EPR

TRAFFIC IMPACT STUDY

Lake Kilby Road / Lake Cohoon Road Development
Suffolk, VA

Prepared for:

Coastal Virginia Developers

By:

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EPR

Nov 2022

APPROVED BY TRAFFIC ENGINEERING ON 12-22-2022

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1.0 PROJECT OVERVIEW

This technical memorandum summarizes the work effort undertaken by EPR for Coastal Virginia Developers (Coastal) to document the traffic impacts of the proposed subdivision in Suffolk, Virginia. The parcel is located south of Pitchkettle Farms and east of Lake Kilby Road / Lake Cohoon Road. This study is based on the conceptual site plan provided by the developer and located in Appendix A. The site plan identifies a proposed site consisting of 204 single family units.

As requested by city staff, this study includes an evaluation of traffic impacts to six adjacent intersections and the development access locations.

A vicinity map is provided in Figure 1.

2.0 BACKGROUND

The proposed development is located south of Pitchkettle Farms and east of Lake Kilby Road / Lake Cohoon Road. City staff requested that the traffic study include an evaluation of impacts at five adjacent intersections. The study intersections are:

1. Pitchkettle Rd and Pitchkettle Farm Ln
2. Pitchkettle Rd and Rte 58 WB Ramps
3. Pitchkettle Rd and Rte 58 EB Ramps
4. Lake Cohoon Rd and Holland Rd
5. Rte 58 and Holland Rd
6. Pitchkettle Rd and Lake Kilby Rd

Pitchkettle Road is a two-lane facility that serves residential areas and connects to Route 58 and to downtown. Pitchkettle Farm Lane is a two-lane facility that serves a neighborhood. Lake Kilby Road and Lake Cohoon Road are two lane facilities that connect relatively low-density residential uses to the local network. Holland Road is a two-lane arterial that connects Route 58 to downtown (and various mixed uses along the corridor). Route 58 is a major four lane limited access facility in this area.

Traffic Volumes

Manual turning movement counts were conducted on Tuesday, June 15, 2021 at the Route 58 ramp junction intersections and at the Pitchkettle Farm Lane intersection. The Pitchkettle Road and Lake Kilby Road counts were taken on November 16, 2021. The counts were from 7 – 9 AM and 4 – 6 PM. The data for the Route 58 and Holland Road intersection were taken from a 2017 traffic impact study and were factored up to 2021. Data for the Lake Cohoon Rd and Holland Rd intersection were calculated using daily volume data from the VDOT traffic count database (year 2019). The existing peak hour traffic volumes are illustrated in Figure 2. The count worksheets for the 2021 counts and the data / calculations for the factored / calculated data are all provided in Appendix B.

3.0 FUTURE YEAR TRAFFIC VOLUMES

Background Traffic

The development is proposed to be built by 2026. To evaluate a year 2026 no build condition (the background traffic in the study area without considering the proposed development), the existing traffic volumes were projected to the year 2026. City staff provided background growth rates per other planning studies in the area – five percent for Route 58 and two percent for the other roadways. The no build 2026 volumes are illustrated in Figure 3.

Proposed Site Trip Generation

The trip generation potential of the proposed development was determined using data published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* (10th Edition). The resulting number of trips estimated to be generated by the proposed development are identified in Table 1.

TABLE 1
Site Generated Traffic
(Vehicles Per Day and Vehicles Per Hour)

USE	ITE Code	ADT	AM PEAK		PM PEAK	
			IN	OUT	IN	OUT
204 Single Family Detached	210	2004	37	113	126	75

Source: ITE Trip Generation Manual

Traffic Distribution

The projected site generated traffic volumes were assigned to the study area. The site trips were assigned to the study intersections by examination of the existing traffic patterns along the study roadway network. Figure 4 illustrates the resulting site generated trips and Figure 5 illustrates the projected year 2026 build traffic volumes.

4.0 INTERSECTION CAPACITY ANALYSES

The intersection capacity analyses were performed using Synchro per the methodology documented in the Highway Capacity Manual (Transportation Research Board). The HCM based calculations are provided in this report.

Capacity analyses are utilized to determine a Level of Service (LOS) for a given intersection operating under either signalized or unsignalized control. The LOS is based on estimated delay and range from LOS A, the best, to LOS F, the worst. In general LOS A and LOS B indicate little or no delay, LOS C indicates average delay, LOS D indicates delay is increasing and noticeable, LOS E indicates the limit of acceptable delay and LOS F is characteristic of over saturated conditions. The actual delays associated with these levels of service are identified in Table 2.

TABLE 2
LOS and Delay Thresholds

LOS	UNSIGNALIZED INT. DELAY (secs)	SIGNALIZED INT. DELAY (secs)
A	0 – 10	< 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Source: Highway Capacity Manual

Capacity analyses were conducted for each of the study intersections for existing conditions, year 2026 no build conditions, and year 2026 build conditions. The analysis results are summarized by intersection in the following sections.

Pitchkettle Road and Pitchkettle Farm Lane (Unsignalized Intersection)
Delay and level of service (LOS) are summarized in Table 3 below. All movements are expected to operate at LOS B or better during both peak hours under all scenarios.

TABLE 3
Pitchkettle Rd and Pitchkettle Farm Ln
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Pitchkettle WB Left	7.8 A	7.7 A	7.8 A	7.8 A	8.0 A	8.0 A
Pitchkettle Farm NB Left	11.1 B	0.0 A	11.5 B	0.0 A	12.7 B	0.0 A
Pitchkettle Farm NB Right	9.6 A	9.8 A	9.7 A	10.0 A	10.8 B	10.7 B

Pitchkettle Road and Rte 58 WB Ramps (Unsignalized Intersection)
Delay and level of service (LOS) are summarized in Table 4 below. The SB thru-left movement from the off ramp is expected to operate at LOS D during the PM peak hour in the future no build scenario and in the build scenario. The projected 95th percentile queue for this movement is projected to be only three vehicles in the no build scenario and just four vehicles in the build scenario.

TABLE 4
Pitchkettle Rd and Rte 58 WB Ramps
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Pitchkettle WB Thru-Left	1.6 A	1.4 A	1.6 A	1.5 A	1.6 A	1.4 A
Rte 58 WB Off Ramp SB Thru-Left	13.5 B	21.5 C	14.5 B	26.9 D	16.0 C	34.0 D
Rte 58 WB Off Ramp SB Right	9.0 A	10.4 B	9.1 A	10.7 B	9.2 A	11.3 B
Intersection	3.3 A	5.4 A	3.5 A	6.4 A	3.4 A	7.1 A
95th Percentile Queue SB Thru-Left				3		4

Pitchkettle Road and Rte 58 EB Ramps (Unsignalized Intersection)
Delay and level of service (LOS) are summarized in Table 5 below. The NB thru-left movement from the off ramp is expected to operate at LOS D / E in the future year scenarios, but the overall intersection level of service is LOS B. To further evaluate traffic operations impacts, the NB thru-left movement 95th percentile queue is projected to be only two vehicles in the no build scenario and just three vehicles in the build scenario.

TABLE 5
Pitchkettle Rd and Rte 58 EB Ramps
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Pitchkettle EB Thru-Left	2.8 A	1.8 A	2.9 A	1.9 A	3.1 A	2.3 A
Rte 58 EB Off Ramp NB Thru-Left	16.1 C	24.0 C	17.9 C	29.9 D	20.6 C	40.5 E
Rte 58 EB Off Ramp NB Right	9.6 A	10.4 B	9.8 A	10.7 B	10.0 B	10.8 B
Intersection	3.5 A	3.4 A	3.7 A	4.1 A	4.1 A	5.2 B
95th Percentile Queue NB Thru-Left				2		3

Lake Cohoon Road and Holland Road (Unsignalized Intersection)
Delay and level of service (LOS) are summarized in Table 6 below. AM peak hour evaluations were not conducted given the lack of available data discussed in the previous section (and calculations provided in Appendix B). All movements are expected to operate at LOS B or better during both peak hours under all scenarios.

TABLE 6
Lake Cohoon Rd and Holland Rd
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Holland EB Left	-	8.5 A	-	8.7 A	-	8.9 A
Lake Cohoon SB Left	-	12.3 B	-	12.9 B	-	13.6 B

Rte 58 and Holland Road (Signalized Intersection)
Delay and level of service (LOS) are summarized in Table 7 below. The intersection is projected to operate at LOS B / C under all scenarios, with very little change from the no build to build scenarios.

TABLE 7
Rte 58 and Holland Rd
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Holland WB Left	38.4 D	33.5 C	50.6 D	38.5 D	51.3 D	38.5 D
Rte 58 NB Thru	17.9 B	13.9 B	30.7 C	17.3 B	31.4 C	17.5 B
Rte 58 NB Right	9.8 A	10.4 B	9.6 A	10.7 B	9.8 A	10.8 B
Rte 58 SB Left	47.9 D	45.8 D	54.7 D	52.4 D	54.7 D	52.4 D
Rte 58 SB Thru	4.3 A	4.0 A	4.6 A	4.7 A	4.6 A	4.7 A
Intersection	14.1 B	10.4 B	20.7 C	11.9 B	21.2 C	12.0 B

Pitchkettle Road and Lake Kilby Road (Unsignalized Intersection)
Delay and level of service (LOS) are summarized in Table 8 below. All movements are expected to operate at LOS C or better during both peak hours under all scenarios.

TABLE 8
Pitchkettle Rd and Lake Kilby Rd
Delay (sec/veh) and LOS

	Existing		2026 No Build		2026 Build	
	AM	PM	AM	PM	AM	PM
Pitchkettle EB All	0.1 A	0.3 A	0.0 A	0.3 A	0.0 A	0.3 A
Pitchkettle WB All	1.5 A	2.0 A	1.6 A	2.1 A	2.3 A	3.4 A
Lake Kilby NB All	9.5 A	10.4 B	10.8 B	10.7 B	12.5 B	13.1 B
Pitchkettle Point SB All	11.9 B	13.7 B	14.1 B	14.9 B	16.8 B	19.3 C

The intersection capacity analysis worksheets from Synchro are provided in the appendix. The existing scenario is located in Appendix C, the 2026 No Build is in Appendix D and the 2026 Build is in Appendix E.

Site Access
The development has one proposed access location on Lake Kilby Road / Lake Cohoon Road. Right and left turn lanes are proposed at the access location.

Additional Turn Lane Evaluations
City staff requested turn lane evaluations at Pitchkettle Road and the Route 58 interchange (both EB and WB ramp junctions), the Pitchkettle Road and Lake Kilby Road intersection, and at Holland Road and Lake Cohoon Road. These evaluations are summarized in Table 9. The build scenario results are the same as the no build scenario results. The turn lane warrants are provided in Appendix F.

Pitchkettle Road and Route 58 Ramp Junctions
At the Pitchkettle Road and Route 58 ramp junctions, the turn lane warrants are met in the no build condition. With the addition of this development, the traffic impacts of this development are very limited with only approximately one second of delay and one additional vehicle in queue (see Tables 4 and 5). In addition, as a result of the geometry related to the bridge, it does not appear to be feasible to make to turn lane improvements. To assist the City with a potential future project to address this issue, the developer will assist with funding for a preliminary engineering study to develop mitigation options for the ramp junction intersections.

Holland Road and Lake Cohoon Road Intersection
A westbound right turn lane improvement will be provided at the Holland Road and Lake Cohoon Road intersection.

TABLE 9
Summary of Requested Turn Lane Warrants

	Left Turn		Right Turn	
	No Build	Build	No Build	Build
Pitchkettle and Rte 58 Ramps WB	Met	Met	Taper Only	Taper Only
Pitchkettle and Rte 58 Ramps EB	Met	Met	Met	Met
Holland and Lake Cohoon*	NA	NA	Met	Met
Pitchkettle and Lake Kilby	Not met	Not met	Not met	Not met

Notes
*Existing left turn lane at Holland and Lake Cohoon

Other Improvements
In addition to the turn lanes at the proposed access location, the developer is proposing to make significant improvements to Lake Kilby Road / Lake Cohoon Road as follows:

-along the property frontage on property side of road (approximately 1,750 linear feet): curb, gutter, piped drainage, mill & overlay

-adjacent (or "off-site") to the property frontage (approximately 3,750 linear feet): remove the crown, mill and overlay, full width of the roadway (approximately 20 feet).

5.0 SUMMARY

A summary of the analysis conducted is provided as follows:

1. Intersection Capacity Analysis
   There is limited traffic impact expected at the study intersections.

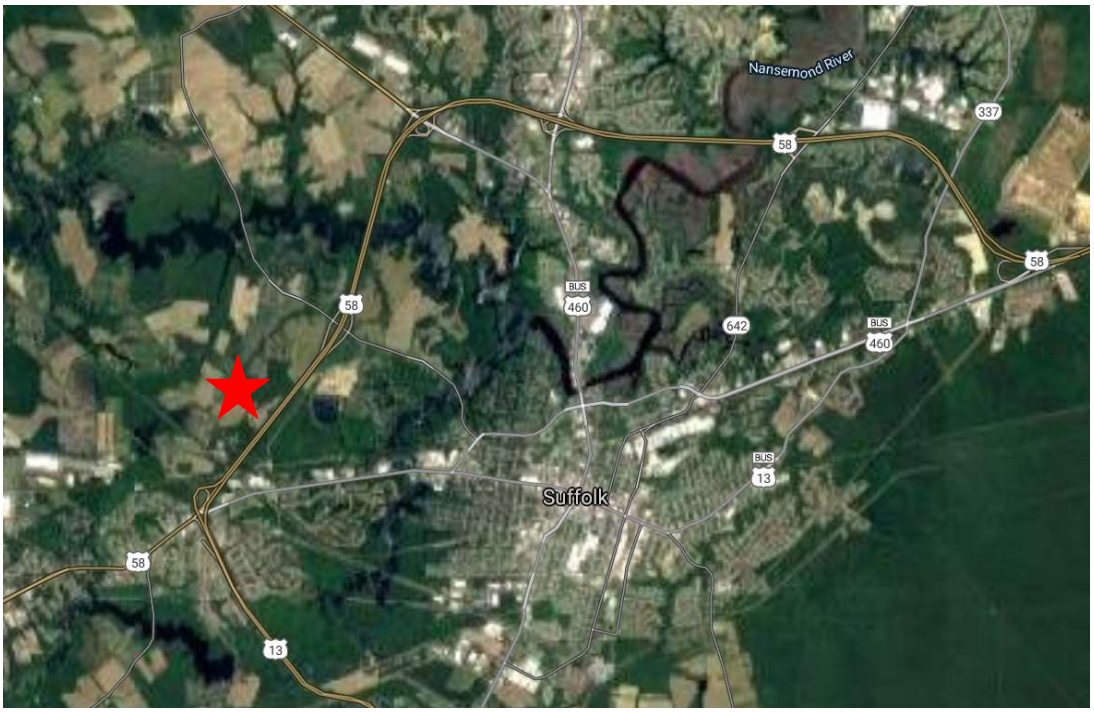
2. Access Locations
   Right and left turn lanes are proposed at the site access location.

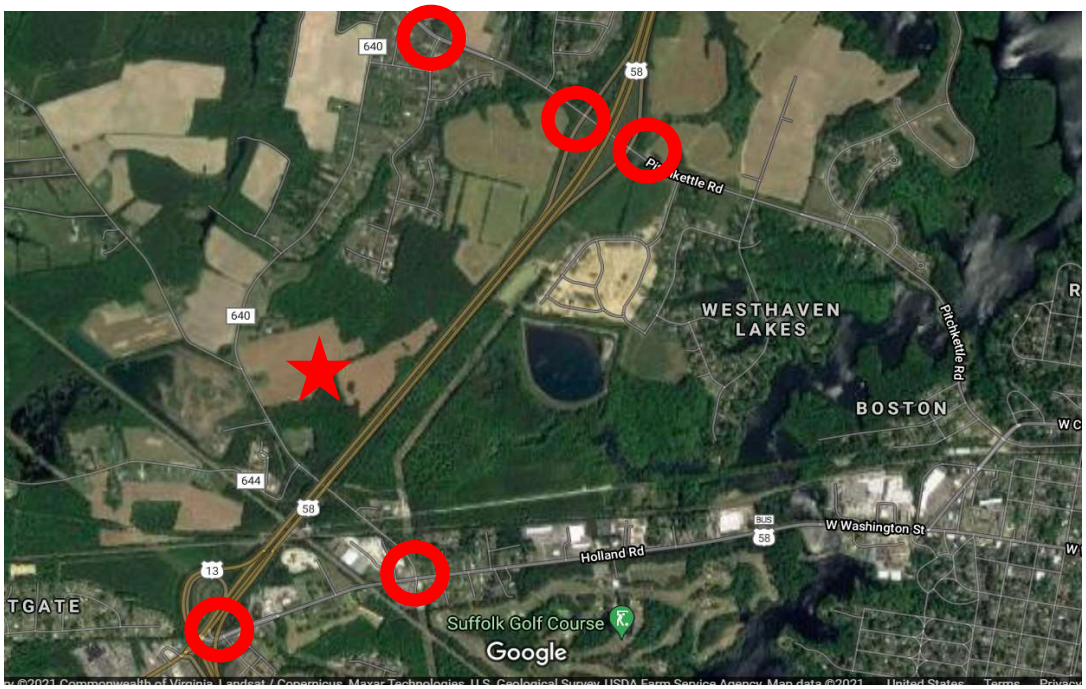
3. Additional Lake Kilby Road / Lake Cohoon Road Improvements
   Lake Kilby Road / Lake Cohoon Road will be improved along the property frontage (approximately 1,750 linear feet and on property side of road) to include curb, gutter, piped drainage, mill and overlay. In addition, adjacent to that improvement for approximately 3,750 linear feet, Lake Kilby Road will be improved within the existing right-of-way to include removal of the crown, mill and overlay to provide 20 feet of pavement width

4. Holland Road and Lake Cohoon Road Intersection
   An exclusive westbound right turn lane will be provided at this intersection.

5. Pitchkettle Road and Route 58 Ramp Junction Intersections
   The developer will contribute $25,000 to assist with funding for a preliminary engineering study to develop mitigation options for the ramp junction intersections. The $25,000 will be paid within 7 days of construction plan approval or at plan approval.

