



RECEIVED

FEB 15 2019

CALN TWP
RTKO

STANDARD RIGHT-TO-KNOW REQUEST FORM

DATE REQUESTED: 2/14/2019

REQUEST SUBMITTED BY: ☒ E-MAIL ☐ U.S. MAIL ☐ FAX ☐ IN-PERSON

REQUEST SUBMITTED TO (Agency name & address): Caln Township
253 Municipal Dr, Thorndale, PA 19372

NAME OF REQUESTER: Matthew Downs

STREET ADDRESS: 1025 Appleville Road

CITY/STATE/COUNTY/ZIP(Required): West Chester, PA Chester County, 19380

TELEPHONE (Optional): [REDACTED] EMAIL (optional): [REDACTED]

RECORDS REQUESTED: **Provide as much specific detail as possible so the agency can identify the information. Please use additional sheets if necessary*

-Demolition Permit(s) for WILD MEADOWS LLC 5030 HORSESHOE PK, 596 N LLOYD AV, 1504 & 1520 FISHERVILLE RD

-Construction Permit(s) for WILD MEADOWS LLC 5030 HORSESHOE PK, 596 N LLOYD AV, 1504 & 1520 FISHERVILLE RD

-Traffic & Environmental study(ies) for any of the above listed locations.

DO YOU WANT COPIES? ☒ YES ☐ NO

DO YOU WANT TO INSPECT THE RECORDS? ☐ YES ☒ NO

DO YOU WANT CERTIFIED COPIES OF RECORDS? ☐ YES ☒ NO

DO YOU WANT TO BE NOTIFIED IN ADVANCE IF THE COST EXCEEDS \$100? ☒ YES ☐ NO

**** PLEASE NOTE: RETAIN A COPY OF THIS REQUEST FOR YOUR FILES ****
**** IT IS A REQUIRED DOCUMENT IF YOU WOULD NEED TO FILE AN APPEAL ****

FOR AGENCY USE ONLY

OPEN-RECORDS OFFICER: A. Lusa

☐ I have provided notice to appropriate third parties and given them an opportunity to object to this request

DATE RECEIVED BY THE AGENCY: 2/15/19

AGENCY FIVE (5) BUSINESS DAY RESPONSE DUE: 2/25/19 (closed for presidents' Day)

***Public bodies may fill anonymous verbal or written requests. If the requestor wishes to pursue the relief and remedies provided for in this Act, the request must be in writing. (Section 702.) Written requests need not include an explanation why information is sought or the intended use of the information unless otherwise required by law. (Section 703.)*

CALN TOWNSHIP FIRE CODE PERMIT

NO :

7098

THIS CARD MUST BE PLACED IN THE OPEN
VIEW AT ALL TIMES.

NAME

Justin Oliver

Site Location

5030 Hershey Pk

Contact Caln Township @ 610-384-0600 for Inspections.
(Minimum 48-Hour Notice Required)

DEWB

TYPE OF WORK BEING PERFORMED

INSPECTIONS REQUIRED FOR THIS PROJECT

☐ Site

☒ Final

TYPE OF WORK BEING PERFORMED
Demolition

FIRE CODE OFFICIAL

Date Issued
1/3/19

Review Corrections Notice- Response

Permit #- B-7098

Applicant- Wild Meadows, LLC

Dated- June 21st, 2018.

Please see below responses in order from your Review Corrections Notice received on June 21st, 2019. We apologize for our delayed response. We are now ready to move forward with this demolition permit. Thank you.

Plan Examiner Comment responses:

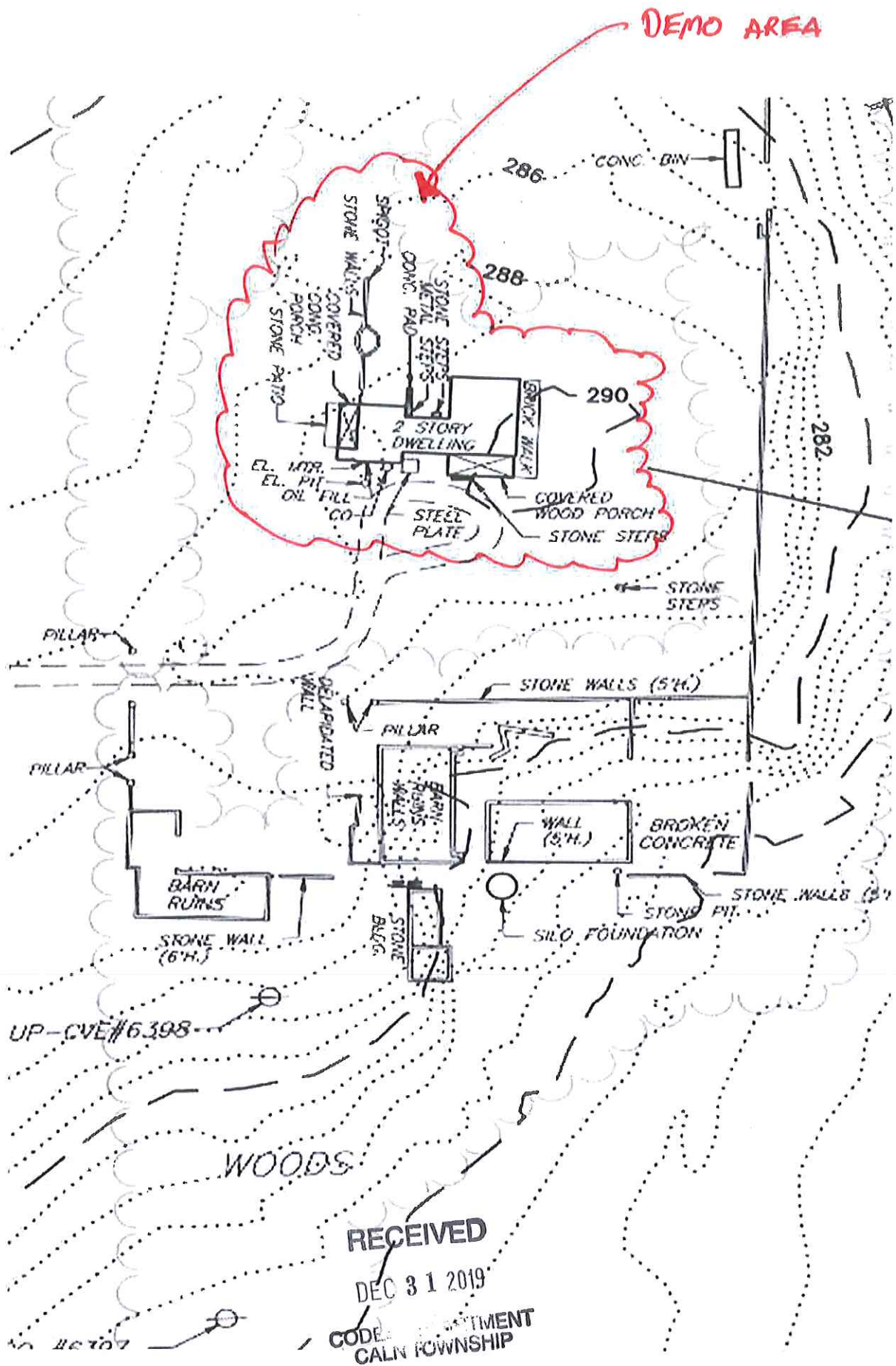
1. Contractor information and insurance for both property owner and contractor are attached.
2. Our cost for the demolition= \$5,000.
3. Peco has verified that electric has been shutoff to the property and is no longer in service. (Miss utility will be contacted before any work begins)
4. Peco has verified that no gas services this address. (Miss utility will be contacted before any work begins)
5. No public water is at this address. (Miss utility will be contacted before any work begins)
6. Private sewer system- will be properly disconnected and removed.
7. Old Farm house will be demolished and removed. Footers will be removed. (old stone stacked footers) Some of stone walls around farm house will remain for future green space areas.

Thank you for your time,

Sincerely,

Justin Olear
Wild Meadows, LLC
610-324-1918
jolear@regalbuilders.net

RECEIVED
DEC 31 2019
CODES DEPARTMENT
CALN TOWNSHIP



12-26-18

SITE PLAN
DEMO PERMIT = #B-7098



TRAFFIC PLANNING AND DESIGN, INC.



Archdiocese Property Mixed-Use Development
Transportation Impact Assessment
Caln Township, Chester County

For Submission To:
PennDOT District 6-0 & Caln Township

ARCHDIOCESE PROPERTY MIXED-USE DEVELOPMENT TRANSPORTATION IMPACT ASSESSMENT

FOR SUBMISSION TO:

Caln Township, Chester County, PA
& PennDOT District 6-0

Prepared For:

Wild Meadows, LLC

Mr. Harry Miller
13 Nobles Pond Crossing
Dover, DE 19904

April 19, 2018

(Last Revised November 6, 2018)

TPD # WIME.00001

Prepared By:

Traffic Planning and Design, Inc.

Sanatoga Commons
2500 East High Street, Suite 650
Pottstown, Pennsylvania 19464

Phone: (610) 326-3100

Fax: (610) 326-9410

E-mail: TPD@TrafficPD.com

Web Site: www.trafficpd.com



Matthew I. Hammond, P.E.

Executive Vice President

Pennsylvania License Number 071037

Table of Contents

EXECUTIVE SUMMARY	i
INTRODUCTION	1
EXISTING ROADWAY NETWORK	1
EXISTING TRAFFIC CONDITIONS	3
BASE (NO-BUILD) CONDITIONS	4
SCHEDULED ROADWAY IMPROVEMENTS	4
PROPOSED SITE ACCESS	5
TRIP GENERATION	6
TRIP DISTRIBUTION	8
PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES	9
LEVELS OF SERVICE FOR AN INTERSECTION	9
CAPACITY ANALYSIS METHODOLOGY	10
LEVELS OF SERVICE IN THE STUDY AREA	11
95TH PERCENTILE QUEUE ANALYSIS	13
AUXILIARY TURN LANE ANALYSIS	14
SIGNAL WARRANT ANALYSIS	15
RECOMMENDATIONS	16
CONCLUSIONS	17

FIGURES 1 – 17

TECHNICAL APPENDICES

Appendix A:	Project Correspondence
Appendix B:	Study Area Photographs
Appendix C:	Manual Traffic Count Printouts
Appendix D:	Nearby Development Trip Distributions
Appendix E:	Planned Roadway Projects
Appendix F:	Conflict Factor Evaluation
Appendix G:	Interaction Worksheets
Appendix H:	Trip Assignment Data
Appendix I:	Volume Development Spreadsheets
Appendix J:	Critical/Follow-Up Gap Data
Appendix K:	Capacity Analyses
Appendix L:	PennDOT Signal Diagrams
Appendix M:	Auxiliary Lane Warrant Analysis
Appendix N:	Signal Warrant Analysis
Appendix O:	Weave Analysis

EXECUTIVE SUMMARY

The purpose of this revised study is to examine the potential traffic impact associated with the Proposed Archdiocese Property Mixed-Use Development on the roadway network in Caln Township, Chester County, PA. Based on this evaluation, the following conclusions were reached:

- The project site is located on the southeastern corner of Manor Avenue (S.R. 0322) and Lloyd Avenue.
- The Proposed Site will consist of the following uses:
 - 225 active-adult (attached) homes;
 - 121 active-adult (detached) homes;
 - 20 ksf general retail space.
- The Proposed Site will be served by four (4) driveways:
 - One (1) full-access driveway to Manor Avenue (S.R. 0322), opposite Rock Raymond Road (S.R. 4017);
 - One (1) right-in/right-out driveway to Manor Avenue (S.R. 0322), located approximately 100 feet east of the centerline of the existing Downingtown Animal Hospital driveway.
 - Two (2) full-access driveways to a Lloyd Avenue:
 - One (1) opposite the Park and Ride Lot;
 - One (1) opposite the Beaver Run Road.
- The measured sight distances at the site driveways will exceed PennDOT safe stopping sight distance (SSSD) criteria, and in most cases will satisfy PennDOT desirable sight distance criteria.
- The Proposed Site will generate at total of 107 new trips during the weekday A.M. peak hour, 134 new trips during the weekday P.M. peak hour, and 154 new trips during the SAT Midday peak hour.
- Under all projected (build) conditions with the development of the proposed site, with site-related recommendations outline in **Table II**, and with and without the future signalization at Manor Avenue (S.R. 0322) and the EB Route 30 Ramps planned for by PennDOT, all study area intersections will satisfy PennDOT ILOS Standards.
- Levels of Service (LOS) for the study area intersections have been summarized in matrix form. **Table I** details the overall intersection LOS for each study area intersection:

TABLE I
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY - ILOS

Intersection	Peak Hour	2017 Exist	2023			ILOS Standards Satisfied?
			Base	Proj.	Proj. ¹	
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)/ Proposed Driveway	AM	B(15.6)	B(15.9)	B(18.7)	--	Yes
	PM	A(9.5)	B(11.2)	B(13.0)	--	
	SAT	A(8.6)	A(7.2)	A(8.4)	--	
Manor Avenue (S.R. 0322) & Lloyd Avenue/ Royal Farms Driveway	AM	C(23.3)	C(28.6)	C(32.5)	--	Yes
	PM	B(12.5)	B(13.8)	B(14.7)	--	
	SAT	B(13.4)	B(12.3)	B(13.3)	--	
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	AM	A(3.6)	A(4.5)	A(5.1)	A(8.0)	Yes
	PM	A(3.4)	C(16.8)	D(29.7)	A(4.9)	
	SAT	A(3.0)	A(3.9)	A(4.9)	A(6.3)	
Lloyd Avenue & Park and Ride/Proposed Driveway	AM	A(0.3)	A(0.3)	A(0.4)	--	Yes
	PM	A(0.2)	A(0.2)	A(0.5)	--	
	SAT	A(0.2)	A(0.2)	A(0.6)	--	
Lloyd Avenue & GO Carlson Boulevard	AM	A(4.1)	A(4.1)	A(4.1)	--	Yes
	PM	A(2.3)	A(2.2)	A(2.2)	--	
	SAT	A(2.0)	A(2.0)	A(1.9)	--	
Lloyd Avenue & Beaver Run Road/ Proposed Driveway	AM	A(0.5)	A(0.4)	A(1.0)	--	Yes
	PM	A(0.1)	A(0.1)	A(0.5)	--	
	SAT	A(0.4)	A(0.4)	A(0.7)	--	
Manor Avenue (S.R. 0322) & Proposed RIRO Driveway	AM	--	--	A(0.0)	--	Yes
	PM	--	--	A(0.0)	--	
	SAT	--	--	A(0.0)	--	

Exist. = Existing, Base = No-Build, Proj. = Build

1= With Signalization (By Others)

- Site-related recommendations are summarized in **Table II**:

**TABLE II
RECOMMENDATIONS**

Intersection	Responsible Entity	Recommendation	
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)/ Proposed Site Driveway	Applicant	Re-design the intersection/signal to accommodate the Proposed Driveway as the NB approach of the existing signal.	
		Align the NB and SB left-turn movements to avoid split-phasing at the intersection	
		Restripe the WB Manor Avenue (S.R. 0322) approach, which is currently a TWCLTL, as a 75 foot left-turn lane	
		Provide signal timing optimization	
		Maximize the EB Manor Avenue (S.R. 0322) ingress radii in order to facilitate safe ingress to the Proposed Site	
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible. Specifically, the Department requested:	Investigate a connection to the existing Royal Farms and Proposed Taco Bell via a marked crosswalk Investigate a connection to the existing sidewalk on the NE corner of the intersection leading into Downingtown. Note that pedestrian activity is prohibited today via signage
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	Applicant	Significantly reduce off-ramp right-turn channelization island (thereby moving the merge of the off-ramp/S.R. 0322 eastbound traffic further west, away from Lloyd Avenue).	
	PennDOT (MPMS #87781)	Signalization of the Intersection	
Manor Avenue (S.R. 0322) & Proposed RIRO Driveway	Applicant	Restrict left-turn ingress/egress to and from the proposed site via a raised pork-chop island	
		Provide adequate egress radii to facilitate access from the site	
		In lieu of a deceleration lane which is not warranted, maximize the ingress radii on EB Manor Avenue in order to facilitate ingress to the site	
		Provide a "STOP"-sign on the NB egress approach of the driveway	
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible	
Lloyd Avenue & Park & Ride/ Proposed Site Driveway	Applicant	Provide adequate ingress/egress radii to facilitate access to/from the site	
		Provide a "STOP"-sign on the NB egress approach of the driveway	
		Provide "Do Not Block Intersection" signage on the EB approach of Lloyd Avenue	
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible	
Lloyd Avenue & Beaver Run Road/ Proposed Site Driveway	Applicant	Provide adequate ingress/egress radii to facilitate access to/from the site	
		Provide a "STOP"-sign on the WB egress approach of the driveway	
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible	

INTRODUCTION

Traffic Planning and Design, Inc. (TPD) has completed a Transportation Impact Assessment (TIA) for the Proposed Archdiocese Property Mixed-Use Development in Caln Township, Chester County, Pennsylvania. The project site is located on the southeastern corner of Manor Avenue (S.R. 0322) and Lloyd Avenue, as shown in **Figure 1**. The Proposed Site will consist of the following uses, as shown in **Figure 2**:

- 225 active-adult (attached) homes;
- 121 active-adult (detached) homes;
- 20 ksf general retail space.

The Proposed Site will be served by four (4) driveways:

- One (1) full-access driveway to Manor Avenue (S.R. 0322), opposite Rock Raymond Road (S.R. 4017);
- One (1) right-in/right-out driveway to Manor Avenue (S.R. 0322), located approximately 100 feet east of the centerline of the existing Downingtown Animal Hospital driveway.
- Two (2) full-access driveways to a Lloyd Avenue:
 - One (1) opposite the Park and Ride Lot;
 - One (1) opposite the Beaver Run Road.

TPD assumed a build-out year of 2023.

This report has been prepared in accordance with PennDOT's *Policies and Procedures for Transportation Impact Studies*, dated January 28, 2009. The scope of this study was confirmed via a PennDOT Scoping Application, dated December 21, 2017, and subsequent PennDOT Scoping Review Letter, dated January 29, 2018. In addition, this TIA was revised based on review comments contained in PennDOT's EPS Review Letter, dated May 18, 2018. All relevant correspondence pertaining to this project has been included in **Appendix A**.

EXISTING ROADWAY NETWORK

A field review of the existing roadway system in the study area was conducted. The existing roadway characteristics within the study area are summarized in **Table 1**. Photographs of the study area intersections are included in **Appendix B**.

TABLE 1
ROADWAY CHARACTERISTICS WITHIN STUDY AREA

Roadway	State Route	Functional Classification/ Roadway Type	Predominant Directional Orientation	Average Daily Traffic ¹	Posted Speed Limit
Route 30	(S.R. 0030)	Urban Freeway	East-West	75,403	55 mph
Manor Avenue	(S.R. 0322)	Urban Principal Arterial	East-West	12,009	35-45 mph
Rock Raymond Road	(S.R. 4017)	Urban Collector	North-South	2,851	35 mph
EB Route 30 Ramps	(S.R. 8010)	Ramps	North-South	N/A	N/P
Lloyd Avenue	N/A	Collector	Varies	4,537	35 mph

¹ = PennDOT iTMS Website (January 2018)

TABLE 1 (CONTINUED)
ROADWAY CHARACTERISTICS WITHIN STUDY AREA

Roadway	State Route	Functional Classification/ Roadway Type	Predominant Directional Orientation	Average Daily Traffic ¹	Posted Speed Limit
GO Carlson Boulevard	N/A	Local Road	East-West	N/A	25 mph
Beaver Run Road	N/A	Local Road	East-West	N/A	25 mph
Park and Ride Driveway	N/A	Driveway	North-South	N/A	N/P

¹ = PennDOT iTMS Website (January 2018)

Bicycle and Pedestrian Facilities

Based on observations during field visits:

Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017) – No sidewalk or specific pedestrian/bicycle facilities currently exist at this intersection. Pedestrian activity is restricted via signage. There are no specific bicycle facilities at this intersection.

Manor Avenue (S.R. 0322) & Lloyd Avenue/Royal Farms Driveway – Sidewalk, pedestrian ramps, and crosswalks exist along the Royal Farms site frontage only. Pedestrian activity is restricted on the remaining parts of the intersection via signage. There are no specific bicycle facilities at this intersection.

Manor Avenue (S.R. 0322) & EB Route 30 Ramps – No sidewalk or specific pedestrian/bicycle facilities currently exist at this intersection.

Lloyd Avenue & Park and Ride Driveway – There is no sidewalk at this intersection. There are no ADA/Pedestrian/Bicycle Facilities at this intersection.

Lloyd Avenue & GO Carlson Boulevard – There is no sidewalk at this intersection. There are no ADA/Pedestrian/Bicycle Facilities at this intersection.

Lloyd Avenue & Beaver Run Road – There is no sidewalk at this intersection. There are no ADA/Pedestrian/Bicycle Facilities at this intersection.

Mass Transit Facilities

There are no mass transit services in the Study Area. The closest service is from the Downingtown Train Station (approximately 0.8 miles away).

Crash Data Investigation

Crash data were obtained from PennDOT for the study area intersections. PennDOT defines a reportable crash as follows, "A reportable (crash) is one in which an injury or fatality occurs or if at least one of the vehicles involved requires towing from the scene." Reportable crashes were tabulated for the five-year time period beginning 01/01/2012 and ending 12/31/2016. For a given intersection, PennDOT considers a crash occurrence of 5 reportable, correctable crashes over a continuous twelve-month period during the past five years to be a threshold value, above which the intersection design should be reviewed to examine if corrective measures can be taken to enhance safety. The number of reportable crashes at the study area intersections is shown in **Table 2**.

