

Traffic Impact Study SR 8 and DeBence Dr / Polk Cut-Off Appendices

Sandycreek Township, PA
06.15.2016



Appendix A: Traffic Volumes



Whitman, Requardt, and Associates, LLP

2009 Mackenzie Way

Suite 240

Cranberry Twp, Pennsylvania, United States 16066

724-779-7940 eclements@wralp.com

People Focused - Project Driven

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

Page No: 1

Turning Movement Data

Start Time	DeBence Dr Westbound						Polk Cut-Off Eastbound						SR 8 Southbound						SR 8 Northbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
07:30	1	0	3	0	0	4	27	1	5	0	0	33	11	68	5	0	0	84	5	66	1	0	0	72	193
07:45	4	0	26	0	0	30	17	0	1	0	0	18	8	62	8	0	0	78	1	71	1	0	0	73	199
Hourly Total	5	0	29	0	0	34	44	1	6	0	0	51	19	130	13	0	0	162	6	137	2	0	0	145	392
08:00	4	2	12	0	0	18	7	1	3	0	0	11	2	51	4	0	0	57	0	67	1	0	0	68	154
08:15	1	0	2	0	0	3	4	0	1	0	0	5	1	54	5	0	0	60	1	61	0	0	0	62	130
08:30	1	0	2	0	0	3	4	0	2	0	0	6	2	56	3	0	0	61	2	47	2	0	0	51	121
08:45	0	1	3	0	0	4	4	0	1	0	0	5	4	48	0	0	0	52	1	56	0	0	0	57	118
Hourly Total	6	3	19	0	0	28	19	1	7	0	0	27	9	209	12	0	0	230	4	231	3	0	0	238	523
09:00	0	0	2	0	0	2	4	0	1	0	1	5	0	51	4	0	0	55	0	44	0	0	0	44	106
09:15	0	0	3	0	1	3	3	0	1	0	0	4	2	47	5	0	1	54	1	54	1	0	1	56	117
09:30	0	0	6	0	0	6	4	0	1	0	0	5	2	49	6	0	0	57	1	51	1	0	0	53	121
09:45	0	0	1	0	0	1	10	0	2	0	0	12	2	44	8	0	0	54	2	42	0	0	0	44	111
Hourly Total	0	0	12	0	1	12	21	0	5	0	1	26	6	191	23	0	1	220	4	191	2	0	1	197	455
10:00	0	1	2	0	0	3	8	0	3	0	0	11	4	46	4	0	0	54	0	47	1	0	0	48	116
10:15	2	0	1	0	0	3	9	0	2	0	0	11	1	59	4	0	0	64	3	53	1	0	0	57	135
10:30	0	1	2	0	0	3	4	0	0	0	0	4	3	47	1	0	0	51	2	30	2	0	0	34	92
10:45	0	0	4	0	0	4	3	0	1	0	0	4	1	54	3	0	0	58	1	28	0	0	0	29	95
Hourly Total	2	2	9	0	0	13	24	0	6	0	0	30	9	206	12	0	0	227	6	158	4	0	0	168	438
11:00	0	0	2	0	0	2	9	0	3	0	0	12	0	49	4	0	0	53	1	61	0	0	0	62	129
11:15	0	0	2	0	0	2	8	0	0	0	0	8	1	45	5	0	0	51	2	36	2	0	0	40	101
11:30	0	0	3	0	0	3	4	0	3	0	0	7	1	35	2	0	0	38	2	47	0	0	0	49	97
11:45	0	0	1	0	0	1	5	0	2	0	0	7	0	33	4	0	0	37	1	44	2	0	0	47	92
Hourly Total	0	0	8	0	0	8	26	0	8	0	0	34	2	162	15	0	0	179	6	188	4	0	0	198	419
12:00	2	0	6	0	0	8	5	1	1	0	0	7	0	45	4	0	0	49	0	38	1	0	0	39	103
12:15	1	0	1	0	0	2	4	0	0	0	0	4	1	49	4	0	0	54	2	45	0	0	0	47	107
12:30	0	0	3	0	0	3	7	0	1	0	0	8	4	51	2	0	0	57	2	48	2	0	0	52	120
12:45	1	0	1	0	0	2	8	0	1	0	0	9	7	56	0	0	0	63	1	49	1	0	0	51	125
Hourly Total	4	0	11	0	0	15	24	1	3	0	0	28	12	201	10	0	0	223	5	180	4	0	0	189	455
13:00	2	1	1	0	0	4	2	0	2	0	0	4	1	52	5	0	0	58	3	53	1	0	0	57	123
13:15	1	0	4	0	0	5	9	0	4	0	0	13	3	70	4	0	0	77	2	49	2	0	0	53	148
13:30	0	0	1	0	0	1	5	2	1	0	0	8	11	47	6	0	0	64	0	47	1	0	0	48	121
13:45	2	0	1	0	0	3	6	1	2	0	0	9	5	54	9	0	0	68	2	57	0	0	0	59	139
Hourly Total	5	1	7	0	0	13	22	3	9	0	0	34	20	223	24	0	0	267	7	206	4	0	0	217	531
14:00	0	3	17	0	0	20	12	0	2	0	0	14	2	38	6	0	0	46	6	50	0	0	0	56	136
14:15	0	0	7	0	0	7	9	0	5	0	0	14	6	60	11	0	0	77	5	80	1	0	0	86	184
14:30	0	1	4	0	0	5	9	1	2	0	0	12	7	66	12	0	0	85	0	87	1	0	0	88	190

14:45	2	0	5	0	0	7	7	0	6	0	0	13	3	67	16	0	0	86	2	61	1	0	0	64	170
Hourly Total	2	4	33	0	0	39	37	1	15	0	0	53	18	231	45	0	0	294	13	278	3	0	0	294	680
15:00	3	3	20	0	0	26	16	1	3	0	0	20	0	82	13	0	0	95	6	66	1	0	0	73	214
15:15	0	0	4	0	0	4	42	1	2	0	0	45	2	70	6	0	0	78	5	64	0	0	0	69	196
15:30	1	2	9	0	0	12	10	0	4	0	0	14	2	71	13	0	0	86	4	60	0	0	0	64	176
15:45	0	0	3	0	0	3	8	0	4	0	0	12	2	81	10	0	0	93	4	63	2	0	0	69	177
Hourly Total	4	5	36	0	0	45	76	2	13	0	0	91	6	304	42	0	0	352	19	253	3	0	0	275	763
16:00	1	0	12	0	0	13	14	1	4	0	0	19	2	67	15	0	0	84	8	84	1	0	0	93	209
16:15	2	0	2	0	0	4	13	1	3	0	0	17	4	86	10	0	0	100	2	71	0	0	0	73	194
16:30	2	0	6	0	0	8	16	0	4	0	0	20	3	85	12	0	0	100	4	104	1	0	0	109	237
16:45	1	0	1	0	0	2	8	0	4	0	0	12	1	89	15	0	0	105	5	68	0	0	0	73	192
Hourly Total	6	0	21	0	0	27	51	2	15	0	0	68	10	327	52	0	0	389	19	327	2	0	0	348	832
17:00	1	0	7	0	0	8	16	0	3	0	0	19	3	73	7	0	0	83	4	76	0	0	0	80	190
17:15	1	0	2	0	0	3	11	0	1	0	0	12	2	72	9	0	0	83	2	70	1	0	0	73	171
17:30	1	0	3	0	0	4	2	0	2	0	0	4	4	53	13	0	0	70	0	59	0	0	0	59	137
17:45	0	0	2	0	0	2	10	0	0	0	1	10	2	37	11	0	0	50	1	55	0	0	0	56	118
Hourly Total	3	0	14	0	0	17	39	0	6	0	1	45	11	235	40	0	0	286	7	260	1	0	0	268	616
18:00	0	0	2	0	0	2	6	1	2	0	0	9	2	35	10	0	0	47	1	43	0	0	0	44	102
18:15	1	0	1	0	0	2	8	0	1	0	0	9	6	26	6	0	0	38	2	48	0	0	0	50	99
18:30	0	0	1	0	0	1	2	0	1	0	0	3	1	35	3	0	0	39	1	48	0	0	0	49	92
18:45	0	0	4	0	0	4	6	0	1	0	0	7	0	22	7	0	0	29	2	26	1	0	0	29	69
Hourly Total	1	0	8	0	0	9	22	1	5	0	0	28	9	118	26	0	0	153	6	165	1	0	0	172	362
19:00	0	0	2	0	0	2	7	0	2	0	0	9	1	35	5	0	0	41	0	30	1	0	0	31	83
19:15	0	0	1	0	0	1	9	0	1	0	0	10	0	28	4	0	0	32	2	33	0	0	0	35	78
Grand Total	38	15	210	0	1	263	421	12	101	0	2	534	132	2600	323	0	1	3055	104	2637	34	0	1	2775	6627
Approach %	14.4	5.7	79.8	0.0	-	-	78.8	2.2	18.9	0.0	-	-	4.3	85.1	10.6	0.0	-	-	3.7	95.0	1.2	0.0	-	-	-
Total %	0.6	0.2	3.2	0.0	-	4.0	6.4	0.2	1.5	0.0	-	8.1	2.0	39.2	4.9	0.0	-	46.1	1.6	39.8	0.5	0.0	-	41.9	-
Lights	18	15	169	0	-	202	408	10	96	0	-	514	101	2248	315	0	-	2664	99	2305	15	0	-	2419	5799
% Lights	47.4	100.0	80.5	-	-	76.8	96.9	83.3	95.0	-	-	96.3	76.5	86.5	97.5	-	-	87.2	95.2	87.4	44.1	-	-	87.2	87.5
Buses	0	0	0	0	-	0	8	0	1	0	-	9	0	14	4	0	-	18	1	14	0	0	-	15	42
% Buses	0.0	0.0	0.0	-	-	0.0	1.9	0.0	1.0	-	-	1.7	0.0	0.5	1.2	-	-	0.6	1.0	0.5	0.0	-	-	0.5	0.6
Trucks	20	0	41	0	-	61	5	2	4	0	-	11	31	338	4	0	-	373	4	318	19	0	-	341	786
% Trucks	52.6	0.0	19.5	-	-	23.2	1.2	16.7	4.0	-	-	2.1	23.5	13.0	1.2	-	-	12.2	3.8	12.1	55.9	-	-	12.3	11.9
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Turning Movement Data Plot

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

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Turning Movement Peak Hour Data (07:30)

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Turning Movement Peak Hour Data Plot (07:30)

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

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Turning Movement Peak Hour Data (14:30)

Start Time	DeBence Dr Westbound						Polk Cut-Off Eastbound						SR 8 Southbound						SR 8 Northbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
14:30	0	1	4	0	0	5	9	1	2	0	0	12	7	66	12	0	0	85	0	87	1	0	0	88	190
14:45	2	0	5	0	0	7	7	0	6	0	0	13	3	67	16	0	0	86	2	61	1	0	0	64	170
15:00	3	3	20	0	0	26	16	1	3	0	0	20	0	82	13	0	0	95	6	66	1	0	0	73	214
15:15	0	0	4	0	0	4	42	1	2	0	0	45	2	70	6	0	0	78	5	64	0	0	0	69	196
Total	5	4	33	0	0	42	74	3	13	0	0	90	12	285	47	0	0	344	13	278	3	0	0	294	770
Approach %	11.9	9.5	78.6	0.0	-	-	82.2	3.3	14.4	0.0	-	-	3.5	82.8	13.7	0.0	-	-	4.4	94.6	1.0	0.0	-	-	-
Total %	0.6	0.5	4.3	0.0	-	5.5	9.6	0.4	1.7	0.0	-	11.7	1.6	37.0	6.1	0.0	-	44.7	1.7	36.1	0.4	0.0	-	-	38.2
PHF	0.417	0.333	0.413	0.000	-	0.404	0.440	0.750	0.542	0.000	-	0.500	0.429	0.869	0.734	0.000	-	0.905	0.542	0.799	0.750	0.000	-	0.835	0.900
Lights	3	4	27	0	-	34	72	3	12	0	-	87	8	260	44	0	-	312	13	248	2	0	-	263	696
% Lights	60.0	100.0	81.8	-	-	81.0	97.3	100.0	92.3	-	-	96.7	66.7	91.2	93.6	-	-	90.7	100.0	89.2	66.7	-	-	89.5	90.4
Buses	0	0	0	0	-	0	2	0	1	0	-	3	0	7	3	0	-	10	0	5	0	0	-	5	18
% Buses	0.0	0.0	0.0	-	-	0.0	2.7	0.0	7.7	-	-	3.3	0.0	2.5	6.4	-	-	2.9	0.0	1.8	0.0	-	-	1.7	2.3
Trucks	2	0	6	0	-	8	0	0	0	0	-	0	4	18	0	0	-	22	0	25	1	0	-	26	56
% Trucks	40.0	0.0	18.2	-	-	19.0	0.0	0.0	0.0	-	-	0.0	33.3	6.3	0.0	-	-	6.4	0.0	9.0	33.3	-	-	8.8	7.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Whitman, Requardt, and Associates, LLP

2009 Mackenzie Way

Suite 240

Cranberry Twp, Pennsylvania, United States 16066

724-779-7940 eclements@wrallp.com

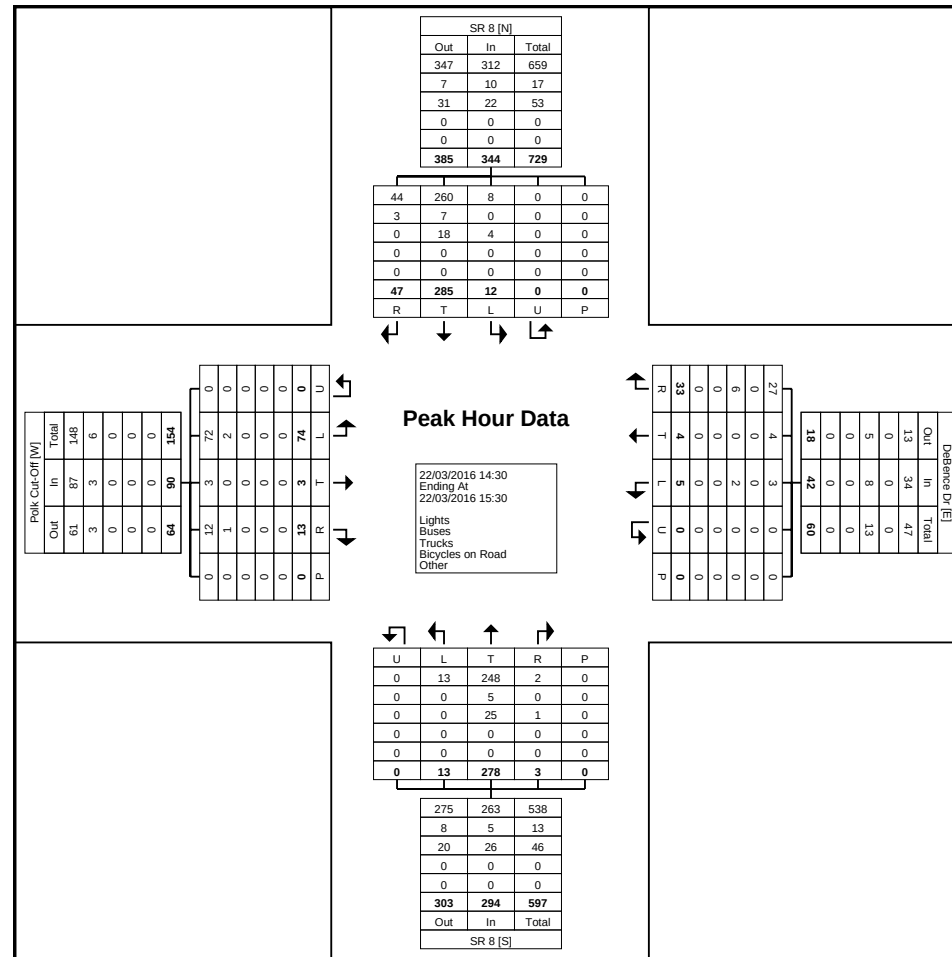
People Focused - Project Driven

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

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Turning Movement Peak Hour Data Plot (14:30)

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Whitman, Requardt, and Associates, LLP

2009 Mackenzie Way

Suite 240

Cranberry Twp, Pennsylvania, United States 16066

724-779-7940 eclements@wrallp.com

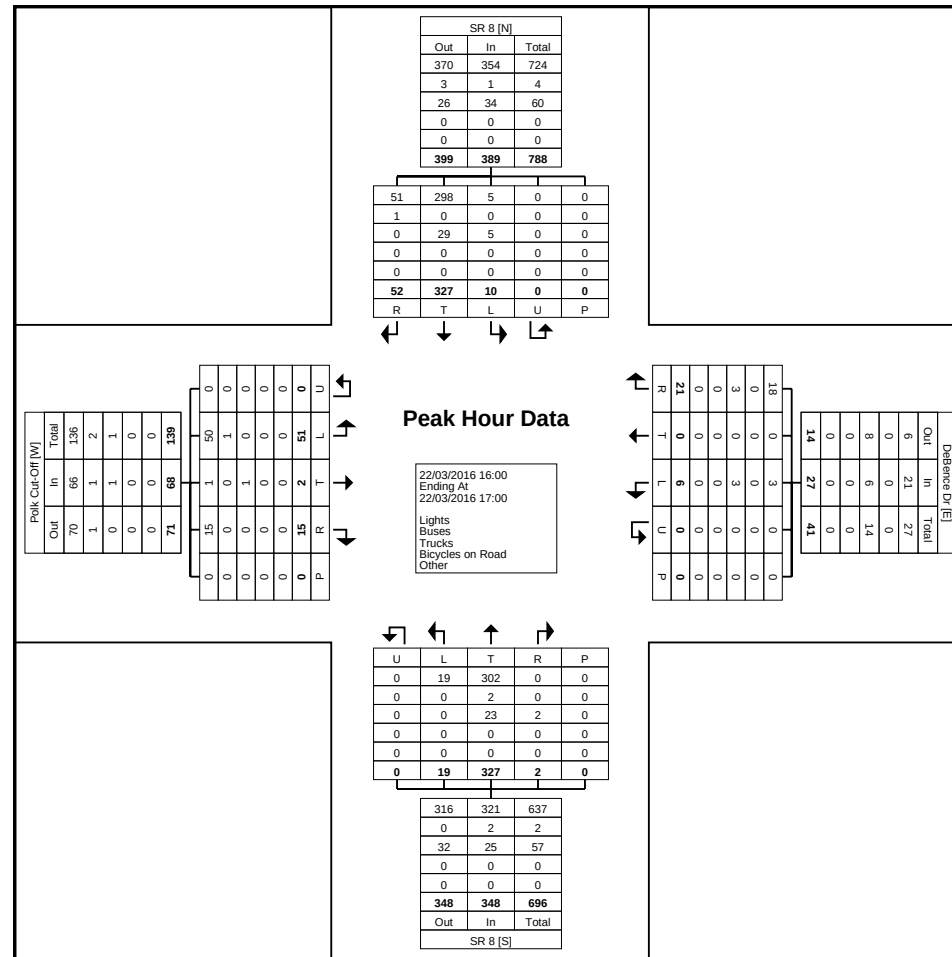
People Focused - Project Driven

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

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Turning Movement Peak Hour Data Plot (16:00)



Whitman, Requardt, and Associates, LLP

***2009 MacKenzie Way
Suite 240***

Cranberry Twp, Pennsylvania, United States 16066

724-779-7940 eclements@wrallp.com

People Focused - Project Driven

Count Name: SR 8 & Polk Cut-Off / DeBence Dr

Site Code: 100

Start Date: 22/03/2016

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Growth Factors for August 2015 to July 2016				
County	Urban Interstate	Rural Interstate	Urban Non-Interstate	Rural Non-Interstate
ADAMS	*	*	1.72	0.93
ALLEGHENY	1.22	*	0.09	0.52
ARMSTRONG	1.31	*	0.13	0.54
BEAVER	1.21	2.33	0.10	0.52
BEDFORD	*	2.40	*	0.60
BERKS	1.47	2.45	0.61	0.65
BLAIR	0.75	1.92	0.00	0.36
BRADFORD	1.30	*	0.25	0.50
BUCKS	2.01	2.63	1.32	0.80
BUTLER	1.91	2.85	0.97	0.83
CAMBRIA	0.33	*	0.00	0.23
CAMERON	*	*	*	0.32
CARBON	1.90	2.86	1.14	0.84
CENTRE	1.93	2.65	1.17	0.82
CHESTER	2.48	3.04	1.75	1.01
CLARION	1.33	2.32	0.37	0.55
CLEARFIELD	*	2.55	0.06	0.57
CLINTON	1.37	2.13	0.56	0.54
COLUMBIA	1.75	2.26	1.15	0.68
CRAWFORD	1.02	2.23	0.00	0.47
CUMBERLAND	1.68	2.12	1.25	0.68
DAUPHIN	1.43	2.31	0.65	0.61
DELAWARE	1.30	*	0.41	*
ELK	*	*	0.01	0.41
ERIE	0.91	1.88	0.05	0.41
FAYETTE	1.05	*	0.00	0.48
FOREST	*	*	*	0.70
FRANKLIN	2.42	2.75	1.85	0.96
FULTON	*	2.54	*	0.78
GREENE	0.95	2.12	0.00	0.44
HUNTINGDON	*	2.23	0.25	0.51
INDIANA	1.60	*	0.50	0.65
JEFFERSON	*	2.63	0.15	0.61
JUNIATA	*	*	*	0.70
LACKAWANNA	1.25	2.38	0.10	0.52
LANCASTER	1.99	2.53	1.31	0.81
LAWRENCE	1.19	2.30	0.08	0.50
LEBANON	*	2.44	0.98	0.70
LEHIGH	1.89	2.97	1.01	0.85
LUZERNE	1.23	2.39	0.09	0.53
LYCOMING	0.99	1.75	0.18	0.39
MCKEAN	1.01	*	0.00	0.44
MERCER	1.03	1.96	0.10	0.42
MIFFLIN	1.25	*	0.12	0.54
MONROE	2.27	2.92	1.73	0.98
MONTGOMERY	1.48	2.41	0.64	0.63
MONTOUR	*	3.02	1.34	0.92
NORTHAMPTON	2.14	*	1.42	0.93
NORTHUMBERLAND	1.18	1.98	0.16	0.43
PERRY	*	*	1.79	0.82
PHILADELPHIA	1.04	*	0.00	*
PIKE	*	3.13	*	1.14
POTTER	*	*	*	0.45
SCHUYLKILL	*	2.06	0.04	0.43
SNYDER	1.57	*	0.90	0.61
SOMERSET	1.01	2.07	0.01	0.44
SULLIVAN	*	*	*	0.51
SUSQUEHANNA	1.50	2.52	0.56	0.64
TIOGA	*	*	*	0.46
UNION	*	2.39	1.41	0.75
VENANGO	1.05	1.93	0.11	0.42
WARREN	*	*	0.01	0.54
WASHINGTON	1.47	2.81	0.21	0.66
WAYNE	*	2.51	1.04	0.75
WESTMORELAND	1.34	2.46	0.24	0.57
WYOMING	*	*	0.42	0.45
YORK	1.91	2.48	1.39	0.79

* = Functional Class Doesn't Exist in County

Questions? Please contact Andrew O'Neill at the Bureau of Planning and Research, 717-346-3250 or andoneill@pa.gov

NOTE: The projected growth factors are derived using historical VMT (Vehicle Miles Traveled) data (1994 to 2014), as well as Woods and Poole demographic and economic data. The factors should be compounded when calculating future values. The factors should not be used to project traffic beyond a 20-year period. Please be aware that these factors are estimates, and unforeseen events (opening of shopping centers, fast food franchises, gas stations, etc) could cause growth to change over time.

Industrial Park (130)

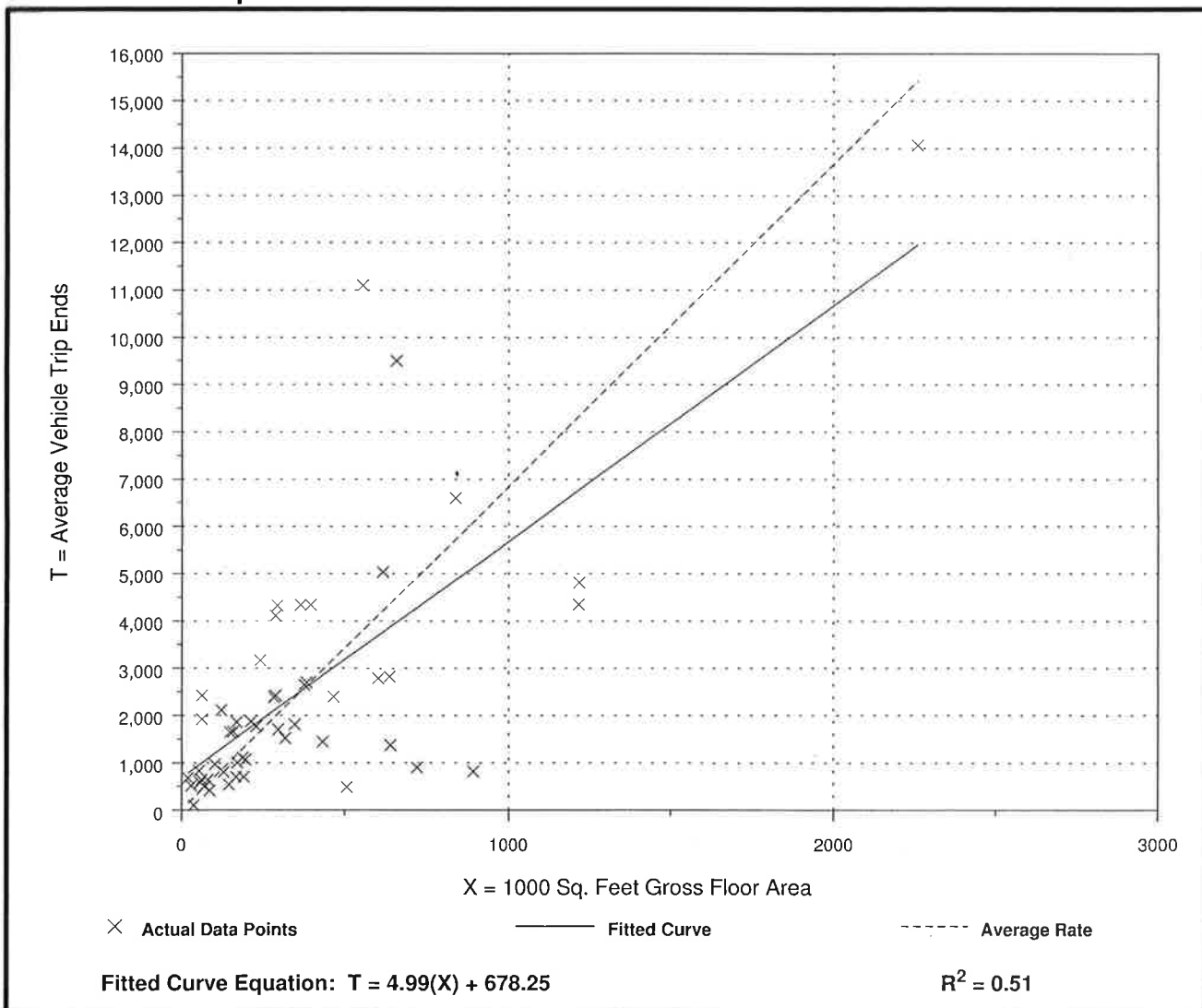
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 52
Average 1000 Sq. Feet GFA: 369
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
6.83	0.91 - 36.97	5.57

Data Plot and Equation



Industrial Park (130)

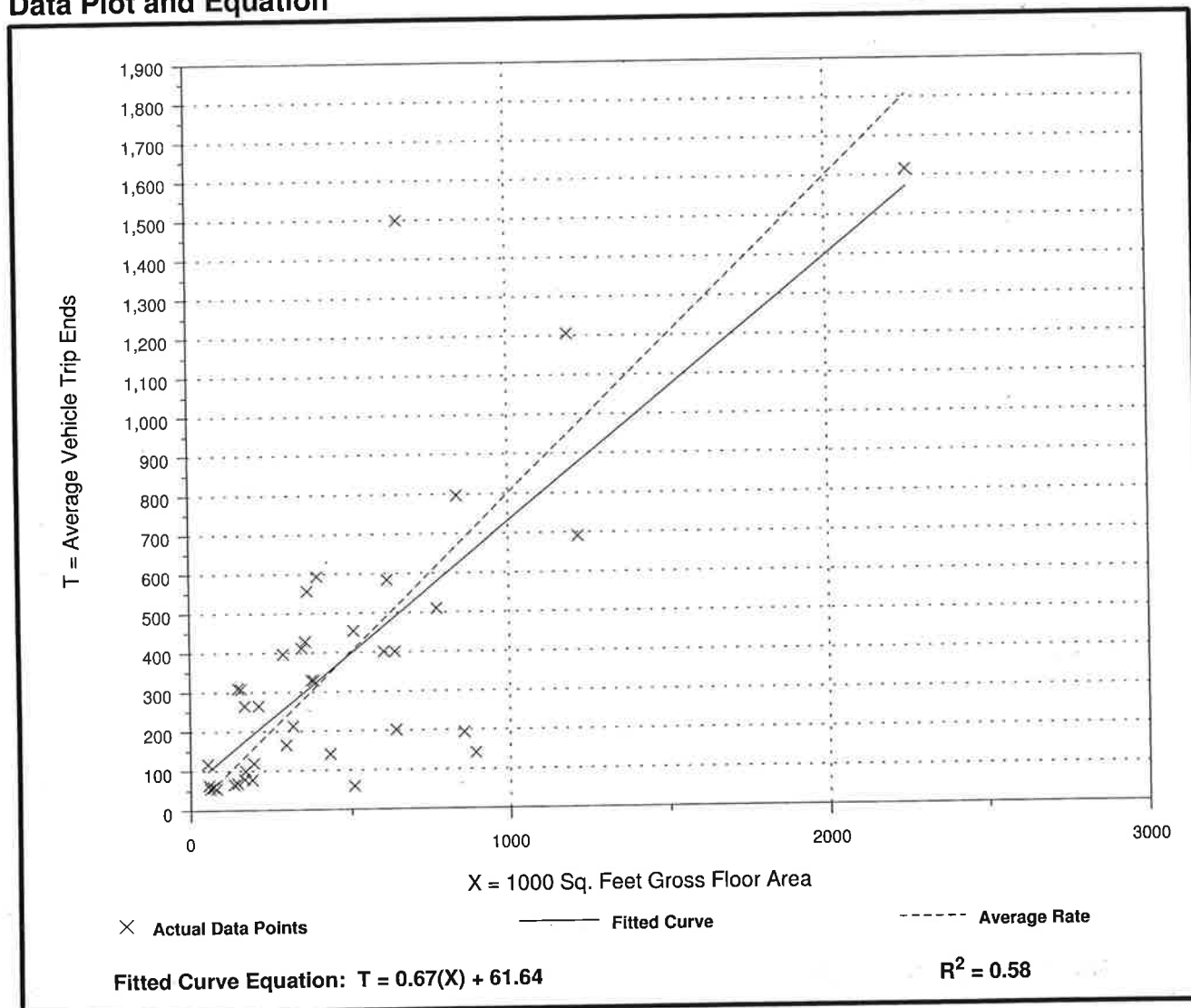
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
A.M. Peak Hour of Generator