FIGURE 1
VICINITY MAP





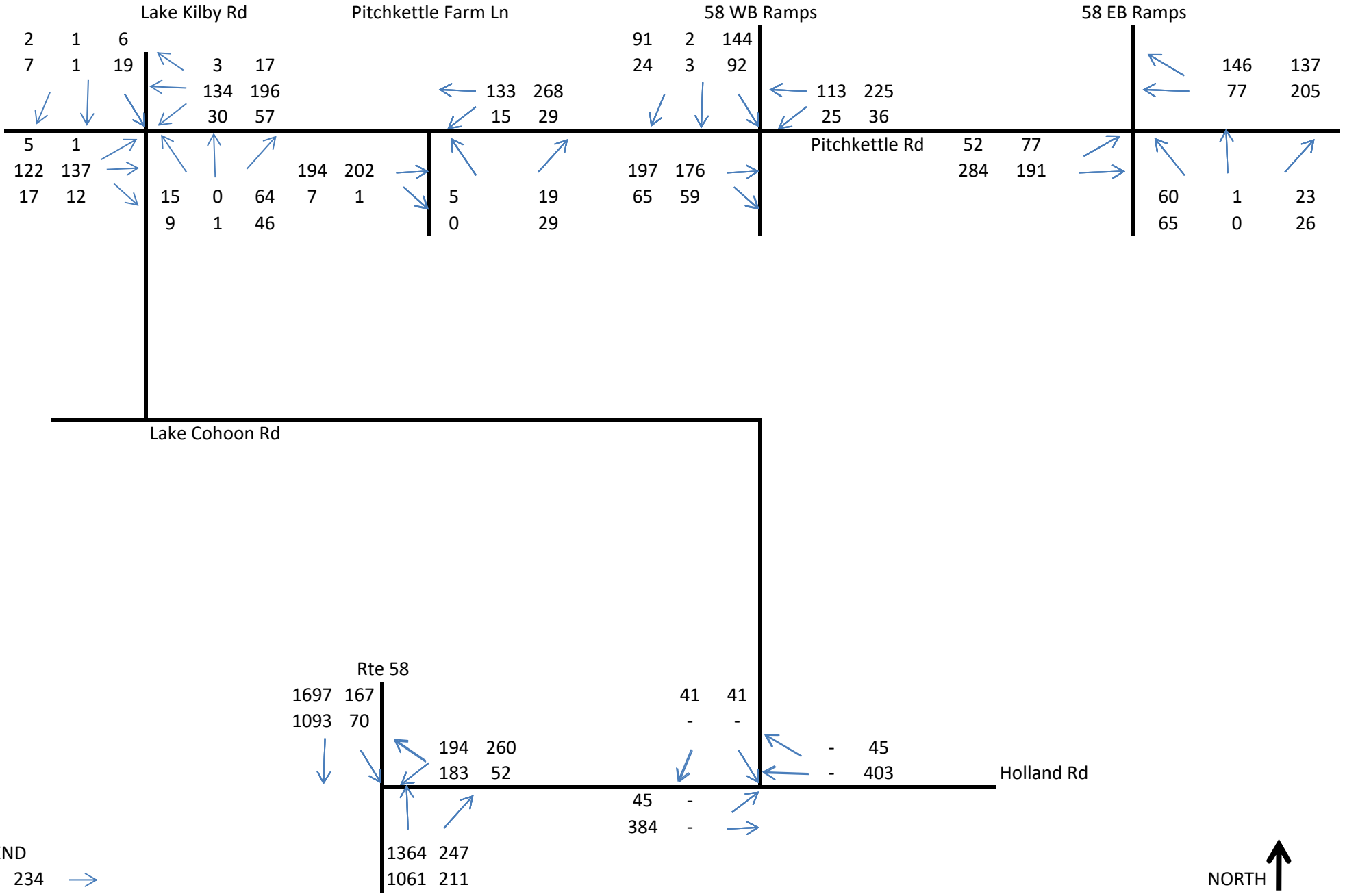
LEGEND

Proposed Site

Study Intersection

NORTH
(not to scale)

FIGURE 2
EXISTING 2021
PEAK HOUR VOLUMES



LEGEND
123 234 →
PM AM
(closest to the arrow is AM)

NORTH
(not to scale)

FIGURE 3
NO BUILD 2026
PEAK HOUR VOLUMES

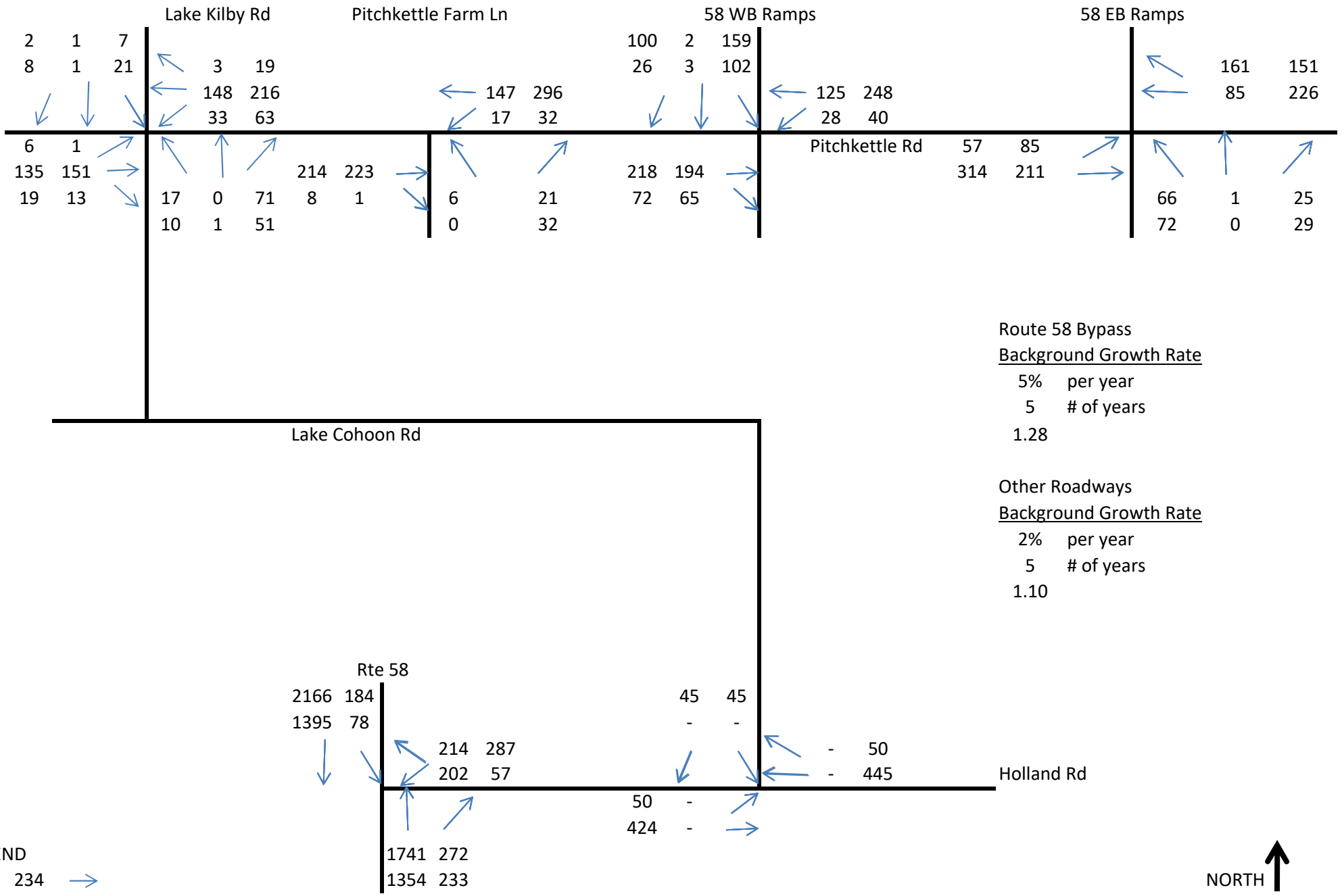
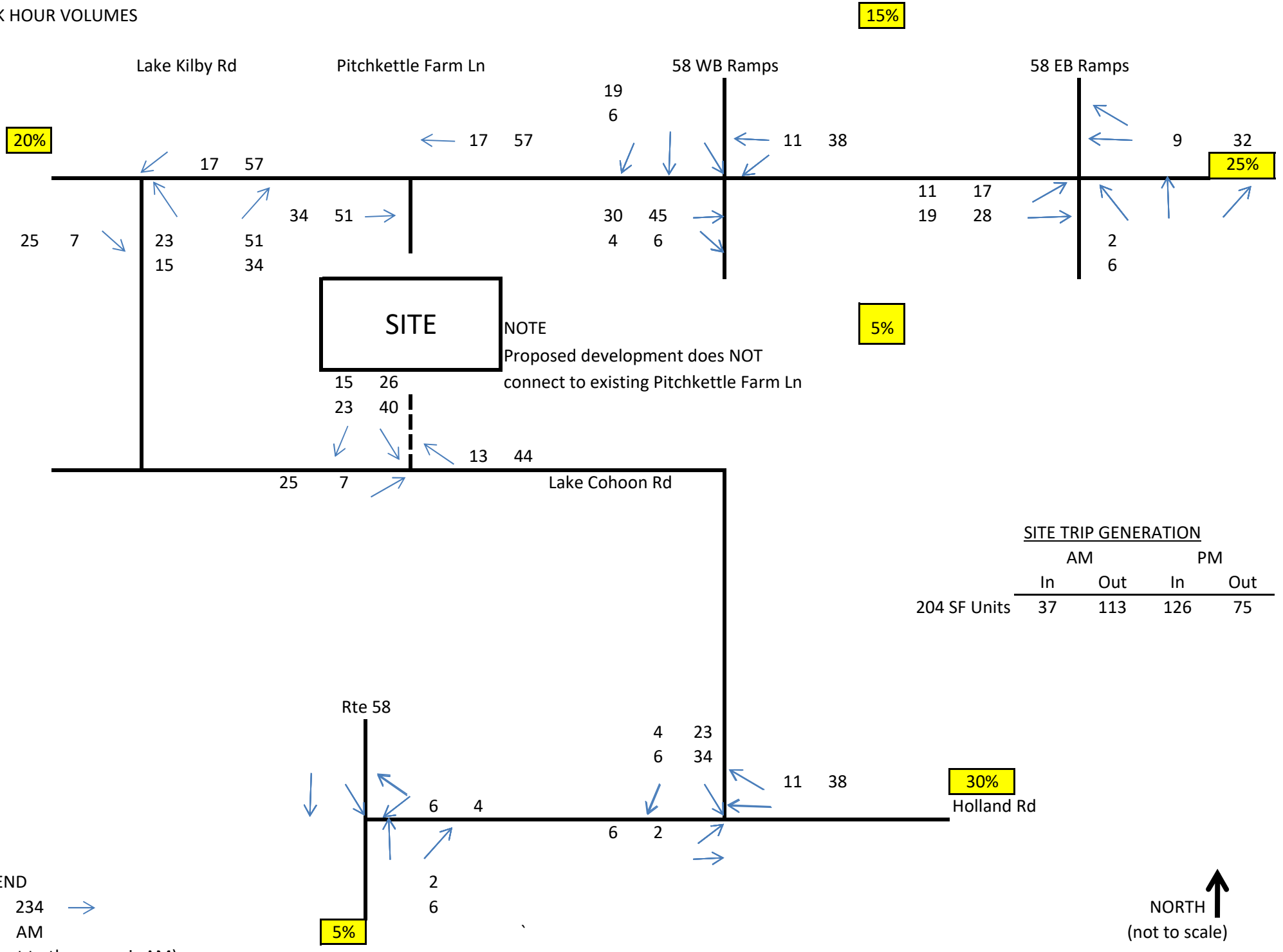


FIGURE 4
SITE TRIPS
PEAK HOUR VOLUMES



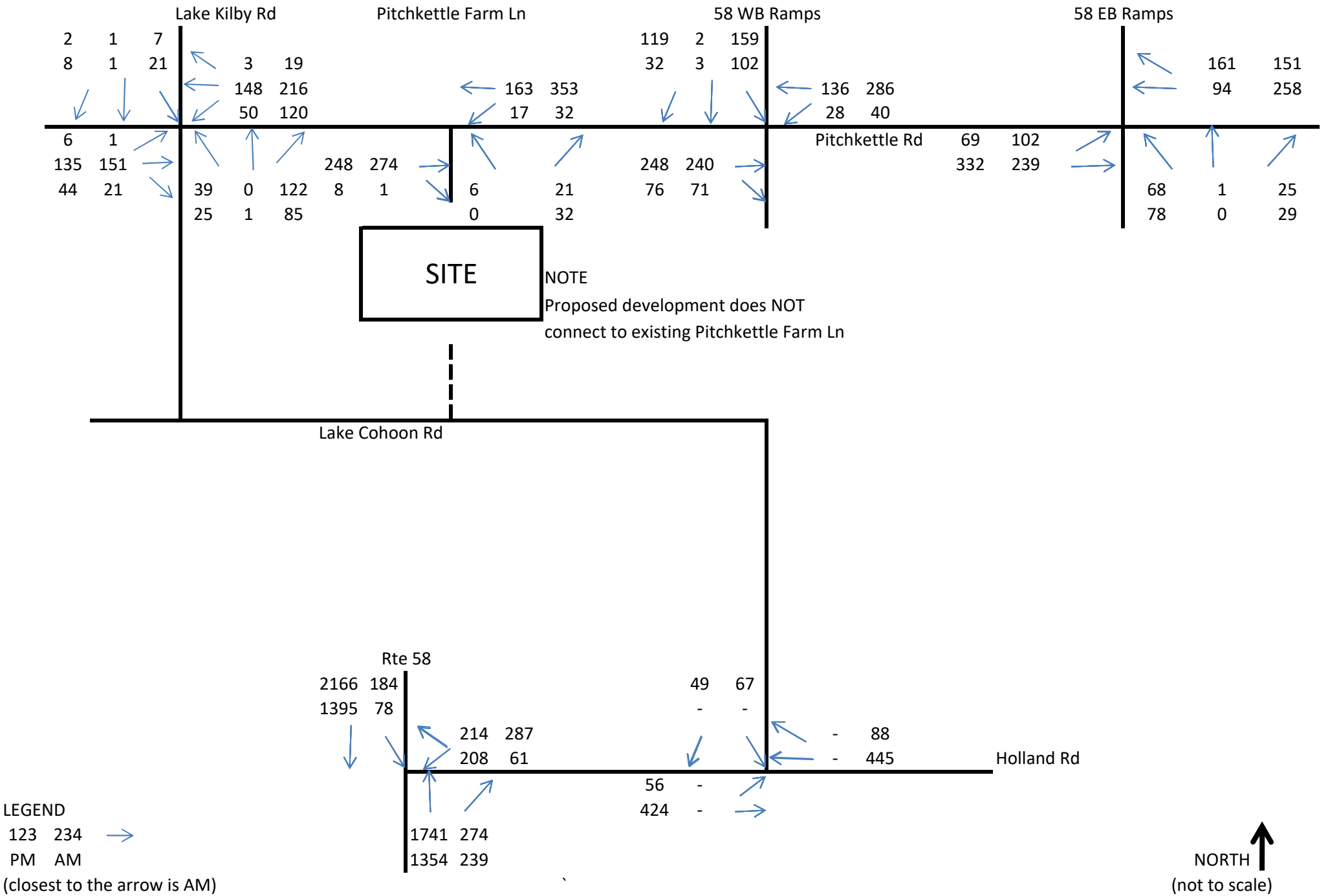
SITE TRIP GENERATION

	AM		PM	
	In	Out	In	Out
204 SF Units	37	113	126	75

LEGEND
123 234
PM AM
(closest to the arrow is AM)

NORTH
(not to scale)

FIGURE 5
BUILD 2026
PEAK HOUR VOLUMES



Appendix A
Concept Plan

LAKE KILBY ROAD

70' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

50' R/W

70' R/W

LAKE COHOON ROAD

ROUTE 58

SWMF

SWMF

PARK

PARK

PARK

PARK

31

31

19

5

5

5

28

14

18

7

11

9

21

SITE DATA

- SITE AREA: ±87.58 AC
- TOTAL LOTS PROPOSED: 204
- PROPOSED DENSITY: 2.33 UNITS/ACRE
- PROPOSED ZONING: RM
- EXISTING ZONING: RE
- REQUIRED OPEN SPACE: 9% OF SITE AREA OR ±7.88 AC
- OPEN SPACE PROVIDED: ±24.0 AC

100 50 0 100 200

scale feet

REVISIONS

No.	Date	Description

CECS
CIVIL ENGINEERING AND CONSTRUCTION SERVICES
ENGINEERS, PLANNERS, SURVEYORS AND GENERAL CONTRACTORS
5267 GREENWICH ROAD, SUITE 300
VIRGINIA BEACH, VIRGINIA 23462
(757) 777-9211

PRELIMINARY LAYOUT FOR KILBY SUBDIVISION

SUFFOLK, VIRGINIA

JOB#	22255
DWG:	22255 Prelim-3.dwg
DATE:	11-2-22
SCALE:	1"=100'

SHEET NUMBER

1 OF 1

Appendix B1
Traffic Count Worksheets

Data Collection Group

757.478.6761
LSmith@DataCollectionGroup.net

File Name : Pitchkettle and 58WB Ramps
Site Code : 33333333
Start Date : 6/15/2021

Groups Printed- Passenger Veh - Trucks

	Pitchkettle From North				Rte 58 WB Off Ramp From East				Pitchkettle From South				Rte 58 WB On Ramp From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	6	39	0	45	9	1	19	29	0	14	4	18	0	0	0	0	92
07:15 AM	13	32	0	45	9	0	16	25	0	23	7	30	0	0	0	0	100
07:30 AM	17	52	0	69	5	2	25	32	0	27	5	32	0	0	0	0	133
07:45 AM	18	41	0	59	7	0	23	30	0	25	10	35	0	0	0	0	124
Total	54	164	0	218	30	3	83	116	0	89	26	115	0	0	0	0	449
08:00 AM	7	44	0	51	6	0	23	29	0	34	5	39	0	0	0	0	119
08:15 AM	17	39	0	56	6	1	21	28	0	27	5	32	0	0	0	0	116
08:30 AM	10	41	0	51	9	0	24	33	0	22	5	27	0	0	0	0	111
08:45 AM	11	50	0	61	10	0	18	28	0	32	10	42	0	0	0	0	131
Total	45	174	0	219	31	1	86	118	0	115	25	140	0	0	0	0	477
*** BREAK ***																	
04:00 PM	26	24	0	50	25	0	39	64	0	39	13	52	0	0	0	0	166
04:15 PM	14	54	0	68	33	0	31	64	0	55	4	59	0	0	0	0	191
04:30 PM	23	60	0	83	19	2	39	60	0	62	10	72	0	0	0	0	215
04:45 PM	9	41	0	50	16	0	38	54	0	39	12	51	0	0	0	0	155
Total	72	179	0	251	93	2	147	242	0	195	39	234	0	0	0	0	727
05:00 PM	19	42	0	61	23	0	36	59	0	69	10	79	0	0	0	0	199
05:15 PM	18	51	0	69	17	0	29	46	0	58	11	69	0	0	0	0	184
05:30 PM	14	27	0	41	20	1	37	58	0	50	9	59	0	0	0	0	158
05:45 PM	14	25	0	39	25	0	37	62	0	35	4	39	0	0	0	0	140
Total	65	145	0	210	85	1	139	225	0	212	34	246	0	0	0	0	681
Grand Total	236	662	0	898	239	7	455	701	0	611	124	735	0	0	0	0	2334
Apprch %	26.3	73.7	0		34.1	1	64.9		0	83.1	16.9		0	0	0		
Total %	10.1	28.4	0	38.5	10.2	0.3	19.5	30	0	26.2	5.3	31.5	0	0	0	0	
Passenger Veh	222	651	0	873	231	7	440	678	0	603	118	721	0	0	0	0	2272
% Passenger Veh	94.1	98.3	0	97.2	96.7	100	96.7	96.7	0	98.7	95.2	98.1	0	0	0	0	97.3
Trucks	14	11	0	25	8	0	15	23	0	8	6	14	0	0	0	0	62
% Trucks	5.9	1.7	0	2.8	3.3	0	3.3	3.3	0	1.3	4.8	1.9	0	0	0	0	2.7

Data Collection Group

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File Name : Pitchkettle and 58WB Ramps
Site Code : 33333333
Start Date : 6/15/2021

	Pitchkettle From North				Rte 58 WB Off Ramp From East				Pitchkettle From South				Rte 58 WB On Ramp From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	17	**52**	0	**69**	5	**2**	**25**	**32**	0	27	5	32	0	0	0	0	**133**
07:45 AM	**18**	41	0	59	**7**	0	23	30	0	25	**10**	35	0	0	0	0	124
08:00 AM	7	44	0	51	6	0	23	29	0	**34**	5	**39**	0	0	0	0	119
08:15 AM	17	39	0	56	6	1	21	28	0	27	5	32	0	0	0	0	116
Total Volume	59	176	0	235	24	3	92	119	0	113	25	138	0	0	0	0	492
% App. Total	25.1	74.9	0		20.2	2.5	77.3		0	81.9	18.1		0	0	0		
PHF	.819	.846	.000	.851	.857	.375	.920	.930	.000	.831	.625	.885	.000	.000	.000	.000	.925
Passenger Veh	49	173	0	222	23	3	88	114	0	112	24	136	0	0	0	0	472
% Passenger Veh	83.1	98.3	0	94.5	95.8	100	95.7	95.8	0	99.1	96.0	98.6	0	0	0	0	95.9
Trucks	10	3	0	13	1	0	4	5	0	1	1	2	0	0	0	0	20
% Trucks	16.9	1.7	0	5.5	4.2	0	4.3	4.2	0	0.9	4.0	1.4	0	0	0	0	4.1