TABLE 2
PENNDOT TOTAL REPORTABLE CRASH DATA

Study Area Intersection	Total Number of Reportable (Correctable) Crashes				
	2012	2013	2014	2015	2016
Manor Avenue & Rock Raymond Road	0	0	1(1)	0	0
Manor Avenue & Lloyd Avenue	0	1(1)	2(2)	2(1)	1(0)
Manor Avenue & EB Route 30 Ramps	1	4(3)	6(6)	3(1)	2(1)

Total Crashes (Correctable Crashes)

Based on a review of the crash data in **Table 2**, there were no twelve-month periods during the past five years where 5 or more crashes occurred that were deemed correctable, with the exception of at the intersection of Manor Avenue (S.R. 0322) and EB Route 30 Ramps. Of these crashes, the main crash pattern includes angle crashes between vehicles making WB left-turns onto the ramp and EB vehicles travelling straight. At the time these crashes occurred, the geometry of Manor Avenue (S.R. 0322) was different and included two (2) lanes in each direction, which could have attributed to this crash pattern. The pavement markings have since been changed and may have contributed to the reduction of crashes over recent years at both intersections involving the Route 30 Ramps, shown in **Table 2**.

EXISTING TRAFFIC CONDITIONS

Manual Turning Movement Counts

Manual traffic counts were conducted on 15-minute intervals during the weekday morning (7:00 to 9:00 A.M.), weekday evening (4:00 to 6:00 P.M.), and Saturday midday (11:00 A.M. to 1:00 P.M.) peak periods. Data pertaining to heavy vehicles, pedestrians and transit vehicles were observed during the manual counts. Peak hours and count dates for the study area intersections are identified in **Table 3**.

TABLE 3
MANUAL TRAFFIC COUNT INFORMATION¹

Intersection	Date of Traffic Counts	Time Period	Intersection Peak Hour ²
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)	Tuesday, December 19, 2017	Weekday A.M.	7:00 to 8:00 A.M.
		Weekday P.M.	4:15 to 5:15 P.M.
	Saturday, December 16, 2017	SAT Midday	11:00 A.M. to 12:00 P.M.
Manor Avenue (S.R. 0322) & Lloyd Avenue/ Royal Farms Driveway	Tuesday, December 19, 2017	Weekday A.M.	7:15 to 8:15 A.M.
		Weekday P.M.	4:15 to 5:15 P.M.
	Saturday, December 16, 2017	SAT Midday	11:15 A.M. to 12:15 P.M.
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	Tuesday, December 19, 2017	Weekday A.M.	7:15 to 8:15 A.M.
		Weekday P.M.	4:15 to 5:15 P.M.
	Saturday, December 16, 2017	SAT Midday	11:00 to 12:00 P.M.
Lloyd Avenue & Park and Ride Driveway	Tuesday, December 19, 2017	Weekday A.M.	7:15 to 8:15 A.M.
		Weekday P.M.	4:30 to 5:30 P.M.
	Saturday, December 16, 2017	SAT Midday	11:45 A.M. to 12:45 P.M.
Lloyd Avenue & GO Carlson Boulevard	Tuesday, December 19, 2017	Weekday A.M.	7:15 to 8:15 A.M.
		Weekday P.M.	4:30 to 5:30 P.M.
	Saturday, December 16, 2017	SAT Midday	11:45 A.M. to 12:45 P.M.
Lloyd Avenue & Beaver Run Road	Tuesday, December 19, 2017	Weekday A.M.	7:00 to 8:00 A.M.
		Weekday P.M.	4:15 to 5:15 P.M.
	Saturday, December 16, 2017	SAT Midday	12:00 to 1:00 P.M.

¹ = Schools confirmed to be in session

² = Peak Hour consists of the four consecutive 15-minute intervals where the highest traffic volumes occur.

2017 Existing Condition traffic volumes for the weekday A.M., P.M., and SAT Midday peak hours are illustrated in **Figures 3-5**. Manual traffic count data sheets are provided in **Appendix C**.

BASE (NO-BUILD) CONDITIONS

Annual Background Growth

A background growth factor for the roadways in the study area was developed based on growth factors for August 2017 to July 2018 obtained from the PennDOT Bureau of Planning and Research (BPR). The PennDOT BPR suggests using a background growth trend factor of 0.65% per year in Chester County for urban non-interstate roadways. As such, the background growth factor was applied annually to yield overall growth percentages of 3.96% (0.65% per year compounded over 6 years) for the 2023 Full-Build Year.

Nearby Planned Developments

Based on experience in the Study Area, TPD included traffic associated with the following developments, which may be built and operational by the time the Proposed Site is completed in the future:

- Dwell at Caln PRD – A 384-unit residential development located on the southern side of Manor Avenue (S.R. 0322), west of Edges Mill Road. TPD generated and distributed for this development based on a TIS prepared by McMahon Associates. The anticipated buildout for this development is 2019. Therefore, TPD assumed full-buildout under all future (base and projected) conditions).
- Taco Bell – A 2.753 ksf (66 seat) fast-food restaurant located on the northwestern corner of Manor Avenue (S.R. 0322) and Rock Raymond Road (S.R. 4017). TPD generated and distributed for this development based on a TIS prepared by TPD. The anticipated buildout for this development is 2019. Therefore, TPD assumed full-buildout under all future (base and projected) conditions).

The additional traffic volumes due to background growth and nearby planned developments were added to the existing traffic data to produce 2023 Base Conditions, as illustrated in **Figures 6-8**. Nearby Planned Development Trip Distribution is included in **Appendix D**.

SCHEDULED ROADWAY IMPROVEMENTS

Based on a review of the PennDOT 12-Year Plan and the DVRPC Transportation Improvement Program (TIP), there was one (1) specific planned roadway improvements project identified in the vicinity of the proposed site:

- "MPMS 87781 – US 30, Coatesville Downingtown Bypass (CER-Eastern Section) – Limits: US 30, from East of Reeceville Rd Interchange to Quarry Rd. This project provides for the final design, right-of-way, utility and construction phases of the Coatesville-Downingtown Bypass Reconstruction - eastern section - by reconstructing and widening the mainline shoulders; replacing and widening the mainline bridge superstructures; constructing new ramps (to complete partial interchanges); reconstructing, realigning, and lengthening all on and off ramps (to provide storage length for traffic signals and/or ramp metering); and reconstructing arterial overpasses. The overall corridor construction cost estimate is \$630 million. MPMS# 14532 provides for the preliminary design portion of this project and the western section, as well as additional study work to determine the approach for this eastern section. MPMS# 84884 contains the construction of the western section. Project CMP (Congestion Management Process) commitments include expansion of Intelligent Transportation Systems (ITS) equipment throughout the

corridor, signal improvements on parallel arterials, numerous improvements to rail transit stations and services in consultation with SEPTA and Amtrak, improved access to rail stations, sidewalks and other improvements for pedestrians and bicyclists on parallel arterials, investigation of park-and-ride locations, and outreach to employers to promote transportation demand management strategies. See DVRPC's 2016-2017 memorandum on supplemental strategies for details related to this project."

This Project also contemplates physical improvements to the Route 322 interchange, including several options for the on/off ramps, including signalization and/or a diverging diamond interchange (DDI). Funding for this Project Starts in 2019, but construction is not estimated to begin any earlier than 2026. Information pertaining to this project is included in **Appendix E**.

Based on further review comments and coordination with PennDOT, the Applicant has agreed to pursue improvements to the EB Route 30 Off-Ramp channelized right-turn onto EB Route 322. This improvement will eliminate the large sweeping channelized right-turn and replace it with a right-turn lane closer to the existing intersection of EB Route 30 Ramp/Route 322. This improvement will maximize the weaving area on Route 322 between this intersection and Lloyd Avenue, to the east.

Additionally, based on further review comments and coordination with PennDOT, the Department agreed that signalization of the intersection of EB Route 30 Ramp/Route 322 will not be the responsibility of the Applicant, but will rather be part of the future project described above. However, this TIS continues to look at this intersection with and without signalization in the future.

It should be noted that the Royal Farms located opposite Lloyd Avenue recently opened and provided several roadway/signal improvements along Manor Avenue (S.R. 0322) and Rock Raymond Road (S.R. 4017). These improvements are included under existing conditions.

PROPOSED SITE ACCESS

The Proposed Site will be served by four (4) driveways:

- One (1) full-access driveway to Manor Avenue (S.R. 0322), opposite Rock Raymond Road (S.R. 4017);
- One (1) right-in/right-out driveway to Manor Avenue (S.R. 0322), located approximately 100 feet east of the centerline of the existing Downingtown Animal Hospital driveway.
- Two (2) full-access driveways to a Lloyd Avenue:
 - One (1) opposite the Park and Ride Lot;
 - One (1) opposite the Beaver Run Road.

Sight Distance Analysis

A sight distance analysis was prepared for the proposed site driveways. In general, recommended safe sight distances depend upon the posted speed limit and roadway grades. The existing sight distances at the proposed driveways were measured in accordance with PennDOT Publication 282 Highway Occupancy Permit Guidelines and compared to PennDOT's desirable sight distance standard, which is identified in 67 PA Code Chapter 441.8(h), "Access to and Occupancy of Highways by Driveways and Local Roads." In addition, measured sight distances at the proposed driveways were compared to PennDOT's safe stopping sight distance standard, which is calculated by the following equation:

$$SSSD = 1.47VT + V^2/[30(f \pm g)]$$

SSSD = safe stopping sight distance (acceptable sight distance)

V = Vehicle Speed

T = Perception Reaction Time of Driver (2.5 seconds)

f = Coefficient of Friction for Wet Pavements

g = Percent of Roadway Grade Divided by 100

Table 4 shows the measured, desirable, acceptable (SSSD), and required sight distances at the site driveways for vehicles entering and exiting the site.

TABLE 4
SIGHT DISTANCE ANALYSIS
PROPOSED SITE DRIVEWAYS

	Direction	Posted Speed (mph)	Sight Distances (feet)			
			Grade ¹ (%)	DES ²	SSSD ²	EXIST
Manor Avenue Full-Access Driveway						
Exiting Movements	To the left	35	-2	440	256	440 ³
	To the right	35	+4	350	236	500+
Entering Left Turns	Approaching same direction	35	+4	N/A	236	500+
	Approaching opposite direction	35	-2	300	256	340
Manor Avenue RIRO Driveway						
Exiting Movements	To the left	45	-2	635	398	700+
	To the right	N/A	N/A	N/A	N/A	N/A
Entering Left Turns	Approaching same direction	N/A	N/A	N/A	N/A	N/A
	Approaching opposite direction	N/A	N/A	N/A	N/A	N/A
Lloyd Avenue Driveway (Opposite Park and Ride Driveway)						
Exiting Movements	To the left	35	+1	440	245	350 ³
	To the right	35	+3	350	239	307 ⁴
Entering Left Turns	Approaching same direction	35	+3	N/A	239	262 ⁴
	Approaching opposite direction	35	+1	300	245	400 ³
Lloyd Avenue Driveway (Opposite Beaver Run Road)						
Exiting Movements	To the left	35	+1	440	245	500+
	To the right	35	-1	350	252	500+
Entering Left Turns	Approaching same direction	35	-1	N/A	252	500+
	Approaching opposite direction	35	+1	300	245	500+

DES = PennDOT Desirable Sight Distance

SSSD = PennDOT Acceptable Sight Distance

EXIST = Existing (measured) Sight Distance

1 = Roadway Grade Approaching Driveway

2 = Based on the posted speed

3 = With Vegetation Removal

4 = To Signalized Intersection (Slower Turning Movements)

As shown in **Table 4** above, the measured sight distances at the site driveways will exceed PennDOT safe stopping sight distance (SSSD) criteria, and in most cases will satisfy PennDOT desirable sight distance criteria.

TRIP GENERATION

The trip generation rates for the proposed site were obtained from the manual *Trip Generation*, Ninth Edition, 2012, an Institute of Transportation Engineers (ITE) Informational Report. The statistics in *Trip Generation* are empirical data based on more than 4,800 trip generation studies. The data are categorized by Land Use Codes, with total vehicular trips for a given land use estimated using an independent variable and statistically generated rates or equations.

Table 5 shows the rates/equations and directional percentages for the analyzed time periods.

TABLE 5
TRIP GENERATION DATA – PROPOSED SITE

Land Use	Time Period	Size (X)	Equations	Enter %	Pass-By %
Senior Adult Housing Detached (ITE Land Use # 251)	Average Weekday	121 du	$\ln(T) = 0.89 \ln(X) + 2.06$	50%	--
	Weekday A.M. Peak Hour		$T = 0.17*(X) + 29.95$	35%	--
	Weekday P.M. Peak Hour		$\ln(T) = 0.75 \ln(X) + 0.35$	61%	--
	Saturday Midday Peak Hour		$T = 0.23*(X)$	48%	--
Senior Adult Housing Attached (ITE Land Use # 252)	Average Weekday	225du	$T = 2.98*(X) + 21.05$	50%	--
	Weekday A.M. Peak Hour		$T = 0.20*(X) - 0.13$	34%	--
	Weekday P.M. Peak Hour		$T = 0.24*(X) + 1.64$	54%	--
	Saturday Midday Peak Hour		$T = 0.31*(X) + 0.46$	57%	--
General Retail (ITE Land Use #820)	Average Weekday	20.0 ksf	$T = 42.70*(X)$	50%	N/A
	Weekday A.M. Peak Hour		$T = 0.96*(X)$	62%	24% ¹
	Weekday P.M. Peak Hour		$T = 3.71*(X)$	48%	34%
	Saturday Midday Peak Hour		$T = 4.82*(X)$	52%	26%

T = Total Trips; X = Independent Variable (ksf, dwelling units)

1 = No Data, Utilized PM Minus 10%

Since the retail is being provided partially as an on-site amenity for the residential portion of the Proposed Site, TPD anticipates interaction between the retail and residential portions of Proposed Site. TPD performed a preliminary interaction and determined the following percentages:

- Average Weekday = 9% (Average of AM and PM)
- Weekday AM = 3%
- Weekday PM = 15%
- SAT Midday = 9% (Average of AM and PM)

The Interaction Worksheets are included in **Appendix G**. The results of the trip generation calculations are summarized in **Table 6**.

TABLE 6
TRIP GENERATION – PROPOSED DEVELOPMENT

Land Use Code	Ind Variable	Total	Int.	External Trips			Pass-By Trips			New Trips		
				Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Average Weekday												
ITE #251	121 du	560	-42	518	259	259	--	--	--	518	259	259
ITE #252	225 du	692	-54	638	319	319	--	--	--	638	319	319
ITE #820	20.0 ksf	854	-94	760	380	380	--	--	--	760	380	380
Total	--	2106	-190	1916	958	958	0	0	0	1916	958	958
Weekday AM												
ITE #251	121 du	51	-1	50	18	32	0	0	0	50	18	32
ITE #252	225 du	45	-1	44	14	30	0	0	0	44	14	30
ITE #820	20.0 ksf	19	-2	17	11	6	4	3	1	13	8	5
Total	--	115	-4	111	43	68	4	3	1	107	40	67
Weekday PM												
ITE #251	121 du	52	-7	45	27	18	0	0	0	45	27	18
ITE #252	225 du	56	-7	49	25	24	0	0	0	49	25	24
ITE #820	20.0 ksf	74	-14	60	32	28	20	11	9	40	21	19
Total	--	182	-28	154	84	70	20	11	19	134	73	61

TABLE 6 (CONTINUED)
TRIP GENERATION – PROPOSED DEVELOPMENT

Land Use Code	Ind Variable	Total	Int.	External Trips			Pass-By Trips			New Trips		
				Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
SAT Midday												
ITE #251	121 du	28	-2	26	12	14	0	0	0	26	12	14
ITE #252	225 du	70	-7	63	36	27	0	0	0	63	36	27
ITE #820	20.0 ksf	96	-8	88	46	42	23	12	11	65	34	31
Total	--	194	-17	177	94	83	23	12	11	154	82	72

Based on the information contained in Table 6, the Proposed Site will generate at total of 107 new trips during the weekday A.M. peak hour, 134 new trips during the weekday P.M. peak hour, and 154 new trips during the SAT Midday peak hour.

TRIP DISTRIBUTION

New Trips - Residential

The distribution and assignment of new trips generated by the residential portion of the proposed development was based upon existing traffic patterns in the Study Area. Based on this evaluation, the new trips for the residential portion of the proposed development were distributed to the local roadway network based on the percentages shown in **Table 7**.

TABLE 7
TRIP DISTRIBUTION PERCENTAGES – NEW TRIPS - RESIDENTIAL

Direction - To/From	Assignment - To/From	Distribution Percentage
		AM/PM/SAT
West	via Manor Avenue	30%
North	via Route 30	25%
East	via Manor Avenue	21%
South	via Lloyd Avenue	9%
North	via Rock Raymond Road	9%
South	via Route 30	6%

New Trips - Retail

The distribution and assignment of new trips generated by the retail portion of the proposed development was based upon existing traffic patterns in the Study Area. Based on this evaluation, the new trips for the retail portion of the proposed development were distributed to the local roadway network based on the percentages shown in **Table 8**.

TABLE 8
TRIP DISTRIBUTION PERCENTAGES – NEW TRIPS - RETAIL

Direction - To/From	Assignment - To/From	Distribution Percentage
		AM/PM/SAT
West	via Manor Avenue	29%
North	via Route 30	24%
East	via Manor Avenue	20%
South	via Lloyd Avenue	9%
North	via Rock Raymond Road	8%
South	via Route 30	6%
West	via GO Carlson Boulevard	4%

Pass-By Trips

The distribution and assignment of pass-by trips generated by the proposed development was based upon existing traffic patterns in the Study Area. Based on this evaluation, the pass-by trips for the proposed development were distributed to the local roadway network based on the percentages shown in **Table 9**.

TABLE 9
TRIP DISTRIBUTION PERCENTAGES – PASS-BY TRIPS

Direction	Distribution Percentage		
	AM	PM	SAT
EB Manor Avenue	49%	29%	32%
WB Manor Avenue	21%	39%	33%
EB Lloyd Avenue	22%	14%	16%
WB Lloyd Avenue	8%	18%	19%

The distribution of site-generated trips for the proposed development during the weekday A.M., P.M., and Saturday midday peak hours are shown in **Figures 9-14**. The trip assignment percentage information is included in **Appendix H**.

PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES

The site-generated trips for the proposed development were added to the base (no-build) conditions to develop respective projected (build) condition traffic volumes, as shown in **Figures 15-17**. Volume development spreadsheets are contained in **Appendix I**.

LEVELS OF SERVICE FOR AN INTERSECTION

For analysis of intersections, level of service is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS criteria is stated in terms of control delay per vehicle for a one-hour analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The criteria are shown in **Table 10**. Delay, as it relates to level of service, is a complex measure and is dependent upon a number of variables. For signalized intersections, these variables include the quality of vehicle progression, the cycle length, the green time ratio, and the volume/capacity ratio for the lane group in question. For unsignalized intersections, delay is related

to the availability of gaps in the flow of traffic on the major street and the driver's discretion in selecting an appropriate gap for a particular movement from the minor street (straight across, left or right turn).

TABLE 10
LEVEL OF SERVICE CRITERIA
UNSIGNALIZED AND SIGNALIZED INTERSECTIONS¹

Level of Service	Control Delay Per Vehicle (Seconds)	
	Signalized	Unsignalized
A	< 10	< 10
B	> 10 and < 20	> 10 and < 15
C	> 20 and < 35	> 15 and < 25
D	> 35 and < 55	> 25 and < 35
E	> 55 and < 80	> 35 and < 50
F	> 80 or v/c > 1.0	> 50 or v/c > 1.0

¹Obtained from Exhibits 18-4 and 19-1 of the Transportation Research Board's Highway Capacity Manual 2010

CAPACITY ANALYSIS METHODOLOGY

Capacity analyses were conducted for the weekday A.M., P.M., and Saturday midday peak hours at the study area intersections. These analyses were conducted according to the methodologies contained in the 2010 *Highway Capacity Manual* (HCM) using *Synchro 10* software, a Trafficware product.

The following conditions were analyzed, as applicable:

- 2017 Existing conditions;
- 2023 Base conditions (Build-out year without development);
- 2023 Projected conditions (Build-out year with development).

It should be noted that based on methodologies contained in Chapter 10 of PennDOT's Publication 46, TPD adjusted the following 2010 HCM default values in the *Synchro 10* capacity analysis. These adjustments were made at the signalized intersections within the study area for all time periods based on the study area location being classified as Suburban:

- Base saturation flow rates for signalized intersections. The saturation flow rate was changed from the default value of 1900 to 1800 based on Exhibit 10-9.
- Start-up lost time and extension of effective green time for signalized intersections. The startup lost time was changed from the default value of 2.0 seconds to 2.5 seconds. Based on the total clearance time (yellow plus all-red time) being greater than 5 seconds, the extension of green time was changed from the default value of 2 seconds to 3.5 seconds. These adjusted values were based on Exhibit 10-10.
- Critical and Follow-Up Gap times were adjusted relative to the difference between default and PA Default values contained in Exhibits 10-11 and 10-12. As requested by PennDOT, worksheets/tables showing how these values were calculated are included in **Appendix J**.