Number of Studies: 39
 Average 1000 Sq. Feet GFA: 457
 Directional Distribution: 87% entering, 13% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.80	0.12 - 2.28	1.02

Data Plot and Equation



Industrial Park (130)

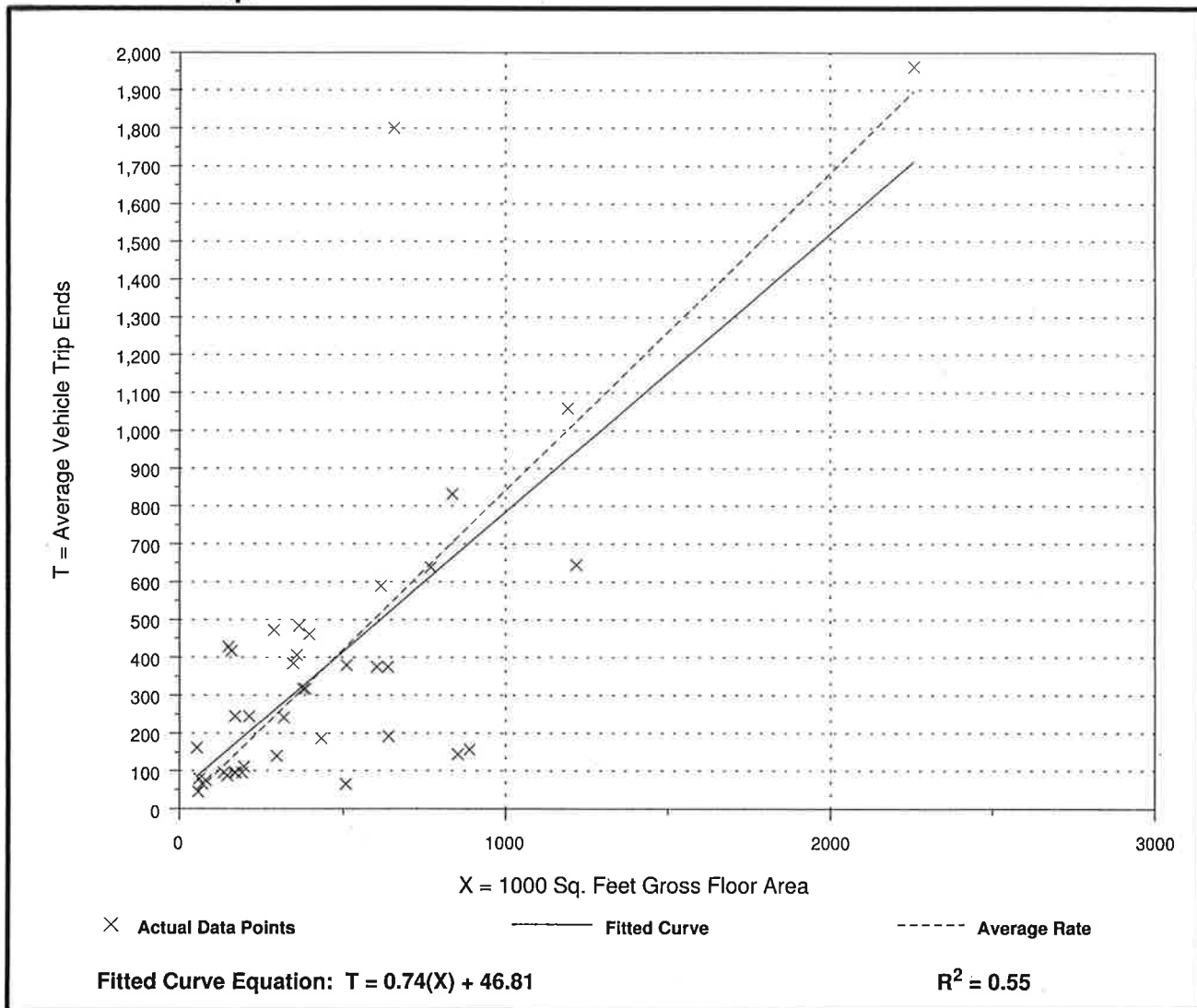
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
P.M. Peak Hour of Generator

Number of Studies: 39
Average 1000 Sq. Feet GFA: 457
Directional Distribution: 21% entering, 79% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.84	0.13 - 2.95	1.08

Data Plot and Equation



Industrial Park (130)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Saturday,
Peak Hour of Generator

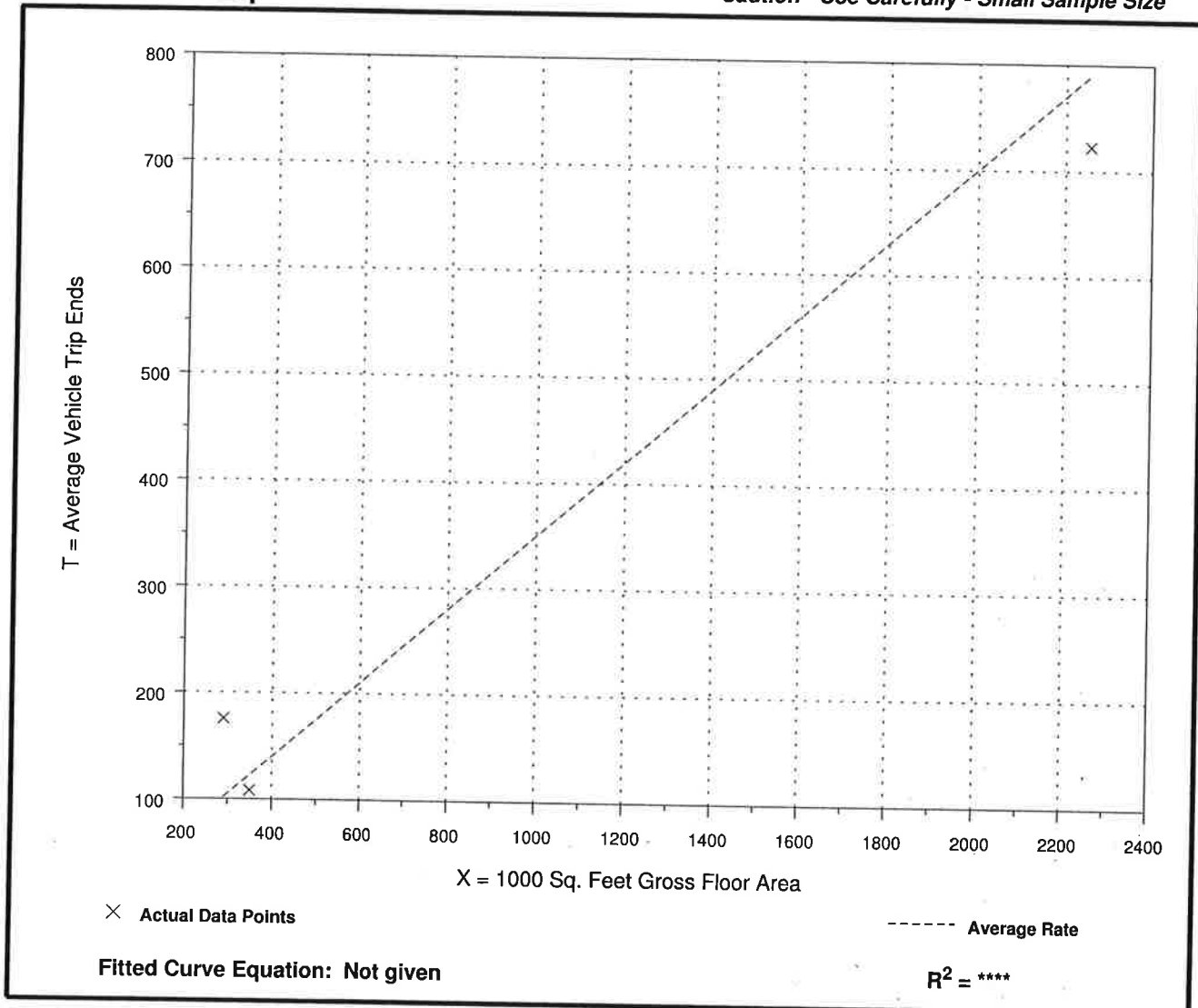
Number of Studies: 3
 Average 1000 Sq. Feet GFA: 966
 Directional Distribution: 32% entering, 68% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
0.35	0.31 - 0.60	0.60

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Industrial Park (130) Trip Generation		
Assumed 40,000 SF (X = 40)		
Weekday		
Fitted Curve	$T=4.99(X)+678.25$	878
R^2	0.51	
Distribution	50/50	
Average Rate	6.83	273
Entering		137
Exiting		137
AM Peak		
Fitted Curve	$T=0.67(X)+61.64$	88
R^2	0.58	
Distribution	87/13	
Average Rate	0.80	32
Entering		28
Exiting		4
PM Peak		
Fitted Curve	$T=.74(X)+46.81$	76
R^2	0.55	
Distribution	21/79	
Average Rate	0.84	34
Entering		7
Exiting		27
Sat Peak		
Fitted Curve	Not Given	-
R^2	-	
Distribution	32/68	
Average Rate	0.35	14
Entering		4
Exiting		10
Trip Generation, 9th Edition Institute of Transportation Engineers		
* Used Average Rate as the R^2 for all are not very confident.		

Appendix B: Speed Study

Whitman, Requardt and Associates, LLP

Radar Speed Study Quantitative Summary

Description:

Direction:	Northbound
Location:	Route 8 @ DeBence Drive
Posted Speed Limit:	50
Date:	3/15/2016
Time:	8:20-9:00 AM
Recorder:	NRS

Results

Sample Size	85
85th Percentile Speed:	48
Modal Speed:	40
Mean Speed:	43
% Over Speeding:	5%

Whitman, Requardt and Associates, LLP

Radar Speed Study Quantitative Summary

Description:

Direction:	Northbound
Location:	Route 8 @ DeBence Drive
Posted Speed Limit:	50
Date:	3/17&23/2016
Time:	4:30-4:45 PM
Recorder:	NRS

Results

Sample Size	107
85th Percentile Speed:	52
Modal Speed:	46
Mean Speed:	46
% Over Speeding:	23%

Whitman, Requardt and Associates, LLP

Radar Speed Study Quantitative Summary

Description:

Direction:	Southbound
Location:	Route 8 @ DeBence Drive
Posted Speed Limit:	50
Date:	3/15/2016
Time:	8:20-9:00 AM
Recorder:	NRS

Results

Sample Size	111
85th Percentile Speed:	50
Modal Speed:	49
Mean Speed:	43
% Over Speeding:	14%

Whitman, Requardt and Associates, LLP

Radar Speed Study Quantitative Summary

Description:

Direction:	Southbound
Location:	Route 8 @ DeBence Drive
Posted Speed Limit:	50
Date:	3/17&23/2016
Time:	4:30-4:45 PM
Recorder:	NRS

Results

Sample Size	86
85th Percentile Speed:	54
Modal Speed:	51
Mean Speed:	50
% Over Speeding:	47%

Appendix C: Gap Study

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100.ppd

Start Date: 3/15/2016

Start Time: 8:00:00 AM

Site Code: 100

Comment 1: PROJECT: SR 8 & DeBence Dr TIS

Comment 2: INT: SR 8 @ DeBence Dr / Polk Cut-Off NB

Comment 3: WEATHER: 40's & Light Rain

Comment 4: COUNTER: WRA (Eamonn Clements)

Start Time	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
08:00 AM	4	0	0	1	1	2	0	1	0	0	1	0	2	0	1
08:05 AM	2	1	0	2	0	1	1	1	1	0	0	1	1	1	3
08:10 AM	2	0	2	0	1	1	0	2	1	0	0	0	2	0	2
08:15 AM	2	1	1	2	2	1	0	0	1	1	0	1	0	1	2
08:20 AM	3	1	0	2	1	2	0	0	0	1	0	0	2	0	3
08:25 AM	3	2	1	1	0	2	0	0	1	0	1	1	0	0	3
08:30 AM	4	1	2	1	0	0	0	0	0	0	0	1	0	2	4
08:35 AM	10	2	0	1	3	0	2	0	0	2	0	0	0	1	1
08:40 AM	2	2	0	2	0	0	0	0	0	0	0	0	0	2	3
08:45 AM	2	1	0	0	0	0	2	2	0	1	0	0	2	0	3
08:50 AM	5	1	4	2	2	0	0	1	1	2	0	0	1	0	2
08:55 AM	0	2	3	1	0	1	1	0	2	1	1	0	0	0	2

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100.ppd

Start Date: 3/15/2016

Start Time: 8:00:00 AM

Site Code: 100

Comment 1: PROJECT: SR 8 & DeBence Dr TIS

Comment 2: INT: SR 8 @ DeBence Dr / Polk Cut-Off SB

Comment 3: WEATHER: 40's & Light Rain

Comment 4: COUNTER: WRA (Eamonn Clements)

Start Time	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
08:00 AM	1	0	0	0	0	2	0	1	1	1	0	0	0	0	4
08:05 AM	3	3	3	1	0	2	1	2	1	0	0	0	1	1	1
08:10 AM	1	1	3	1	1	1	0	2	1	1	0	0	0	0	3
08:15 AM	2	4	3	1	1	0	1	0	1	1	1	0	0	0	3
08:20 AM	2	1	2	0	4	1	0	0	1	2	0	2	0	0	2
08:25 AM	3	3	2	2	2	1	0	1	1	0	0	0	1	1	2
08:30 AM	5	1	3	2	1	0	1	0	1	2	1	0	1	0	2
08:35 AM	3	4	1	1	1	1	2	0	1	0	1	0	0	0	3
08:40 AM	2	1	2	3	1	2	0	1	1	0	1	0	1	0	2
08:45 AM	0	4	1	0	0	1	2	0	0	1	0	0	0	1	3
08:50 AM	2	1	0	0	2	1	2	0	1	0	2	0	0	0	3
08:55 AM	5	4	5	0	1	1	2	0	0	0	0	1	0	0	2

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100.ppd

Start Date: 3/15/2016

Start Time: 8:00:00 AM

Site Code: 100

Comment 1: PROJECT: SR 8 & DeBence Dr TIS

Comment 2: INT: SR 8 @ DeBence Dr / Polk Cut-Off Both

Comment 3: WEATHER: 40's & Light Rain

Comment 4: COUNTER: WRA (Eamonn Clements)

Start Time	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
08:00 AM	6	4	0	0	1	4	1	1	1	0	0	0	0	0	2
08:05 AM	9	5	5	3	1	2	0	1	0	0	0	1	1	1	0
08:10 AM	6	1	3	2	4	2	2	3	1	0	0	0	0	0	1
08:15 AM	7	5	3	1	2	2	1	0	3	3	0	0	0	0	0
08:20 AM	9	4	1	5	6	2	0	1	1	1	0	0	1	0	0
08:25 AM	11	5	4	3	1	3	0	0	1	0	1	1	1	0	0
08:30 AM	7	3	4	3	0	1	1	1	0	2	0	2	0	0	1
08:35 AM	9	5	1	1	4	2	2	1	1	1	0	0	0	0	0
08:40 AM	8	5	1	4	1	1	0	2	0	0	1	1	1	0	1
08:45 AM	4	5	1	2	1	0	2	3	1	1	0	0	1	0	1
08:50 AM	6	3	4	3	1	1	1	2	1	1	1	0	0	0	1
08:55 AM	8	5	7	2	0	3	1	0	0	1	0	1	0	0	1

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_MD.ppd

Start Date: 3/17/2016

Start Time: 2:30:00 PM

Site Code: 00000002

Comment 1: PROJECT:

Comment 2: INT: NB

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
02:30 PM	0	12	11	9	11	3	7	2	1	2	2	2	2	1	1	5
02:45 PM	0	11	8	6	8	6	1	4	1	2	3	0	0	3	4	5
03:00 PM	0	12	13	11	8	5	9	3	1	0	2	2	1	2	3	3
03:15 PM	0	12	6	3	5	9	5	5	1	4	3	2	1	1	2	4

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_MD.ppd

Start Date: 3/17/2016

Start Time: 2:30:00 PM

Site Code: 00000002

Comment 1: PROJECT:

Comment 2: INT: SB

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
02:30 PM	0	5	7	3	6	6	6	3	3	3	3	4	1	1	1	4
02:45 PM	0	19	7	10	8	8	3	4	4	2	0	1	0	0	2	7
03:00 PM	0	11	7	4	4	8	4	6	0	2	1	0	1	2	1	8
03:15 PM	0	15	7	6	5	6	3	1	2	1	5	0	1	1	1	7

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_MD.ppd

Start Date: 3/17/2016

Start Time: 2:30:00 PM

Site Code: 00000002

Comment 1: PROJECT:

Comment 2: INT: Both

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
02:30 PM	0	30	21	13	16	10	7	4	2	1	0	1	0	0	0	1
02:45 PM	0	41	18	11	14	4	9	4	2	2	0	2	0	1	1	1
03:00 PM	0	33	18	19	9	10	7	3	0	0	2	1	2	1	0	1
03:15 PM	0	37	15	13	11	11	6	4	1	4	4	0	0	1	0	0

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_PM.ppd

Start Date: 3/17/2016

Start Time: 4:45:00 PM

Site Code: 00000003

Comment 1: PROJECT:

Comment 2: INT: NB

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
04:45 PM	0	10	6	6	7	9	5	2	6	0	5	1	2	0	2	5
05:00 PM	0	14	8	9	15	8	8	8	2	2	1	1	1	1	0	2
05:15 PM	1	20	9	17	10	4	2	8	2	4	0	2	0	1	0	4
05:30 PM	0	17	13	2	5	4	6	4	4	3	0	2	2	3	1	4

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_PM.ppd

Start Date: 3/17/2016

Start Time: 4:45:00 PM

Site Code: 00000003

Comment 1: PROJECT:

Comment 2: INT: SB

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
04:45 PM	0	11	9	4	3	6	7	4	2	4	2	1	0	2	0	7
05:00 PM	0	8	9	6	3	5	2	0	3	2	1	0	5	1	2	8
05:15 PM	0	8	11	3	7	8	1	4	1	1	2	2	0	0	3	7
05:30 PM	0	4	2	5	4	8	2	2	1	3	3	3	0	3	0	6

File Name: N:\31855-010\Engineering\Design\Traffic\Gap Study\Int 100_PM.ppd

Start Date: 3/17/2016

Start Time: 4:45:00 PM

Site Code: 00000003

Comment 1: PROJECT:

Comment 2: INT: Both

Comment 3: WEATHER:

Comment 4: COUNTER:

Start Time	Volume	2 - 3	4 - 5	6 - 7	8 - 9	10 - 11	12 - 13	14 - 15	16 - 17	18 - 19	20 - 21	22 - 23	24 - 25	26 - 27	28 - 29	>29
04:45 PM	0	36	18	20	14	4	5	2	5	0	3	1	0	0	0	2
05:00 PM	0	32	17	15	17	11	8	5	1	2	0	0	0	0	0	1
05:15 PM	1	40	26	17	13	6	2	7	1	3	1	1	0	0	0	1
05:30 PM	0	35	14	11	7	7	4	3	5	5	5	0	0	0	2	0

Appendix D: Base Year Results

Synchro HCS 2010 Reports

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	55	2	10	10	2	43	7	265	3	22	235	22
Future Vol, veh/h	55	2	10	10	2	43	7	265	3	22	235	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	65	2	12	12	2	51	8	312	4	26	276	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	515	673	151	521	684	158	302	0	0	315	0	0
Stage 1	341	341	-	330	330	-	-	-	-	-	-	-
Stage 2	174	332	-	191	354	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	478	424	886	350	403	777	1173	-	-	1193	-	-
Stage 1	679	680	-	539	674	-	-	-	-	-	-	-
Stage 2	829	685	-	663	659	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	433	410	886	335	389	777	1173	-	-	1193	-	-
Mov Cap-2 Maneuver	433	410	-	335	389	-	-	-	-	-	-	-
Stage 1	674	662	-	535	669	-	-	-	-	-	-	-
Stage 2	766	680	-	635	642	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.2			11.6			0.2			0.7		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1173	-	-	468	609	1193	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.168	0.106	0.022	-	-				
HCM Control Delay (s)	8.1	0	-	14.2	11.6	8.1	0.1	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	74	3	13	5	4	33	13	278	3	12	285	47
Future Vol, veh/h	74	3	13	5	4	33	13	278	3	12	285	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	82	3	14	6	4	37	14	309	3	13	317	52
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	555	710	184	526	735	156	369	0	0	312	0	0
Stage 1	369	369	-	339	339	-	-	-	-	-	-	-
Stage 2	186	341	-	187	396	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	452	406	821	382	379	821	1201	-	-	1049	-	-
Stage 1	660	664	-	576	668	-	-	-	-	-	-	-
Stage 2	820	680	-	713	635	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	418	394	821	364	368	821	1201	-	-	1049	-	-
Mov Cap-2 Maneuver	418	394	-	364	368	-	-	-	-	-	-	-
Stage 1	651	653	-	568	659	-	-	-	-	-	-	-
Stage 2	767	670	-	686	625	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.3			11			0.4			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1201	-	-	449	648	1049	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.223	0.072	0.013	-	-				
HCM Control Delay (s)	8	0.1	-	15.3	11	8.5	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.8	0.2	0	-	-				

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	51	2	15	6	0	21	19	327	2	10	327	52
Future Vol, veh/h	51	2	15	6	0	21	19	327	2	10	327	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	55	2	16	7	0	23	21	355	2	11	355	57
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	624	804	206	599	832	179	412	0	0	358	0	0
Stage 1	405	405	-	398	398	-	-	-	-	-	-	-
Stage 2	219	399	-	201	434	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	415	272	821	320	337	805	1158	-	-	916	-	-
Stage 1	641	525	-	508	634	-	-	-	-	-	-	-
Stage 2	798	528	-	676	613	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	391	261	821	302	324	805	1158	-	-	916	-	-
Mov Cap-2 Maneuver	391	261	-	302	324	-	-	-	-	-	-	-
Stage 1	626	517	-	496	619	-	-	-	-	-	-	-
Stage 2	758	516	-	649	603	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15			11.4			0.5			0.3		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1158	-	-	435	588	916	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.17	0.05	0.012	-	-				
HCM Control Delay (s)	8.2	0.1	-	15	11.4	9	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0	-	-				

Appendix E: Traffic Signal Warrant Analysis

WARRANT 1:	EIGHT-HOUR VEHICULAR VOLUME	Meets Criteria	No
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*Option 1: Condition A must be met at the 100% level for **any** 8 hours of an average day to satisfy Warrant 1.*

OR

*Option 2: Condition B must be met at the 100% level for **any** 8 hours of an average day to satisfy Warrant 1.*

OR

Option 3: If the speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the traffic volumes in the 70% columns in the tables may be used in lieu of the 100% criteria to satisfy Warrant 1.

If neither Condition A nor Condition B alone are met, the combination of A and B should be tested after adequate trial of other alternatives has failed to solve the traffic problems.

*Option 4: Condition A **AND** B both must be met at the 80% level for any 8 hours of an average day to satisfy Warrant 1.*

OR

*Option 5: If the speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the criteria for Condition A **AND** B both must be met at the 56% level for any 8 hours of an average day to satisfy Warrant 1.*

Note 1: Major street volumes represent the total volume of both major street approaches.

Note 2: Minor street volumes represent the highest individual side street approach for each hour. The eight hours used must be for same eight hours as the major street, however the minor street approach used can vary for the eight hours.

Warrant 1, Condition A - Minimum Vehicular Volume

Applicable Criteria	Number Lanes		100% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	500	150	-
X	2 or more	1	600	150	No
-	2 or more	2 or more	600	200	-
-	1	2 or more	500	200	-

Applicable Criteria	Number Lanes		80% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	400	120	-
X	2 or more	1	480	120	No
-	2 or more	2 or more	480	160	-
-	1	2 or more	400	160	-

Applicable Criteria	Number Lanes		70% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	350	105	-
X	2 or more	1	420	105	No
-	2 or more	2 or more	420	140	-
-	1	2 or more	350	140	-

Applicable Criteria	Number Lanes		56% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	280	84	-
X	2 or more	1	336	84	No, Only 1 Hr
-	2 or more	2 or more	336	112	-
-	1	2 or more	280	112	-

Warrant 1, Condition B - Interruption of Continuous Traffic

Applicable Criteria	Number Lanes		100% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	750	75	-
X	2 or more	1	900	75	No
-	2 or more	2 or more	900	100	-
-	1	2 or more	750	100	-

Applicable Criteria	Number Lanes		80% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	600	60	-
X	2 or more	1	720	60	No, Only 1 Hr
-	2 or more	2 or more	720	80	-
-	1	2 or more	600	80	-

Applicable Criteria	Number Lanes		70% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	525	53	-
X	2 or more	1	630	53	No, Only 2 Hr
-	2 or more	2 or more	630	70	-
-	1	2 or more	525	70	-

Applicable Criteria	Number Lanes		56% Criteria		Meets Criteria
	Major St.	Minor St.	Major VPH (Total)	Minor VPH (High Side)	
-	1	1	420	42	-
X	2 or more	1	504	42	No, Only 4 Hr
-	2 or more	2 or more	504	56	-
-	1	2 or more	420	56	-

WARRANT 2:	FOUR-HOUR VEHICULAR VOLUME	Meets Criteria	-
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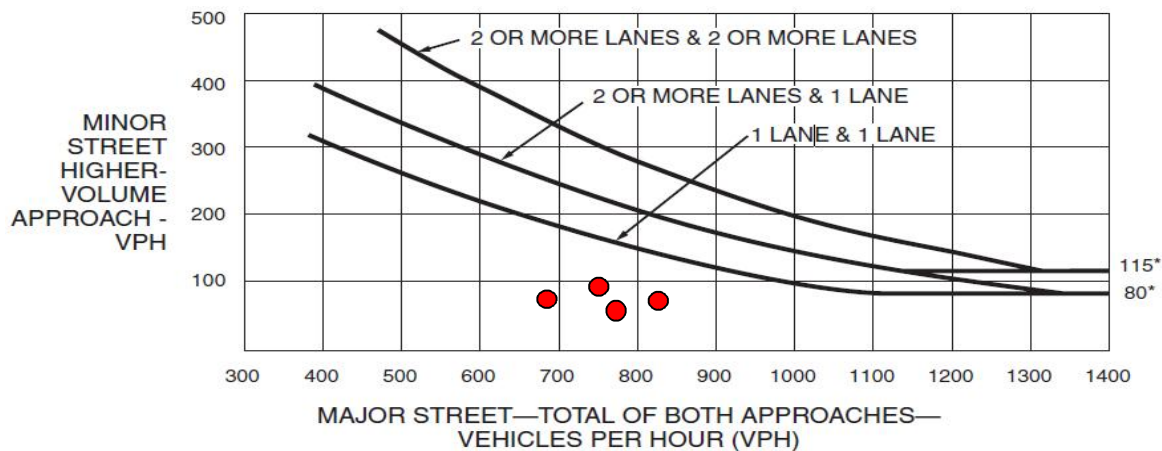
Option 1: Plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for any 4 hours of an average day all lie above the 100% criteria graph curve to satisfy Warrant 2.

OR

Option 2: If the posted / statutory / 85th percentile speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the traffic volumes in the 70% criteria graph may be used in lieu of the 100% criteria to satisfy Warrant 2.

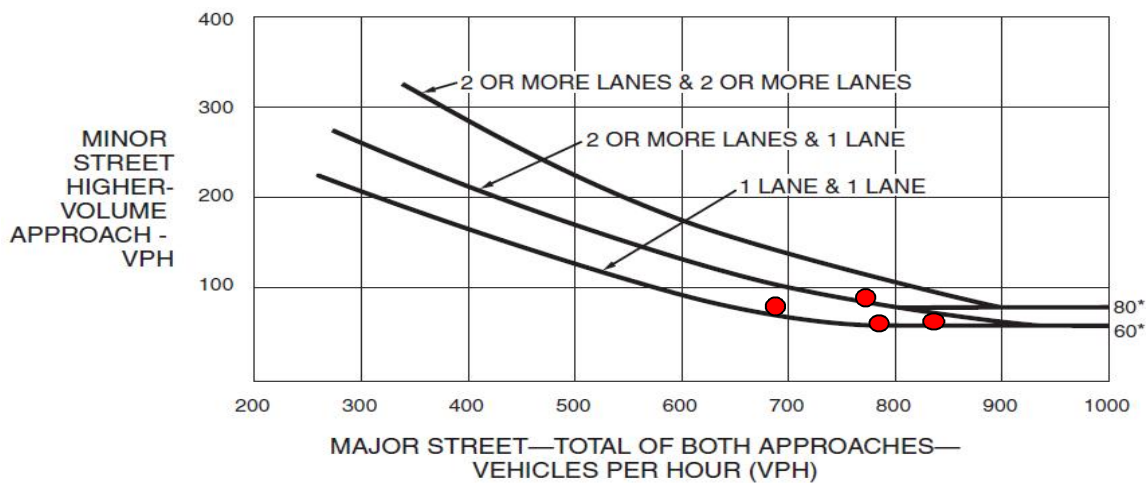
Note 1: Major street volumes represent the total volume of both major street approaches.

