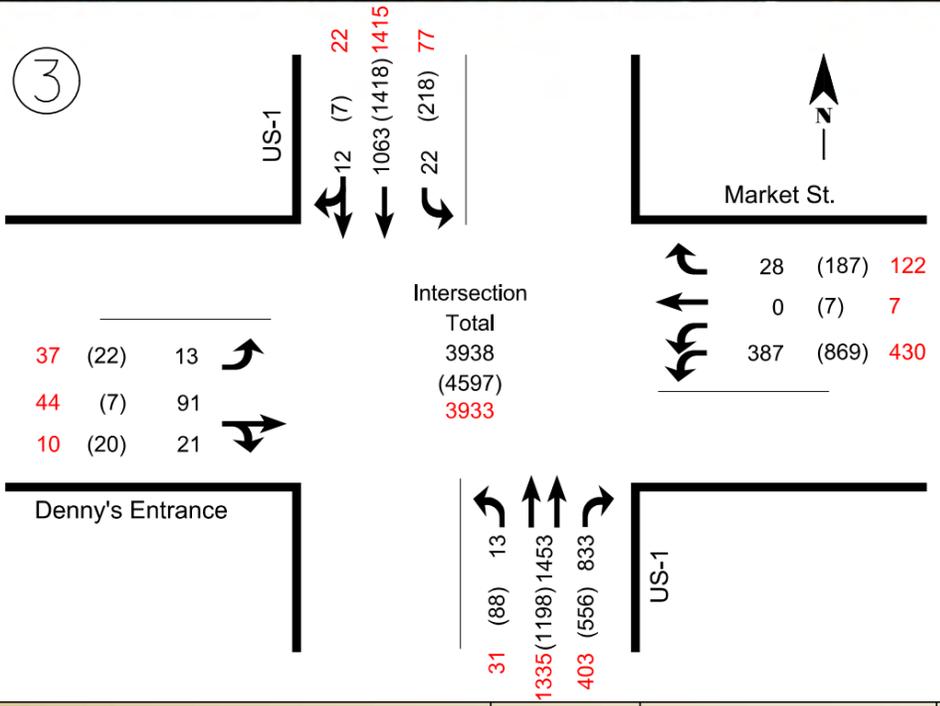
9





# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM
- Traffic Movement
- Intersection Number

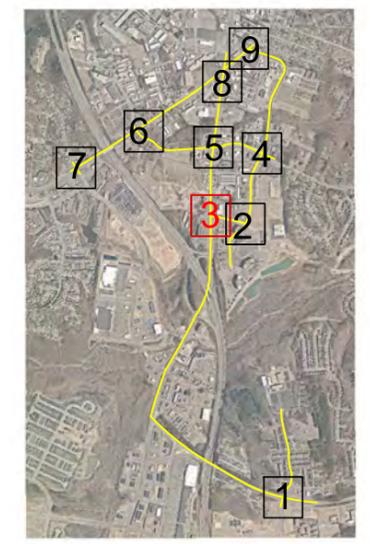


### PROPOSED IMPROVEMENTS\*:

- Westbound Approach:**
- add second left-turn lane to be ~400'
  - convert shared through/left-turn lane to be exclusive through lane
- Eastbound Approach:**
- add a left-turn lane to be ~150'
  - convert shared through/left-/right-turn lane to be shared through/right-turn lane

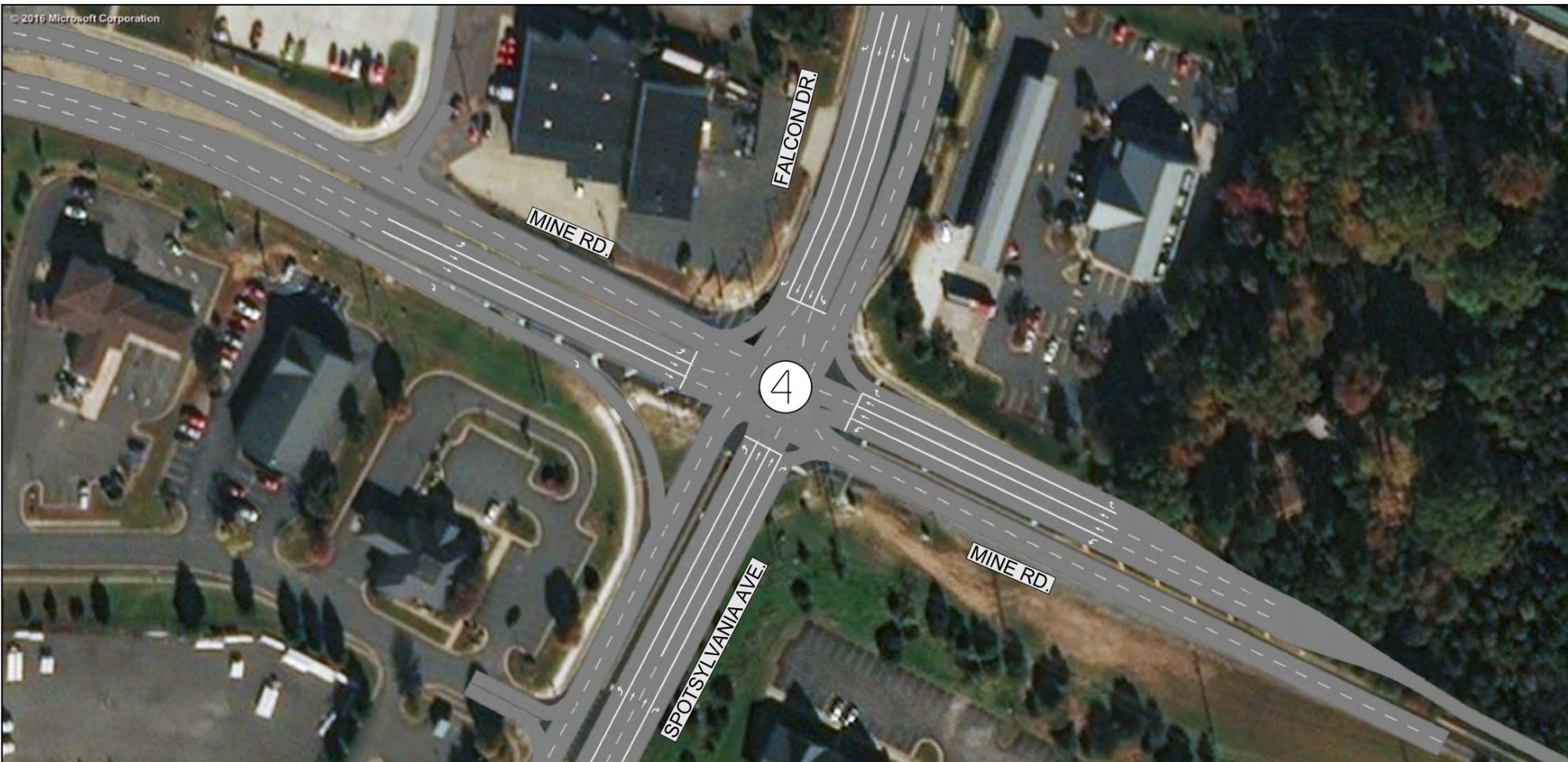
\*In addition to signal optimization and coordination, as applicable

Sheet Locator



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CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	3
			VDOT UPC PROJECT NO.: 107192			





# LEGEND

xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

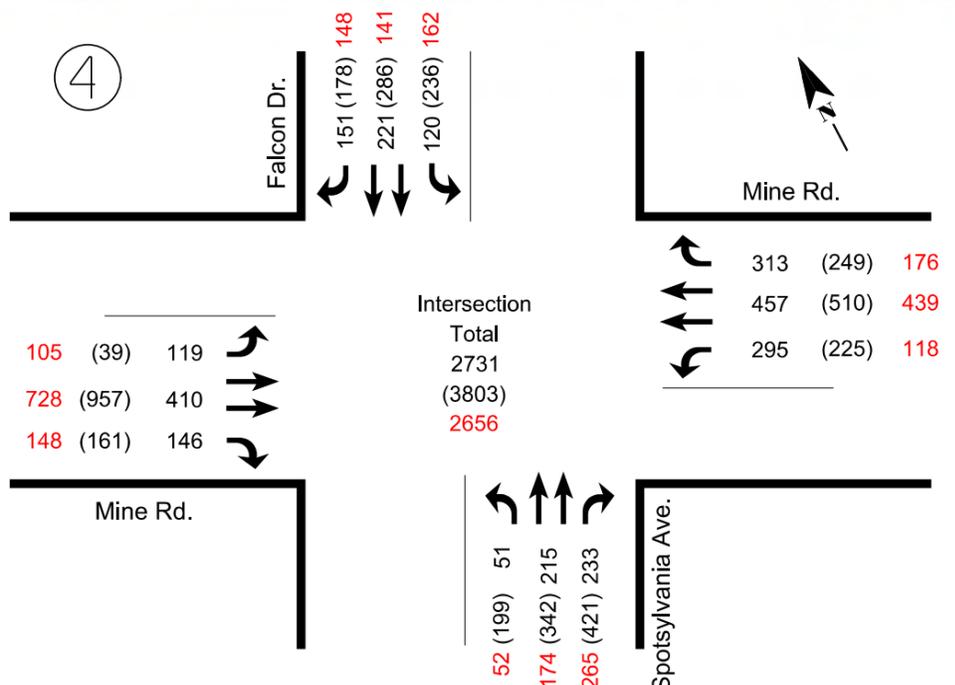
(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM

Traffic Movement

Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add second through lane
- convert shared through/left-turn lane to be exclusive through lane

#### Westbound Approach:

- add second through lane to be ~500'
- extend left-turn lane to be ~400'
- extend right-turn lane to be ~225'

#### Southbound Approach:

- add right-turn lane to be ~250'
- convert shared through/right-turn lane to be exclusive through lane
- extend left-turn lane to be ~300'

\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.:

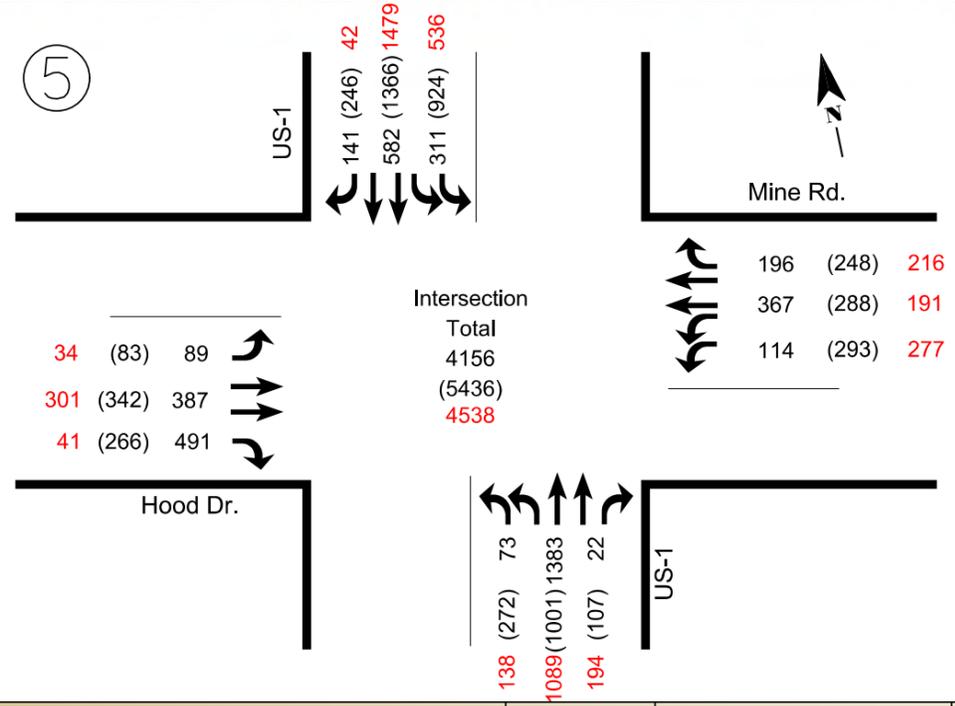
4 OF 9





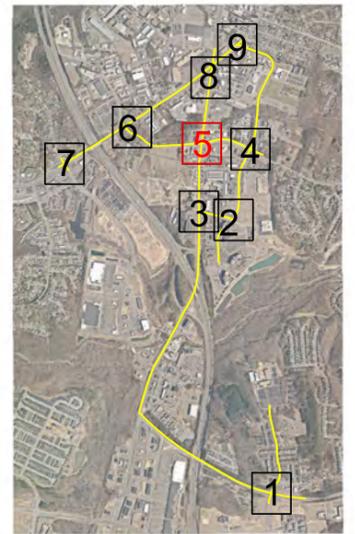
# LEGEND

- xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM
- Traffic Movement
- Intersection Number



- PROPOSED IMPROVEMENTS\*:**
- Northbound Approach:**
    - add second left-turn lane to be ~400'
  - Westbound Approach:**
    - add second left-turn lane to be ~300'
    - add second through lane
    - convert existing shared through/left-turn lane to be exclusive through lane
  - Westbound Receiving:**
    - add second receiving lane to be ~850'
  - Southbound Approach:**
    - add second left-turn lane to be ~600'
  - Eastbound Approach:**
    - add second through lane to be ~850'
    - convert shared through/left-turn lane to be exclusive through lane
    - add a left-turn lane to be ~450'

Sheet Locator



\*In addition to signal optimization and coordination, as applicable

	DRAWN BY:	RAM	<b>ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS</b>	SCALE:	NOT TO SCALE		DATE:	10/05/2018			
	CHECKED BY:	KHB		<b>RTE. 1/208 CORRIDOR STUDY</b>	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	5	OF	9		



# LEGEND

xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

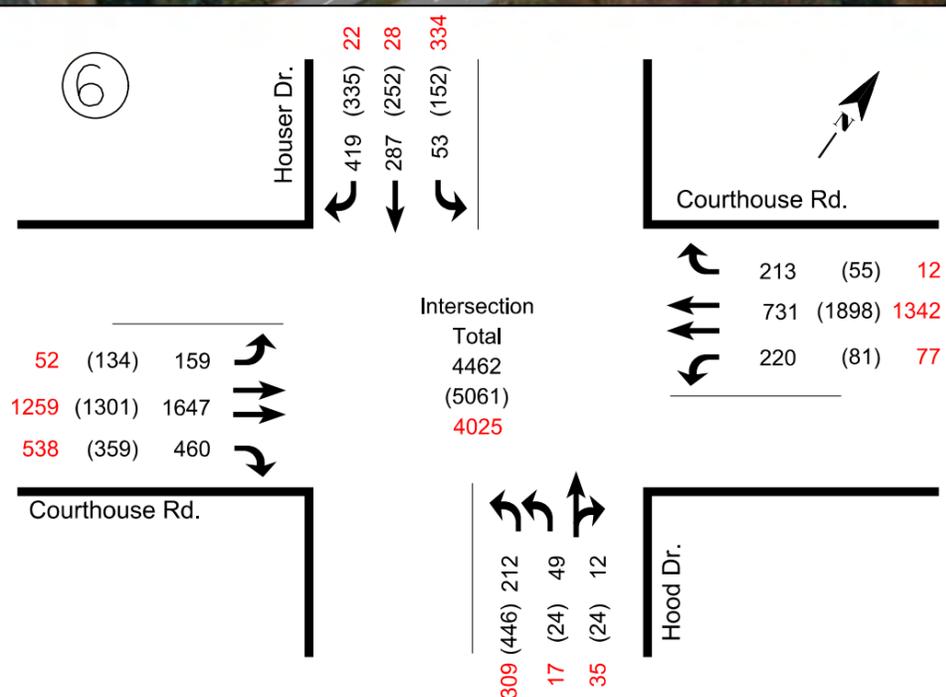
(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM

Traffic Movement

Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add dual-left turn lanes to be ~365'
- convert shared through/left-/right-turn lane to be shared through/right-turn lane

#### Southbound Approach:

- add a left-turn lane to be ~350'
- convert shared through/left-turn lane to be exclusive through lane

#### Eastbound Approach:

- extend left-turn lane to be ~350'

\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

SCALE:

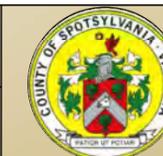
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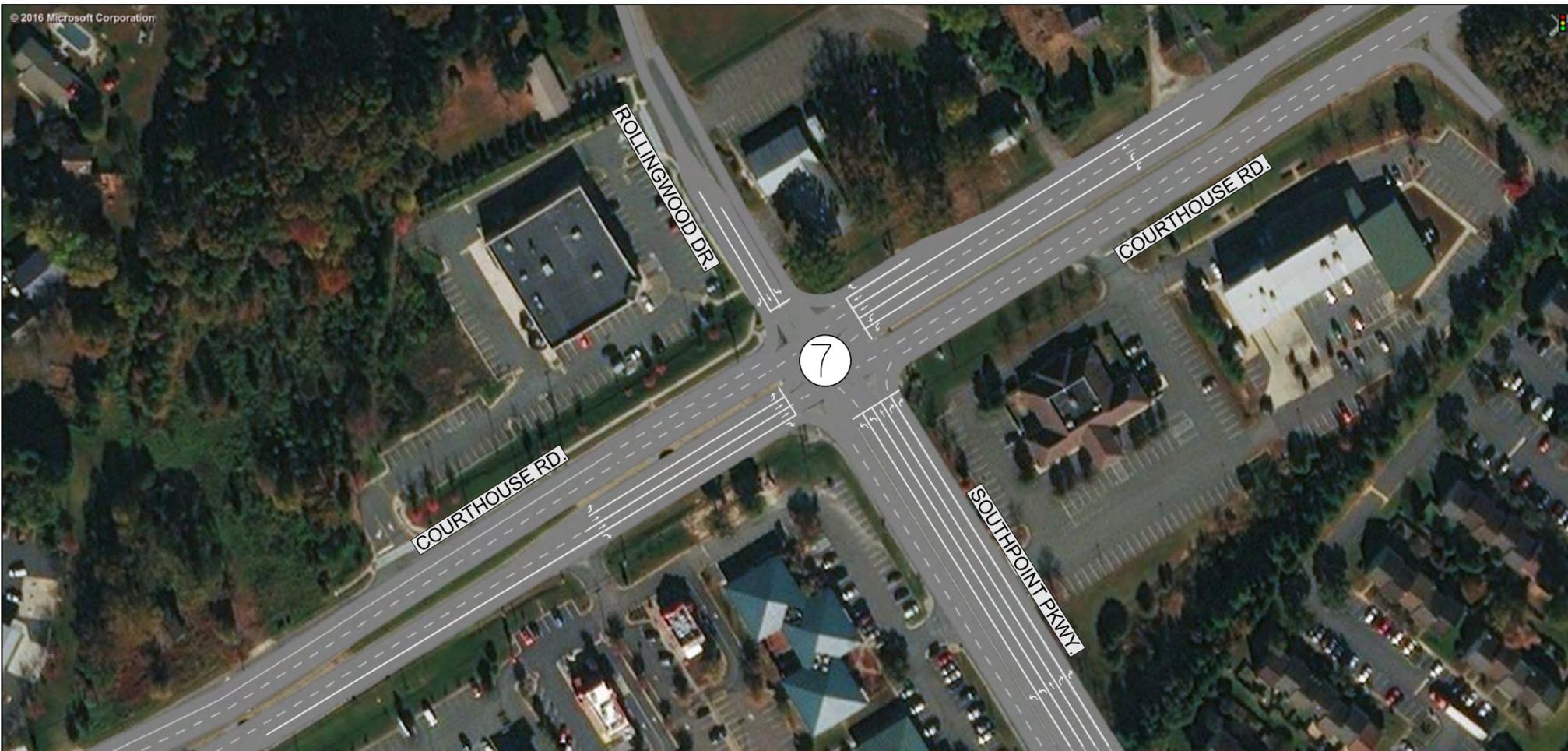
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 6 OF 9





