4 TRIP GENERATION AND TRAFFIC DISTRIBUTION

The site-generated traffic volumes in Tables 4-1 are based on the 8th Edition of the Institute of Transportation Engineer's (ITE's) *Trip Generation Manual*. This is the standard traffic engineering resource used to estimate future vehicular trips based on proposed land uses.

Table 4-1: Trip Generation Summary 18-Hole Golf Course

					Saturday Peak Hour		
LAND USE	ITE CODE	AMOUNT	UNITS	Daily Traffic	IN	OUT	TOTAL
Golf Course	430	18	Holes	731	40	42	83

SOURCE: Institute of Transportation Engineers' *Trip Generation Report 8th Edition*

The proposed site traffic distribution percentages are shown on Figures 4-1. The peak hour site trip volumes for the 18-hole golf course from Table 4-1 were multiplied by the percentages from Figure 4-1 to generate the new site traffic volumes, also shown on Figure 4-1.

Based on conversations with the property owner about types of activity and expected arrival patterns, 60 percent of visitors were assumed to arrive via Scottsville Road (Route 20). The remaining 40 percent were assumed to arrive via Route 53.

The 60 percent of visitors using Route 20 results in 24 left turns from Carter's Mountain Road into the property. The 40 percent split coming from Route 53 results in 16 right turns from Carter's Mountain Road.

5 LEFT AND RIGHT TURN LANE ANALYSES

The guidelines for left and right turn lane treatments are found in Appendix F of VDOT's *Road Design Manual*. These guidelines provide criteria for the installation of left and right turn lanes on two-lane and four-lane highways at unsignalized intersections. Left and right turn lane analyses were completed using the 2013 total traffic volumes for the movements listed below:

- Northbound Carter's Mountain Road left turn into the property.
- Southbound Carter's Mountain Road right turn into the property.
- Westbound Route 53 left turn onto James Monroe Parkway.
- Eastbound Route 53 right turn onto James Monroe Parkway.
- Northbound James Monroe Parkway left turn onto Route 53.
- Northbound James Monroe Parkway right turn onto Route 53.

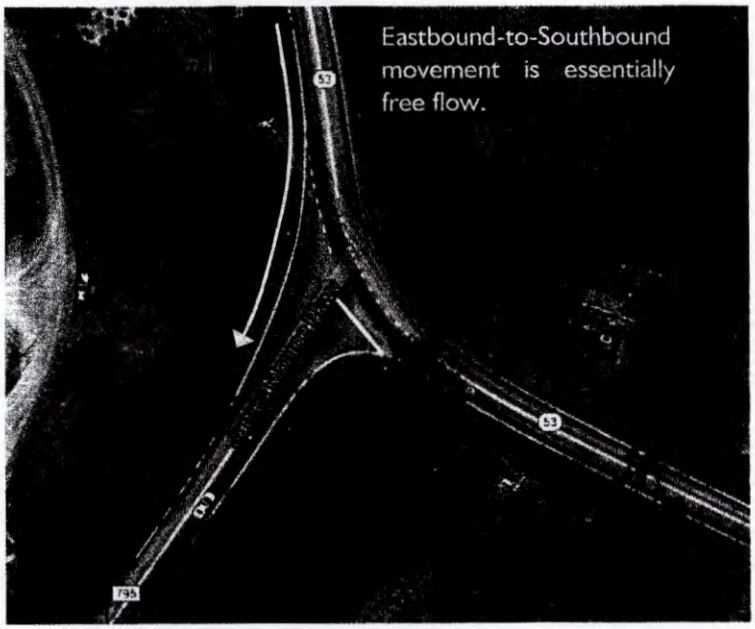
Golf Course Entrance

- The left turn lane analysis for northbound Carter's Mountain Road (Route 627) at the property entrance is shown on Figure 5-1. The VDOT turn lane methodology indicates that **a left turn lane is not warranted** to accommodate the projected traffic volumes for the 18-hole golf course development.
- The right turn lane analysis for southbound Carter's Mountain Road (Route 627) at the proposed site entrance is shown on Figure 5-2. The VDOT turn lane methodology indicates that **a right turn lane or taper is not warranted** to accommodate the projected traffic volumes for the 18-hole golf course development.

Route 53 Intersection

It is important to note that very few additional vehicles are expected to travel through this intersection compared to today's traffic volumes. The traffic counts were adapted from the STARS report, which focused on weekday peak periods, not Saturdays. Even if the golf course peak period did occur at the same time as other traffic on the road, the golf course traffic is projected to be about one car every four minutes.

- The right turn lane analysis for eastbound Route 53 at James Monroe Parkway (Route 795) is shown on Figure 5-3. The VDOT turn lane methodology indicates that **a right turn lane would be warranted** on Route 53 to accommodate traffic through the intersection **(with or without new golf course traffic)**. However, the current geometry (Y-shape) of this intersection allows the eastbound to southbound right turn movement to act as a free right turn. In other words, drivers don't need to come to a complete stop to turn right as they would at a 90-degree T-intersection.



- The left turn lane analysis for westbound Route 53 at James Monroe Parkway (Route 795) is shown on Figure 5-4. The VDOT turn lane methodology indicates that **a left turn lane with 200 feet of storage would be warranted** on Route 53 to accommodate the traffic volumes **(with or without new golf course traffic)**.
- The right turn lane analysis for northbound James Monroe Parkway (Route 795) at Route 53 is shown on Figure 5-5. The VDOT turn lane methodology indicates that **a right turn lane is not necessary** to accommodate the traffic volumes.
- The left turn lane analysis for southbound James Monroe Parkway (Route 795) is shown on Figure 5-6. The VDOT turn lane methodology indicates that **a left turn lane is not warranted** to accommodate the projected future traffic volumes.