In addition, capacity analyses were conducted at the proposed site driveway intersections under the projected conditions. The capacity analysis worksheets are included in **Appendix K**. The PennDOT-approved signal plans are included in **Appendix L**.



PennDOT's Transportation Impact Study Guidelines outlined in Strike-Off Letter 470-09-4, dated February 12, 2009 contain the following criteria regarding levels of service:

- Page 29 of the Guidelines state that if evaluation of the With Development Horizon Year Scenario to the Without Development Horizon Year Scenario indicates that the overall intersection level of service has dropped, the applicant will be required to mitigate the level of service if the increase in overall intersection delay is greater than 10-seconds. If the overall intersection delay increase is less than or equal to 10-seconds, mitigation of the intersection will not be required.
- Page 29 of the Guidelines state that for mitigation scenarios, applicants are expected to mitigate the overall intersection LOS to the original Without Development LOS; the 10-second delay variance is not applied to mitigation scenarios. Applicants may be required to address available storage and queue lengths at critical movements or approaches even if the overall LOS requirements are met.
- Page 31 of the Guidelines state that if signalization is the preferred alternative for mitigation, overall intersection LOS C in rural areas and LOS D in urban areas is acceptable.
- Page 31 of the Guidelines states new signalized or unsignalized intersection established to serve as access to the development shall be designed to operate at minimum LOS C for rural areas, and minimum LOS D for urban areas.

Per PennDOT Standards, in order to determine the true impact of the Proposed Site, signal timings were optimized under base (future no build). Those timings were then utilized for each respective projected (future build) scenario.

LEVELS OF SERVICE IN THE STUDY AREA

Level of service (LOS) matrices for the study area intersections are shown in **Table 11** for the weekday A.M., P.M., Saturday midday peak hours.



TABLE 11
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY

Intersection	Movement	Weekday A.M.				Weekday P.M.				SAT Midday			
		2017 Exist	2023			2017 Exist	2023			2017 Exist	2023		
			Base	Proj.	Proj. ¹		Base	Proj.	Proj. ¹		Base	Proj.	Proj. ¹
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)/ Proposed Driveway	EBL	A	A	B	--	A	A	B	--	A	A	A	--
	EBT	A	A	A	--	A	A	A	--	A	A	A	--
	EBR	--	--		--	--	--		--	--	--		--
	WBL	--	--	B	--	--	--	A	--	--	--	A	--
	WBT	B	B	C	--	B	B	B	--	A	A	A	--
	WBR				--				--				--
	NBLTR	--	--	D	--	--	--	D	--	--	--	C	--
	SBL	E	E	D	--	D	D	D	--	D	D	C	--
	SBT	--	--	C	--	--	--	D	--	--	--	C	--
	SBR	C	C		--	D	D		--	C	C		--
	ILOS	B(15.6)	B(15.9)	B(18.7)	--	A(9.5)	B(11.2)	B(13.0)	--	A(8.6)	A(7.2)	A(8.4)	--
Manor Avenue (S.R. 0322) & Lloyd Avenue/ Royal Farms Driveway	EBL	B	B	B	--	A	C	C	--	A	A	B	--
	EBT	C	D	D	--	B	B	B	--	B	B	B	--
	EBR	B	B	B	--	B	B	B	--	A	B	B	--
	WBL	B	C	C	--	A	A	B	--	A	A	A	--
	WBT	A	A	A	--	A	A	A	--	A	A	A	--
	WBR	A	A	A	--	A	A	A	--	A	A	A	--
	NBLT	D	D	D	--	D	D	D	--	C	C	C	--
	NBR	D	D	C	--	C	C	C	--	C	C	C	--
	SBLT	D	D	D	--	D	C	C	--	C	C	C	--
	ILOS	C(23.3)	C(28.6)	C(32.5)	--	B(12.5)	B(13.8)	B(14.7)	--	B(13.4)	B(12.3)	B(13.3)	--
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	EBT	--	--	--	A	--	--	--	A	--	--	--	A
	EBR	--	--	--	A	--	--	--	A	--	--	--	A
	WBL	B	C	C	B	B	B	B	A	B	B	B	A
	WBT	--	--	--	A	--	--	--	A	--	--	--	A
	NBL	F(58.4)	F(117.3)	F(169.4)	E	F(203.3)	F(999+)	F(999+)	E	E	F(92.8)	F(153.8)	D
	NBR	C	C	C	A	C	C	C	A	B	C	C	A
	ILOS	A(3.6)	A(4.5)	A(5.1)	A(8.0)	A(3.4)	C(16.8)	D(29.7)	A(4.9)	A(3.0)	A(3.9)	A(4.9)	A(6.3)
Lloyd Avenue & Park and Ride/ Proposed Driveway	EBL	A	A	A	--	A	A	A	--	A	A	A	--
	WBL	--	--	A	--	--	--	A	--	--	--	A	--
	NB	--	--	B	--	--	--	B	--	--	--	B	--
	SB	C	C	C	--	B	B	C	--	B	B	B	--
	ILOS	A(0.3)	A(0.3)	A(0.4)	--	A(0.2)	A(0.2)	A(0.5)	--	A(0.2)	A(0.2)	A(0.6)	--

Exist. = Existing, Base = No-Build, Proj. = Build
1= With Signalization (By Others)

TABLE 11 (CONTINUED)
LEVEL OF SERVICE DELAY (SECONDS) SUMMARY

Intersection	Movement	Weekday A.M.			Weekday P.M.			SAT Midday		
		2017 Exist	2023		2017 Exist	2023		2017 Exist	2023	
			Base	Proj.		Base	Proj.		Base	Proj.
Lloyd Avenue & GO Carlson Boulevard	EB	B	C	C	B	B	C	B	B	B
	NBL	A	A	A	A	A	A	A	A	A
	ILOS	A(4.1)	A(4.1)	A(4.1)	A(2.3)	A(2.2)	A(2.2)	A(2.0)	A(2.0)	A(1.9)
Lloyd Avenue & Beaver Run Road/ Proposed Driveway	EB	B	B	B	B	B	B	B	B	B
	WB	--	--	B	--	--	B	--	--	B
	NBL	A	A	A	A	A	A	A	A	A
	SBL	--	--	A	--	--	A	--	--	A
	ILOS	A(0.5)	A(0.4)	A(1.0)	A(0.1)	A(0.1)	A(0.5)	A(0.4)	A(0.4)	A(0.7)
Manor Avenue (S.R. 0322) & Proposed RIRO Driveway	NBR	--	--	A	--	--	B	--	--	B
	ILOS	--	--	A(0.0)	--	--	A(0.0)	--	--	A(0.0)

Exist. = Existing, Base = No-Build, Proj. = Build

As shown in **Table 11**, under all projected (build) conditions with the development of the proposed site, with site-related recommendations outline in **Table 14**, and with or without the future signalization at Manor Avenue (S.R. 0322) and the EB Route 30 Ramps planned for by PennDOT, all study area intersections will satisfy PennDOT ILOS Standards.

95TH PERCENTILE QUEUE ANALYSIS

Queue analyses were conducted at the study area intersections using *Synchro 10* software. For this analysis, the 95th percentile queue is defined as the queue length that is exceeded in 5% of the signal cycles. As an example, for a signal with a 90-second cycle, this means that the 95th percentile queue length will be exceeded during 2 of the 40 signal cycles that occur during the peak hour. The queue analysis results are for the 2026 Design Year are summarized in **Table 12** for the analyzed peak hours.

TABLE 12
95TH PERCENTILE QUEUE ANALYSIS

Intersection	Movement	Available Stacking (Base/Proj.)	95 th Percentile Queues (Feet)					
			2023					
			AM		PM		SAT	
			Base	Proj. ¹	Base	Proj. ¹	Base	Proj. ¹
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)/ Proposed Driveway	EBL	145 ²	230	253	55	58	<25	25
	EBT	[325]	63	103	<25	<25	<25	<25
	EBR		--		--		--	
	WBL	--/75	--	<25	--	<25	--	<25
	WBTR	--	280	318	548	588	255	260
	NBLTR	--	--	63	--	55	--	40
	SBL	230	358	345	98	95	63	58
	SBT		--		--		--	
	SBR	--	255	143	183	105	95	58

[Distance to Adjacent Study Area Intersection]

¹With Site-Related Recommendations, ²TWCLTL So Available Storage is Longer

TABLE 12 (CONTINUED)
95TH PERCENTILE QUEUE ANALYSIS

Intersection	Movement	Available Stacking (Base/Proj.)	95 th Percentile Queues (Feet)					
			2023					
			AM		PM		SAT	
			Base	Proj. ¹	Base	Proj. ¹	Base	Proj. ¹
Manor Avenue (S.R. 0322) & Lloyd Avenue/ Royal Farms Driveway	EBL	190	38	38	55	58	30	33
	EBT	[465]	1000	1108	413	458	333	375
	EBR	385	72	80	153	168	90	100
	WBL	150 ²	95	103	58	63	30	33
	WBT	[600]	<25	<25	40	38	<25	<25
	WBR	150	<25	<25	<25	<25	<25	<25
	NBLT	--	340	363	272	285	205	220
	NBR	150	195	195	58	58	<25	<25
	SBLTR	--	75	75	95	95	65	65
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	EBT	[600]	--	520	--	380	--	335
	EBR	--	--	<25	--	<25	--	<25
	WBL	250	72	220	35	90	40	85
	WBT	[465]	--	<25	--	<25	--	<25
	NBL	--	30	25	100	33	42	33
	NBR	--	60	<25	68	<25	40	<25
Lloyd Avenue & Park and Ride/ Proposed Driveway	EBL	[755]	<25	<25	<25	<25	<25	<25
	WBL	[225]	--	<25	--	<25	--	<25
	NB	--	--	<25	--	<25	--	<25
	SB	--	<25	<25	<25	<25	<25	<25
Lloyd Avenue & GO Carlson Boulevard	EB	--	40	43	<25	<25	<25	<25
	NBL	[450]	<25	<25	<25	<25	<25	<25
Lloyd Avenue & Beaver Run Road/ Proposed Driveway	EB	--	<25	<25	<25	<25	<25	<25
	WB	--	--	<25	--	<25	--	<25
	NBL	--	<25	<25	<25	<25	<25	<25
	SBL	[450]	--	<25	--	<25	--	<25
Manor Avenue (S.R. 0322) & Proposed RIRO Driveway	NBR	--	--	<25	--	<25	--	<25

[Distance to Adjacent Study Area Intersection]

¹With Signalization (By Others)

²TWCLTL So Available Storage is Longer

Queue analysis worksheets are included with the capacity analysis worksheets provided in **Appendix K**.

AUXILIARY TURN LANE ANALYSIS

Methodology

TPD evaluated auxiliary turn lane warrants at the Proposed Driveways. The warrant analysis methodology contained within Chapter 11 of PennDOT's *Publication 46*, Section 11.17 and Strike-Off Letter 470-08-07 was utilized for this evaluation.

Findings

Table 13 summarizes the results of the auxiliary turn lane analysis at the site access intersections.

TABLE 13
AUXILIARY TURN LANE ANALYSIS SUMMARY

Intersection	Auxiliary Lane	Warrant Satisfied?	Required Lane Length	Proposed Lane Length
Proposed Manor Avenue Driveway @ Rock Raymond Road	WB Left-Turn Lane	Yes	75'	75'
	EB Right-Turn Lane	No	--	--
Proposed Manor Avenue R/O Driveway	EB Right-Turn Lane	No	--	Maximize Ingress Radii
Proposed Lloyd Avenue Driveway @ Park and Ride Driveway	WB Left-Turn Lane	No	--	--
	EB Right-Turn Lane	No	--	--
Proposed Lloyd Avenue Driveway @ Beaver Run Road	SB Left-Turn Lane	No	--	--
	NB Right-Turn Lane	No	--	--

The calculations for the auxiliary turn lane warrants are included in **Appendix M**.

SIGNAL WARRANT ANALYSIS

As requested by PennDOT in their Scoping Review (dated January 29, 2018), TPD performed a Signal Warrant Analysis at the intersection of Manor Avenue (S.R. 0322) and EB Route 30 Ramps. TPD evaluated warrants at this intersection two (2) ways:

- With both directions of Manor Avenue (S.R. 0322) as the Major Roadway and the Northbound approach of the EB Route 30 Ramp as the Minor Roadway. It should be noted that, based on the existing geometry of the intersection (large right-turn radii), both the EBR and NBR movements were excluded as they would not be part of any future signalization.
- With the EB direction of Manor Avenue (S.R. 0322) as the Major Roadway and the WBL movement of Manor Avenue (S.R. 0322) as the Minor Roadway.

As such, TPD evaluated three (3) applicable signal warrants contained in the 2009 MUTCD and PennDOT Publication 46/412, as follows:

- Warrant 2 – (Four-Hour Vehicular Volume)
- Warrant 3 – (Peak Hour Volume)
- Warrant 7 – (Crash Experience)

Based on the results of this warrant analysis:

- None of the warrants are satisfied under 2023 Projected Conditions (future with development) when the intersection is evaluated with the NB approach of the EB Route 30 Ramp as the Minor Roadway.
- Warrant 2 and Warrant 3 are satisfied under 2018 Existing Conditions (today without the development) when the intersection is evaluated with the EB direction of Manor Avenue (S.R. 0322) as the Major Roadway and the WBL movement of Manor Avenue (S.R. 0322) as the Minor Roadway.

Therefore, projected condition analyses at the intersection were evaluated with and without signalization. However, as shown above, signal warrants are not warranted due to the development of the Proposed Site. Furthermore, as stated before, there is a long-range (funded) project for this interchange (MPMS 87781) that includes signalization of this intersection. ***Additionally, based on further review comments and coordination with PennDOT, the Department agreed that signalization of the intersection of EB***

Route 30 Ramp/Route 322 will not be the responsibility of the Applicant, but will rather be part of the future project described above. Signal Warrants are included in **Appendix N**.

RECOMMENDATIONS

TPD has made the following recommendations in relation to the Proposed Development in Caln Township, as outlined in **Table 14**:

TABLE 14
RECOMMENDATIONS

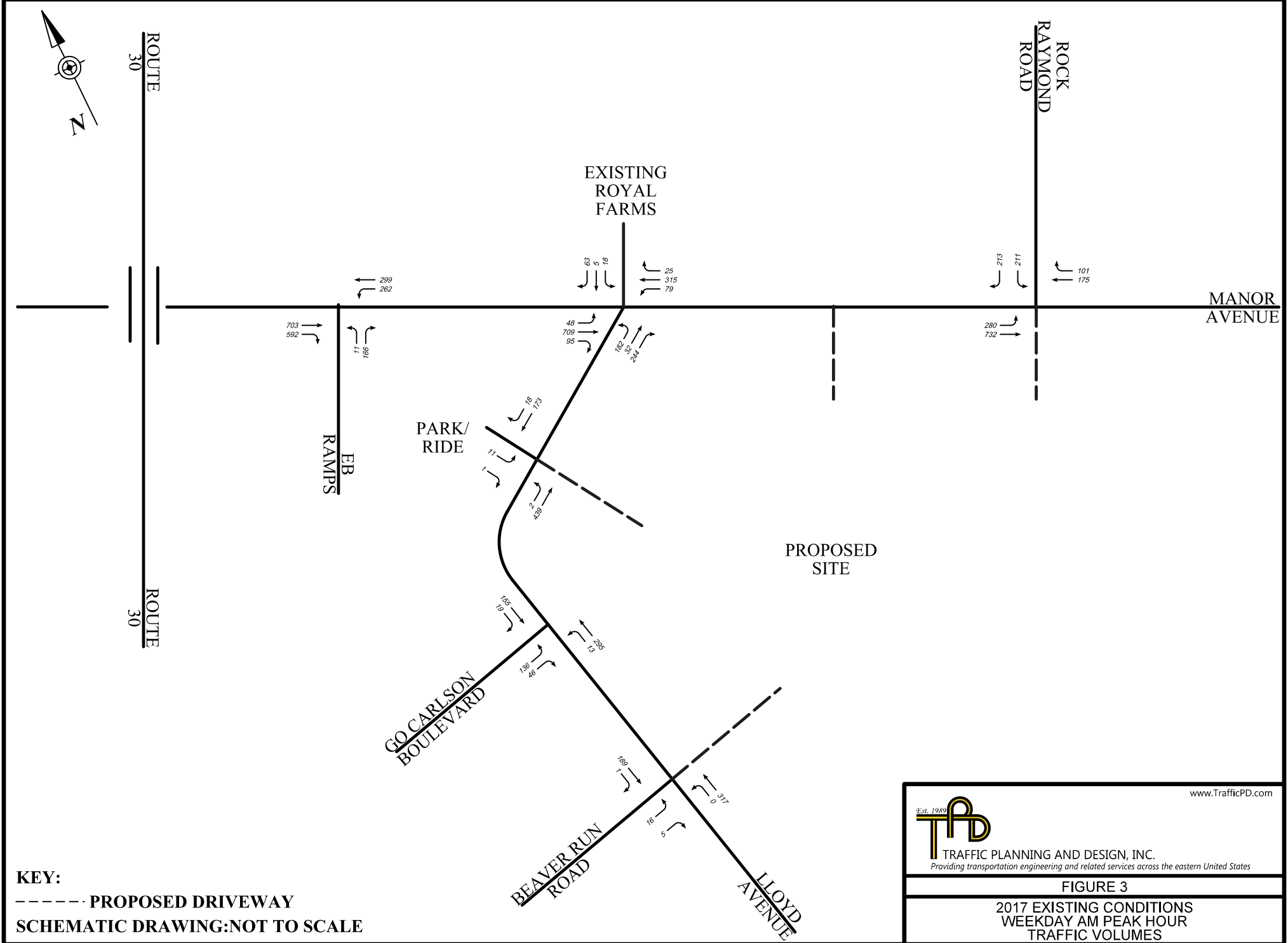
Intersection	Responsible Entity	Recommendation
Manor Avenue (S.R. 0322) & Rock Raymond Road (S.R. 4017)/ Proposed Site Driveway	Applicant	Re-design the intersection/signal to accommodate the Proposed Driveway as the NB approach of the existing signal.
		Align the NB and SB left-turn movements to avoid split-phasing at the intersection
		Restripe the WB Manor Avenue (S.R. 0322) approach, which is currently a TWCLTL, as a 75 foot left-turn lane
		Provide signal timing optimization
		Maximize the EB Manor Avenue (S.R. 0322) ingress radii in order to facilitate safe ingress to the Proposed Site
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible. Specifically, the Department requested:
		Investigate a connection to the existing Royal Farms and Proposed Taco Bell via a marked crosswalk
		Investigate a connection to the existing sidewalk on the NE corner of the intersection leading into Downingtown. Note that pedestrian activity is prohibited today via signage
Manor Avenue (S.R. 0322) & EB Route 30 Ramps	Applicant	Significantly reduce off-ramp right-turn channelization island (thereby moving the merge of the off-ramp/S.R. 0322 eastbound traffic further west, away from Lloyd Avenue).
	PennDOT (MPMS #87781)	Signalization of the Intersection
Manor Avenue (S.R. 0322) & Proposed RIRO Driveway	Applicant	Restrict left-turn ingress/egress to and from the proposed site via a raised pork-chop island
		Provide adequate egress radii to facilitate access from the site
		In lieu of a deceleration lane which is not warranted, maximize the ingress radii on EB Manor Avenue in order to facilitate ingress to the site
		Provide a "STOP"-sign on the NB egress approach of the driveway
Lloyd Avenue & Park & Ride/ Proposed Site Driveway	Applicant	Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible
		Provide adequate ingress/egress radii to facilitate access to/from the site
		Provide a "STOP"-sign on the NB egress approach of the driveway
		Provide "Do Not Block Intersection" signage on the EB approach of Lloyd Avenue
Lloyd Avenue & Beaver Run Road/ Proposed Site Driveway	Applicant	Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible
		Provide adequate ingress/egress radii to facilitate access to/from the site
		Provide a "STOP"-sign on the WB egress approach of the driveway
		Work with PennDOT and Caln Township to upgrade Pedestrian/ADA facilities at this intersection, to the extent feasible

As part of PennDOT's HOP process, the applicant will coordinate and fund the implementation of the recommended roadway improvements. Preliminary construction costs have not been determined at this time.