Note 2: Minor street volumes represent the highest individual side street approach for each hour. The eight hours used must be for same eight hours as the major street, however the minor street approach used can vary for the eight hours.



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 2 - 100% Criteria



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 2 - 70% Criteria

WARRANT 3:	PEAK HOUR	Meets Criteria	No
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To satisfy Warrant 3, the criteria in **EITHER** Condition A or B must be met.

Option 1: To satisfy Warrant 3, Condition A - all **THREE** of the following conditions exist for the same 1 hour of an avg day:

1: Total stopped delay on one stop-controlled minor street approach (one direction only) equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach;

AND

2: Volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one lane or 150 vph for two lanes;

AND

3: Total entering volume during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four or more approaches to satisfy Warrant 3.

Option 2: To satisfy Warrant 3, Condition B - plotted points for peak hour of an average day lies above the 100% criteria graph.

OR

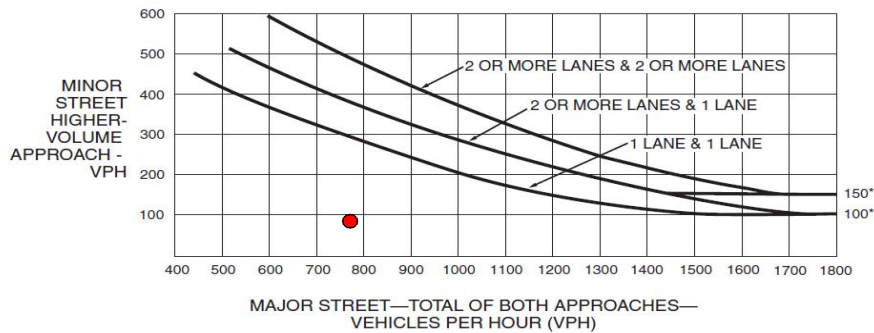
Option 3: If the speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the traffic volumes in the 70% criteria graph may be used in lieu of the 100% criteria to satisfy Warrant 3.

Note 1: Major street volumes represent the total volume of both major street approaches.

Note 2: Minor street volumes represent the highest individual side street approach for each hour. The eight hours used must be for same eight hours as the major street, however the minor street approach used can vary for the eight hours.

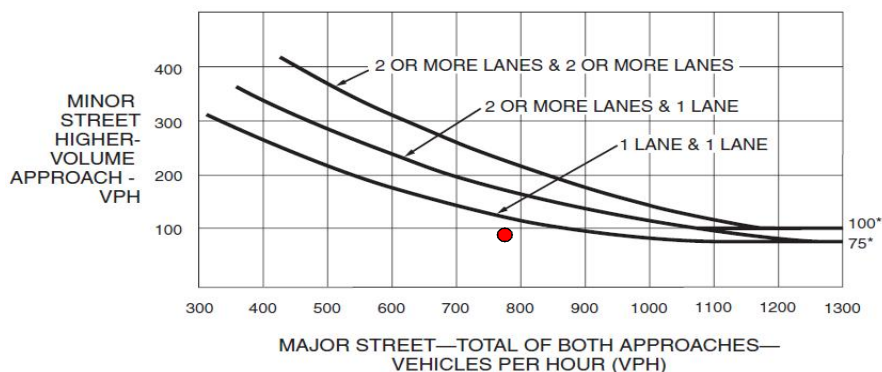
Note 3: Only applied in unusual cases such as office complexes, manufacturing plants, HOV facilities, etc. that attract or discharge large numbers of vehicles over a short time.

Warrant 3, Condition B



*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.

Warrant 3 - 100% Criteria



*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.

Warrant 3 - 70% Criteria

WARRANT 7:	CRASH EXPERIENCE	Meets Criteria	No
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Option 1: To satisfy Warrant 7, all of the following criteria must be met:

A: Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the frequency of crashes;

AND

B: Five or more reported crashes that could be corrected by a traffic 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;

AND

C: For each of any 8 hours of an average day, the vehicles per hour (vph) given in both the 80% columns of Condition A & B of Warrant 1 are met, or the volume of pedestrian traffic is not less than 80% of the requirements in Warrant 4.

Note 1: For Criterion C, the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Note 2: For Criterion C, if the posted / statutory / 85th percentile speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the traffic volumes in the 56% columns of Warrant 1 may be used in place of the 80% columns.

WARRANT PA-1:	ADT Volume Warrant	Meets Criteria	No
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Option 1: to satisfy Warrant PA-1, the estimated ADT volumes on the major street and on the higher volume minor street or driveway approach to the intersection, when projected using an accepted procedure such as put forth in the Trip Generation Manual published by the Institute of Transportation Engineers, equals or exceeds the values in **EITHER** Condition A or Condition B.

Option 2: If the posted / statutory / 85th percentile speed on the major street exceeds 40 mph (70 km/h), or if the intersection lies in an isolated community having a population of less than 10,000, the 70% criteria may be used for Condition A and Condition B.

Note 1: This warrant must apply at a proposed intersection, an intersection revised by a highway construction project, or at the driveway of a proposed commercial or residential development where vehicle counts cannot be taken.

Note 2: If a traffic control signal is installed under this warrant, a traffic count must be taken within 6 months of the opening of a development or within 2 years of the opening of a highway. If the traffic volumes do not satisfy this warrant, or one or more of the other nine warrants, consideration should be given to removing the traffic control signal and replacing it with appropriate alternative traffic control devices.

Condition A - ADT Volume Warrant

Applicable Criteria	Number Lanes		100% Criteria		Meets Criteria
	Major St.	Minor St.	Major ADT (Total)	Minor ADT (High Side)	
-	1	1	10,000	3,000	-
X	2 or more	1	12,000	3,000	No
-	2 or more	2 or more	12,000	4,000	-
-	1	2 or more	10,000	4,000	-

Applicable Criteria	Number Lanes		70% Criteria		Meets Criteria
	Major St.	Minor St.	Major ADT (Total)	Minor ADT (High Side)	
-	1	1	7,000	2,100	-
X	2 or more	1	8,400	2,100	No
-	2 or more	2 or more	8,400	2,800	-
-	1	2 or more	7,000	2,800	-

Condition B - ADT Volume Warrant

Applicable Criteria	Number Lanes		100% Criteria		Meets Criteria
	Major St.	Minor St.	Major ADT (Total)	Minor ADT (High Side)	
-	1	1	15,000	1,500	-
X	2 or more	1	18,000	1,500	No
-	2 or more	2 or more	18,000	2,000	-
-	1	2 or more	15,000	2,000	-

Applicable Criteria	Number Lanes		70% Criteria		Meets Criteria
	Major St.	Minor St.	Major ADT (Total)	Minor ADT (High Side)	
-	1	1	10,500	1,050	-
X	2 or more	1	12,600	1,050	No
-	2 or more	2 or more	12,600	1,400	-
-	1	2 or more	10,500	1,400	-

Appendix F: Turning Lane Warrant Analysis

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound -Development	
Analysis Period: 2021 Design Hour: AM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Left or Right-Turn Lane Analysis?: Type of Analysis Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	14.3%	9
	Through	-	271	14.3%	330
	Right	No	6	0.0%	N/A
Opposing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	Yes	22	0.0%	22
Advancing Volume: 339 Opposing Volume: 302 Left Turn Volume: 9 % Left Turns in Advancing Volume: 2.65%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 9 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
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PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

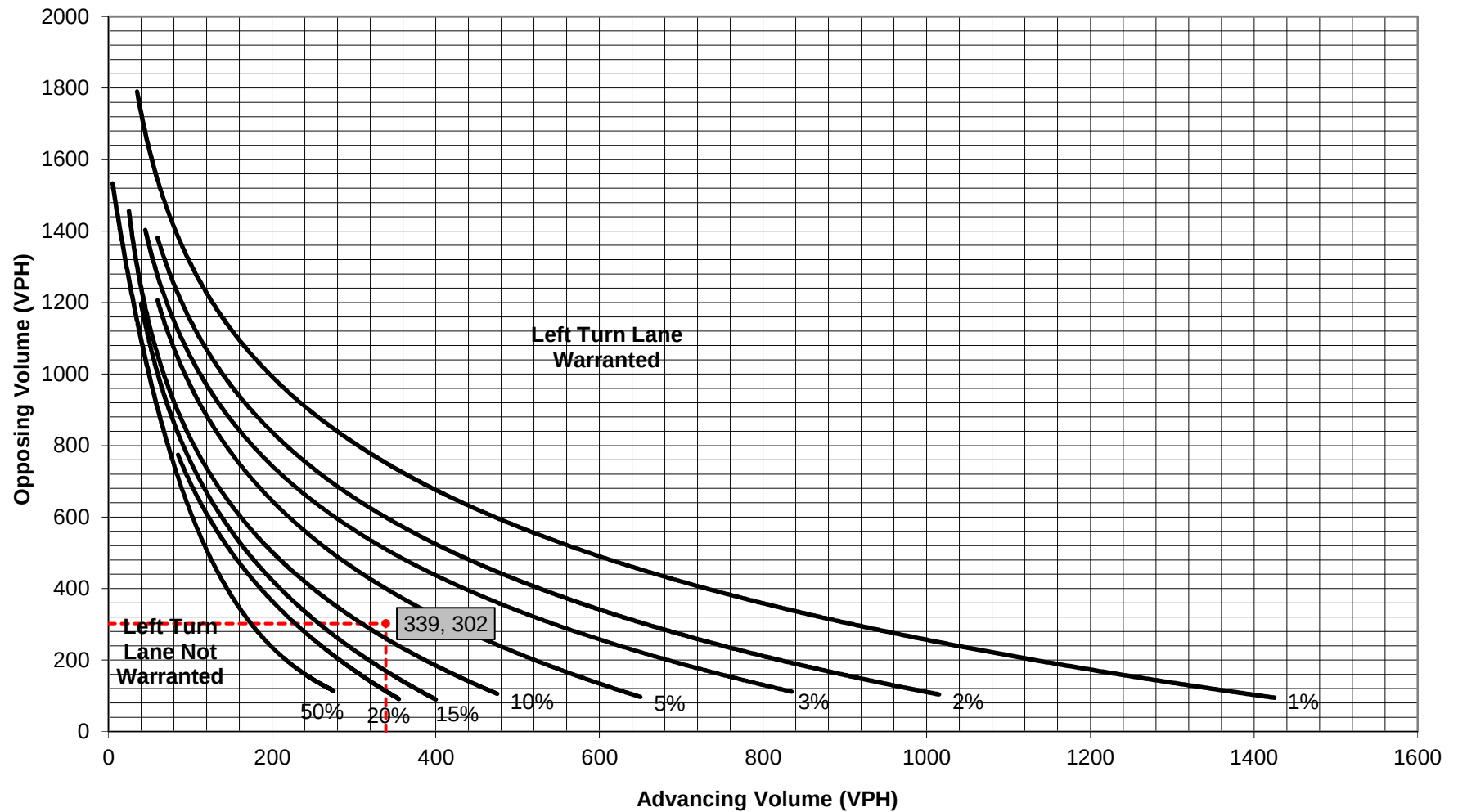
Additional Findings:

N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp
 County: Venango County
 PennDOT Engineering District: 1

Analysis Date: 5/31/2016
 Conducted By: WB
 Checked By: NS
 Agency/Company Name: WRA

Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off
 Northbound -Development

Analysis Period: 2021
 Design Hour: AM Peak Hour
 Intersection Control: Unsignalized
 Posted Speed Limit (MPH): 50
 Type of Terrain: Rolling

Number of Approach Lanes: 2
 Undivided or Divided Highway: Undivided

Left or Right-Turn Lane Analysis?: Type of Analysis
 Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	14.3%	N/A
	Through	-	271	14.3%	N/A
	Right	No	6	0.0%	N/A
Opposing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	Yes	22	0.0%	N/A

Advancing Volume: N/A
 Opposing Volume: N/A
 Left Turn Volume: N/A

% Left Turns in Advancing Volume: N/A

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22

Advancing Volume: 302
 Right Turn Volume: 22

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A
 Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 12**
 Warrant Met?: **No**

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized
 Design Hour Volume of Turning Lane: 22
 Cycles Per Hour (Assumed): Known
 Cycles Per Hour (If Known): 40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

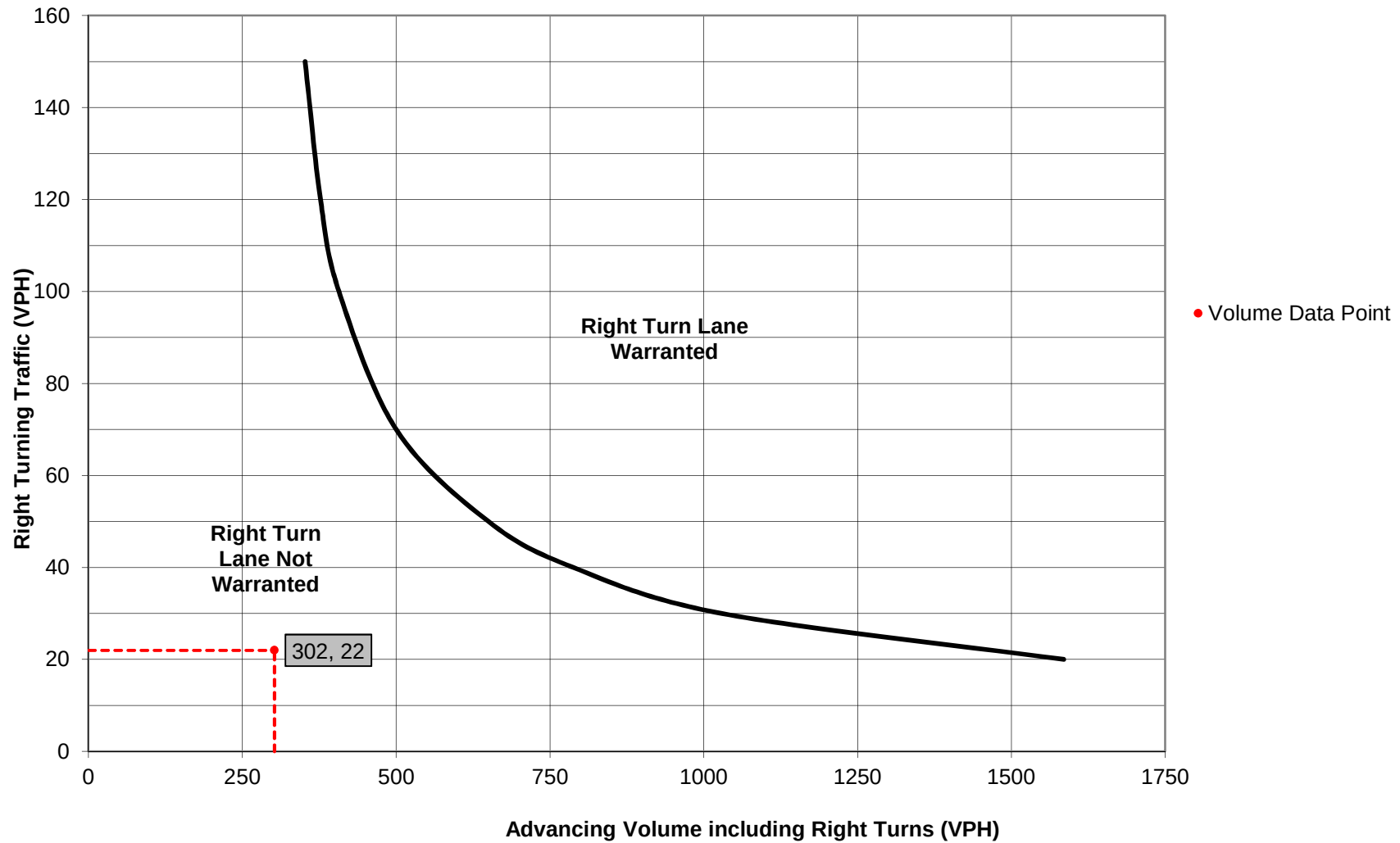
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A: N/A Feet
 Condition B: N/A Feet
 Condition C: N/A Feet
 Required Right Turn Lane Storage Length: N/A Feet

Additional Findings:
 N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp
County: Venango County
PennDOT Engineering District: 1

Analysis Date: 5/31/2016
Conducted By: WB
Checked By: NS
Agency/Company Name: WRA

Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off
Northbound - No Development

Analysis Period: 2021
Design Hour: AM Peak Hour
Intersection Control: Unsignalized
Posted Speed Limit (MPH): 50
Type of Terrain: Rolling

Number of Approach Lanes: 2
Undivided or Divided Highway: Undivided

Left or Right-Turn Lane Analysis?: Type of Analysis
Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	14.3%	9
	Through	-	271	14.3%	330
	Right	No	3	0.0%	N/A
Opposing	Left	No	22	9.1%	N/A
	Through	-	240	11.1%	280
	Right	Yes	22	0.0%	22

Advancing Volume: 339
Opposing Volume: 302
Left Turn Volume: 9

% Left Turns in Advancing Volume: 2.65%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A

Advancing Volume: N/A
Right Turn Volume: N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 7
Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A
Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized
Design Hour Volume of Turning Lane: 9
Cycles Per Hour (Assumed): Known
Cycles Per Hour (If Known): 40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

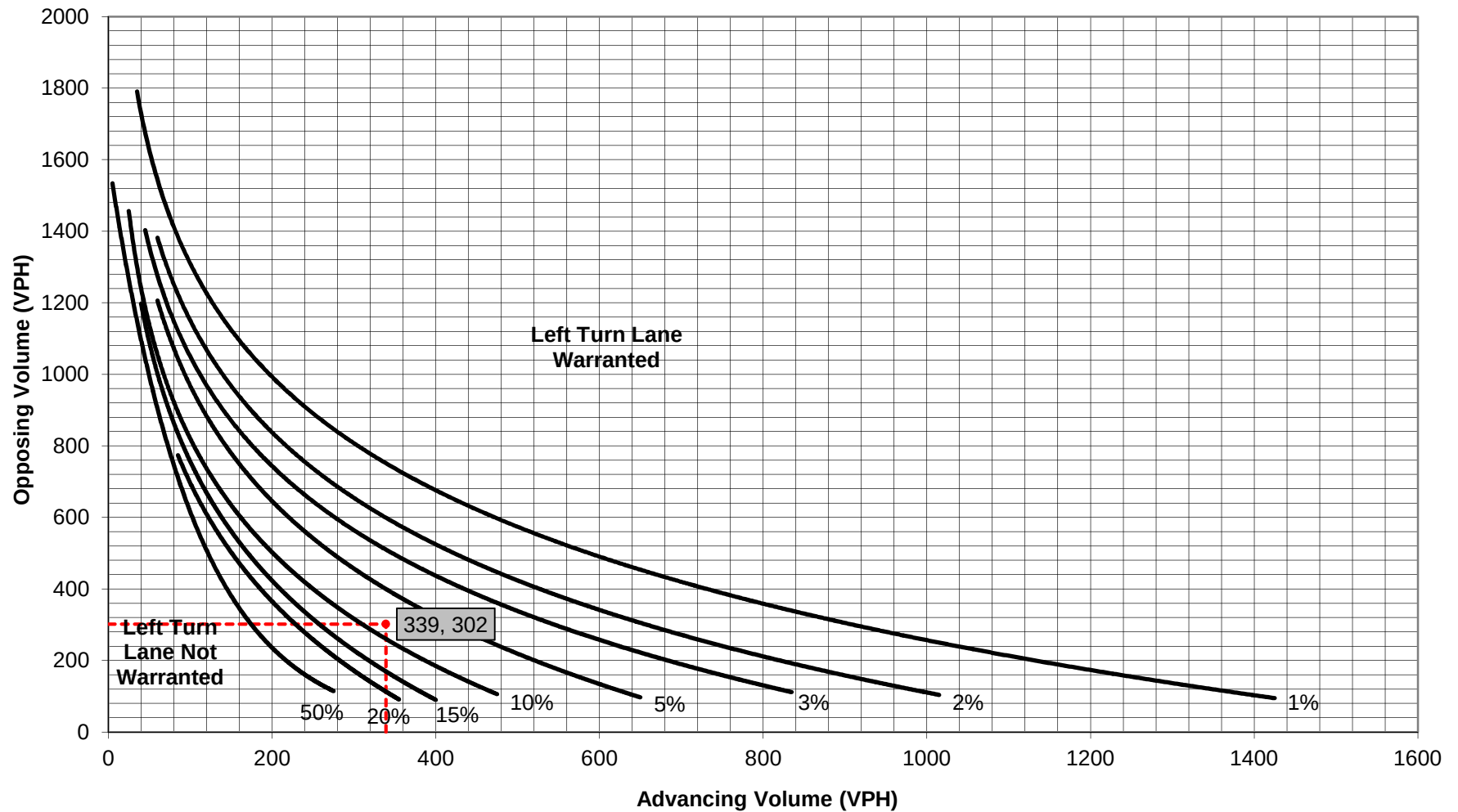
Left Turn Lane Storage Length, Condition A: N/A Feet
Condition B: N/A Feet
Condition C: N/A Feet
Required Left Turn Lane Storage Length: N/A Feet

Additional Findings:
N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound - No Development	
Analysis Period: 2021 Design Hour: AM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	14.3%	N/A
	Through	-	271	14.3%	N/A
	Right	No	3	0.0%	N/A
Opposing	Left	No	22	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	Yes	22	0.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
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PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

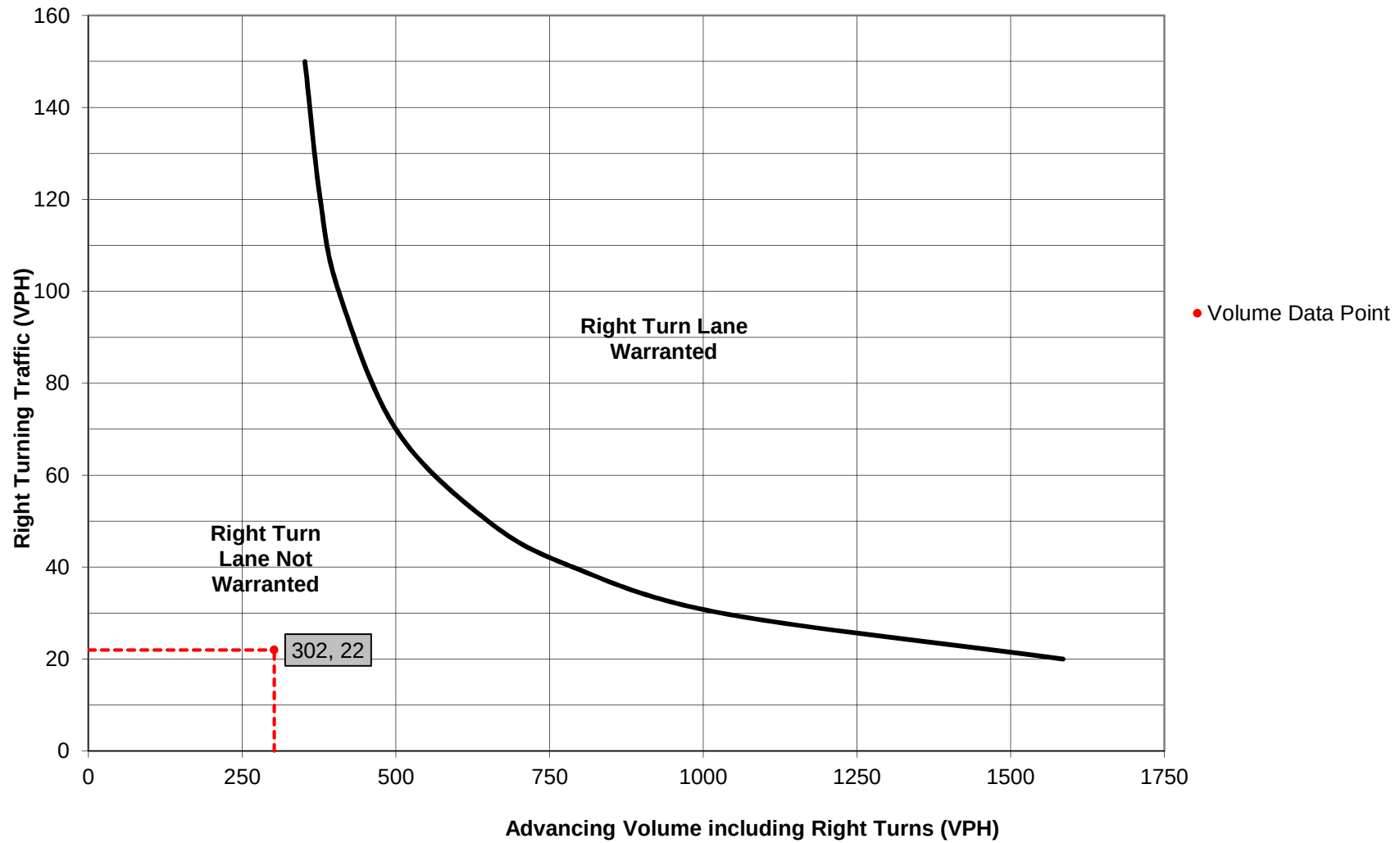
Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp	Analysis Date: 5/31/2016
County: Venango County	Conducted By: WB
PennDOT Engineering District: 1	Checked By: NS
	Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021	Number of Approach Lanes: 2
Design Hour: AM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	Type of Analysis
Posted Speed Limit (MPH): 50	
Type of Terrain: Rolling	
	Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	45	9.1%	52
	Through	-	240	11.1%	280
	Right	No	22	0.0%	N/A
Opposing	Left	No	7	14.3%	N/A
	Through	-	271	14.3%	330
	Right	Yes	6	0.0%	6

Advancing Volume: 332

Opposing Volume: 336

Left Turn Volume: 52

% Left Turns in Advancing Volume: 15.66%

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A

Advancing Volume: N/A

Right Turn Volume: N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7	Applicable Warrant Figure: N/A
Warrant Met?: Yes	Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized	
Design Hour Volume of Turning Lane: 52	
Cycles Per Hour (Assumed): Known	
Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	175	Feet
Condition C:	168	Feet
Required Left Turn Lane Storage Length:	175	Feet

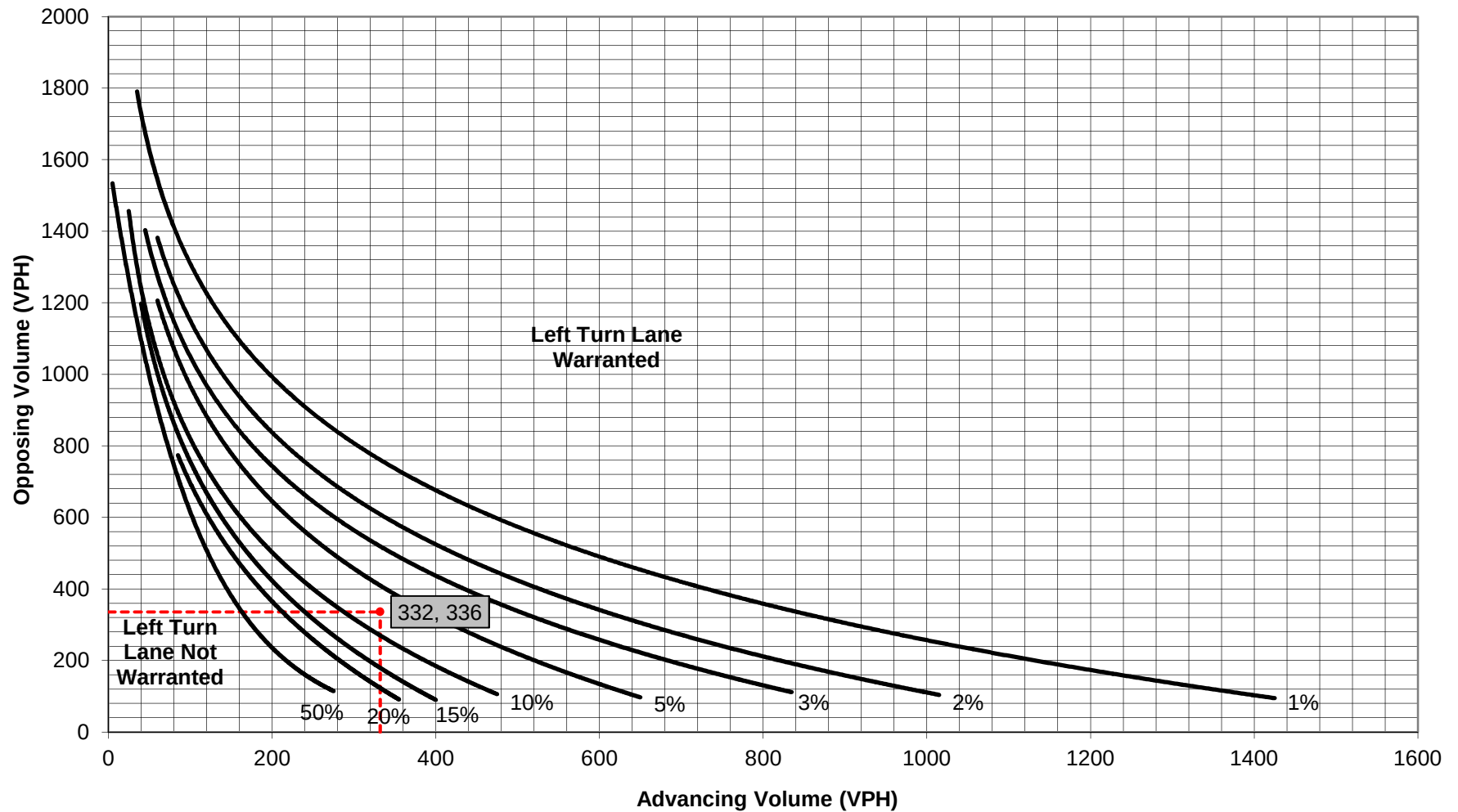
Additional Findings:

N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021 Design Hour: AM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	No	22	0.0%	N/A
Opposing	Left	No	7	14.3%	N/A
	Through	-	271	14.3%	N/A
	Right	Yes	6	0.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

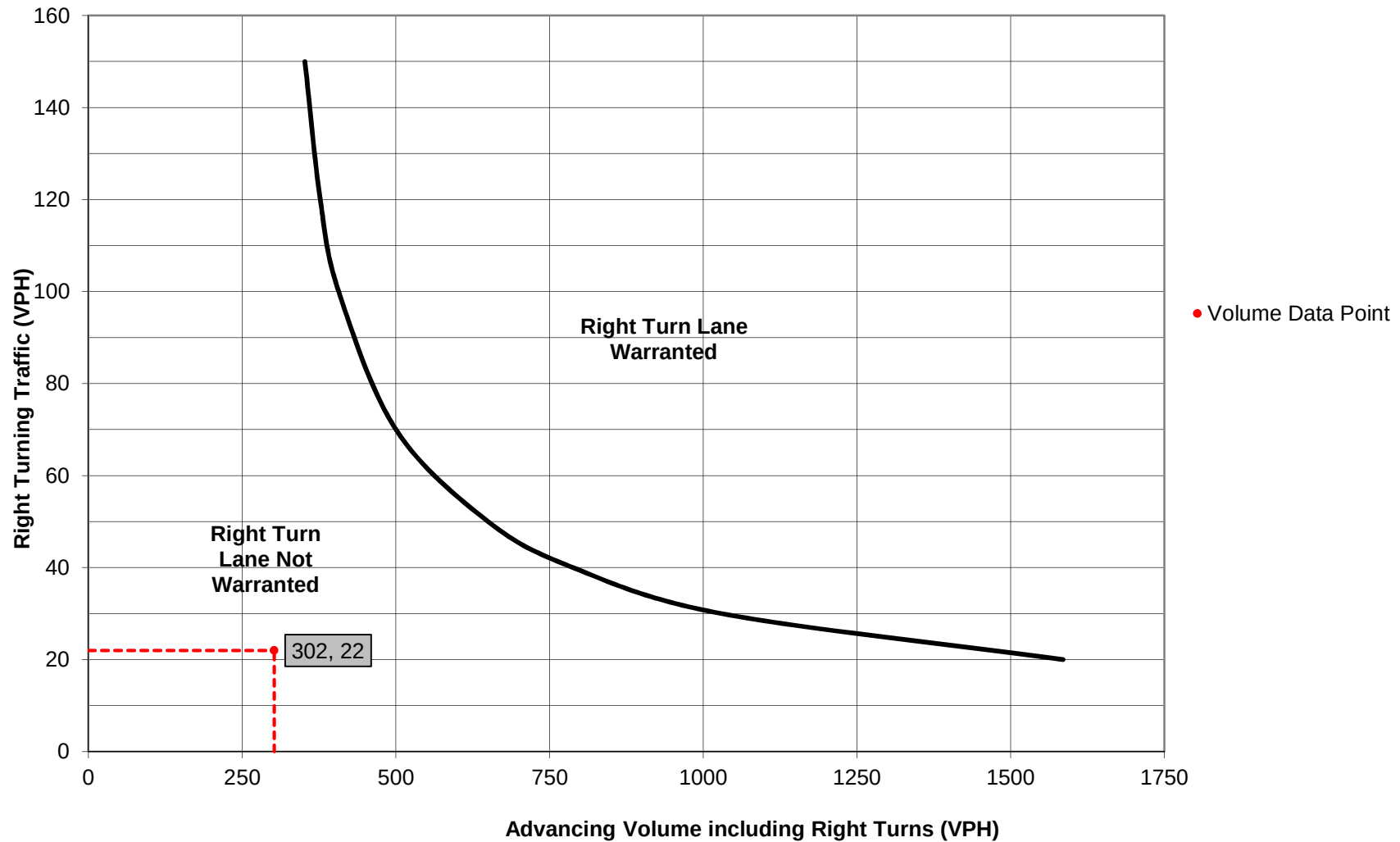
Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -No Development	
Analysis Period: 2021 Design Hour: AM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	22	9.1%	26
	Through	-	240	11.1%	280
	Right	No	22	0.0%	N/A
Opposing	Left	No	7	14.3%	N/A
	Through	-	271	14.3%	330
	Right	Yes	3	0.0%	3
Advancing Volume: 306 Opposing Volume: 333 Left Turn Volume: 26 % Left Turns in Advancing Volume: 8.50%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

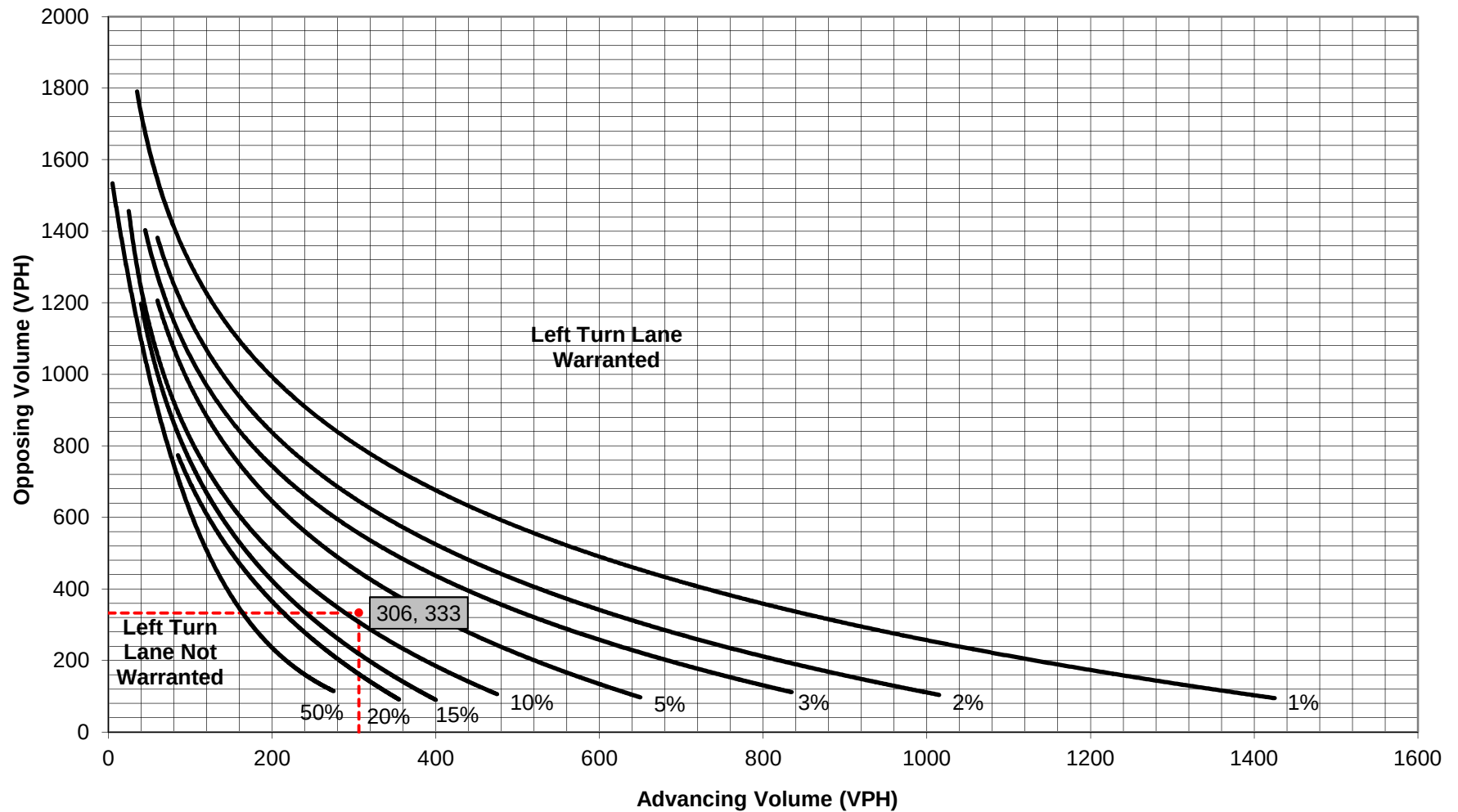
TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 26 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -No Development	
Analysis Period: 2021 Design Hour: AM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	22	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	No	22	0.0%	N/A
Opposing	Left	No	7	14.3%	N/A
	Through	-	271	14.3%	N/A
	Right	Yes	3	0.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

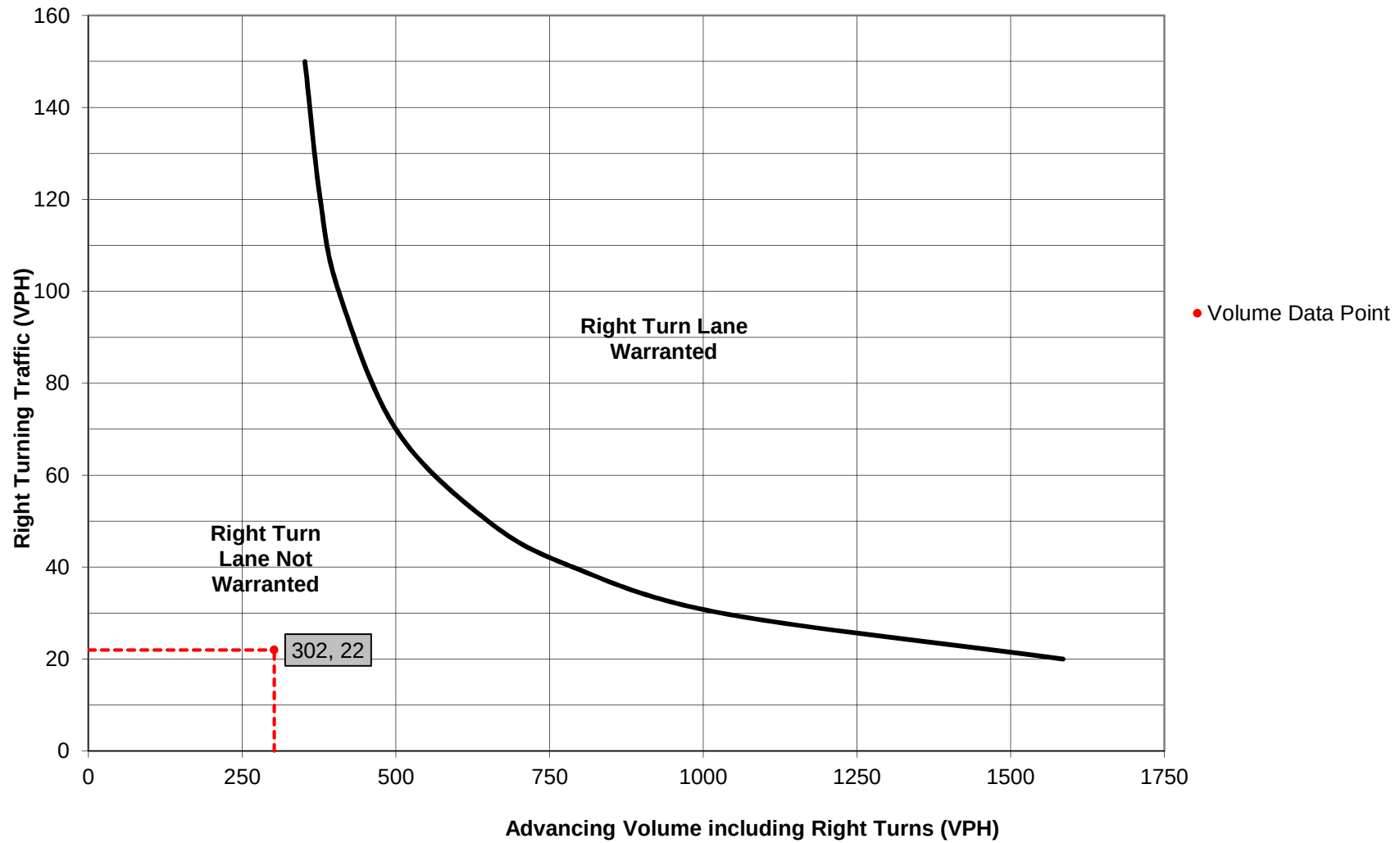
Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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	Turn Demand Volume																																								
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Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound -Development	
Analysis Period: 2021 Design Hour: Midday Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	13	0.0%	13
	Through	-	284	10.8%	331
	Right	No	4	33.3%	N/A
Opposing	Left	No	14	33.3%	N/A
	Through	-	291	8.8%	330
	Right	Yes	48	6.4%	53
Advancing Volume: 344 Opposing Volume: 383 Left Turn Volume: 13 % Left Turns in Advancing Volume: 3.78%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 13 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
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PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

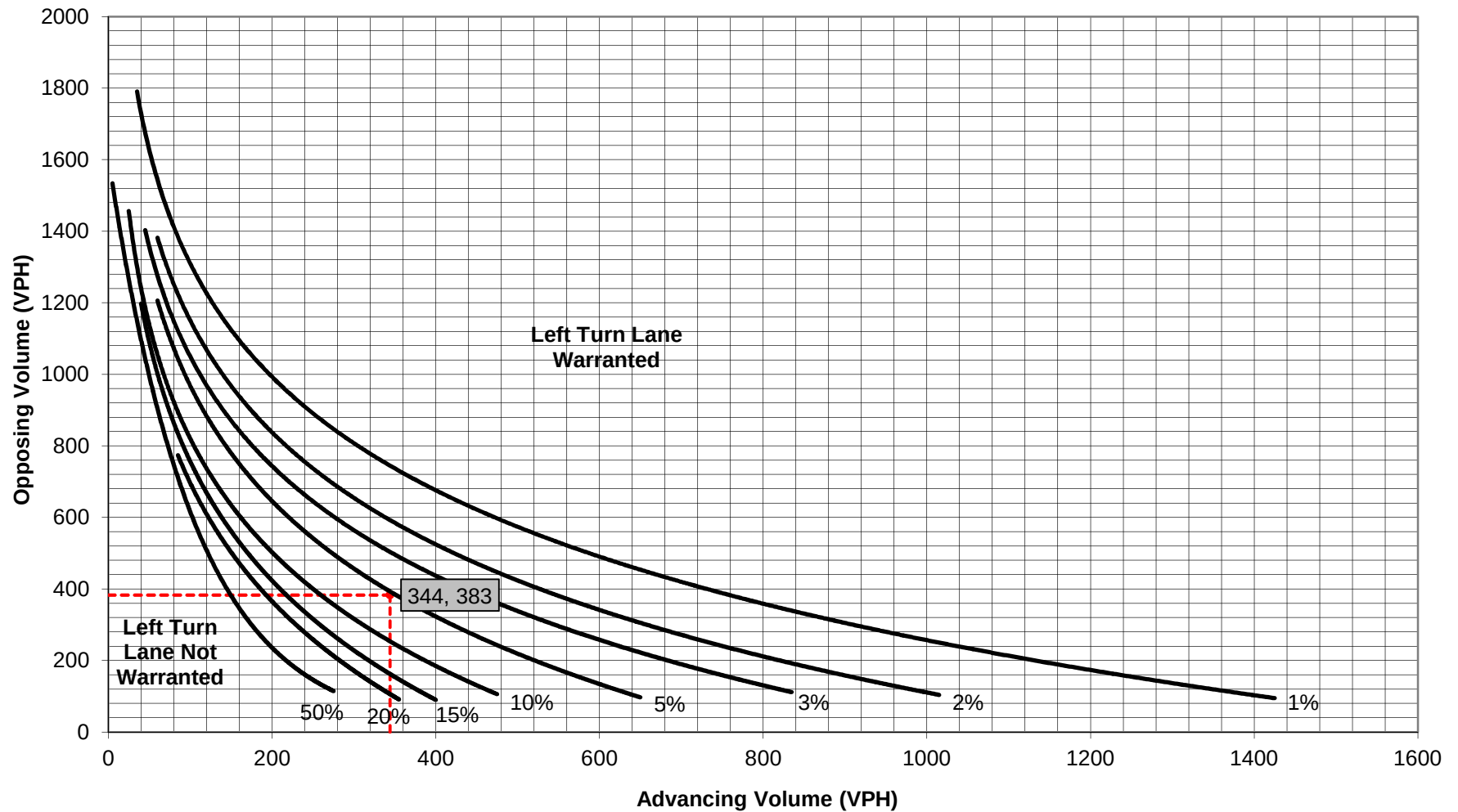
Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

Additional Findings:
N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

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Analysis Period: 2021 Design Hour: Midday Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	13	0.0%	N/A
	Through	-	284	10.8%	N/A
	Right	No	4	33.3%	N/A
Opposing	Left	No	14	33.3%	N/A
	Through	-	291	8.8%	N/A
	Right	Yes	48	6.4%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	--

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

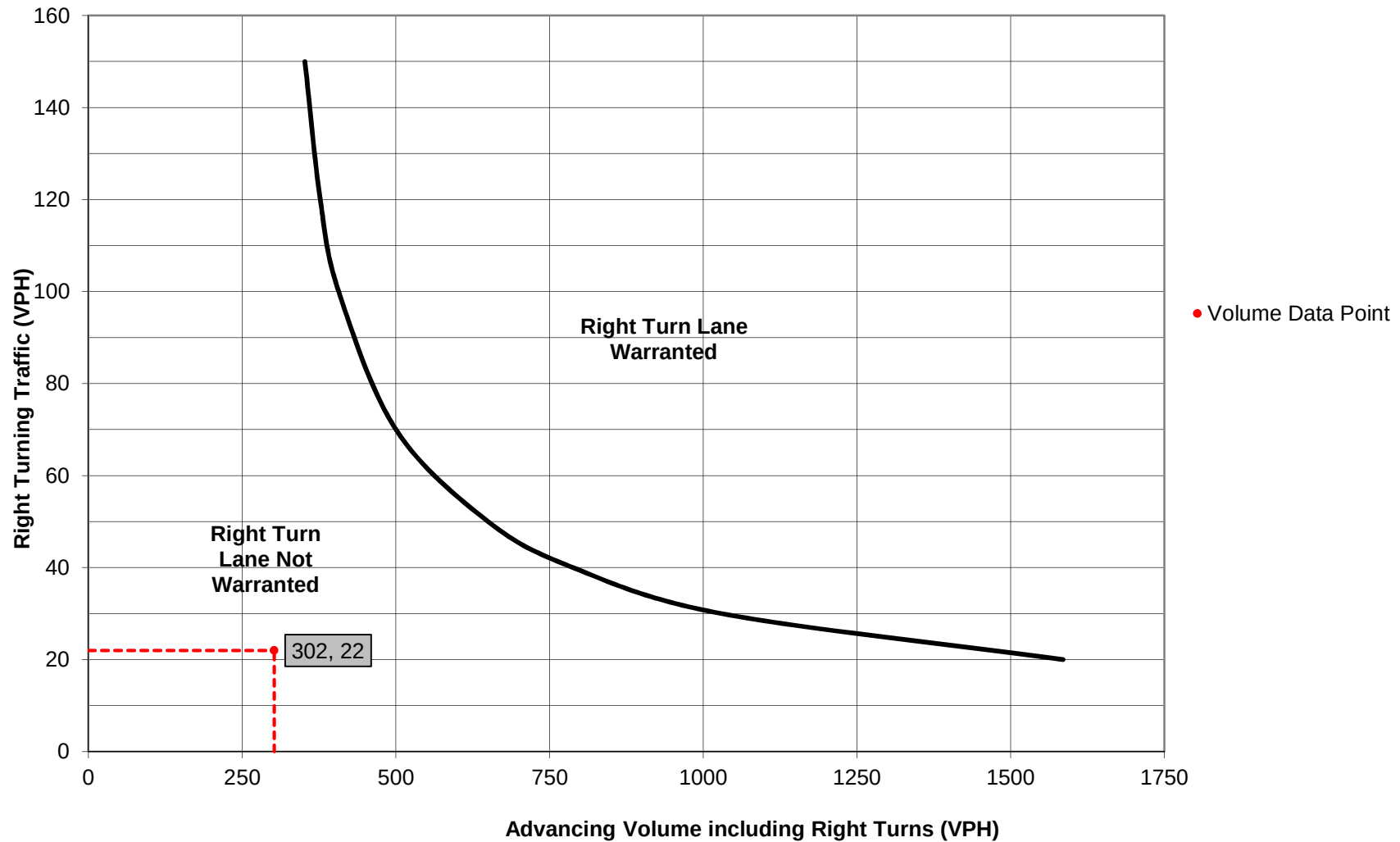
Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

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Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 13 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	--

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

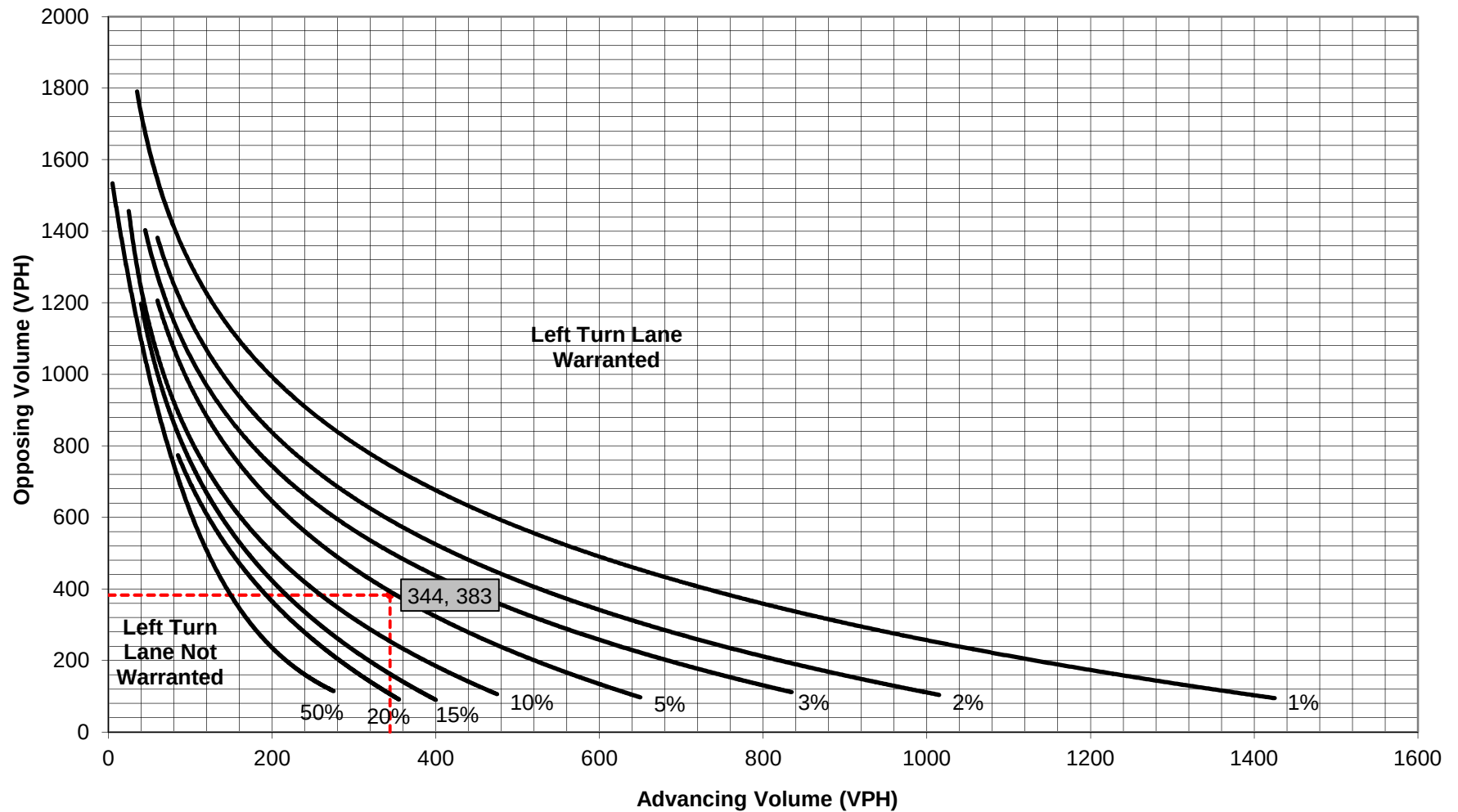
Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

Additional Findings:
N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



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	Right	Yes	48	6.4%	N/A
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Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	--

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

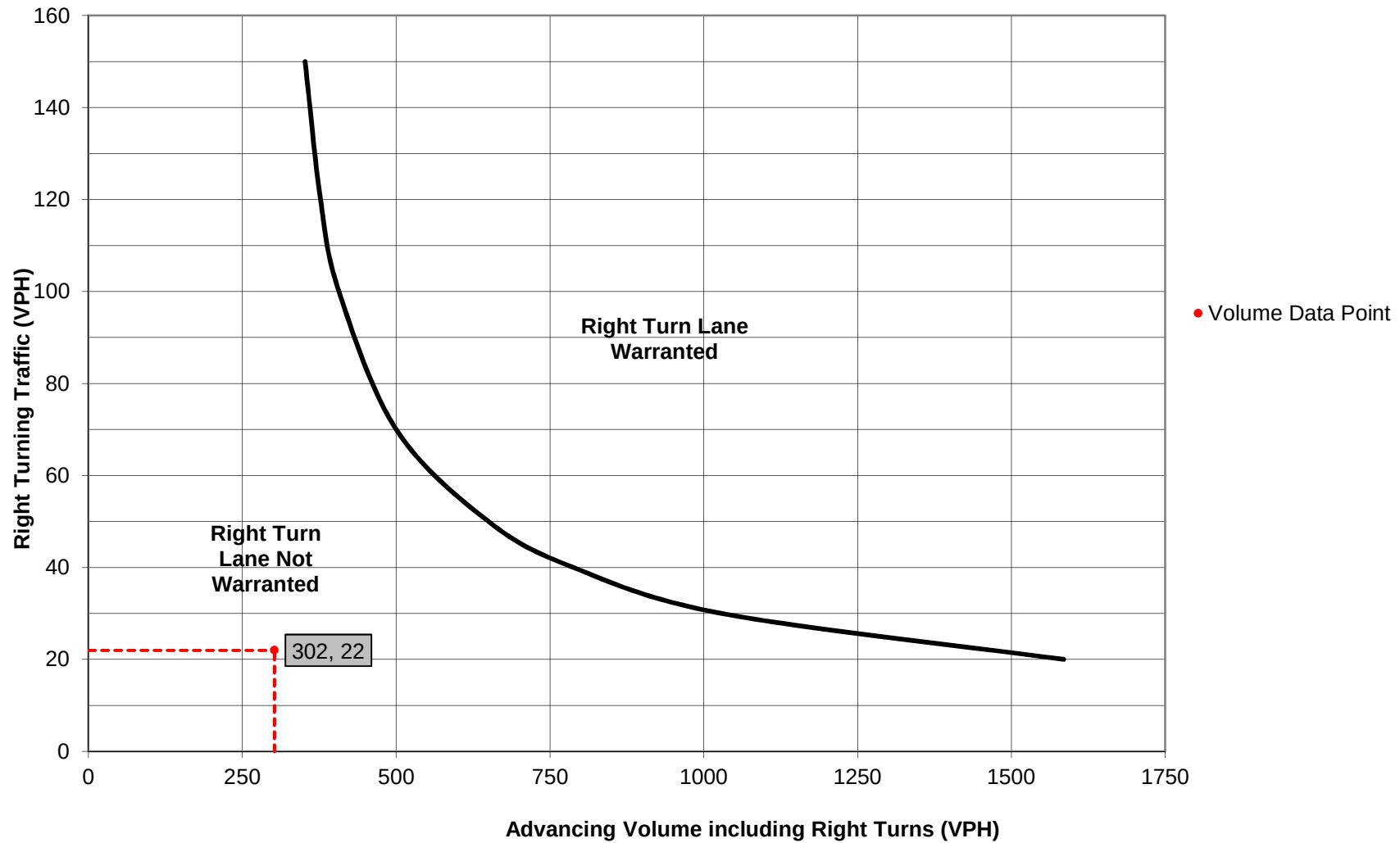
Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp	Analysis Date: 5/31/2016
County: Venango County	Conducted By: WB
PennDOT Engineering District: 1	Checked By: NS
	Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021	Number of Approach Lanes: 2
Design Hour: Midday Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	Type of Analysis
Posted Speed Limit (MPH): 50	
Type of Terrain: Rolling	
	Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	14	33.3%	21
	Through	-	291	8.8%	330
	Right	No	48	6.4%	N/A
Opposing	Left	No	13	0.0%	N/A
	Through	-	284	10.8%	331
	Right	Yes	4	33.3%	6

Advancing Volume: 351

Opposing Volume: 337

Left Turn Volume: 21

% Left Turns in Advancing Volume: 5.98%

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A

Advancing Volume: N/A

Right Turn Volume: N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7	Applicable Warrant Figure: N/A
Warrant Met?: No	Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized	
Design Hour Volume of Turning Lane: 21	
Cycles Per Hour (Assumed): Known	
Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A: N/A