# LEGEND

xxxx Weekday AM  
Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM

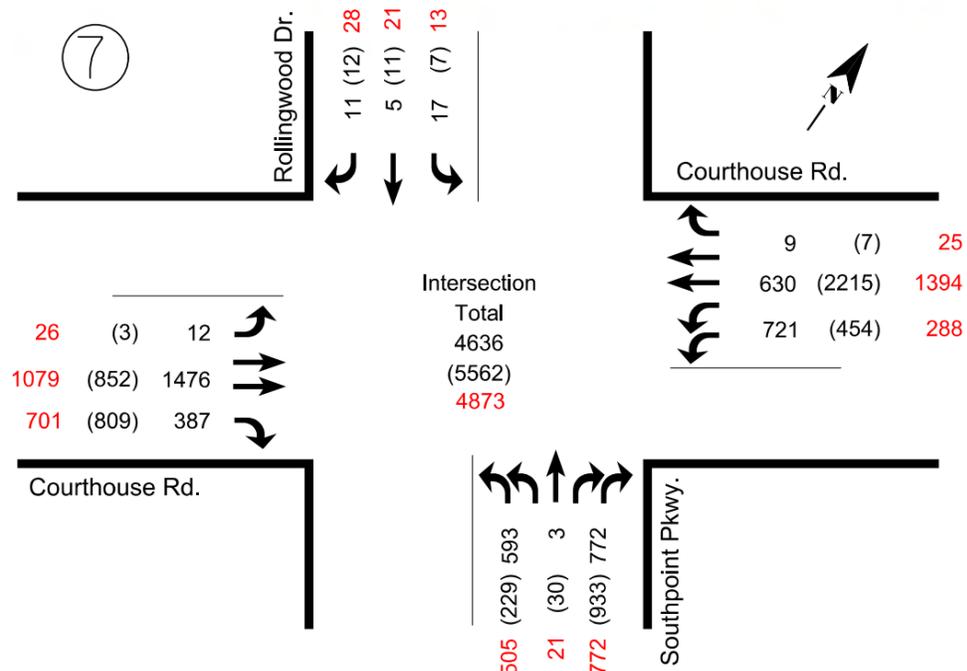
(xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM

xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM

Traffic Movement

Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- add second left-turn lane to be ~430'
- add second right-turn lane to be ~500'
- convert shared through/left-turn lane to be exclusive through lane

#### Westbound Approach:

- add second left-turn lane to be ~400'
- extend existing left-turn lane to be ~400'

#### Southbound Approach:

- add a left-turn lane to be ~100'
- convert shared through/left-turn lane to be exclusive through lane

\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

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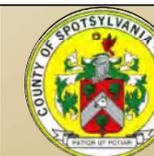
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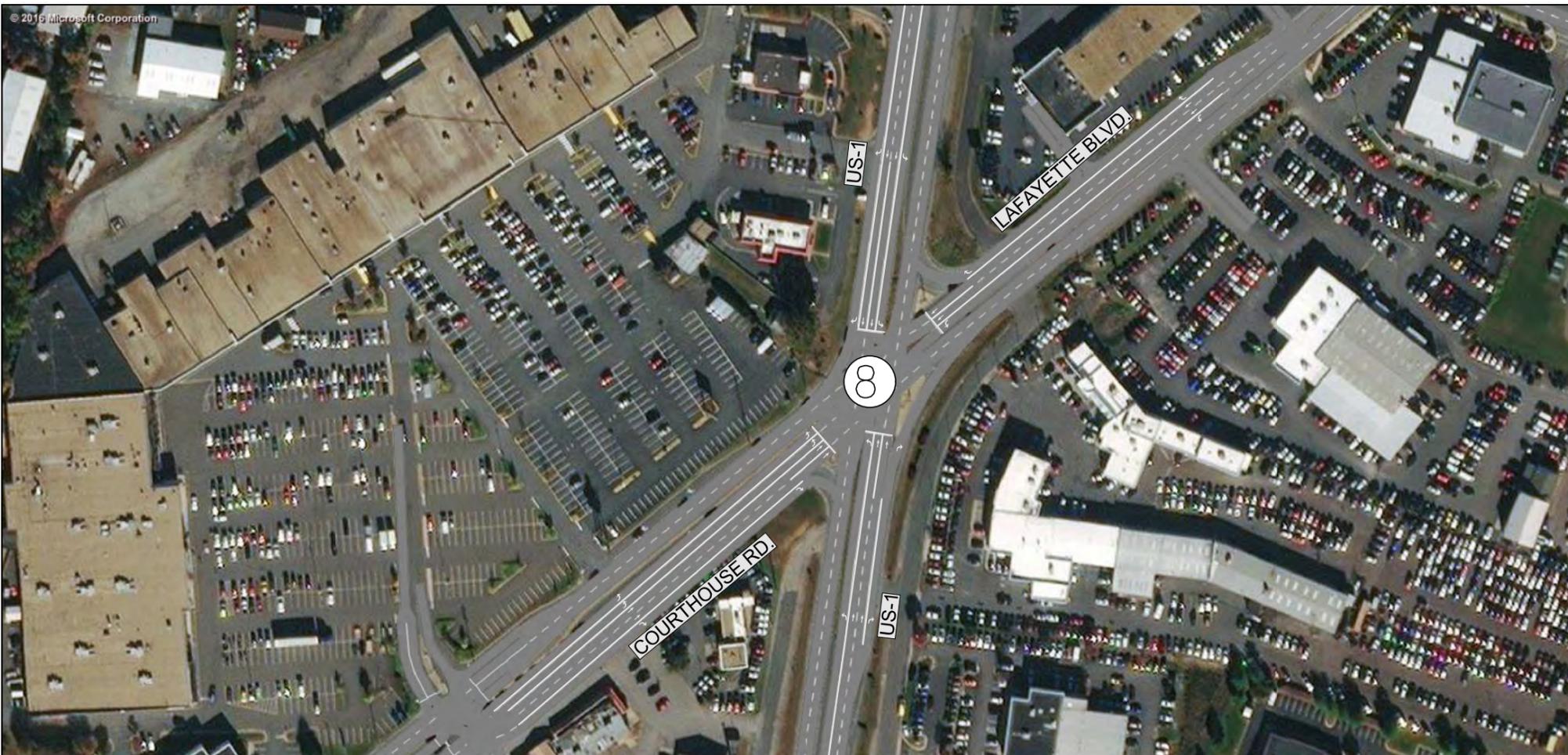
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 7 OF 9





# LEGEND

- xxxx Weekday AM Peak Hour Volume (PHV)  
Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV  
Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday) PHV  
Time: 11:45AM-12:45PM

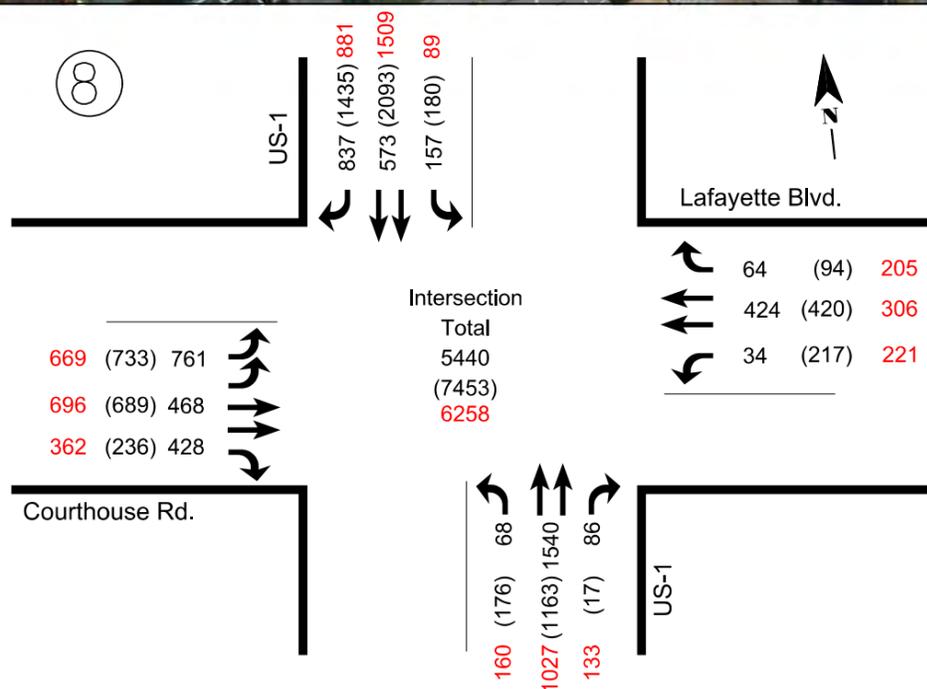


Traffic Movement



Intersection Number

Sheet Locator



### PROPOSED IMPROVEMENTS\*:

#### Northbound Approach:

- extend existing left-turn lane to be ~530'

#### Westbound Approach:

- extend existing left-turn lane to be ~600'
- add a right-turn lane to be ~400'
- convert shared through/right-turn lane to be exclusive through lane

#### Southbound Approach:

- extend existing left-turn lane to be ~380'
- extend existing right-turn lane to be ~380'

#### Eastbound Approach:

- add second left-turn lane to be ~500'
- extend existing left-turn lane to be ~500'
- add a right-turn lane to be ~500'
- convert shared through/right-turn lane to be exclusive through lane

\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

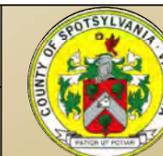
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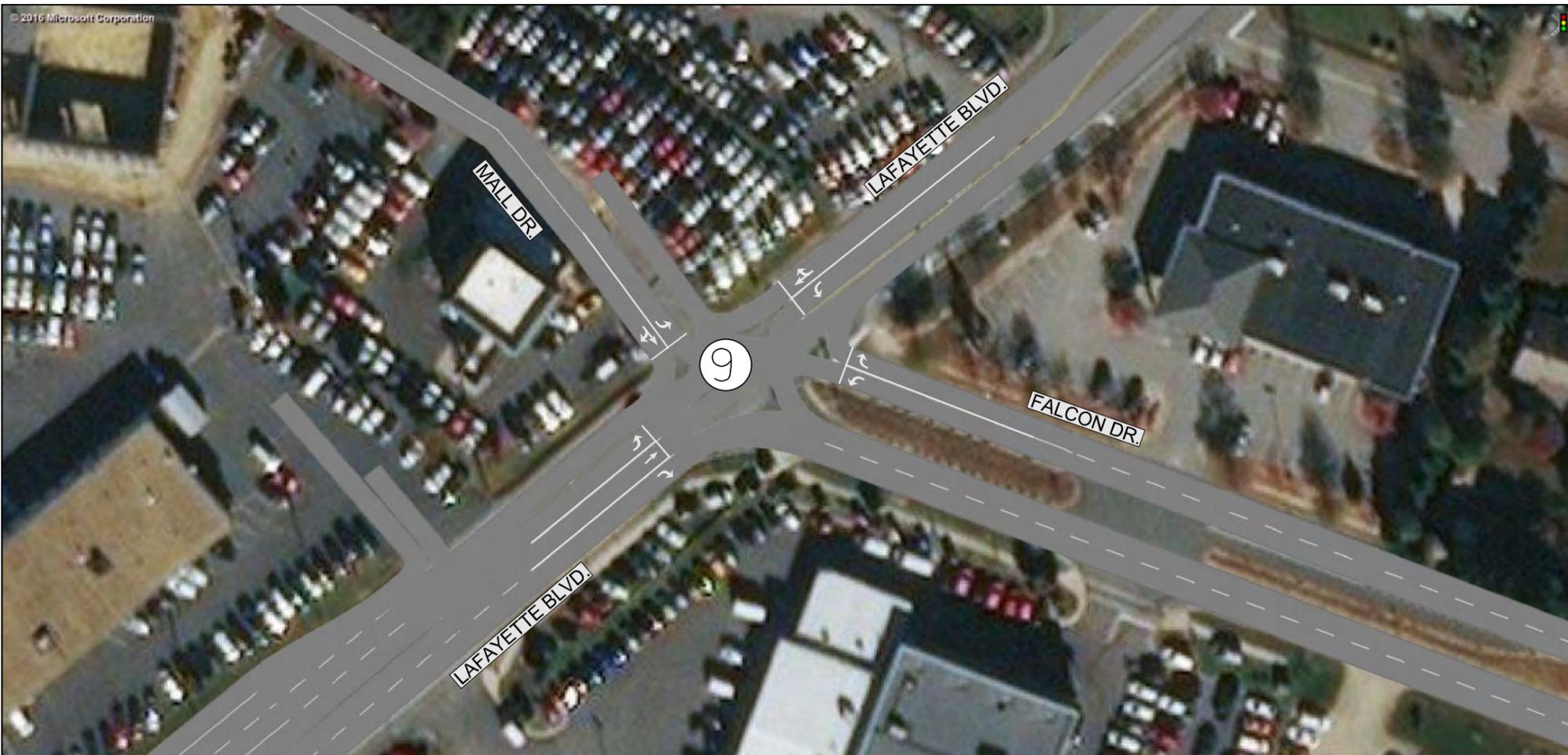
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SHEET NO.:

DATE: 10/05/2018

8 OF 9



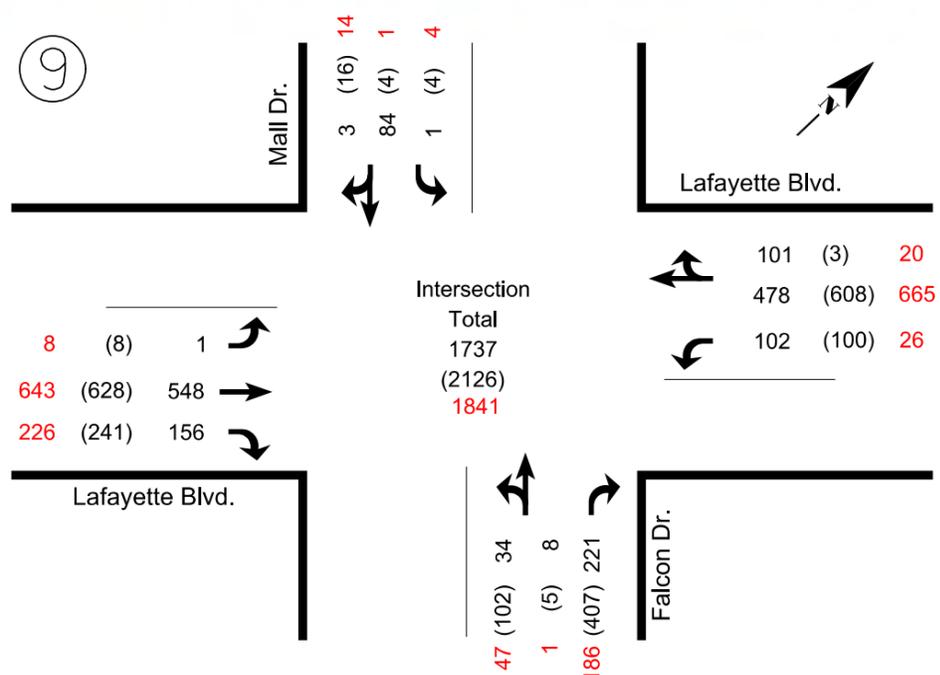


# LEGEND

- xxxx Weekday AM Peak Hour Volume (PHV) Time: 7:30AM-8:30AM
- (xxxx) Weekday PM PHV Time: 4:30PM-5:30PM
- xxxx Weekend (Saturday) PHV Time: 11:45AM-12:45PM



⊗ Intersection Number



### PROPOSED IMPROVEMENTS\*:

#### Southbound Approach:

- add a left-turn lane to be ~100'
- convert shared left/through/right-turn lane to be shared through/right-turn lane

Sheet Locator



\*In addition to signal optimization and coordination, as applicable



DRAWN BY: RAM

CHECKED BY: KHB

ALTERNATIVE 2 - PHV + PROPOSED IMPROVEMENTS

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

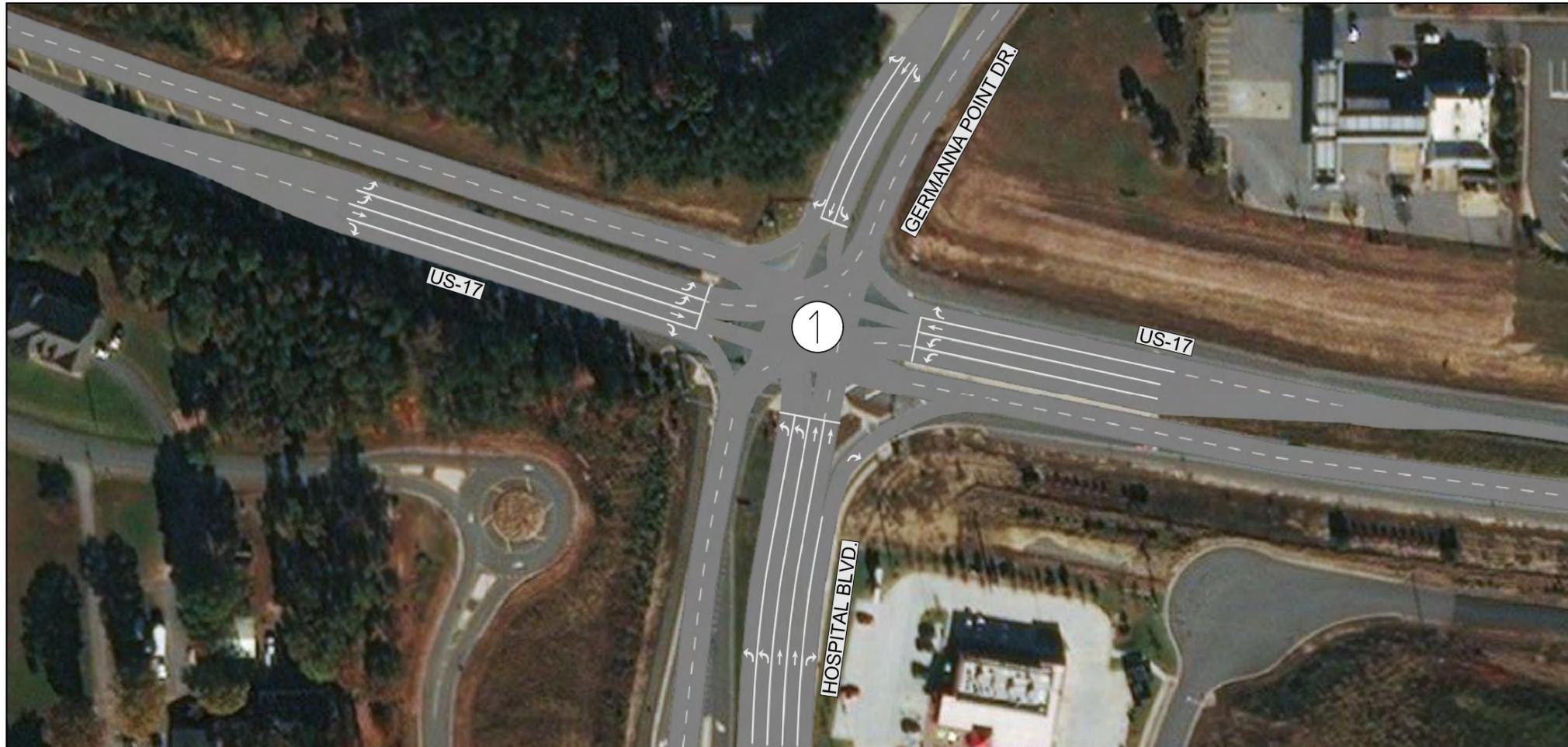
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VDOT UPC PROJECT NO.: 107192

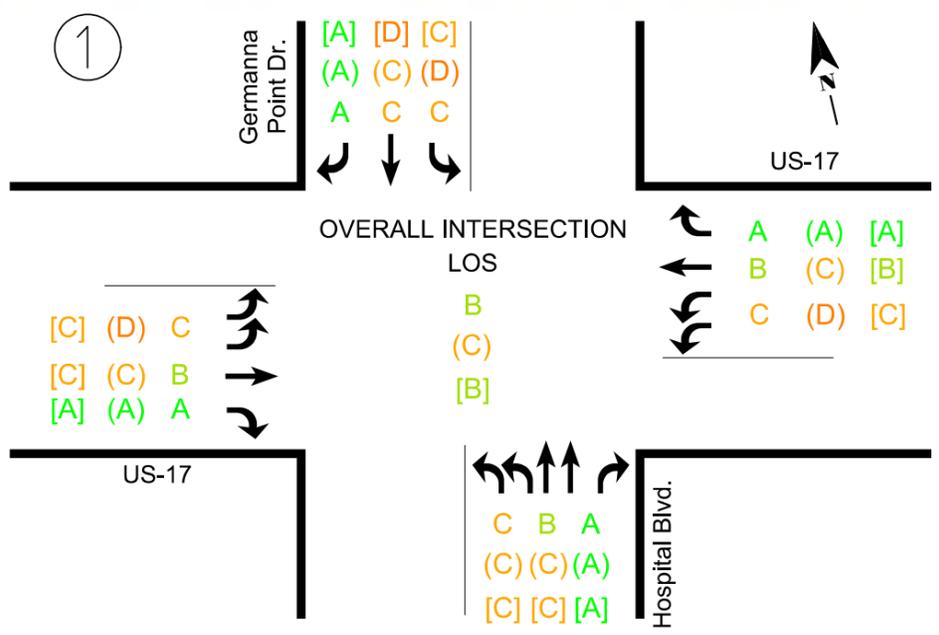
SHEET NO.: 9 OF 9





# LEGEND

- X (X) [X] AM (PM) [SAT] Level of Service (LOS)
- Traffic Movement
- ⊗ Intersection Number
- A B C D E F  
  
 LOS COLOR RAMP



Operational capacity of the corridor for the future year (2035) Alternative 2 scenario was analyzed in VISSIM for AM, PM, and Saturday peak hours. Delays were used to determine the operating Level of Service for individual movements and intersections.