CONCLUSIONS

Based on the results of the transportation impact assessment, TPD offers the following conclusions:

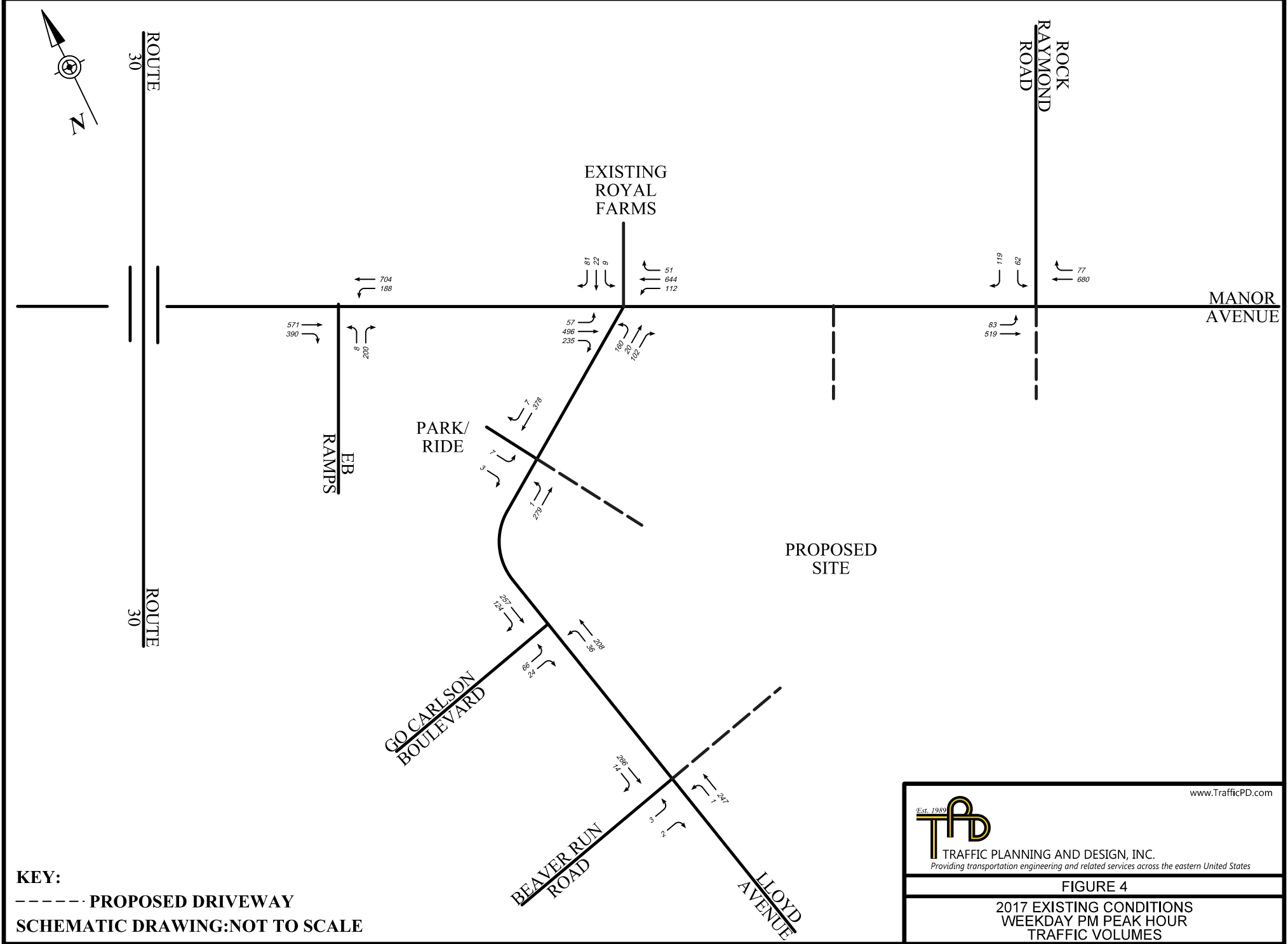
- The project site is located on the southeastern corner of Manor Avenue (S.R. 0322) and Lloyd Avenue.
- The Proposed Site will consist of the following uses:
 - 225 active-adult (attached) homes;
 - 121 active-adult (detached) homes;
 - 20 ksf general retail space.
- The Proposed Site will be served by four (4) driveways:
 - One (1) full-access driveway to Manor Avenue (S.R. 0322), opposite Rock Raymond Road (S.R. 4017);
 - One (1) right-in/right-out driveway to Manor Avenue (S.R. 0322), located approximately 100 feet east of the centerline of the existing Downingtown Animal Hospital driveway.
 - Two (2) full-access driveways to a Lloyd Avenue:
 - One (1) opposite the Park and Ride Lot;
 - One (1) opposite the Beaver Run Road.
- The measured sight distances at the site driveways will exceed PennDOT safe stopping sight distance (SSSD) criteria, and in most cases will satisfy PennDOT desirable sight distance criteria.
- The Proposed Site will generate at total of 107 new trips during the weekday A.M. peak hour, 134 new trips during the weekday P.M. peak hour, and 154 new trips during the SAT Midday peak hour.
- Under all projected (build) conditions with the development of the proposed site, with site-related recommendations outline in **Table 14**, and with and without the future signalization at Manor Avenue (S.R. 0322) and the EB Route 30 Ramps planned for by PennDOT, all study area intersections will satisfy PennDOT ILOS Standards.

