BALZER AND ASSOCIATES INC

REFLECTING TOMORROW

January 23, 2009

Lance Terpenny
Town of Christiansburg
100 East Main Street
Christiansburg, Virginia 24073

RE: Alberts Property Rezoning
Traffic Signal Warrant Analysis
Town of Christiansburg, Virginia

Dear Lance,

In conjunction with the Alberts Property Rezoning proposal, a traffic signal warrant analysis was completed for the Peppers Ferry Road (Route 114)/Dudley Drive/New Village Drive intersection under total future conditions. The analysis takes in account the existing traffic at the intersection, the development of 82 single family homes associated with the Alberts Property, and the development of two parcels south of Peppers Ferry Road with access from Dudley Drive. For purposes of this analysis, all of the developments were assumed to be completed by 2015.

The following presents the data, assumptions, and results of the analysis.

Existing Conditions

Peppers Ferry Road (Route 114) is a two-lane undivided primary roadway with a posted speed limit of 45 miles per hour in the vicinity of the site. There are no traffic signals within one mile of the site in either direction along Peppers Ferry Road. According to the most recent VDOT data (2007), Peppers Ferry Road has an average daily traffic of 13,000 in the vicinity of the site. A westbound right turn lane is provided at the intersection with Dudley Drive/New Village Drive.

Dudley Drive is a two-lane undivided secondary roadway that serves residential developments to the south of Peppers Ferry Road. Dudley Drive operates under side street stop control at the intersection with Peppers Ferry Road.

New Village Drive is a two-lane undivided secondary roadway that serves 193 single family homes to the north of Peppers Ferry Road. New Village Drive forms the fourth leg of the Peppers Ferry Road/Dudley Drive intersection and operates under side street stop control at the intersection.

Existing Traffic Counts

Existing turning movement traffic counts were conducted by Balzer and Associates at the subject intersection on Tuesday January 13, 2009 from 7:00 AM to 6:00 PM. The raw traffic data is included in Attachment A.

The counts indicated that the AM peak hour occurs between 7:30 and 8:30 AM and the PM peak hour occurs between 4:45 and 5:45 PM. The intersection experiences a heavy vehicle percentage of 2.68% during the AM peak hour and 0.37% during the PM peak hour.

Other Development Trip Generation

This analysis accounts for the impact of two other developments in the study area. These projects include a 72.5 acre site and a 19.3 acre site both of which are located south of Peppers Ferry Road as shown in Attachment B. For purposes of this analysis, it was assumed that the 72.5 acre site could be developed with 315 single family lots while the 19.3 acre site could be developed with 83 single family lots.

The number of trips that would be generated by the other developments in the study area were estimated based on the standard rates/equations from the Institute of Transportation Engineers Trip Generation Manual, 7th edition, and are shown on Table 1.

As shown on Table 1, it is estimated that the 72.5 acre site would generate 230 AM peak hour trips, 301 PM peak hour trips, and 2,988 average daily trips upon completion. It is also estimated that the 19.3 acre site would generate 68 AM peak hour trips, 91 PM peak hour trips, and 876 average daily trips upon completion.

Alberts Property Trip Generation

The number of trips that would be generated by the proposed Alberts property rezoning were estimated based on the standard rates/equations from the Institute of Transportation Engineers Trip Generation Manual, 7th edition, and are shown on Table 1.

As shown on Table 1, it is estimated that the Alberts property rezoning would generate 67 AM peak hour trips, 90 PM peak hour trips, and 866 average daily trips upon completion.

Trip Distribution Analysis

The distribution of the peak hour and daily trips generated by the proposed developments was based on the existing traffic counts and local travel patterns. The existing traffic counts indicate

that 78% of the traffic leaving Dudley Drive/New Village Drive during the AM peak hour travel eastbound on Peppers Ferry Road. The counts also indicate that 80% of the traffic entering Dudley Drive/New Village Drive during the PM peak hour approaches the intersection traveling westbound on Peppers Ferry Road. Therefore, the distribution of the peak hour and daily trips generated by the proposed developments was assumed to be distributed as follows:

To/From	**Percent**
East on Peppers Ferry Road	80%
West on Peppers Ferry Road	20%
Total	**100%**

Hourly Traffic Variations

In order to develop the hourly traffic forecasts needed for the signal warrant analysis, an analysis was conducted to determine the existing hourly traffic variations as a percentage of the average daily traffic (ADT). New Village Drive currently serves 193 single family homes that generate 1,904 average daily trips. The existing hourly inbound and outbound traffic on New Village Drive was then compared to the ADT to determine the percentage of traffic entering and exiting during each hour. The results of the analysis are shown on Table 2.

Site Traffic Assignments

The trips that would be generated by the proposed developments were assigned to the local roadway network according to the directional distribution and hourly traffic variations described above. The resulting hourly traffic assignments are shown on Table 3.

Total Future Traffic Forecasts

The trips generated by the proposed developments were then added to the existing traffic counts to yield the total future traffic forecasts by hour as shown on Table 3.

Signal Warrant Analysis

In order to determine the need for and appropriateness of a traffic signal, a signal warrant analysis was completed for the Peppers Ferry Road (Route 114)/Dudley Drive/New Village Drive intersection under total future traffic conditions. The Manual for Uniform Traffic Control Devices (MUTCD) lists eight (8) warrants that should be evaluated when considering the installation of a traffic signal.

The hourly traffic forecasts shown on Table 3 were used to evaluate each of the MUTCD warrants. In accordance with the MUTCD regulations (Page 4C-1), westbound right turns were excluded as there is an exclusive right turn lane at the intersection. All other right turns were included in the analysis.

The results of the analysis are presented in Attachment C and summarized in Table 4. As shown in Table 4, the intersection does not meet any of the warrants for installation of a traffic signal under total future traffic condition.

Conclusions

With the development of the Alberts Property and the other developments in the area, a traffic signal is not warranted at the intersection of Peppers Ferry Road (Route 114)/Dudley Drive/New Village Drive.

Please advise us if you have any questions or comments.

Sincerely,
BALZER AND ASSOCIATES, INC.

Steve Schmidt, EIT
Transportation Consultant

Table 1
Alberts Rezoning
Area Development Trip Generation Analysis[1]

Land Use	Size[2]	Units	Land Use Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Average Daily Trips
Development										
1. Albert Rezoning										
Single Family	82	D.U.	210	17	50	67	57	33	90	866
2. 72.5 Acre Site South of Peppers Ferry Road[2]										
Single Family	315	D.U.	210	58	172	230	190	111	301	2,988
3. 19.3 Acre Site South of Peppers Ferry Road[3]										
Single Family	83	D.U.	210	17	51	68	57	34	91	876
Total Development Trips				92	273	365	304	178	482	4,730

Notes: (1) Based on the Institute of Transportation Engineers Trip Generation, 7th Edition.
(2) Development programs provided by Chesterfield County Department of Transportation.