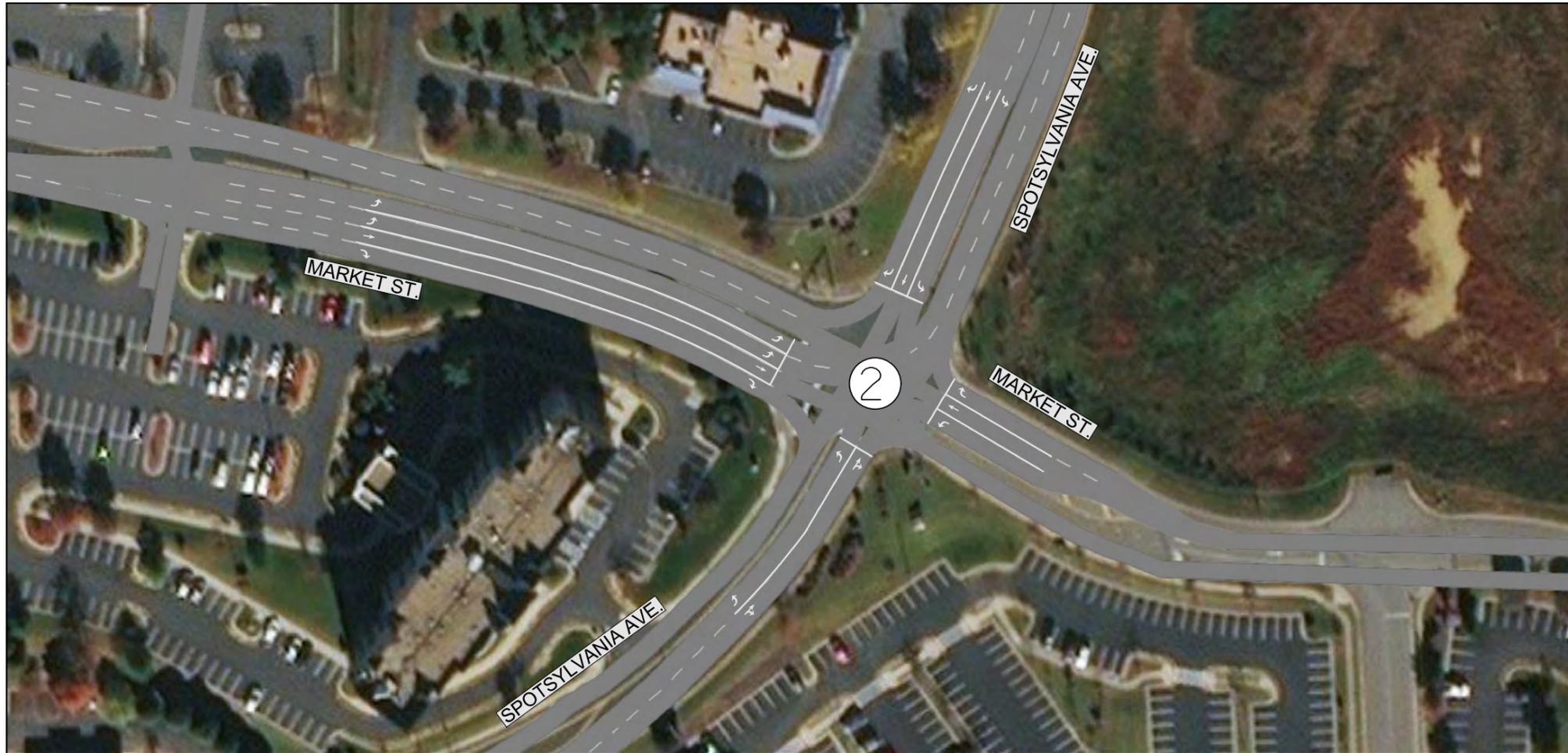


10/8/2018 8:02:54 AM



DRAWN BY:	RAM	2035 ALTERNATIVE 2 - LEVELS OF SERVICE	SCALE:	NOT TO SCALE	DATE:	10/05/2018	
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1	OF
			VDOT UPC PROJECT NO.: 107192				



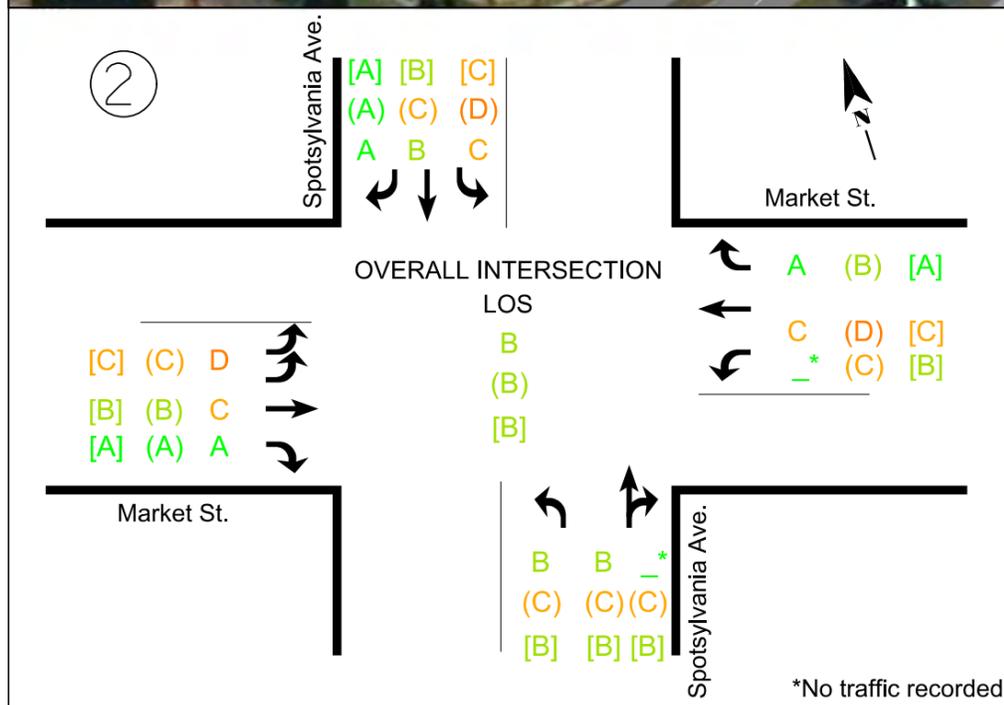
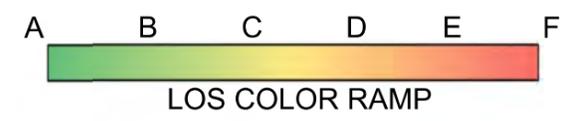


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



10/8/2018 8:04:01 AM



DRAWN BY:	RAM	2035 ALTERNATIVE 2 - LEVELS OF SERVICE	SCALE:	NOT TO SCALE	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	2
			VDOT UPC PROJECT NO.: 107192			



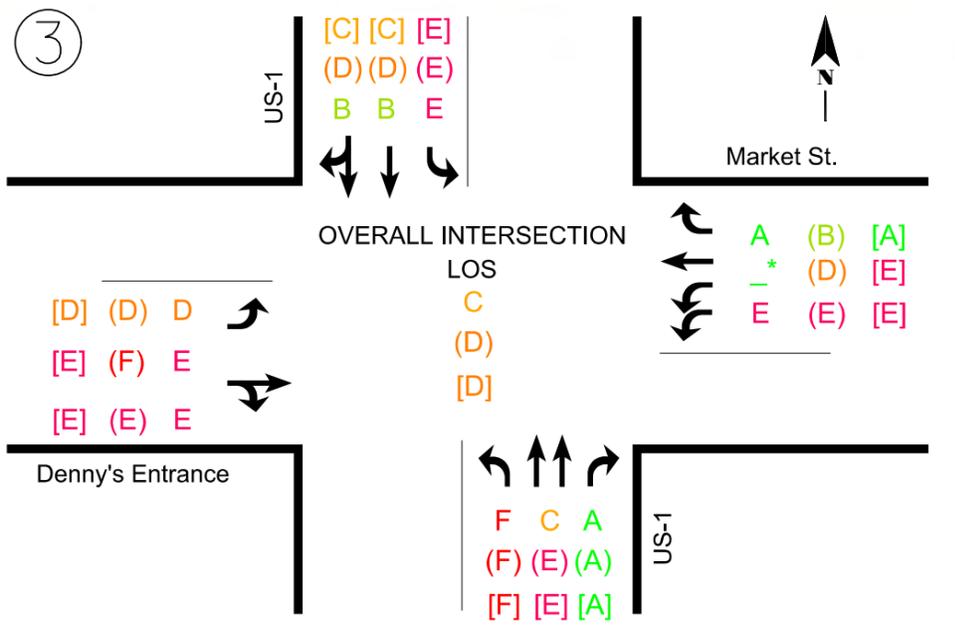


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

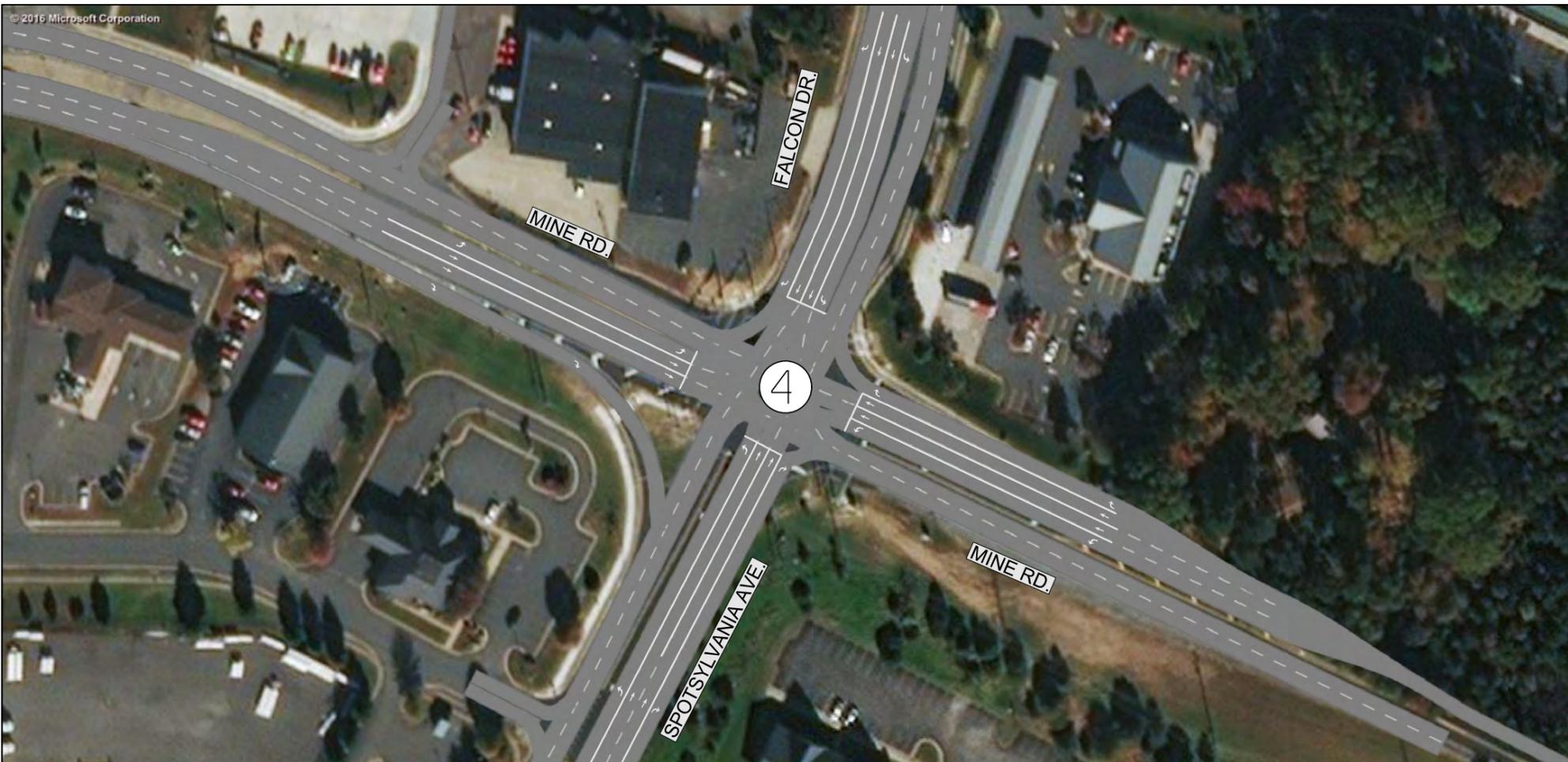
⊗ Intersection Number



Sheet Locator



	DRAWN BY:	RAM	<b>2035 ALTERNATIVE 2 - LEVELS OF SERVICE</b> <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	NOT TO SCALE	DATE:	10/05/2018	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	3	OF	

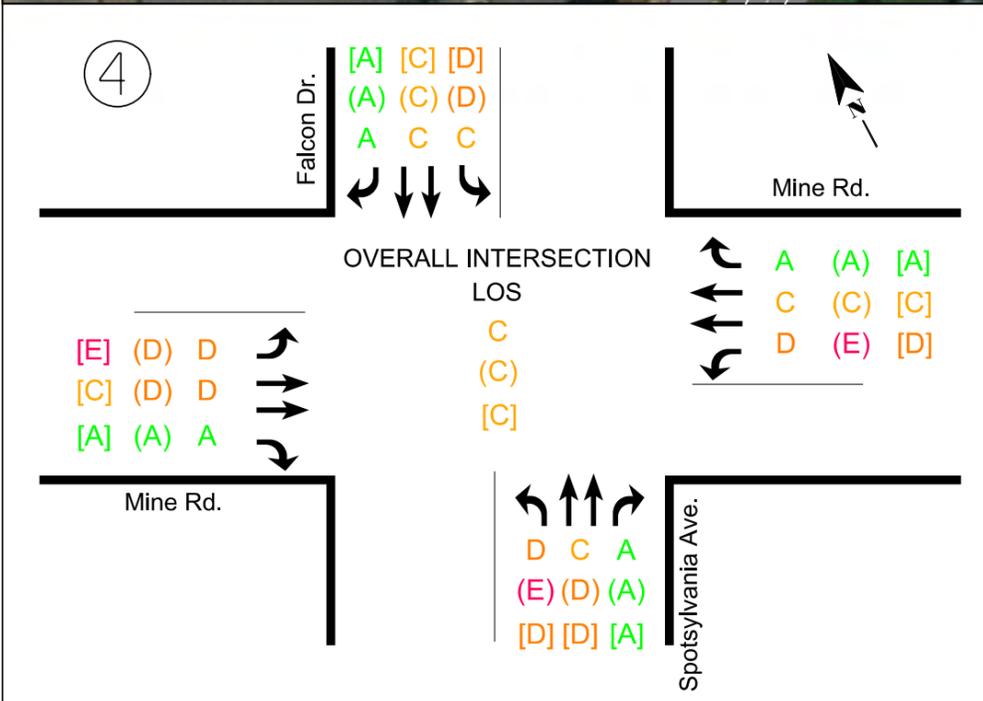
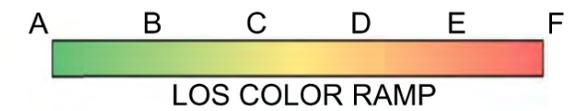


# LEGEND

X (X) AM (PM) Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 2 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