To summarize, some left and right turn lanes may be warranted on Route 53 at James Monroe Parkway based solely on existing weekday morning and afternoon peak hour traffic volumes. However, the STARS report provided by VDOT did not recommend any turn lane installations for this intersection. One of the recommendations was to explore the feasibility of a modern roundabout to improve safety. A roundabout would negate the need for new turn lanes.

6 CONCLUSIONS AND RECOMMENDATIONS

The proposed 18-hole golf course does not warrant either left or right turn lanes on Carter's Mountain Road (Route 627). Therefore, new turn lanes are not recommended at the proposed entrance.

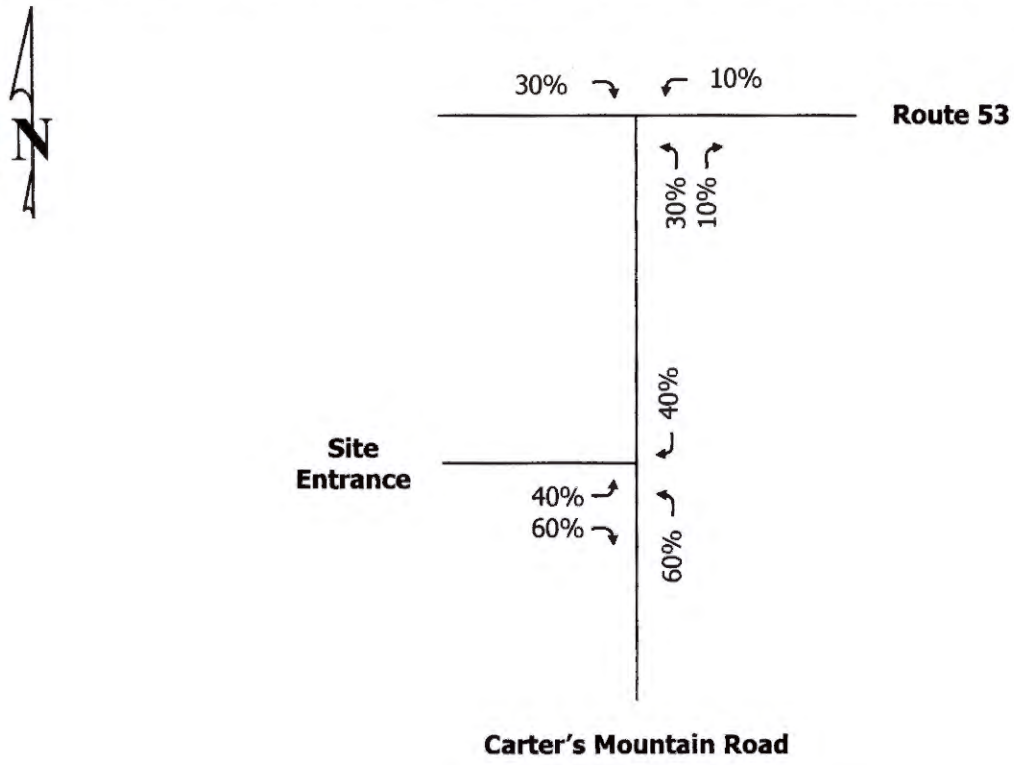
Some left and right turn lanes may be warranted on Route 53 based on existing weekday morning and afternoon peak hour traffic. It is understood that VDOT may pursue the installation of a roundabout at the intersection of Route 53 and James Monroe Parkway.

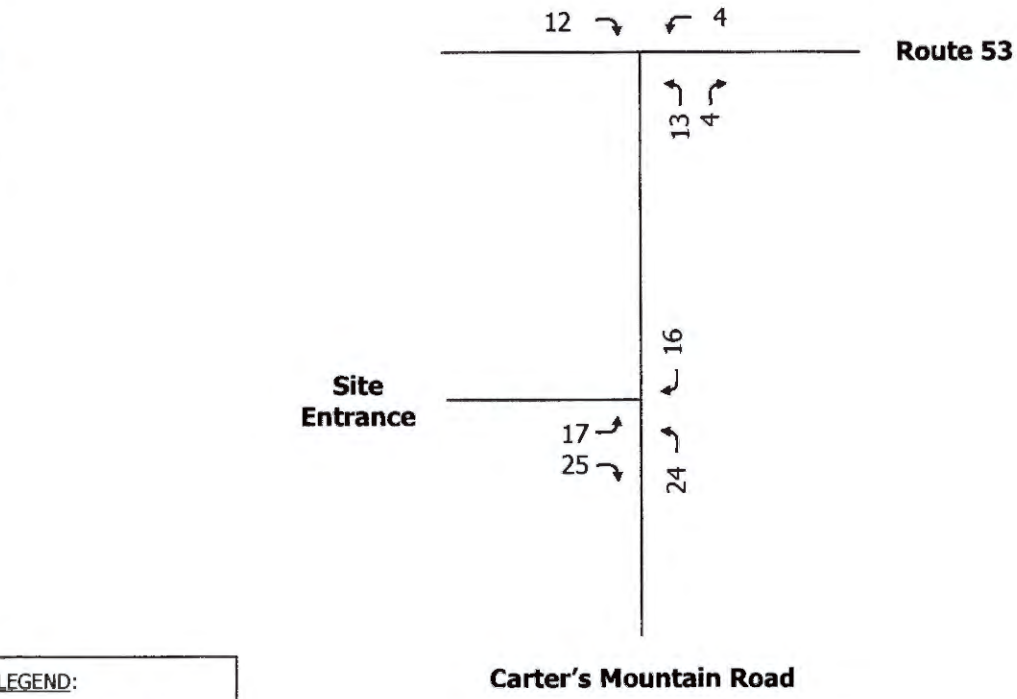
The 18-hole golf course is expected to have a negligible impact on the traffic of the surrounding network.