Feet

Condition B: N/A

Feet

Condition C: N/A

Feet

Required Left Turn Lane Storage Length: N/A

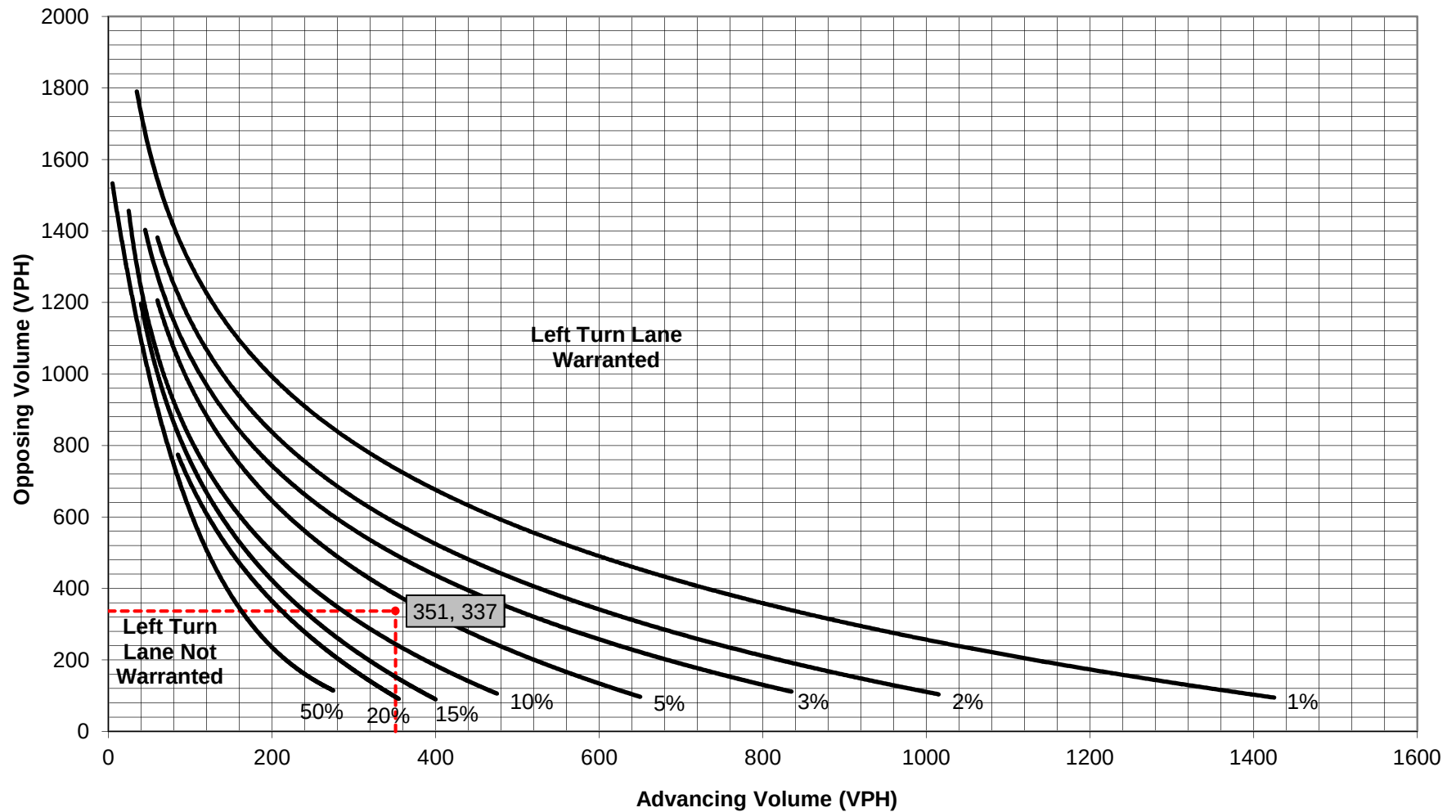
Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021 Design Hour: Midday Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	14	33.3%	N/A
	Through	-	291	8.8%	N/A
	Right	No	48	6.4%	N/A
Opposing	Left	No	13	0.0%	N/A
	Through	-	284	10.8%	N/A
	Right	Yes	4	33.3%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

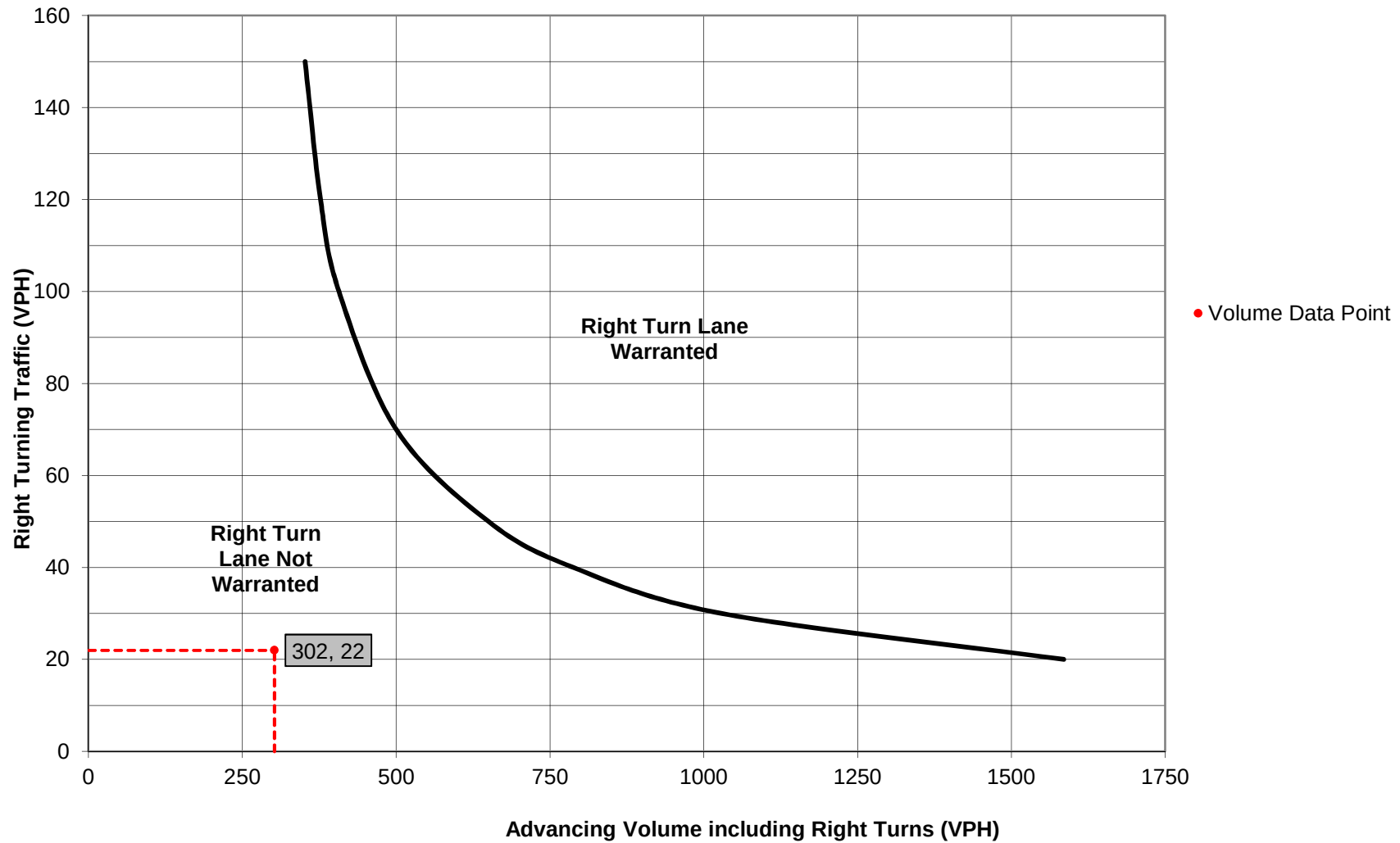
Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -No Development	
Analysis Period: 2021 Design Hour: Midday Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	12	33.3%	18
	Through	-	291	8.8%	330
	Right	No	48	6.4%	N/A
Opposing	Left	No	13	0.0%	N/A
	Through	-	284	10.8%	331
	Right	Yes	3	33.3%	5
Advancing Volume: 348 Opposing Volume: 336 Left Turn Volume: 18 % Left Turns in Advancing Volume: 5.17%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

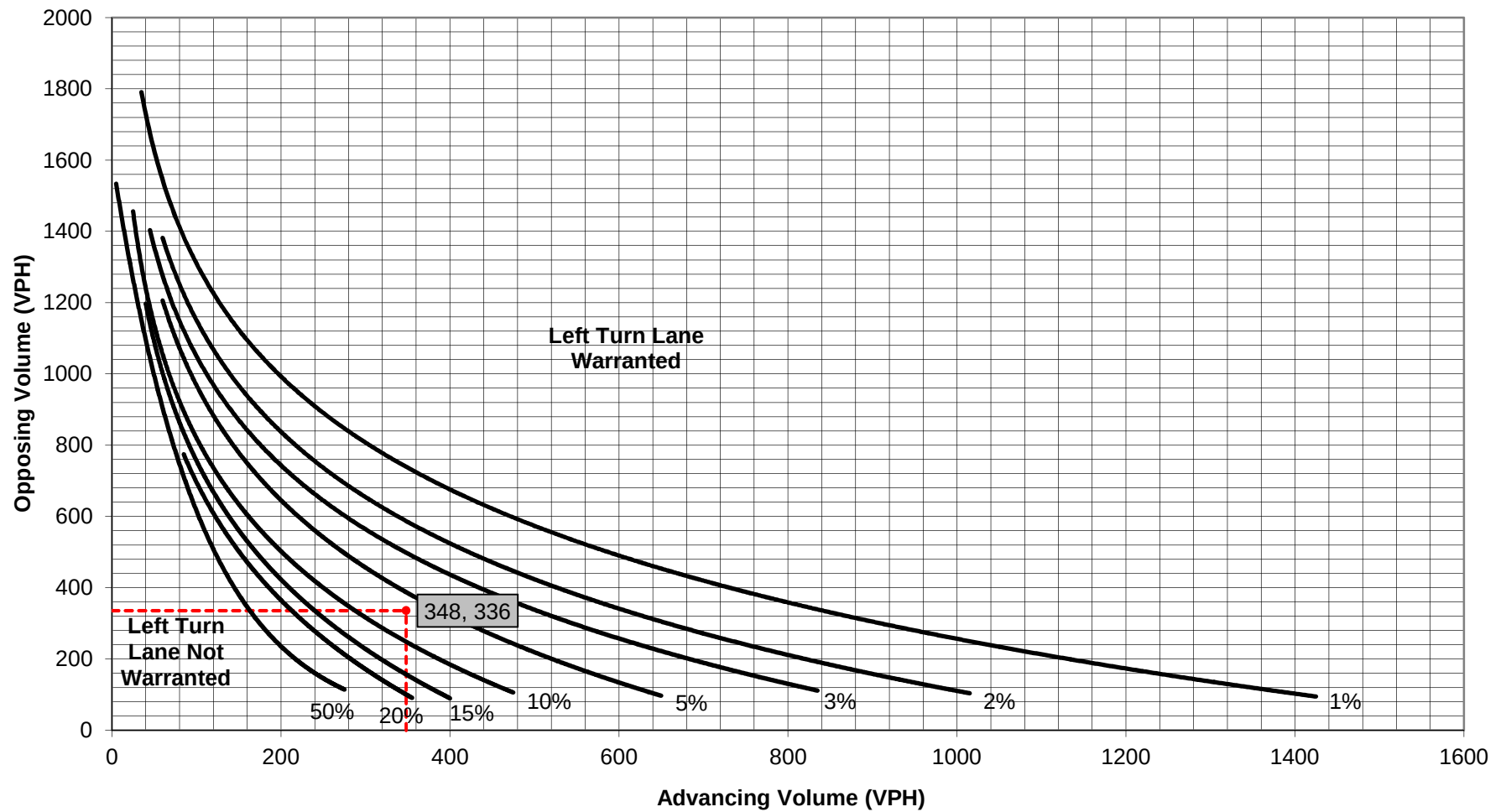
TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 18 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <td>High</td> <td>Low</td> <td>High</td> <td>Low</td> <td>High</td> <td>Low</td> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -No Development	
Analysis Period: 2021 Design Hour: Midday Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	12	33.3%	N/A
	Through	-	291	8.8%	N/A
	Right	No	48	6.4%	N/A
Opposing	Left	No	13	0.0%	N/A
	Through	-	284	10.8%	N/A
	Right	Yes	3	33.3%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

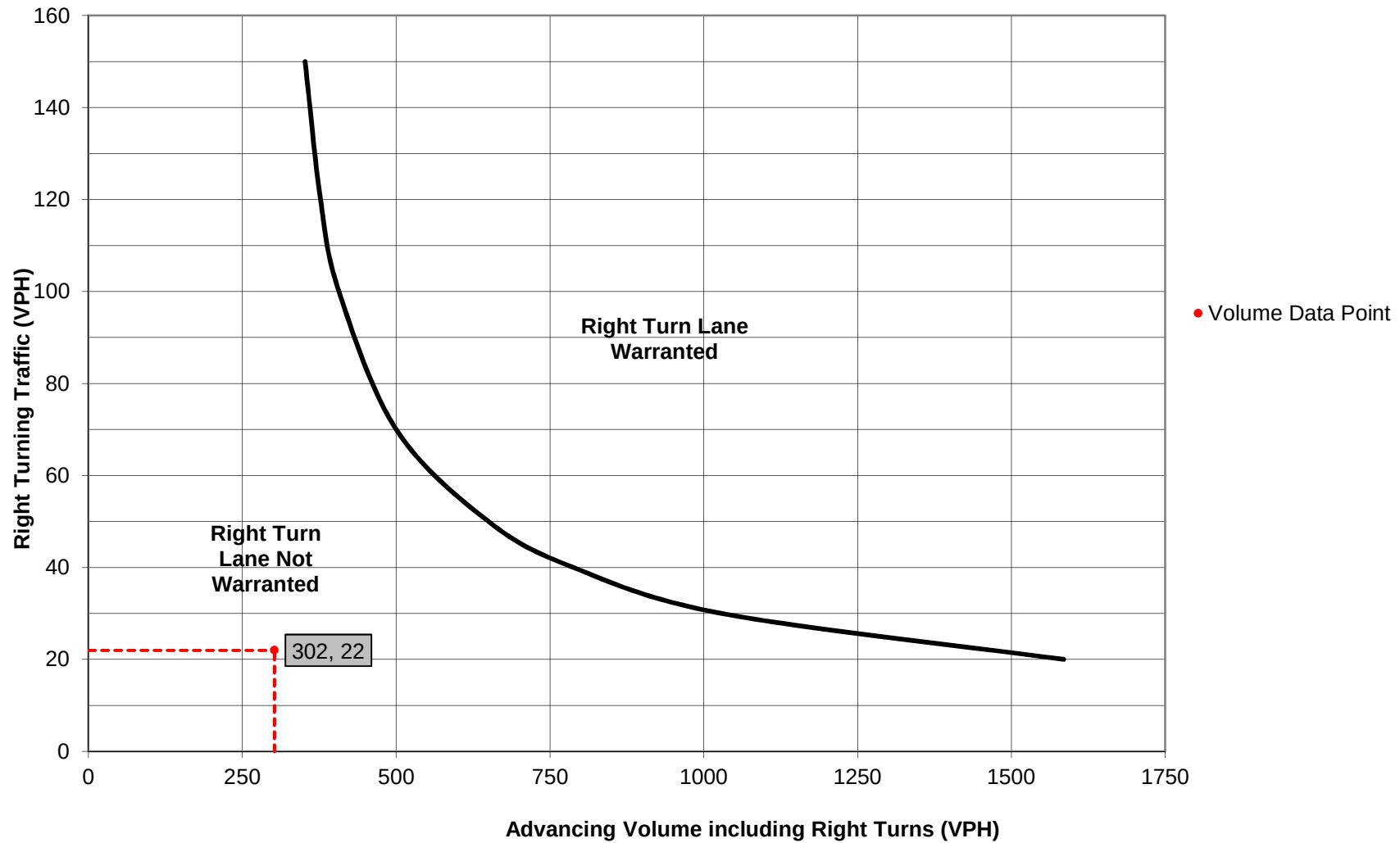
Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp
County: Venango County
PennDOT Engineering District: 1

Analysis Date: 5/31/2016
Conducted By: WB
Checked By: NS
Agency/Company Name: WRA

Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off
Northbound - Development

Analysis Period: 2021
Design Hour: PM Peak Hour
Intersection Control: Unsignalized
Posted Speed Limit (MPH): 50
Type of Terrain: Rolling

Number of Approach Lanes: 2
Undivided or Divided Highway: Undivided

Type of Analysis: Left Turn Lane
Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	19	0.0%	19
	Through	-	334	7.6%	373
	Right	No	3	100.0%	N/A
Opposing	Left	No	15	50.0%	N/A
	Through	-	334	8.9%	379
	Right	Yes	53	1.9%	55

Advancing Volume: 392
Opposing Volume: 434
Left Turn Volume: 19

% Left Turns in Advancing Volume: 4.85%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	-	3	100.0%	N/A

Advancing Volume: N/A
Right Turn Volume: N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 7
Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A
Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized
Design Hour Volume of Turning Lane: 19
Cycles Per Hour (Assumed): Known
Cycles Per Hour (If Known): 40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

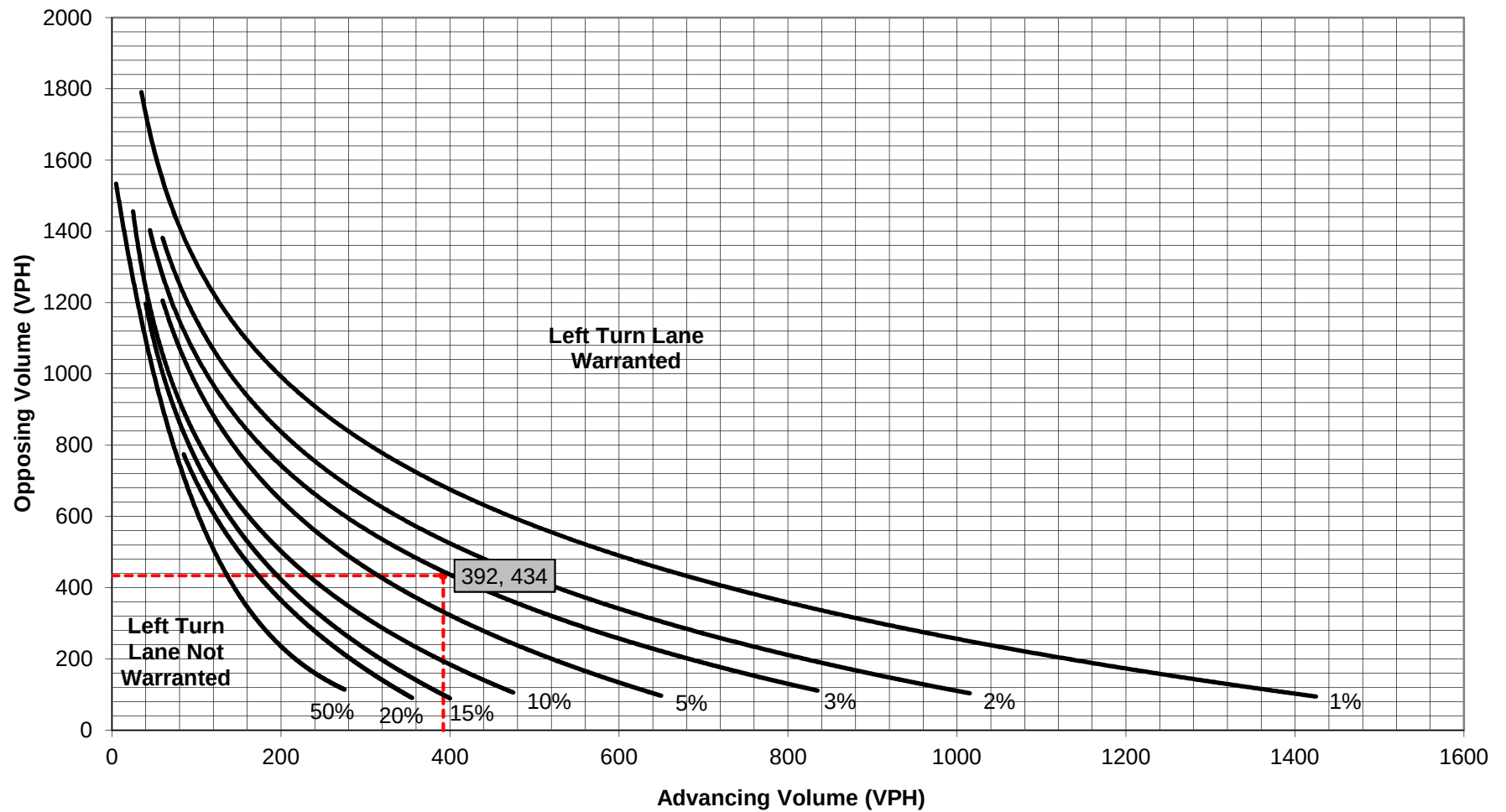
Left Turn Lane Storage Length, Condition A: N/A Feet
Condition B: N/A Feet
Condition C: N/A Feet
Required Left Turn Lane Storage Length: N/A Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound - Development	
Analysis Period: 2021 Design Hour: PM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	No	3	100.0%	N/A
Opposing	Left	No	15	50.0%	N/A
	Through	-	334	8.9%	N/A
	Right	Yes	53	1.9%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	373
	Right	-	3	100.0%	8
Advancing Volume: 381 Right Turn Volume: 8					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 8 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
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PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

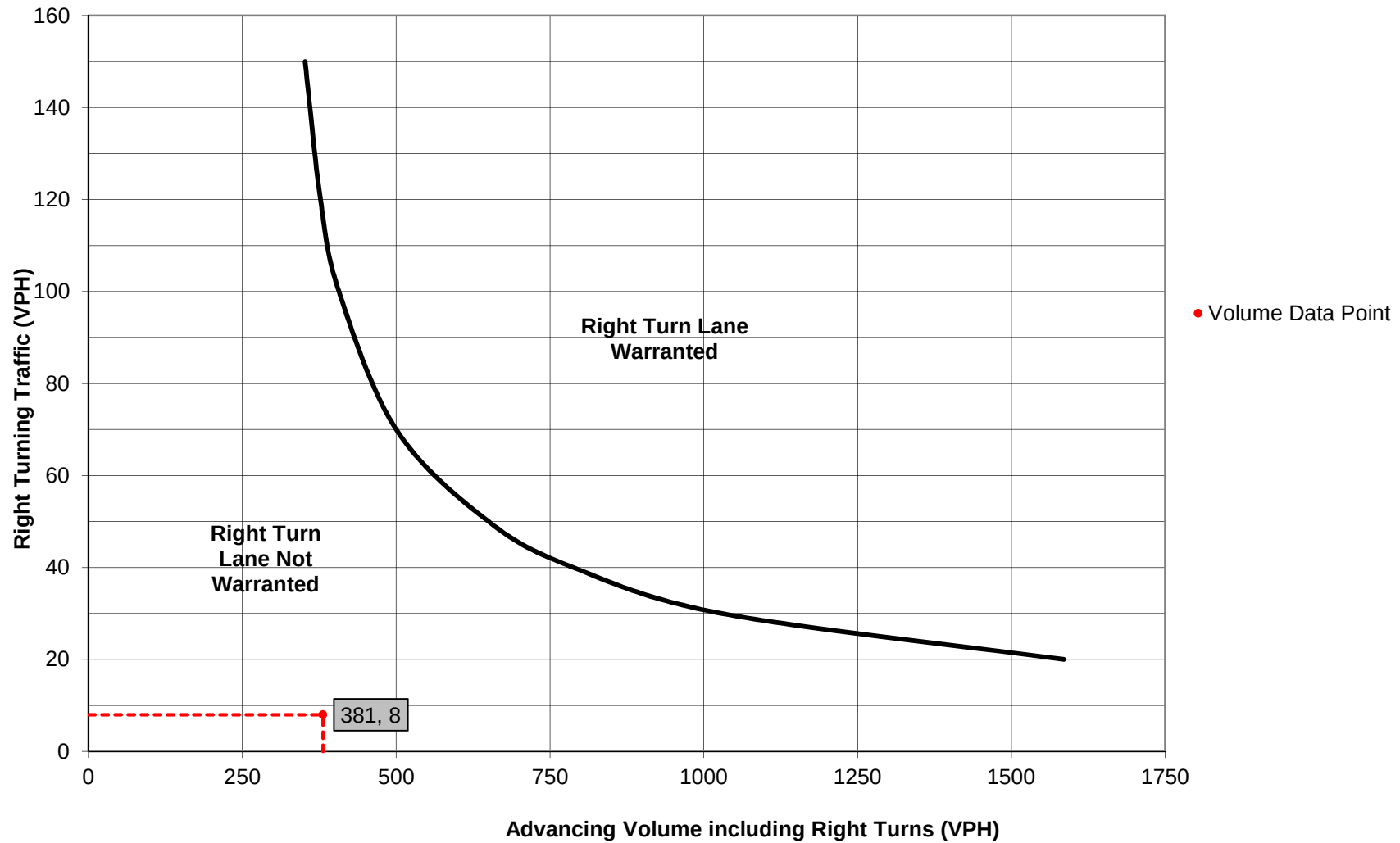
Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound - No Development	
Analysis Period: 2021 Design Hour: PM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	19	0.0%	19
	Through	-	334	7.6%	373
	Right	No	2	100.0%	N/A
Opposing	Left	No	10	50.0%	N/A
	Through	-	334	8.9%	379
	Right	Yes	53	1.9%	55
Advancing Volume: 392 Opposing Volume: 434 Left Turn Volume: 19					
% Left Turns in Advancing Volume: 4.85%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	-	2	100.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 19 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	--

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

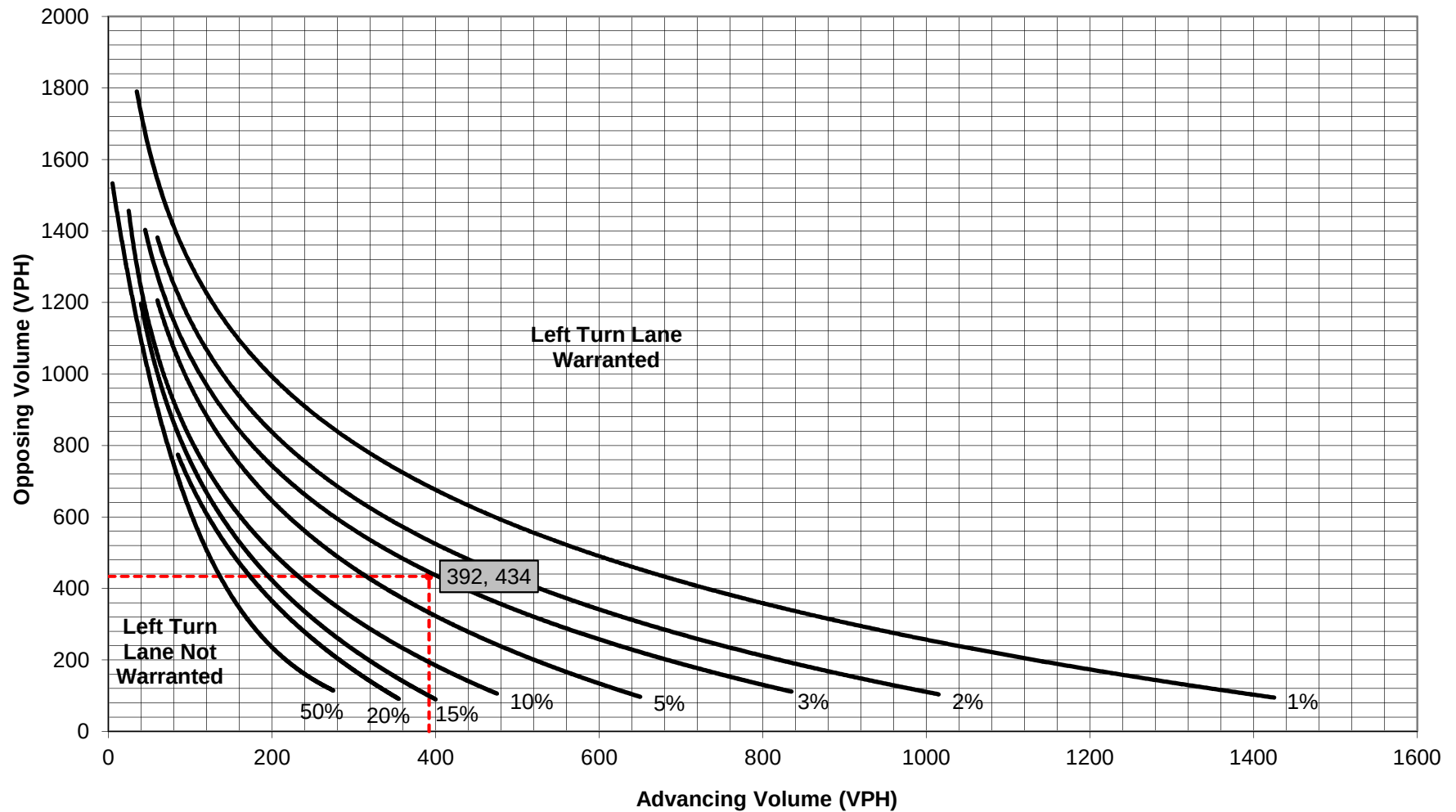
Additional Findings:

N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp	Analysis Date: 5/31/2016
County: Venango County	Conducted By: WB
PennDOT Engineering District: 1	Checked By: NS
	Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Northbound - No Development	
Analysis Period: 2021	Number of Approach Lanes: 2
Design Hour: PM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	Type of Analysis
Posted Speed Limit (MPH): 50	
Type of Terrain: Rolling	
	Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	No	2	100.0%	N/A
Opposing	Left	No	10	50.0%	N/A
	Through	-	334	8.9%	N/A
	Right	Yes	53	1.9%	N/A

Advancing Volume: N/A

Opposing Volume: N/A

Left Turn Volume: N/A

% Left Turns in Advancing Volume: N/A

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	373
	Right	-	2	100.0%	5

Advancing Volume: 378

Right Turn Volume: 5

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A	Applicable Warrant Figure: Figure 12
Warrant Met?: N/A	Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized	
Design Hour Volume of Turning Lane: 5	
Cycles Per Hour (Assumed): Known	
Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A: N/A Feet

Condition B: N/A Feet

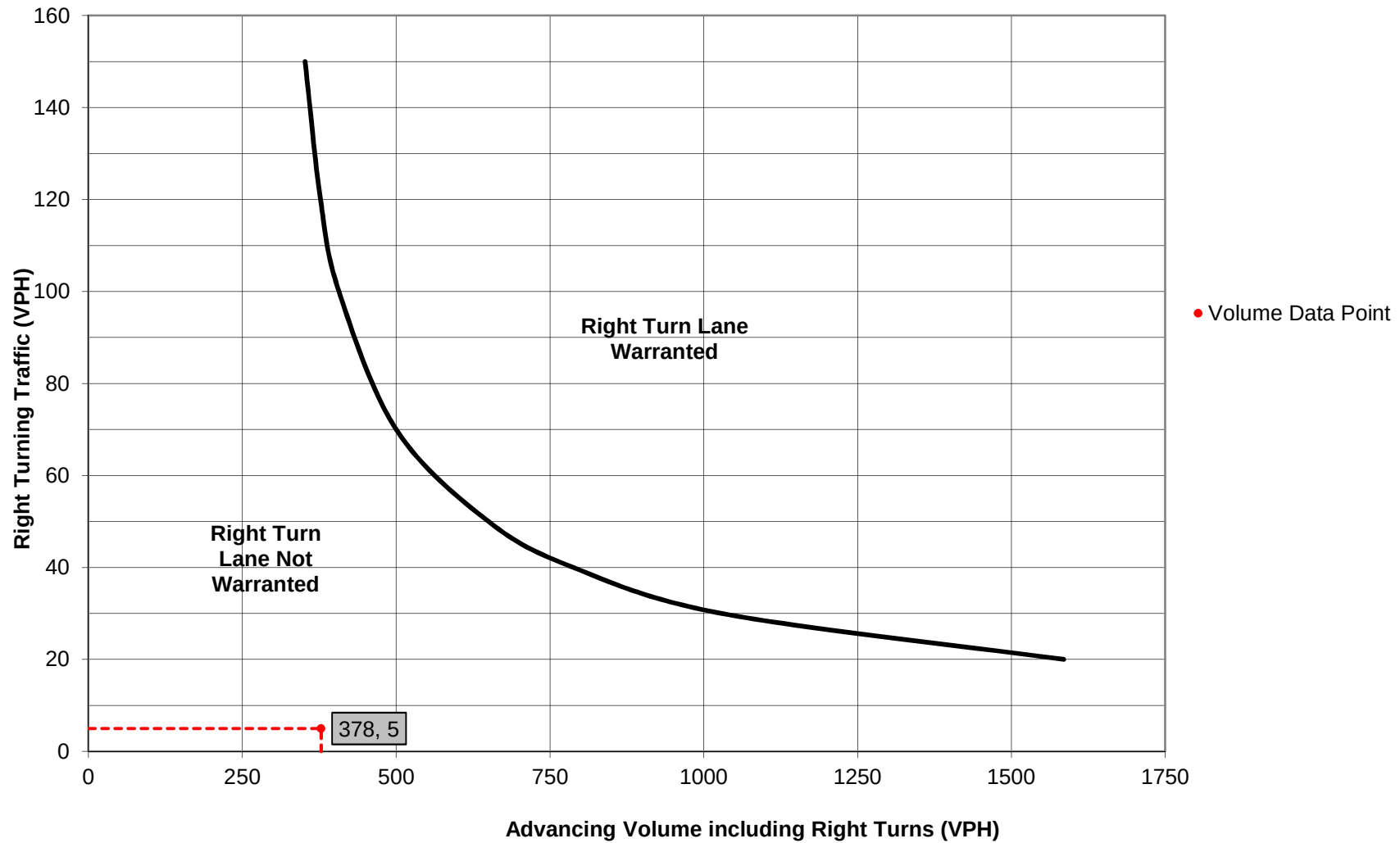
Condition C: N/A Feet

Required Right Turn Lane Storage Length: N/A Feet

Additional Findings: N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp	Analysis Date: 5/31/2016
County: Venango County	Conducted By: WB
PennDOT Engineering District: 1	Checked By: NS
	Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021	Number of Approach Lanes: 2
Design Hour: PM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	Type of Analysis
Posted Speed Limit (MPH): 50	
Type of Terrain: Rolling	
	Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	15	50.0%	27
	Through	-	334	8.9%	379
	Right	No	53	1.9%	N/A
Opposing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	373
	Right	Yes	3	100.0%	8

Advancing Volume: 406

Opposing Volume: 381

Left Turn Volume: 27

% Left Turns in Advancing Volume: 6.65%

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A

Advancing Volume: N/A

Right Turn Volume: N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7	Applicable Warrant Figure: N/A
Warrant Met?: Yes	Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized	
Design Hour Volume of Turning Lane: 27	
Cycles Per Hour (Assumed): Known	
Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: 1.0

Type of Traffic Control	PennDOT Publication 46, Exhibit 11-6					
	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	175	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	175	Feet

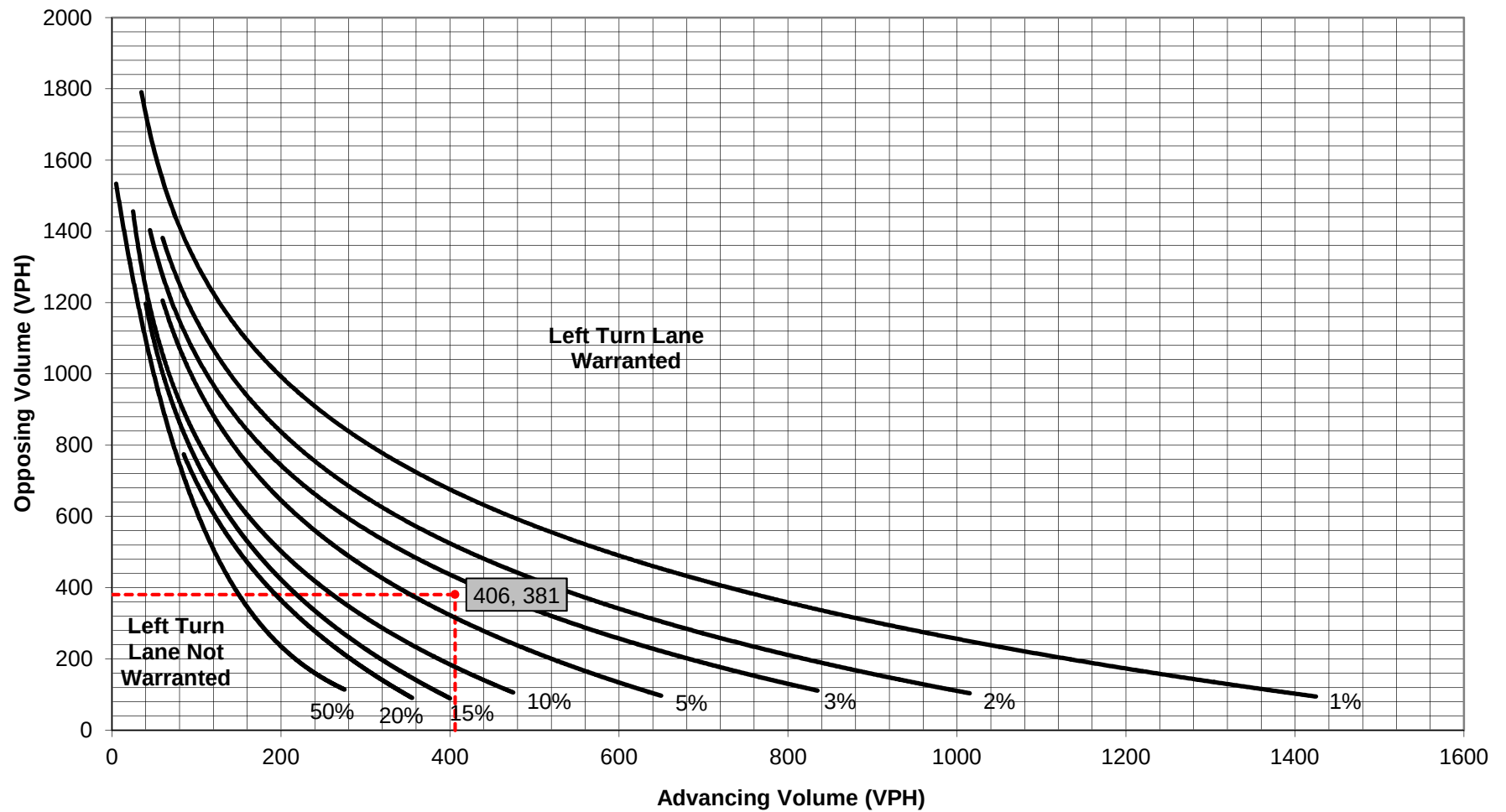
Additional Findings:

N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -Development	
Analysis Period: 2021 Design Hour: PM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Right Turn Lane Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	15	50.0%	N/A
	Through	-	334	8.9%	N/A
	Right	No	53	1.9%	N/A
Opposing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	Yes	3	100.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22
Advancing Volume: 302 Right Turn Volume: 22					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 12 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 22 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	----------------------------------

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

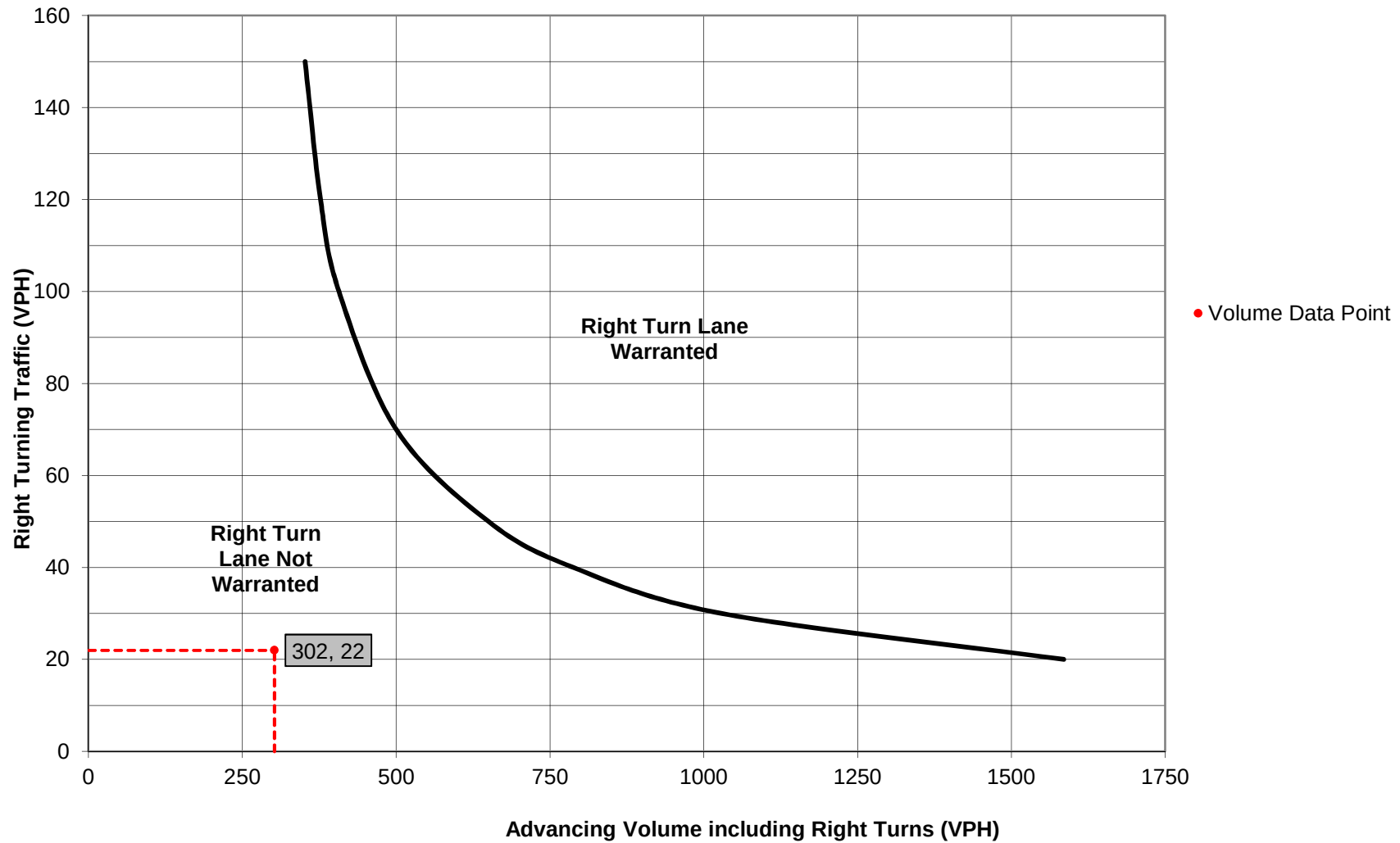
Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp County: Venango County PennDOT Engineering District: 1	Analysis Date: 5/31/2016 Conducted By: WB Checked By: NS Agency/Company Name: WRA
Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off Southbound -No Development	
Analysis Period: 2021 Design Hour: PM Peak Hour Intersection Control: Unsignalized Posted Speed Limit (MPH): 50 Type of Terrain: Rolling	Number of Approach Lanes: 2 Undivided or Divided Highway: Undivided Type of Analysis: Type of Analysis Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	50.0%	18
	Through	-	334	8.9%	379
	Right	No	53	1.9%	N/A
Opposing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	373
	Right	Yes	2	100.0%	5
Advancing Volume: 397 Opposing Volume: 378 Left Turn Volume: 18 % Left Turns in Advancing Volume: 4.53%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	N/A
	Right	-	22	0.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 7 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 18 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 40	Average # of Vehicles/Cycle: N/A
--	--

PennDOT Publication 46, Exhibit 11-6						
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

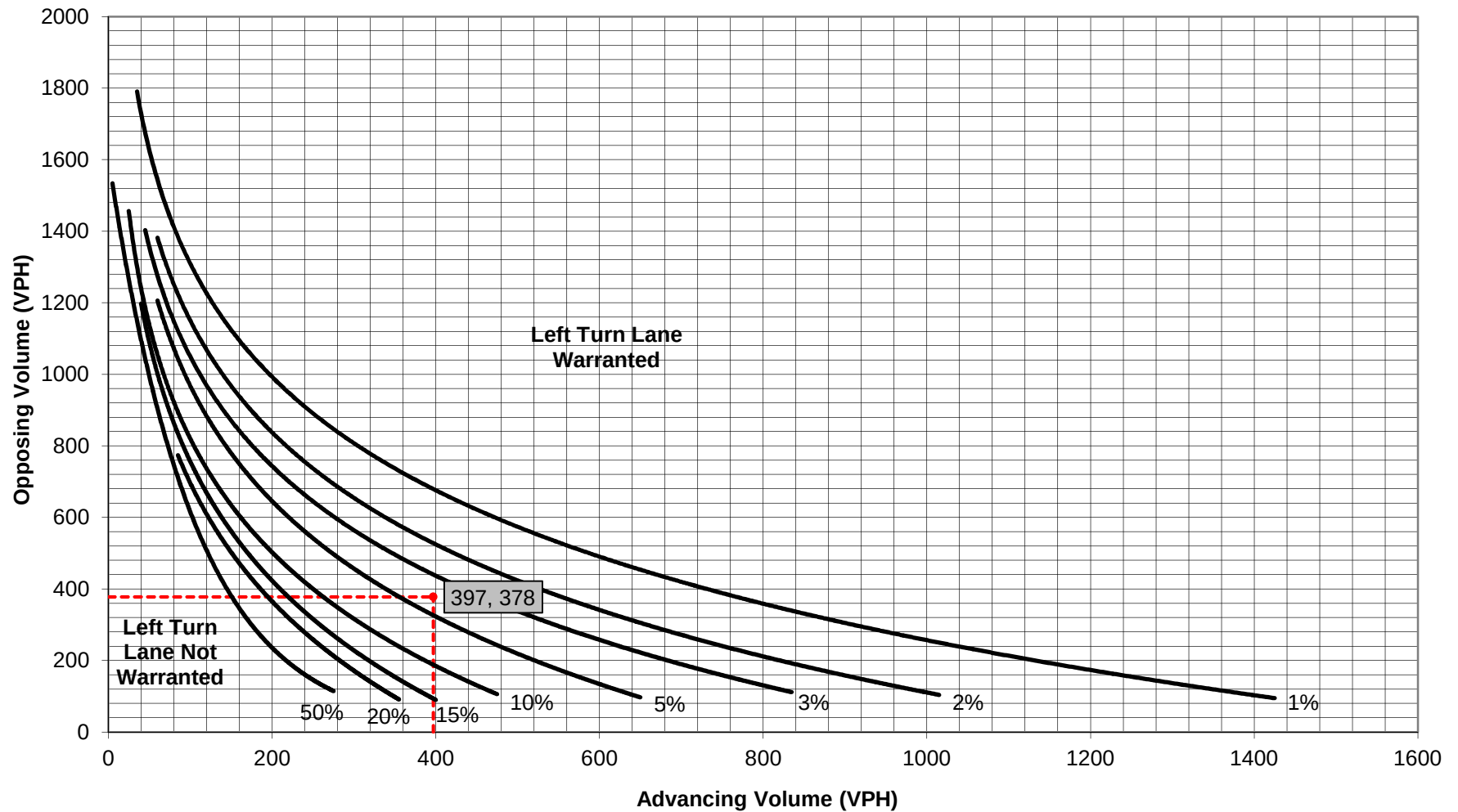
Additional Findings:

N/A

Additional Comments / Justifications:

Figure 7. Warrant for left turn lanes on four-lane, undivided highways
(unsignalized and signalized intersections)
(L = % Left Turns in Advancing Volume)

• Volume Data Point



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Sandycreek Twp
County: Venango County
PennDOT Engineering District: 1

Analysis Date: 5/31/2016
Conducted By: WB
Checked By: NS
Agency/Company Name: WRA

Intersection & Approach Description: SR 8 @ DeBence Dr / Polk Cut-Off
Southbound -No Development

Analysis Period: 2021
Design Hour: PM Peak Hour
Intersection Control: Unsignalized
Posted Speed Limit (MPH): 50
Type of Terrain: Rolling

Number of Approach Lanes: 2
Undivided or Divided Highway: Undivided

Left or Right-Turn Lane Analysis?: Type of Analysis
Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	50.0%	N/A
	Through	-	334	8.9%	N/A
	Right	No	53	1.9%	N/A
Opposing	Left	No	19	0.0%	N/A
	Through	-	334	7.6%	N/A
	Right	Yes	2	100.0%	N/A

Advancing Volume: N/A
Opposing Volume: N/A
Left Turn Volume: N/A

% Left Turns in Advancing Volume: N/A

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	45	9.1%	N/A
	Through	-	240	11.1%	280
	Right	-	22	0.0%	22

Advancing Volume: 302
Right Turn Volume: 22

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A
Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 12**
Warrant Met?: **No**

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized
Design Hour Volume of Turning Lane: 22
Cycles Per Hour (Assumed): Known
Cycles Per Hour (If Known): 40

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

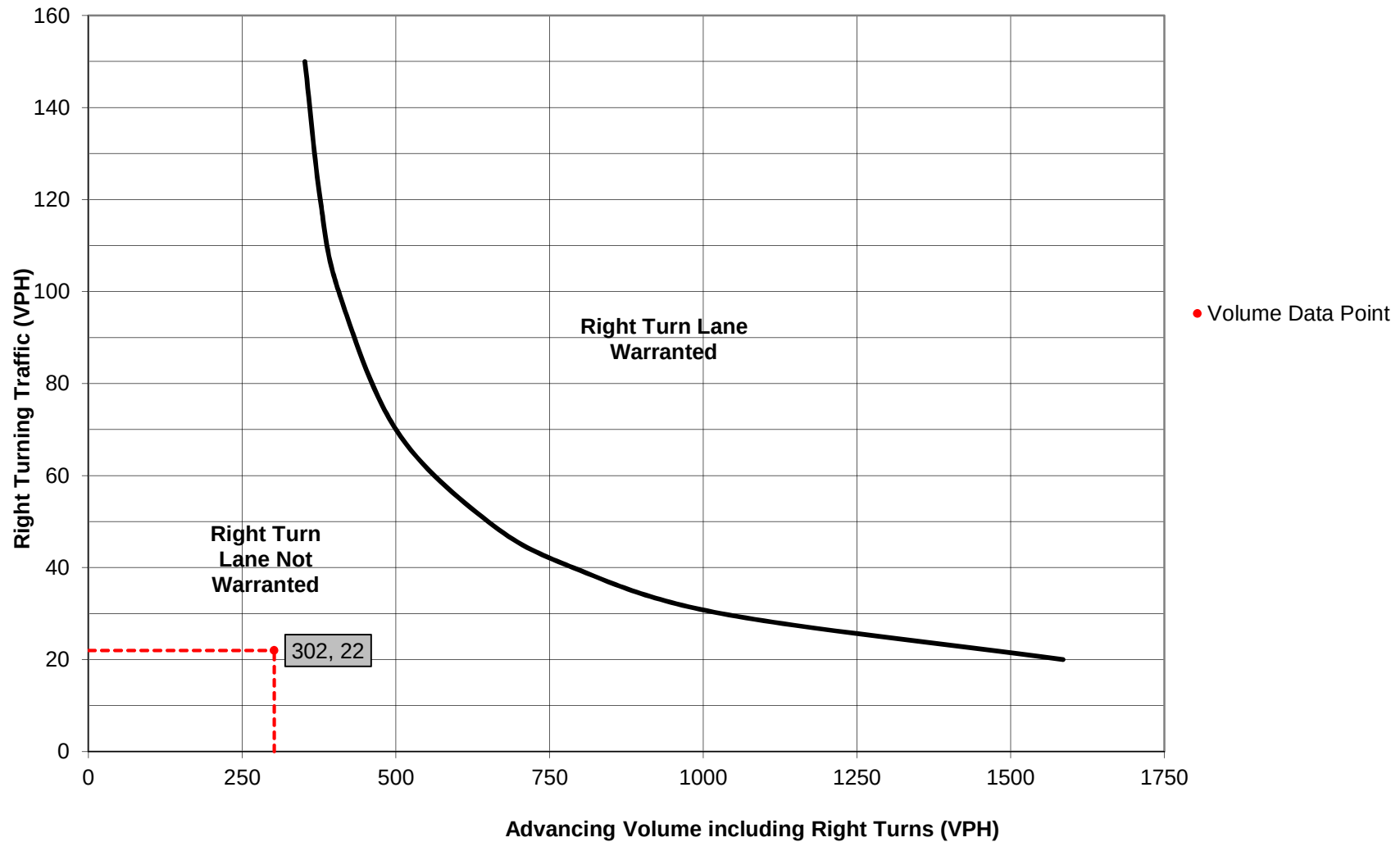
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A: N/A Feet
Condition B: N/A Feet
Condition C: N/A Feet
Required Right Turn Lane Storage Length: N/A Feet

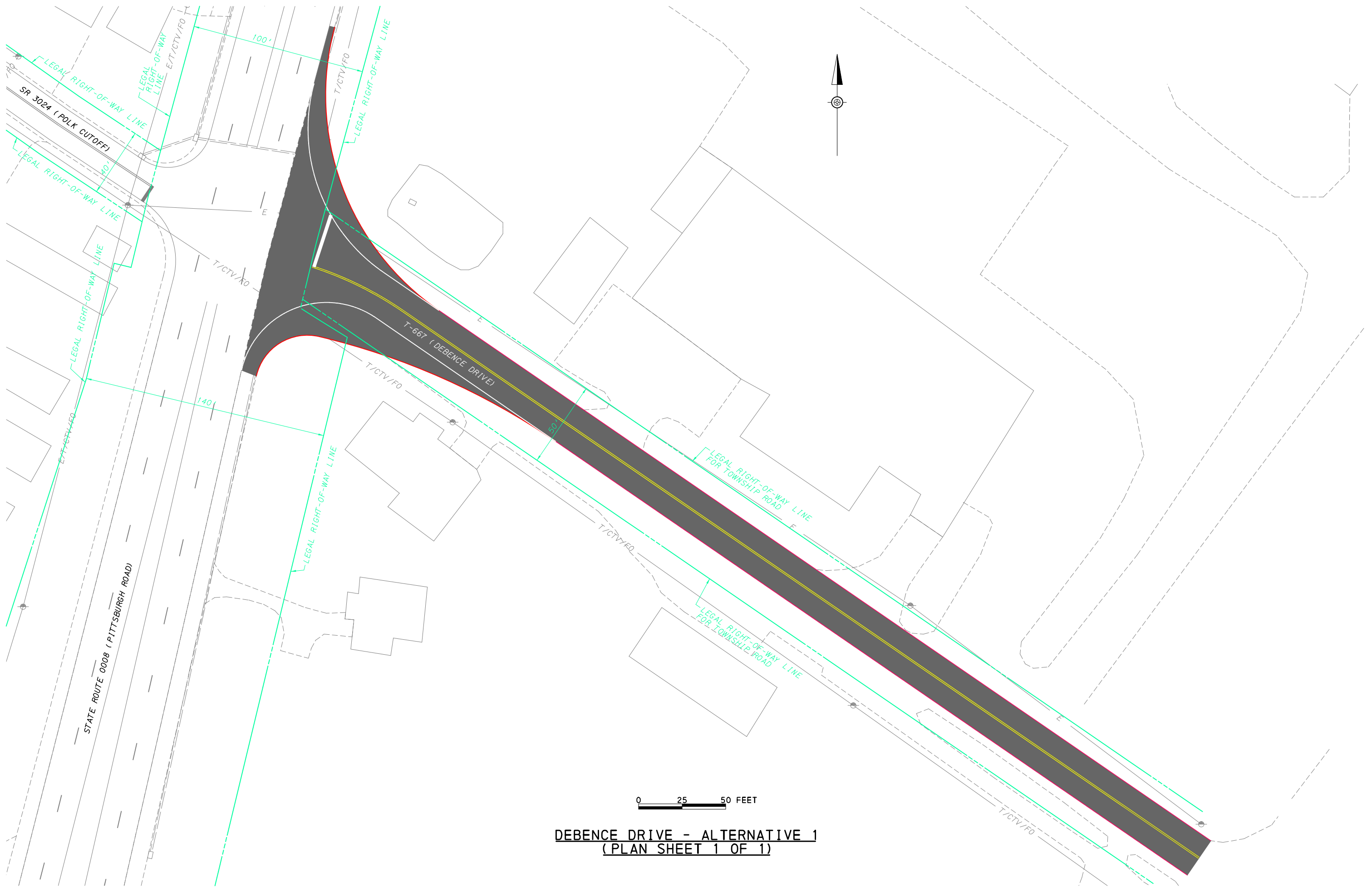
Additional Findings:
N/A

Additional Comments / Justifications:

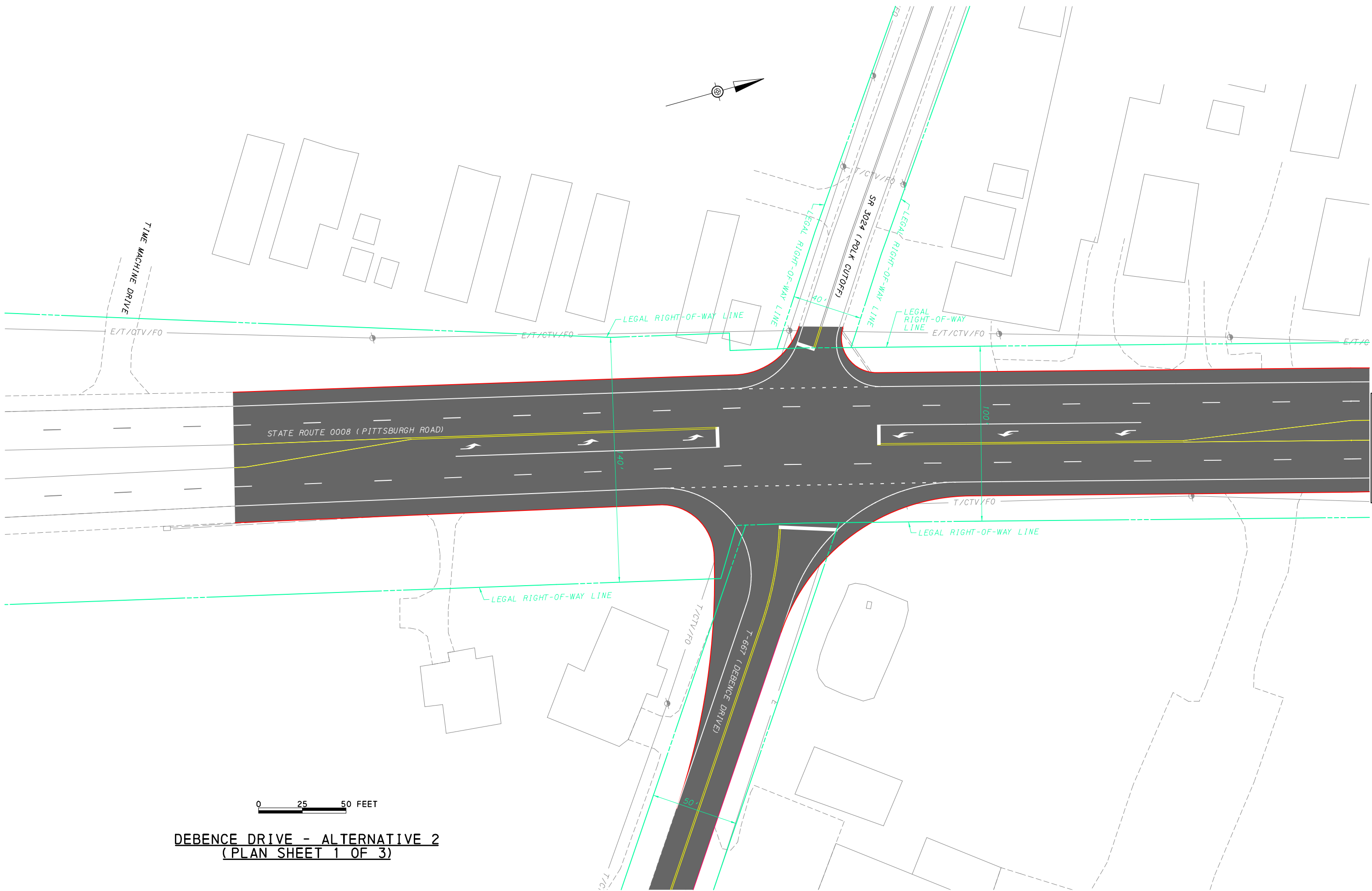
**Figure 12. Warrant for right turn lanes on four-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