Table 2
Alberts Rezoning
New Village Drive
Existing Residential Hourly Traffic Variations

New Village Drive Currently Serves 193 Single Family Lots

Average Daily Traffic (ADT) 1,904

Time of Day	Outbound New Village Drive @ Route 114 Existing Traffic	Outbound New Village Drive @ Route 114 Percent of ADT	Inbound New Village Drive @ Route 114 Existing Traffic	Inbound New Village Drive @ Route 114 Percent of ADT
7:00 AM	78	4.10%	14	0.74%
8:00 AM	79	4.15%	21	1.10%
9:00 AM	32	1.68%	14	0.74%
10:00 AM	31	1.63%	19	1.00%
11:00 AM	30	1.58%	36	1.89%
12:00 PM	43	2.26%	44	2.31%
1:00 PM	40	2.10%	32	1.68%
2:00 PM	33	1.73%	29	1.52%
3:00 PM	37	1.94%	53	2.78%
4:00 PM	35	1.84%	70	3.68%
5:00 PM	36	1.89%	101	5.30%
Totals	474	24.89%	433	22.74%

Table 3
Alberts Rezoning
Route 114 (Peppers Ferry Road)/New Village Drive/Dudley Road
Total Future Traffic Forecasts by Hour (2015)

	Dudley Drive Northbound Right				Dudley Drive Northbound Through				Dudley Drive Northbound Left				Northbound Total
Time of Day	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	
7:00 AM	10	81	0	91	0	0	0	0	0	1	0	1	92
8:00 AM	2	82	0	84	0	0	0	0	6	1	0	7	91
9:00 AM	2	33	0	35	0	0	0	0	3	0	0	3	38
10:00 AM	0	32	0	32	0	0	0	0	4	0	0	4	36
11:00 AM	4	31	0	35	0	0	0	0	5	0	0	5	40
12:00 PM	1	45	0	46	0	0	0	0	2	0	0	2	48
1:00 PM	2	41	0	43	1	0	0	1	1	0	0	1	45
2:00 PM	4	34	0	38	0	0	0	0	5	0	0	5	43
3:00 PM	0	38	0	38	0	0	0	0	5	0	0	5	43
4:00 PM	1	36	0	37	0	0	0	0	3	0	0	3	40
5:00 PM	3	37	0	40	0	0	0	0	1	0	0	1	41

	New Village Drive Southbound Right				New Village Drive Southbound Through				New Village Drive Southbound Left				Southbound Total
Time of Day	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	
7:00 AM	21	0	7	28	0	0	0	0	57	0	28	85	113
8:00 AM	12	0	7	19	0	0	0	0	67	0	29	96	115
9:00 AM	2	0	3	5	0	0	0	0	30	0	12	42	47
10:00 AM	3	0	3	6	0	0	0	0	28	0	11	39	45
11:00 AM	6	0	3	9	1	0	0	1	23	0	11	34	44
12:00 PM	4	0	4	8	0	0	0	0	39	0	16	55	63
1:00 PM	4	0	4	8	0	0	0	0	36	0	15	51	59
2:00 PM	4	0	3	7	0	0	0	0	29	0	12	41	48
3:00 PM	11	0	3	14	0	0	0	0	26	0	13	39	53
4:00 PM	7	0	3	10	0	0	0	0	28	0	13	41	51
5:00 PM	4	0	3	7	0	0	0	0	32	0	13	45	52

	Route 114 (Peppers Ferry Road) Eastbound Right				Route 114 (Peppers Ferry Road) Eastbound Through				Route 114 (Peppers Ferry Road) Eastbound Left				Eastbound Total
Time of Day	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	
7:00 AM	1	0	0	1	457	1	0	458	1	0	1	2	461
8:00 AM	1	0	0	1	480	2	0	482	6	0	2	8	491
9:00 AM	4	0	0	4	337	1	0	338	1	0	1	2	344
10:00 AM	7	0	0	7	334	2	0	336	1	0	2	3	346
11:00 AM	3	0	0	3	355	3	0	358	5	0	3	8	369
12:00 PM	4	0	0	4	410	4	0	414	3	0	4	7	425
1:00 PM	1	0	0	1	396	3	0	399	3	0	3	6	406
2:00 PM	1	0	0	1	384	2	0	386	4	0	3	7	394
3:00 PM	5	0	0	5	476	4	0	480	12	0	5	17	502
4:00 PM	8	1	0	9	551	6	0	557	19	0	6	25	591
5:00 PM	11	1	0	12	496	8	0	504	10	0	9	19	535

	Route 114 (Peppers Ferry Road) Westbound Right				Route 114 (Peppers Ferry Road) Westbound Through				Route 114 (Peppers Ferry Road) Westbound Left				Westbound Total [1]
Time of Day	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	Existing	Background	Site	Total Future	
7:00 AM	13	0	5	18	282	6	0	288	2	15	0	17	305
8:00 AM	15	0	8	23	224	7	0	231	4	22	0	26	257
9:00 AM	13	0	5	18	215	3	0	218	2	15	0	17	235
10:00 AM	18	0	7	25	235	3	0	238	1	20	0	21	259
11:00 AM	31	0	13	44	306	2	0	308	1	37	0	38	346
12:00 PM	41	0	16	57	398	4	0	402	5	46	0	51	453
1:00 PM	28	0	12	40	373	3	0	376	1	33	0	34	410
2:00 PM	25	0	11	36	448	3	0	451	0	30	0	30	481
3:00 PM	39	0	19	58	528	3	0	531	4	55	0	59	590
4:00 PM	51	0	25	76	595	3	0	598	1	73	0	74	672
5:00 PM	91	0	37	128	700	3	0	703	7	105	0	112	815

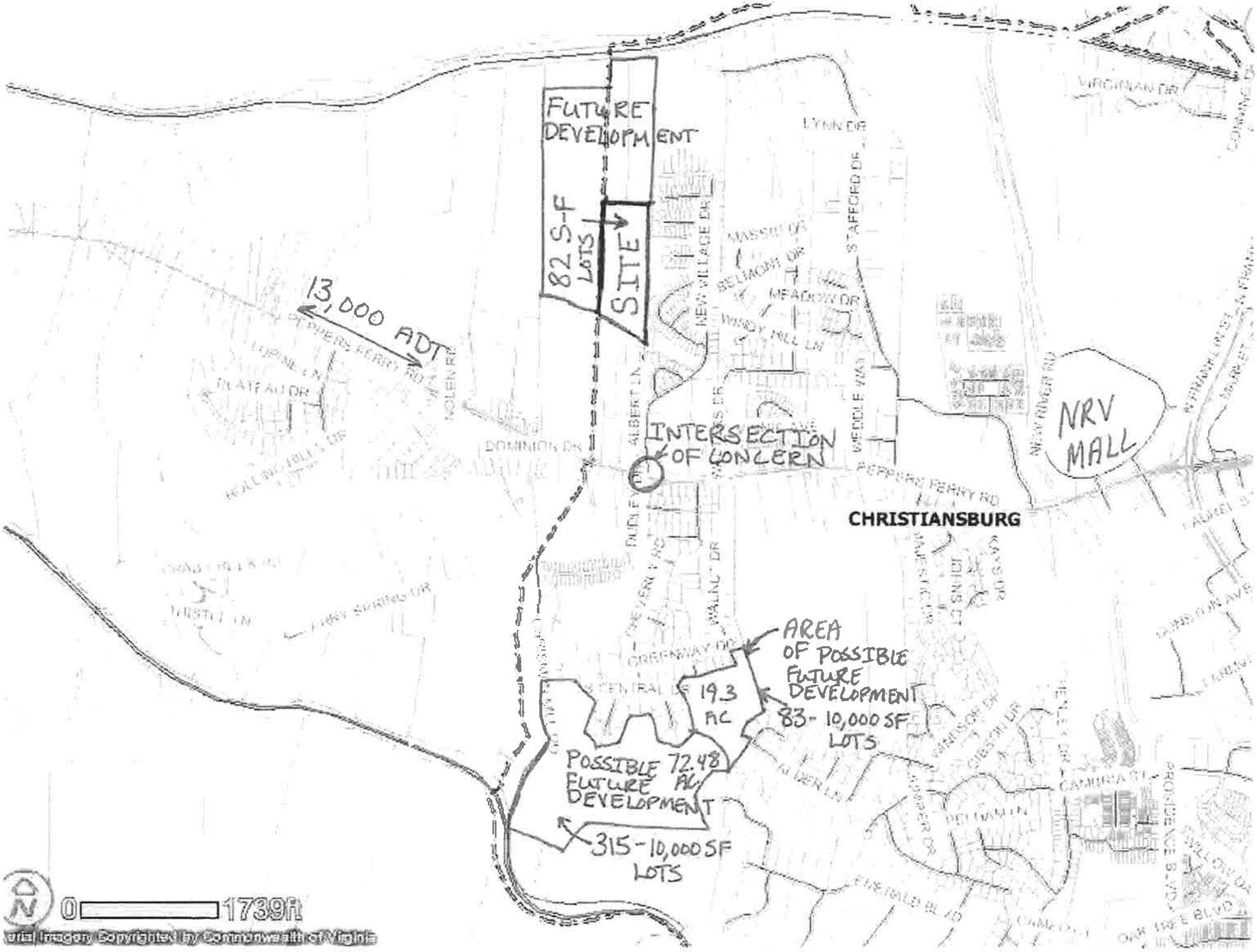
Note: (1) Westbound total does not include right turns per MUTCD regulations (Page 4C-1).