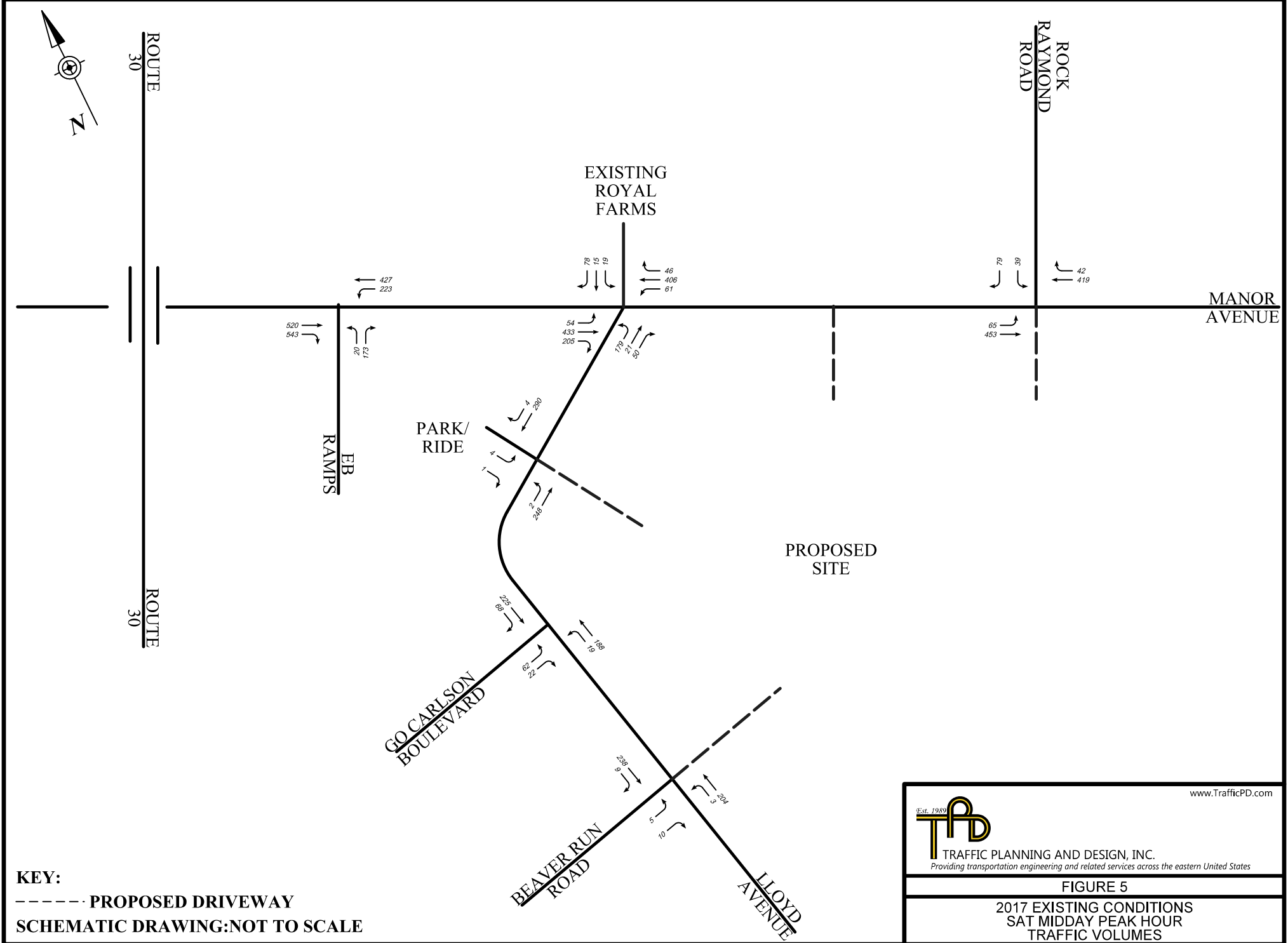



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FIGURE 3

**2017 EXISTING CONDITIONS
 WEEKDAY AM PEAK HOUR
 TRAFFIC VOLUMES**





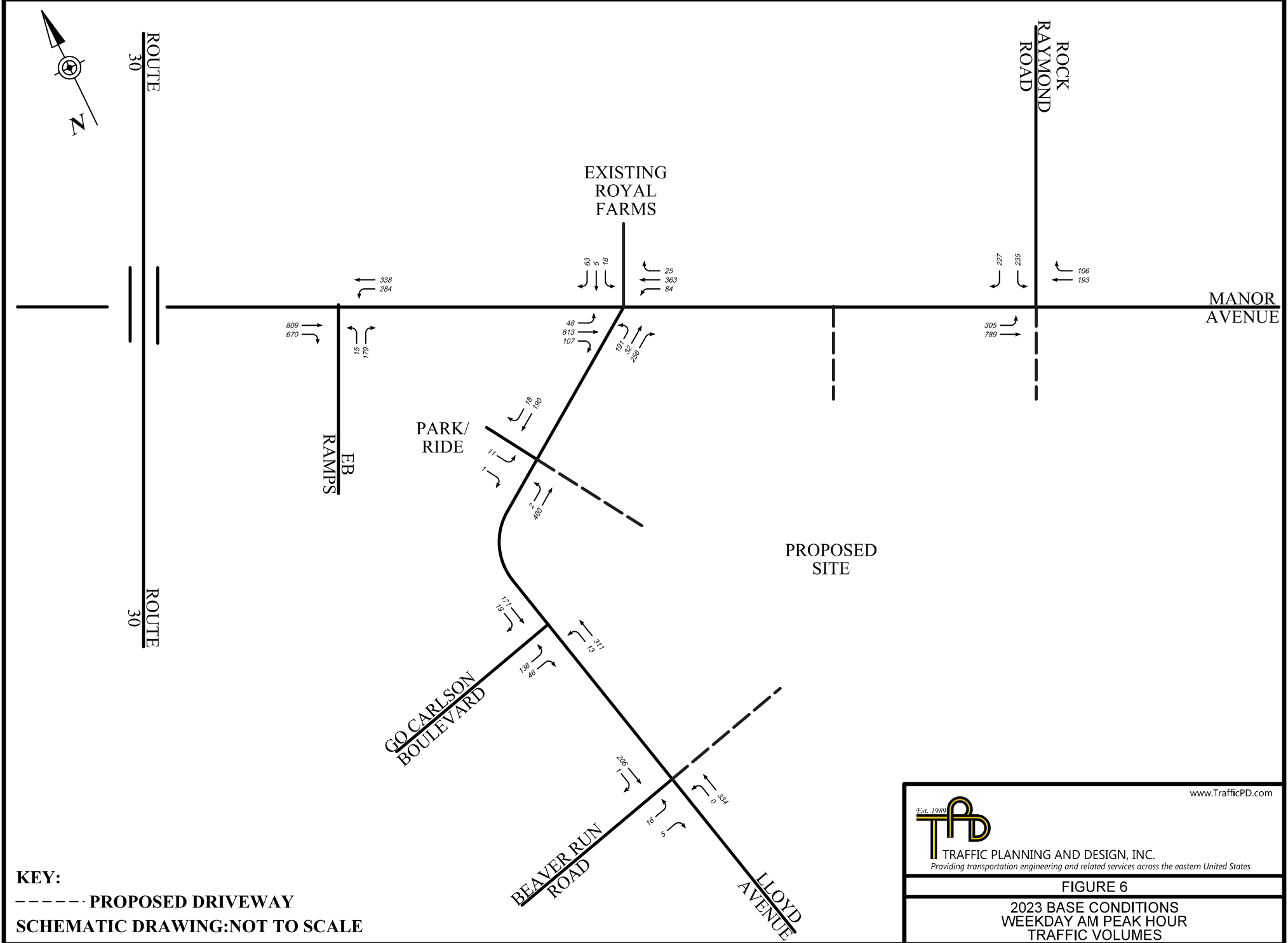



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FIGURE 5

**2017 EXISTING CONDITIONS
 SAT MIDDAY PEAK HOUR
 TRAFFIC VOLUMES**



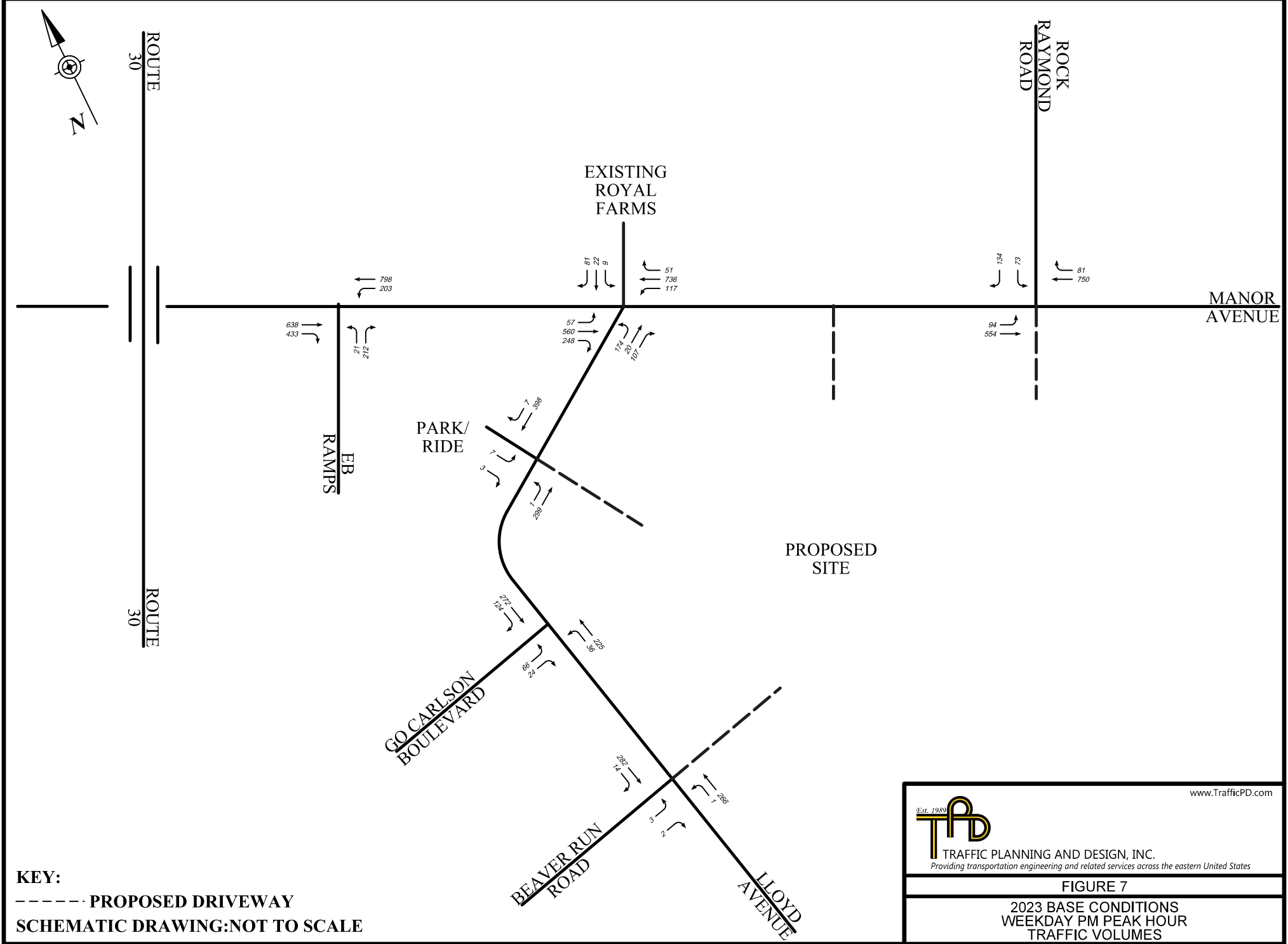


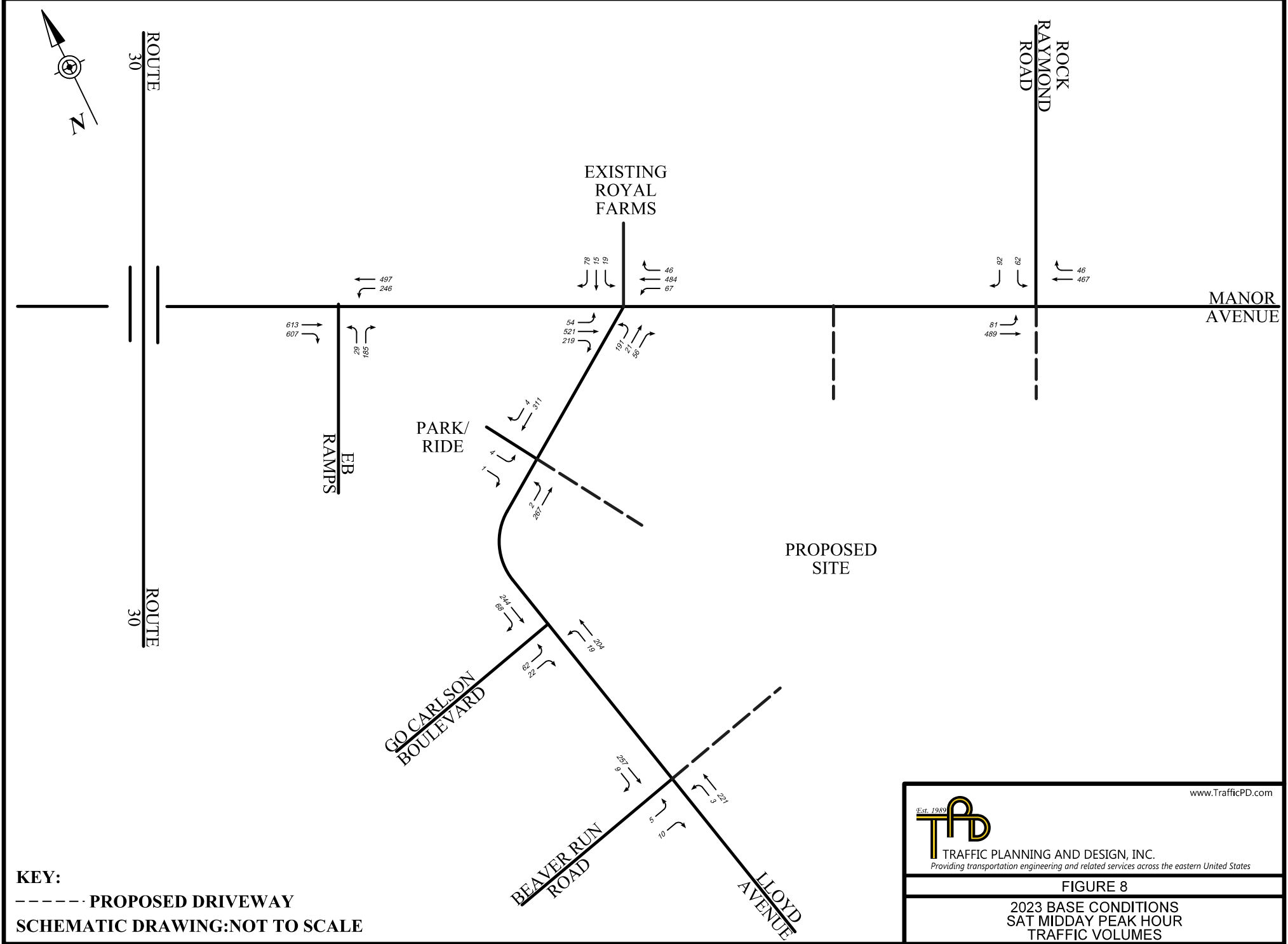
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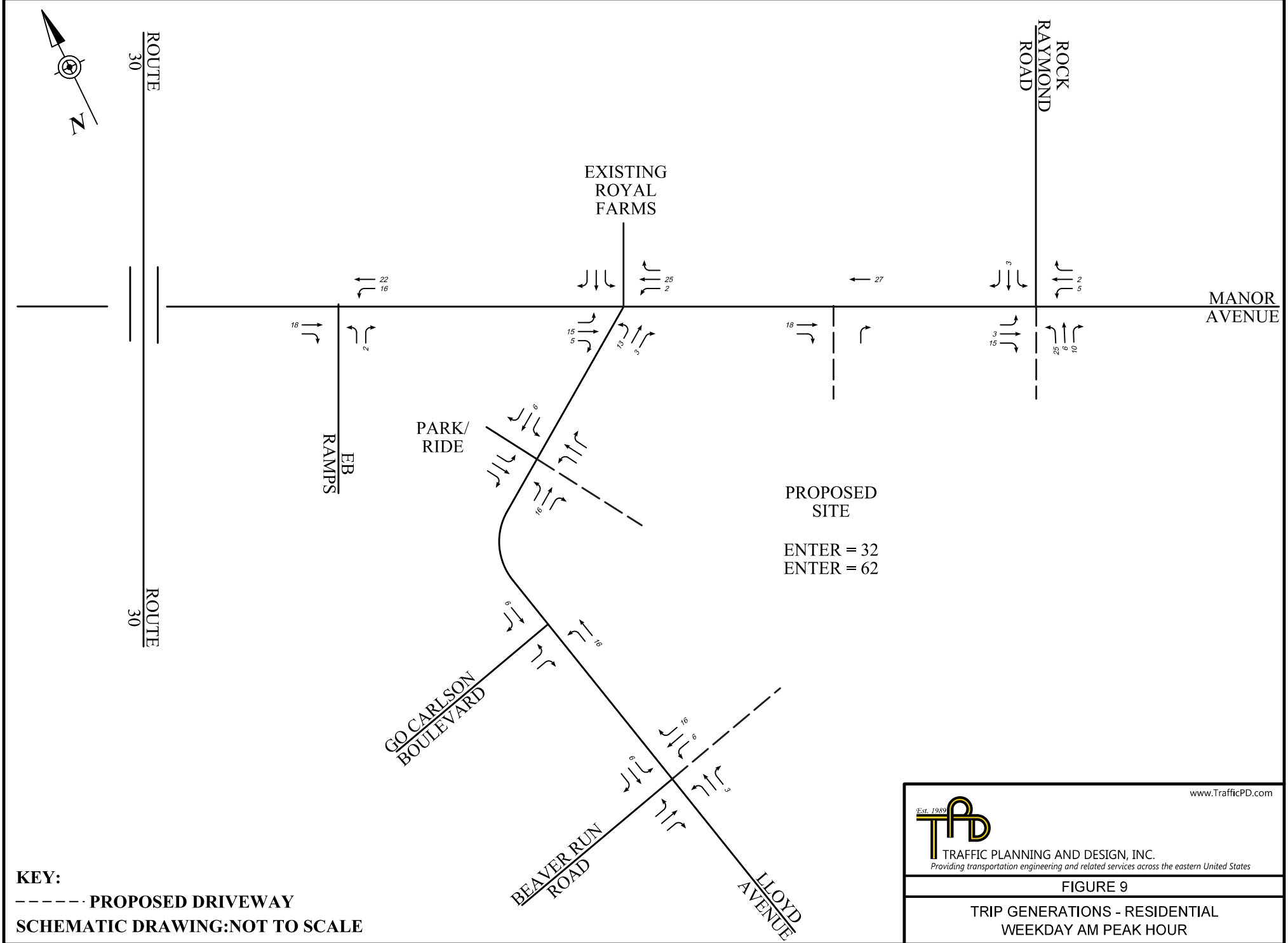
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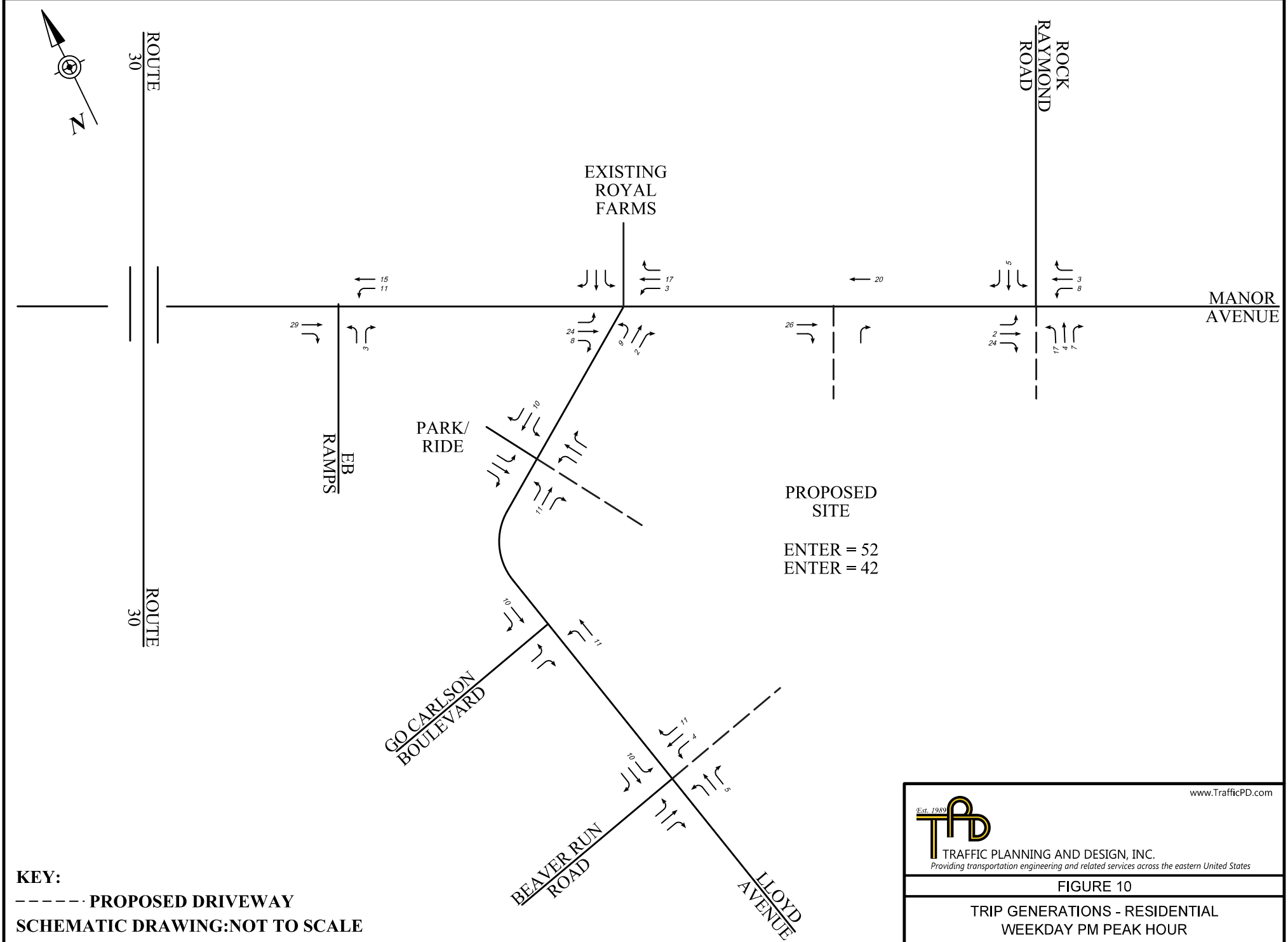
FIGURE 6

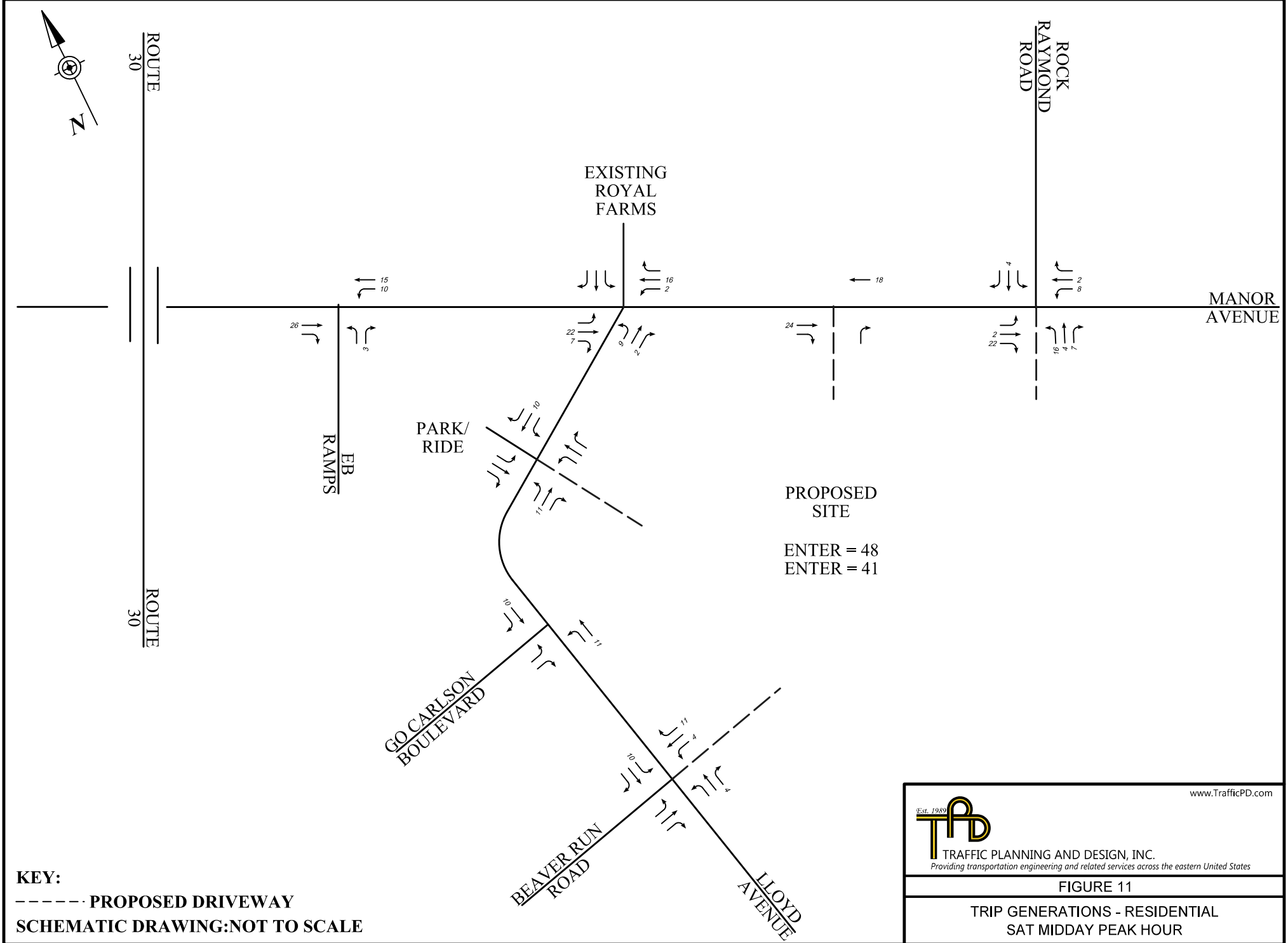
2023 BASE CONDITIONS
 WEEKDAY AM PEAK HOUR
 TRAFFIC VOLUMES












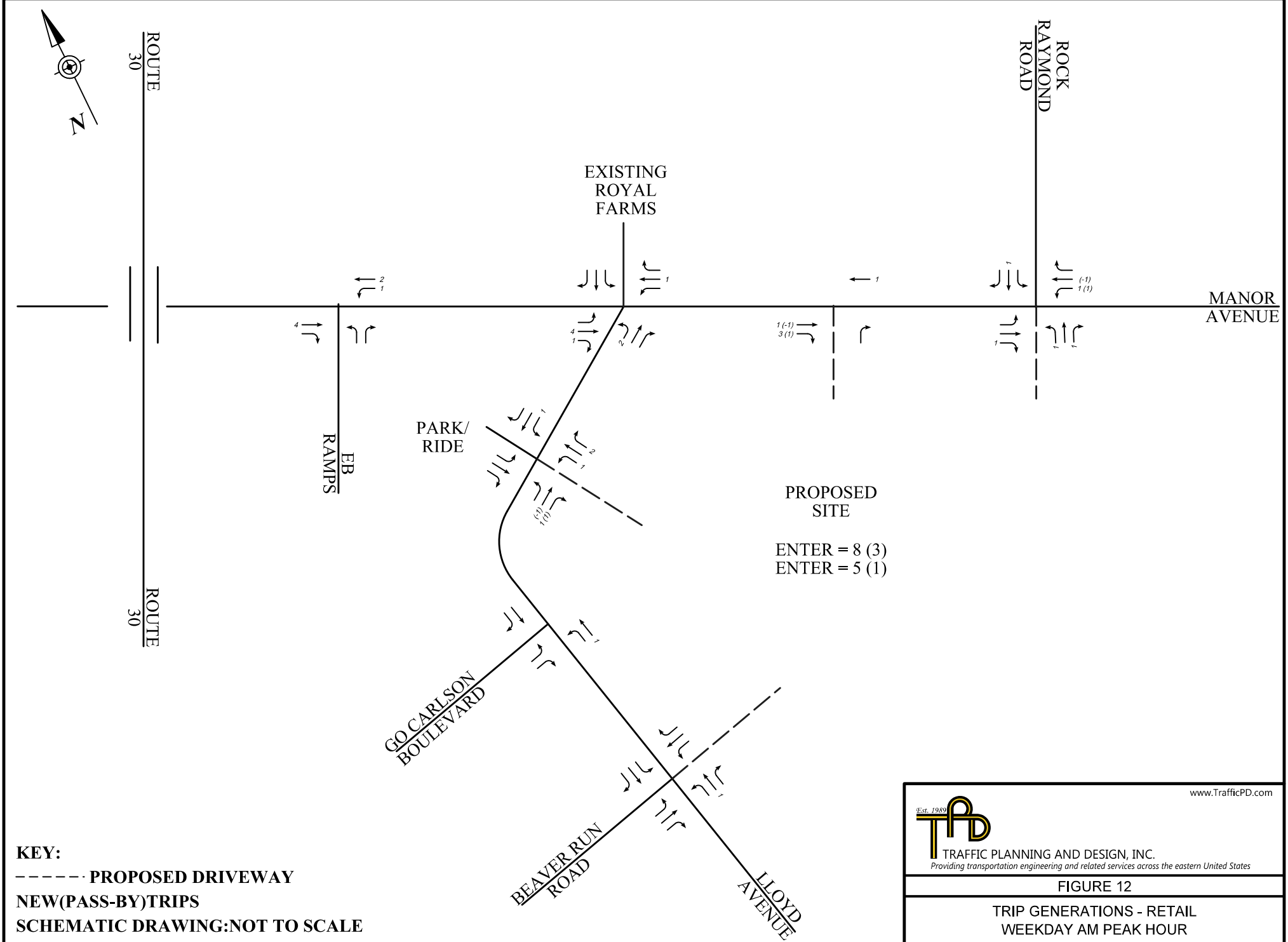


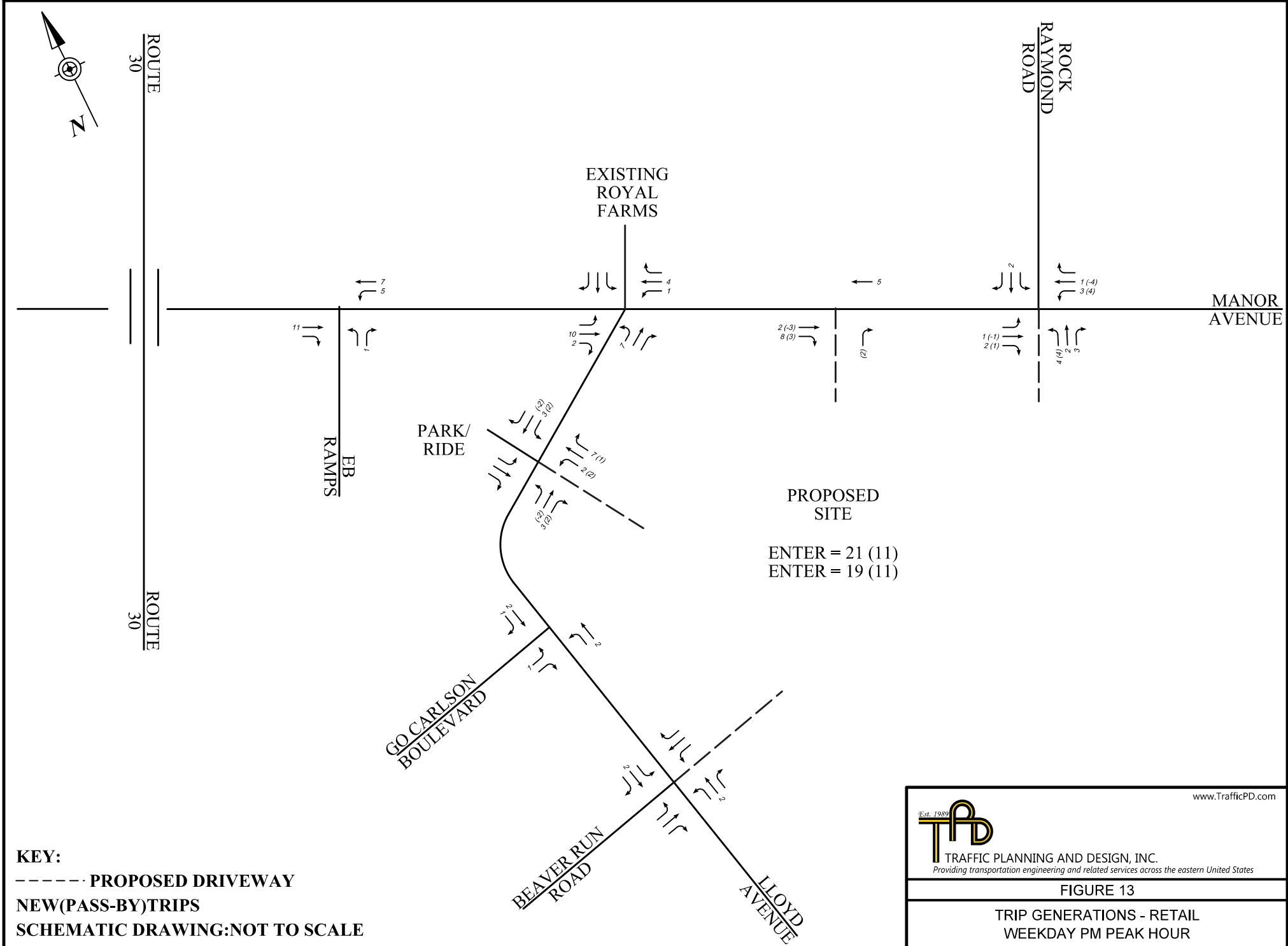
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FIGURE 11