Exhibit 8

Attachments

Exhibit 8





LEGEND:
——— Existing Road

NOT TO SCALE

TIMMONS GROUP

Roadway Network Distribution and Volumes

Exhibit 8

Figure 4-1

Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Your Vision Achieved Through Ours.

Figure 3-1

Date Start: 31-Jul-13
Date End: 06-Aug-13

Start Time	03-Aug-13 Sat	SB	NB	Total
12:00 AM		0	1	1
12:15		2	0	2
12:30		0	0	0
12:45		0	1	1
01:00		0	0	0
01:15		1	0	1
01:30		0	0	0
01:45		0	0	0
02:00		0	0	0
02:15		0	0	0
02:30		0	0	0
02:45		0	0	0
03:00		0	0	0
03:15		0	0	0
03:30		0	0	0
03:45		0	0	0
04:00		0	0	0
04:15		0	0	0
04:30		0	0	0
04:45		0	0	0
05:00		0	0	0
05:15		0	0	0
05:30		0	0	0
05:45		1	0	1
06:00		1	0	1
06:15		0	0	0
06:30		2	1	3
06:45		0	2	2
07:00		2	1	3
07:15		1	1	2
07:30		2	1	3
07:45		4	0	4
08:00		2	2	4
08:15		1	2	3
08:30		3	1	4
08:45		3	2	5
09:00		4	1	5
09:15		1	5	6
09:30		1	4	5
09:45		2	6	8
10:00		1	5	6
10:15		2	3	5
10:30		5	7	12
10:45		1	12	13
11:00		4	2	6
11:15		1	6	7
11:30		4	8	12
11:45		4	6	10
Total		55	80	135
Percent		40.7%	59.3%	
Peak		11:00	10:45	10:30
Vol.		13	28	38
P.H.F.		0.650	0.583	0.731

Exhibit 8

Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Your Vision Achieved Through Ours.

Figure 3-1

Date Start: 31-Jul-13
Date End: 06-Aug-13

Start Time	03-Aug-13 Sat	SB	NB	Total
12:00 PM		4	4	8
12:15		3	8	11
12:30		3	7	10
12:45		2	5	7
01:00		7	**10**	17
01:15		2	**4**	6
01:30		7	**9**	16
01:45		4	**10**	14
02:00		10	7	17
02:15		10	3	13
02:30		5	5	10
02:45		**10**	5	**15**
03:00		**6**	4	**10**
03:15		**4**	5	**9**
03:30		**16**	13	**29**
03:45		5	7	12
04:00		5	7	12
04:15		4	4	8
04:30		4	6	10
04:45		3	4	7
05:00		6	3	9
05:15		3	2	5
05:30		5	5	10
05:45		6	4	10
06:00		4	2	6
06:15		6	4	10
06:30		4	2	6
06:45		1	2	3
07:00		4	4	8
07:15		0	3	3
07:30		1	2	3
07:45		2	0	2
08:00		2	3	5
08:15		2	4	6
08:30		2	1	3
08:45		0	2	2
09:00		2	1	3
09:15		2	0	2
09:30		0	1	1
09:45		4	2	6
10:00		6	1	7
10:15		7	1	8
10:30		3	1	4
10:45		1	2	3
11:00		1	1	2
11:15		5	0	5
11:30		1	0	1
11:45		2	1	3
Total		196	181	377
Percent		52.0%	48.0%	
Peak		14:45	13:00	14:45
Vol.		36	33	63
P.H.F.		0.563	0.825	0.543

Exhibit 8

Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Your Vision Achieved Through Ours.

Figure 3-2

Date Start: 31-Jul-13
Date End: 08-Aug-13

Start Time	03-Aug-13 Sat	SB	NB	Combined Total
12:00 AM		2	2	4
01:00		1	0	1
02:00		0	0	0
03:00		0	0	0
04:00		0	0	0
05:00		1	0	1
06:00		3	3	6
07:00		9	3	12
08:00		9	7	16
09:00		8	16	24
10:00		9	27	36
11:00		13	22	35
12:00 PM		12	24	36
01:00		20	33	53
02:00		35	20	55
03:00		31	29	60
04:00		16	21	37
05:00		20	14	34
06:00		15	10	25
07:00		7	9	16
08:00		6	10	16
09:00		8	4	12
10:00		17	5	22
11:00		9	2	11
Total		251	261	
Percent		49.0%	51.0%	