Table 4
Alberts Rezoning
Route 114 (Peppers Ferry Road)/New Village Drive/Dudley Road
Traffic Signal Warrant Summary [1]

Time of Day	Vehicle Count		Warrants								
			1A			1B			2	3A	3B
	Major	Minor	100%	80%	70%	100%	80%	70%	70%		
Volume Required (Major/Minor)			500/150	400/120	350/105	750/75	600/60	525/53			
7:00 AM	766	113	No	No	Yes	Yes	Yes	Yes	Yes	No	No
8:00 AM	748	115	No	No	Yes	No	Yes	Yes	Yes	No	No
9:00 AM	579	47	No	No	No	No	No	No	No	No	No
10:00 AM	605	45	No	No	No	No	No	No	No	No	No
11:00 AM	715	44	No	No	No	No	No	No	No	No	No
12:00 PM	878	63	No	No	No	No	No	Yes	No	No	No
1:00 PM	816	59	No	No	No	No	No	Yes	No	No	No
2:00 PM	875	48	No	No	No	No	No	No	No	No	No
3:00 PM	1,092	53	No	No	No	No	No	Yes	No	No	No
4:00 PM	1,263	51	No	No	No	No	No	No	No	No	No
5:00 PM	1,350	52	No	No	No	No	No	No	No	No	No
Hours Met			0	0	2	1	2	5	2	1	1
Hours Required			8	8	8	8	8	8	4	0	0
Warrant Met			**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Note: (1) None of the conditions of Warrants 4-8 were satisfied. See Attachment D for details.

Attachment A


FUTURE DEVELOPMENT
82 S-F LOTS
SITE
13,000 ADT
INTERSECTION OF CONCERN
NRV MALL
CHRISTIANSBURG
AREA OF POSSIBLE FUTURE DEVELOPMENT
83-10,000 SF LOTS
19.3 AC
POSSIBLE FUTURE DEVELOPMENT
72.48 AC
315-10,000 SF LOTS
PEPPER FERRY RD
STAFFORD DR
LYNN DR
VIRGINIAN DR
NEW VILLAGE DR
MEADOW DR
DOMINION DR
ALBERT LN
WALNUT DR
GREENWAY DR
CENTRAL DR
PLATEAU DR
NOLEN RD
NEW RIVER RD
CAMBRIA BL
EMERALD BLVD
0 1739ft
Aerial Imagery Copyrighted by Commonwealth of Virginia

Attachment B

Balzer and Associates
15871 City View Drive, Suite 200
Midlothian, Virginia 23113
804-794-0571

Project Name: Alberts Rezoning
Intersection: Route 114/Dudley Drive/New Village Drive
Count Date: Tuesday 1/13/08
Count Type: All Vehicles

EXISTING 15 MINUTE COUNTS

Count Intervals	Southbound New Village Drive				Westbound Route 114 (Peppers Ferry Road)				Northbound Dudley Drive				Eastbound Route 114 (Peppers Ferry Road)				North & South	East & West	Int. Total
	Right	Thru	Left	App Total	Right	Thru	Left	App Total	Right	Thru	Left	App Total	Right	Thru	Left	App Total			
AM																			
7:00-7:15	6	0	13	19	5	75	1	81	3	0	0	3	1	124	0	125	22	206	228
7:15-7:30	4	0	9	13	1	55	1	57	2	0	0	2	0	70	0	70	15	127	142
7:30-7:45	6	0	13	19	2	81	0	83	4	0	0	4	0	117	0	117	23	200	223
7:45-8:00	5	0	22	27	5	71	0	76	1	0	0	1	0	146	1	147	28	223	251
8:00-8:15	3	0	18	21	2	82	2	66	0	0	1	1	0	113	1	114	22	180	202
8:15-8:30	5	0	17	22	5	45	0	50	1	0	1	2	0	120	0	120	24	170	194
8:30-8:45	1	0	16	17	2	60	2	64	1	0	4	5	0	124	2	126	22	190	212
8:45-9:00	3	0	16	19	6	57	0	63	0	0	0	0	1	123	3	127	19	190	209
9:00-9:15	0	0	5	5	4	56	0	60	0	0	1	1	2	88	0	90	6	150	156
9:15-9:30	0	0	9	9	2	46	1	49	0	0	1	1	0	69	1	70	10	119	129
9:30-9:45	0	0	9	9	5	64	1	70	1	0	1	2	1	100	0	101	11	171	182
9:45-10:00	2	0	7	9	2	49	0	51	1	0	0	1	1	80	0	81	10	132	142
10:00-10:15	0	0	12	12	3	42	1	46	0	0	2	2	0	80	0	80	14	126	140
10:15-10:30	1	0	5	6	4	66	0	70	0	0	0	0	4	85	0	89	6	159	165
10:30-10:45	1	0	2	3	5	61	0	66	0	0	2	2	2	76	0	78	5	144	149
10:45-11:00	1	0	9	10	6	66	0	72	0	0	0	0	1	93	1	95	10	167	177
11:00-11:15	0	1	4	5	7	76	0	83	0	0	3	3	2	85	0	87	8	170	178
11:15-11:30	1	0	3	4	5	77	0	82	3	0	1	4	0	85	2	87	8	169	177
11:30-11:45	2	0	7	9	6	80	0	86	1	0	0	1	1	96	1	98	10	184	194
11:45-12:00	3	0	9	12	13	73	1	87	0	0	1	1	0	89	2	91	13	178	191
AM Totals	**44**	**1**	**206**	**250**	**90**	**1,262**	**10**	**1,362**	**19**	**0**	**18**	**36**	**16**	**1,963**	**14**	**1,993**	**286**	**3,355**	**3,641**
PM																			
12:00-12:15	0	0	6	6	12	77	2	91	1	0	0	1	3	92	0	95	7	186	193
12:15-12:30	2	0	9	11	15	109	0	124	0	0	1	1	0	104	2	106	12	230	242
12:30-12:45	2	0	14	16	7	105	3	115	0	0	1	1	0	106	0	106	17	221	238
12:45-1:00	0	0	10	10	7	107	0	114	0	0	0	0	1	108	1	110	10	224	234
1:00-1:15	0	0	11	11	6	99	0	105	0	0	0	0	0	90	0	90	11	195	206
1:15-1:30	0	0	10	10	8	79	0	87	0	0	0	0	1	95	1	97	10	184	194
1:30-1:45	3	0	6	9	10	93	1	104	1	1	1	3	0	111	2	113	12	217	229
1:45-2:00	1	0	9	10	4	102	0	106	1	0	0	1	0	100	0	100	11	206	217
2:00-2:15	1	0	8	9	3	105	0	108	2	0	1	3	1	84	0	85	12	193	205
2:15-2:30	1	0	5	6	8	118	0	126	0	0	2	2	0	115	1	116	8	242	250
2:30-2:45	2	0	10	12	6	104	0	110	1	0	0	1	0	96	3	99	13	209	222
2:45-3:00	0	0	6	6	8	121	0	129	1	0	2	3	0	89	0	89	9	218	227
3:00-3:15	4	0	4	8	12	131	1	144	0	0	3	3	0	91	3	94	11	238	249
3:15-3:30	3	0	9	12	9	129	0	138	0	0	0	0	1	105	1	107	12	245	257
3:30-3:45	2	0	5	7	4	146	1	151	0	0	1	1	3	135	4	142	8	293	301
3:45-4:00	2	0	8	10	14	122	2	138	0	0	1	1	1	145	4	150	11	288	299
4:00-4:15	3	0	5	8	10	155	0	165	0	0	2	2	3	127	5	135	10	300	310
4:15-4:30	2	0	7	9	16	131	1	148	1	0	0	1	0	134	5	139	10	287	297
4:30-4:45	1	0	6	7	10	145	0	155	0	0	1	1	2	159	5	166	8	321	329
4:45-5:00	1	0	10	11	15	164	0	179	0	0	0	0	3	131	4	138	11	317	328
5:00-5:15	0	0	11	11	22	178	0	200	0	0	0	0	4	132	0	136	11	336	347
5:15-5:30	0	0	10	10	26	205	1	232	1	0	0	1	2	110	6	118	11	350	361
5:30-5:45	4	0	5	9	22	169	2	193	1	0	1	2	2	124	1	127	11	320	331
5:45-6:00	0	0	6	6	21	148	4	173	1	0	0	1	3	130	3	136	7	309	316
PM Totals	**34**	**0**	**190**	**224**	**275**	**3,042**	**18**	**3,336**	**11**	**1**	**17**	**29**	**30**	**2,713**	**51**	**2,794**	**253**	**6,129**	**6,382**