Data Collection Group

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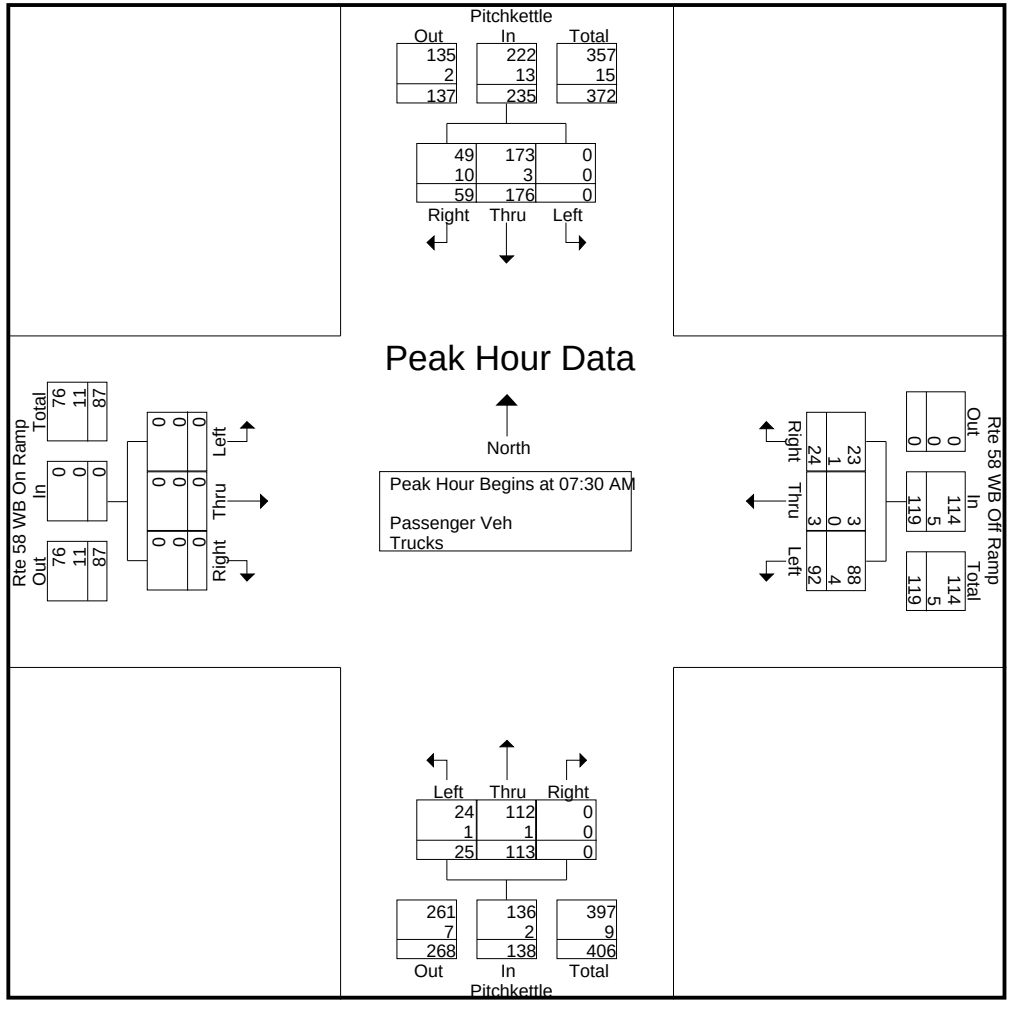
File Name : Pitchkettle and 58WB Ramps
Site Code : 33333333
Start Date : 6/15/2021
Page No : 3



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	Pitchkettle From North				Rte 58 WB Off Ramp From East				Pitchkettle From South				Rte 58 WB On Ramp From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	14	54	0	68	**33**	0	31	**64**	0	55	4	59	0	0	0	0	191
04:30 PM	**23**	**60**	0	**83**	19	**2**	**39**	60	0	62	10	72	0	0	0	0	**215**
04:45 PM	9	41	0	50	16	0	38	54	0	39	**12**	51	0	0	0	0	155
05:00 PM	19	42	0	61	23	0	36	59	0	**69**	10	**79**	0	0	0	0	199
Total Volume	65	197	0	262	91	2	144	237	0	225	36	261	0	0	0	0	760
% App. Total	24.8	75.2	0		38.4	0.8	60.8		0	86.2	13.8		0	0	0		
PHF	.707	.821	.000	.789	.689	.250	.923	.926	.000	.815	.750	.826	.000	.000	.000	.000	.884
Passenger Veh	65	195	0	260	88	2	141	231	0	223	34	257	0	0	0	0	748
% Passenger Veh	100	99.0	0	99.2	96.7	100	97.9	97.5	0	99.1	94.4	98.5	0	0	0	0	98.4
Trucks	0	2	0	2	3	0	3	6	0	2	2	4	0	0	0	0	12
% Trucks	0	1.0	0	0.8	3.3	0	2.1	2.5	0	0.9	5.6	1.5	0	0	0	0	1.6

Data Collection Group

757.478.6761
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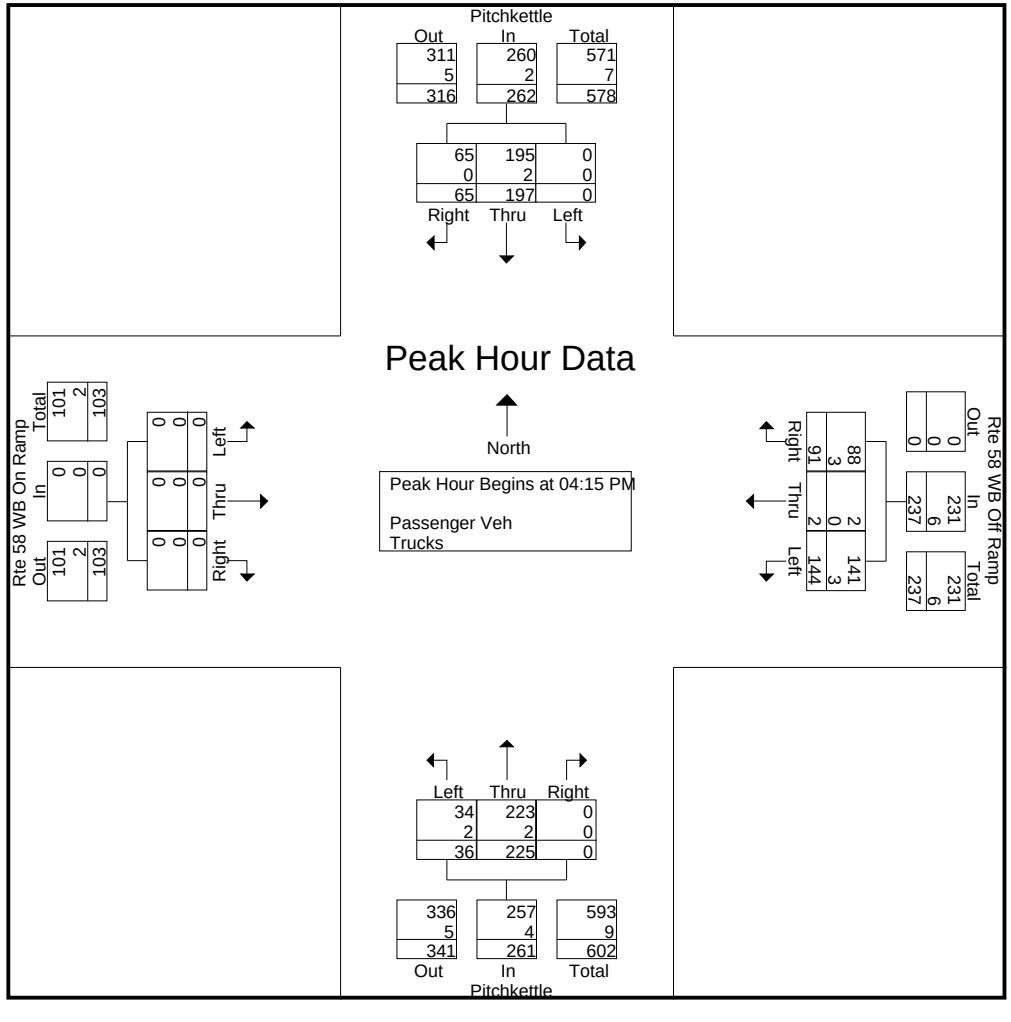
File Name : Pitchkettle and 58WB Ramps
Site Code : 33333333
Start Date : 6/15/2021
Page No : 5



Data Collection Group

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File Name : Pitchkettle and Pitchkettle Farm
Site Code :
Start Date : 6/15/2021
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Pitchkettle Rd From East			Pitchkettle Farm Ln From South			Pitchkettle Rd From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	20	2	22	8	0	8	0	39	39	69
07:15 AM	29	5	34	8	0	8	0	29	29	71
07:30 AM	31	5	36	3	1	4	0	55	55	95
07:45 AM	39	2	41	4	0	4	0	56	56	101
Total	119	14	133	23	1	24	0	179	179	336
08:00 AM	37	5	42	6	4	10	1	47	48	100
08:15 AM	26	3	29	6	0	6	0	44	44	79
08:30 AM	31	3	34	9	2	11	2	37	39	84
08:45 AM	33	6	39	10	4	14	0	42	42	95
Total	127	17	144	31	10	41	3	170	173	358
04:00 PM	48	12	60	6	1	7	0	45	45	112
04:15 PM	52	7	59	6	0	6	1	45	46	111
04:30 PM	66	7	73	9	0	9	1	54	55	137
04:45 PM	55	9	64	6	0	6	2	42	44	114
Total	221	35	256	27	1	28	4	186	190	474
05:00 PM	78	7	85	2	0	2	1	50	51	138
05:15 PM	69	6	75	12	0	12	3	48	51	138
05:30 PM	71	8	79	6	0	6	0	34	34	119
05:45 PM	42	5	47	6	3	9	3	45	48	104
Total	260	26	286	26	3	29	7	177	184	499
Grand Total	727	92	819	107	15	122	14	712	726	1667
Apprch %	88.8	11.2		87.7	12.3		1.9	98.1		
Total %	43.6	5.5	49.1	6.4	0.9	7.3	0.8	42.7	43.6	
Passenger Veh	690	90	780	103	14	117	13	678	691	1588
% Passenger Veh	94.9	97.8	95.2	96.3	93.3	95.9	92.9	95.2	95.2	95.3
Trucks	37	2	39	4	1	5	1	34	35	79
% Trucks	5.1	2.2	4.8	3.7	6.7	4.1	7.1	4.8	4.8	4.7

Data Collection Group

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File Name : Pitchkettle and Pitchkettle Farm
Site Code :
Start Date : 6/15/2021

	Pitchkettle Rd From East			Pitchkettle Farm Ln From South			Pitchkettle Rd From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	31	**5**	36	3	1	4	0	55	55	95
07:45 AM	**39**	2	41	4	0	4	0	**56**	**56**	**101**
08:00 AM	37	5	**42**	**6**	**4**	**10**	**1**	47	48	100
08:15 AM	26	3	29	6	0	6	0	44	44	79
Total Volume	133	15	148	19	5	24	1	202	203	375
% App. Total	89.9	10.1		79.2	20.8		0.5	99.5		
PHF	.853	.750	.881	.792	.313	.600	.250	.902	.906	.928
Passenger Veh	123	13	136	19	5	24	1	189	190	350
% Passenger Veh	92.5	86.7	91.9	100	100	100	100	93.6	93.6	93.3
Trucks	10	2	12	0	0	0	0	13	13	25
% Trucks	7.5	13.3	8.1	0	0	0	0	6.4	6.4	6.7

Data Collection Group

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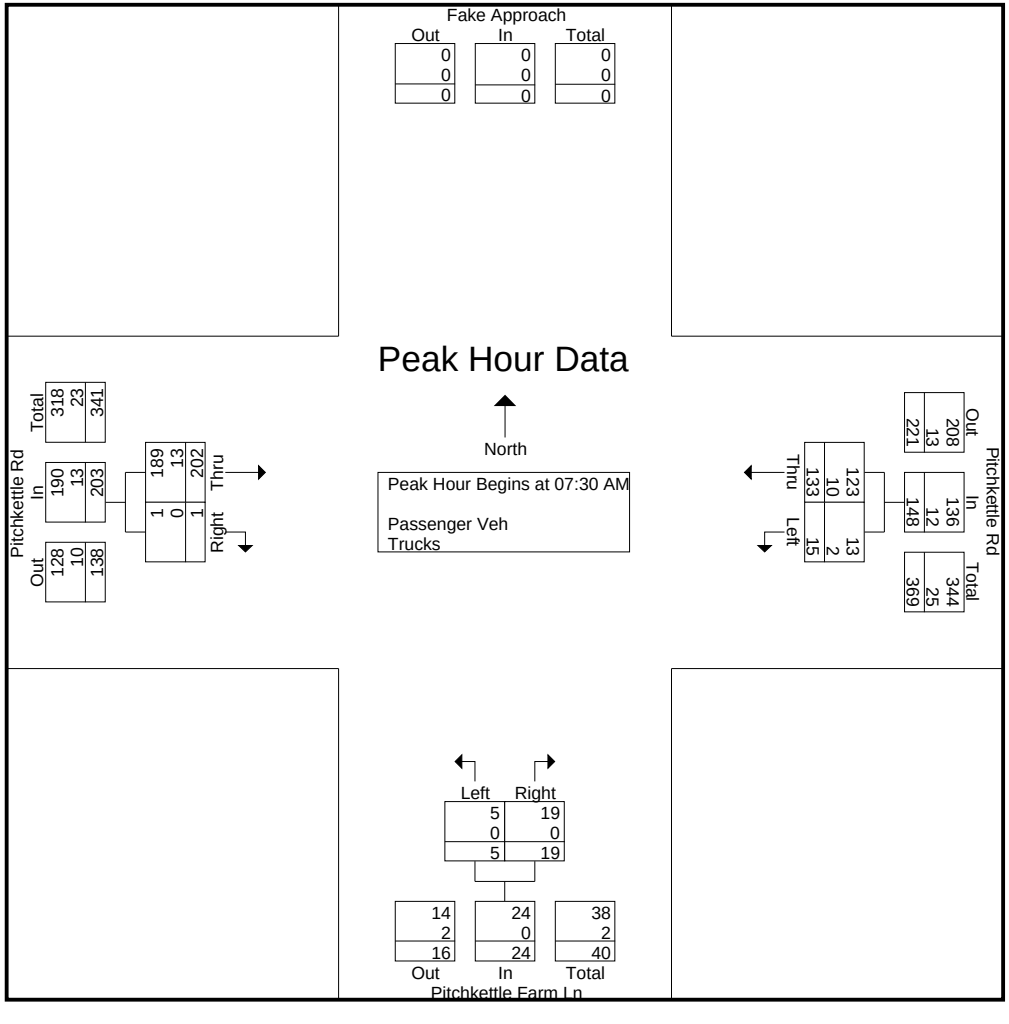
File Name : Pitchkettle and Pitchkettle Farm
Site Code :
Start Date : 6/15/2021
Page No : 3



Data Collection Group

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File Name : Pitchkettle and Pitchkettle Farm
Site Code :
Start Date : 6/15/2021

	Pitchkettle Rd From East			Pitchkettle Farm Ln From South			Pitchkettle Rd From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	66	7	73	9	0	9	1	**54**	**55**	137
04:45 PM	55	**9**	64	6	0	6	2	42	44	114
05:00 PM	**78**	7	**85**	2	0	2	1	50	51	**138**
05:15 PM	69	6	75	**12**	0	**12**	**3**	48	51	138
Total Volume	268	29	297	29	0	29	7	194	201	527
% App. Total	90.2	9.8		100	0		3.5	96.5		
PHF	.859	.806	.874	.604	.000	.604	.583	.898	.914	.955
Passenger Veh	264	29	293	25	0	25	7	186	193	511
% Passenger Veh	98.5	100	98.7	86.2	0	86.2	100	95.9	96.0	97.0
Trucks	4	0	4	4	0	4	0	8	8	16
% Trucks	1.5	0	1.3	13.8	0	13.8	0	4.1	4.0	3.0

Data Collection Group

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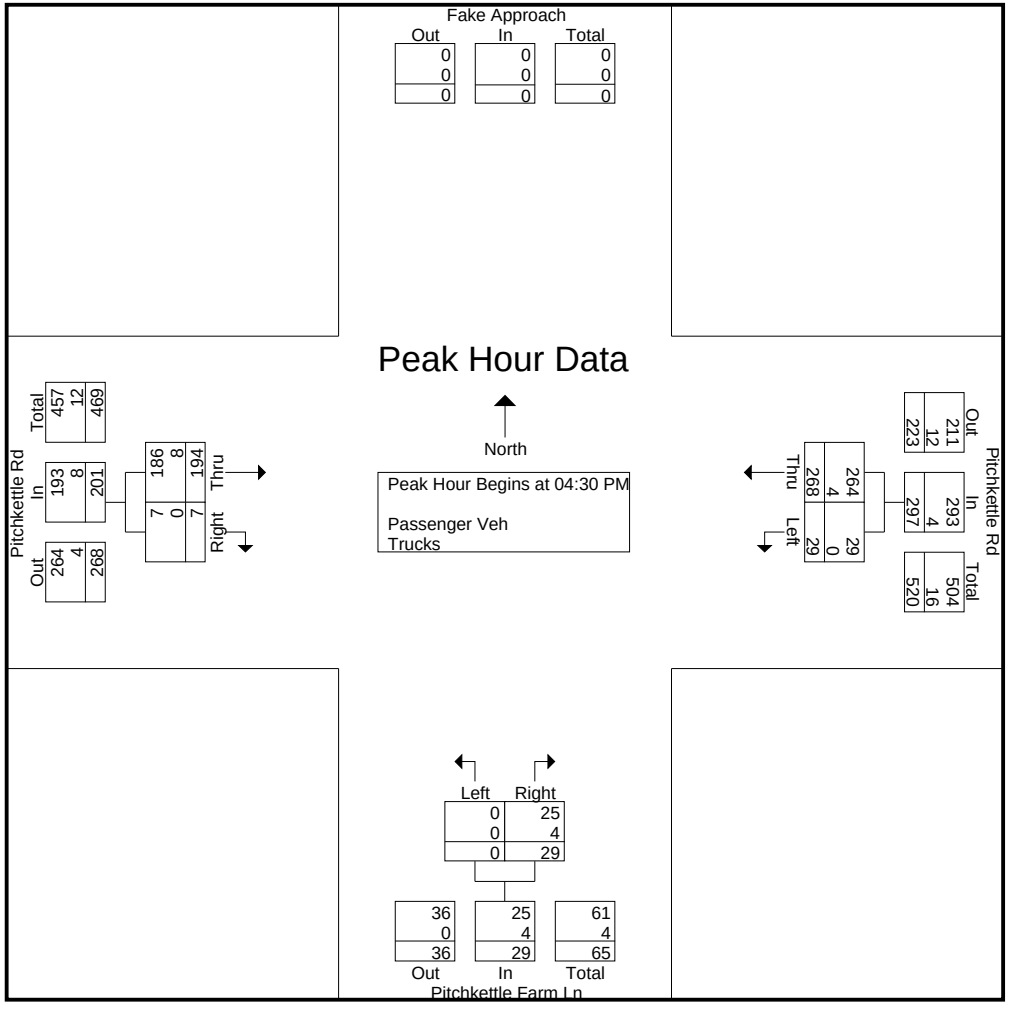
File Name : Pitchkettle and Pitchkettle Farm
Site Code :
Start Date : 6/15/2021
Page No : 5



Data Collection Group

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File Name : Pitchkettle and Rte 58 EB Ramps
Site Code :
Start Date : 6/15/2021
Page No : 1