Appendix G: Concept Drawings



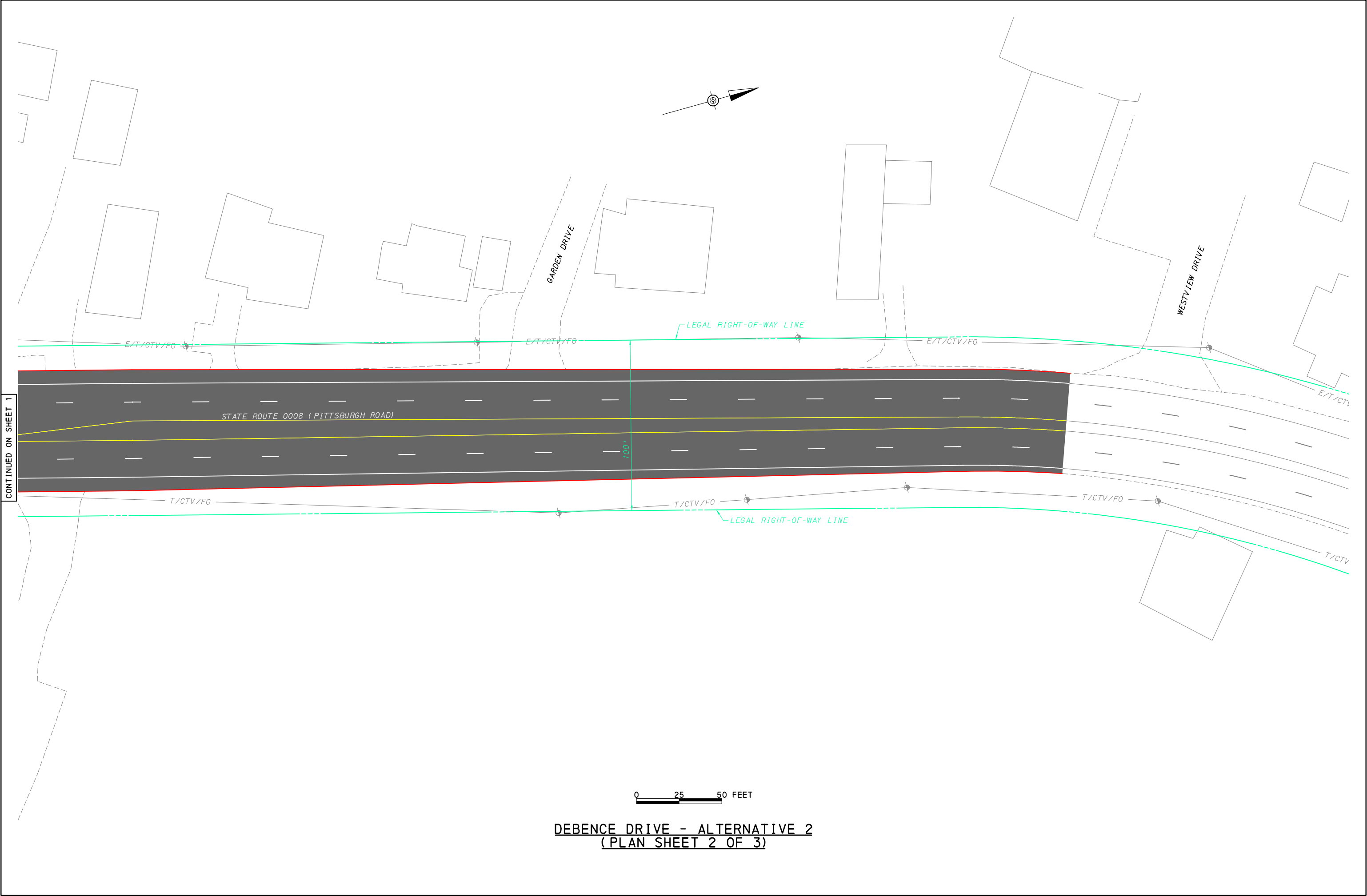
DEBENCE DRIVE - ALTERNATIVE 1
(PLAN SHEET 1 OF 1)



DEBENCE DRIVE - ALTERNATIVE 2
(PLAN SHEET 1 OF 3)

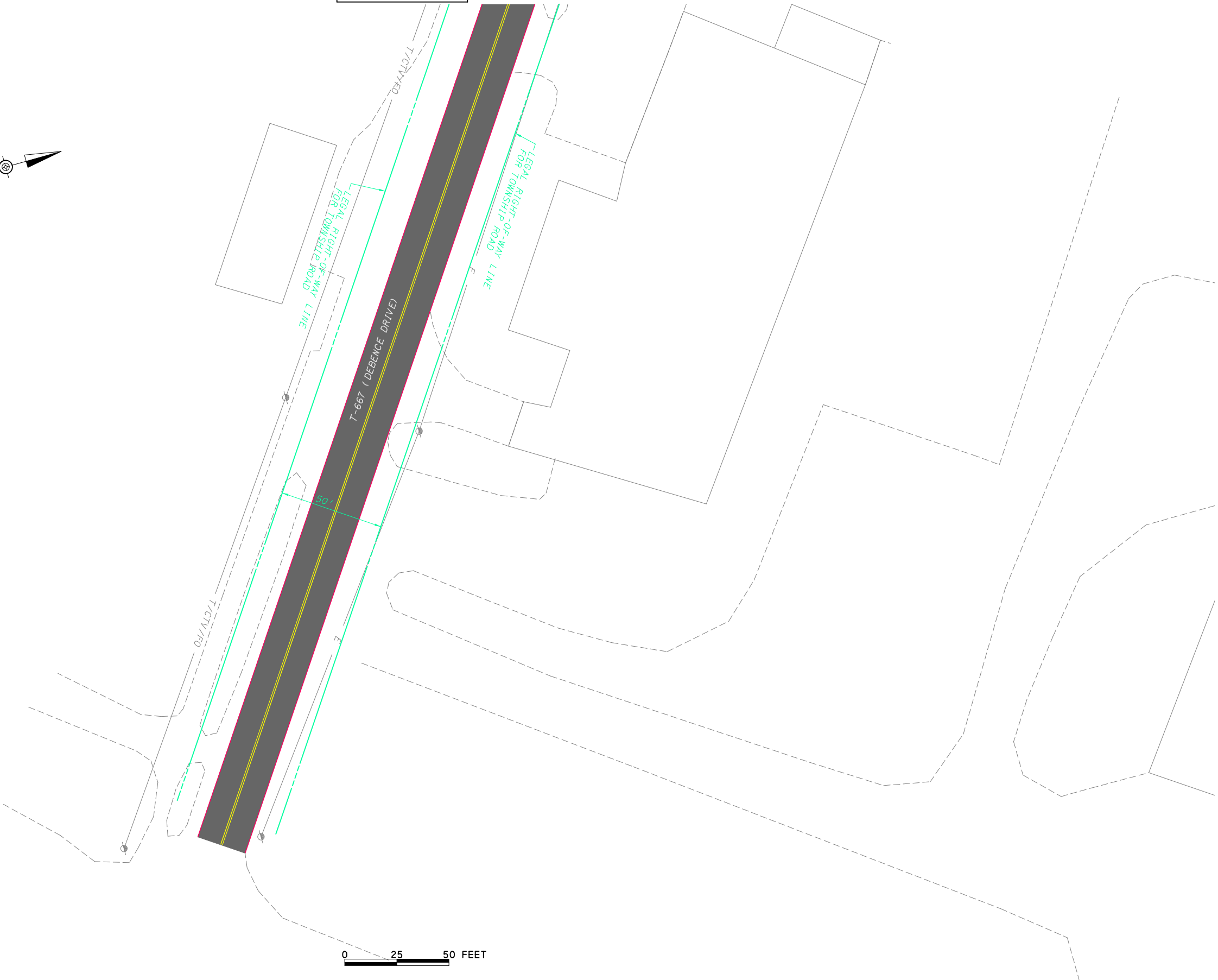
CONTINUED ON SHEET 3

CONTINUED ON SHEET 2



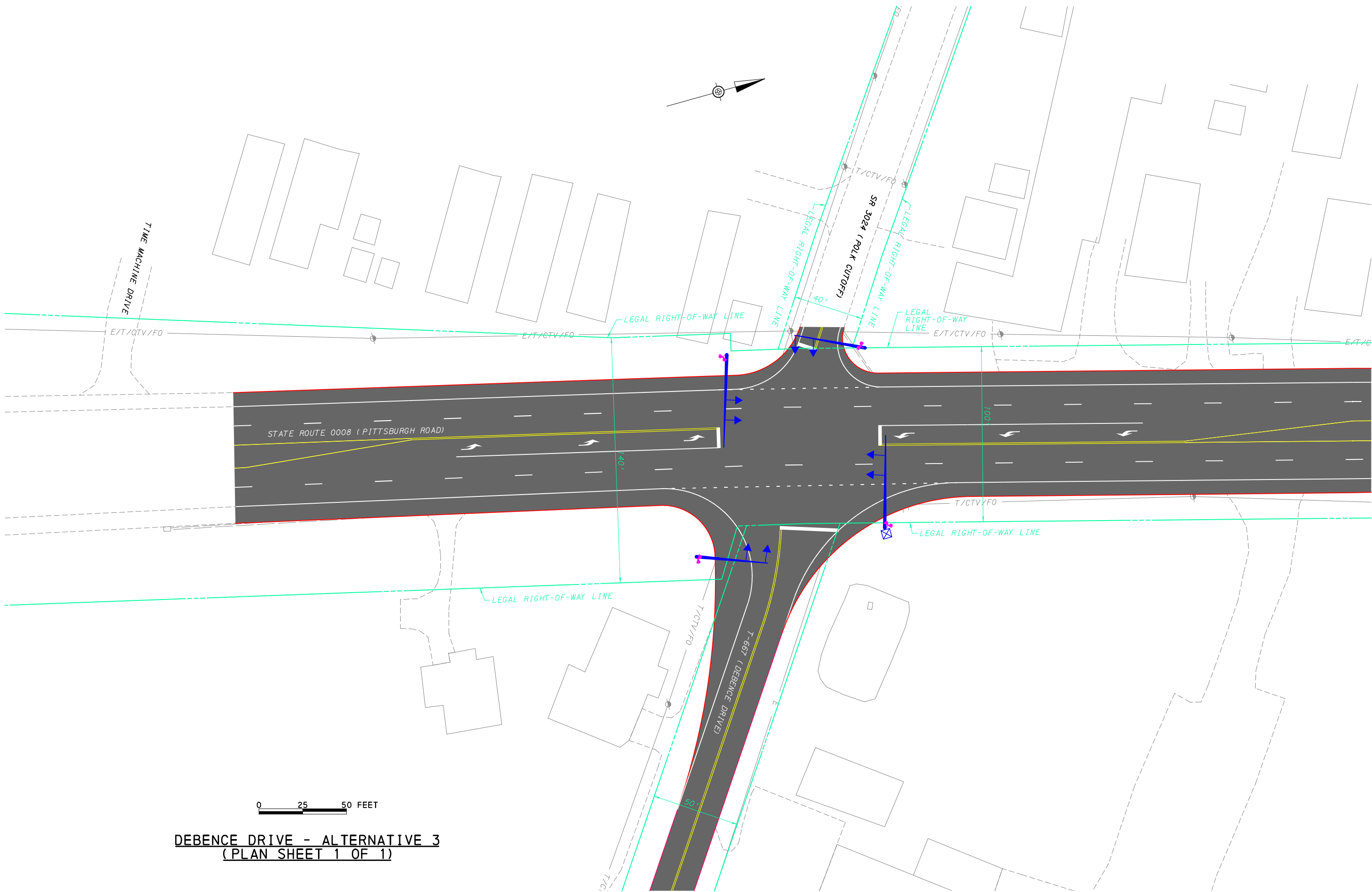
DEBENCE DRIVE - ALTERNATIVE 2
(PLAN SHEET 2 OF 3)

CONTINUED ON SHEET 1



0 25 50 FEET

DEBENCE DRIVE - ALTERNATIVE 2
(PLAN SHEET 3 OF 3)



Appendix H: Future Year Results

Synchro HCS 2010 Reports

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Future Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	2	12	12	2	52	8	319	4	26	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	524	686	154	531	697	161	308	0	0	322	0	0
Stage 1	347	347	-	337	337	-	-	-	-	-	-	-
Stage 2	177	339	-	194	360	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	471	418	882	344	397	773	1167	-	-	1186	-	-
Stage 1	674	676	-	534	669	-	-	-	-	-	-	-
Stage 2	826	681	-	660	656	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	426	403	882	329	383	773	1167	-	-	1186	-	-
Mov Cap-2 Maneuver	426	403	-	329	383	-	-	-	-	-	-	-
Stage 1	669	658	-	530	664	-	-	-	-	-	-	-
Stage 2	762	676	-	631	638	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.5			11.7			0.2			0.7		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	460	605	1186	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.174	0.109	0.022	-	-				
HCM Control Delay (s)	8.1	0	-	14.5	11.7	8.1	0.1	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Future Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	3	14	6	4	38	14	316	3	13	323	53
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	566	725	188	536	749	159	377	0	0	319	0	0
Stage 1	377	377	-	346	346	-	-	-	-	-	-	-
Stage 2	189	348	-	190	403	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	445	399	816	375	373	817	1193	-	-	1042	-	-
Stage 1	654	659	-	570	664	-	-	-	-	-	-	-
Stage 2	817	676	-	710	631	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	411	387	816	358	362	817	1193	-	-	1042	-	-
Mov Cap-2 Maneuver	411	387	-	358	362	-	-	-	-	-	-	-
Stage 1	645	648	-	562	655	-	-	-	-	-	-	-
Stage 2	763	667	-	683	621	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.6			11			0.4			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1193	-	-	441	645	1042	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.232	0.074	0.013	-	-				
HCM Control Delay (s)	8.1	0.1	-	15.6	11	8.5	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.9	0.2	0	-	-				

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Future Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	2	16	7	0	23	21	363	2	11	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	637	821	210	609	847	183	421	0	0	365	0	0
Stage 1	414	414	-	405	405	-	-	-	-	-	-	-
Stage 2	223	407	-	204	442	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	407	265	816	315	331	800	1149	-	-	909	-	-
Stage 1	634	520	-	503	630	-	-	-	-	-	-	-
Stage 2	794	524	-	673	609	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	384	255	816	298	318	800	1149	-	-	909	-	-
Mov Cap-2 Maneuver	384	255	-	298	318	-	-	-	-	-	-	-
Stage 1	619	512	-	491	616	-	-	-	-	-	-	-
Stage 2	754	512	-	646	599	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.2			11.5			0.5			0.3		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	427	582	909	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.176	0.05	0.012	-	-				
HCM Control Delay (s)	8.2	0.1	-	15.2	11.5	9	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0	-	-				

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Future Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	2	12	12	2	52	8	319	4	26	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	524	686	154	531	697	161	308	0	0	322	0	0
Stage 1	347	347	-	337	337	-	-	-	-	-	-	-
Stage 2	177	339	-	194	360	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	471	418	882	344	397	773	1167	-	-	1186	-	-
Stage 1	674	676	-	534	669	-	-	-	-	-	-	-
Stage 2	826	681	-	660	656	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	426	403	882	329	383	773	1167	-	-	1186	-	-
Mov Cap-2 Maneuver	426	403	-	329	383	-	-	-	-	-	-	-
Stage 1	669	658	-	530	664	-	-	-	-	-	-	-
Stage 2	762	676	-	631	638	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.5			11.7			0.2			0.7		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	460	605	1186	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.174	0.109	0.022	-	-				
HCM Control Delay (s)	8.1	0	-	14.5	11.7	8.1	0.1	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Future Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	3	14	6	4	38	14	316	3	13	323	53
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	566	725	188	536	749	159	377	0	0	319	0	0
Stage 1	377	377	-	346	346	-	-	-	-	-	-	-
Stage 2	189	348	-	190	403	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	445	399	816	375	373	817	1193	-	-	1042	-	-
Stage 1	654	659	-	570	664	-	-	-	-	-	-	-
Stage 2	817	676	-	710	631	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	411	387	816	358	362	817	1193	-	-	1042	-	-
Mov Cap-2 Maneuver	411	387	-	358	362	-	-	-	-	-	-	-
Stage 1	645	648	-	562	655	-	-	-	-	-	-	-
Stage 2	763	667	-	683	621	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.6			11			0.4			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1193	-	-	441	645	1042	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.232	0.074	0.013	-	-				
HCM Control Delay (s)	8.1	0.1	-	15.6	11	8.5	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.9	0.2	0	-	-				

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Future Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	2	16	7	0	23	21	363	2	11	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	637	821	210	609	847	183	421	0	0	365	0	0
Stage 1	414	414	-	405	405	-	-	-	-	-	-	-
Stage 2	223	407	-	204	442	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	407	265	816	315	331	800	1149	-	-	909	-	-
Stage 1	634	520	-	503	630	-	-	-	-	-	-	-
Stage 2	794	524	-	673	609	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	384	255	816	298	318	800	1149	-	-	909	-	-
Mov Cap-2 Maneuver	384	255	-	298	318	-	-	-	-	-	-	-
Stage 1	619	512	-	491	616	-	-	-	-	-	-	-
Stage 2	754	512	-	646	599	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.2			11.5			0.5			0.3		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	427	582	909	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.176	0.05	0.012	-	-				
HCM Control Delay (s)	8.2	0.1	-	15.2	11.5	9	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0	-	-				

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Future Vol, veh/h	56	2	10	10	2	44	7	271	3	22	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	2	12	12	2	52	8	319	4	26	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	524	686	154	531	697	161	308	0	0	322	0	0
Stage 1	347	347	-	337	337	-	-	-	-	-	-	-
Stage 2	177	339	-	194	360	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	471	418	882	344	397	773	1167	-	-	1186	-	-
Stage 1	674	676	-	534	669	-	-	-	-	-	-	-
Stage 2	826	681	-	660	656	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	428	406	882	331	386	773	1167	-	-	1186	-	-
Mov Cap-2 Maneuver	428	406	-	331	386	-	-	-	-	-	-	-
Stage 1	669	661	-	530	664	-	-	-	-	-	-	-
Stage 2	763	676	-	635	642	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.4			11.7			0.2			0.6		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	462	607	1186	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.173	0.109	0.022	-	-				
HCM Control Delay (s)	8.1	-	-	14.4	11.7	8.1	-	-				
HCM Lane LOS	A	-	-	B	B	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.6	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Future Vol, veh/h	76	3	13	5	4	34	13	284	3	12	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	3	14	6	4	38	14	316	3	13	323	53
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	566	725	188	536	749	159	377	0	0	319	0	0
Stage 1	377	377	-	346	346	-	-	-	-	-	-	-
Stage 2	189	348	-	190	403	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	445	399	816	375	373	817	1193	-	-	1042	-	-
Stage 1	654	659	-	570	664	-	-	-	-	-	-	-
Stage 2	817	676	-	710	631	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	413	389	816	359	364	817	1193	-	-	1042	-	-
Mov Cap-2 Maneuver	413	389	-	359	364	-	-	-	-	-	-	-
Stage 1	646	651	-	563	656	-	-	-	-	-	-	-
Stage 2	765	668	-	685	623	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.5			11			0.3			0.3		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1193	-	-	443	646	1042	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.231	0.074	0.013	-	-				
HCM Control Delay (s)	8.1	-	-	15.5	11	8.5	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.9	0.2	0	-	-				

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Future Vol, veh/h	52	2	15	6	0	21	19	334	2	10	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	2	16	7	0	23	21	363	2	11	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	637	821	210	609	847	183	421	0	0	365	0	0
Stage 1	414	414	-	405	405	-	-	-	-	-	-	-
Stage 2	223	407	-	204	442	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	407	265	816	315	331	800	1149	-	-	909	-	-
Stage 1	634	520	-	503	630	-	-	-	-	-	-	-
Stage 2	794	524	-	673	609	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	386	257	816	300	321	800	1149	-	-	909	-	-
Mov Cap-2 Maneuver	386	257	-	300	321	-	-	-	-	-	-	-
Stage 1	622	514	-	494	618	-	-	-	-	-	-	-
Stage 2	757	514	-	649	602	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.2			11.5			0.4			0.2		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	429	584	909	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.175	0.05	0.012	-	-				
HCM Control Delay (s)	8.2	-	-	15.2	11.5	9	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0	-	-				

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 AM Alt 3 + No Dev

6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	2	10	10	2	44	7	271	3	22	240	22
Future Volume (veh/h)	56	2	10	10	2	44	7	271	3	22	240	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1621	1675	1666	1217	1666	1433	1435	1634	1529	1514	1666
Adj Flow Rate, veh/h	66	2	12	12	2	52	8	319	4	26	282	26
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	14	14	14	9	11	11
Cap, veh/h	322	4	21	147	8	83	589	1244	16	601	1202	110
Arrive On Green	0.11	0.10	0.11	0.11	0.10	0.11	0.45	0.45	0.47	0.45	0.45	0.47
Sat Flow, veh/h	1201	36	218	145	83	848	945	2758	35	995	2665	244
Grp Volume(v), veh/h	80	0	0	66	0	0	8	158	165	26	151	157
Grp Sat Flow(s),veh/h/ln	1456	0	0	1076	0	0	945	1363	1429	995	1438	1471
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.2	2.3	2.3	0.5	2.1	2.1
Cycle Q Clear(g_c), s	1.5	0.0	0.0	1.8	0.0	0.0	2.3	2.3	2.3	2.8	2.1	2.1
Prop In Lane	0.82		0.15	0.18		0.79	1.00		0.02	1.00		0.17
Lane Grp Cap(c), veh/h	369	0	0	254	0	0	589	615	645	601	649	664
V/C Ratio(X)	0.22	0.00	0.00	0.26	0.00	0.00	0.01	0.26	0.26	0.04	0.23	0.24
Avail Cap(c_a), veh/h	976	0	0	720	0	0	986	1188	1245	1019	1253	1281
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.5	0.0	0.0	13.7	0.0	0.0	6.1	5.5	5.5	6.4	5.4	5.4
Incr Delay (d2), s/veh	0.6	0.0	0.0	1.1	0.0	0.0	0.0	0.5	0.4	0.1	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.6	0.0	0.0	0.0	0.9	1.0	0.2	0.9	0.9
LnGrp Delay(d),s/veh	14.2	0.0	0.0	14.8	0.0	0.0	6.1	5.9	5.9	6.4	5.8	5.8
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		80			66			331			334	
Approach Delay, s/veh		14.2			14.8			5.9			5.8	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.6		21.5		10.6				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+l1), s		4.3		3.5		4.8		3.8				
Green Ext Time (p_c), s		5.6		0.8		5.5		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				7.4								
HCM 2010 LOS				A								

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 Midday Alt 3 + No Dev

6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (veh/h)	76	3	13	5	4	34	13	284	3	12	291	48
Future Volume (veh/h)	76	3	13	5	4	34	13	284	3	12	291	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1616	1675	1666	1397	1666	1634	1469	1634	1253	1535	1666
Adj Flow Rate, veh/h	84	3	14	6	4	38	14	316	3	13	323	53
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	0	11	11	33	9	9
Cap, veh/h	322	4	20	136	15	98	597	1276	12	536	1132	184
Arrive On Green	0.11	0.10	0.11	0.11	0.10	0.11	0.45	0.45	0.47	0.45	0.45	0.47
Sat Flow, veh/h	1185	42	198	107	155	995	1012	2833	27	818	2513	408
Grp Volume(v), veh/h	101	0	0	48	0	0	14	156	163	13	186	190
Grp Sat Flow(s),veh/h/ln	1425	0	0	1256	0	0	1012	1395	1464	818	1458	1463
Q Serve(g_s), s	0.9	0.0	0.0	0.0	0.0	0.0	0.3	2.2	2.2	0.3	2.6	2.6
Cycle Q Clear(g_c), s	2.1	0.0	0.0	1.2	0.0	0.0	2.9	2.2	2.2	2.5	2.6	2.6
Prop In Lane	0.83		0.14	0.12		0.79	1.00		0.02	1.00		0.28
Lane Grp Cap(c), veh/h	368	0	0	270	0	0	597	629	660	536	657	659
V/C Ratio(X)	0.27	0.00	0.00	0.18	0.00	0.00	0.02	0.25	0.25	0.02	0.28	0.29
Avail Cap(c_a), veh/h	976	0	0	806	0	0	1022	1214	1274	879	1269	1273
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.7	0.0	0.0	13.4	0.0	0.0	6.5	5.5	5.5	6.3	5.6	5.5
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.7	0.0	0.0	0.0	0.4	0.4	0.0	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	0.4	0.0	0.0	0.1	0.9	0.9	0.1	1.1	1.1
LnGrp Delay(d),s/veh	14.6	0.0	0.0	14.0	0.0	0.0	6.5	5.9	5.9	6.3	6.1	6.0
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		101			48			333			389	
Approach Delay, s/veh		14.6			14.0			5.9			6.1	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.7		21.5		10.7				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+l1), s		4.9		4.1		4.6		3.2				
Green Ext Time (p_c), s		6.1		0.8		6.1		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay				7.4								
HCM 2010 LOS				A								

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 PM Alt 3 + No Dev
6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	2	15	6	0	21	19	334	2	10	334	53
Future Volume (veh/h)	52	2	15	6	0	21	19	334	2	10	334	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1653	1675	1666	1362	1666	1634	1519	1634	1111	1546	1666
Adj Flow Rate, veh/h	57	2	16	7	0	23	21	363	2	11	363	58
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	50	50	50	0	0	0	0	7	7	50	9	9
Cap, veh/h	289	3	25	159	4	75	588	1355	7	496	1170	185
Arrive On Green	0.10	0.08	0.10	0.10	0.00	0.10	0.46	0.46	0.48	0.46	0.46	0.48
Sat Flow, veh/h	1108	39	311	231	55	938	971	2944	16	696	2542	403
Grp Volume(v), veh/h	75	0	0	30	0	0	21	178	187	11	208	213
Grp Sat Flow(s),veh/h/ln	1458	0	0	1224	0	0	971	1443	1517	696	1469	1475
Q Serve(g_s), s	0.8	0.0	0.0	0.0	0.0	0.0	0.4	2.4	2.4	0.3	2.8	2.8
Cycle Q Clear(g_c), s	1.5	0.0	0.0	0.7	0.0	0.0	3.3	2.4	2.4	2.7	2.8	2.8
Prop In Lane	0.76		0.21	0.23		0.77	1.00		0.01	1.00		0.27
Lane Grp Cap(c), veh/h	340	0	0	258	0	0	588	664	698	496	676	679
V/C Ratio(X)	0.22	0.00	0.00	0.12	0.00	0.00	0.04	0.27	0.27	0.02	0.31	0.31
Avail Cap(c_a), veh/h	1014	0	0	810	0	0	1004	1283	1348	794	1306	1311
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.8	0.0	0.0	13.4	0.0	0.0	6.4	5.2	5.2	6.1	5.3	5.3
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.4	0.0	0.0	0.1	0.5	0.4	0.0	0.5	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.3	0.0	0.0	0.1	1.0	1.1	0.1	1.2	1.2
LnGrp Delay(d),s/veh	14.5	0.0	0.0	13.9	0.0	0.0	6.4	5.7	5.7	6.1	5.9	5.9
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		75			30			386			432	
Approach Delay, s/veh		14.5			13.9			5.7			5.9	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.0		21.5		10.0				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+l1), s		5.3		3.5		4.8		2.7				
Green Ext Time (p_c), s		6.9		0.5		7.0		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			6.8									
HCM 2010 LOS			A									