HOURLY COUNT BREAKDOWN

1 Hour Totals	Southbound New Village Drive					Westbound Route 114 (Peppers Ferry Road)					Northbound Dudley Drive					Eastbound Route 114 (Peppers Ferry Road)					North & South	East & West	Int. Total	Int. Peak Hour Factor
	Right	Thru	Left	App Total	App PHF	Right	Thru	Left	App Total	App PHF	Right	Thru	Left	App Total	App PHF	Right	Thru	Left	App Total	App PHF				
AM																								
844 7:00-8:00	21	0	57	78	0.72	13	282	2	297	0.89	10	0	0	10	0.63	1	457	1	459	0.78	88	756	844	0.84
818 7:15-8:15	18	0	62	80	0.74	10	269	3	282	0.85	7	0	1	8	0.50	0	446	2	448	0.76	88	730	818	0.81
870 7:30-8:30	19	0	70	89	0.82	14	259	2	275	0.83	6	0	2	8	0.50	0	496	2	498	0.85	97	773	870	0.87
859 7:45-8:45	14	0	73	87	0.81	14	238	4	256	0.84	3	0	6	9	0.45	0	503	4	507	0.86	96	763	859	0.86
817 8:00-9:00	12	0	67	79	0.90	15	224	4	243	0.92	2	0	6	8	0.40	1	480	6	487	0.96	87	730	817	0.96
771 8:15-9:15	9	0	54	63	0.72	17	218	2	237	0.93	2	0	6	8	0.40	3	455	5	463	0.91	71	700	771	0.91
706 8:30-9:30	4	0	46	50	0.66	14	219	3	236	0.92	1	0	6	7	0.35	3	404	6	413	0.81	57	649	706	0.83
676 8:45-9:45	3	0	39	42	0.55	17	223	2	242	0.86	1	0	3	4	0.50	4	380	4	388	0.76	46	630	676	0.81
609 9:00-10:00	2	0	30	32	0.69	13	215	2	230	0.82	2	0	3	5	0.63	4	337	1	342	0.85	37	572	609	0.84
593 9:15-10:15	2	0	37	39	0.81	12	201	3	216	0.77	2	0	4	6	0.75	2	329	1	332	0.82	45	548	593	0.81
629 9:30-10:30	3	0	33	36	0.75	14	221	2	237	0.85	2	0	3	5	0.63	6	345	0	351	0.87	41	588	629	0.86
596 9:45-10:45	4	0	26	30	0.63	14	218	1	233	0.83	1	0	4	5	0.63	7	321	0	328	0.92	35	561	596	0.90
631 10:00-11:00	3	0	28	31	0.65	18	235	1	254	0.68	0	0	4	4	0.50	7	334	1	342	0.90	35	596	631	0.89
669 10:15-11:15	3	1	20	24	0.60	22	269	0	291	0.86	0	0	5	5	0.42	9	339	1	349	0.92	29	640	669	0.94
681 10:30-11:30	3	1	18	22	0.55	23	280	0	303	0.91	3	0	6	9	0.56	5	339	3	347	0.91	31	650	681	0.96
726 10:45-11:45	4	1	23	28	0.70	24	299	0	323	0.94	4	0	4	8	0.50	4	359	4	367	0.94	36	690	726	0.94
740 11:00-12:00	6	1	23	30	0.63	31	306	1	338	0.97	4	0	5	9	0.56	3	355	5	363	0.93	39	701	740	0.95
755 11:15-12:15	6	0	25	31	0.52	36	307	3	346	0.73	5	0	2	7	0.38	4	362	5	371	0.70	38	717	755	0.72
820 11:30-12:30	7	0	31	38	0.44	46	339	3	388	0.50	2	0	2	4	0.50	4	381	5	390	0.48	42	778	820	0.50
864 11:45-12:45	7	0	38	45	0.26	47	364	6	417	0.27	1	0	3	4	0.26	3	391	4	398	0.26	49	815	864	0.26
AM Peak 7:30-8:30	**19**	**0**	**70**	**89**	**0.82**	**14**	**259**	**2**	**275**	**0.83**	**6**	**0**	**2**	**8**	**0.50**	**0**	**496**	**2**	**498**	**0.85**	**97**	**773**	**870**	**0.87**
PM																								
907 12:00-1:00	4	0	39	43	0.67	41	398	5	444	0.90	1	0	2	3	0.75	4	410	3	417	0.95	46	861	907	0.94
920 12:15-1:15	4	0	44	48	0.75	35	420	3	458	0.92	0	0	2	2	0.50	1	408	3	412	0.94	50	870	920	0.95
872 12:30-1:30	2	0	45	47	0.73	28	390	3	421	0.92	0	0	1	1	0.25	2	399	2	403	0.92	48	824	872	0.92
863 12:45-1:45	3	0	37	40	0.91	31	378	1	410	0.90	1	1	1	3	0.25	2	404	4	410	0.91	43	820	863	0.92
846 1:00-2:00	4	0	36	40	0.91	28	373	1	402	0.95	2	1	1	4	0.33	1	396	3	400	0.88	44	802	846	0.92
845 1:15-2:15	5	0	33	38	0.95	25	379	1	405	0.94	4	1	2	7	0.58	2	390	3	395	0.87	45	800	845	0.92
901 1:30-2:30	6	0	28	34	0.85	25	418	1	444	0.88	4	1	4	9	0.75	1	410	3	414	0.89	43	858	901	0.90
894 1:45-2:45	5	0	32	37	0.77	21	429	0	450	0.89	4	0	3	7	0.58	1	395	4	400	0.86	44	850	894	0.89
904 2:00-3:00	4	0	29	33	0.69	25	448	0	473	0.92	4	0	5	9	0.75	1	384	4	389	0.84	42	862	904	0.90
948 2:15-3:15	7	0	25	32	0.67	34	474	1	509	0.88	2	0	7	9	0.75	0	391	7	398	0.86	41	907	948	0.95
955 2:30-3:30	9	0	29	38	0.79	35	485	1	521	0.90	2	0	5	7	0.58	1	381	7	389	0.91	45	910	955	0.93
1,034 2:45-3:45	9	0	24	33	0.69	33	527	2	562	0.93	1	0	6	7	0.58	4	420	8	432	0.76	40	994	1,034	0.86
1,106 3:00-4:00	11	0	26	37	0.77	39	528	4	571	0.95	0	0	5	5	0.42	5	476	12	493	0.82	42	1,064	1,106	0.92
1,167 3:15-4:15	10	0	27	37	0.77	37	552	3	592	0.90	0	0	4	4	0.50	8	512	14	534	0.89	41	1,126	1,167	0.94
1,207 3:30-4:30	9	0	25	34	0.85	44	554	4	602	0.91	1	0	4	5	0.63	7	541	18	566	0.94	39	1,168	1,207	0.97
1,235 3:45-4:45	8	0	26	34	0.85	50	553	3	606	0.92	1	0	4	5	0.63	6	565	19	590	0.89	39	1,196	1,235	0.94
1,264 4:00-5:00	7	0	28	35	0.80	51	595	1	647	0.90	1	0	3	4	0.50	8	551	19	578	0.87	39	1,225	1,264	0.96
1,301 4:15-5:15	4	0	34	38	0.86	63	618	1	682	0.85	1	0	1	2	0.50	9	556	14	579	0.87	40	1,261	1,301	0.94
1,365 4:30-5:30	2	0	37	39	0.89	73	692	1	766	0.83	1	0	1	2	0.50	11	532	15	558	0.84	41	1,324	1,365	0.95
1,367 4:45-5:45	5	0	36	41	0.93	85	716	3	804	0.87	2	0	1	3	0.38	11	497	11	519	0.94	44	1,323	1,367	0.95
1,355 5:00-6:00	4	0	32	36	0.82	91	700	7	798	0.86	3	0	1	4	0.50	11	496	10	517	0.95	40	1,315	1,355	0.94
PM Peak 4:45-5:45	**5**	**0**	**36**	**41**	**0.93**	**85**	**716**	**3**	**804**	**0.87**	**2**	**0**	**1**	**3**	**0.38**	**11**	**497**	**11**	**519**	**0.94**	**44**	**1,323**	**1,367**	**0.95**