TRIP GENERATIONS - RESIDENTIAL
SAT MIDDAY PEAK HOUR





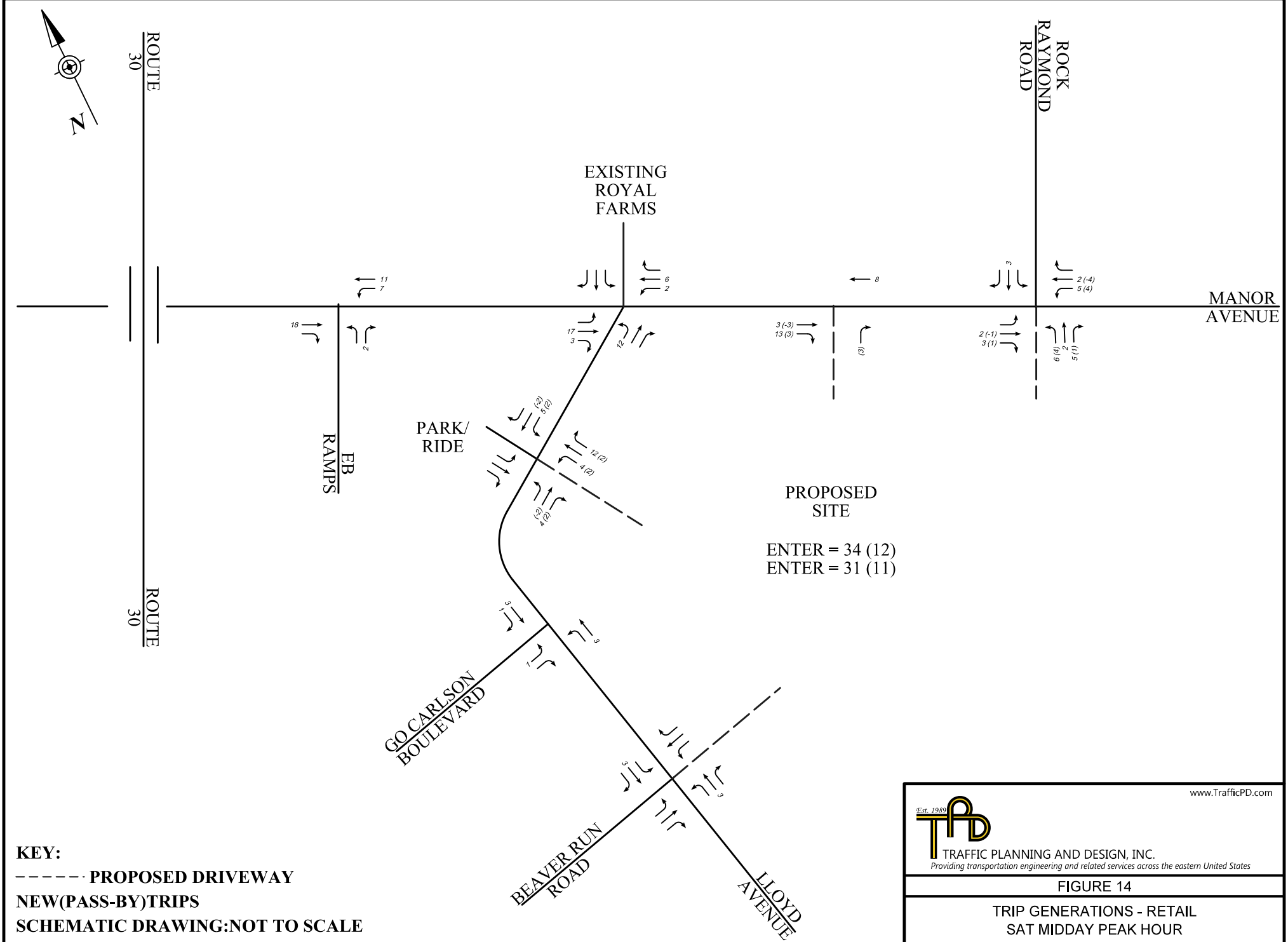



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FIGURE 13

TRIP GENERATIONS - RETAIL
 WEEKDAY PM PEAK HOUR

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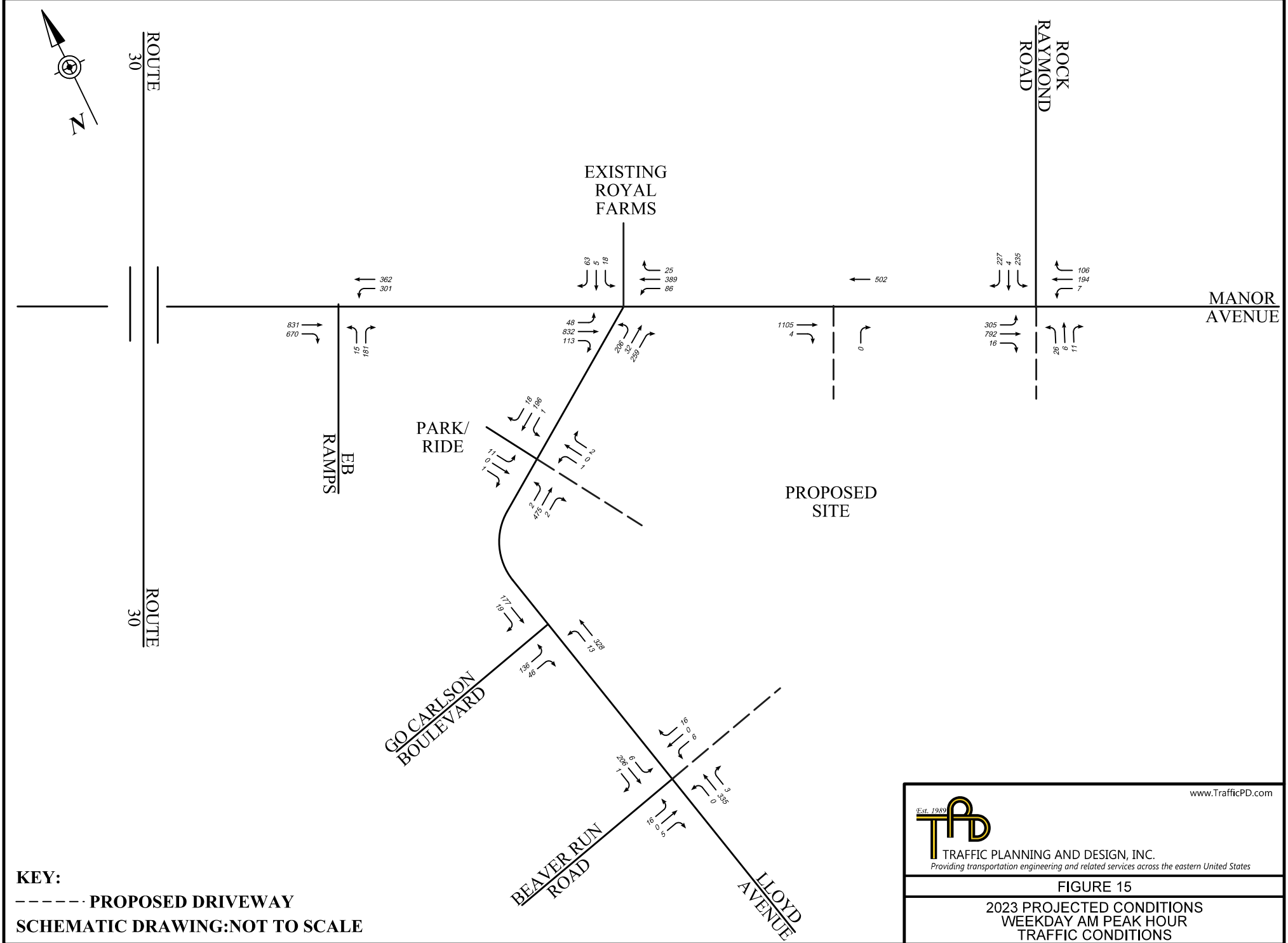


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FIGURE 14

TRIP GENERATIONS - RETAIL SAT MIDDAY PEAK HOUR



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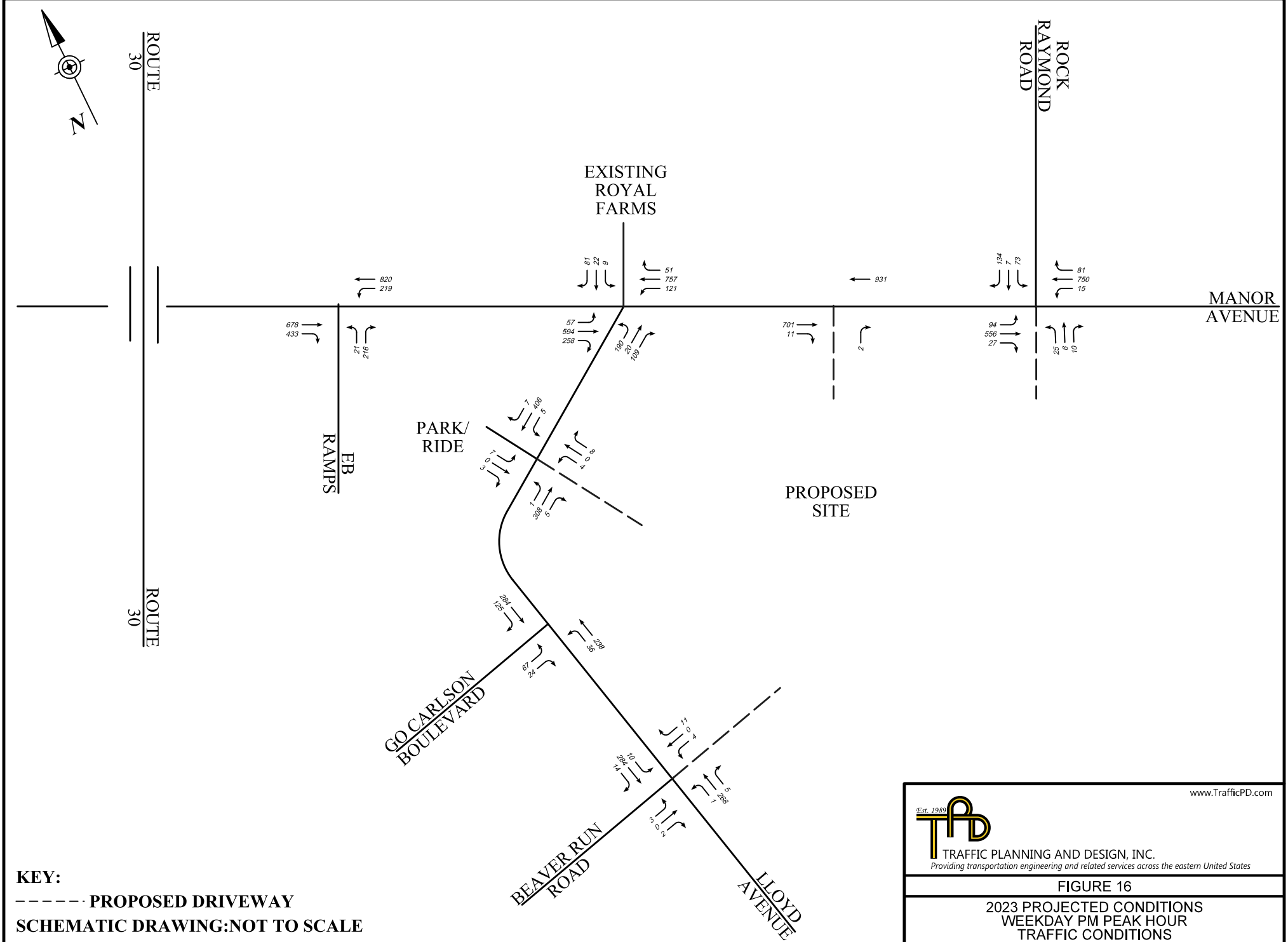
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FIGURE 15

2023 PROJECTED CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC CONDITIONS

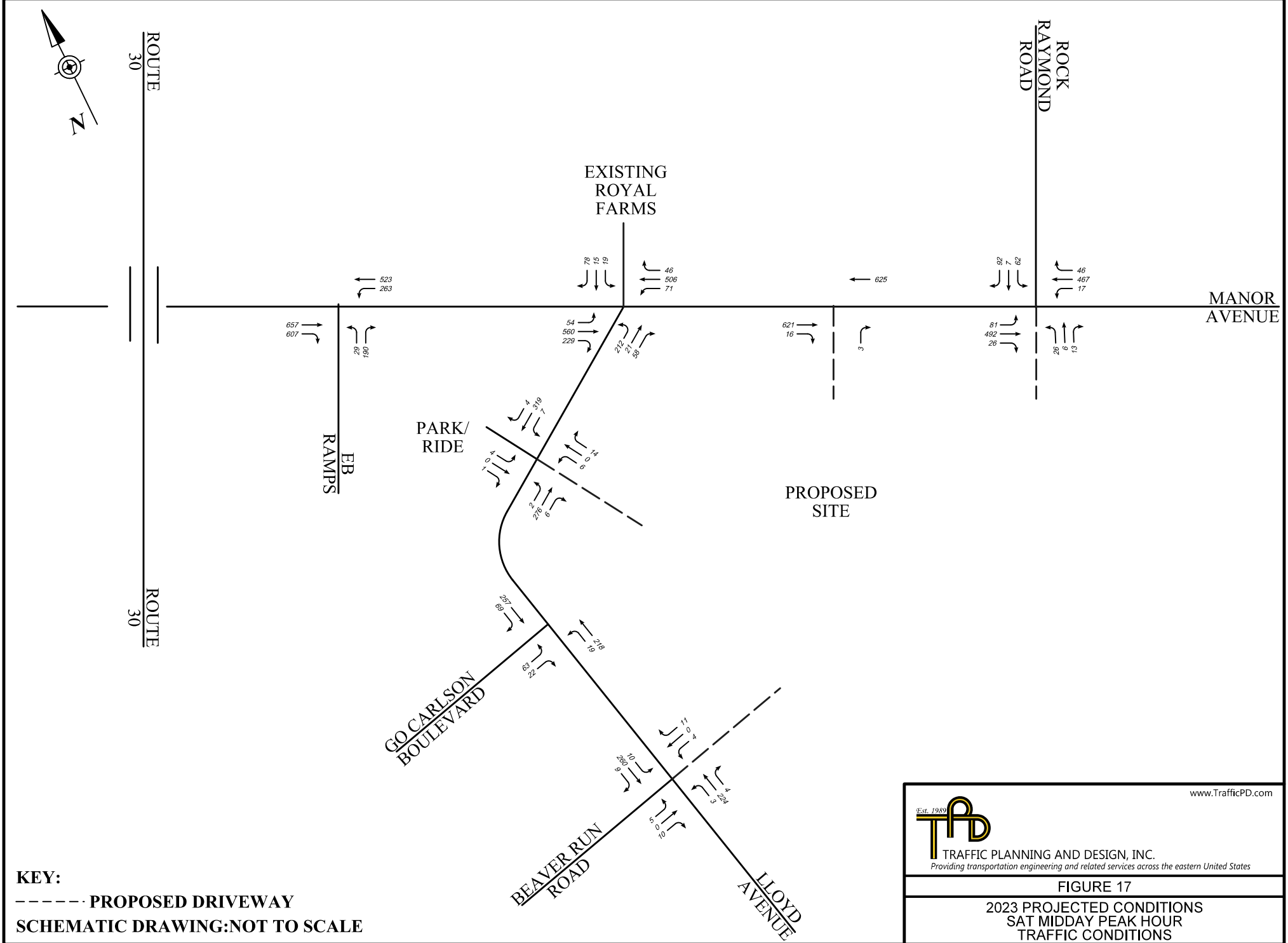



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FIGURE 16

**2023 PROJECTED CONDITIONS
 WEEKDAY PM PEAK HOUR
 TRAFFIC CONDITIONS**





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FIGURE 17

2023 PROJECTED CONDITIONS SAT MIDDAY PEAK HOUR TRAFFIC CONDITIONS

APPENDIX A

PROJECT CORRESPONDENCE



Date: 05/18/2018
Subject: Highway Occupancy Permit Application No. 158882 - Returned For Revisions
To: Wild Meadows, LLC
13 Nobles Pond Crossing
Dover, DE 19904
From: PennDOT Engineering District 6-0
7000 Geerdes Boulevard
King of Prussia, PA 19406

Dear Applicant,

PennDOT has reviewed your application for completeness, consistency and compliance with applicable Department Regulations. This review has identified issues that must be addressed in order for our review to continue.

The Department's review comments are attached.

Once the comments have been addressed, please resubmit the application and associated material for further review.

Upon resubmission, the applicant's engineer should put together a letter that describes how each comment has been addressed and where each can be found. This will help expedite the review. For guidance on HOP applications refer to 67 PA Code, Chapter 441, Chapter 459 and PennDOT Publication 282, "Highway Occupancy Permit Guidelines". Additional comments may follow upon review of the resubmitted application.

If you have any questions regarding this matter, you may contact the Department's representative, Andrew Parker, P.E., PTOE of McCormick Taylor, Inc. at 610-640-3500.

Response Comments**Date:** 05/18/2018**Application Number:** 158882**Form Letter Notes**

- (1) * Upon resubmission, the applicant's engineer should put together a letter that describes how each comment has been addressed and where each can be found in the plan set. A copy of these comments and any previously submitted plans should also be provided.

* Additional comments may follow upon review of the resubmitted application. If you have any questions pertaining to the technical aspects of this review, please contact the Department's representative, Andrew Parker, P.E., PTOE of McCormick Taylor, Inc. at 610-640-3500.

* For guidance on Highway Occupancy Permit applications refer to PA Code Title 67, Chapter 441, Chapter 459 and PennDOT Publication 282. This will help expedite the review.

General

- (1) The Department requires written evidence, prior to the issuance of a permit, that Caln Township is aware of the project and has had the opportunity to comment. Provide written evidence (e.g. municipal engineering review, council or planning commission meeting minutes, executed TE-160, etc.), which is less than one year old, to satisfy this requirement. (PA Code, Title 67, Chapter 441.3(j)).
- (2) Be advised that this Highway Occupancy Permit involves the modification of an existing traffic signal and coordinated signal system. As such, the permittee must retain the design professional responsible for the traffic signal design to ensure they are available as appropriate and reasonable for construction and inspection related field meetings as well as post-installation to address timing or other field adjustments. The permit will not be closed out until final as-built drawings, approved by the municipality, are provided to the Department on mylar (signed) and electronically (Autocad). This will be a condition of the permit.

Application

- (1) As a reminder, please refer to Comment 14 of the Department's Scoping Application review letter for C17-022XP dated January 29, 2018 with respect to items to consider for the access design and formal HOP application.
- (2) Permit processing, review, and inspection fees are required. A check/money order in the amount of

\$ 75 must be submitted. (Pa. Code Title 67, Chapter 441.4)

Transportation Impact Study/Transportation Impact Assessment

- (1) The following comments pertain the Transportation Impact Assessment (TIA) submitted by Traffic Planning and Design (TPD), last revised April 19, 2018:
 - a. As previously noted, the applicant for Wild Meadows must coordinate with the applicant for the proposed Taco Bell (EPS No. 152572), to be located directly across S.R. 0322 (Manor Avenue). This coordination is required to ensure that the TIA reflects consistent assumptions regarding trip generation volumes and access movements, and that proposed and/or required mitigation measures in terms of roadway improvements, intersection/signal improvements, and pedestrian facility improvements are appropriately addressed. As part of this coordination, it is noted that the applicant must ensure the following mitigation elements are constructed as part of the Wild Meadows development if they were not already constructed as part of the Taco Bell development (assuming the Taco Bell is constructed first as anticipated):
 - i) Provide a pedestrian connection from the Wild Meadows development to the Royal Farms and proposed Taco Bell on the north side of S.R. 0322. This will require a marked crosswalk across the west leg of the signalized intersection of S.R. 0322 and S.R. 4017 (Rock Raymond Road).
 - ii) Provide a pedestrian connection from the development to the existing sidewalk on the north side of S.R. 0322 east of S.R. 4017 that leads into Downingtown. This will include a crosswalk across the north leg of the signalized intersection.
 - iii) Modify the intersection of S.R. 0322 & Eastbound Route 30 Bypass Ramps by significantly reducing off-ramp right-turn channelization island (thereby moving the merge of the off-ramp/S.R. 0322 eastbound traffic further west, away from Lloyd Avenue). Signalization and potential other improvements at this intersection will be deferred until a later time as part of PennDOT's US 30 and S.R. 0322 interchange project (MPMS 87781).
- (2) TIA continued:
 - b. Queues on northbound Lloyd Avenue at S.R. 0322 (Manor Avenue) will at times extend back past the proposed driveway opposite the existing Park & Ride egress. Modify signal timings or provide other mitigation as needed to address the projected queues on northbound Lloyd Avenue, or consider moving the proposed driveway further from S.R. 0322.
 - c. On Lloyd Avenue at the future driveway proposed to be located opposite the Park & Ride egress, provide a 75-foot left-turn lane on southbound Lloyd Avenue and a 75-foot right-turn lane on northbound Lloyd Avenue. This will require widening of Lloyd Avenue along the site frontage. These turn lanes are recommended to serve the commercial portion of the development that would

utilize this proposed driveway.

d. Include full details of the previous weaving analysis performed as part of the Royal Farms TIS (EPS No. 97984) as an appendix.

e. As previously noted, the median on the proposed driveway opposite S.R. 4017 (Rock Raymond Road) will not be permitted due to concerns regarding driveway alignment and sight distance. Drivers on the southbound S.R. 4017 approach must have a clear view of vehicles on the northbound driveway approach, and vice-versa.

f. The Department strongly encourages installing a signal at the one-lane bridge on Lloyd Avenue just over one-half mile south of S.R. 0322 (Manor Avenue) to address traffic control and delays. The applicant must continue to discuss this improvement with the Township, and contribute towards it as appropriate. Provide the Department with an update on the status of the possible signal, including documentation of correspondence with Caln Township indicating their position on the signalization of the one-lane bridge and what involvement they require, if any, from the Wild Meadows development for the signal.

g. Future submissions should clearly indicate the location of the proposed Right-In/Right-Out driveway on S.R. 0322 (Manor Avenue) on site plan and HOP plans.

Right-Of-Way (Design Manual Part III, Chapter 3)

- (1) Provide an area of dedicated right-of-way along the S.R. 0322 (Manor Avenue) site frontage as needed to accommodate potential future widening/improvements along S.R. 0322 as part of PennDOT's US 30 and S.R. 0322 interchange project (MPMS 87781). The right-of-way dedication should be shown to accommodate an additional 12' travel lane and 8' shoulder, with additional area reserved for signage. No permanent fixtures should be constructed within the proposed right-of-way area.



TRAFFIC PLANNING AND DESIGN, INC.

WWW.TRAFFICPD.COM

April 19, 2018

Mr. Francis Hanney
Traffic Services Manager
PennDOT District 6-0
7000 Geerdes Boulevard
King of Prussia, PA 19406-1525

RE: Scoping Application Response Letter

Archdiocese Property Mixed-Use Development
Caln Township, Chester County, PA
TPD# WIME.00001
Log# C17-022XP
Application# PRE 1467

Dear Mr. Hanney:

This letter pertains to the proposed Archdiocese Property Development in Caln Township, Chester County, PA. Traffic Planning and Design, Inc. (TPD) has prepared this response letter to address the scoping comments provided by PennDOT in their Scoping Review Letter, dated January 29, 2018. These comments pertained to TPD's TIS Scoping Application, dated December 21, 2017. For the discussion below, PennDOT's comments are shown in *italic* type, with the corresponding TPD response shown in **bold** type:

SCOPING APPLICATION REVIEW COMMENTS

1. *The study area must be expanded to include the intersection of S.R. 0322 (Manor Avenue) & eastbound Route 30 Bypass Ramps.*

Response: Will comply.

2. *As previously discussed during reviews of the application for the nearby Royal Farms that opened in late 2017 (EPS Application No. 97984 — Caln-Horseshoe, L.P.), the Department is concerned about the weave maneuver between the eastbound Route 30 Bypass off-ramp right turn onto S.R. 0322 and the signalized intersection at Lloyd Avenue. There were discussions about potential mitigation measures to be considered in the future, including a concept whereby the existing eastbound Route 30 Bypass off-ramp right-turn channelization island would be reduced and the merge point of the off-ramp/S.R. 0322 traffic moved further to the west, thereby providing a longer weaving section. Further analysis is warranted now that the Royal Farms has opened and with updated traffic projections for the proposed Wild Meadows development. Re-evaluate the intersection and weaving operations in this area, including the aforementioned modification of the off-ramp right-turn island/merge point as well as potential signalization of the intersection of S.R. 0322 & eastbound Route 30 Bypass Ramps.*

Response: TPD is aware of the improvements that will be funded under MPMS 87781 (Discussed in the TIA), which include:

- a. **Signalization at the EB Route 30 Ramp**
- b. **Reduction of the channelized right turn (as suggested in review comment)**
- c. **Evaluation of a diverging diamond interchange (DDI).**

It is TPD's understanding that these improvements are funded after the buildout year of the TIA. Furthermore, based on a comparison between the projected volumes contained in the Royal Farms TIS (AM/PM/SAT) and the actual counts collected at the constructed Royal Farms driveway (AM/PM/SAT):

- a. **The actual EBL entering the Royal Farms is approximately 21% less than in the Royal Farms TIS**
- b. **The actual EBR entering onto Lloyd Avenue is approximately 38% less than in the Royal Farms TIS**
- c. **The actual EBT entering on SR 0322 is approximately 2% less than in the Royal Farms TIS**

Therefore, it is TPD's opinion that the results of the Weaving Analysis previously provided in the Royal Farms TIS will not degrade.