Groups Printed- Passenger Veh - Trucks

	Pitchkettle Rd From East				58 EB Off Ramp From South				Pitchkettle Rd From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	29	10	0	39	8	0	6	14	0	26	32	58	111
07:15 AM	39	17	0	56	8	0	13	21	0	29	19	48	125
07:30 AM	41	14	0	55	4	0	17	21	0	54	23	77	153
07:45 AM	34	23	0	57	8	0	12	20	0	47	17	64	141
Total	143	64	0	207	28	0	48	76	0	156	91	247	530
08:00 AM	40	25	0	65	2	1	14	17	0	47	20	67	149
08:15 AM	31	15	0	46	9	0	17	26	0	43	17	60	132
08:30 AM	22	17	0	39	5	0	10	15	0	48	17	65	119
08:45 AM	21	28	0	49	7	1	12	20	0	48	20	68	137
Total	114	85	0	199	23	2	53	78	0	186	74	260	537
04:00 PM	35	35	0	70	8	0	17	25	0	52	11	63	158
04:15 PM	23	43	0	66	6	0	15	21	0	70	15	85	172
04:30 PM	34	54	0	88	9	0	17	26	0	87	12	99	213
04:45 PM	32	43	0	75	6	0	8	14	0	67	12	79	168
Total	124	175	0	299	29	0	57	86	0	276	50	326	711
05:00 PM	49	65	0	114	4	0	14	18	0	68	10	78	210
05:15 PM	22	43	0	65	7	0	26	33	0	62	18	80	178
05:30 PM	34	35	0	69	10	0	24	34	0	54	10	64	167
05:45 PM	34	26	0	60	3	0	12	15	0	51	11	62	137
Total	139	169	0	308	24	0	76	100	0	235	49	284	692
Grand Total	520	493	0	1013	104	2	234	340	0	853	264	1117	2470
Apprch %	51.3	48.7	0		30.6	0.6	68.8		0	76.4	23.6		
Total %	21.1	20	0	41	4.2	0.1	9.5	13.8	0	34.5	10.7	45.2	
Passenger Veh	496	473	0	969	100	0	219	319	0	810	249	1059	2347
% Passenger Veh	95.4	95.9	0	95.7	96.2	0	93.6	93.8	0	95	94.3	94.8	95
Trucks	24	20	0	44	4	2	15	21	0	43	15	58	123
% Trucks	4.6	4.1	0	4.3	3.8	100	6.4	6.2	0	5	5.7	5.2	5

Data Collection Group

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File Name : Pitchkettle and Rte 58 EB Ramps
Site Code :
Start Date : 6/15/2021
Page No : 2

	Pitchkettle Rd From East				58 EB Off Ramp From South				Pitchkettle Rd From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	**41**	14	0	55	4	0	**17**	21	0	**54**	**23**	**77**	**153**
07:45 AM	34	23	0	57	8	0	12	20	0	47	17	64	141
08:00 AM	40	**25**	0	**65**	2	**1**	14	17	0	47	20	67	149
08:15 AM	31	15	0	46	**9**	0	17	**26**	0	43	17	60	132
Total Volume	146	77	0	223	23	1	60	84	0	191	77	268	575
% App. Total	65.5	34.5	0		27.4	1.2	71.4		0	71.3	28.7		
PHF	.890	.770	.000	.858	.639	.250	.882	.808	.000	.884	.837	.870	.940
Passenger Veh	136	75	0	211	23	0	54	77	0	184	71	255	543
% Passenger Veh	93.2	97.4	0	94.6	100	0	90.0	91.7	0	96.3	92.2	95.1	94.4
Trucks	10	2	0	12	0	1	6	7	0	7	6	13	32
% Trucks	6.8	2.6	0	5.4	0	100	10.0	8.3	0	3.7	7.8	4.9	5.6

Data Collection Group

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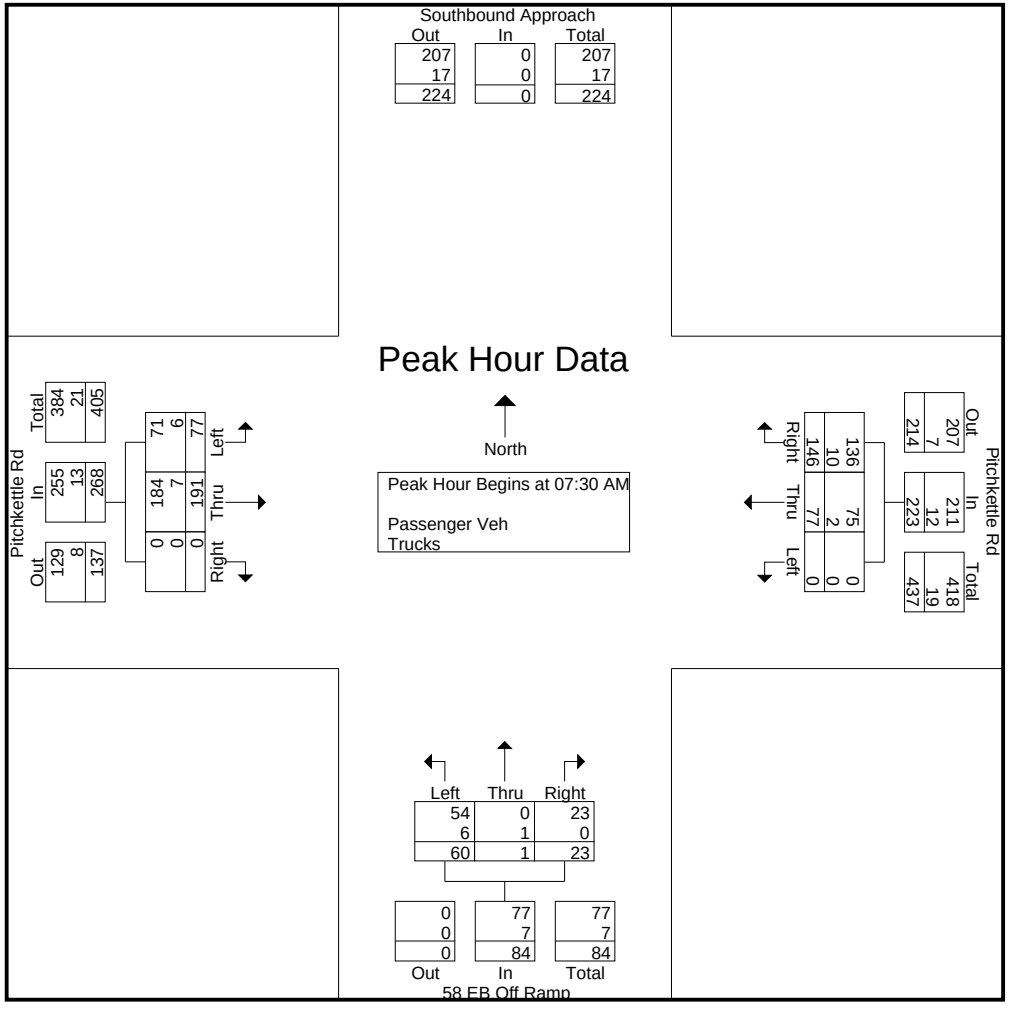
File Name : Pitchkettle and Rte 58 EB Ramps
Site Code :
Start Date : 6/15/2021
Page No : 3



Data Collection Group

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File Name : Pitchkettle and Rte 58 EB Ramps
Site Code :
Start Date : 6/15/2021
Page No : 4

	Pitchkettle Rd From East				58 EB Off Ramp From South				Pitchkettle Rd From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	34	54	0	88	**9**	0	17	26	0	**87**	12	**99**	**213**
04:45 PM	32	43	0	75	6	0	8	14	0	67	12	79	168
05:00 PM	**49**	**65**	0	**114**	4	0	14	18	0	68	10	78	210
05:15 PM	22	43	0	65	7	0	**26**	**33**	0	62	**18**	80	178
Total Volume	137	205	0	342	26	0	65	91	0	284	52	336	769
% App. Total	40.1	59.9	0		28.6	0	71.4		0	84.5	15.5		
PHF	.699	.788	.000	.750	.722	.000	.625	.689	.000	.816	.722	.848	.903
Passenger Veh	134	203	0	337	26	0	64	90	0	274	51	325	752
% Passenger Veh	97.8	99.0	0	98.5	100	0	98.5	98.9	0	96.5	98.1	96.7	97.8
Trucks	3	2	0	5	0	0	1	1	0	10	1	11	17
% Trucks	2.2	1.0	0	1.5	0	0	1.5	1.1	0	3.5	1.9	3.3	2.2

Data Collection Group

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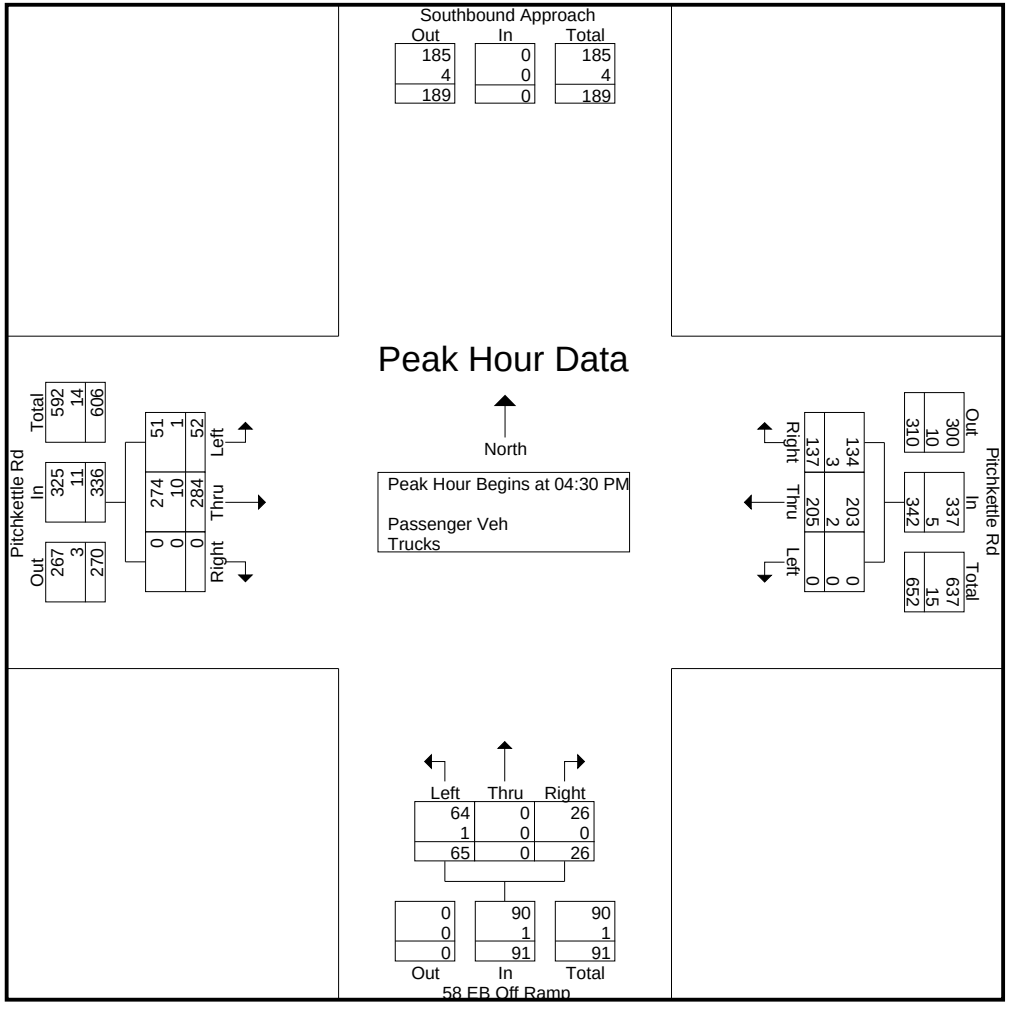
File Name : Pitchkettle and Rte 58 EB Ramps
Site Code :
Start Date : 6/15/2021
Page No : 5



Data Collection Group
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File Name : Rte 58 and Holland
Site Code : 92619261
Start Date : 9/26/2017
Page No : 1

Groups Printed- Passenger Veh - Trucks

	From North					Rte 58 From East					Holland Bus From South					Rte 58 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	144	12	0	156	54	0	38	0	92	42	248	0	0	290	538
07:15 AM	0	0	0	0	0	0	208	13	0	221	46	0	27	0	73	48	275	0	0	323	617
07:30 AM	0	0	0	0	0	0	215	24	0	239	48	0	41	0	89	47	328	0	0	375	703
07:45 AM	0	0	0	0	0	0	251	19	0	270	44	0	50	0	94	74	247	0	0	321	685
Total	0	0	0	0	0	0	818	68	0	886	192	0	156	0	348	211	1098	0	0	1309	2543
08:00 AM	0	0	0	0	0	0	225	9	0	234	41	0	51	0	92	59	272	0	0	331	657
08:15 AM	0	0	0	0	0	0	218	34	0	252	32	0	28	0	60	57	212	0	0	269	581
08:30 AM	0	0	0	0	0	0	187	25	0	212	38	0	27	0	65	45	216	0	0	261	538
08:45 AM	0	0	0	0	0	0	212	20	0	232	41	0	47	0	88	59	189	0	0	248	568
Total	0	0	0	0	0	0	842	88	0	930	152	0	153	0	305	220	889	0	0	1109	2344
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	302	44	0	346	62	0	13	0	75	47	227	0	0	274	695
04:15 PM	0	0	0	0	0	0	345	35	0	380	71	0	11	0	82	52	216	0	0	268	730
04:30 PM	0	0	0	0	0	0	388	36	0	424	57	0	10	0	67	43	235	0	0	278	769
04:45 PM	0	0	0	0	0	0	329	39	0	368	53	0	12	0	65	57	195	0	0	252	685
Total	0	0	0	0	0	0	1364	154	0	1518	243	0	46	0	289	199	873	0	0	1072	2879
05:00 PM	0	0	0	0	0	0	334	44	0	378	59	0	15	0	74	43	227	0	0	270	722
05:15 PM	0	0	0	0	0	0	345	52	0	397	58	0	15	0	73	49	195	0	0	244	714
05:30 PM	0	0	0	0	0	0	374	48	0	422	58	0	11	0	69	49	205	0	0	254	745
05:45 PM	0	0	0	0	0	0	301	45	0	346	43	0	9	0	52	32	252	0	0	284	682
Total	0	0	0	0	0	0	1354	189	0	1543	218	0	50	0	268	173	879	0	0	1052	2863
Grand Total	0	0	0	0	0	0	4378	499	0	4877	805	0	405	0	1210	803	3739	0	0	4542	10629
Apprch %	0	0	0	0		0	89.8	10.2	0		66.5	0	33.5	0		17.7	82.3	0	0		
Total %	0	0	0	0	0	0	41.2	4.7	0	45.9	7.6	0	3.8	0	11.4	7.6	35.2	0	0	42.7	
Passenger Veh	0	0	0	0	0	0	3763	480	0	4243	777	0	380	0	1157	776	3234	0	0	4010	9410
% Passenger Veh	0	0	0	0	0	0	86	96.2	0	87	96.5	0	93.8	0	95.6	96.6	86.5	0	0	88.3	88.5
Trucks	0	0	0	0	0	0	615	19	0	634	28	0	25	0	53	27	505	0	0	532	1219
% Trucks	0	0	0	0	0	0	14	3.8	0	13	3.5	0	6.2	0	4.4	3.4	13.5	0	0	11.7	11.5

Data Collection Group
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File Name : Rte 58 and Holland
Site Code : 92619261
Start Date : 9/26/2017
Page No : 2

	From North					Rte 58 From East					Holland Bus From South					Rte 58 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	208	13	0	221	46	0	27	0	73	48	275	0	0	323	617
07:30 AM	0	0	0	0	0	0	215	**24**	0	239	**48**	0	41	0	89	47	**328**	0	0	**375**	**703**
07:45 AM	0	0	0	0	0	0	**251**	19	0	**270**	44	0	50	0	**94**	**74**	247	0	0	321	685
08:00 AM	0	0	0	0	0	0	225	9	0	234	41	0	**51**	0	92	59	272	0	0	331	657
Total Volume	0	0	0	0	0	0	899	65	0	964	179	0	169	0	348	228	1122	0	0	1350	2662
% App. Total	0	0	0	0		0	93.3	6.7	0		51.4	0	48.6	0		16.9	83.1	0	0		
PHF	.000	.000	.000	.000	.000	.000	.895	.677	.000	.893	.932	.000	.828	.000	.926	.770	.855	.000	.000	.900	.947
Passenger Veh	0	0	0	0	0	0	715	58	0	773	172	0	156	0	328	217	975	0	0	1192	2293
% Passenger Veh	0	0	0	0	0	0	79.5	89.2	0	80.2	96.1	0	92.3	0	94.3	95.2	86.9	0	0	88.3	86.1
Trucks	0	0	0	0	0	0	184	7	0	191	7	0	13	0	20	11	147	0	0	158	369
% Trucks	0	0	0	0	0	0	20.5	10.8	0	19.8	3.9	0	7.7	0	5.7	4.8	13.1	0	0	11.7	13.9

Data Collection Group
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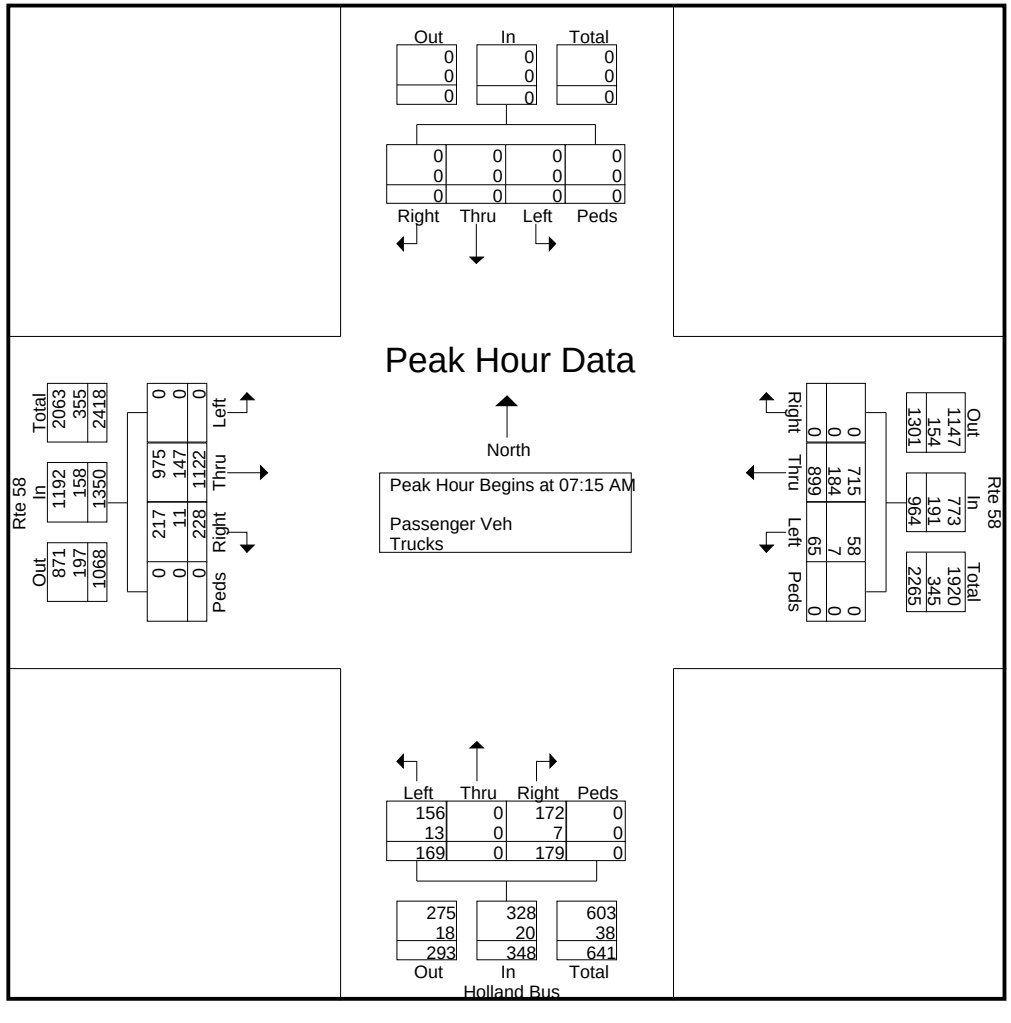
File Name : Rte 58 and Holland
Site Code : 92619261
Start Date : 9/26/2017
Page No : 3