Balzer and Associates
15871 City View Drive, Suite 200
Midlothian, Virginia 23113
804-794-0571

Project Name: Alberts Rezoning
Intersection: Route 114/Dudley Drive/New Village Drive
Count Date: Tuesday 1/13/08
Count Type: Heavy Vehicles

EXISTING 15 MINUTE COUNTS

Count Intervals	Southbound New Village Drive				Westbound Route 114 (Peppers Ferry Road)				Northbound Dudley Drive				Eastbound Route 114 (Peppers Ferry Road)				North & South	East & West	Int. Total
	Right	Thru	Left	App Total	Right	Thru	Left	App Total	Right	Thru	Left	App Total	Right	Thru	Left	App Total			
AM																			
7:00-7:15	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	6	0	6	6
7:15-7:30	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	2	2
7:30-7:45	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	5	5
7:45-8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1
8:00-8:15	0	0	0	0	1	2	0	3	0	0	0	0	0	1	1	2	0	5	5
8:15-8:30	1	0	0	1	0	3	0	3	0	0	1	1	0	3	0	3	2	6	8
8:30-8:45	0	0	0	0	0	4	0	4	1	0	0	1	0	4	0	4	1	8	9
8:45-9:00	0	0	0	0	0	7	0	7	0	0	0	0	0	3	0	3	0	10	10
9:00-9:15	0	0	0	0	0	1	0	1	0	0	0	0	1	3	0	4	0	5	5
9:15-9:30	0	0	0	0	0	2	0	2	0	0	0	0	0	3	0	3	0	5	5
9:30-9:45	0	0	0	0	0	4	0	4	0	0	0	0	0	1	0	1	0	5	5
9:45-10:00	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	0	3	3
10:00-10:15	0	0	1	1	0	3	0	3	0	0	0	0	0	3	0	3	1	6	7
10:15-10:30	0	0	0	0	1	5	0	6	0	0	0	0	1	3	0	4	0	10	10
10:30-10:45	0	0	0	0	1	3	0	4	0	0	0	0	0	2	0	2	0	6	6
10:45-11:00	0	0	0	0	0	3	0	3	0	0	0	0	0	6	0	6	0	9	9
11:00-11:15	0	0	1	1	0	3	0	3	0	0	0	0	0	4	0	4	1	7	8
11:15-11:30	0	0	0	0	0	4	0	4	0	0	0	0	0	3	0	3	0	7	7
11:30-11:45	0	0	0	0	0	1	0	1	0	0	0	0	0	4	0	4	0	5	5
11:45-12:00	0	0	1	1	0	4	0	4	0	0	0	0	0	4	0	4	1	8	9
AM Totals	**1**	**0**	**3**	**4**	**3**	**56**	**0**	**59**	**1**	**0**	**1**	**2**	**3**	**56**	**1**	**60**	**6**	**119**	**125**
PM																			
12:00-12:15	0	0	0	0	1	0	0	1	0	0	0	0	0	2	0	2	0	3	3
12:15-12:30	1	0	0	1	0	5	0	5	0	0	0	0	0	3	0	3	1	8	9
12:30-12:45	0	0	0	0	0	4	0	4	0	0	0	0	0	1	0	1	0	5	5
12:45-1:00	0	0	0	0	0	3	0	3	0	0	0	0	0	3	1	4	0	7	7
1:00-1:15	0	0	0	0	0	3	0	3	0	0	0	0	0	4	0	4	0	7	7
1:15-1:30	0	0	0	0	0	1	0	1	0	0	0	0	0	4	0	4	0	5	5
1:30-1:45	0	0	0	0	0	4	0	4	0	0	0	0	0	3	0	3	0	7	7
1:45-2:00	0	0	0	0	0	2	0	2	0	0	0	0	0	5	0	5	0	7	7
2:00-2:15	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2	0	4	4
2:15-2:30	0	0	1	1	0	3	0	3	0	0	0	0	0	7	0	7	1	10	11
2:30-2:45	0	0	0	0	0	7	0	7	0	0	0	0	0	2	0	2	0	9	9
2:45-3:00	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2	0	4	4
3:00-3:15	0	0	0	0	0	4	0	4	0	0	1	1	0	2	0	2	1	6	7
3:15-3:30	1	0	1	2	2	3	0	5	0	0	0	0	0	8	0	8	2	13	15
3:30-3:45	0	0	0	0	0	3	0	3	0	0	0	0	2	4	0	6	0	9	9
3:45-4:00	0	0	0	0	0	0	0	0	0	0	1	1	1	4	0	5	1	5	6
4:00-4:15	0	0	0	0	0	3	0	3	0	0	0	0	0	5	2	7	0	10	10
4:15-4:30	1	0	0	1	0	1	0	1	0	0	0	0	0	5	0	5	1	6	7
4:30-4:45	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	4	0	4	4
4:45-5:00	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	0	3	3
5:00-5:15	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	2	2
5:15-5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	2
5:30-5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45-6:00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1
PM Totals	**3**	**0**	**2**	**5**	**3**	**54**	**0**	**57**	**0**	**0**	**2**	**2**	**4**	**73**	**3**	**80**	**7**	**137**	**144**