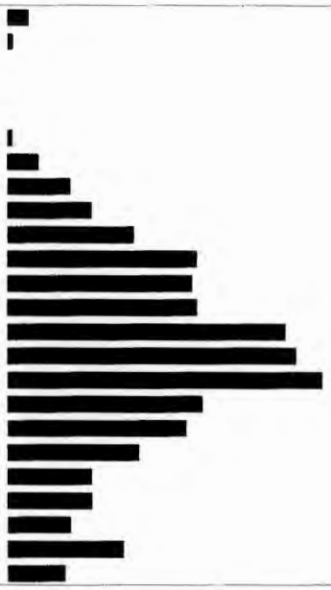
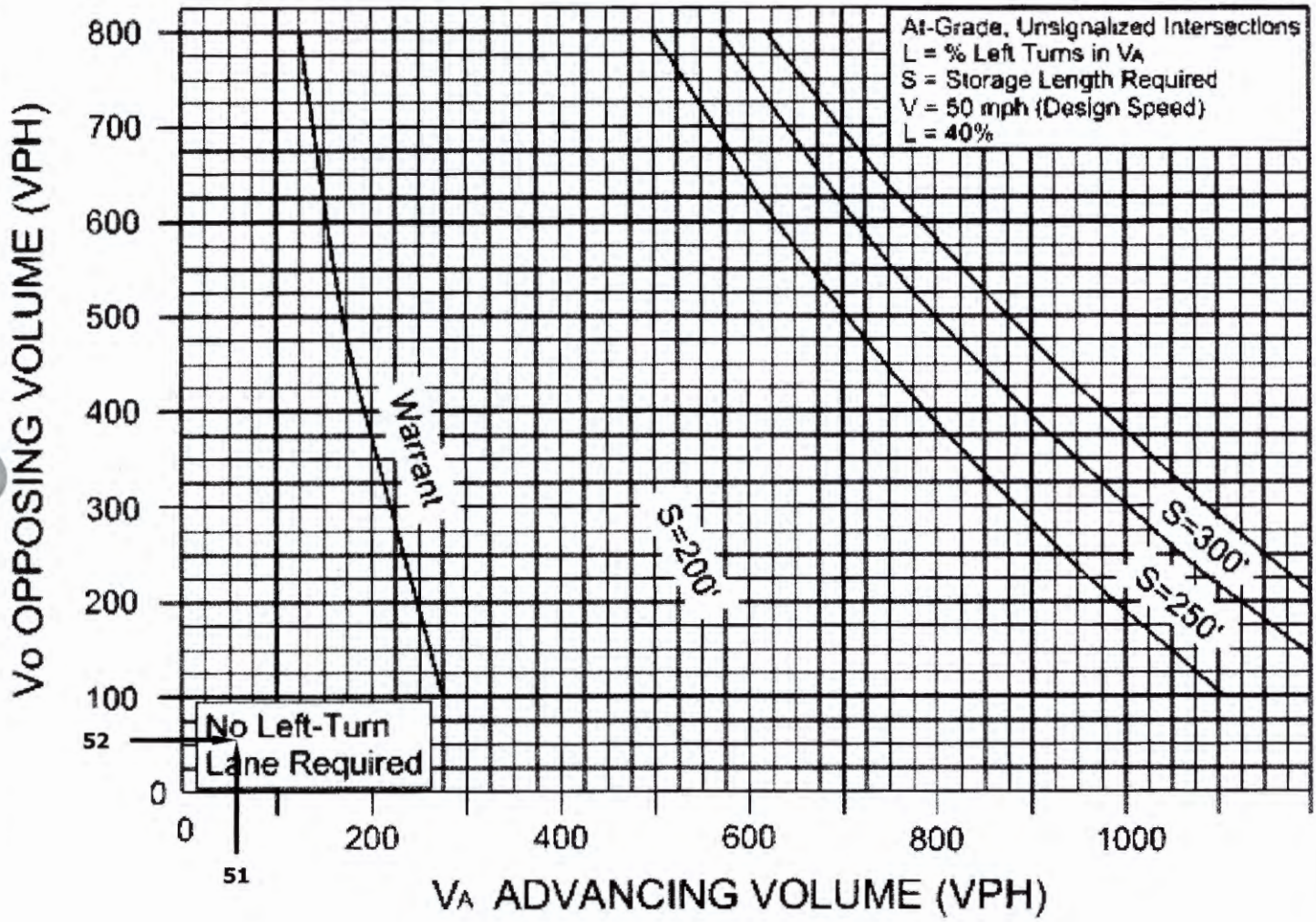