3. *The proposed site driveway that would intersect S.R. 0322 (Manor Avenue) opposite S.R. 4017 (Rock Raymond Road) must be properly aligned/designed with an emphasis on intersection safety and operations. The side-street left-turn lanes must be aligned directly opposite one another to allow for concurrent left-turn signal phasing. Split phasing will not be allowed. The driveway median indicated on the submitted conceptual site plan will not be permitted as shown due to concerns regarding driveway alignment, lane configurations required to achieve acceptable capacity/operations, and sight distance.*

Response: So noted.

4. *The Department is aware of previous discussions between Caln Township and other developers regarding possible signalization of the one-lane bridge on Lloyd Avenue just over one-half mile south of S.R. 0322 (Manor Avenue). Lloyd Avenue is under the jurisdiction of Caln Township, and the Department generally supports the idea of installing a signal to address traffic control and delays at the one-lane bridge. Adding a signal will involve review and approval of signal permit plans by the Department. Coordinate with Caln Township and provide the Department with an update on the status of a potential signal at the bridge.*

Response: Based on further coordination, it is TPD's understanding that this improvement will not be pursued as part of this project based on the minimal impact caused by the Proposed Development.

5. *The PennDOT project number, C17-022XP, for this scoping application review must be referenced when the formal Highway Occupancy Permit (HOP) application is submitted.*

Response: Will comply.

6. *Please note that District 6-0 is accepting TIA submissions via EPS. This will provide a more efficient and timely review of the submissions for the applicants while also assisting the Department with document management. Note that utilizing EPS will require a formal permit application be made for the access; therefore, submissions should be sure to include:*

- a. *A transmittal letter including responses to Scoping comments or comments from previous reviews*
- b. *Scoping Meeting Request Form (if previously submitted)*
- c. *Minutes of the Scoping meeting or any previous minutes*
- d. *Forms M950-MPC and M950-AA (as appropriate)*
- e. *Previously completed municipal reviews (if any)*
- f. *Electronic copies of capacity analysis files (e.g. HCS or Synchro)*

Response: Will comply to the extent feasible as part of the first EPS Submission.

7. *The following Scoping elements appear acceptable:*
- a. *Study Type (TIA)*
 - b. *Development Schedule*
 - c. *Trip Generation*
 - d. *Analysis Periods (AM peak, PM peak and Saturday MID day peak)*
 - e. *Growth Rate (0.65%)*
 - f. *Analysis Type (Synchro 10 and HCM 2010)*
 - g. *Sight Distance Analysis*
 - h. *Turn Lane/Length Analysis*
 - i. *Queuing Analysis*
 - j. *Crash Analysis*
 - k. *Other Analyses As Needed*

Response: So noted.

8. *All weekday traffic counts should be conducted while schools are in session.*

Response: Will comply – The traffic counts were conducted when Downingtown School District was in session.

9. *All traffic count data should reflect volumes occurring after the Royal Farms at S.R. 0322 (Manor Avenue) & Lloyd Avenue opened in late 2017.*

Response: Will comply – The traffic counts were conducted after the Royal Farms was open and operational.

10. *The Department will comment on the assumed Trip Distribution and Assignment when submitted.*

Response: So noted.

11. *Provide a pedestrian connection from the development to the Royal Farms on the north side of S.R. 0322 (Manor Avenue). This would require a marked crosswalk across S.R. 0322 (Manor Avenue) at the signalized intersection(s) at Lloyd Avenue and/or S.R. 4017 (Rock Raymond Road).*

Response: Will comply to the extent feasible. It should be noted that pedestrian activity crossing S.R. 0322 is currently restricted via signage, however the Applicant will work with PennDOT, Caln

Township and the Applicant for the proposed Taco Bell to determine the appropriate pedestrian related improvements at the subject intersection.

12. *Provide a pedestrian connection from the development to the existing sidewalk on the north side of S.R. 0322 (Manor Avenue) east of S.R. 4017 (Rock Raymond Road) that leads into Downingtown.*

Response: Will Comply to the extent feasible. It should be noted that pedestrian activity is currently restricted at the intersection via signage, however the Applicant will work with PennDOT, Caln Township and the Applicant for the proposed Taco Bell to determine the appropriate pedestrian related improvements at the subject intersection.

13. *The applicant for Wild Meadows must coordinate with the applicant for the proposed Taco Bell (EPS Application No. 152572 — Summerwood Corporation), to be located directly across S.R. 0322 (Manor Avenue) from Wild Meadows. This coordination is required to ensure that the TIA reflects consistent assumptions regarding trip generation volumes and access movements, and that proposed and/or required mitigation measures in terms of roadway improvements, intersection/signal improvements, and pedestrian facility improvements are appropriately addressed. A crosswalk across the west leg of S.R. 0322 at S.R. 4017 (Rock Raymond Road) is strongly recommended to accommodate anticipated pedestrian activity between the proposed residential development on the south side of S.R. 0322 and the commercial establishments (Royal Farms and proposed Taco Bell) on the north side of S.R. 0322.*

Response: Will Comply to the extent feasible.

14. *With respect to the access design and formal permit application, please ensure that the following items are addressed:*
- Please be advised that pursuant to and in accordance with Title 67, Chapter 441.8(h)(2)(iv) of the code, the Safe Stopping Sight Distance is the absolute minimum acceptable sight distance for all driveways. Sight distance values obtained from the use of reduction factors which fall below the Safe Stopping Sight Distance will not be accepted by the Department. It is the designer's responsibility to ensure that this minimum requirement is satisfied.*
 - It should be understood that in accordance with PennDOT Strike-Off Letter 470-10-03 and pursuant to section 421 of the State Highway Law (36 P.S. § 670-421) the installation of drainage facilities within the Legal Right-of-Way may necessitate additional permitting requirements, including, but not limited to, a separate Highway Occupancy Permit from the Municipality for the future maintenance of the new drainage facilities.*
 - Truck turning templates must be provided to ensure that the driveway intersection can safely accommodate a WB-62 design vehicle. If the largest permitted vehicle type to utilize the proposed site access is smaller than the WB-62, then a note must be included on the plans indicating the vehicle size and the truck turning templates for that vehicle size must be provided; the largest permitted vehicle size will become a condition of the permit.*
 - ADA compliance within the limits of work (along the access frontage at a minimum) must be evaluated in the final design (i.e. new/modified facilities, impact to SEPTA bus stops, etc.). Ensure that all pedestrian improvements along the site frontages, at all site access points, and at the signalized intersections are ADA compliant.*
 - Consistent with current Department Policy, applicants for Highway Occupancy Permits must apply for an EPS Business Partner ID (BPID). The BPID is to be used in the establishment of a billing account for the invoicing of inspection costs. For information on obtaining a BPID, you may visit:*

<https://www.dot14.state.pa.us/EPS/home/manaeeBPRegistration> .1sp

[Please make sure that you follow the instructions that are in the "PINK" area]. After a BPID is obtained and activated by the system administrator, please provide the following information in the applicant contact information tab under "Applicant Team":

- i) BPID (please ensure that the BPID is searchable through the "looking glass" feature)
- ii) Contact information (name/title/phone/email) for a "general" contact person (person that typically deals with the Highway Occupancy Permit application process)
- iii) Contact information (name/title/phone/email) for a "billing" contact person (person that typically deals with the Highway Occupancy Permit invoicing process)

Response: Will comply.

Thank you for your continuing review, and please call if there is any further information you require with regards to these responses.

Sincerely,

TRAFFIC PLANNING AND DESIGN, INC.



Matthew I. Hammond, P.E.

Executive Vice President

MHammond@TrafficPD.com

Attachments: PennDOT Scoping Review (01/29/2018)

Cc: Kristen Denne, Township Manager, Caln Township
Project Team
TPD File



January 29, 2018

CALN TOWNSHIP, CHESTER COUNTY
S.R. 0332 (MANOR AVENUE) AND S.R. 4017 (ROCK RAYMOND ROAD)
HIGHWAY OCCUPANCY PERMIT APPLICATION NO. PRE1467
WILD MEADOWS, LLC
TRAFFIC LOG NO.: C17-022XP
SCOPING APPLICATION REVIEW

Matthew I. Hammond, P.E.
Traffic Planning and Design, Inc.
2500 E. High Street, Suite 650
Pottstown, PA 19464

Dear Mr. Hammond:

The Department has reviewed the Scoping Application submission for compliance with applicable Department Regulations. This preliminary review has identified deficiencies that must be addressed in order for your application submission to be processed as efficiently as possible.

The Department understands that the provided analysis is preliminary in nature. As such, the Department reserves the right to make future additional comments based on the formal submission of a complete Transportation Impact Assessment (TIA).

Our comments on your preliminary submission are as follows:

SCOPING COMMENTS

1. The study area must be expanded to include the intersection of S.R. 0322 (Manor Avenue) & eastbound Route 30 Bypass Ramps.
2. As previously discussed during reviews of the application for the nearby Royal Farms that opened in late 2017 (EPS Application No. 97984 – Caln-Horseshoe, L.P.), the Department is concerned about the weave maneuver between the eastbound Route 30 Bypass off-ramp right turn onto S.R. 0322 and the signalized intersection at Lloyd Avenue. There were discussions about potential mitigation measures to be considered in the future, including a concept whereby the existing eastbound Route 30 Bypass off-ramp right-turn channelization island would be reduced and the merge point of the off-ramp/S.R. 0322 traffic moved further to the west, thereby providing a longer weaving section. Further analysis is warranted now that the Royal Farms has opened and with updated traffic projections for the proposed Wild Meadows development. Re-evaluate the intersection and weaving operations in this area, including the aforementioned modification of the off-ramp right-turn island / merge point as well as potential signalization of the intersection of S.R. 0322 & eastbound Route 30 Bypass Ramps.

3. The proposed site driveway that would intersect S.R. 0322 (Manor Avenue) opposite S.R. 4017 (Rock Raymond Road) must be properly aligned/designed with an emphasis on intersection safety and operations. The side-street left-turn lanes must be aligned directly opposite one another to allow for concurrent left-turn signal phasing. Split phasing will not be allowed. The driveway median indicated on the submitted conceptual site plan will not be permitted as shown due to concerns regarding driveway alignment, lane configurations required to achieve acceptable capacity/operations, and sight distance.
4. The Department is aware of previous discussions between Caln Township and other developers regarding possible signalization of the one-lane bridge on Lloyd Avenue just over one-half mile south of S.R. 0322 (Manor Avenue). Lloyd Avenue is under the jurisdiction of Caln Township, and the Department generally supports the idea of installing a signal to address traffic control and delays at the one-lane bridge. Adding a signal will involve review and approval of signal permit plans by the Department. Coordinate with Caln Township and provide the Department with an update on the status of a potential signal at the bridge.
5. The PennDOT project number, C17-022XP, for this scoping application review must be referenced when the formal Highway Occupancy Permit (HOP) application is submitted.
6. Please note that District 6-0 is accepting TIA submissions via EPS. This will provide a more efficient and timely review of the submissions for the applicants while also assisting the Department with document management. Note that utilizing EPS will require a formal permit application be made for the access; therefore, submissions should be sure to include:
 - a. A transmittal letter including responses to Scoping comments or comments from previous reviews
 - b. Scoping Meeting Request Form (if previously submitted)
 - c. Minutes of the Scoping meeting or any previous minutes
 - d. Forms M950-MPC and M950-AA (as appropriate)
 - e. Previously completed municipal reviews (if any)
 - f. Electronic copies of capacity analysis files (e.g. HCS or Synchro)
7. The following Scoping elements appear acceptable:
 - a. Study Type (TIA)
 - b. Development Schedule
 - c. Trip Generation
 - d. Analysis Periods (AM peak, PM peak and Saturday MID day peak)
 - e. Growth Rate (0.65%)
 - f. Analysis Type (Synchro 10 and HCM 2010)
 - g. Sight Distance Analysis
 - h. Turn Lane/Length Analysis
 - i. Queuing Analysis
 - j. Crash Analysis

k. Other Analyses As Needed

8. All weekday traffic counts should be conducted while schools are in session.
9. All traffic count data should reflect volumes occurring after the Royal Farms at S.R. 0322 (Manor Avenue) & Lloyd Avenue opened in late 2017.
10. The Department will comment on the assumed Trip Distribution and Assignment when submitted.
11. Provide a pedestrian connection from the development to the Royal Farms on the north side of S.R. 0322 (Manor Avenue). This would require a marked crosswalk across S.R. 0322 (Manor Avenue) at the signalized intersection(s) at Lloyd Avenue and/or S.R. 4017 (Rock Raymond Road).
12. Provide a pedestrian connection from the development to the existing sidewalk on the north side of S.R. 0322 (Manor Avenue) east of S.R. 4017 (Rock Raymond Road) that leads into Downingtown.
13. The applicant for Wild Meadows must coordinate with the applicant for the proposed Taco Bell (EPS Application No. 152572 – Summerwood Corporation), to be located directly across S.R. 0322 (Manor Avenue) from Wild Meadows. This coordination is required to ensure that the TIA reflects consistent assumptions regarding trip generation volumes and access movements, and that proposed and/or required mitigation measures in terms of roadway improvements, intersection/signal improvements, and pedestrian facility improvements are appropriately addressed. A crosswalk across the west leg of S.R. 0322 at S.R. 4017 (Rock Raymond Road) is strongly recommended to accommodate anticipated pedestrian activity between the proposed residential development on the south side of S.R. 0322 and the commercial establishments (Royal Farms and proposed Taco Bell) on the north side of S.R. 0322.
14. With respect to the access design and formal permit application, please ensure that the following items are addressed:
 - a. Please be advised that pursuant to and in accordance with Title 67, Chapter 441.8(h)(2)(iv) of the code, the Safe Stopping Sight Distance is the absolute minimum acceptable sight distance for all driveways. Sight distance values obtained from the use of reduction factors which fall below the Safe Stopping Sight Distance will not be accepted by the Department. It is the designer's responsibility to ensure that this minimum requirement is satisfied.
 - b. It should be understood that in accordance with PennDOT Strike-Off Letter 470-10-03 and pursuant to section 421 of the State Highway Law (36 P.S. § 670-421) the installation of drainage facilities within the Legal Right-of-Way may necessitate additional permitting requirements, including, but not limited to, a separate Highway Occupancy Permit from the Municipality for the future maintenance of the new drainage facilities.
 - c. Truck turning templates must be provided to ensure that the driveway intersection can safely accommodate a WB-62 design vehicle. If the largest permitted vehicle type to utilize the proposed site access is smaller than the WB-62, then a note must be included on the plans indicating the vehicle size and the truck turning templates for that vehicle

size must be provided; the largest permitted vehicle size will become a condition of the permit.

- d. ADA compliance within the limits of work (along the access frontage at a minimum) must be evaluated in the final design (i.e. new/modified facilities, impact to SEPTA bus stops, etc.). Ensure that all pedestrian improvements along the site frontages, at all site access points, and at the signalized intersections are ADA compliant.
- e. Consistent with current Department Policy, applicants for Highway Occupancy Permits must apply for an EPS Business Partner ID (BPID). The BPID is to be used in the establishment of a billing account for the invoicing of inspection costs. For information on obtaining a BPID, you may visit:

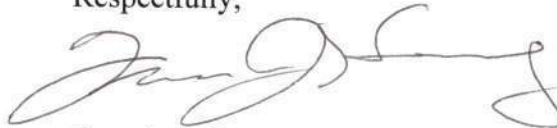
<https://www.dot14.state.pa.us/EPS/home/manageBPRegistration.jsp>

[Please make sure that you follow the instructions that are in the "PINK" area]. After a BPID is obtained and activated by the system administrator, please provide the following information in the applicant contact information tab under "Applicant Team":

- i) BPID (please ensure that the BPID is searchable through the "looking glass" feature)
- ii) Contact information (name/title/phone/email) for a "general" contact person (person that typically deals with the Highway Occupancy Permit application process)
- iii) Contact information (name/title/phone/email) for a "billing" contact person (person that typically deals with the Highway Occupancy Permit invoicing process)

The Department has performed this preliminary review based only on the limited information provided. We reserve the right to make future, additional, detailed comments based on the formal submission and application for a Highway Occupancy Permit. If you have any questions pertaining to the technical aspects of this review, please contact Andrew Parker, P.E., PTOE of McCormick Taylor, Inc. at 610.640.3500 or ajparker@mccormicktaylor.com.

Respectfully,



Francis J. Hanney
Senior Manager Traffic Services Division
Engineering District 6-0

cc: M. Miele, P.E.
A. Patel, P.E.
Traffic Services File
Caln Township
Chester County Planning Commission



TRAFFIC PLANNING AND DESIGN, INC.

WWW.TRAFFICPD.COM

December 21, 2017

Mr. Fran Hanney
PennDOT District 6-0
7000 Geerdes Blvd
King of Prussia, PA 19406

RE: TRANSPORTATION IMPACT ASSESSMENT (TIA) SCOPING APPLICATION

Archdiocese Property Residential/Commercial Development

Caln Township, Chester County, Pa

TPD No. WIME.00001

Dear Mr. Hanney:

On behalf of the Wild Meadows, LLC, Traffic Planning and Design, Inc. (TPD) has prepared the following TIA Scoping Application for the above referenced project.

Scoping Meeting Date: TBD

Applicant: Wild Meadows, LLC

Applicant's Consultant: Traffic Planning and Design, Inc. (TPD) – Matthew Hammond

Applicant's Primary Contact: Harry Miller, Wild Meadows, LLC

1. LOCATION OF PROPOSED DEVELOPMENT:

PennDOT Engineering Dist: 6-0 County: Chester

Municipality: Caln Township

State Route(s): Route 322 (S.R. 0322)

Rock Raymond Road (S.R. 4017)

Please refer to the attached **Figure 1** which shows the project location. The proposed conceptual site plan is **attached**.

2. DESCRIPTION OF PROPOSED DEVELOPMENT:

- Proposed Site Access:
 - One (1) full-access driveway to Route 322 (S.R. 0322), opposite Rock Raymond Road (S.R. 4017);
 - One (1) right-in/right-out driveway to Route 322 (S.R. 0322) between Lloyd Avenue and Rock Raymond Road (S.R. 4017) serving the Commercial/Retail area;
 - Two (2) full-access driveways to Lloyd Avenue.
- Proposed Land Uses (assumed):
 - 150 active-adult (detached) homes;

- 150 active-adult (attached) homes;
- 20.0 ksf retail space.
- Community Linkages (access to neighboring properties, cross easements, pedestrian and transit accommodations): N/A

3. *DEVELOPMENT SCHEDULE AND STAGING:*

- Anticipated Opening Date: 2023
- Design Year: N/A
- Proposed Development/Staging: N/A

4. *TRIP GENERATION:*

Trip generation for the proposed development will be based on:

- ☒ ITE Trip Generation Manual.
- ITE Land Use #251 (Senior Adult Housing – Detached)
 - ITE Land Use #252 (Senior Adult Housing – Attached)
 - ITE Land Use #820 (General Retail)
- ☐ Other independent surveys.

TABLE 1
TRIP GENERATION DATA – PROPOSED SITE

Land Use	Time Period	Size (X)	Equations/Rates	Enter %	Pass %
Senior Adult Housing – Detached (ITE Land Use # 251)	Average Weekday	150 du	$\ln(T) = 0.89 \cdot \ln(X) + 2.06$	50%	--
	Weekday A.M. Peak Hour		$T = 0.17 \cdot (X) + 29.95$	35%	--
	Weekday P.M. Peak Hour		$\ln(T) = 0.75 \cdot \ln(X) + 0.35$	61%	--
	SAT Midday Peak Hour		$T = 0.23 \cdot (X)$	48%	--
Senior Adult Housing – Attached (ITE Land Use # 252)	Average Weekday	150 du	$T = 2.98 \cdot (X) + 21.05$	50%	--
	Weekday A.M. Peak Hour		$T = 0.20 \cdot (X) - 0.13$	34%	--
	Weekday P.M. Peak Hour		$T = 0.24 \cdot (X) + 1.64$	54%	--
	SAT Midday Peak Hour		$T = 0.31 \cdot (X) + 0.46$	57%	--
General Retail (ITE Land Use #820)	Average Weekday	20.0 ksf	$T = 42.70 \cdot (X)$	50%	N/A
	Weekday A.M. Peak Hour		$T = 0.96 \cdot (X)$	62%	24% ¹
	Weekday P.M. Peak Hour		$T = 3.71 \cdot (X)$	48%	34%
	SAT Midday Peak Hour		$T = 4.82 \cdot (X)$	52%	26%

T = Total Trips; X = Independent Variable (ksf, dwelling units)

1 = No Data, Utilized PM Minus 10%

Since the retail is being provided partially as an on-site amenity for the residential portion of the Proposed Site, TPD anticipates interaction between the retail and residential portions of Proposed Site. TPD performed a preliminary interaction and determined the following percentages:

- Average Weekday = 10% (Average of AM and PM)
- Weekday AM = 4%
- Weekday PM = 16%
- SAT Midday = 10% (Average of AM and PM)

The Preliminary Interaction Worksheets are included in the attachments of this Scoping Application.

The results of the trip generation calculations are summarized in **Table 2**.