HOURLY COUNT BREAKDOWN

1 Hour Totals	Southbound New Village Drive					Westbound Route 114 (Peppers Ferry Road)					Northbound Dudley Drive					Eastbound Route 114 (Peppers Ferry Road)					North & South	East & West	Int. Total	Int. Heavy Veh %
	Right	Thru	Left	App Total	Heavy %	Right	Thru	Left	App Total	Heavy %	Right	Thru	Left	App Total	Heavy %	Right	Thru	Left	App Total	Heavy %				
AM																								
7:00-8:00	0	0	0	0	0.00%	0	6	0	6	2.02%	0	0	0	0	0.00%	1	7	0	8	1.74%	0	14	14	1.66%
7:15-8:15	0	0	0	0	0.00%	1	8	0	9	3.19%	0	0	0	0	0.00%	0	3	1	4	0.89%	0	13	13	1.59%
7:30-8:30	1	0	0	1	1.12%	1	10	0	11	4.00%	0	0	1	1	12.50%	0	5	1	6	1.20%	2	17	19	2.18%
7:45-8:45	1	0	0	1	1.15%	1	9	0	10	3.91%	1	0	1	2	22.22%	0	9	1	10	1.97%	3	20	23	2.68%
8:00-9:00	1	0	0	1	1.27%	1	16	0	17	7.00%	1	0	1	2	25.00%	0	11	1	12	2.46%	3	29	32	3.92%
8:15-9:15	1	0	0	1	1.59%	0	15	0	15	6.33%	1	0	1	2	25.00%	1	13	0	14	3.02%	3	29	32	4.15%
8:30-9:30	0	0	0	0	0.00%	0	14	0	14	5.93%	1	0	0	1	14.29%	1	13	0	14	3.39%	1	28	29	4.11%
8:45-9:45	0	0	0	0	0.00%	0	14	0	14	5.79%	0	0	0	0	0.00%	1	10	0	11	2.84%	0	25	25	3.70%
9:00-10:00	0	0	0	0	0.00%	0	8	0	8	3.48%	0	0	0	0	0.00%	1	9	0	10	2.92%	0	18	18	2.96%
9:15-10:15	0	0	1	1	2.56%	0	10	0	10	4.63%	0	0	0	0	0.00%	0	9	0	9	2.71%	1	19	20	3.37%
9:30-10:30	0	0	1	1	2.78%	1	13	0	14	5.91%	0	0	0	0	0.00%	1	9	0	10	2.85%	1	24	25	3.97%
9:45-10:45	0	0	1	1	3.33%	2	12	0	14	6.01%	0	0	0	0	0.00%	1	10	0	11	3.35%	1	25	26	4.36%
10:00-11:00	0	0	1	1	3.23%	2	14	0	16	6.30%	0	0	0	0	0.00%	1	14	0	15	4.39%	1	31	32	5.07%
10:15-11:15	0	0	1	1	4.17%	2	14	0	16	5.50%	0	0	0	0	0.00%	1	15	0	16	4.58%	1	32	33	4.93%
10:30-11:30	0	0	1	1	4.55%	1	13	0	14	4.62%	0	0	0	0	0.00%	0	15	0	15	4.32%	1	29	30	4.41%
10:45-11:45	0	0	1	1	3.57%	0	11	0	11	3.41%	0	0	0	0	0.00%	0	17	0	17	4.63%	1	28	29	3.99%
11:00-12:00	0	0	2	2	6.67%	0	12	0	12	3.55%	0	0	0	0	0.00%	0	15	0	15	4.13%	2	27	29	3.92%
11:15-12:15	0	0	1	1	3.23%	1	9	0	10	2.89%	0	0	0	0	0.00%	0	13	0	13	3.50%	1	23	24	3.18%
11:30-12:30	1	0	1	2	5.26%	1	10	0	11	2.84%	0	0	0	0	0.00%	0	13	0	13	3.33%	2	24	26	3.17%
11:45-12:45	1	0	1	2	4.44%	1	13	0	14	3.36%	0	0	0	0	0.00%	0	10	0	10	2.51%	2	24	26	3.01%
AM Peak 8:00-9:00	**1**	**0**	**0**	**1**	**1.12%**	**1**	**16**	**0**	**17**	**7.00%**	**1**	**0**	**1**	**2**	**25.00%**	**0**	**11**	**1**	**12**	**2.46%**	**3**	**29**	**32**	**2.69%**
PM																								
12:00-1:00	1	0	0	1	2.33%	1	12	0	13	2.93%	0	0	0	0	0.00%	0	9	1	10	2.40%	1	23	24	2.65%
12:15-1:15	1	0	0	1	2.08%	0	15	0	15	3.28%	0	0	0	0	0.00%	0	11	1	12	2.91%	1	27	28	3.04%
12:30-1:30	0	0	0	0	0.00%	0	11	0	11	2.61%	0	0	0	0	0.00%	0	12	1	13	3.23%	0	24	24	2.75%
12:45-1:45	0	0	0	0	0.00%	0	11	0	11	2.68%	0	0	0	0	0.00%	0	14	1	15	3.66%	0	26	26	3.01%
1:00-2:00	0	0	0	0	0.00%	0	10	0	10	2.49%	0	0	0	0	0.00%	0	16	0	16	4.00%	0	26	26	3.07%
1:15-2:15	0	0	0	0	0.00%	0	9	0	9	2.22%	0	0	0	0	0.00%	0	14	0	14	3.54%	0	23	23	2.72%
1:30-2:30	0	0	1	1	2.94%	0	11	0	11	2.48%	0	0	0	0	0.00%	0	17	0	17	4.11%	1	28	29	3.22%
1:45-2:45	0	0	1	1	2.70%	0	14	0	14	3.11%	0	0	0	0	0.00%	0	16	0	16	4.00%	1	30	31	3.47%
2:00-3:00	0	0	1	1	3.03%	0	14	0	14	2.96%	0	0	0	0	0.00%	0	13	0	13	3.34%	1	27	28	3.10%
2:15-3:15	0	0	1	1	3.13%	0	16	0	16	3.14%	0	0	1	1	11.11%	0	13	0	13	3.27%	2	29	31	3.27%
2:30-3:30	1	0	1	2	5.26%	2	16	0	18	3.45%	0	0	1	1	14.29%	0	14	0	14	3.60%	3	32	35	3.66%
2:45-3:45	1	0	1	2	6.06%	2	12	0	14	2.49%	0	0	1	1	14.29%	2	16	0	18	4.17%	3	32	35	3.38%
3:00-4:00	1	0	1	2	5.41%	2	10	0	12	2.10%	0	0	2	2	40.00%	3	18	0	21	4.26%	4	33	37	3.35%
3:15-4:15	1	0	1	2	5.41%	2	9	0	11	1.86%	0	0	1	1	25.00%	3	21	2	26	4.87%	3	37	40	3.43%
3:30-4:30	1	0	0	1	2.94%	0	7	0	7	1.16%	0	0	1	1	20.00%	3	18	2	23	4.06%	2	30	32	2.65%
3:45-4:45	1	0	0	1	2.94%	0	4	0	4	0.66%	0	0	1	1	20.00%	2	17	2	21	3.56%	2	25	27	2.19%
4:00-5:00	1	0	0	1	2.86%	0	5	0	5	0.77%	0	0	0	0	0.00%	1	15	2	18	3.11%	1	23	24	1.90%
4:15-5:15	1	0	0	1	2.63%	0	4	0	4	0.59%	0	0	0	0	0.00%	1	10	0	11	1.90%	1	15	16	1.23%
4:30-5:30	0	0	0	0	0.00%	0	3	0	3	0.39%	0	0	0	0	0.00%	1	7	0	8	1.43%	0	11	11	0.81%
4:45-5:45	0	0	0	0	0.00%	0	3	0	3	0.37%	0	0	0	0	0.00%	0	4	0	4	0.77%	0	7	7	0.51%
5:00-6:00	0	0	0	0	0.00%	0	3	0	3	0.38%	0	0	0	0	0.00%	0	2	0	2	0.39%	0	5	5	0.37%
PM Peak 5:00-6:00	**0**	**0**	**0**	**0**	**0.00%**	**0**	**3**	**0**	**3**	**0.38%**	**0**	**0**	**0**	**0**	**0.00%**	**0**	**2**	**0**	**2**	**0.39%**	**0**	**5**	**40**	**0.37%**