Exhibit 8

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (50 MPH)
FIGURE 3-16 VDOT ROAD DESIGN MANUAL APPENDIX F



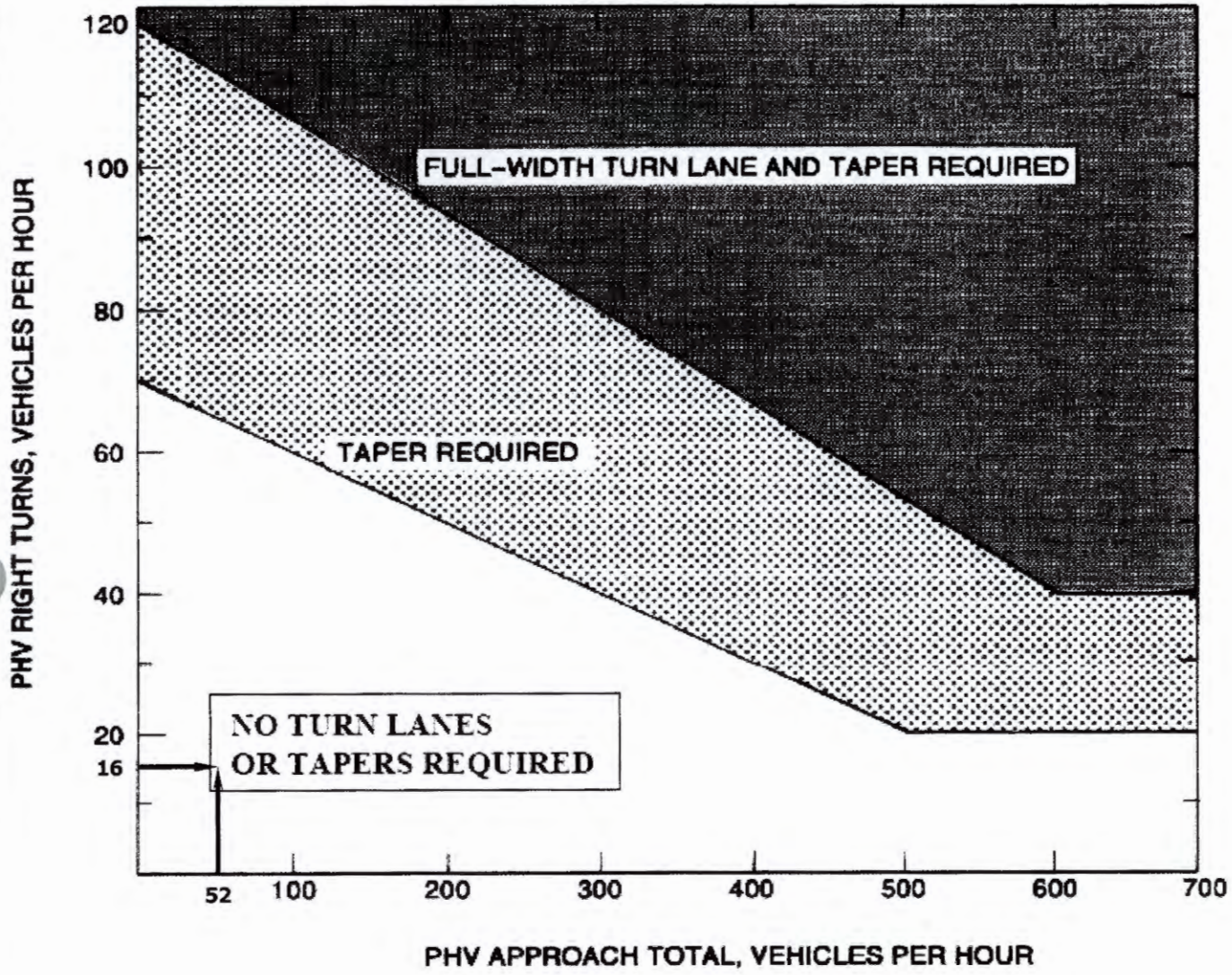
LEGEND

SAT Peak Hour

NO LEFT TURN LANE WARRANTED

TIMMONS GROUP	2013 Saturday Volume Carter's Mountain Road (Route 795) Northbound Left Turn Lane	Figure 5-1