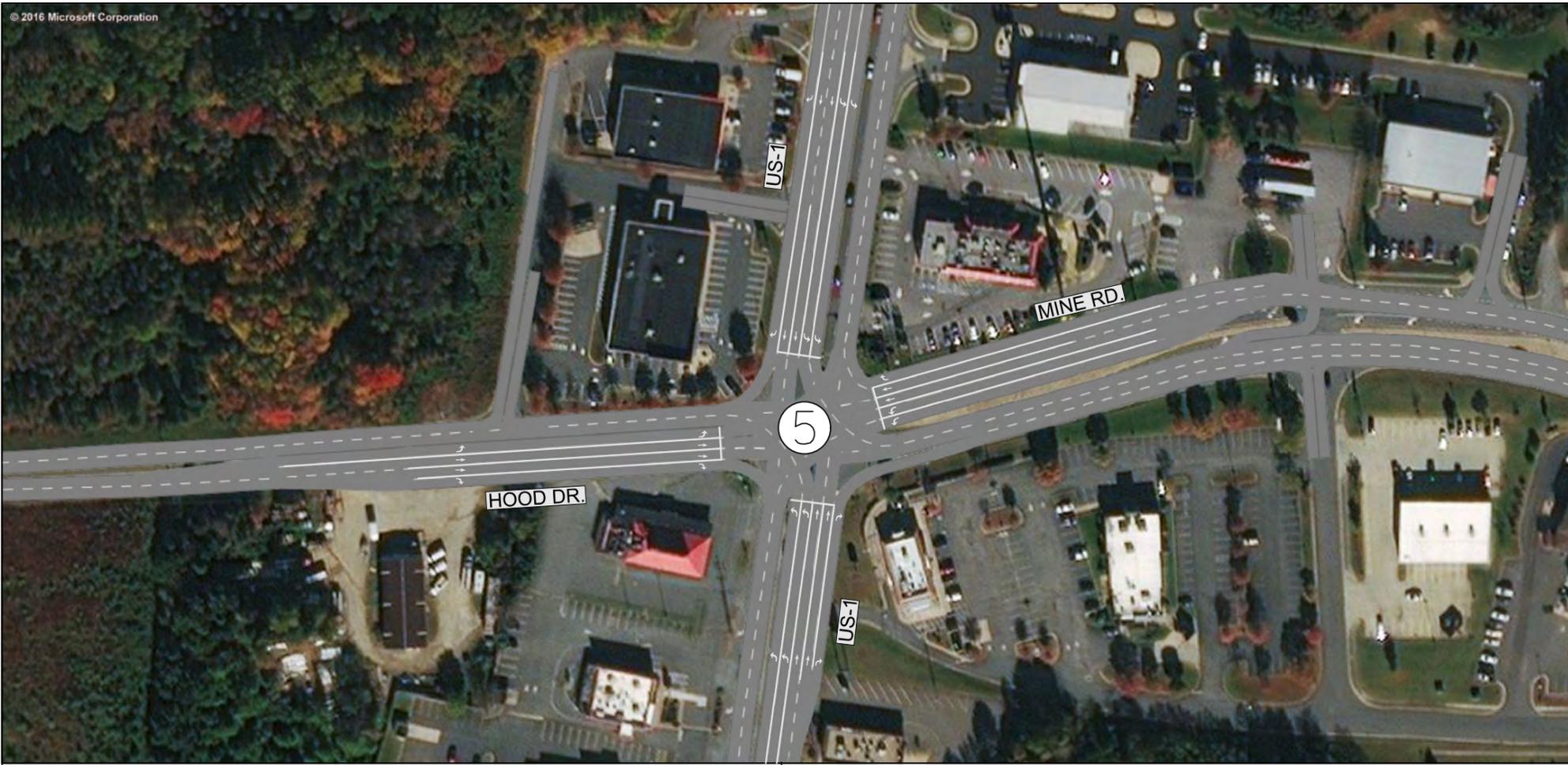
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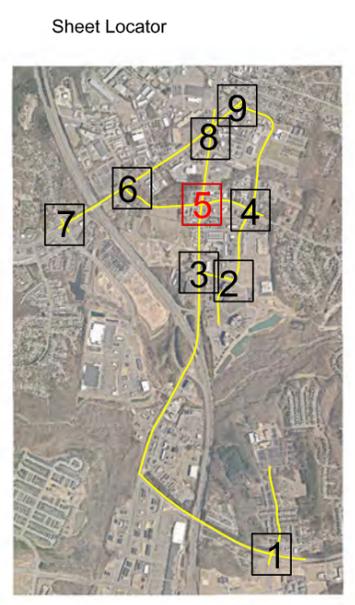
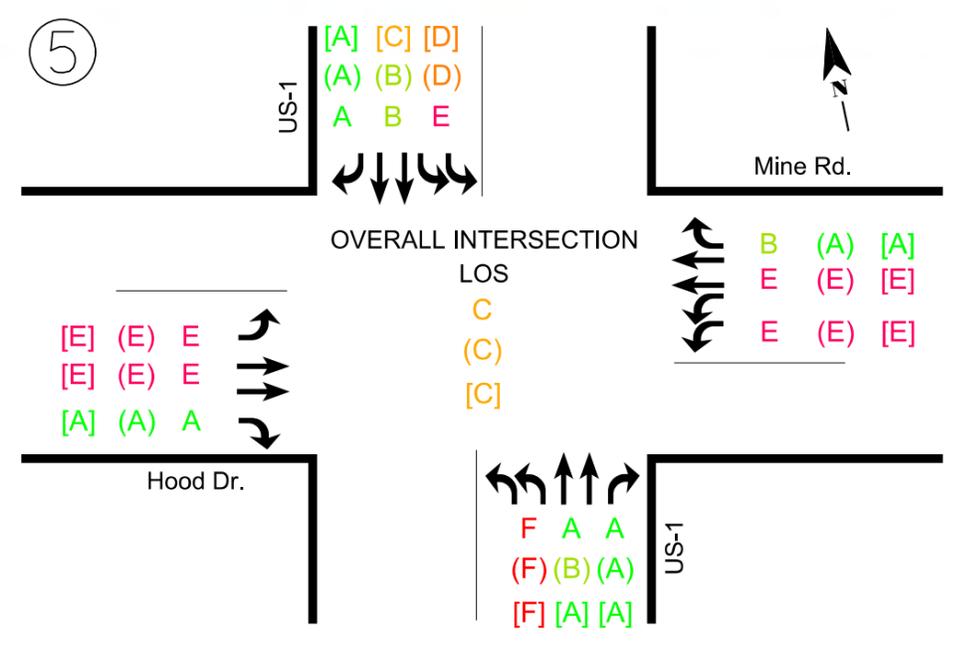
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# LEGEND

- X (X) AM (PM) Level of Service (LOS)
  - ↔ Traffic Movement
  - ⊗ Intersection Number
- A B C D E F
- 
- LOS COLOR RAMP



12/27/2018 3:07:46 PM



DRAWN BY:	RAM	2035 ALTERNATIVE 2 - LEVELS OF SERVICE	SCALE:	NOT TO SCALE	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	5
			VDOT UPC PROJECT NO.: 107192			





# LEGEND

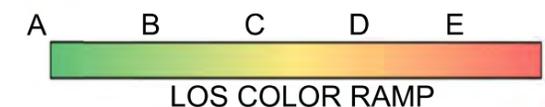
X (X) [X] AM (PM) [SAT] Level of Service (LOS)



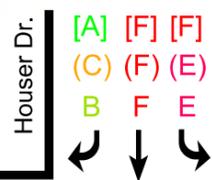
Traffic Movement



Intersection Number



6



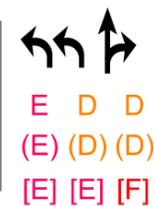
OVERALL INTERSECTION

LOS

D

(D)

[C]



Courthouse Rd.

Hood Dr.

Sheet Locator



DRAWN BY:

RAM

CHECKED BY:

KHB

2035 ALTERNATIVE 2 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

DATE:

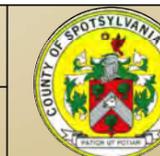
10/05/2018

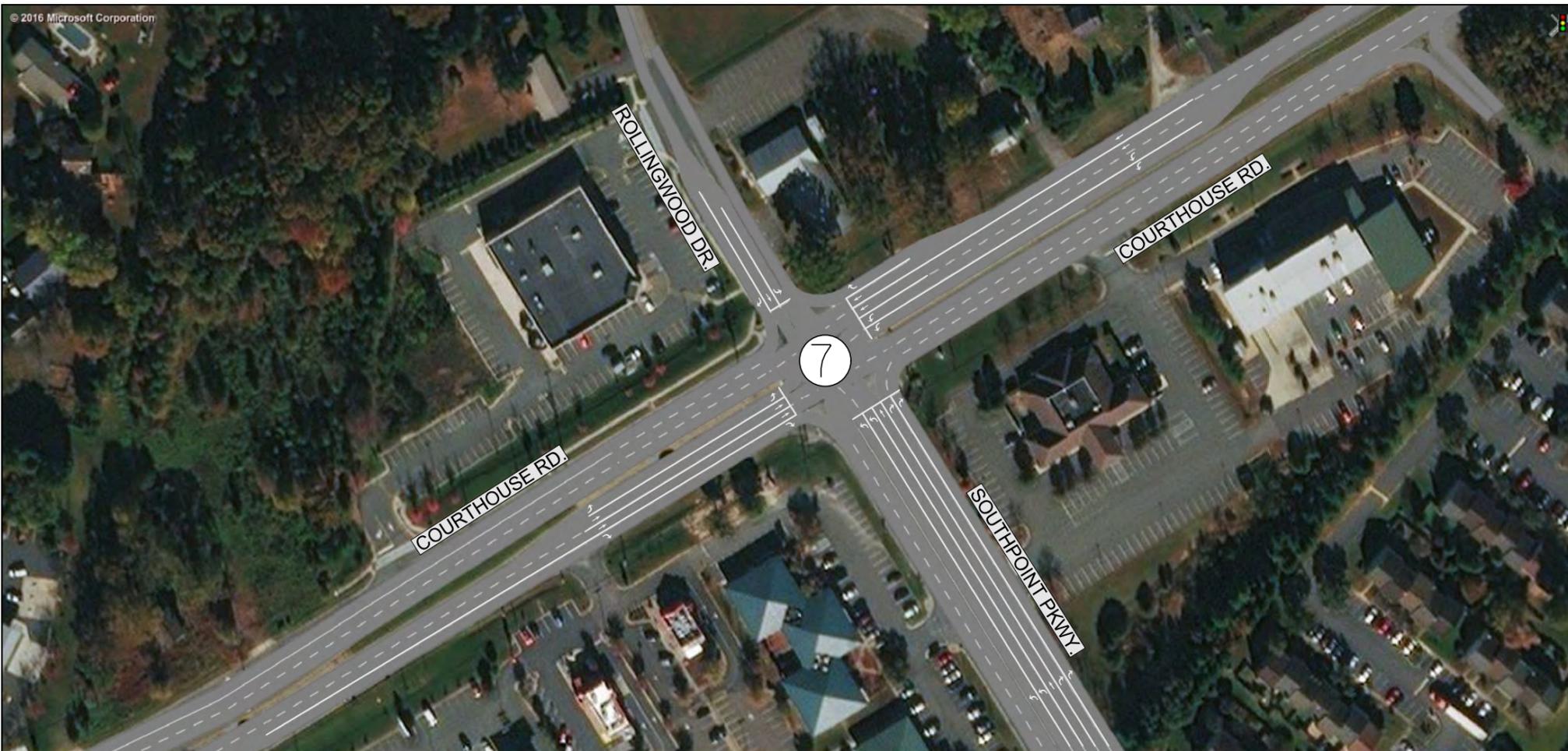
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OF

9



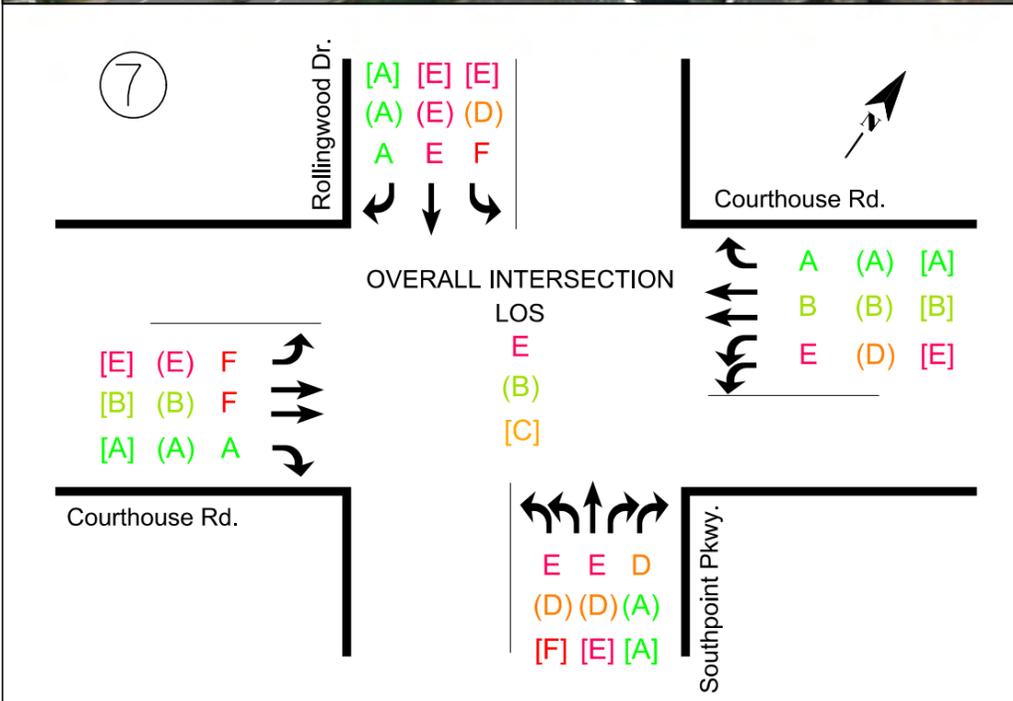
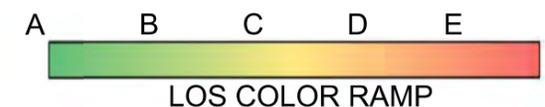


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 2 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

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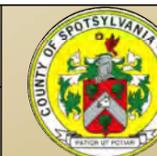
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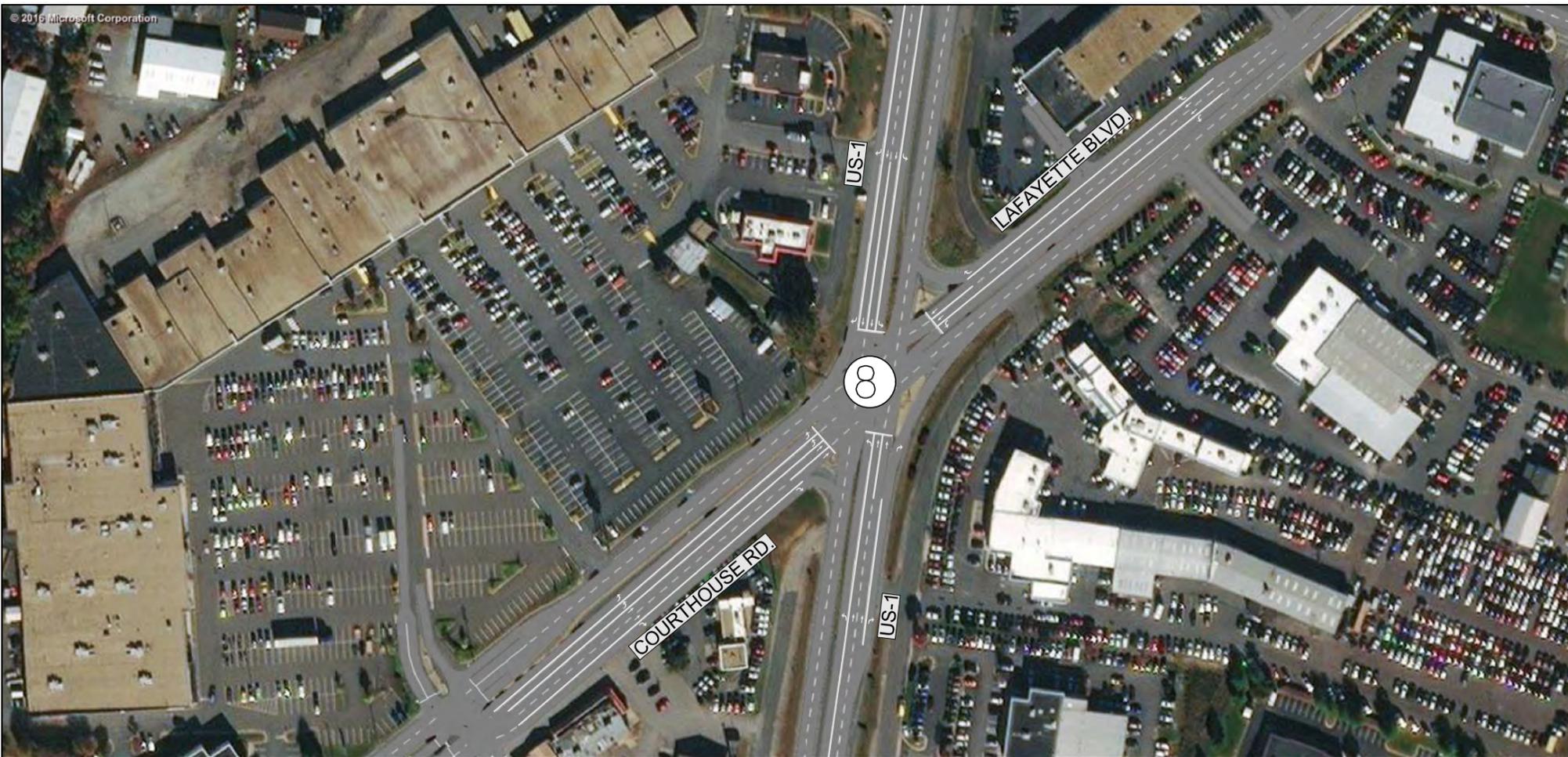
DATE: 10/05/2018

JMT PROJECT NO.: 15-0038-003

VDOT UPC PROJECT NO.: 107192

SHEET NO.: 7 OF 9



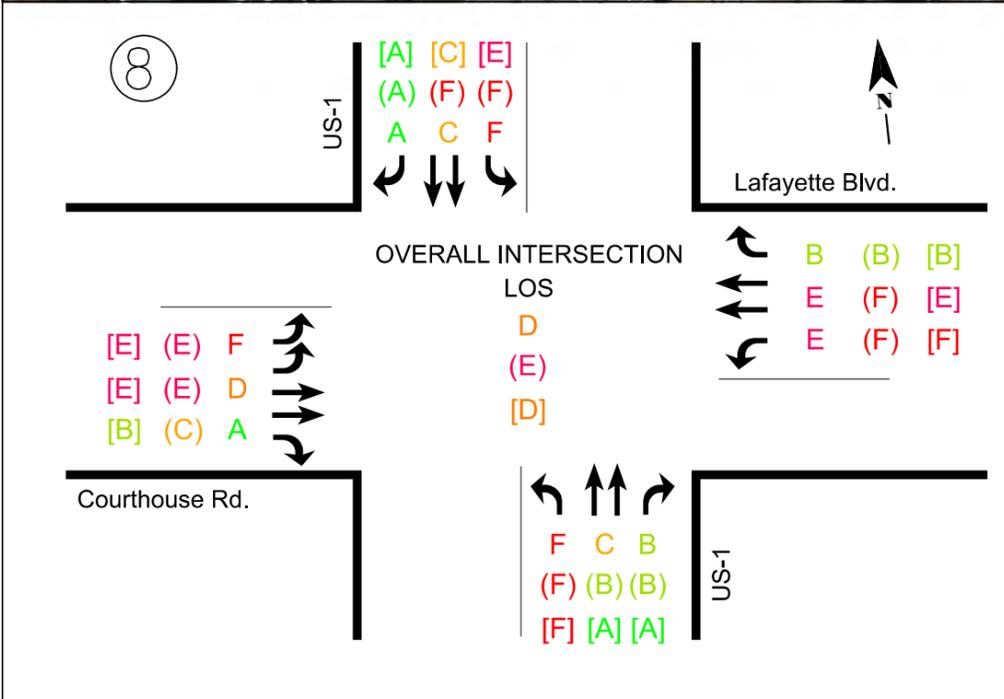
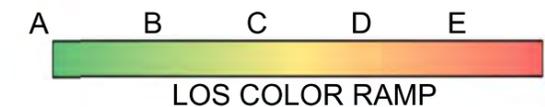


# LEGEND

X (X) [X] AM (PM) [SAT] Level of Service (LOS)

↔ Traffic Movement

⊗ Intersection Number



Sheet Locator



DRAWN BY: RAM

CHECKED BY: KHB

2035 ALTERNATIVE 2 - LEVELS OF SERVICE

RTE. 1/208 CORRIDOR STUDY

SCALE:

NOT TO SCALE

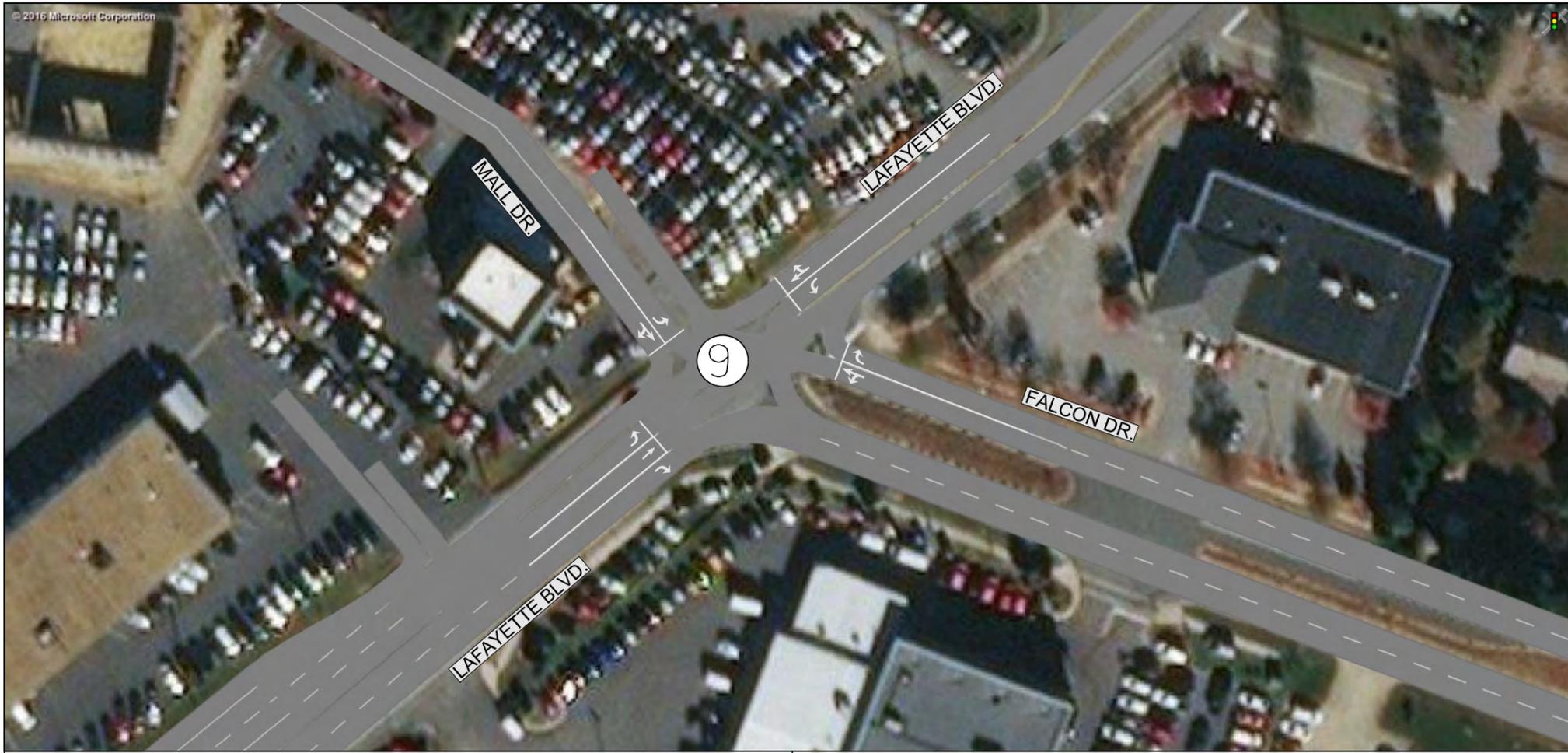
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VDOT UPC PROJECT NO.: 107192

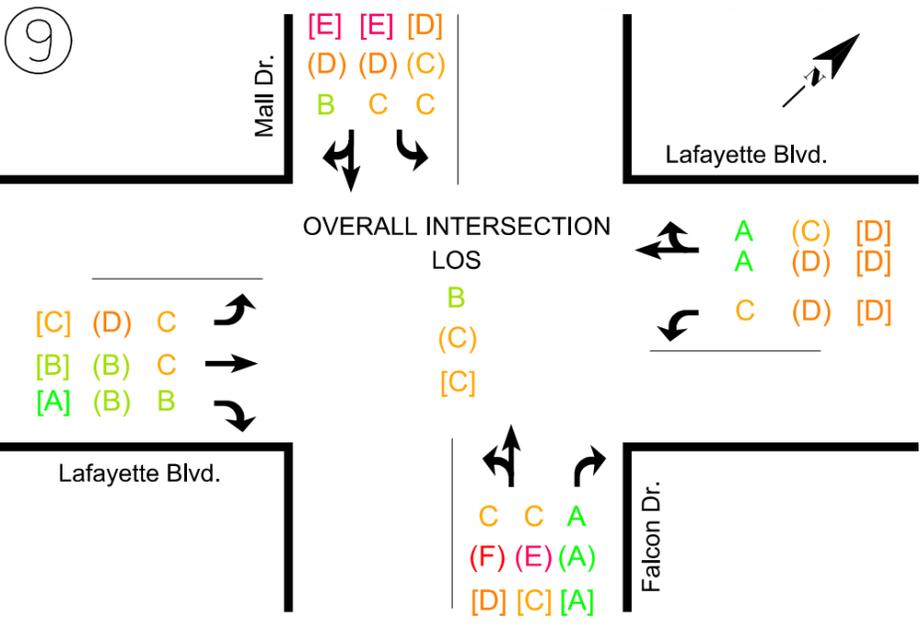
SHEET NO.: 8 OF 9



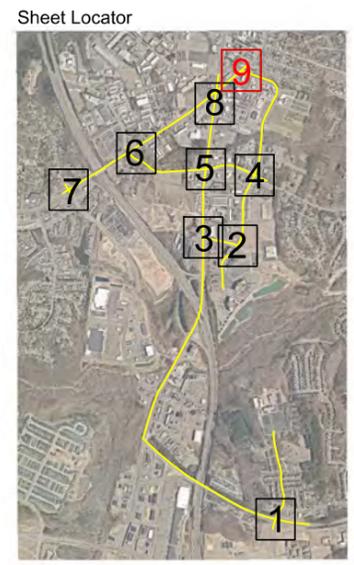


# LEGEND

- X (X) [X] AM (PM) [SAT] Level of Service (LOS)
- Traffic Movement
- ⊗ Intersection Number
- A B C D E F  
 LOS COLOR RAMP



\*No traffic recorded



10/8/2018 8:35:05 AM



DRAWN BY:	RAM	2035 ALTERNATIVE 2 - LEVELS OF SERVICE	SCALE:	NOT TO SCALE	DATE:	10/05/2018
CHECKED BY:	KHB		RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	9 OF 9



**APPROVED PROJECTS FOR 2018 SMART SCALE APPLICATION**

This study evaluated the capacity of two alternatives to address the future traffic issues within the study corridor. Alternative 1 consists of adding a connection between Spotsylvania Avenue and Germanna Point Drive, called "Germanna Connector" with improvements at the nine study intersections. Alternative 2 consists of improvements at the study intersections without the Germanna Connector. Both alternatives with detailed capacity analysis and approximate costs were presented to the Spotsylvania County on May 10, 2018. The County's Transportation Committee, Planning Department, and Board of Supervisors approved and submitted two Smart Scale applications based on this corridor Study. Although the Smart Scale applications were based on Alternative 1, the County, due to cost constraints, split the project into two applications. One application (Project #1) includes the Germanna Connector, and other application (Project #2) includes proposed improvements at one of the nine intersections, Rte. 1 at Rte. 208/Lafayette Blvd. As of October 5, 2018, the applications are under the review by VDOT.

**PROJECT #1:**

One of the two Smart Scale applications was based on the proposed Germanna Connector which is part of Alternative 1. The application considered only the Germanna Connector, without the proposed improvement at the nine study intersections due to the budget constraints. The submitted Germanna Connector draft plan (prepared by VDOT for the application and provided by the County) is shown in Figure F 4 which includes the proposed alignment and the connection to the existing roadways, Spotsylvania Avenue and Germanna Point Drive. The Connector's cross section coincides with what was proposed in Alternative 1. It consists of two 12'-lane wide roadway with a 10' wide shared use path as shown in Figure F 4.

The proposed alignment was based on the previous study conducted by Michael Baker and provided by the County.

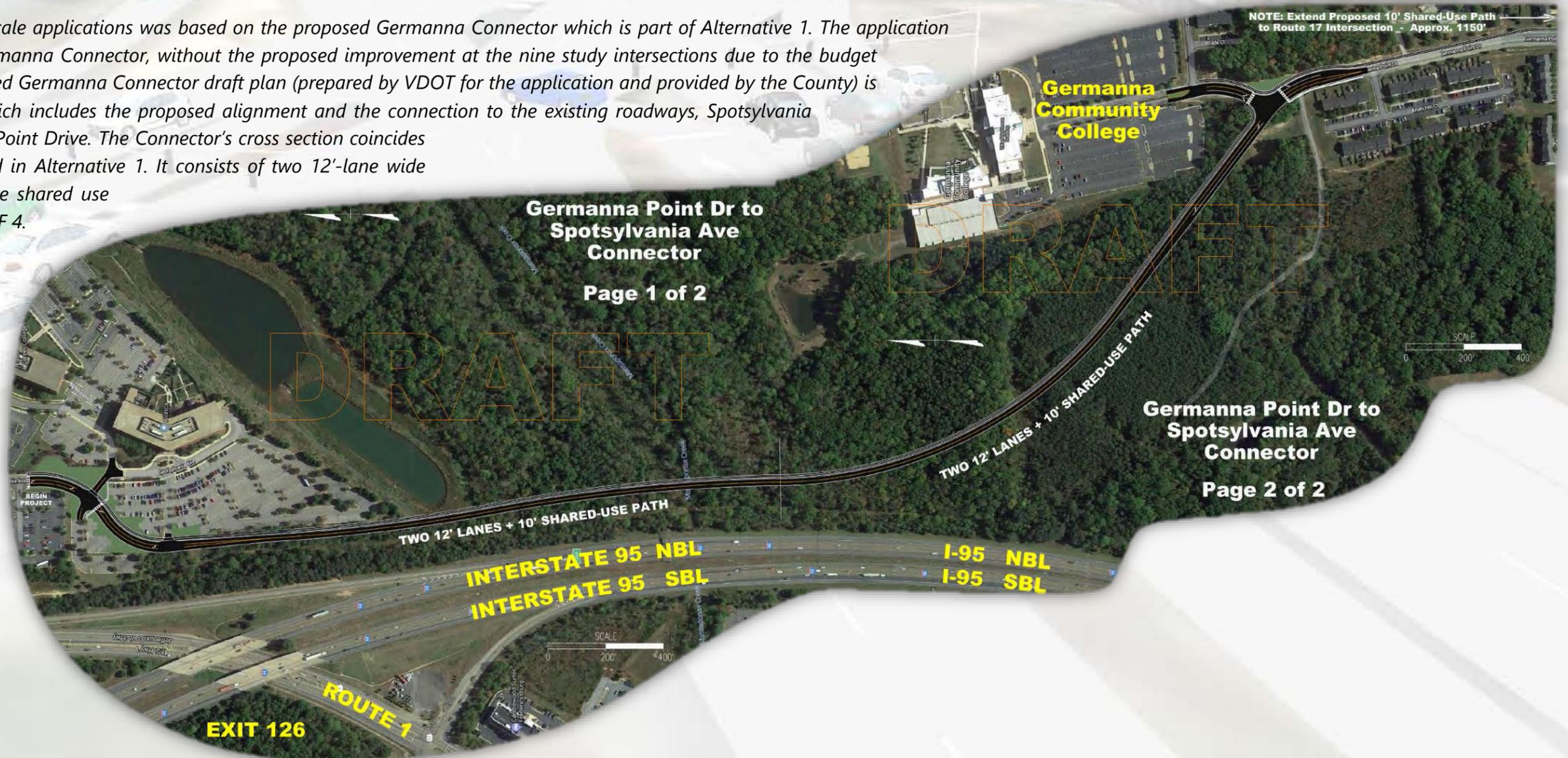


Figure F 4: Smart Scale Application - Project #1 (Source: VDOT)



# APPENDICES

# Appendix A

## Existing Access Management Evaluation

Table 1: Assessment of Existing Access Points within the study area

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
<b>Courthouse Road</b>						
N1		Rollingwood Dr.	FM	Project Start		
					318	250
N2		Residence Driveway	RI/RO	Y/N		
					127	250
N3		Residence Driveway	RI/RO	N/N		
					62	250
N4		Residence Driveway	RI/RO	N/N		
					220	250
N5		Residence Driveway	RI/RO	N/Y		
					906	250
N6		208 Tire & Auto Repair Entrance	RI/RO	Y/N		
					98	250
N7		Shopping Center Entrance	RI/RO	N/N		
					193	250
N8		Hood Dr.	FM	N/N		
					163	250
N9		Shopping Center Entrance	RI/RO	N/Y		
					574	250
N10		Residence Driveway	RI/RO	Y/N		
					78	250
N11		Residence Driveway	RI/RO	N/N		
					245	250
N12		Residence Driveway	RI/RO	N/N		
					76	250
N13		Bug Box Entrance	RI/RO	N/N		
					91	250

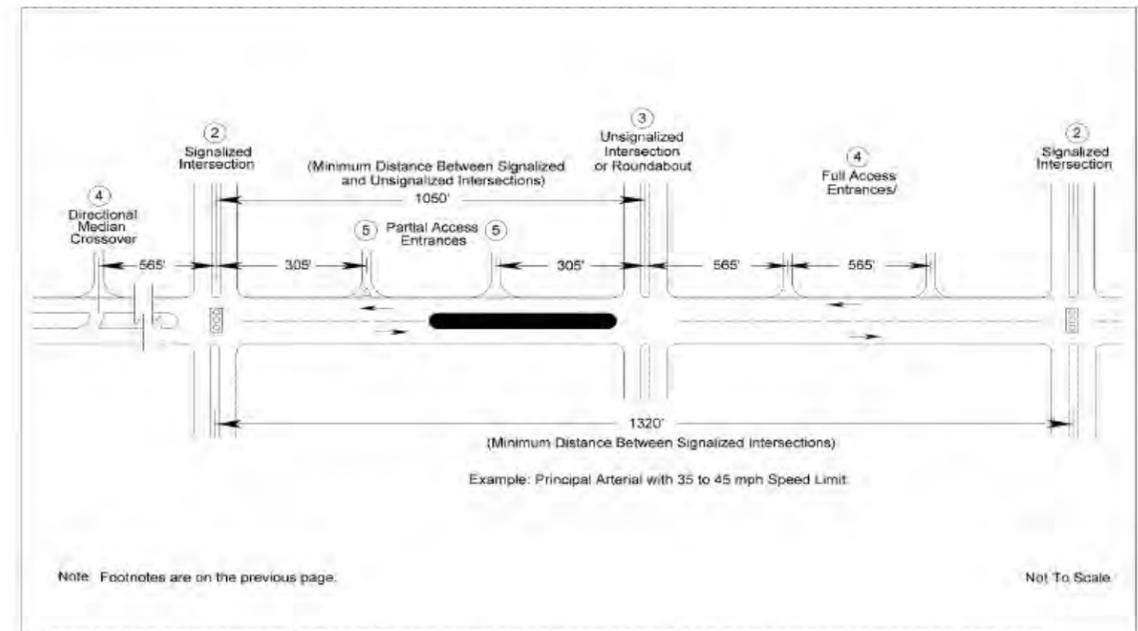


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
N14		Business Entrance	RI/RO	N/Y		
					379	250
N15		Ewell Rd.	FM	Y/N		
					151	250
N16		Business Entrance	RI/RO	N/Y		
					497	250
N17		Shopping Center Entrance	FM	Y/Y		
					252	250
N18		Shopping Center Entrance	RI/RO	Y/Y		
					469	250
N19		Route 1/Jefferson Davis Hwy.	FM	Y/N		
<b>Lafayette Blvd</b>						
					177	660
N20		Wicker St.	FM	N/N		
					154	250
N21		Buick/GMC Entrance	RI/RO	N/Y		
					322	250
N22		Buick/GMC Entrance	FM	Y/N		
					166	470
N23		Mall Dr.	FM	N/-		
<b>Courthouse Road</b>						
S1		Southpoint Pkwy.	FM	Project Start		
					303	250
S2		Found and Sons Funeral Home Entrance	RI/RO	Y/Y		
					395	250
S3		Clarke Ct.	RI/RO	Y/Y		
					889	250
S4		Empty Lot	RI/RO	Y/Y		
					269	250

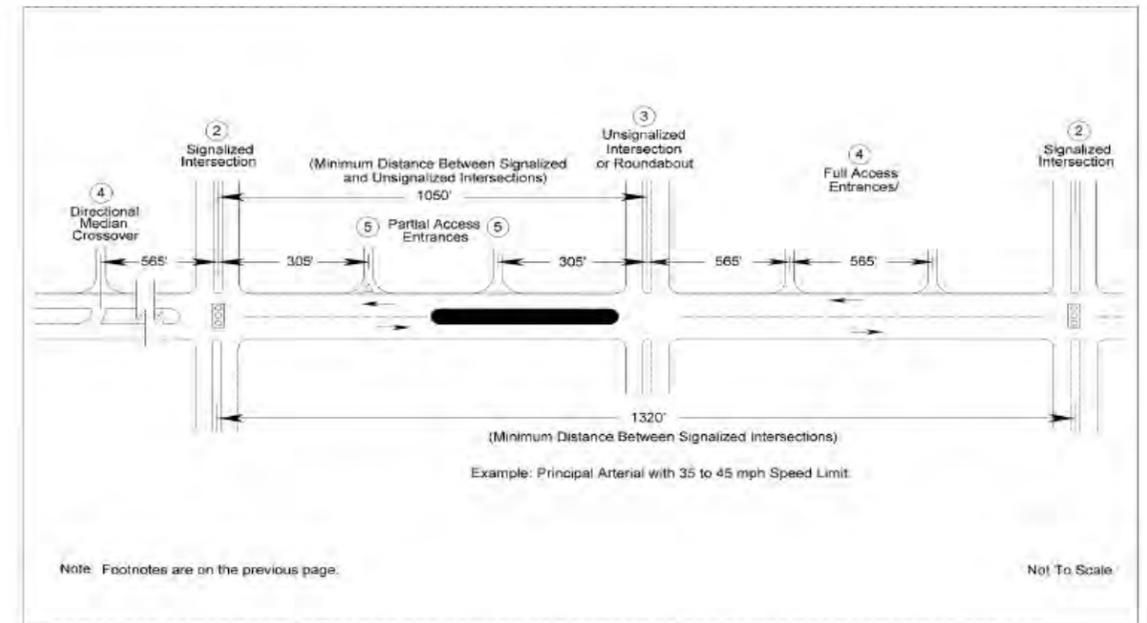


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
S5		Law Office Emroch & Kilduff Entrance	RI/RO	Y/N	72	250
S6		Hood Dr.	FM	N/Y	375	250
S7		Residence Driveway	RI/RO	Y/Y	443	250
S8		Shopping Center Entrance	RI/RO	Y/N	140	250
S9		Amanda Ln.	RI/RO	N/N	107	250
S10		Residence Driveway	RI/RO	N/N	111	250
S11		Residence Driveway	RI/RO	N/N	70	250
S12		Residence Driveway	RI/RO	N/N	107	250
S13		Residence Driveway	RI/RO	N/Y	252	250
S14		Gulf Entrance	FM	Y/N	241	250
S15		Courthouse Car Wash Entrance	RI/RO	N/N	139	250
S16		Dairy Queen Entrance	RI/RO	N/Y	269	250
S17		Business Entrance	FM	Y/N	239	250
S18		Star Cars Entrance	RI/RO	N/Y		