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Future Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	5	12	13	2	55	8	319	7	53	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	578	743	154	588	753	163	308	0	0	326	0	0
Stage 1	401	401	-	339	339	-	-	-	-	-	-	-
Stage 2	177	342	-	249	414	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	435	391	882	311	371	771	1167	-	-	1181	-	-
Stage 1	632	646	-	532	668	-	-	-	-	-	-	-
Stage 2	826	679	-	609	625	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	383	367	882	290	348	771	1167	-	-	1181	-	-
Mov Cap-2 Maneuver	383	367	-	290	348	-	-	-	-	-	-	-
Stage 1	627	611	-	528	663	-	-	-	-	-	-	-
Stage 2	758	674	-	564	591	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.8			12.2			0.2			1.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	416	573	1181	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.198	0.123	0.045	-	-				
HCM Control Delay (s)	8.1	0	-	15.8	12.2	8.2	0.2	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.7	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Future Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	4	14	7	6	47	14	316	4	16	323	53
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	570	730	188	542	755	160	377	0	0	320	0	0
Stage 1	381	381	-	347	347	-	-	-	-	-	-	-
Stage 2	189	349	-	195	408	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	442	397	816	372	370	816	1193	-	-	1041	-	-
Stage 1	650	657	-	569	663	-	-	-	-	-	-	-
Stage 2	817	675	-	705	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	401	384	816	353	358	816	1193	-	-	1041	-	-
Mov Cap-2 Maneuver	401	384	-	353	358	-	-	-	-	-	-	-
Stage 1	641	644	-	561	654	-	-	-	-	-	-	-
Stage 2	753	666	-	674	615	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16			11.2			0.4			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1193	-	-	431	643	1041	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.24	0.092	0.015	-	-				
HCM Control Delay (s)	8.1	0.1	-	16	11.2	8.5	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0	-	-				

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Future Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	3	16	13	0	46	21	363	3	16	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	647	832	210	622	859	183	421	0	0	366	0	0
Stage 1	424	424	-	406	406	-	-	-	-	-	-	-
Stage 2	223	408	-	216	453	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	401	261	816	308	326	800	1149	-	-	908	-	-
Stage 1	626	514	-	502	629	-	-	-	-	-	-	-
Stage 2	794	523	-	661	603	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	365	249	816	288	311	800	1149	-	-	908	-	-
Mov Cap-2 Maneuver	365	249	-	288	311	-	-	-	-	-	-	-
Stage 1	612	502	-	490	615	-	-	-	-	-	-	-
Stage 2	731	511	-	629	589	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.9			12			0.5			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	405	573	908	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.188	0.102	0.018	-	-				
HCM Control Delay (s)	8.2	0.1	-	15.9	12	9	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.3	0.1	-	-				

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Future Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	5	12	13	2	55	8	319	7	53	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	578	743	154	588	753	163	308	0	0	326	0	0
Stage 1	401	401	-	339	339	-	-	-	-	-	-	-
Stage 2	177	342	-	249	414	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	435	391	882	311	371	771	1167	-	-	1181	-	-
Stage 1	632	646	-	532	668	-	-	-	-	-	-	-
Stage 2	826	679	-	609	625	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	383	367	882	290	348	771	1167	-	-	1181	-	-
Mov Cap-2 Maneuver	383	367	-	290	348	-	-	-	-	-	-	-
Stage 1	627	611	-	528	663	-	-	-	-	-	-	-
Stage 2	758	674	-	564	591	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.8			12.2			0.2			1.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	416	573	1181	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.198	0.123	0.045	-	-				
HCM Control Delay (s)	8.1	0	-	15.8	12.2	8.2	0.2	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.7	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Future Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	4	14	7	6	47	14	316	4	16	323	53
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	570	730	188	542	755	160	377	0	0	320	0	0
Stage 1	381	381	-	347	347	-	-	-	-	-	-	-
Stage 2	189	349	-	195	408	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	442	397	816	372	370	816	1193	-	-	1041	-	-
Stage 1	650	657	-	569	663	-	-	-	-	-	-	-
Stage 2	817	675	-	705	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	401	384	816	353	358	816	1193	-	-	1041	-	-
Mov Cap-2 Maneuver	401	384	-	353	358	-	-	-	-	-	-	-
Stage 1	641	644	-	561	654	-	-	-	-	-	-	-
Stage 2	753	666	-	674	615	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16			11.2			0.4			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1193	-	-	431	643	1041	-	-				
HCM Lane V/C Ratio	0.012	-	-	0.24	0.092	0.015	-	-				
HCM Control Delay (s)	8.1	0.1	-	16	11.2	8.5	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0	-	-				

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Future Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	3	16	13	0	46	21	363	3	16	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	647	832	210	622	859	183	421	0	0	366	0	0
Stage 1	424	424	-	406	406	-	-	-	-	-	-	-
Stage 2	223	408	-	216	453	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	401	261	816	308	326	800	1149	-	-	908	-	-
Stage 1	626	514	-	502	629	-	-	-	-	-	-	-
Stage 2	794	523	-	661	603	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	365	249	816	288	311	800	1149	-	-	908	-	-
Mov Cap-2 Maneuver	365	249	-	288	311	-	-	-	-	-	-	-
Stage 1	612	502	-	490	615	-	-	-	-	-	-	-
Stage 2	731	511	-	629	589	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.9			12			0.5			0.4		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	405	573	908	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.188	0.102	0.018	-	-				
HCM Control Delay (s)	8.2	0.1	-	15.9	12	9	0.1	-				
HCM Lane LOS	A	A	-	C	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.3	0.1	-	-				

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Future Vol, veh/h	56	4	10	11	2	47	7	271	6	45	240	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	4	0	0	60	0	33	14	14	0	9	11	0
Mvmt Flow	66	5	12	13	2	55	8	319	7	53	282	26
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	578	743	154	588	753	163	308	0	0	326	0	0
Stage 1	401	401	-	339	339	-	-	-	-	-	-	-
Stage 2	177	342	-	249	414	-	-	-	-	-	-	-
Critical Hdwy	6.98	5.9	6.6	8.3	6.1	7.36	4.38	-	-	4.28	-	-
Critical Hdwy Stg 1	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.98	4.9	-	7.3	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.54	4	3.3	4.1	4	3.63	2.34	-	-	2.29	-	-
Pot Cap-1 Maneuver	435	391	882	311	371	771	1167	-	-	1181	-	-
Stage 1	632	646	-	532	668	-	-	-	-	-	-	-
Stage 2	826	679	-	609	625	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	386	371	882	292	352	771	1167	-	-	1181	-	-
Mov Cap-2 Maneuver	386	371	-	292	352	-	-	-	-	-	-	-
Stage 1	628	617	-	528	663	-	-	-	-	-	-	-
Stage 2	759	674	-	570	597	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.7			12.1			0.2			1.2		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1167	-	-	419	575	1181	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.197	0.123	0.045	-	-				
HCM Control Delay (s)	8.1	-	-	15.7	12.1	8.2	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.7	0.4	0.1	-	-				

Intersection												
Int Delay, s/veh	2.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Future Vol, veh/h	76	4	13	6	5	42	13	284	4	14	291	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	8	40	0	18	0	11	33	33	9	6
Mvmt Flow	84	4	14	7	6	47	14	316	4	16	323	53

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	570	730	188	542	755	160	377	0	0	320	0	0
Stage 1	381	381	-	347	347	-	-	-	-	-	-	-
Stage 2	189	349	-	195	408	-	-	-	-	-	-	-
Critical Hdwy	6.96	5.9	6.76	7.9	6.1	7.06	4.1	-	-	4.76	-	-
Critical Hdwy Stg 1	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.96	4.9	-	6.9	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.53	4	3.38	3.9	4	3.48	2.2	-	-	2.53	-	-
Pot Cap-1 Maneuver	442	397	816	372	370	816	1193	-	-	1041	-	-
Stage 1	650	657	-	569	663	-	-	-	-	-	-	-
Stage 2	817	675	-	705	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	403	386	816	355	360	816	1193	-	-	1041	-	-
Mov Cap-2 Maneuver	403	386	-	355	360	-	-	-	-	-	-	-
Stage 1	642	647	-	562	655	-	-	-	-	-	-	-
Stage 2	755	667	-	677	618	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.9	11.2	0.3	0.3
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1193	-	-	433	644	1041	-	-
HCM Lane V/C Ratio	0.012	-	-	0.239	0.091	0.015	-	-
HCM Control Delay (s)	8.1	-	-	15.9	11.2	8.5	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0	-	-

Intersection												
Int Delay, s/veh	2.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Future Vol, veh/h	52	3	15	12	0	42	19	334	3	15	334	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	175	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-3	-	-	-2	-	-	2	-	-	-2	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	50	0	50	0	14	0	7	100	50	9	0
Mvmt Flow	57	3	16	13	0	46	21	363	3	16	363	58
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	647	832	210	622	859	183	421	0	0	366	0	0
Stage 1	424	424	-	406	406	-	-	-	-	-	-	-
Stage 2	223	408	-	216	453	-	-	-	-	-	-	-
Critical Hdwy	6.9	6.9	6.6	8.1	6.1	6.98	4.1	-	-	5.1	-	-
Critical Hdwy Stg 1	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.9	5.9	-	7.1	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.5	3.3	4	4	3.44	2.2	-	-	2.7	-	-
Pot Cap-1 Maneuver	401	261	816	308	326	800	1149	-	-	908	-	-
Stage 1	626	514	-	502	629	-	-	-	-	-	-	-
Stage 2	794	523	-	661	603	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	368	252	816	291	314	800	1149	-	-	908	-	-
Mov Cap-2 Maneuver	368	252	-	291	314	-	-	-	-	-	-	-
Stage 1	615	505	-	493	618	-	-	-	-	-	-	-
Stage 2	735	513	-	632	592	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	15.8			12			0.4			0.3		
HCM LOS	C			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1149	-	-	408	576	908	-	-				
HCM Lane V/C Ratio	0.018	-	-	0.186	0.102	0.018	-	-				
HCM Control Delay (s)	8.2	-	-	15.8	12	9	-	-				
HCM Lane LOS	A	-	-	C	B	A	-	-				
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.3	0.1	-	-				

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 AM Alt 3 + Dev
6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	4	10	11	2	47	7	271	6	45	240	22
Future Volume (veh/h)	56	4	10	11	2	47	7	271	6	45	240	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1623	1675	1666	1216	1666	1433	1437	1634	1529	1514	1666
Adj Flow Rate, veh/h	66	5	12	13	2	55	8	319	7	53	282	26
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	14	14	14	9	11	11
Cap, veh/h	317	9	21	147	8	85	587	1229	27	597	1199	110
Arrive On Green	0.12	0.10	0.12	0.12	0.10	0.12	0.45	0.45	0.47	0.45	0.45	0.47
Sat Flow, veh/h	1162	92	212	147	83	844	945	2731	60	992	2665	244
Grp Volume(v), veh/h	83	0	0	70	0	0	8	159	167	53	151	157
Grp Sat Flow(s),veh/h/ln	1466	0	0	1074	0	0	945	1365	1426	992	1438	1471
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.2	2.3	2.3	1.1	2.1	2.1
Cycle Q Clear(g_c), s	1.6	0.0	0.0	1.9	0.0	0.0	2.3	2.3	2.3	3.5	2.1	2.1
Prop In Lane	0.80		0.14	0.19		0.79	1.00		0.04	1.00		0.17
Lane Grp Cap(c), veh/h	370	0	0	257	0	0	587	614	642	597	647	662
V/C Ratio(X)	0.22	0.00	0.00	0.27	0.00	0.00	0.01	0.26	0.26	0.09	0.23	0.24
Avail Cap(c_a), veh/h	974	0	0	717	0	0	983	1186	1239	1013	1250	1278
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.5	0.0	0.0	13.7	0.0	0.0	6.2	5.5	5.5	6.6	5.4	5.4
Incr Delay (d2), s/veh	0.6	0.0	0.0	1.2	0.0	0.0	0.0	0.5	0.5	0.1	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.7	0.0	0.0	0.0	1.0	1.0	0.3	0.9	0.9
LnGrp Delay(d),s/veh	14.2	0.0	0.0	14.9	0.0	0.0	6.2	6.0	6.0	6.7	5.8	5.8
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		83			70			334			361	
Approach Delay, s/veh		14.2			14.9			6.0			6.0	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.7		21.5		10.7				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+I1), s		4.3		3.6		5.5		3.9				
Green Ext Time (p_c), s		5.9		0.9		5.8		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay				7.5								
HCM 2010 LOS				A								

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 Middy Alt 3+ Dev
6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	4	13	6	5	42	13	284	4	14	291	48
Future Volume (veh/h)	76	4	13	6	5	42	13	284	4	14	291	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1617	1675	1666	1403	1666	1634	1468	1634	1253	1535	1666
Adj Flow Rate, veh/h	84	4	14	7	6	47	14	316	4	16	323	53
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	0	11	11	33	9	9
Cap, veh/h	325	6	20	134	18	102	594	1265	16	532	1127	183
Arrive On Green	0.12	0.10	0.12	0.12	0.10	0.12	0.45	0.45	0.46	0.45	0.45	0.46
Sat Flow, veh/h	1179	56	196	98	174	984	1012	2821	36	817	2513	408
Grp Volume(v), veh/h	102	0	0	60	0	0	14	156	164	16	186	190
Grp Sat Flow(s),veh/h/ln	1431	0	0	1257	0	0	1012	1395	1462	817	1458	1463
Q Serve(g_s), s	0.7	0.0	0.0	0.0	0.0	0.0	0.3	2.2	2.3	0.4	2.6	2.6
Cycle Q Clear(g_c), s	2.1	0.0	0.0	1.4	0.0	0.0	2.9	2.2	2.3	2.7	2.6	2.6
Prop In Lane	0.82		0.14	0.12		0.78	1.00		0.02	1.00		0.28
Lane Grp Cap(c), veh/h	373	0	0	274	0	0	594	625	655	532	654	656
V/C Ratio(X)	0.27	0.00	0.00	0.22	0.00	0.00	0.02	0.25	0.25	0.03	0.28	0.29
Avail Cap(c_a), veh/h	968	0	0	804	0	0	1016	1207	1265	873	1262	1266
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.7	0.0	0.0	13.4	0.0	0.0	6.6	5.5	5.5	6.4	5.6	5.6
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.9	0.0	0.0	0.0	0.4	0.4	0.0	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	0.0	0.5	0.0	0.0	0.1	0.9	1.0	0.1	1.1	1.1
LnGrp Delay(d),s/veh	14.5	0.0	0.0	14.3	0.0	0.0	6.6	6.0	6.0	6.4	6.1	6.1
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		102			60			334			392	
Approach Delay, s/veh		14.5			14.3			6.0			6.1	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.8		21.5		10.8				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+l1), s		4.9		4.1		4.7		3.4				
Green Ext Time (p_c), s		6.1		0.9		6.1		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay				7.6								
HCM 2010 LOS				A								

HCM 2010 Signalized Intersection Summary
3: SR 8 & Polk Cut-Off/DeBence Dr

2021 PM Alt 3+ Dev
6/17/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↕		↗	↕	
Traffic Volume (veh/h)	52	3	15	12	0	42	19	334	3	15	334	53
Future Volume (veh/h)	52	3	15	12	0	42	19	334	3	15	334	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1675	1642	1675	1666	1367	1666	1634	1516	1634	1111	1546	1666
Adj Flow Rate, veh/h	57	3	16	13	0	46	21	363	3	16	363	58
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	50	50	50	0	0	0	0	7	7	50	9	9
Cap, veh/h	300	5	29	157	6	88	576	1327	11	486	1152	182
Arrive On Green	0.11	0.09	0.11	0.11	0.00	0.11	0.45	0.45	0.47	0.45	0.45	0.47
Sat Flow, veh/h	1099	58	309	205	61	941	971	2927	24	695	2542	403
Grp Volume(v), veh/h	76	0	0	59	0	0	21	178	188	16	208	213
Grp Sat Flow(s),veh/h/ln	1466	0	0	1207	0	0	971	1440	1512	695	1469	1475
Q Serve(g_s), s	0.1	0.0	0.0	0.0	0.0	0.0	0.5	2.5	2.5	0.5	2.9	2.9
Cycle Q Clear(g_c), s	1.4	0.0	0.0	1.4	0.0	0.0	3.4	2.5	2.5	2.9	2.9	2.9
Prop In Lane	0.75		0.21	0.22		0.78	1.00		0.02	1.00		0.27
Lane Grp Cap(c), veh/h	357	0	0	269	0	0	576	653	685	486	666	669
V/C Ratio(X)	0.21	0.00	0.00	0.22	0.00	0.00	0.04	0.27	0.27	0.03	0.31	0.32
Avail Cap(c_a), veh/h	986	0	0	797	0	0	986	1260	1323	779	1286	1291
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	0.0	13.6	0.0	0.0	6.7	5.5	5.5	6.4	5.6	5.5
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.9	0.0	0.0	0.1	0.5	0.5	0.1	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.5	0.0	0.0	0.1	1.0	1.1	0.1	1.3	1.3
LnGrp Delay(d),s/veh	14.2	0.0	0.0	14.4	0.0	0.0	6.7	5.9	5.9	6.4	6.1	6.1
LnGrp LOS	B			B			A	A	A	A	A	A
Approach Vol, veh/h		76			59			387			437	
Approach Delay, s/veh		14.2			14.4			6.0			6.1	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.5		10.5		21.5		10.5				
Change Period (Y+Rc), s		6.5		7.0		6.5		7.0				
Max Green Setting (Gmax), s		28.5		18.0		28.5		18.0				
Max Q Clear Time (g_c+l1), s		5.4		3.4		4.9		3.4				
Green Ext Time (p_c), s		7.0		0.8		7.1		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				7.2								
HCM 2010 LOS				A								

Appendix I: Cost Estimates

DeBence Drive, Venango County

Conceptual Cost Estimate

Last Updated 06-10-16

Alternative 1 - Remove Sight Obstructions and Improve Intersection Approaches					
Pay Item	Description	Quantity	Unit	Unit Cost	Total Cost
0203-0001	CLASS 1 EXCAVATION	905	CY	\$22.00	\$19,910.00
0311-0422	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BASE COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 25.0 MM MIX, 4" DEPTH	720	SY	\$24.00	\$17,280.00
0350-0106	SUBBASE 6" DEPTH (NO. 2A)	720	SY	\$15.00	\$10,800.00
0411-0484	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 9.5 MM MIX, 1 1/2" DEPTH, SRL-M	2,355	SY	\$17.00	\$40,035.00
0411-6450	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BINDER COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 19.0 MM MIX, 2 1/2" DEPTH	720	SY	\$13.00	\$9,360.00
0460-0001	BITUMINOUS TACK COAT	2,160	SY	\$0.25	\$540.00
0491-0012	MILLING OF BITUMINOUS PAVEMENT SURFACE, 1 1/2" DEPTH, MILLED MATERIAL RETAINED BY CONTRACTOR	1,635	SY	\$10.00	\$16,350.00
0605-2781	TYPE M FRAME AND BICYCLE SAFE GRATE	1	SET	\$1,000.00	\$1,000.00
0605-2850	STANDARD INLET BOX, HEIGHT < /= 10'	1	EA	\$2,600.00	\$2,600.00
0802-0001	TOPSOIL FURNISHED AND PLACED (4" DEPTH)	25	CY	\$50.00	\$1,250.00
0804-0011	SEEDING AND SOIL SUPPLEMENTS - FORMULA B	9	LB	\$72.00	\$648.00
0804-0014	SEEDING - FORMULA E	2	LB	\$90.00	\$180.00
0805-0022	MULCHING - STRAW	1	TON	\$415.00	\$415.00
0810-0052	SELECTIVE TREE REMOVAL	2	EA	\$1,500.00	\$3,000.00
0931-0001	POST MOUNTED SIGNS, TYPE B	7	SF	\$40.00	\$280.00
0960-0021	24" WHITE HOT THERMOPLASTIC PAVEMENT MARKINGS	35	LF	\$15.00	\$525.00
0962-1001	6" WHITE WATERBORNE PAVEMENT MARKINGS	880	LF	\$0.25	\$220.00
0962-1005	4" YELLOW WATERBORNE PAVEMENT MARKINGS	2,455	LF	\$0.20	\$491.00
SUBTOTAL 1					\$124,884.00
MPT, MOBILIZATION, FIELD OFFICE, and EQUIPMENT				15% OF SUBTOTAL 1	\$18,732.60
SUBTOTAL 2					\$143,616.60
CONTINGENCIES				40% OF SUBTOTAL 2	\$57,446.64
SUBTOTAL OF CONSTRUCTION					\$201,063.24
RIGHT-OF-WAY					\$15,000.00
UTILITIES					\$30,000.00
ENGINEERING				15% OF SUBTOTAL OF CONSTRUCTION	\$30,159.49
CONSTRUCTION INSPECTION				12% OF SUBTOTAL OF CONSTRUCTION	\$24,127.59
TOTAL					\$300,350.31

DeBence Drive, Venango County

Conceptual Cost Estimate

Last Updated 06-10-16

Alternative 2 - Alternative 1 + Left Turn Lanes on SR 0008					
Pay Item	Description	Quantity	Unit	Unit Cost	Total Cost
0203-0001	CLASS 1 EXCAVATION	1,630	CY	\$22.00	\$35,860.00
0311-0422	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BASE COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 25.0 MM MIX, 4" DEPTH	670	SY	\$24.00	\$16,080.00
0350-0106	SUBBASE 6" DEPTH (NO. 2A)	2,925	SY	\$15.00	\$43,875.00
0411-0484	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 9.5 MM MIX, 1 1/2" DEPTH, SRL-M	11,285	SY	\$17.00	\$191,845.00
0411-6450	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BINDER COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 19.0 MM MIX, 2 1/2" DEPTH	670	SY	\$13.00	\$8,710.00
0460-0001	BITUMINOUS TACK COAT	12,625	SY	\$0.25	\$3,156.25
0491-0012	MILLING OF BITUMINOUS PAVEMENT SURFACE, 1 1/2" DEPTH, MILLED MATERIAL RETAINED BY CONTRACTOR	8,365	SY	\$10.00	\$83,650.00
0501-0030	PLAIN CEMENT CONCRETE PAVEMENT, 9" DEPTH	2,255	SY	\$100.00	\$225,500.00
0605-2781	TYPE M FRAME AND BICYCLE SAFE GRATE	1	SET	\$1,000.00	\$1,000.00
0605-2850	STANDARD INLET BOX, HEIGHT < /= 10'	1	EA	\$2,600.00	\$2,600.00
0802-0001	TOPSOIL FURNISHED AND PLACED (4" DEPTH)	115	CY	\$50.00	\$5,750.00
0804-0011	SEEDING AND SOIL SUPPLEMENTS - FORMULA B	45	LB	\$72.00	\$3,240.00
0804-0014	SEEDING - FORMULA E	10	LB	\$90.00	\$900.00
0810-0052	SELECTIVE TREE REMOVAL	2	EA	\$1,500.00	\$3,000.00
0805-0022	MULCHING - STRAW	1	TON	\$415.00	\$415.00
0931-0001	POST MOUNTED SIGNS, TYPE B	7	SF	\$40.00	\$280.00
0960-0021	24" WHITE HOT THERMOPLASTIC PAVEMENT MARKINGS	70	LF	\$15.00	\$1,050.00
0961-0224	COLD WHITE PLASTIC LEGEND "LEFT ARROW", 12'-0" X 3'-0", INLAID	6	EA	\$400.00	\$2,400.00
0962-1001	6" WHITE WATERBORNE PAVEMENT MARKINGS	7,135	LF	\$0.25	\$1,783.75
0962-1005	4" YELLOW WATERBORNE PAVEMENT MARKINGS	6,945	LF	\$0.20	\$1,389.00
SUBTOTAL 1					\$632,484.00
MPT, MOBILIZATION, FIELD OFFICE, and EQUIPMENT				15% OF SUBTOTAL 1	\$94,872.60
SUBTOTAL 2					\$727,356.60
CONTINGENCIES				40% OF SUBTOTAL 2	\$290,942.64
SUBTOTAL OF CONSTRUCTION					\$1,018,299.24
RIGHT-OF-WAY					\$15,000.00
UTILITIES					\$30,000.00
ENGINEERING				15% OF SUBTOTAL OF CONSTRUCTION	\$152,744.89
CONSTRUCTION INSPECTION				12% OF SUBTOTAL OF CONSTRUCTION	\$122,195.91
TOTAL					\$1,338,240.03

DeBence Drive, Venango County

Conceptual Cost Estimate

Last Updated 06-10-16

Alternative 3 - Alternative 1 & 2 + Traffic Signal Control					
Pay Item	Description	Quantity	Unit	Unit Cost	Total Cost
0203-0001	CLASS 1 EXCAVATION	1,630	CY	\$22.00	\$35,860.00
0311-0422	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BASE COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 25.0 MM MIX, 4" DEPTH	670	SY	\$24.00	\$16,080.00
0350-0106	SUBBASE 6" DEPTH (NO. 2A)	2,925	SY	\$15.00	\$43,875.00
0411-0484	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 9.5 MM MIX, 1 1/2" DEPTH, SRL-M	11,285	SY	\$17.00	\$191,845.00
0411-6450	SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BINDER COURSE, PG 64-22, 0.3 TO < 3 MILLION ESALS, 19.0 MM MIX, 2 1/2" DEPTH	670	SY	\$13.00	\$8,710.00
0460-0001	BITUMINOUS TACK COAT	12,625	SY	\$0.25	\$3,156.25
0491-0012	MILLING OF BITUMINOUS PAVEMENT SURFACE, 1 1/2" DEPTH, MILLED MATERIAL RETAINED BY CONTRACTOR	8,365	SY	\$10.00	\$83,650.00
0501-0030	PLAIN CEMENT CONCRETE PAVEMENT, 9" DEPTH	2,255	SY	\$100.00	\$225,500.00
0605-2781	TYPE M FRAME AND BICYCLE SAFE GRATE	1	SET	\$1,000.00	\$1,000.00
0605-2850	STANDARD INLET BOX, HEIGHT < /= 10'	1	EA	\$2,600.00	\$2,600.00
0802-0001	TOPSOIL FURNISHED AND PLACED (4" DEPTH)	115	CY	\$50.00	\$5,750.00
0804-0011	SEEDING AND SOIL SUPPLEMENTS - FORMULA B	45	LB	\$72.00	\$3,240.00
0804-0014	SEEDING - FORMULA E	10	LB	\$90.00	\$900.00
0810-0052	SELECTIVE TREE REMOVAL	2	EA	\$1,500.00	\$3,000.00
0805-0022	MULCHING - STRAW	1	TON	\$415.00	\$415.00
0910-0002	JUNCTION BOX, JB-2	1	EA	\$2,000.00	\$2,000.00
0931-0001	POST MOUNTED SIGNS, TYPE B	22	SF	\$40.00	\$880.00
0935-0001	POST MOUNTED SIGNS, TYPE F	25	SF	\$20.00	\$500.00
0936-0200	STRUCTURE MOUNTED FLAT SHEET ALUMINUM SIGN	41	SF	\$55.00	\$2,255.00
0936-0300	INTERNALLY ILLUMINATED SIGN	2	EA	\$3,900.00	\$7,800.00
0951-0140	TRAFFIC SIGNAL SUPPORT, 40' MAST ARM	4	EA	\$16,000.00	\$64,000.00
0951-2152	TRAFFIC SIGNAL SUPPORT, 52' MAST ARM	2	EA	\$20,000.00	\$40,000.00
0952-1041	NEMA TS-2, TYPE 2 CONTROLLER ASSEMBLY, TYPE II MOUNTING	1	EA	\$9,500.00	\$9,500.00
0952-2051	CONTROLLER ASSEMBLY, SOLID STATE FLASHER, SINGLE CIRCUIT, TYPE II MOUNTING	2	EA	\$1,000.00	\$2,000.00
0954-0014	4 INCH CONDUIT	240	LF	\$8.00	\$1,920.00
0954-0102	SIGNAL CABLE, 12 AWG, 5 CONDUCTOR	650	LF	\$3.75	\$2,437.50
0954-0151	TRENCH AND BACKFILL, TYPE I	240	LF	\$18.00	\$4,320.00
0954-0302	JUNCTION BOX, JB-27	3	EA	\$1,000.00	\$3,000.00
0954-0402	ELECTRICAL SERVICE, TYPE B	3	EA	\$2,750.00	\$8,250.00

DeBence Drive, Venango County

Conceptual Cost Estimate

Last Updated 06-10-16

0955-2082	VEHICULAR SIGNAL HEAD, ONE 8" SECTION	4	EA	\$500.00	\$2,000.00
0955-3208	VEHICULAR SIGNAL HEAD, THREE 12" SECTIONS	8	EA	\$825.00	\$6,600.00
0960-0021	24" WHITE HOT THERMOPLASTIC PAVEMENT MARKINGS	96	LF	\$15.00	\$1,440.00
0961-0224	COLD WHITE PLASTIC LEGEND "LEFT ARROW", 12'-0" X 3'-0", INLAID	6	EA	\$400.00	\$2,400.00
0962-1001	6" WHITE WATERBORNE PAVEMENT MARKINGS	7,135	LF	\$0.25	\$1,783.75
0962-1005	4" YELLOW WATERBORNE PAVEMENT MARKINGS	6,945	LF	\$0.20	\$1,389.00
9000-0063	GPS ANTENNA AND RECEIVER	1	EA	\$1,000.00	\$1,000.00
9956-0770	DIGITAL WAVE RADAR STOP BAR DETECTION SYSTEM	4	EA	\$6,250.00	\$25,000.00
SUBTOTAL 1					\$816,056.50
MPT, MOBILIZATION, FIELD OFFICE, and EQUIPMENT		15% OF SUBTOTAL 1			\$122,408.48
SUBTOTAL 2					\$938,464.98
CONTINGENCIES		40% OF SUBTOTAL 2			\$375,385.99
SUBTOTAL OF CONSTRUCTION					\$1,313,850.97
RIGHT-OF-WAY					\$15,000.00
UTILITIES					\$80,000.00
ENGINEERING		15% OF SUBTOTAL OF CONSTRUCTION			\$197,077.64
CONSTRUCTION INSPECTION		12% OF SUBTOTAL OF CONSTRUCTION			\$157,662.12
TOTAL					\$1,763,590.73