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



LEGEND
——— SAT Peak Hour

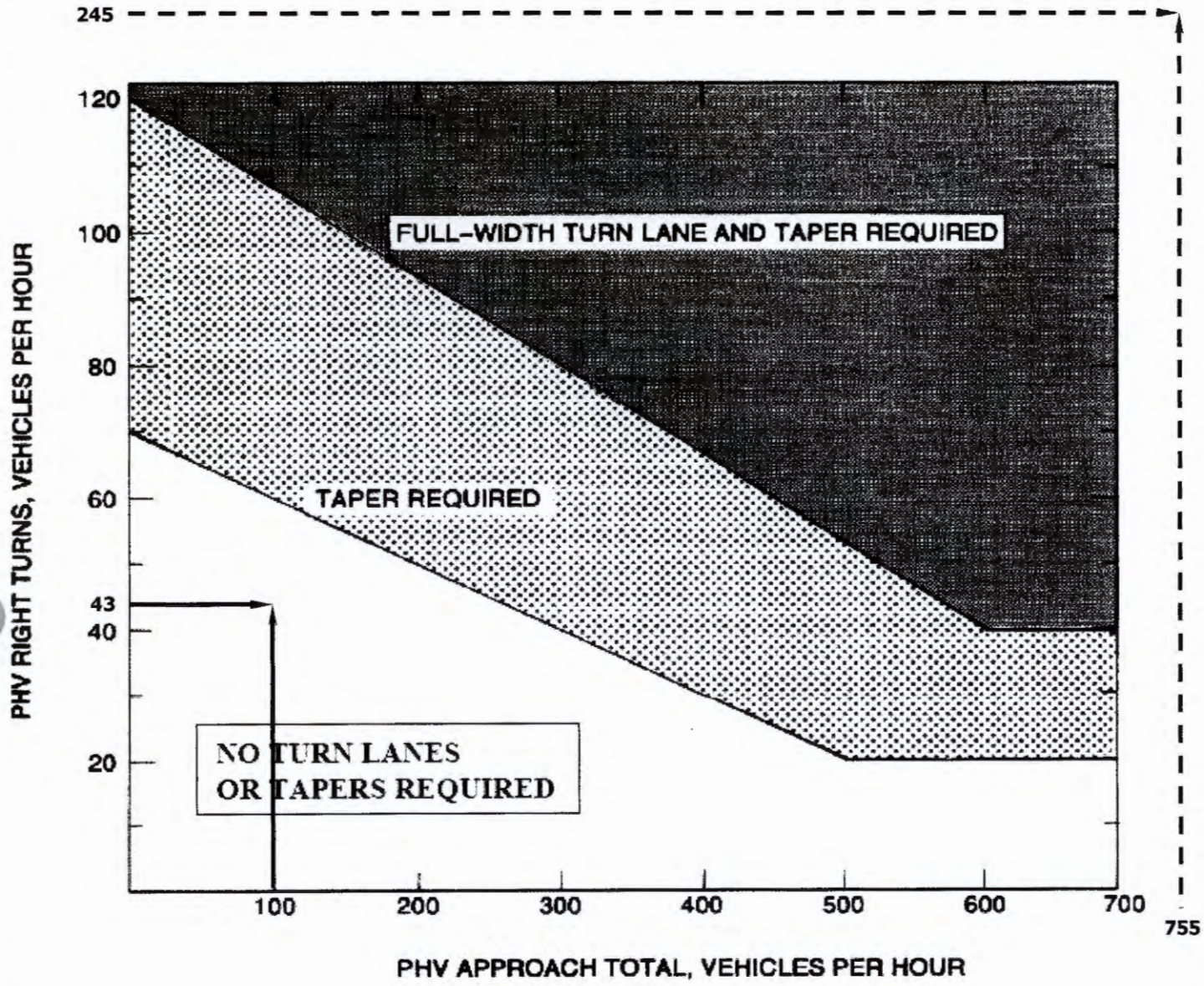
NO RIGHT TURN LANE OR TAPER WARRANTED

TIMMONS GROUP

2013 Saturday Volume
Carter's Mountain Road (Route 795)
Southbound Right Turn Lane

Figure 5-2

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



LEGEND
AM Peak Hour
PM Peak Hour

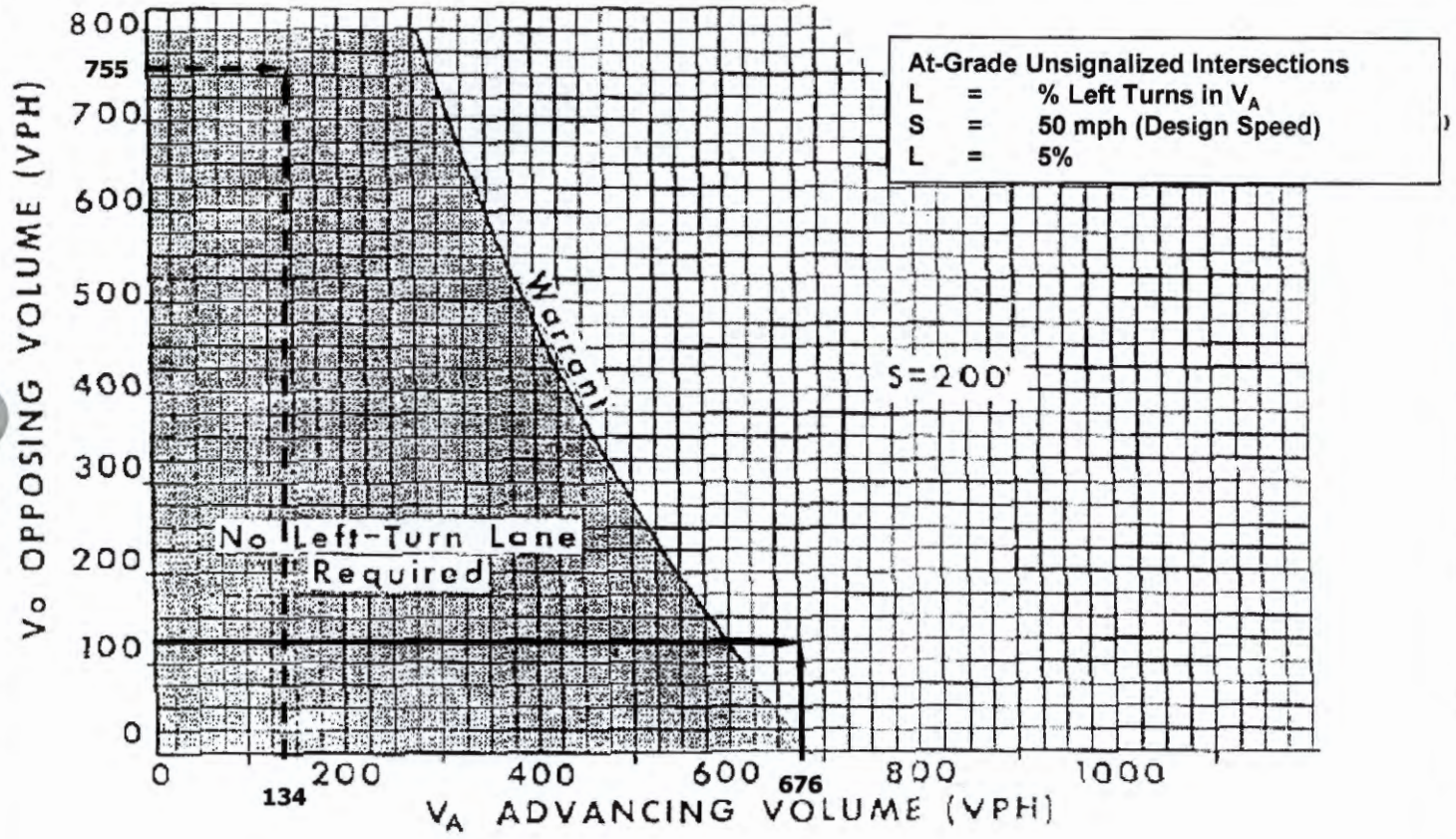
FULL WIDTH RIGHT TURN LANE
AND TAPER WARRANTED