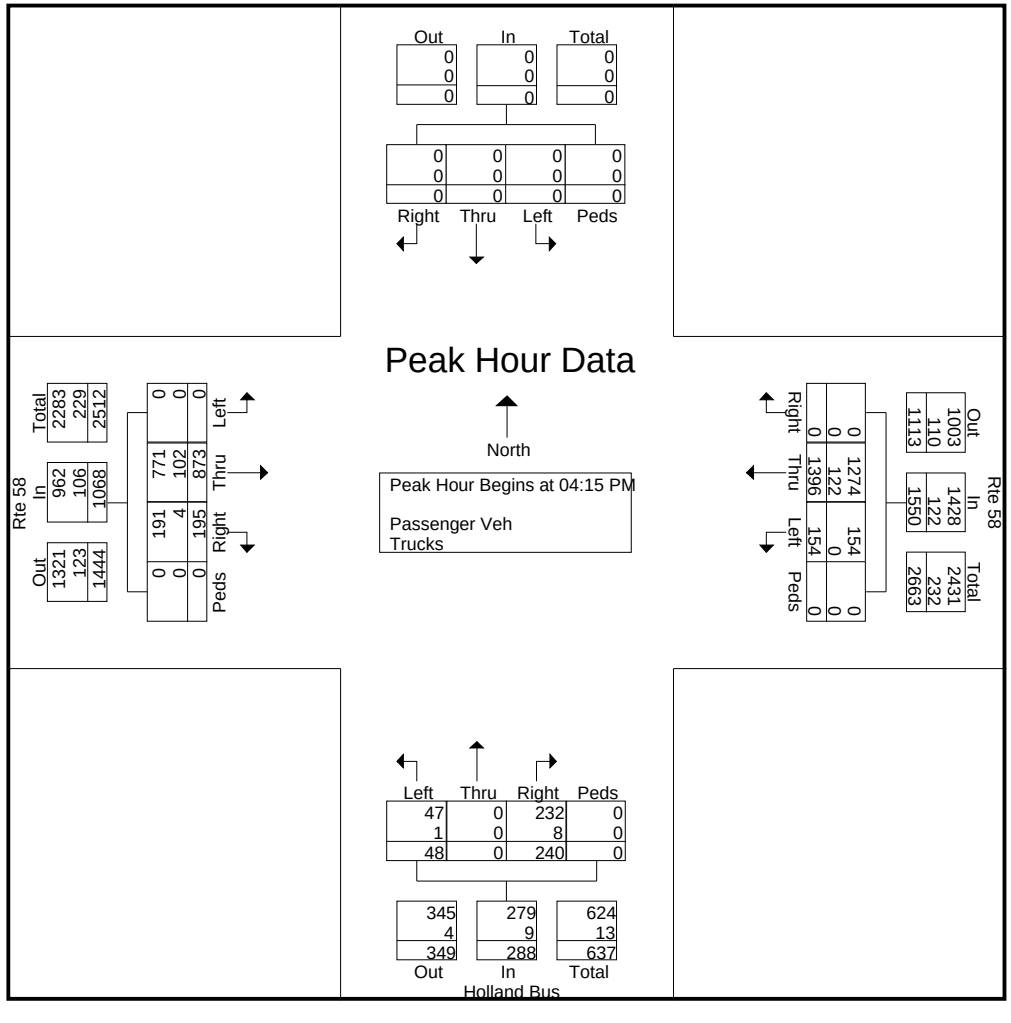
Data Collection Group
LSmith@DataCollectionGroup.net

File Name : Rte 58 and Holland
Site Code : 92619261
Start Date : 9/26/2017
Page No : 4

	From North					Rte 58 From East					Holland Bus From South					Rte 58 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	0	0	0	0	345	35	0	380	**71**	0	11	0	**82**	52	216	0	0	268	730
04:30 PM	0	0	0	0	0	0	**388**	36	0	**424**	57	0	10	0	67	43	**235**	0	0	**278**	**769**
04:45 PM	0	0	0	0	0	0	329	39	0	368	53	0	12	0	65	**57**	195	0	0	252	685
05:00 PM	0	0	0	0	0	0	334	**44**	0	378	59	0	**15**	0	74	43	227	0	0	270	722
Total Volume	0	0	0	0	0	0	1396	154	0	1550	240	0	48	0	288	195	873	0	0	1068	2906
% App. Total	0	0	0	0		0	90.1	9.9	0		83.3	0	16.7	0		18.3	81.7	0	0		
PHF	.000	.000	.000	.000	.000	.000	.899	.875	.000	.914	.845	.000	.800	.000	.878	.855	.929	.000	.000	.960	.945
Passenger Veh	0	0	0	0	0	0	1274	154	0	1428	232	0	47	0	279	191	771	0	0	962	2669
% Passenger Veh	0	0	0	0	0	0	91.3	100	0	92.1	96.7	0	97.9	0	96.9	97.9	88.3	0	0	90.1	91.8
Trucks	0	0	0	0	0	0	122	0	0	122	8	0	1	0	9	4	102	0	0	106	237
% Trucks	0	0	0	0	0	0	8.7	0	0	7.9	3.3	0	2.1	0	3.1	2.1	11.7	0	0	9.9	8.2

Data Collection Group
LSmith@DataCollectionGroup.net

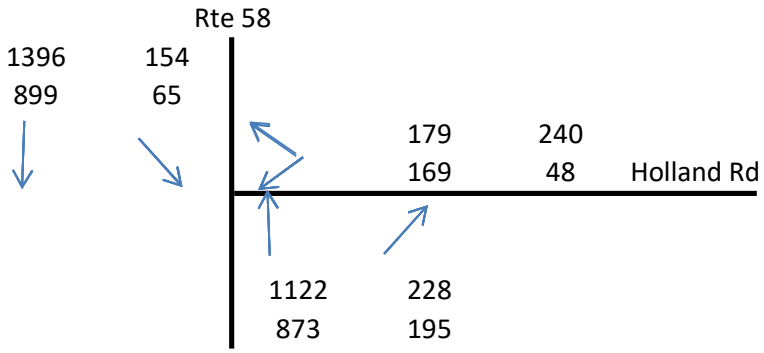
File Name : Rte 58 and Holland
Site Code : 92619261
Start Date : 9/26/2017
Page No : 5



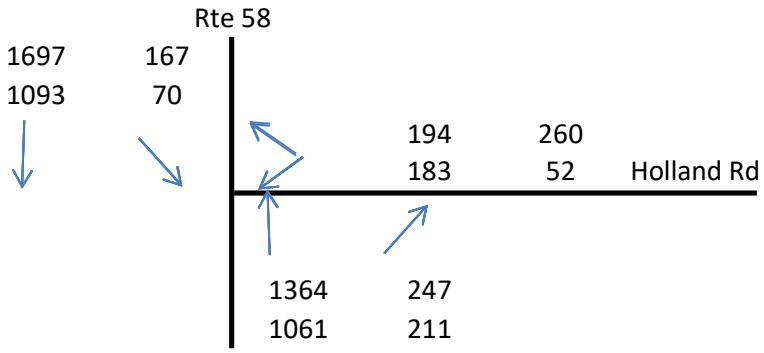
Appendix B2
Rte 58 and Holland
Traffic Count Data

Appendix B2
Rte 58 and Holland
2017 TMC Factored to 2021

September 2017 TMC



Factored to 2021



Route 58 Bypass
Background Growth Rate

5%	per year
4	# of years
1.22	

Other Roadways
Background Growth Rate

2%	per year
4	# of years
1.08	

LEGEND
123 234 →
PM AM
(closest to the arrow is AM)

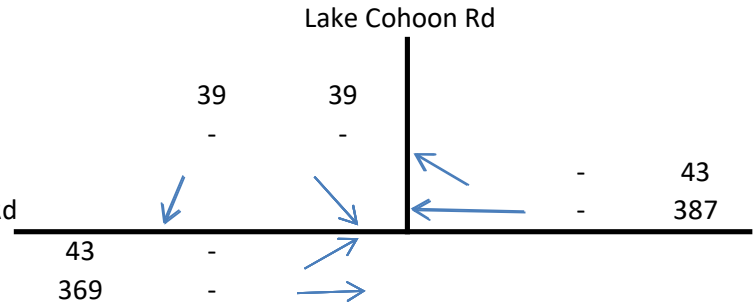
NORTH ↑
(not to scale)

Appendix B3
Holland and Lake Cohoon
Traffic Count Data

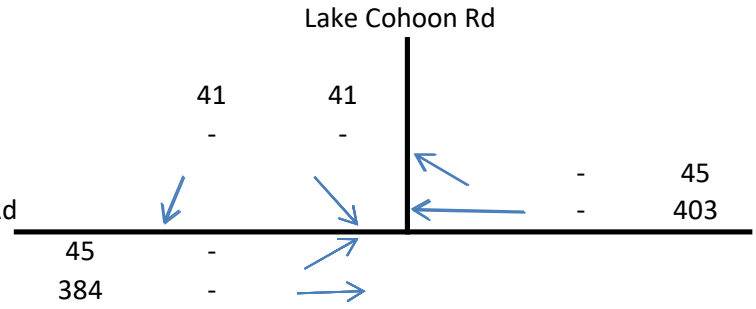
Appendix B3
Lake Cohoon and Holland
2019 ADT Data Factored to 2021 TMC Data

2019 ADT Data (from VDOT Database)	ADT	Truck %	D Factor	K factor	PM Peak Hour Volume Calc Total	Directional	
Lake Cohoon Rd	1500	3	0.527	0.11	165	87	78
Holland Rd	8900	3	0.512	0.085	757	387	369

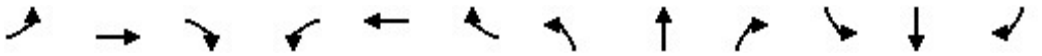
2019 Calculated TMC Data



Factored to 2021



Appendix C
Intersection Capacity Analysis Worksheets – Existing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	176	59	25	113	0	0	0	0	92	3	24
Future Volume (Veh/h)	0	176	59	25	113	0	0	0	0	92	3	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	207	69	28	127	0	0	0	0	99	3	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	127			276			452	424	242	424	459	127
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	127			276			452	424	242	424	459	127
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	81	99	97
cM capacity (veh/h)	1435			1293			492	510	797	528	485	918

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	276	155	102	26
Volume Left	0	28	99	0
Volume Right	69	0	0	26
cSH	1700	1293	526	918
Volume to Capacity	0.16	0.02	0.19	0.03
Queue Length 95th (ft)	0	2	18	2
Control Delay (s)	0.0	1.6	13.5	9.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.6	12.6	
Approach LOS			B	

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	202	1	15	133	5	19
Future Volume (Veh/h)	202	1	15	133	5	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.88	0.88	0.60	0.60
Hourly flow rate (vph)	222	1	17	151	8	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			223		407	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		407	222
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		99	96
cM capacity (veh/h)			1311		596	823

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	222	1	17	151	8	32
Volume Left	0	0	17	0	8	0
Volume Right	0	1	0	0	0	32
cSH	1700	1700	1311	1700	596	823
Volume to Capacity	0.13	0.00	0.01	0.09	0.01	0.04
Queue Length 95th (ft)	0	0	1	0	1	3
Control Delay (s)	0.0	0.0	7.8	0.0	11.1	9.6
Lane LOS			A		B	A
Approach Delay (s)	0.0		0.8		9.9	
Approach LOS					A	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

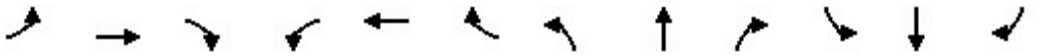
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	183	194	1364	247	70	1093
Future Volume (veh/h)	183	194	1364	247	70	1093
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1722	1722	1604	1604
Adj Flow Rate, veh/h	197	0	1516	274	79	1228
Peak Hour Factor	0.93	0.93	0.90	0.90	0.89	0.89
Percent Heavy Veh, %	6	6	12	12	20	20
Cap, veh/h	281		1809	807	96	3134
Arrive On Green	0.08	0.00	0.55	0.55	0.06	0.72
Sat Flow, veh/h	3346	1535	3358	1459	1527	4522
Grp Volume(v), veh/h	197	0	1516	274	79	1228
Grp Sat Flow(s),veh/h/ln	1673	1535	1636	1459	1527	1459
Q Serve(g_s), s	4.0	0.0	27.0	7.2	3.6	7.8
Cycle Q Clear(g_c), s	4.0	0.0	27.0	7.2	3.6	7.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	281		1809	807	96	3134
V/C Ratio(X)	0.70		0.84	0.34	0.82	0.39
Avail Cap(c_a), veh/h	287		1809	807	196	3134
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	0.0	13.0	8.6	32.4	3.9
Incr Delay (d2), s/veh	7.2	0.0	4.8	1.1	15.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	9.4	2.2	1.7	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.4	0.0	17.9	9.8	47.9	4.3
LnGrp LOS	D		B	A	D	A
Approach Vol, veh/h	197	A	1790			1307
Approach Delay, s/veh	38.4		16.6			6.9
Approach LOS	D		B			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	11.4	45.7				57.1	12.9
Change Period (Y+Rc), s	7.0	7.0				7.0	7.0
Max Green Setting (Gmax), s	9.0	34.0				50.0	6.0
Max Q Clear Time (g_c+I1), s	5.6	29.0				9.8	6.0
Green Ext Time (p_c), s	0.0	4.1				12.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	14.1
HCM 6th LOS	B

Notes

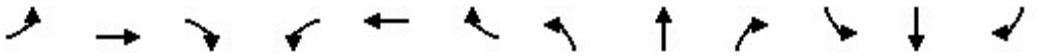
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	191	0	0	77	146	60	1	23	0	0	0
Future Volume (Veh/h)	77	191	0	0	77	146	60	1	23	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.81	0.81	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	89	220	0	0	90	170	74	1	28	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	260			220			573	658	220	602	573	175
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	260			220			573	658	220	602	573	175
tC, single (s)	4.1			4.1			7.2	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.1	3.4	3.5	4.0	3.3
p0 queue free %	93			100			81	100	97	100	100	100
cM capacity (veh/h)	1287			1332			399	351	805	376	400	868

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	309	260	75	28
Volume Left	89	0	74	0
Volume Right	0	170	0	28
cSH	1287	1700	398	805
Volume to Capacity	0.07	0.15	0.19	0.03
Queue Length 95th (ft)	6	0	17	3
Control Delay (s)	2.8	0.0	16.1	9.6
Lane LOS	A		C	A
Approach Delay (s)	2.8	0.0	14.4	
Approach LOS			B	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	197	65	36	225	0	0	0	0	144	2	91
Future Volume (Veh/h)	0	197	65	36	225	0	0	0	0	144	2	91
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.79	0.79	0.83	0.83	0.83	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	249	82	43	271	0	0	0	0	155	2	98
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	271			331			746	647	290	647	688	271
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	271			331			746	647	290	647	688	271
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	100	58	99	87
cM capacity (veh/h)	1298			1228			279	376	749	372	355	765

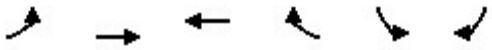
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	331	314	157	98
Volume Left	0	43	155	0
Volume Right	82	0	0	98
cSH	1700	1228	372	765
Volume to Capacity	0.19	0.04	0.42	0.13
Queue Length 95th (ft)	0	3	51	11
Control Delay (s)	0.0	1.4	21.5	10.4
Lane LOS		A	C	B
Approach Delay (s)	0.0	1.4	17.3	
Approach LOS			C	

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	194	7	29	268	0	29
Future Volume (Veh/h)	194	7	29	268	0	29
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.87	0.87	0.60	0.60
Hourly flow rate (vph)	213	8	33	308	0	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			221		587	213
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			221		587	213
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			98		100	94
cM capacity (veh/h)			1354		442	798

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	213	8	33	308	0	48
Volume Left	0	0	33	0	0	0
Volume Right	0	8	0	0	0	48
cSH	1700	1700	1354	1700	1700	798
Volume to Capacity	0.13	0.00	0.02	0.18	0.00	0.06
Queue Length 95th (ft)	0	0	2	0	0	5
Control Delay (s)	0.0	0.0	7.7	0.0	0.0	9.8
Lane LOS			A		A	A
Approach Delay (s)	0.0		0.7		9.8	
Approach LOS					A	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	384	403	45	41	41
Future Volume (Veh/h)	45	384	403	45	41	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	417	438	49	45	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	487				953	438
vC1, stage 1 conf vol					438	
vC2, stage 2 conf vol					515	
vCu, unblocked vol	487				953	438
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				91	93
cM capacity (veh/h)	1071				482	617

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	49	417	438	49	90
Volume Left	49	0	0	0	45
Volume Right	0	0	0	49	45
cSH	1071	1700	1700	1700	963
Volume to Capacity	0.05	0.25	0.26	0.03	0.09
Queue Length 95th (ft)	4	0	0	0	8
Control Delay (s)	8.5	0.0	0.0	0.0	12.3
Lane LOS	A				B
Approach Delay (s)	0.9		0.0		12.3
Approach LOS					B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

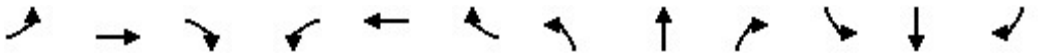
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	52	260	1061	211	167	1697
Future Volume (veh/h)	52	260	1061	211	167	1697
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1856	1856	1752	1752	1781	1781
Adj Flow Rate, veh/h	59	0	1105	220	184	1865
Peak Hour Factor	0.88	0.88	0.96	0.96	0.91	0.91
Percent Heavy Veh, %	3	3	10	10	8	8
Cap, veh/h	167		1730	772	223	3654
Arrive On Green	0.05	0.00	0.52	0.52	0.13	0.75
Sat Flow, veh/h	3428	1572	3416	1485	1697	5024
Grp Volume(v), veh/h	59	0	1105	220	184	1865
Grp Sat Flow(s),veh/h/ln	1714	1572	1664	1485	1697	1621
Q Serve(g_s), s	1.2	0.0	16.7	5.8	7.4	10.8
Cycle Q Clear(g_c), s	1.2	0.0	16.7	5.8	7.4	10.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	167		1730	772	223	3654
V/C Ratio(X)	0.35		0.64	0.29	0.82	0.51
Avail Cap(c_a), veh/h	441		1730	772	267	3654
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	0.0	12.1	9.5	29.6	3.5
Incr Delay (d2), s/veh	1.3	0.0	1.8	0.9	16.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	5.8	1.9	3.9	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.5	0.0	13.9	10.4	45.8	4.0
LnGrp LOS	C		B	B	D	A
Approach Vol, veh/h	59	A	1325			2049
Approach Delay, s/veh	33.5		13.3			7.8
Approach LOS	C		B			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	16.2	43.4				59.6	10.4
Change Period (Y+Rc), s	7.0	7.0				7.0	7.0
Max Green Setting (Gmax), s	11.0	29.0				47.0	9.0
Max Q Clear Time (g_c+I1), s	9.4	18.7				12.8	3.2
Green Ext Time (p_c), s	0.1	6.0				20.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Notes

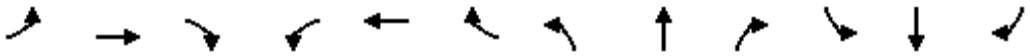
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	284	0	0	205	137	65	0	26	0	0	0
Future Volume (Veh/h)	52	284	0	0	205	137	65	0	26	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.69	0.69	0.69	0.92	0.92	0.92
Hourly flow rate (vph)	61	334	0	0	273	183	94	0	38	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	456			334			820	912	334	858	820	364
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	456			334			820	912	334	858	820	364
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			67	100	95	100	100	100
cM capacity (veh/h)	1100			1225			282	260	710	251	292	680