Attachment C

Warrants Evaluation Worksheet

Major Street: PEPPERS FERRY ROAD — Speed Limit: 45 MPH

Minor Street: DUDLEY DRIVE / NEW VILLAGE DRIVE — Speed Limit: 25 MPH

Traffic Volume Data: ☐ Traffic Count: _____ (Date, Week Day)

☒ Projected Traffic: 2015 (Design Year)

WARRANT 1 - Eight-Hour Vehicular Volume
CONDITION A - Minimum Vehicular Flow

WARRANT 1, CONDITION A MET (100%) ? YES ☐ NO ☒

WARRANT 1, CONDITION A MET (80%) ? YES ☐ NO ☒

WARRANT 1, CONDITION A MET (70%) ? YES ☐ NO ☒

APPROACH LANES		MINIMUM REQUIREMENTS (Veh/Hr)						HOUR							
		100%	80%	70%	100%	80%	70%								
Major Street	Minor Street	Both Approaches (Major Street)			Highest Approach (Minor Street)										
1	1	500	400	350	150	120	105								
2 or more	1	600	480	420	150	120	105								
2 or more	2 or more	600	480	420	200	160	140								
1	2 or more	500	400	350	200	160	140								

SEE ATTACHED ANALYSIS

WARRANT 1 - Eight-Hour Vehicular Volume
CONDITION B - Interruption of Continuous Traffic

WARRANT 1, CONDITION B MET (100%) ? YES ☐ NO ☒
WARRANT 1, CONDITION B MET (80%) ? YES ☐ NO ☒
WARRANT 1, CONDITION B MET (70%) ? YES ☐ NO ☒

APPROACH LANES		MINIMUM REQUIREMENTS (Veh/Hr)						HOUR							
		100%	80%	70%	100%	80%	70%								
Major Street	Minor Street	Both Approaches (Major SL)			Highest Approach (Minor St.)										
1	1	750	600	525	75	60	53								
2 or more	1	900	720	630	75	60	53								
2 or more	2 or more	900	720	630	100	80	70								
1	2 or more	750	600	525	100	80	70								

WARRANT 2 - Four-Hour Vehicular Volume

WARRANT 2 MET (100%) ?* YES ☐ NO ☒

APPROACH LANES	1 Lane & 1 Lane	2 or More Lanes & 1 Lane	2 or More Lanes & 2 or More Lanes	HOUR			
Both Approaches (Major Street)							
Highest Approaches (Minor Street)							

*Refer to Figure 4C-1 or Figure 4C-2 to determine if this warrant is met.

SEE ATTACHED ANALYSIS

WARRANT 3 - Peak Hour Delay

WARRANT 3 MET (100%) ? YES ☐ NO ☒

REQUIREMENT	FULFILLED
The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach; or	
The volume on the same minor street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; or	
The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.	Yes ☐ No ☐
The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach	Yes ☐ No ☐

SEE ATTACHED ANALYSIS

WARRANT 4 - Pedestrian Volume

WARRANT 4 MET (100%) ? YES ☐ NO ☒

REQUIREMENT	FULFILLED
The pedestrian volume crossing the major street is 100 or more for each of any four hours or is 190 or more during any one hour; and	Yes ☐ No ☒
There are fewer than 60 gaps per hour in the major street traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic; and	Yes ☐ No ☒
The nearest traffic signal along the major street is greater than 300 feet; and	Yes ☒ No ☐
The new traffic signal will not seriously disrupt progressive traffic flow on the major street.	Yes ☐ No ☒

WARRANT 5 - School Crossing

WARRANT 5 MET (100%) ? YES ☐ NO ☒

REQUIREMENT	FULFILLED
The frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less then the number of minutes in the same period and there are a minimum of 20 students during the highest crossing hour.	Yes ☐ No ☒

WARRANT 6 - Coordinated Signal System

WARRANT 6 MET (100%) ? YES ☐ NO ☒

MINIMUM REQUIREMENTS	DISTANCE TO NEAREST SIGNAL	FULFILLED
> 1000 feet	N_—_m, S_—_m, E_1_m, W_1_m.	Yes ☒ No ☐
On a one-way street or street which has predominately unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning, or		
On a two-way street, adjacent signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.		Yes ☐ No ☒

WARRANT 7 - Crash Experience

WARRANT 7 MET (100%) ? YES ☐ NO ☒

REQUIREMENTS	FULFILLED
For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Warrant 1, Condition A, or the vph in both of the 80 percent columns of Warrant 1, Condition B, exists on the major street and the higher volume minor street approach, respectively, to the intersection, or the volume of pedestrian traffic is less than 80 percent of the requirements specified in the Pedestrian Volume Warrant. These major and minor street volumes shall not be required to be on the same approach during each of the 8 hours; and	Yes ☐ No ☒
Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce crash frequency; and	Yes ☐ No ☒
Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash.	Yes ☐ No ☒

WARRANT 8 - Roadway Network

WARRANT 8 MET (100%) ? YES ☐ NO ☒

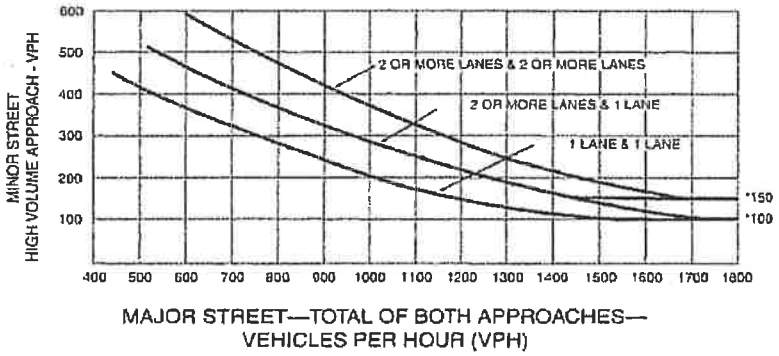
MINIMUM VOLUME REQUIREMENT	ENTERING VOLUMES - ALL APPROACHES	FULFILLED
1000 VEH/HR	During typical weekday peak hour 1,443 Veh/Hr, or During each of any 5 hrs. of a Sat. and/or Sun._____Veh/Hr.	Yes ☒ No ☐