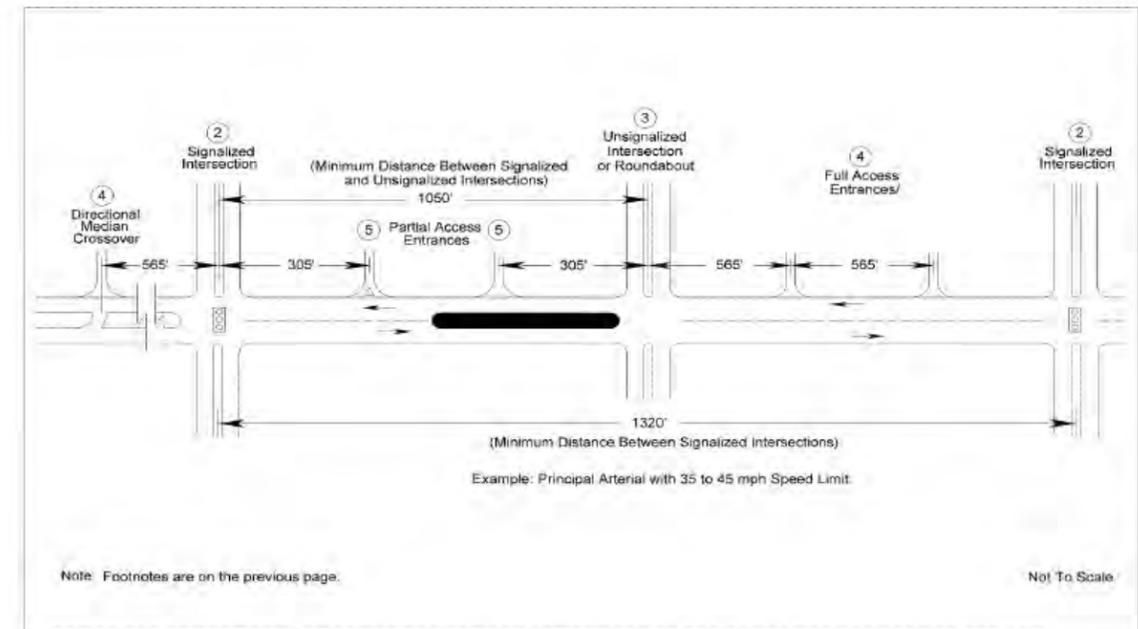


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
					408	250
S19		Route 1/Jefferson Davis Hwy.	FM	Y/N		
<b>Lafayette Blvd</b>						
					249	660
S20		Wicker St.	FM	N/N		
					262	470
S21		Safford Chrysler Jeep Dodge Entrance	FM	N/N		
					167	470
S22		Safford Fiat Entrance	FM	N/N		
					244	470
S23		Falcon Dr.	FM	N/-		
<b>Hood Dr.</b>						
N45		Route 208/Courthouse Rd.	FM	Project Start		
					781	335
N24		Residence Driveway	FM	Y/N		
					174	335
N25		Residence Driveway	FM	N/N		
					95	335
N26		Residence Driveway	FM	N/N		
					51	335
N27		Residence Driveway	FM	N/Y		
					888	335
N28		Rite Aid Entrance	FM	Y/N		
<b>Mine Rd.</b>						
					303	335
N29		Route 1/Jefferson Davis Hwy.	FM	N/Y		
					308	250
N30		McDonald's Entrance	RI/RO	Y/N		
					106	250
N31		McDonald's Entrance	RI/RO	N/N		
					108	250
N32		McDonald's Entrance	FM	N/N		
					175	250

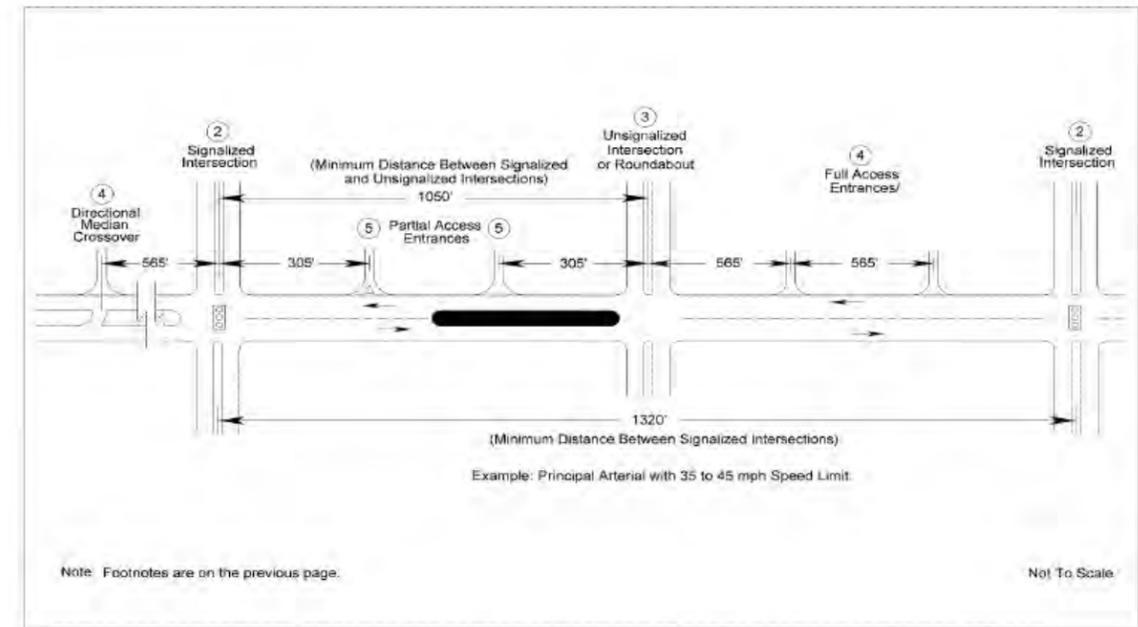


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
N33		Affordable Automotive Repair Entrance	RI/RO	N/N	66	250
N34		Verizon Entrance	RI/RO	N/N	169	250
N35		O' Reilly Auto Parts Entrance	RI/RO	N/N	143	250
N36		Stoner Dr.	FM	N/N	332	440
N37		Falcon Dr.	FM	N/-		
<b>Hood Dr.</b>						
S37		Route 208/Courthouse Rd.	FM	Project Start	95	335
S24		Law Office Emroch & Kilduff Entrance	FM	N/N	156	335
S25		Side Street (Not in system)	FM	N/N	162	335
S26		McGowan Dr.	FM	N/N	229	335
S27		Residence Driveway	FM	N/N	104	335
S28		Residence Driveway	FM	N/N	75	335
S29		Residence Driveway	FM	N/N	107	335
S30		Residence Driveway	FM	N/Y	934	335
S31		Danielson Well Drilling Entrance	FM	Y/N	129	335
S32		Danielson Well Drilling Entrance	FM	N/N	93	335
S33		Business Entrance	FM	N/N	230	335
S34		Route 1/Jefferson Davis Hwy.	FM	N/Y		
<b>Mine Rd.</b>						
					521	440
S35		Business Entrance	FM	Y/Y		

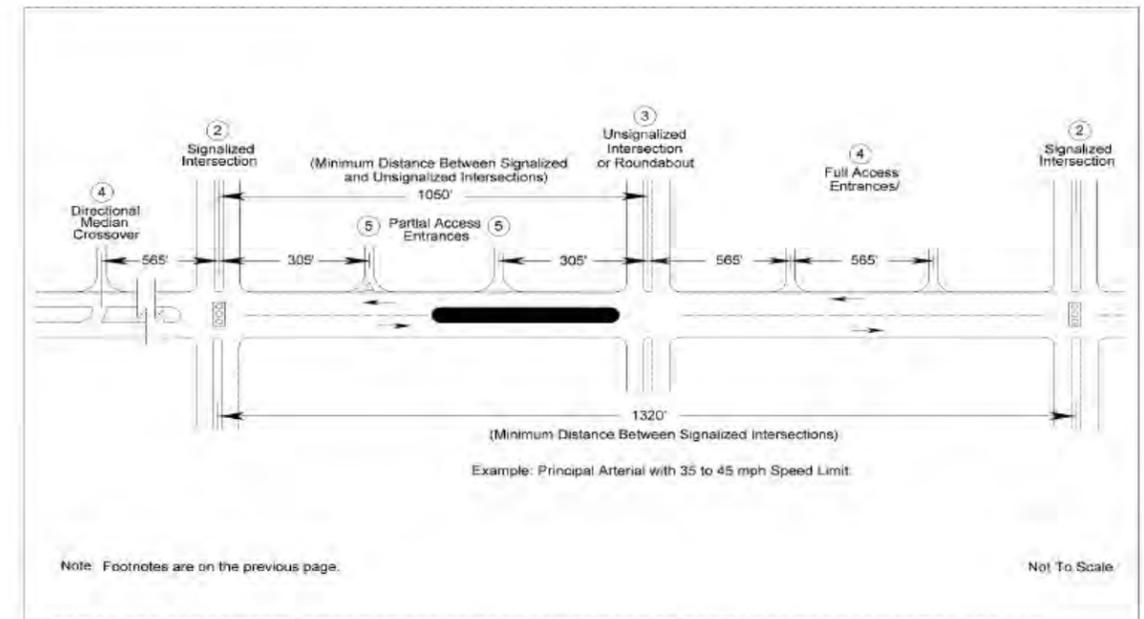


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
					830	440
S36		Spotsylvania Ave.	FM	Y/-		
<b>Falcon Dr.</b>						
S23		Lafayette Blvd.	FM	Project Start		
					201	440
E1		CVS Entrance	FM	N/Y		
					1044	440
E2		Clay St.	FM	Y/Y		
					779	440
E3		Ball Field Entrance	FM	Y/Y		
					701	335
E4		Empire Ct.	FM	Y/N		
					259	335
E5		Business Entrance	FM	N/Y		
					365	335
E6		Mine Rd.	FM	Y/Y		
<b>Spotsylvania Ave.</b>						
					511	440
E7		Business Entrance	FM	Y/Y		
					833	440
E8		Business Entrance	FM	Y/Y		
					668	440
E9		Market St.	FM	Y/Y		
					671	440
E10		Business Entrance	FM	Y/N		
					184	440
E11		Business Entrance	FM	N/-		
<b>Falcon Dr.</b>						
S23		Lafayette Blvd.	FM	Project Start		
					205	440

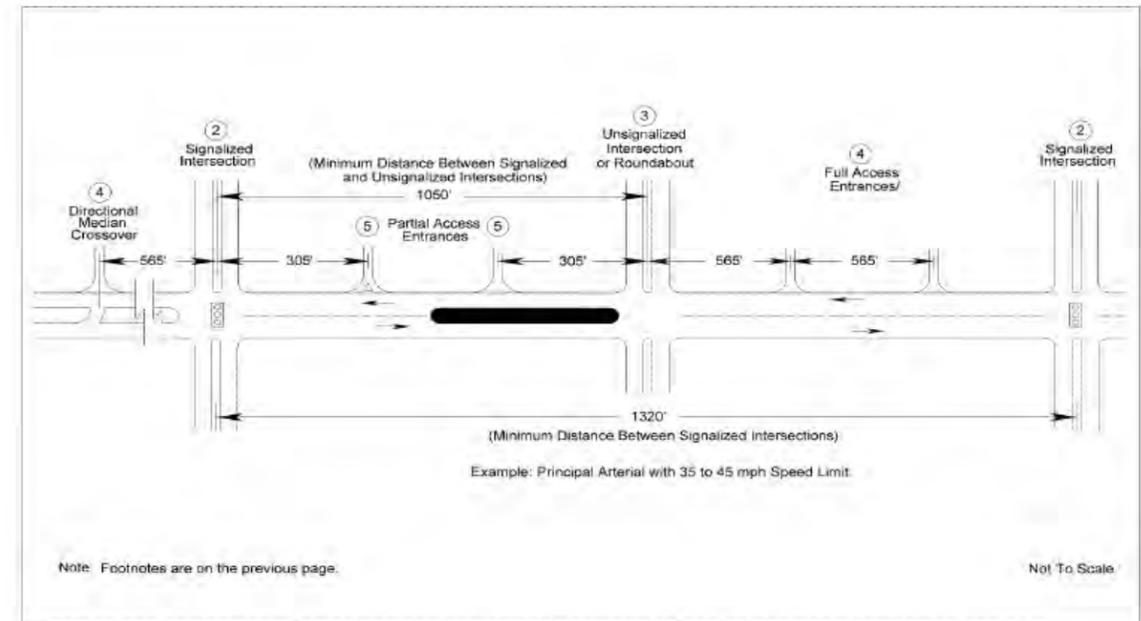


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
W1		Safford Fiat Entrance	FM	N/N		
					137	250
W65		Ecclesia Worship Center Entrance	RI/RO	N/N		
					234	250
W2		Columbia Dr.	FM	N/N		
					169	250
W3		Business Entrance	RI/RO	N/N		
					104	250
W4		Business Entrance	RI/RO	N/N		
					144	250
W5		Business Entrance	FM	N/N		
					133	335
W6		Business Entrance	FM	N/Y		
					1088	335
W7		Carr Dr.	FM	Y/N		
					1108	335
W64		Business Entrance	FM	N/Y		
					183	440
W8		Mine Rd.	FM	Y/N		
<b>Spotsylvania Ave.</b>						
					327	335
W9		Business Entrance	FM	N/N		
					101	250
W10		Ferguson Entrance	RI	N/N		
					197	250
W11		Business Dr.	FM	N/N		
					335	335
W12		Business Entrance	FM	N/N		
					168	335
W13		Business Entrance	FM	N/N		
					258	335

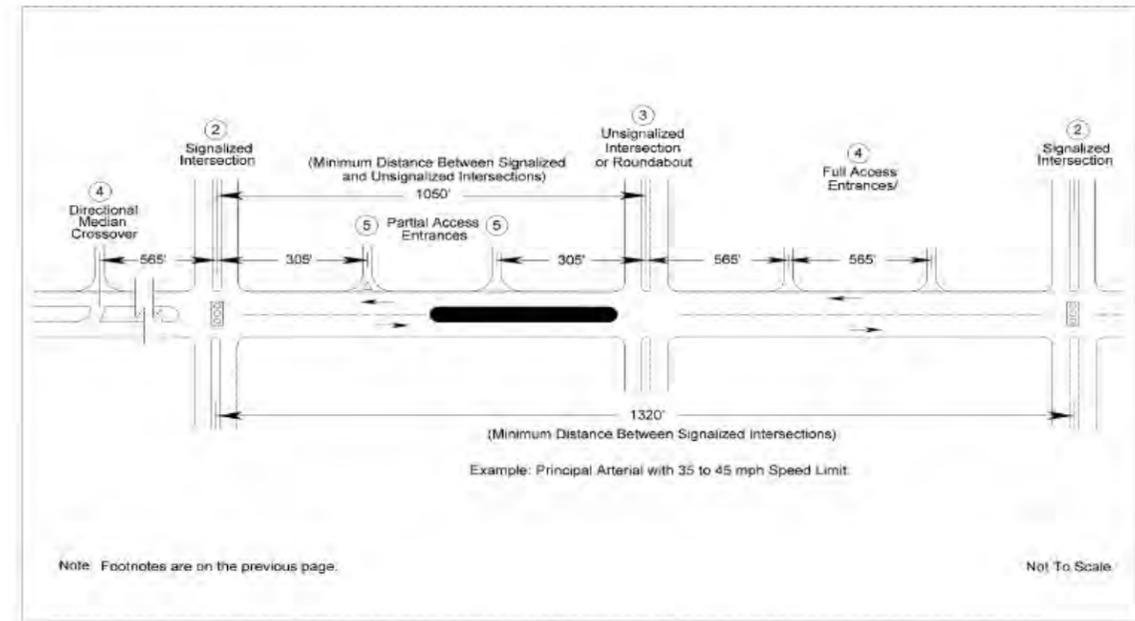


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\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
W14		Business Entrance	FM	N/N	293	335
W15		Business Entrance	FM	N/Y	367	335
W16		Market St.	FM	Y/N	225	335
W17		Hampton Inn Entrance	FM	N/Y	264	335
W18		Hooters Entrance	FM	Y/N	82	335
W19		Business Entrance	FM	N/N	133	335
W20		Business Entrance	FM	N/N	184	335
W21		Fairfield Entrance	FM	N/N	161	335
W22		Fairfield Entrance	FM	N/N	177	335
W23		Golden Corral Entrance	FM	N/Y	175	335
W24		Business Entrance	FM	N/-		
<b>Germanna Point Dr.</b>						
E12		Cotter Ct	FM	Project Start	736	225
E13		Pratts Dr	FM	Y/Y	567	225
E14		Papillion Ct	FM	Y/N	304	440
E15		Leighann Ln	FM	N/Y	474	440
E16		Lee Hill School Dr	FM	Y/N	389	440
E17		Route 17/Mills Dr	FM	N/-		
W25		Vacant Lot Entrance	FM	-/Y		

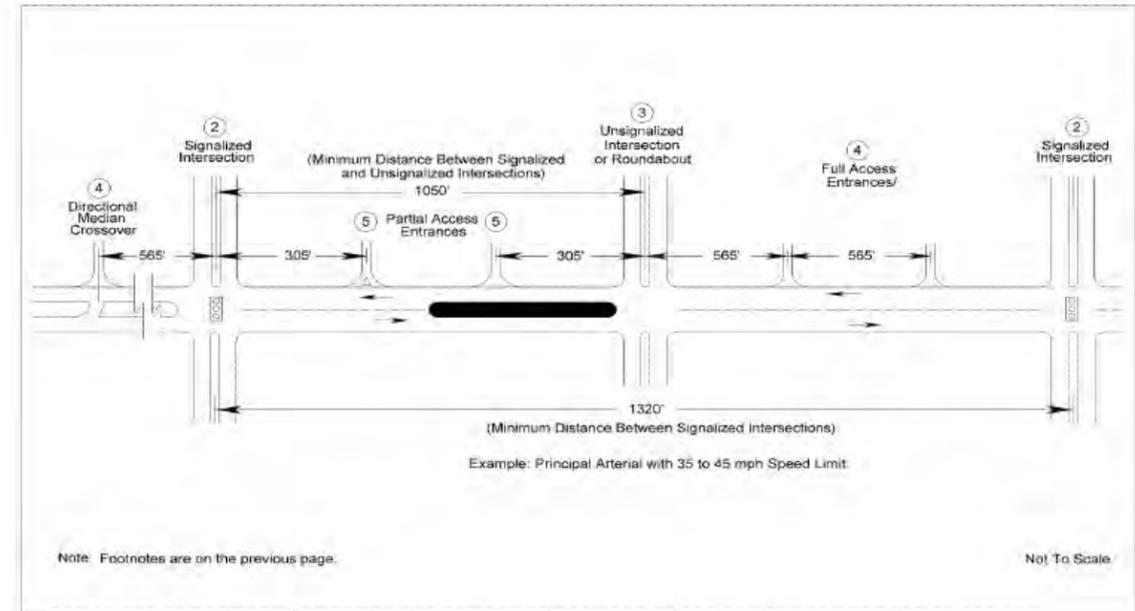


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\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
					268	225
W26		Matt Hill Ct	FM	Y/Y		
					673	440
W27		Colonnade Way	FM	Y/Y		
					855	225
W28		Residence Driveway	FM	Y/Y		
					295	225
W29		Route 17/Mills Dr	FM	Y/-		
<b>US 17</b>						
N38		Germanna Point Dr	FM	Project Start		
					2015	1050
N39		Glenwood Dr	FM	Y/Y		
					2234	1050
N40		Route 1/Jefferson Davis Hwy	FM	Y/-		
<b>US 1</b>						
S38		Hospital Blvd	FM	-/Y		
					2002	1050
S39		Overview Dr	FM	Y/Y		
					1715	305
S40		Business Entrance	LI/RI/RO	Y/Y		
					495	305
S41		Route 1/Jefferson Davis Hwy	FM	Y/-		
E18		Route 17/Mills Dr	LI/RI/RO	Project Start		
					623	305
E19		Southpoint Dr	RI/RO	Y/Y		
					718	305
E20		Southpoint Pkwy	FM	Y/Y		
					380	305
E21		McDonald's Entrance	RI/RO	Y/N		
					113	305
E22		Sunoco Entrance	LI/RI/RO	N/N		
					174	305
E23		Sunoco Entrance	RI/RO	N/N		
					230	305
E24		KFC Entrance	FM	N/Y		