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	395	456	94	38
Volume Left	61	0	94	0
Volume Right	0	183	0	38
cSH	1100	1700	282	710
Volume to Capacity	0.06	0.27	0.33	0.05
Queue Length 95th (ft)	4	0	35	4
Control Delay (s)	1.8	0.0	24.0	10.4
Lane LOS	A		C	B
Approach Delay (s)	1.8	0.0	20.1	
Approach LOS			C	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	37	12	30	134	3	15	0	64	19	1	7
Future Volume (Veh/h)	1	37	12	30	134	3	15	0	64	19	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.82	0.82	0.82	0.61	0.61	0.61
Hourly flow rate (vph)	1	45	14	40	179	4	18	0	78	31	2	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	183			59			327	317	52	393	322	181
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	183			59			327	317	52	393	322	181
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			97	100	92	94	100	99
cM capacity (veh/h)	1374			1526			598	578	1007	509	576	857

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	60	223	96	44
Volume Left	1	40	18	31
Volume Right	14	4	78	11
cSH	1374	1526	893	569
Volume to Capacity	0.00	0.03	0.11	0.08
Queue Length 95th (ft)	0	2	9	6
Control Delay (s)	0.1	1.5	9.5	11.9
Lane LOS	A	A	A	B
Approach Delay (s)	0.1	1.5	9.5	11.9
Approach LOS			A	B

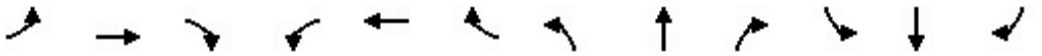
Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	122	17	57	196	17	9	1	46	6	1	2
Future Volume (Veh/h)	5	122	17	57	196	17	9	1	46	6	1	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.81	0.81	0.81	0.82	0.82	0.82	0.75	0.75	0.75
Hourly flow rate (vph)	6	145	20	70	242	21	11	1	56	8	1	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	263			165			563	570	155	616	570	252
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	263			165			563	570	155	616	570	252
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			97	100	94	98	100	100
cM capacity (veh/h)	1278			1413			414	405	886	364	411	791

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	171	333	68	12
Volume Left	6	70	11	8
Volume Right	20	21	56	3
cSH	1278	1413	737	425
Volume to Capacity	0.00	0.05	0.09	0.03
Queue Length 95th (ft)	0	4	8	2
Control Delay (s)	0.3	2.0	10.4	13.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	2.0	10.4	13.7
Approach LOS			B	B

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D
Intersection Capacity Analysis Worksheets – 2026 No Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	194	65	28	125	0	0	0	0	102	3	26
Future Volume (Veh/h)	0	194	65	28	125	0	0	0	0	102	3	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	228	76	31	140	0	0	0	0	110	3	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	140			304			498	468	266	468	506	140
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	140			304			498	468	266	468	506	140
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			100	100	100	78	99	97
cM capacity (veh/h)	1419			1263			457	481	773	493	455	903

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	304	171	113	28
Volume Left	0	31	110	0
Volume Right	76	0	0	28
cSH	1700	1263	491	903
Volume to Capacity	0.18	0.02	0.23	0.03
Queue Length 95th (ft)	0	2	22	2
Control Delay (s)	0.0	1.6	14.5	9.1
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.6	13.4	
Approach LOS			B	

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	223	1	17	147	6	21
Future Volume (Veh/h)	223	1	17	147	6	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.88	0.88	0.60	0.60
Hourly flow rate (vph)	245	1	19	167	10	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			246		450	245
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			246		450	245
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		98	96
cM capacity (veh/h)			1286		562	799

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	245	1	19	167	10	35
Volume Left	0	0	19	0	10	0
Volume Right	0	1	0	0	0	35
cSH	1700	1700	1286	1700	562	799
Volume to Capacity	0.14	0.00	0.01	0.10	0.02	0.04
Queue Length 95th (ft)	0	0	1	0	1	3
Control Delay (s)	0.0	0.0	7.8	0.0	11.5	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		0.8		10.1	
Approach LOS					B	

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

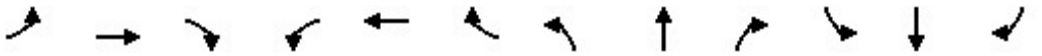
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	202	214	1741	272	78	1395
Future Volume (veh/h)	202	214	1741	272	78	1395
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1722	1722	1604	1604
Adj Flow Rate, veh/h	217	0	1934	302	88	1567
Peak Hour Factor	0.93	0.93	0.90	0.90	0.89	0.89
Percent Heavy Veh, %	6	6	12	12	20	20
Cap, veh/h	286		1997	891	108	3322
Arrive On Green	0.09	0.00	0.61	0.61	0.07	0.76
Sat Flow, veh/h	3346	1535	3358	1459	1527	4522
Grp Volume(v), veh/h	217	0	1934	302	88	1567
Grp Sat Flow(s),veh/h/ln	1673	1535	1636	1459	1527	1459
Q Serve(g_s), s	5.7	0.0	50.7	9.2	5.1	12.1
Cycle Q Clear(g_c), s	5.7	0.0	50.7	9.2	5.1	12.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	286		1997	891	108	3322
V/C Ratio(X)	0.76		0.97	0.34	0.81	0.47
Avail Cap(c_a), veh/h	297		1997	891	187	3322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	16.7	8.6	41.2	4.1
Incr Delay (d2), s/veh	10.4	0.0	14.0	1.0	13.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	20.1	2.9	2.3	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	50.6	0.0	30.7	9.6	54.7	4.6
LnGrp LOS	D		C	A	D	A
Approach Vol, veh/h	217	A	2236			1655
Approach Delay, s/veh	50.6		27.8			7.2
Approach LOS	D		C			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	13.4	61.9			75.3	14.7
Change Period (Y+Rc), s	7.0	7.0			7.0	7.0
Max Green Setting (Gmax), s	11.0	50.0			68.0	8.0
Max Q Clear Time (g_c+I1), s	7.1	52.7			14.1	7.7
Green Ext Time (p_c), s	0.1	0.0			19.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

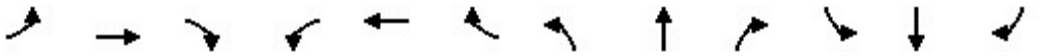
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	211	0	0	85	161	66	1	25	0	0	0
Future Volume (Veh/h)	85	211	0	0	85	161	66	1	25	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.81	0.81	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	98	243	0	0	99	187	81	1	31	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	286			243			632	725	243	663	632	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	286			243			632	725	243	663	632	192
tC, single (s)	4.1			4.1			7.2	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.1	3.4	3.5	4.0	3.3
p0 queue free %	92			100			78	100	96	100	100	100
cM capacity (veh/h)	1259			1306			362	318	781	338	367	849

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	341	286	82	31
Volume Left	98	0	81	0
Volume Right	0	187	0	31
cSH	1259	1700	361	781
Volume to Capacity	0.08	0.17	0.23	0.04
Queue Length 95th (ft)	6	0	21	3
Control Delay (s)	2.9	0.0	17.9	9.8
Lane LOS	A		C	A
Approach Delay (s)	2.9	0.0	15.6	
Approach LOS			C	

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	218	72	40	248	0	0	0	0	159	2	100
Future Volume (Veh/h)	0	218	72	40	248	0	0	0	0	159	2	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.79	0.79	0.83	0.83	0.83	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	276	91	48	299	0	0	0	0	171	2	108
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	299			367			826	716	322	716	762	299
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	299			367			826	716	322	716	762	299
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	100	49	99	85
cM capacity (veh/h)	1268			1192			240	341	719	333	320	738

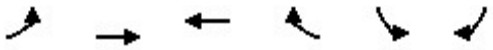
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	367	347	173	108
Volume Left	0	48	171	0
Volume Right	91	0	0	108
cSH	1700	1192	333	738
Volume to Capacity	0.22	0.04	0.52	0.15
Queue Length 95th (ft)	0	3	71	13
Control Delay (s)	0.0	1.5	26.9	10.7
Lane LOS		A	D	B
Approach Delay (s)	0.0	1.5	20.7	
Approach LOS			C	

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	214	8	32	296	0	32
Future Volume (Veh/h)	214	8	32	296	0	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.87	0.87	0.60	0.60
Hourly flow rate (vph)	235	9	37	340	0	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			244		649	235
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			244		649	235
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			97		100	93
cM capacity (veh/h)			1328		404	775

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	235	9	37	340	0	53
Volume Left	0	0	37	0	0	0
Volume Right	0	9	0	0	0	53
cSH	1700	1700	1328	1700	1700	775
Volume to Capacity	0.14	0.01	0.03	0.20	0.00	0.07
Queue Length 95th (ft)	0	0	2	0	0	5
Control Delay (s)	0.0	0.0	7.8	0.0	0.0	10.0
Lane LOS			A		A	A
Approach Delay (s)	0.0		0.8		10.0	
Approach LOS					A	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	50	424	445	50	45	45
Future Volume (Veh/h)	50	424	445	50	45	45
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	461	484	54	49	49
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	538				1053	484
vC1, stage 1 conf vol					484	
vC2, stage 2 conf vol					569	
vCu, unblocked vol	538				1053	484
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	95				89	92
cM capacity (veh/h)	1025				448	581

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	54	461	484	54	98
Volume Left	54	0	0	0	49
Volume Right	0	0	0	54	49
cSH	1025	1700	1700	1700	895
Volume to Capacity	0.05	0.27	0.28	0.03	0.11
Queue Length 95th (ft)	4	0	0	0	9
Control Delay (s)	8.7	0.0	0.0	0.0	12.9
Lane LOS	A				B
Approach Delay (s)	0.9		0.0		12.9
Approach LOS					B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

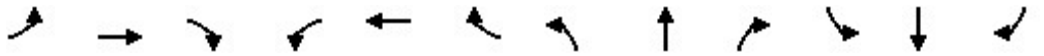
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	57	287	1354	233	184	2166
Future Volume (veh/h)	57	287	1354	233	184	2166
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1856	1856	1752	1752	1781	1781
Adj Flow Rate, veh/h	65	0	1410	243	202	2380
Peak Hour Factor	0.88	0.88	0.96	0.96	0.91	0.91
Percent Heavy Veh, %	3	3	10	10	8	8
Cap, veh/h	164		1827	815	239	3780
Arrive On Green	0.05	0.00	0.55	0.55	0.14	0.78
Sat Flow, veh/h	3428	1572	3416	1485	1697	5024
Grp Volume(v), veh/h	65	0	1410	243	202	2380
Grp Sat Flow(s),veh/h/ln	1714	1572	1664	1485	1697	1621
Q Serve(g_s), s	1.5	0.0	26.5	7.1	9.3	17.1
Cycle Q Clear(g_c), s	1.5	0.0	26.5	7.1	9.3	17.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	164		1827	815	239	3780
V/C Ratio(X)	0.40		0.77	0.30	0.85	0.63
Avail Cap(c_a), veh/h	343		1827	815	276	3780
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	0.0	14.1	9.7	33.5	3.9
Incr Delay (d2), s/veh	1.6	0.0	3.2	0.9	18.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	9.5	2.3	5.0	3.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.5	0.0	17.3	10.7	52.4	4.7
LnGrp LOS	D		B	B	D	A
Approach Vol, veh/h	65	A	1653			2582
Approach Delay, s/veh	38.5		16.4			8.4
Approach LOS	D		B			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	18.3	50.9				69.2	10.8
Change Period (Y+Rc), s	7.0	7.0				7.0	7.0
Max Green Setting (Gmax), s	13.0	38.0				58.0	8.0
Max Q Clear Time (g_c+I1), s	11.3	28.5				19.1	3.5
Green Ext Time (p_c), s	0.1	6.8				29.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	11.9
HCM 6th LOS	B

Notes

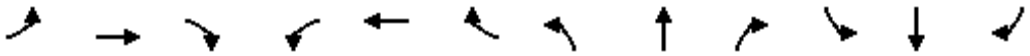
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	314	0	0	226	151	72	0	29	0	0	0
Future Volume (Veh/h)	57	314	0	0	226	151	72	0	29	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.69	0.69	0.69	0.92	0.92	0.92
Hourly flow rate (vph)	67	369	0	0	301	201	104	0	42	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	502			369			904	1005	369	946	904	402
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502			369			904	1005	369	946	904	402
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			58	100	94	100	100	100
cM capacity (veh/h)	1057			1190			246	227	679	215	259	649

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	436	502	104	42
Volume Left	67	0	104	0
Volume Right	0	201	0	42
cSH	1057	1700	246	679
Volume to Capacity	0.06	0.30	0.42	0.06
Queue Length 95th (ft)	5	0	49	5
Control Delay (s)	1.9	0.0	29.9	10.7
Lane LOS	A		D	B
Approach Delay (s)	1.9	0.0	24.4	
Approach LOS			C	

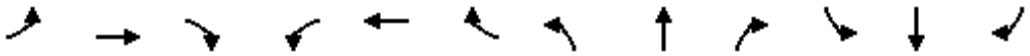
Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	151	13	33	148	3	17	0	71	21	1	8
Future Volume (Veh/h)	1	151	13	33	148	3	17	0	71	21	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.82	0.82	0.82	0.61	0.61	0.61
Hourly flow rate (vph)	1	182	16	44	197	4	21	0	87	34	2	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	201			198			493	481	190	566	487	199
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			198			493	481	190	566	487	199
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			95	100	90	91	100	98
cM capacity (veh/h)	1353			1357			461	464	844	378	462	837

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	199	245	108	49
Volume Left	1	44	21	34
Volume Right	16	4	87	13
cSH	1353	1357	726	446
Volume to Capacity	0.00	0.03	0.15	0.11
Queue Length 95th (ft)	0	3	13	9
Control Delay (s)	0.0	1.6	10.8	14.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	1.6	10.8	14.1
Approach LOS			B	B

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

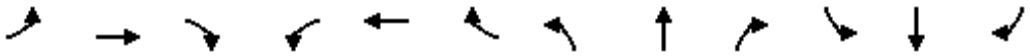


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	135	19	63	216	19	10	1	51	7	1	2
Future Volume (Veh/h)	6	135	19	63	216	19	10	1	51	7	1	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.81	0.81	0.81	0.82	0.82	0.82	0.75	0.75	0.75
Hourly flow rate (vph)	7	161	23	78	267	23	12	1	62	9	1	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	290			184			624	632	172	684	632	278
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290			184			624	632	172	684	632	278
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			97	100	93	97	100	100
cM capacity (veh/h)	1249			1391			374	370	866	323	375	765

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	191	368	75	13
Volume Left	7	78	12	9
Volume Right	23	23	62	3
cSH	1249	1391	705	377
Volume to Capacity	0.01	0.06	0.11	0.03
Queue Length 95th (ft)	0	4	9	3
Control Delay (s)	0.3	2.1	10.7	14.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	2.1	10.7	14.9
Approach LOS			B	B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

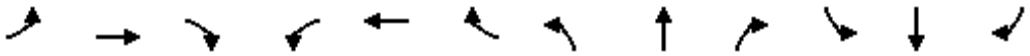
Appendix E
Intersection Capacity Analysis Worksheets – 2026 Build



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	151	21	50	148	3	39	0	122	21	1	8
Future Volume (Veh/h)	1	151	21	50	148	3	39	0	122	21	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.82	0.82	0.82	0.61	0.61	0.61
Hourly flow rate (vph)	1	182	25	67	197	4	48	0	149	34	2	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	201			207			544	532	194	678	542	199
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			207			544	532	194	678	542	199
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			95			89	100	82	88	100	98
cM capacity (veh/h)	1353			1346			420	427	839	287	422	837

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	208	268	197	49
Volume Left	1	67	48	34
Volume Right	25	4	149	13
cSH	1353	1346	675	353
Volume to Capacity	0.00	0.05	0.29	0.14
Queue Length 95th (ft)	0	4	30	12
Control Delay (s)	0.0	2.3	12.5	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.0	2.3	12.5	16.8
Approach LOS			B	C

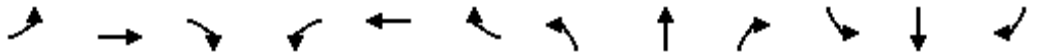
Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	239	0	0	94	161	68	1	25	0	0	0
Future Volume (Veh/h)	102	239	0	0	94	161	68	1	25	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.81	0.81	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	117	275	0	0	109	187	84	1	31	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	296			275			712	805	275	743	712	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	296			275			712	805	275	743	712	202
tC, single (s)	4.1			4.1			7.2	6.6	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.1	3.4	3.5	4.0	3.3
p0 queue free %	91			100			73	100	96	100	100	100
cM capacity (veh/h)	1248			1271			316	280	750	294	324	838

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	392	296	85	31
Volume Left	117	0	84	0
Volume Right	0	187	0	31
cSH	1248	1700	315	750
Volume to Capacity	0.09	0.17	0.27	0.04
Queue Length 95th (ft)	8	0	27	3
Control Delay (s)	3.1	0.0	20.6	10.0
Lane LOS	A		C	B
Approach Delay (s)	3.1	0.0	17.8	
Approach LOS			C	

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	240	71	28	136	0	0	0	0	102	3	32
Future Volume (Veh/h)	0	240	71	28	136	0	0	0	0	102	3	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	282	84	31	153	0	0	0	0	110	3	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	153			366			574	539	324	539	581	153
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153			366			574	539	324	539	581	153
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			100	100	100	75	99	96
cM capacity (veh/h)	1403			1198			402	438	717	441	411	888

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	366	184	113	34
Volume Left	0	31	110	0
Volume Right	84	0	0	34
cSH	1700	1198	440	888
Volume to Capacity	0.22	0.03	0.26	0.04
Queue Length 95th (ft)	0	2	25	3
Control Delay (s)	0.0	1.6	16.0	9.2
Lane LOS		A	C	A
Approach Delay (s)	0.0	1.6	14.4	
Approach LOS			B	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	274	1	33	163	6	72
Future Volume (Veh/h)	274	1	33	163	6	72
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.88	0.88	0.60	0.60
Hourly flow rate (vph)	301	1	38	185	10	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			302		562	301
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			302		562	301
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			97		98	84
cM capacity (veh/h)			1226		476	743

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	301	1	38	185	10	120
Volume Left	0	0	38	0	10	0
Volume Right	0	1	0	0	0	120
cSH	1700	1700	1226	1700	476	743
Volume to Capacity	0.18	0.00	0.03	0.11	0.02	0.16
Queue Length 95th (ft)	0	0	2	0	2	14
Control Delay (s)	0.0	0.0	8.0	0.0	12.7	10.8
Lane LOS			A		B	B
Approach Delay (s)	0.0		1.4		10.9	
Approach LOS					B	

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

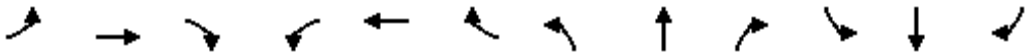
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	208	214	1741	274	78	1395
Future Volume (veh/h)	208	214	1741	274	78	1395
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1811	1811	1722	1722	1604	1604
Adj Flow Rate, veh/h	224	0	1934	304	88	1567
Peak Hour Factor	0.93	0.93	0.90	0.90	0.89	0.89
Percent Heavy Veh, %	6	6	12	12	20	20
Cap, veh/h	293		1991	888	108	3314
Arrive On Green	0.09	0.00	0.61	0.61	0.07	0.76
Sat Flow, veh/h	3346	1535	3358	1459	1527	4522
Grp Volume(v), veh/h	224	0	1934	304	88	1567
Grp Sat Flow(s),veh/h/ln	1673	1535	1636	1459	1527	1459
Q Serve(g_s), s	5.9	0.0	50.9	9.3	5.1	12.2
Cycle Q Clear(g_c), s	5.9	0.0	50.9	9.3	5.1	12.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	293		1991	888	108	3314
V/C Ratio(X)	0.77		0.97	0.34	0.81	0.47
Avail Cap(c_a), veh/h	297		1991	888	187	3314
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	16.9	8.7	41.2	4.1
Incr Delay (d2), s/veh	11.1	0.0	14.5	1.1	13.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	20.3	2.9	2.3	2.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	51.3	0.0	31.4	9.8	54.7	4.6
LnGrp LOS	D		C	A	D	A
Approach Vol, veh/h	224		2238			1655
Approach Delay, s/veh	51.3		28.4			7.3
Approach LOS	D		C			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	13.4	61.8				75.1	14.9
Change Period (Y+Rc), s	7.0	7.0				7.0	7.0
Max Green Setting (Gmax), s	10.0	50.0				68.0	8.0
Max Q Clear Time (g_c+I1), s	7.1	52.9				14.2	7.9
Green Ext Time (p_c), s	0.1	0.0				19.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	21.2
HCM 6th LOS	C