Characteristics of major routes	Major St.	Minor St.
Street or highway system serving as principal network for through traffic flow, or	YES	NO
Rural or suburban highway outside, entering, or traversing a city, or	NO	NO
Appears as major route on an official plan	YES	NO

Any major route characteristics met, both streets — Yes ☐ No ☒

WARRANT 3 - Peak Hour Delay

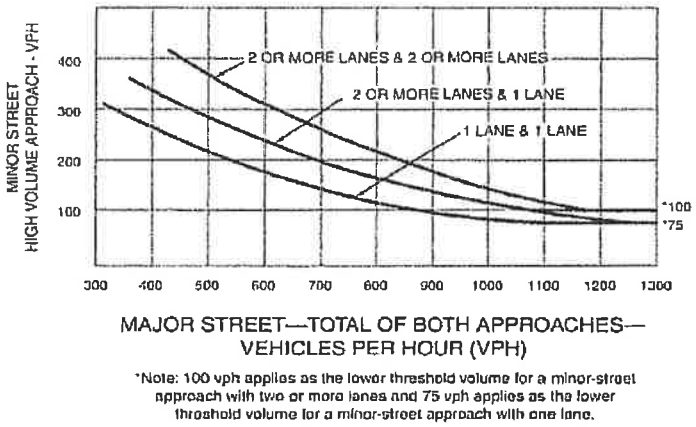
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

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Warrants Summary

Information			
Analyst	SOS	Intersection	Route 114/Dudley Dr/New Villag
Agency/Co	Balzer and Associates	Jurisdiction	Christiansburg, Virginia
Date Performed	1/16/2009	Units	U.S. Customary
Project ID	Alberts Rezoning (B0500004.00)	Time Period Analyzed	Total Future
East/West Street	Route 114 (Peppers Ferry Road)	North/South Street	Dudley Drive/New Village Drive
File Name	Signal Warrant.xhy	Major Street	East-West

Project Description *Alberts Rezoning (B0500004.00)*

General				Roadway Network	
Major Street Speed (mph)	45	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	5815	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	1	0	0	1	1	0	1	0	0	1	0
Lane usage		LTR			LT	R		LTR			LTR	
Vehicle Volume Averages (vph)	8	392	4	39	362	0	3	0	43	47	0	10
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	

Warrant 8: Roadway Network	
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	
8 B. Weekend Volume (Five hours total)	

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Warrants Volume

Information

Analyst	SOS	Intersection	Route 114/Dudley Dr/New Villag
Agency/Co	Balzer and Associates	Jurisdiction	Christiansburg, Virginia
Date Performed	1/16/2009	Units	U.S. Customary
Project ID	Alberts Rezoning (B0500004.00)	Time Period Analyzed	Total Future
East/West Street	Route 114 (Peppers Ferry Road)	North/South Street	Dudley Drive/New Village Drive
File Name	Signal Warrant.xhy	Major Street	East-West

Project Description *Alberts Rezoning (B0500004.00)*

Warrant 1

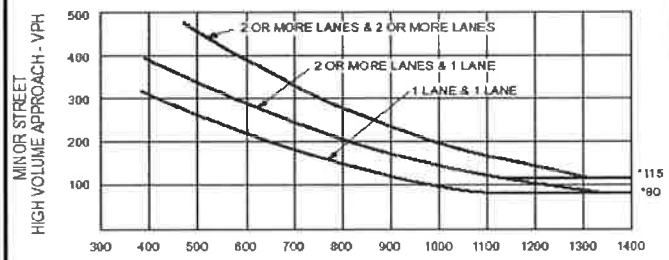
Condition A - Minimum Vehicular Volume

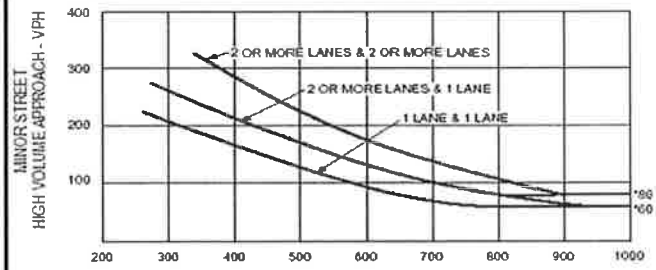
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	100%*	80%*	70%*	100%*	80%*	70%*
1	1	500	400	350	150	120	105
2 or more	1	600	480	420	150	120	105
2 or more	2 or more	600	480	420	200	160	140
1	2 or more	500	400	350	200	160	140

Condition B - Interruption of Continuous Traffic

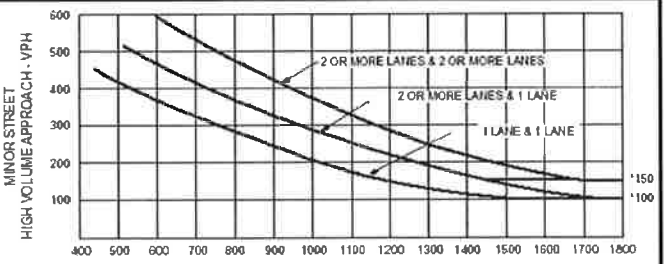
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	100%*	80%*	70%*	100%*	80%*	70%*
1	1	750	600	525	75	60	53
2 or more	1	900	720	630	75	60	53
2 or more	2 or more	900	720	630	100	80	70
1	2 or more	750	600	525	100	80	70

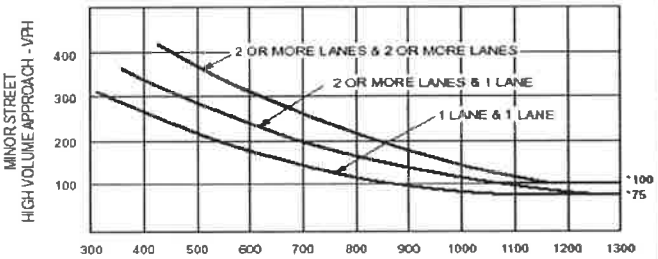
Warrant 2





Warrant 3





Volume Summary

Major Street Lanes 2+ **Minor Street Lanes** 1 **Speed** 45 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (70%)	1A (56%)	1B (70%)	1B (56%)	2 (70%)	3A (70%)	3B (70%)
07-08	766	113	971	Yes	Yes	Yes	Yes	Yes	No	No
08-09	748	115	954	Yes	Yes	Yes	Yes	Yes	No	No
09-10	579	47	664	No	No	No	Yes	No	No	No
10-11	605	45	686	No	No	No	Yes	No	No	No
11-12	715	44	799	No	No	No	Yes	No	No	No
12-13	878	63	989	No	No	Yes	Yes	No	No	No
13-14	816	59	920	No	No	Yes	Yes	No	No	No
14-15	875	48	966	No	No	No	Yes	No	No	No
15-16	1092	53	1188	No	No	Yes	Yes	No	No	No
16-17	1263	51	1354	No	No	No	Yes	No	No	No
17-18	1350	52	1443	No	No	Yes	Yes	No	No	No
18-19	0	0	0	No	No	No	No	No	No	No
Totals	9687	690	10934	2	2	6	11	2	0	0

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