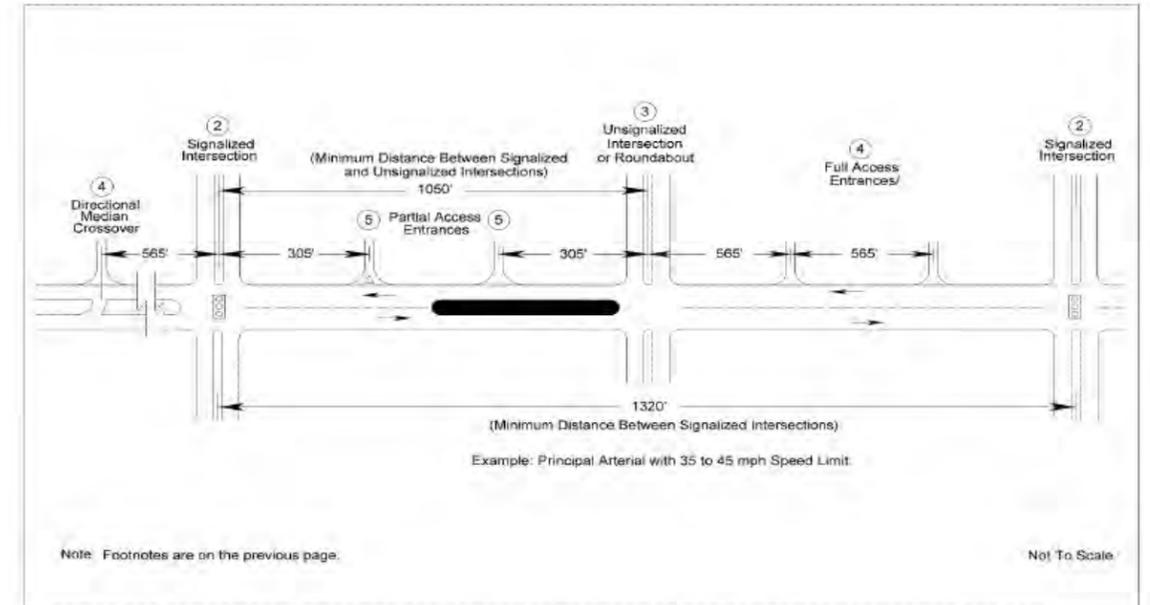


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\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
					472	305
E25		Crossings Ct	RI/RO	Y/Y		
					410	305
E26		I-95 SB On-Ramp	FM	Y/Y		
					2747	1320
E27		Market St	FM	Y/N		
					96	305
E28		Knights Inn Entrance	RI/RO	N/N		
					275	305
E29		Knights Inn Entrance	RI/RO	N/N		
					85	305
E30		Tobacco Country/Gulf Entrance	RI/RO	N/N		
					83	305
E31		Bakers Ln	FM	N/N		
					55	565
E32		Travelodge Entrance	FM	N/N		
					118	565
E33		Travelodge Entrance	FM	N/N		
					66	565
E34		Old Gas Station Entrance	FM	N/N		
					101	565
E35		Old Gas Station Entrance	FM	N/N		
					123	565
E36		Jiffy Lube Entrance	FM	N/N		
					187	305
E37		Business Dr	RI/RO	N/N		
					103	305
E38		Motel 6 Entrance	FM	N/N		
					55	565
E39		Motel 6 Entrance	FM	N/N		
					113	565
E40		Autos By Choice Entrance	FM	N/N		
					64	565
E41		Loanmax Title Loans Entrance	FM	N/N		
					88	565
E42		Loanmax Title Loans Entrance	FM	N/N		
					65	305

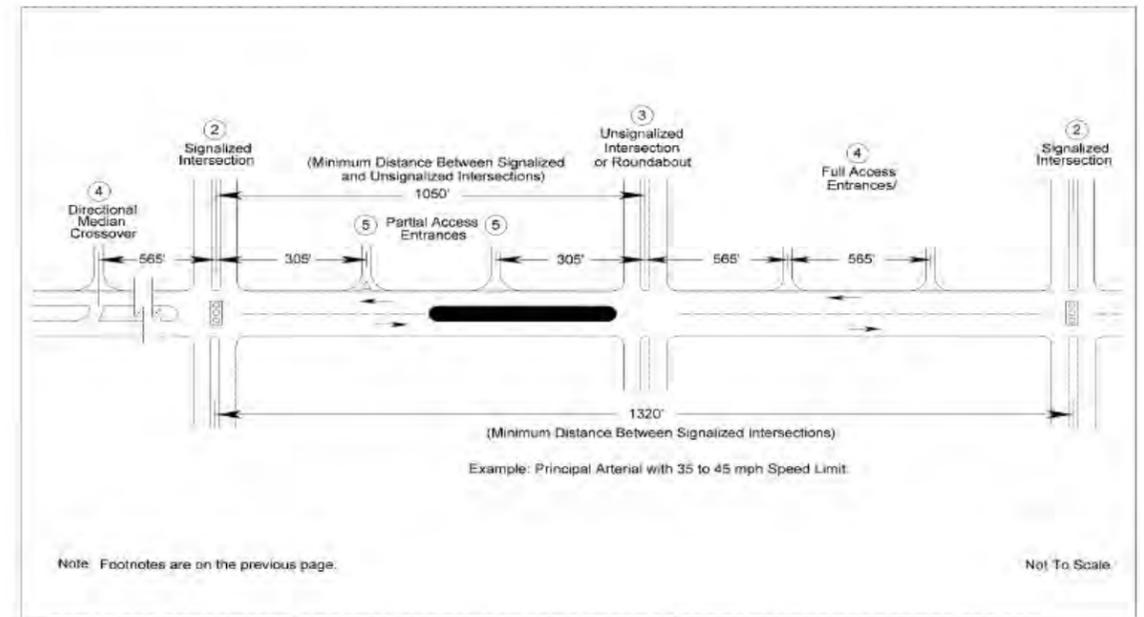


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
E43		Business Entrance	RI	N/N		
					196	305
E44		Mine Rd	FM	N/N		
					124	565
E45		McDonald's Entrance	FM	N/N		
					165	565
E46		McDonald's Entrance	FM	N/N		
					111	305
E47		Harley-Davidson Entrance	RI/RO	N/N		
					297	305
E48		Wicker St	FM	N/Y		
					852	565
E49		Carr Dr	FM	Y/Y		
					364	305
E50		Wicker St	RI/RO	Y/N		
					304	305
E51		Lafayette Blvd	FM	N/-		
W30		Route 17/Mills Dr	FM	Project Start		
					1354	1320
W31		Southpoint Pkwy	FM	Y/Y		
					1067	305
W32		Exxon Entrance	RI/RO	Y/N		
					105	305
W33		Exxon Entrance	RI/RO	N/Y		
					617	305
W34		I-95 SB Off-Ramp	FM	Y/Y		
					1725	1320
W35		I-95 NB On-Ramp	FM	Y/Y		
					995	565
W36		Denny's Entrance	FM	Y/N		
					66	305
W37		Tires and more Inc Entrance	RI/RO	N/N		
					70	305
W38		Tires and more Inc Entrance	RI/RO	N/N		
					62	305

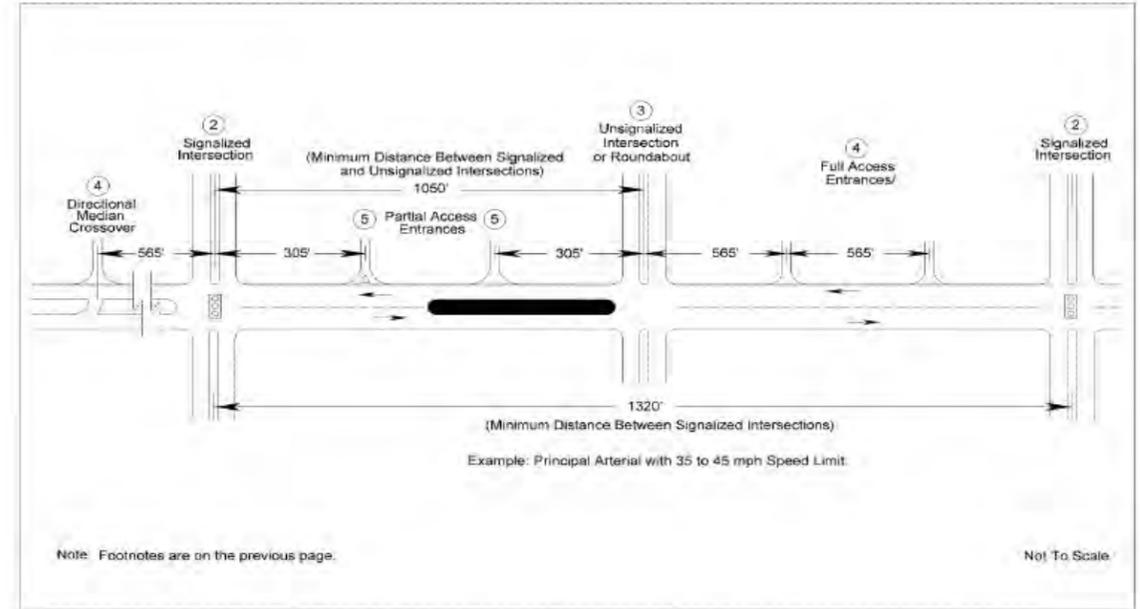


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
W39		Super Value Inn Entrance	RI/RO	N/N		
					59	305
W40		Econo Lodge Entrance	RI/RO	N/N		
					104	305
W41		Shell Gas Station Entrance	RI/RO	N/N		
					207	305
W42		Shell Gas Station Entrance	FM	N/N		
					59	565
W43		Vacant Lot Entrance	FM	N/N		
					164	565
W44		Citgo Entrance	FM	N/N		
					135	565
W45		Citgo Entrance	FM	N/N		
					75	565
W46		BP Entrance	FM	N/N		
					89	565
W47		BP Entrance	FM	N/N		
					76	565
W48		BP Entrance	FM	N/N		
					52	565
W49		Uhaul Storage Entrance	FM	N/N		
					45	565
W50		Royal Inn Entrance	FM	N/N		
					100	565
W51		Pizza Hut Entrance	FM	N/N		
					94	565
W52		Pizza Hut Entrance	FM	N/N		
					96	565
W53		Arby's Entrance	FM	N/N		
					89	565
W54		Arby's Entrance	FM	N/N		
					83	565
W55		Old Pizza Hut Entrance	FM	N/N		
					70	565
W56		Old Pizza Hut Entrance	FM	N/N		
					98	565

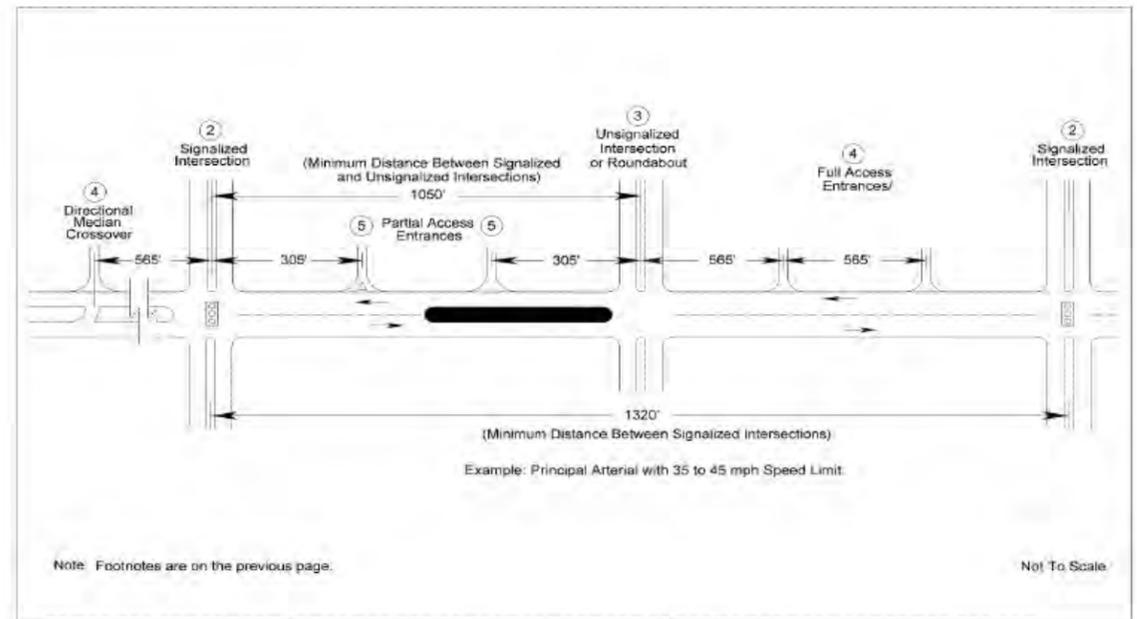


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Entrance #	Existing Station	Access to	Entrance Type*	Meets VDOT Acc. Mgmt. Spacing STD (Y/N) (To Adjacent Entrance)	Existing Spacing (Ft.)	Required Spacing Standards (Ft.)
W57		Hood Dr	FM	N/N	212	305
W58		Rite Aid Entrance	RI/RO	N/N	185	305
W59		Advanced Auto Parts Entrance	RI/RO	N/Y	343	305
W60		Frontage Rd	FM	Y/Y	803	565
W61		Frontage Rd	FM	Y/Y	424	305
W62		Frontage Rd	RI/RO	Y/N	175	305
W63		Route 208/Courthouse Rd	FM	N/-		
<b>Market St.</b>						
N41		Route 1/Jefferson Davis Hwy	FM	Project Start	515	335
N42		Knights Inn Entrance	FM	Y/N	134	335
N43		Business Entrance	FM	N/Y	344	335
N44		Spotsylvania Ave	FM	Y/N		
S42		Route 1/Jefferson Davis Hwy	FM	Project Start	77	335
S43		Business Entrance	FM	N/N	112	335
S44		Exxon Entrance	FM	N/N	95	335
S45		Exxon Entrance	FM	N/N	205	335
S46		Hampton Inn Entrance	FM	N/Y	461	335
S47		Spotsylvania Ave	FM	Y/-		

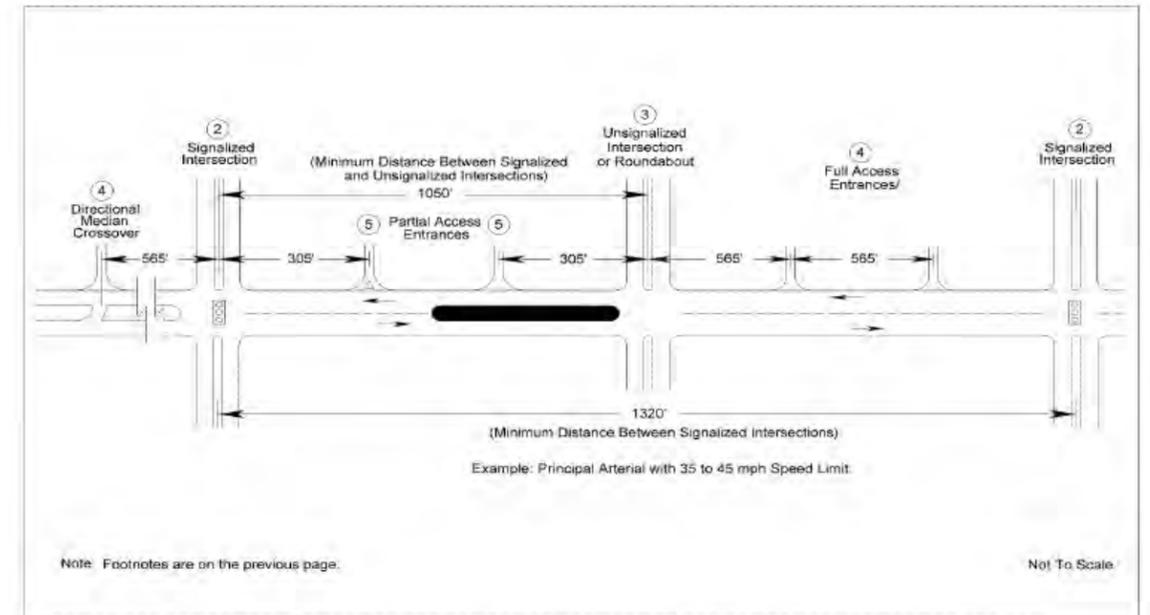


FIGURE 2-8.1 ILLUSTRATION OF THE RELATIONSHIP BETWEEN SPACING STANDARDS\*

\* Rev. 7/14

Intersection

- \*RI/RO = Right In/Right Out
- RI Only = Right In Only
- RO Only = Right Out Only
- LI/RI/RO = Left In/Right In/Right Out
- FM = Full Movement