TIMMONS GROUP

Peak Hour Volumes
Thomas Jefferson Parkway (Route 53)
Eastbound Right Turn Lane

Figure
5-3

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (50 MPH)
FIGURE 3-11 VDOT ROAD DESIGN MANUAL APPENDIX F

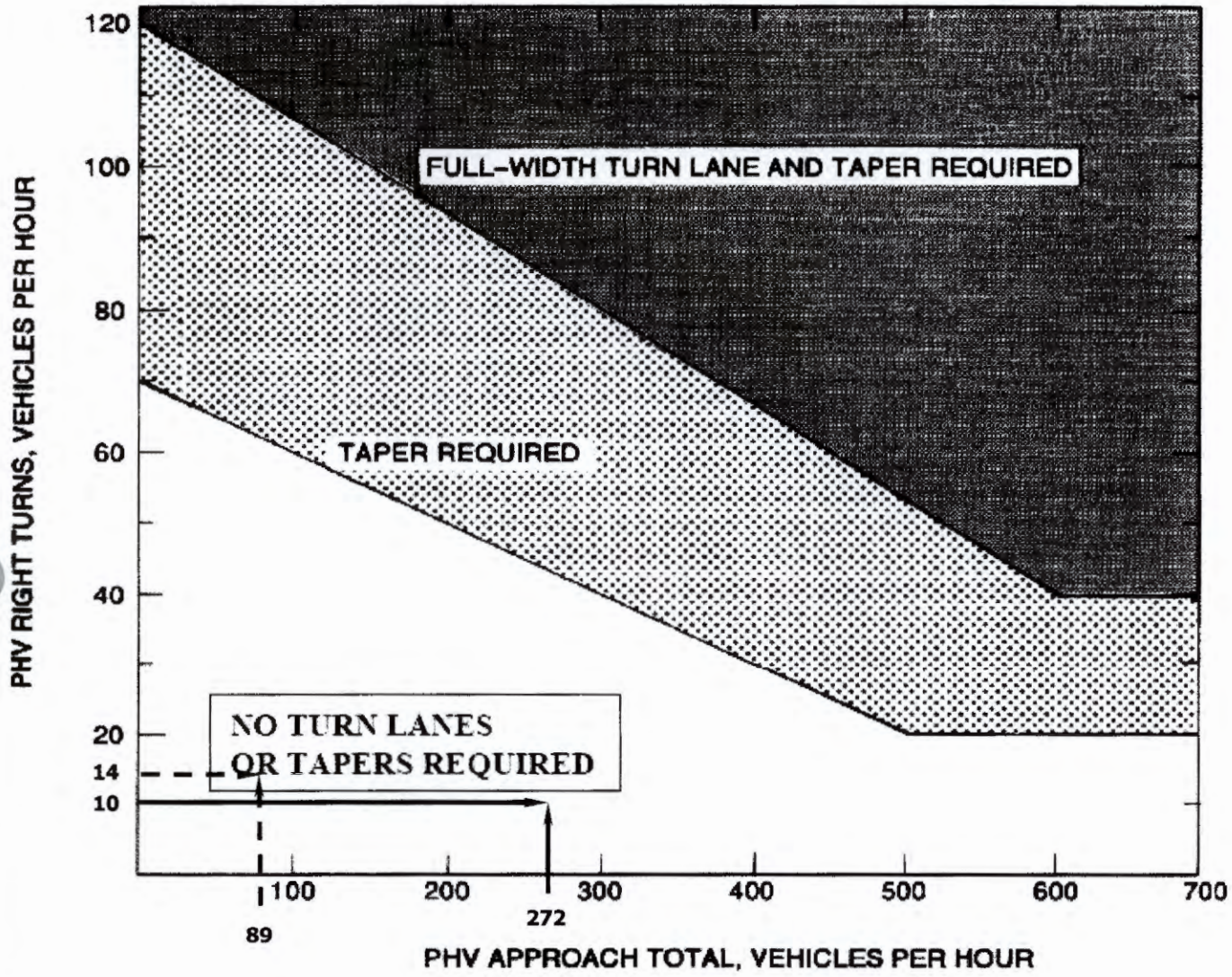


LEGEND
——— AM Peak Hour
- - - - PM Peak Hour

200' LEFT TURN LANE WARRANTED

TIMMONS GROUP	Peak Hour Volumes Thomas Jefferson Parkway (Route 53) Westbound Left Turn Lane Exhibit 8	Figure 5-4

GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)
FIGURE 3-26 VDOT ROAD DESIGN MANUAL APPENDIX F



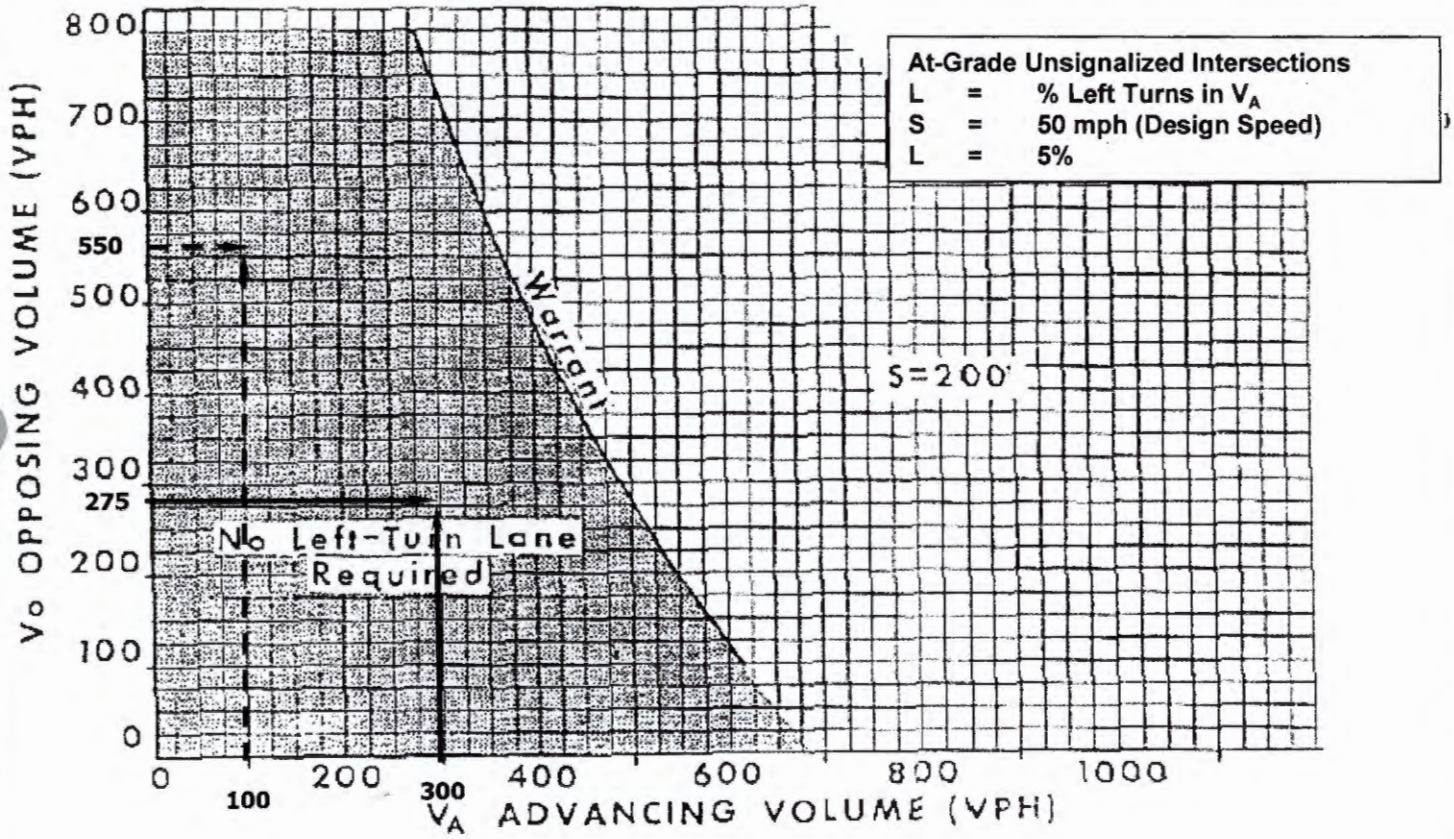
LEGEND
AM Peak Hour
PM Peak Hour

NO RIGHT TURN LANE OR TAPER WARRANTED

TIMMONS GROUP	Peak Hour Volumes James Monroe Parkway (Route 795) Northbound Right Turn Lane	Figure 5-5

Exhibit 8

WARRANT FOR LEFT-TURN STORAGE LANES
ON TWO-LANE HIGHWAYS (50 MPH)
FIGURE 3-11 VDOT ROAD DESIGN MANUAL APPENDIX F



LEGEND
AM Peak Hour
PM Peak Hour

NO LEFT TURN LANE WARRANTED

TIMMONS GROUP

Peak Hour Volumes
James Monroe Parkway (Route 795)
Southbound Left Turn Lane

Figure 5-6

Exhibit 8

Exhibit 9

Exhibit 10

Exhibit 11

Exhibit 12

Exhibit 13

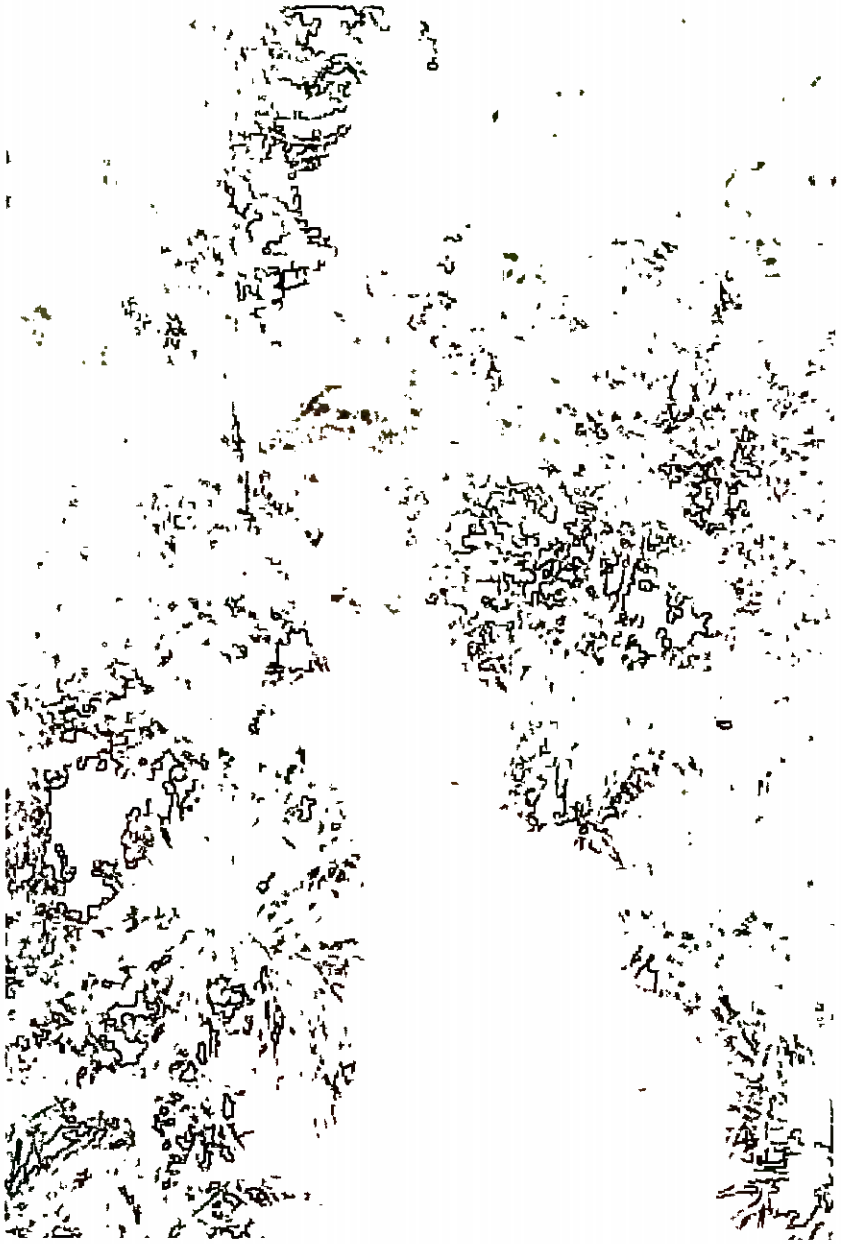


Exhibit 14

Exhibit 15

Exhibit 16

Exhibit 17

Exhibit 18

Exhibit 19