Notes

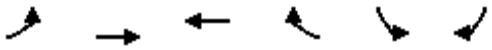
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	135	44	120	216	19	25	1	85	7	1	2
Future Volume (Veh/h)	6	135	44	120	216	19	25	1	85	7	1	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.81	0.81	0.81	0.82	0.82	0.82	0.75	0.75	0.75
Hourly flow rate (vph)	7	161	52	148	267	23	30	1	104	9	1	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	290			213			779	787	187	880	802	278
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290			213			779	787	187	880	802	278
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			89			89	100	88	96	100	100
cM capacity (veh/h)	1249			1357			282	285	850	216	283	765

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	220	438	135	13
Volume Left	7	148	30	9
Volume Right	52	23	104	3
cSH	1249	1357	581	264
Volume to Capacity	0.01	0.11	0.23	0.05
Queue Length 95th (ft)	0	9	22	4
Control Delay (s)	0.3	3.4	13.1	19.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.3	3.4	13.1	19.3
Approach LOS			B	C

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	56	424	445	88	67	49
Future Volume (Veh/h)	56	424	445	88	67	49
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	61	461	484	96	73	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	580				1067	484
vC1, stage 1 conf vol					484	
vC2, stage 2 conf vol					583	
vCu, unblocked vol	580				1067	484
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	94				83	91
cM capacity (veh/h)	989				440	581

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	61	461	484	96	126
Volume Left	61	0	0	0	73
Volume Right	0	0	0	96	53
cSH	989	1700	1700	1700	759
Volume to Capacity	0.06	0.27	0.28	0.06	0.17
Queue Length 95th (ft)	5	0	0	0	15
Control Delay (s)	8.9	0.0	0.0	0.0	13.6
Lane LOS	A				B
Approach Delay (s)	1.0		0.0		13.6
Approach LOS					B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	248	8	89	353	0	66
Future Volume (Veh/h)	248	8	89	353	0	66
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.87	0.87	0.60	0.60
Hourly flow rate (vph)	273	9	102	406	0	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			282		883	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			282		883	273
tC, single (s)			4.1		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.4
p0 queue free %			92		100	85
cM capacity (veh/h)			1286		277	738

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	273	9	102	406	0	110
Volume Left	0	0	102	0	0	0
Volume Right	0	9	0	0	0	110
cSH	1700	1700	1286	1700	1700	738
Volume to Capacity	0.16	0.01	0.08	0.24	0.00	0.15
Queue Length 95th (ft)	0	0	6	0	0	13
Control Delay (s)	0.0	0.0	8.0	0.0	0.0	10.7
Lane LOS			A		A	B
Approach Delay (s)	0.0		1.6		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

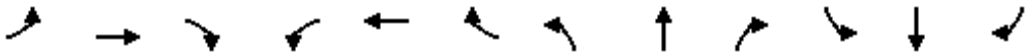
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	61	287	1354	239	184	2166
Future Volume (veh/h)	61	287	1354	239	184	2166
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1856	1856	1752	1752	1781	1781
Adj Flow Rate, veh/h	69	0	1410	249	202	2380
Peak Hour Factor	0.88	0.88	0.96	0.96	0.91	0.91
Percent Heavy Veh, %	3	3	10	10	8	8
Cap, veh/h	168		1823	813	239	3774
Arrive On Green	0.05	0.00	0.55	0.55	0.14	0.78
Sat Flow, veh/h	3428	1572	3416	1485	1697	5024
Grp Volume(v), veh/h	69	0	1410	249	202	2380
Grp Sat Flow(s),veh/h/ln	1714	1572	1664	1485	1697	1621
Q Serve(g_s), s	1.6	0.0	26.6	7.3	9.3	17.2
Cycle Q Clear(g_c), s	1.6	0.0	26.6	7.3	9.3	17.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	168		1823	813	239	3774
V/C Ratio(X)	0.41		0.77	0.31	0.85	0.63
Avail Cap(c_a), veh/h	343		1823	813	276	3774
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.9	0.0	14.2	9.8	33.5	3.9
Incr Delay (d2), s/veh	1.6	0.0	3.3	1.0	18.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	9.6	2.4	5.0	3.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	38.5	0.0	17.5	10.8	52.4	4.7
LnGrp LOS	D		B	B	D	A
Approach Vol, veh/h	69		1659			2582
Approach Delay, s/veh	38.5		16.5			8.5
Approach LOS	D		B			A

Timer - Assigned Phs	1	2				6	8
Phs Duration (G+Y+Rc), s	18.3	50.8				69.1	10.9
Change Period (Y+Rc), s	7.0	7.0				7.0	7.0
Max Green Setting (Gmax), s	13.0	38.0				58.0	8.0
Max Q Clear Time (g_c+I1), s	11.3	28.6				19.2	3.6
Green Ext Time (p_c), s	0.1	6.8				29.1	0.1

Intersection Summary	
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Notes

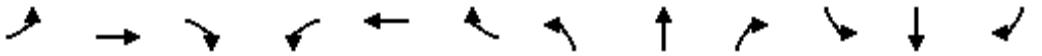
Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	332	0	0	258	151	78	0	29	0	0	0
Future Volume (Veh/h)	69	332	0	0	258	151	78	0	29	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.75	0.75	0.75	0.69	0.69	0.69	0.92	0.92	0.92
Hourly flow rate (vph)	81	391	0	0	344	201	113	0	42	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	545			391			998	1098	391	1040	998	444
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	545			391			998	1098	391	1040	998	444
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			46	100	94	100	100	100
cM capacity (veh/h)	1019			1168			210	197	660	183	225	614

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	472	545	113	42
Volume Left	81	0	113	0
Volume Right	0	201	0	42
cSH	1019	1700	210	660
Volume to Capacity	0.08	0.32	0.54	0.06
Queue Length 95th (ft)	6	0	71	5
Control Delay (s)	2.3	0.0	40.5	10.8
Lane LOS	A		E	B
Approach Delay (s)	2.3	0.0	32.4	
Approach LOS			D	

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	248	76	40	286	0	0	0	0	159	2	119
Future Volume (Veh/h)	0	248	76	40	286	0	0	0	0	159	2	119
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.79	0.79	0.83	0.83	0.83	0.92	0.92	0.92	0.93	0.93	0.93
Hourly flow rate (vph)	0	314	96	48	345	0	0	0	0	171	2	128
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	345			410			932	803	362	803	851	345
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			410			932	803	362	803	851	345
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			100	100	100	41	99	82
cM capacity (veh/h)	1220			1149			194	304	683	291	284	696

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	410	393	173	128
Volume Left	0	48	171	0
Volume Right	96	0	0	128
cSH	1700	1149	291	696
Volume to Capacity	0.24	0.04	0.59	0.18
Queue Length 95th (ft)	0	3	89	17
Control Delay (s)	0.0	1.4	34.0	11.3
Lane LOS		A	D	B
Approach Delay (s)	0.0	1.4	24.4	
Approach LOS			C	

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F
Turn Lane Warrants

Figure 1A
Pitchkettle and Rte 58 WB Ramps
Left Turn Lane Warrant
No Build 2026

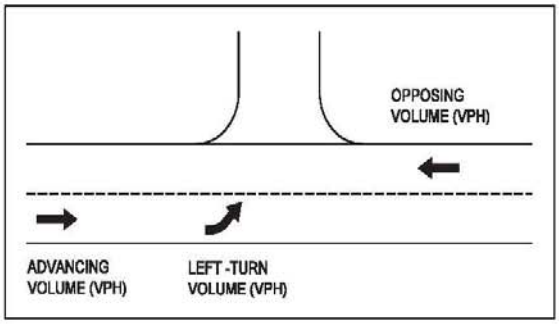
WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2011 AASHTO Green Book, Chapter 9, Section 9.7.3, Page 9-132, Table 9-23

* USE DESIGN SPEED IF AVAILABLE, IF NOT USE LEGAL SPEED LIMIT.*



Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

With opposing volume (VPH) of 600 and 10% of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 28 vph
Opposing = 259 vph
Advancing = 153 vph
Not Warranted

PM Volume
Left Turn = 40 vph
Opposing = 290 vph
Advancing = 288 vph
Warranted

* Rev. 7/14

Figure 1B
Pitchkettle and Rte 58 WB Ramps
Left Turn Lane Warrant
Build 2026

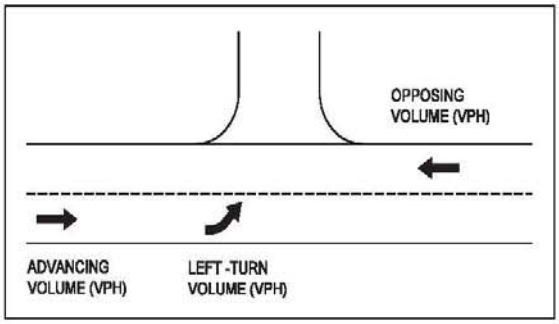
WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2011 AASHTO Green Book, Chapter 9, Section 9.7.3, Page 9-132, Table 9-23

* USE DESIGN SPEED IF AVAILABLE, IF NOT USE LEGAL SPEED LIMIT.*



Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

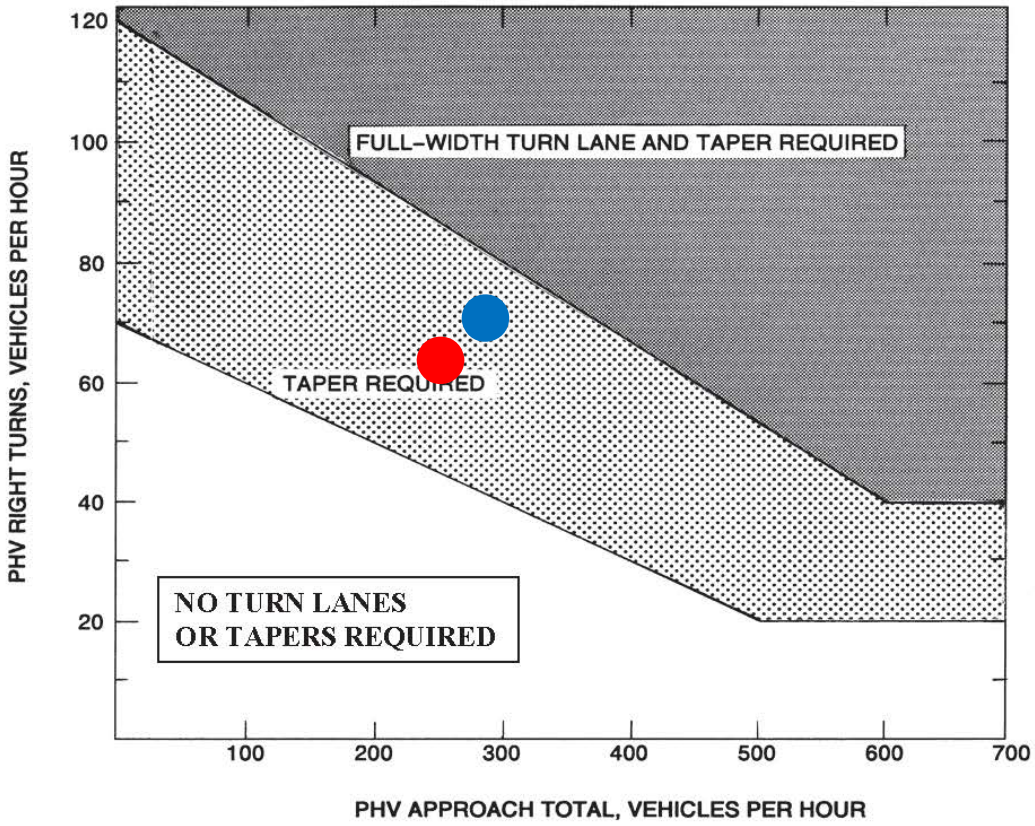
With opposing volume (VPH) of 600 and 10% of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 28 vph
Opposing = 315 vph
Advancing = 165 vph
Not Warranted

PM Volume
Left Turn = 40 vph
Opposing = 326 vph
Advancing = 330 vph
Warranted

Figure 1C
Pitchkettle and Rte 58 WB Ramps
Right Turn Lane Warrant
No Build 2026



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

AM Volume
Approach = 259 vph
Right = 65 vph
Taper Required

PM Volume
Approach = 290 vph
Right = 72 vph
Taper Required

LEGEND

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

Adjustment for Right Turns

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

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

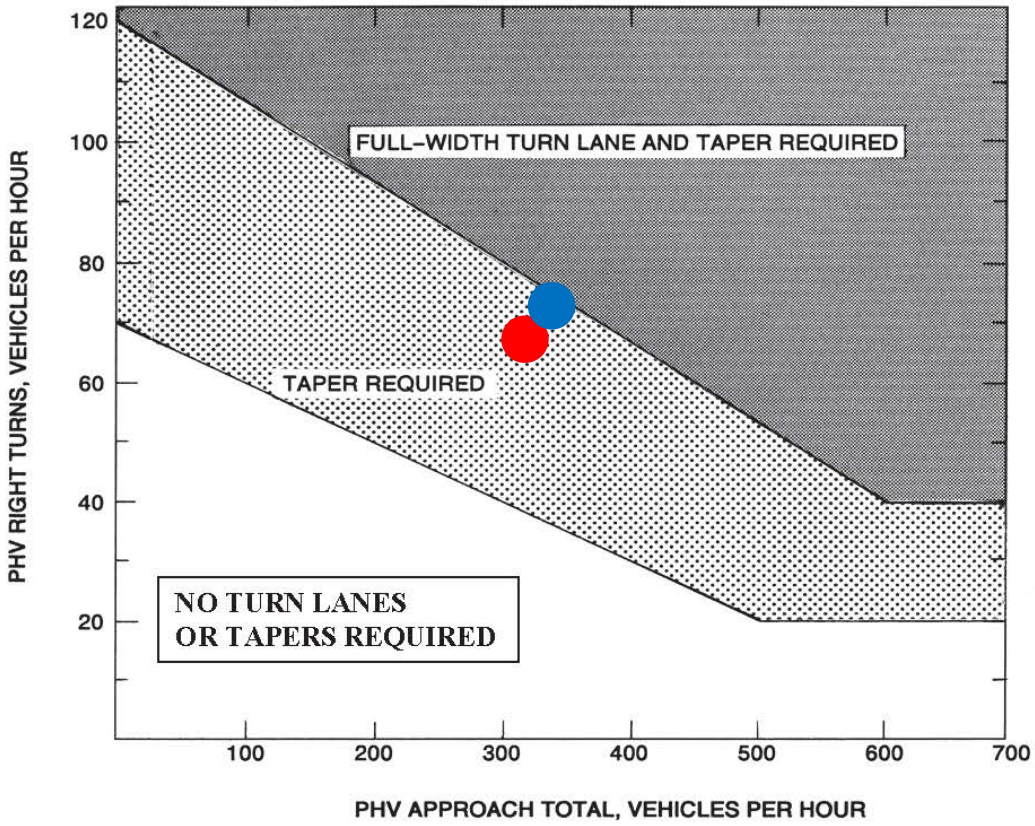
Note: An average of 11% for K x D will suffice.

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

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

* Rev. 1/15

Figure 1D
Pitchkettle and Rte 58 WB Ramps
Right Turn Lane Warrant
Build 2026



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

AM Volume
Approach = 315 vph
Right = 71 vph
Taper Required

PM Volume
Approach = 326 vph
Right = 76 vph
Taper Required

LEGEND

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

Adjustment for Right Turns

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

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

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

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

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

* Rev. 1/15

Figure 2A
Pitchkettle and Rte 58 EB Ramps
Left Turn Lane Warrant
No Build 2026

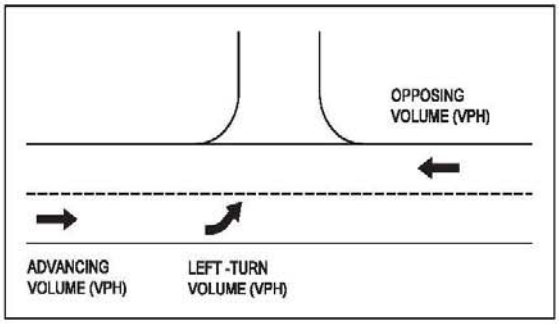
WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2011 AASHTO Green Book, Chapter 9, Section 9.7.3, Page 9-132, Table 9-23

* USE DESIGN SPEED IF AVAILABLE, IF NOT USE LEGAL SPEED LIMIT.*



Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

Figure 1A

opposing volume (VPH) of 600 and of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 85 vph
Opposing = 246 vph
Advancing = 296 vph
Not Warranted

PM Volume
Left Turn = 57 vph
Opposing = 377 vph
Advancing = 371 vph
Warranted

Figure 2B
Pitchkettle and Rte 58 EB Ramps
Left Turn Lane Warrant
Build 2026

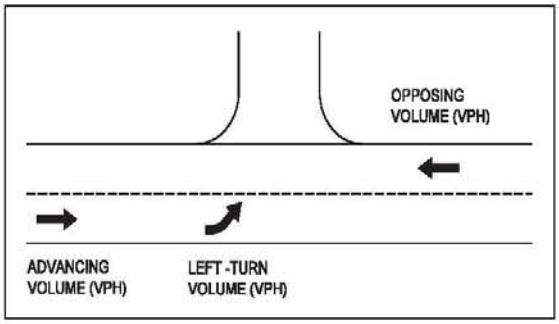
WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	185	170
400	430	320	240	210
200	550	400	300	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2011 AASHTO Green Book, Chapter 9, Section 9.7.3, Page 9-132, Table 9-23

* USE DESIGN SPEED IF AVAILABLE, IF NOT USE LEGAL SPEED LIMIT.*



Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

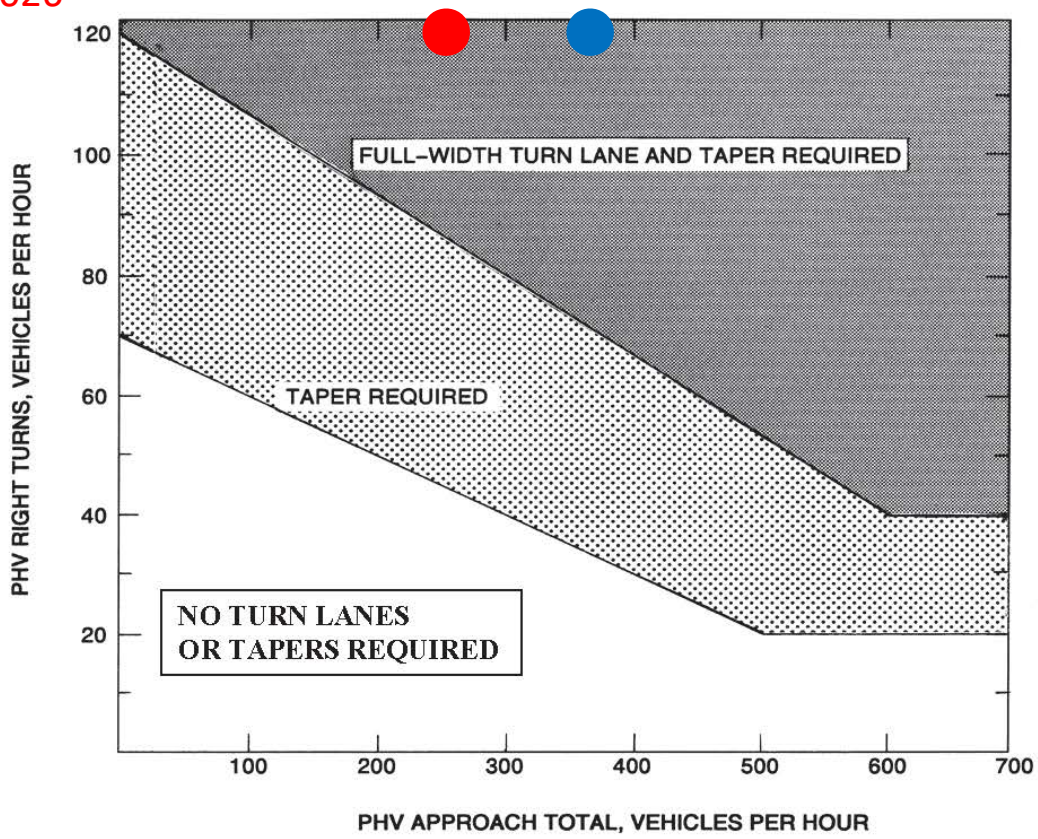
With opposing volume (VPH) of 600 and 10% of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 104 vph
Opposing = 256 vph
Advancing = 346 vph
Warranted