# Appendix **B**

## Existing Traffic Control Devices

## Rte. 1/208 Traffic Control Device Replacement List

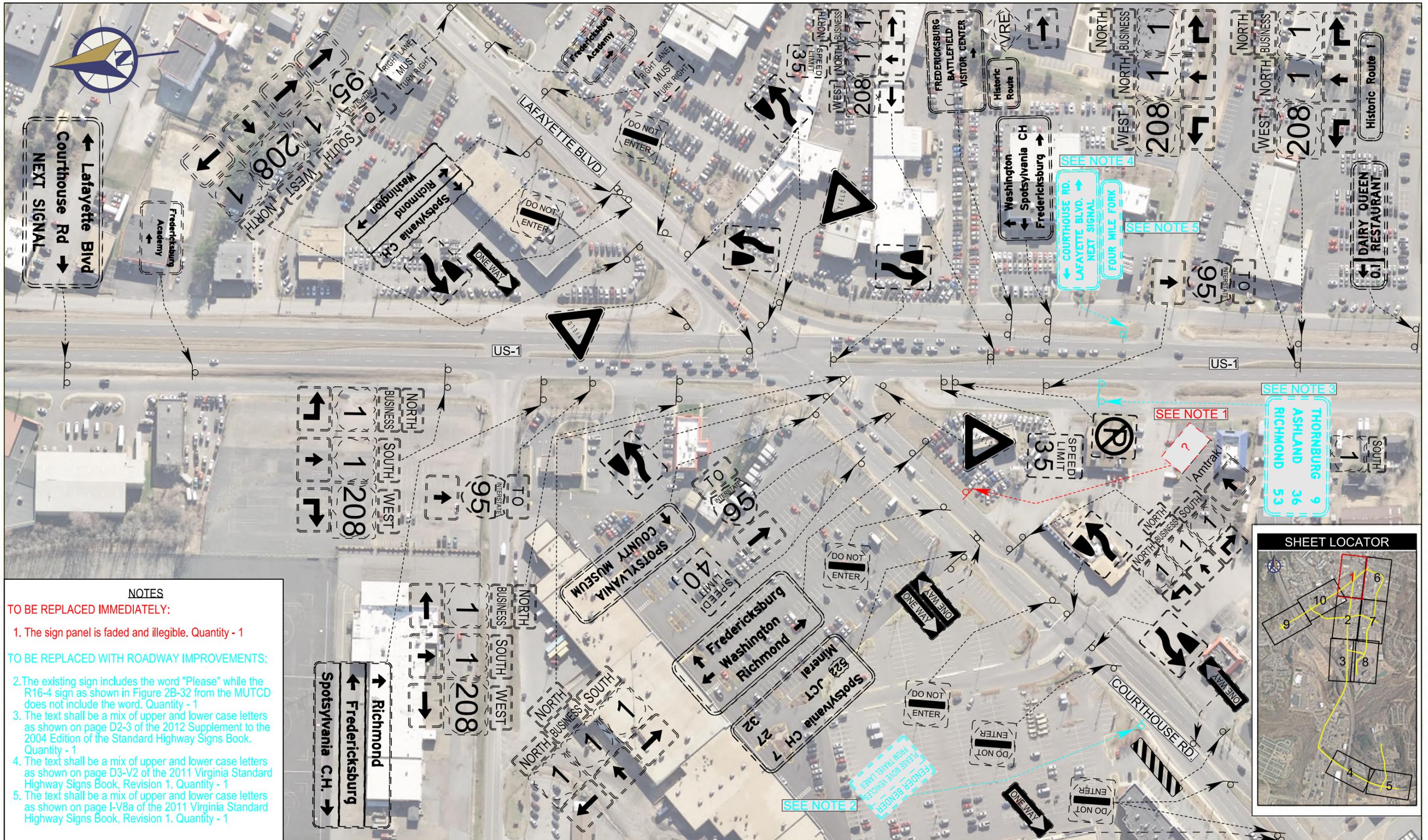
### To Be Replaced Immediately

Sheet #	Description of the Sign	Location	Reason for Non-Compliance	No. of Signs On Post	Photos
1	Amtrak	Courthouse Rd.	Faded and Illegible	1	
10	DO NOT ENTER	Courthouse Rd.	Faded and Illegible	1	
<b>Subtotal: number of signs to be replaced immediately</b>				<b>2</b>	

### To Be Replaced with Roadway Improvements

Sheet #	Description of the Sign	Location	Reason for Non-Compliance	No. of Signs On Post	Photos
1	FENDER BENDER PLEASE REMOVE VEHICLES FROM TRAVEL LANES	Courthouse Rd.	Includes the word "PLEASE"	1	
1	THORNBURG 9 ASHLAND 36 RICHMOND 53	US-1	Text shall be a mix of upper and lower case letters	1	
1	← COURTHOUSE RD. LAFAYETTE BLVD. → NEXT SIGNAL FOUR MILE FORK	US-1	Text shall be a mix of upper and lower case letters	2	
2	SHANNON AIRPORT 	US-1	Text shall be a mix of upper and lower case letters	1	
3	NORTH I-95 USE CENTER LANE	Market St.	Cardinal direction shall have a larger "N"	1	

Sheet #	Description of the Sign	Location	Reason for Non-Compliance	No. of Signs On Post	Photos
3	FREDERICKSBURG 4 ALEXANDRIA 51 WASHINGTON 56	US-1	Text shall be a mix of upper and lower case letters	1	
6	FALCON DRIVE/COLUMBIA DRIVE	Falcon Dr.	Text shall be a mix of upper and lower case letters	2	
9	TO WAKEMAN DR →	Courthouse Rd.	Text shall be a mix of upper and lower case letters	1	
9	ROLLINGWOOD DR WAKEMAN DR	Courthouse Rd.	Text shall be a mix of upper and lower case letters	2	
9	← TO WAKEMAN DR	Courthouse Rd.	Text shall be a mix of upper and lower case letters	1	
10	MCGOWAN DR	Hood Dr.	Text shall be a mix of upper and lower case letters	1	
<b>Subtotal: number of signs to be replaced with roadway improvements</b>				<b>14</b>	
<b>Total: Overall number of signs to be replaced</b>				<b>16</b>	
<p>Note: 1. Sign panels to be replaced are assumed to remain on the existing sign post.  2. Sign inventory created from publicly available domains (Google Earth &amp; Bing Maps). The deficient signs verified from videos and photos collected during field visits from 2016 and Dec. 2017</p>					



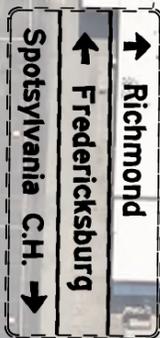
**NOTES**

**TO BE REPLACED IMMEDIATELY:**

- 1. The sign panel is faded and illegible. Quantity - 1

**TO BE REPLACED WITH ROADWAY IMPROVEMENTS:**

- 2. The existing sign includes the word "Please" while the R16-4 sign as shown in Figure 2B-32 from the MUTCD does not include the word. Quantity - 1
- 3. The text shall be a mix of upper and lower case letters as shown on page D2-3 of the 2012 Supplement to the 2004 Edition of the Standard Highway Signs Book. Quantity - 1
- 4. The text shall be a mix of upper and lower case letters as shown on page D3-V2 of the 2011 Virginia Standard Highway Signs Book, Revision 1. Quantity - 1
- 5. The text shall be a mix of upper and lower case letters as shown on page I-V8a of the 2011 Virginia Standard Highway Signs Book, Revision 1. Quantity - 1



DRAWN BY:	BNG
CHECKED BY:	KHB

**TRAFFIC CONTROL DEVICES ASSESSMENT**

**RTE. 1/208 CORRIDOR STUDY**

SCALE:	1:150	DATE:	12/07/2017
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JMT PROJECT NO.: 15-0038-003	SHEET NO.:	1	OF	10
VDOT UPC PROJECT NO.: 107192				





**NOTES**

TO BE REPLACED WITH ROADWAY IMPROVEMENTS:

1. The text shall be a mix of upper and lower case letters as shown on page D1-1 of the 2012 Supplement to the 2004 Edition of the Standard Highway Signs Book. Quantity - 1

	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	2	OF	



**NOTES**

**TO BE REPLACED WITH ROADWAY IMPROVEMENTS:**

1. The cardinal direction shall have a larger "N" as shown on page E6-2a of the 2012 Supplement to the 2004 Edition of the Standard Highway Signs Book. Quantity - 1
2. The text shall be a mix of upper and lower case letters as shown on page D2-3 of the 2012 Supplement to the 2004 Edition of the Standard Highway Signs Book. Quantity - 1



DRAWN BY: BNG  
 CHECKED BY: KHB

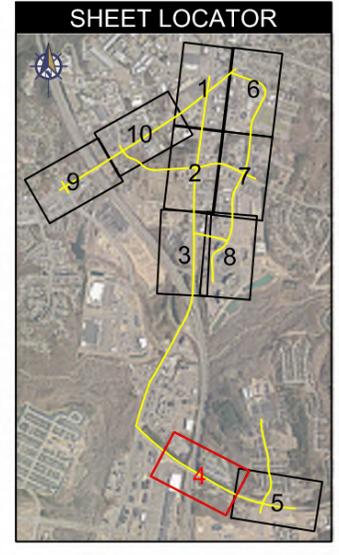
**TRAFFIC CONTROL DEVICES ASSESSMENT**

**RTE. 1/208 CORRIDOR STUDY**

SCALE: 1:150  
 DATE: 12/07/2017

JMT PROJECT NO.: 15-0038-003  
 VDOT UPC PROJECT NO.: 107192  
 SHEET NO.: 3 OF 10

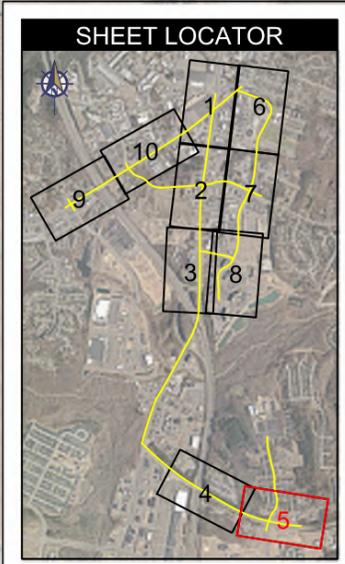




**NOTES**  
All signs meet current MUTCD and VA Standards.

	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	4	OF	

12/8/2017 7:48:40 AM



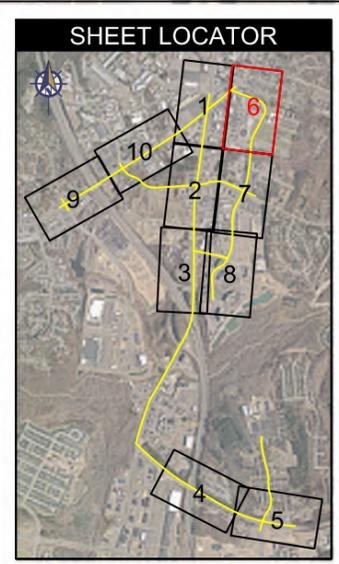
**NOTES**  
All signs meet current MUTCD and VA Standards.

	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003 VDOT UPC PROJECT NO.: 107192	SHEET NO.:	5	OF	

12/8/2017 7:51:31 AM

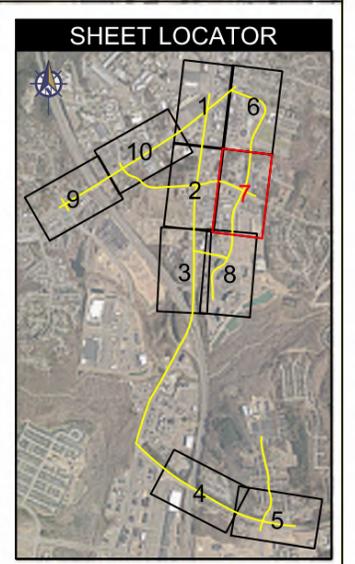


**NOTES**  
 TO BE REPLACED WITH ROADWAY IMPROVEMENTS:  
 1. Street name signs use all uppercase letters. Current standards specify using a combination of upper and lower case letters. Refer to Section 2D.43 paragraph 03 of the 2011 VA Supplement of the MUTCD.  
 Quantity - 2



	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
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12/8/2017 8:55:53 AM



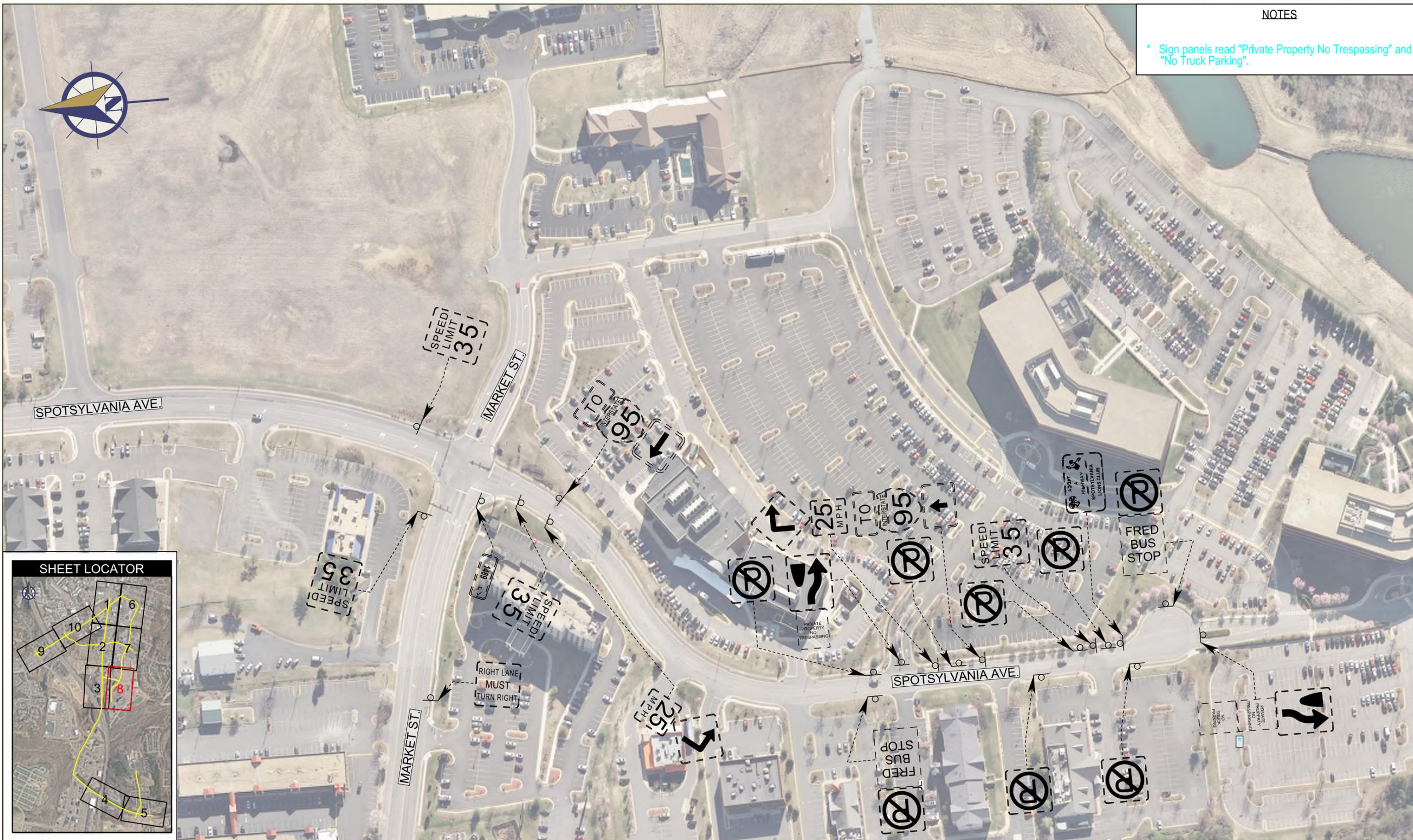
**NOTES**  
All signs meet current MUTCD and VA Standards.

	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
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12/8/2017 8:35:23 AM

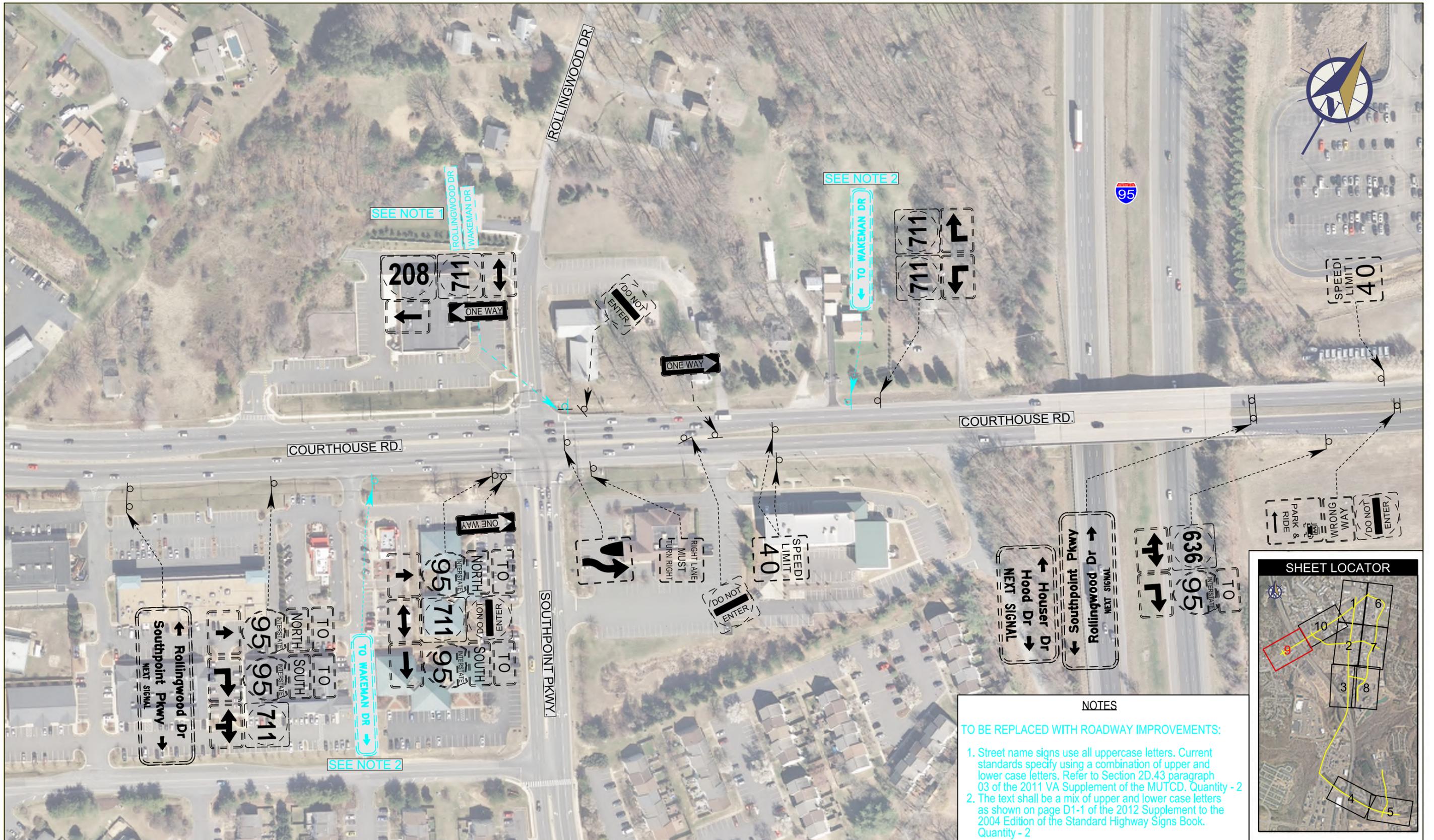
NOTES

\* Sign panels read "Private Property No Trespassing" and "No Truck Parking".



	DRAWN BY:	BNG	TRAFFIC CONTROL DEVICES ASSESSMENT	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB	RTE. 1/208 CORRIDOR STUDY	JMT PROJECT NO.: 15-0038-003	SHEET NO.:	8	OF	
				VDOT UPC PROJECT NO.: 107192				

12/8/2017 8:38:48 AM



**NOTES**

TO BE REPLACED WITH ROADWAY IMPROVEMENTS:

1. Street name signs use all uppercase letters. Current standards specify using a combination of upper and lower case letters. Refer to Section 2D.43 paragraph 03 of the 2011 VA Supplement of the MUTCD. Quantity - 2
2. The text shall be a mix of upper and lower case letters as shown on page D1-1 of the 2012 Supplement to the 2004 Edition of the Standard Highway Signs Book. Quantity - 2

	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	SHEET NO.:	9	OF	
				VDOT UPC PROJECT NO.:	107192			



	DRAWN BY:	BNG	<b>TRAFFIC CONTROL DEVICES ASSESSMENT</b>  <b>RTE. 1/208 CORRIDOR STUDY</b>	SCALE:	1:150	DATE:	12/07/2017	
	CHECKED BY:	KHB		JMT PROJECT NO.: 15-0038-003	SHEET NO.:	10	OF	
				VDOT UPC PROJECT NO.:	107192			