PM Volume
Left Turn = 70 vph
Opposing = 412 vph
Advancing = 404 vph
Warranted

Figure 2C
Pitchkettle and Rte 58 EB Ramps
Right Turn Lane Warrant
No Build 2026



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

AM Volume
Approach = 246 vph
Right = 161 vph
Turn Lane Required

PM Volume
Approach = 377 vph
Right = 151 vph
Turn Lane Required

LEGEND

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

Adjustment for Right Turns

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

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

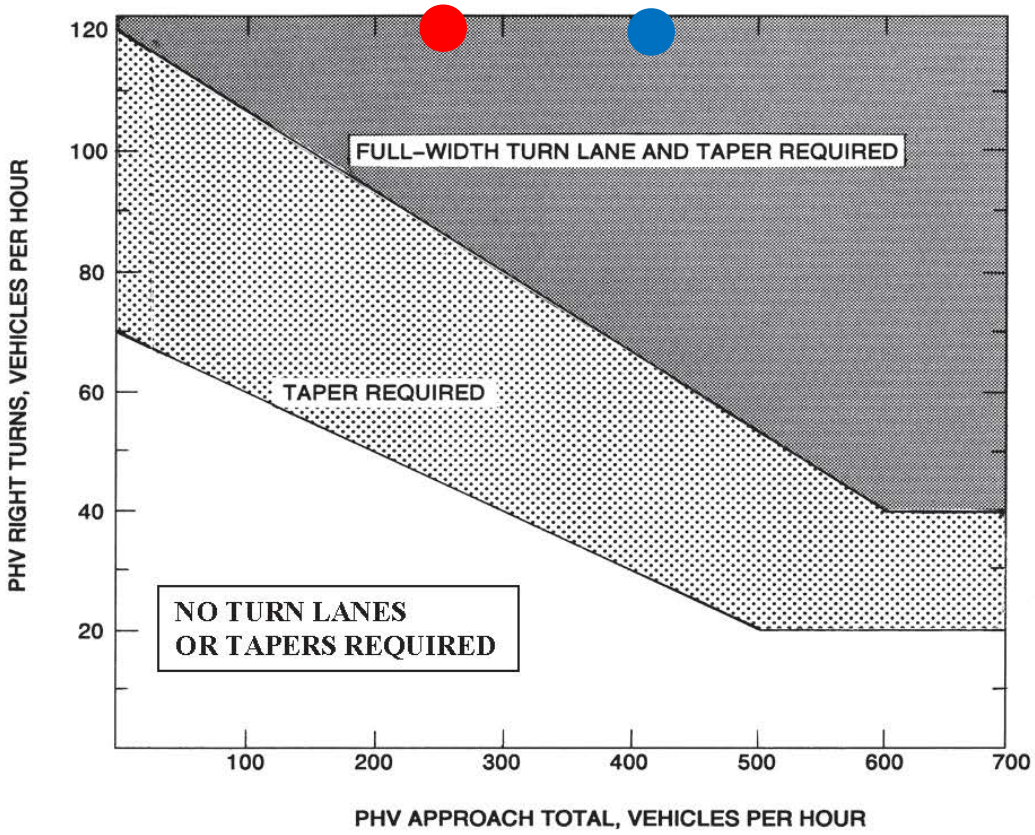
Note: An average of 11% for K x D will suffice.

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

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

* Rev. 1/15

Figure 2D
Pitchkettle and Rte 58 EB Ramps
Right Turn Lane Warrant
Build 2026



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

AM Volume
Approach = 256 vph
Right = 161 vph
Turn Lane Required

PM Volume
Approach = 412 vph
Right = 151 vph
Turn Lane Required

LEGEND

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

Adjustment for Right Turns

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

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

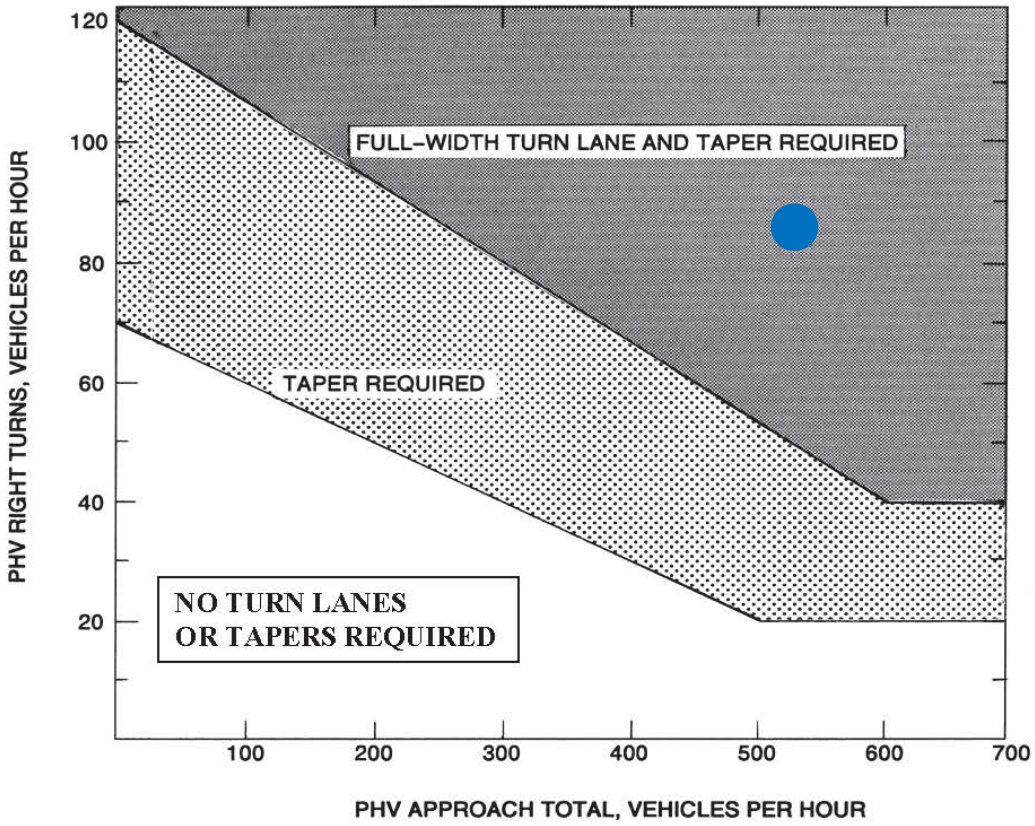
Note: An average of 11% for K x D will suffice.

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

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

* Rev. 1/15

Figure 3A
Holland and Lake Cohoon
Right Turn Lane Warrant
No Build 2026



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

PM Volume
Approach = 537 vph
Right = 92 vph
Turn Lane Required

LEGEND

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

Adjustment for Right Turns

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

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

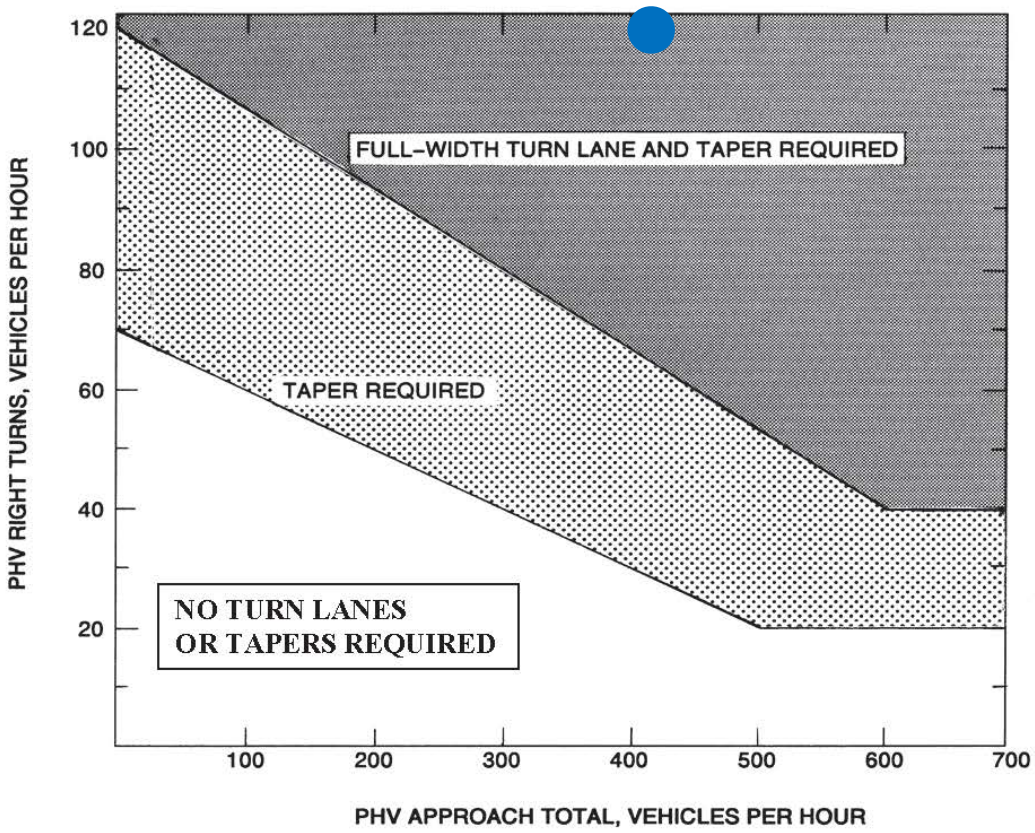
Note: An average of 11% for K x D will suffice.

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

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

* Rev. 1/15

Figure 3B
Holland and Lake Cohoon
Right Turn Lane Warrant
Build 2026



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

PM Volume
Approach = 412 vph
Right = 151 vph
Turn Lane Required

LEGEND

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

Adjustment for Right Turns

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

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

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

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

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

* Rev. 1/15

Pitchkettle and Lake Kilby
Left Turn Lane Warrant
No Build 2026

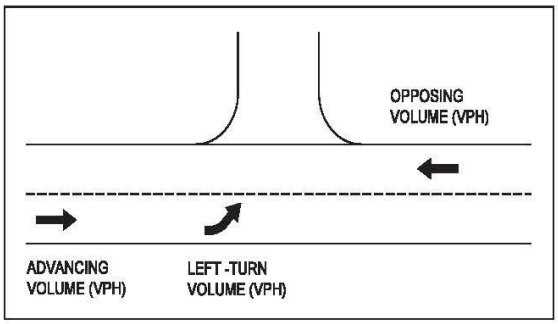
WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	[illegible]	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

Source: Adapted from 2011 AASHTO Green Book, Chapter 9, Section 9.7.3, Page 9-132, Table 9-23

* USE DESIGN SPEED IF AVAILABLE, IF NOT USE LEGAL SPEED LIMIT.*



Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

With opposing volume (VPH) of 600 and 10% of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 33 vph
Opposing = 165 vph
Advancing = 184 vph
Not Warranted

PM Volume
Left Turn = 63 vph
Opposing = 160 vph
Advancing = 298 vph
Not Warranted

* Rev. 7/14

Pitchkettle and Lake Kilby
Left Turn Lane Warrant
Build 2026

WARRANTS FOR LEFT TURN LANES ON TWO-LANE HIGHWAYS

VPH OPPOSING VOLUME	ADVANCING VOLUME			
	5% LEFT TURNS	10% LEFT TURNS	20% LEFT TURNS	30% LEFT TURNS
	40-MPH DESIGN SPEED*			
800	330	240	180	160
600	410	305	225	200
400	510	380	275	245
200	640	470	350	305
100	720	515	390	340
	50-MPH DESIGN SPEED*			
800	280	210	165	135
600	350	280	195	170
400	430	320	240	210
200	550	400	[illegible]	270
100	615	445	335	295
	60-MPH DESIGN SPEED*			
800	230	170	125	115
600	290	210	160	140
400	365	270	200	175
200	450	330	250	215
100	505	370	275	240

TABLE 3-1

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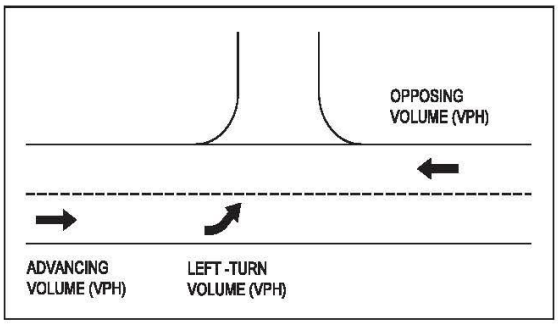


Example:

Two-lane highway with 40-MPH operating speed

Opposing Volume (VPH) - 600
Advancing Volume (VPH) - 440
Left-Turn Volume (VPH) - 44 or 10% of Advancing Volume

With opposing volume (VPH) of 600 and 10% of advancing volume (VPH) making left turns, and advancing volume (VPH) of 305 or more will warrant a left-turn lane.

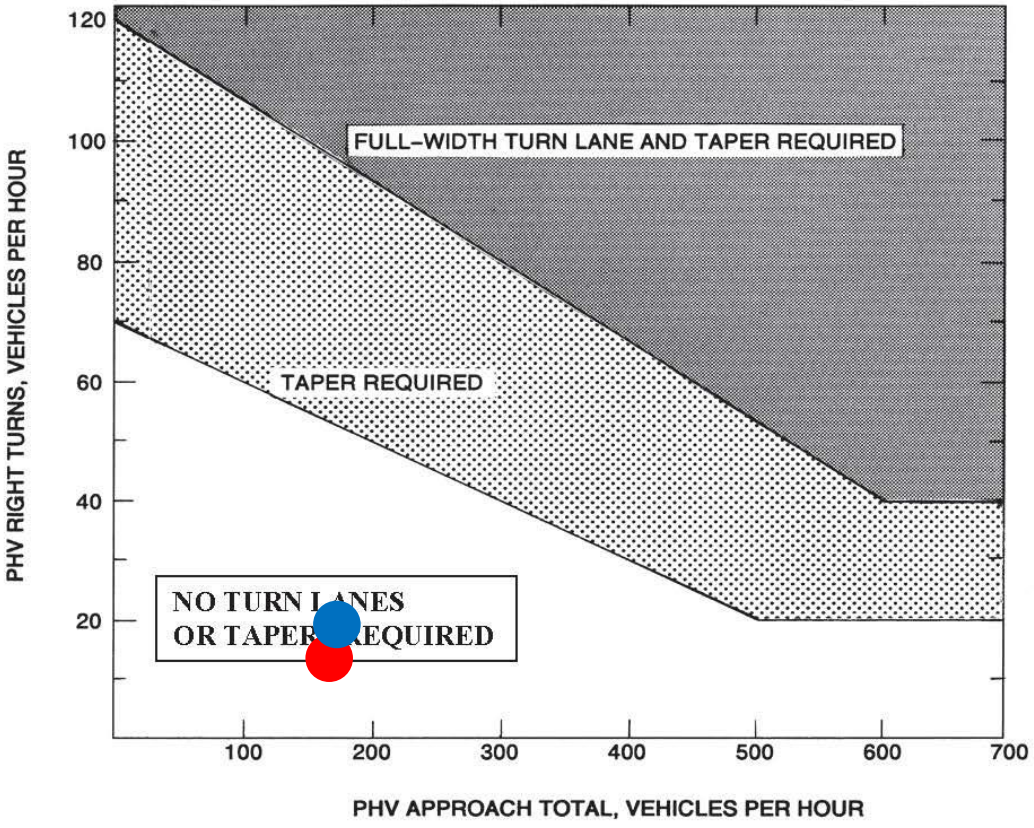
When the Average Running Speed on an existing facility is available, the corresponding Design Speed may be obtained from Appendix A, Section A-1.

AM Volume
Left Turn = 33 vph
Opposing = 174 vph
Advancing = 184 vph
Not Warranted

PM Volume
Left Turn = 63 vph
Opposing = 188 vph
Advancing = 298 vph
Not Warranted

* Rev. 7/14

Pitchkettle and Lake Kilby
Right Turn Lane Warrant
No Build 2026



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

AM Volume
Approach = 165 vph
Right = 13 vph
Not Warranted

PM Volume
Approach = 160 vph
Right = 19 vph
Not Warranted

LEGEND

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

Adjustment for Right Turns

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

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

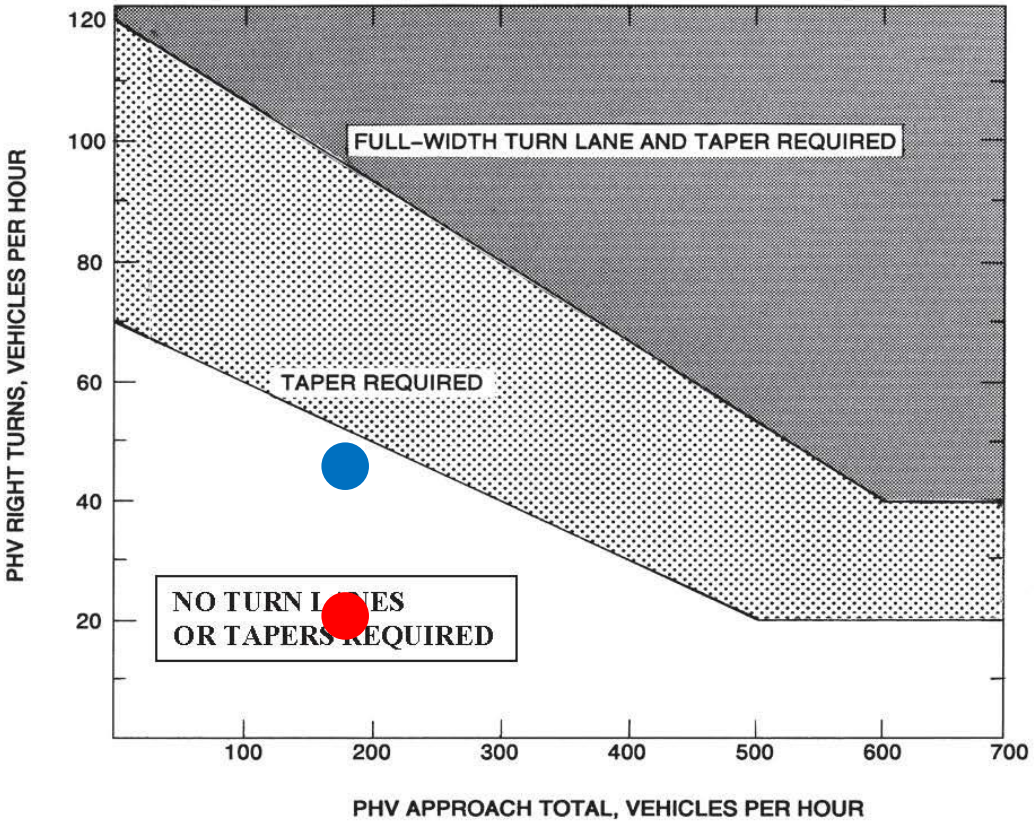
Note: An average of 11% for K x D will suffice.

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

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

* Rev. 1/15

Pitchkettle and Lake Kilby
Right Turn Lane Warrant
Build 2026



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

AM Volume
Approach = 173 vph
Right = 21 vph
Not Warranted

PM Volume
Approach = 188 vph
Right = 47 vph
Not Warranted

LEGEND

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

Adjustment for Right Turns

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

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

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

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

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

* Rev. 1/15