**TABLE 2
TRIP GENERATION – PROPOSED DEVELOPMENT**

Land Use Code	Ind Variable	Total	Int.	External Trips			Pass-By Trips			New Trips		
				Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Average Weekday												
ITE #251	150 du	680	-64	616	308	308	--	--	--	616	308	308
ITE #252	150 du	470	-38	432	216	216	--	--	--	432	216	216
ITE #820	20.0 ksf	854	-98	756	378	378	--	--	--	756	378	378
Total	--	2004	-200	1804	902	902	0	0	0	1804	902	902
Weekday AM												
ITE #251	150 du	55	-1	54	18	36	0	0	0	54	18	36
ITE #252	150 du	30	-1	29	10	19	0	0	0	29	10	19
ITE #820	20.0 ksf	19	-2	17	11	6	4	2	2	13	9	4
Total	--	104	-4	100	39	61	4	2	2	96	37	59
Weekday PM												
ITE #251	150 du	61	-9	52	31	21	0	0	0	52	31	21
ITE #252	150 du	38	-5	33	17	16	0	0	0	33	17	16
ITE #820	20.0 ksf	74	-14	60	32	28	20	10	10	40	22	18
Total	--	173	-28	145	80	65	20	10	10	125	70	55
SAT Midday												
ITE #251	150 du	35	-6	29	14	15	0	0	0	29	14	15
ITE #252	150 du	47	-4	43	25	18	0	0	0	43	25	18
ITE #820	20.0 ksf	96	-8	88	46	42	23	12	11	65	34	31
Total	--	178	-18	160	85	75	23	12	11	137	73	64

5. *ESTIMATED DAILY TRIP GENERATION/DRIVEWAY CLASSIFICATION:*

- Estimated Daily Trip Generation of Proposed Development: 1804 trips/day or 902 vehicles/day
- Driveway Classification Based on Trip Generation and Three (3) Access Points: Three (3) Low Volume Driveways

6. *TRANSPORTATION IMPACT STUDY REQUIRED?*

☒ No

☐ Yes, based on:

☐ 3,000 or more vehicle trips/day generated

☐ During any one-hour time period, 100 or more new (added) vehicle trips generated entering or 100 or more new (added) vehicle trips generated exiting development.

☐ Other considerations as described below:

7. *TRAFFIC IMPACT ASSESSMENT REQUIRED?* ☐ No ☒ Yes

8. *TIA STUDY AREA:*

- Roadway and Study Intersections
 - Route 322 (S.R. 0322) and Rock Raymond Road (S.R. 4017)/Proposed Driveway;
 - Route 322 (S.R. 0322) and Lloyd Avenue/Royal Farms Driveway;
 - Lloyd Avenue and Park and Ride Driveway/Proposed Driveway;
 - Lloyd Avenue and GO Carlson Boulevard;
 - Lloyd Avenue and Beaver Run Road/Proposed Driveway.
- Land use context (Refer to Smart Transportation Handbook)

- Will be addressed in the TIA
- Known Congestion Areas
 - TBD
- Known Safety Concerns
 - TBD
- Known Environmental Constraints
 - TBD
- Pedestrian/Bike Review (Community Centers, Parks, Schools, etc.)
 - Will be addressed in the TIA
- Transit Review (Current routes/stops)
 - Will be addressed in the TIA

9. *STUDY AREA TYPE:*

Urban ☒

Rural ☐

10. *TIS ANALYSIS PERIOD AND TIMES:*

- Weekday A.M. peak hour (7:00-9:00 A.M.)
- Weekday P.M. peak hour (4:00-6:00 P.M.)
- Saturday Midday peak hour (11:00 A.M.-1:00 P.M.)

Study Years to be evaluated:

- 2017 Existing Conditions
- 2023 Opening Year Conditions

11. *TRAFFIC ADJUSTMENT FACTORS:*

- Seasonal Adjustment: (Identify counts requiring adjustment and methodology): None
- Annual Base Traffic Growth: 0.65%/year based on PennDOT Bureau of Planning and Research (BPR) data pertaining to urban non-interstate roadways in Chester County.
- Pass-By Trips: See Tables 1-2 (above)
- Captured Trips for Multi-Use Sites: See Table 2 (above)
- Modal Split Reductions: None
- Other Reduction: None

12. *OTHER PROJECTS WITHIN STUDY AREA TO BE ADDED TO BASE TRAFFIC:*

To be determined. At a minimum, the following will be included:

- Dwell at Caln PRD – a 384-unit residential development located on the southern side of Route 322, west of Edges Mill Road. TPD will account for this site based on a TIS prepared by McMahon Associates. The anticipated build-out for this development is 2019.
- Taco Bell – a 2,703 ksf fast-food restaurant with 66 seats located on the northwestern quadrant of the intersection of Route 322 and Rock Raymond Road. TPD will account for this site based on a TIA concurrently being performed by TPD. The anticipated build-out for this development is 2019.

13. *TRIP DISTRIBUTION AND ASSIGNMENT:*

TPD recommends distributing and assigning trips to the surrounding roadways based upon an evaluation of the following: (1) existing traffic patterns, (2) roadways surrounding the site, and (3) the proposed site driveway location and configuration.

14. APPROVAL OF DATA COLLECTION ELEMENTS AND METHODOLOGIES:

Location	Time Period	Count Type
All Existing "Roadway and Study Intersections" noted in #8 above	Weekday A.M. Peak Hour	Manual Turning Movement Count
	Weekday P.M. Peak Hour	
	SAT Midday Peak Hour	

15. CAPACITY/LOS ANALYSIS:

Capacity analyses to be conducted at the study area intersections for the peak hours and study years to be evaluated according to the methodologies contained in the 2010 HCM (where applicable), utilizing SYNCHRO 10 software. In addition, capacity analyses will be conducted at the proposed site driveway intersection under opening year conditions.

16. ROADWAY IMPROVEMENTS/MODIFICATIONS BY OTHERS TO BE INCLUDED: TBD

17. OTHER NEEDED ANALYSES:

- a. Sight Distance Analysis: Yes
- b. Signal Warrant Analysis: As needed
- c. Required Signal Phasing/Timing Modifications: As Needed
- d. Traffic Signal Corridor/Network Analysis: As Needed
- e. Analysis of the Need for Turning Lanes: Yes
- f. Turning Lane Lengths: Utilizing Pub. 46, Chapter 11
- g. Left Turn Signal Phasing Analysis: As Needed
- h. Queuing Analysis: Utilizing HCM 2010 Methodology
- i. Gap Studies: As Needed
- j. Crash Analysis: Yes
- k. Weaving Analysis: As Needed
- l. Other Required Studies: As Needed

18. ADDITIONAL COMMENTS OR RECOMMENDATIONS RELATIVE TO THE SCOPE OF THE TIS:

TBD

TRAFFIC PLANNING AND DESIGN, INC.



Matthew I. Hammond, P.E.

Executive Vice President

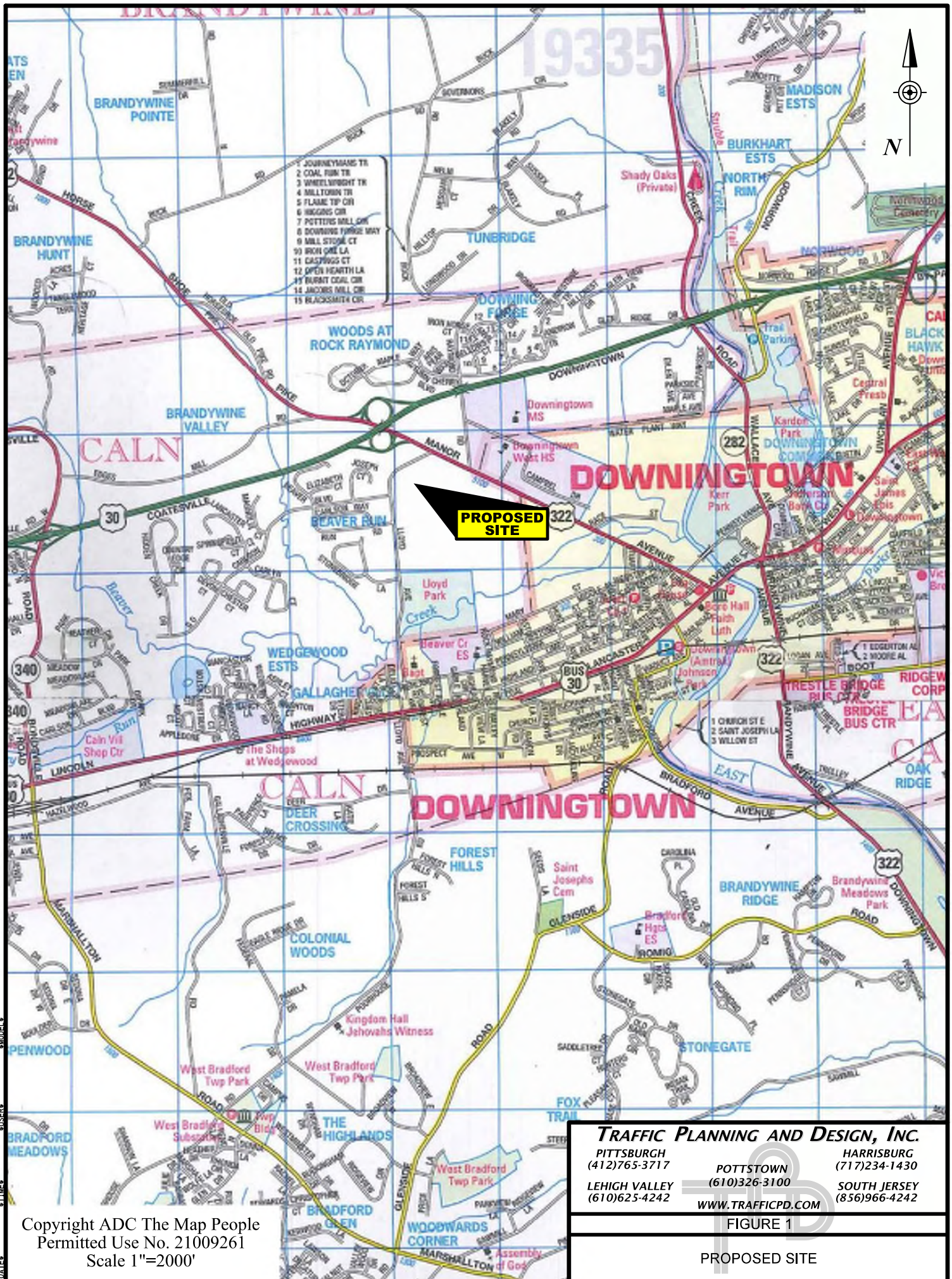
mhammond@TrafficPD.com

Attachments: Figure 1 – Study Area

Preliminary Interaction Worksheets
Royal Farms TIS (2015-11-20)
Conceptual Site Plan

cc: Kristen Denne, Caln Township Manager

Project Team (via Email)
TPD File



Copyright ADC The Map People
 Permitted Use No. 21009261
 Scale 1"=2000'

FIGURE 1
 PROPOSED SITE

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	WIME.00001			Organization:	TPD
Project Location:	Cain Township/Chester County			Performed By:	mb
Scenario Description:	Projected Conditions			Date:	12/19/2017
Analysis Year:				Checked By:	
Analysis Period:	AM Street Peak Hour			Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	20	ksf	19	12	7
Restaurant				0		
Cinema/Entertainment				0		
Residential	251 / 252	300	du	85	29	56
Hotel				0		
All Other Land Uses ²				0		
				104	41	63

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	104	41	63
Internal Capture Percentage	4%	5%	3%
External Vehicle-Trips ⁵	100	39	61
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	8%	14%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	2%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	WIME.00001
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	12	12	1.00	7	7
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	29	29	1.00	56	56
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		1	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	11	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	1		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	1	11	12	11	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	28	29	28	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	1	6	7	6	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	55	56	55	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	WIME.00001			Organization:	TPD
Project Location:	Cain Township/Chester County			Performed By:	mb
Scenario Description:	Projected Conditions			Date:	12/19/2017
Analysis Year:				Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	20	ksf	74	36	38
Restaurant				0		
Cinema/Entertainment				0		
Residential	251 / 252	300	du	99	58	41
Hotel				0		
All Other Land Uses ²				0		
				173	94	79

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	10	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	173	94	79
Internal Capture Percentage	16%	15%	18%
External Vehicle-Trips ⁵	145	80	65
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	17%	10%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	WIME.00001
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	36	36	1.00	38	38
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	58	58	1.00	41	41
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		11	2	10	2
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	17	9	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	2	0
Retail	0		0	0	27	0
Restaurant	0	18		0	9	0
Cinema/Entertainment	0	1	0		2	0
Residential	0	4	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	4	32	36	32	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	10	48	58	48	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	10	28	38	28	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	37	41	37	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

TRAFFIC PLANNING

AND DESIGN, INC.



Caln Royal Farms

Transportation Impact Study

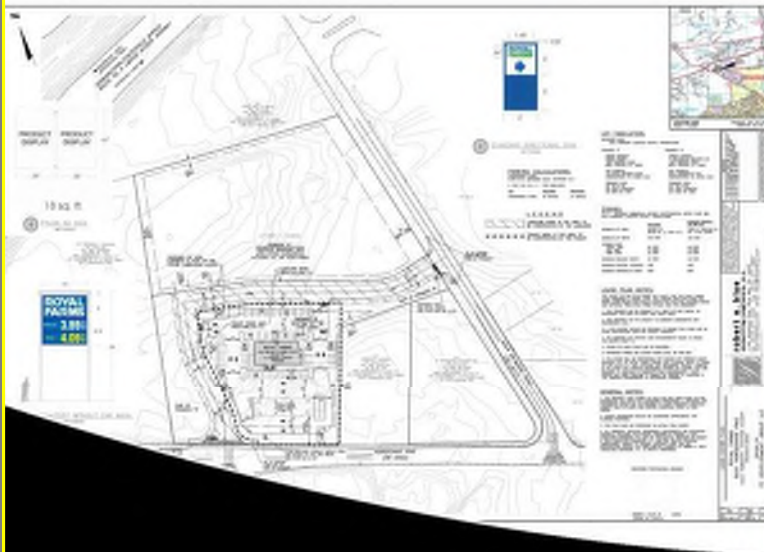
Caln Township, Chester County

For Submission To:

PennDOT District 6-0 & Caln Township

January 9, 2015 (Last Revised: November 20, 2015)

TPD# FCDG.A.00003



CALN ROYAL FARMS TRANSPORTATION IMPACT STUDY

For Submission to:

**Caln Township, Chester County, PA
& PennDOT District 6-0**

Prepared For:

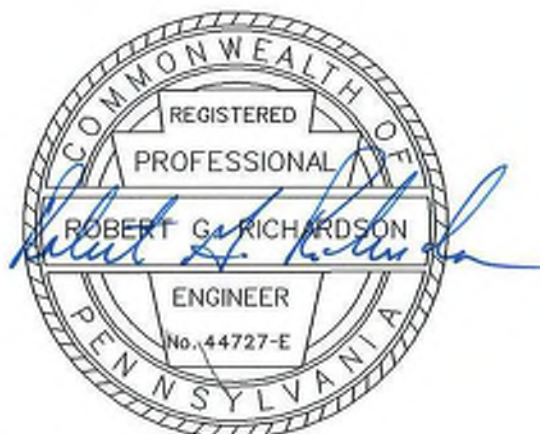
**Mr. Carl Freedman
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**January 9, 2015
(Last Revised November 20,
2015)
TPD # FCDG.A.00003**

Prepared By:

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION.....	5
EXISTING ROADWAY NETWORK.....	5
EXISTING TRAFFIC CONDITIONS	8
BASE (NO-BUILD) CONDITIONS.....	9
SCHEDULED ROADWAY IMPROVEMENTS.....	9
PROPOSED SITE ACCESS.....	10
TRIP GENERATION	11
TRIP DISTRIBUTION	12
PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES	13
LEVELS OF SERVICE FOR AN INTERSECTION	13
CAPACITY ANALYSIS METHODOLOGY	14
LEVELS OF SERVICE IN THE STUDY AREA	15
95TH PERCENTILE QUEUE ANALYSIS.....	16
AUXILIARY TURN LANE ANALYSIS.....	18
RECOMMENDATIONS	18
CONCLUSIONS	19

Figures 1 – 14

Technical Appendices

Appendix A:	Project Correspondence
Appendix B:	Study Area Photographs
Appendix C:	Smart Transportation Criteria
Appendix D:	Manual Traffic Count Printouts
Appendix E:	Nearby Development Data
Appendix F:	Volume Development Spreadsheets
Appendix G:	Capacity Analyses
Appendix H:	Traffic Signal Diagrams
Appendix I:	Auxiliary Turn Lane Warrant Analyses
Appendix J:	Concept Plans



EXECUTIVE SUMMARY

The purpose of this study is to examine the potential traffic impact associated with the proposed development on the roadway network in Caln Township, Chester County, PA. Based on this evaluation, the following conclusions were reached:

- The project site is located on the northwestern quadrant of the intersection of Route 322 (S.R. 0322) and Rock Raymond Road (S.R. 4017). The proposed site will consist of a 5,379 s.f. Royal Farms convenience market with sixteen (16) fueling positions.
- Access to the proposed site will be served by two (2) full-access driveway locations, as follows:
 - One (1) full-access driveway on the northern side of Route 322 (S.R. 0322), opposite Lloyd Avenue. This driveway will form the fourth leg of the existing signal with Lloyd Avenue.
 - One (1) full-access driveway on the western side of Rock Raymond Road (S.R. 4017), north of Route 322 (S.R. 0322).
- The measured sight distances at the proposed site driveways will satisfy all PennDOT's sight distance requirements.
- The proposed development will generate approximately **99 new trips** during the weekday A.M. peak hour and **103 new trips** during the weekday P.M. peak hour.
- Under 2021 Projected Conditions, with the site-related recommendations, all levels of service at the study area intersection comply with the requirements outlined in PennDOT's TIS Guidelines.
- Traffic Planning and Design Inc. (TPD) recommends the following roadway improvements as outlined at the study area intersections:

Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)

- Optimize signal timings.
- Work with Caln Township and PennDOT to provide adequate ADA facilities where applicable.

Route 322 (S.R. 0322) & Lloyd Avenue/Proposed Site Driveway

- Provide a 175-foot long left-turn lane on eastbound Route 322 (S.R. 0322).
- Provide a 150-foot long right-turn lane on westbound Route 322 (S.R. 0322).
- Provide a 150-foot long right-turn lane on northbound Lloyd Avenue.
- Provide adequate turning radii in order to optimize ingress/egress.
- Optimize signal timings.
- Work with Caln Township and PennDOT to provide adequate ADA facilities where applicable.



- Widen along Route 322 (S.R. 0322) to connect the left-turn lanes at Lloyd Ave and Rock Raymond Road with a two-way center left turn lane (TWCLTL), in order to maximize available left-turn stacking at both intersections.

Rock Raymond Road (S.R. 4017) & Proposed Site Driveway

- Provide “STOP” signage on the eastbound driveway approach for vehicles exiting the proposed site.
- Provide “Do Not Block Intersection” signage along Rock Raymond Road for the proposed driveway.
- Provide adequate turning radii in order to optimize ingress/egress.
- Work with Caln Township, PennDOT, and Downingtown School District to provide adequate ADA facilities where applicable.

As part of PennDOT’s HOP process, the applicant will coordinate and fund the implementation of the recommended roadway improvements. Preliminary construction costs have not been determined at this time.

- Levels of Service (LOS) for the study area intersections have been summarized in matrix form. **Table I** details the overall intersection LOS for each study area intersection.



TABLE I
LEVEL OF SERVICE DELAY (SECONDS)

Intersection	Movement	Weekday AM Peak Hour				
		2014 Existing	2016 Base	2016 Proj. ¹	2021 Base	2021 Proj. ¹
Rock Raymond Road (S.R. 4017) & Route 322 (S.R. 0322)	EBL	A	A	A	A	A
	EBT	A	A	A	A	A
	WBT	B	B	B	B	B
	WBR					
	SBL	E	E	E	E	E
	SBR	D	D	D	D	D
	ILOS	B(13.7)	B(14.1)	B(15.8)	B(14.9)	B(17.1)
Lloyd Avenue/ Proposed Driveway & Route 322 (S.R. 0322)	EBL	--	--	B	--	B
	EBT	D	D	D	F(88.4)	D
	EBR	B	B	B	B	B
	WBL	C	C	C	D	C
	WBT	A	A	A	A	A
	WBR	--	--	A	--	A
	NBL	F(162.1)	F(183.1)	D	F(239.8)	E
	NBT			D		D
	NBR			D		D
	SBL	--	--	D	--	D
	SBT					
	SBR					
	ILOS	E(65.7)	E(74.2)	C(28.3)	F(110.3)	D(35.4)
EB Route 30 Ramps & Route 322 (S.R. 0322)	NBL	F(146.5)	F(252.3)	F(210.7)	F(770.3)	F(540.7)
	NBR	C	C	C	C	C
	WBL	B	B	B	B	B
	ILOS	A(3.9)	A(5.2)	A(4.9)	B(11.2)	A(8.9)
WB Route 30 Ramps & Route 322 (S.R. 0322)	EBL	A	A	A	A	A
	EBT	--	A	A	B	B
	WBT	--	A	A	A	A
	WBR	--				
	SBL	F(416.9)	D	D	D	D
	SBR	B	--	--	--	--
	ILOS	E(37.0)	B(12.0)	B(13.1)	B(13.8)	B(15.1)
Rock Raymond Road (S.R. 4017) & Proposed Driveway	EB	--	--	B	--	B
	NBL	--	--	A	--	A
	ILOS	--	--	A(1.4)	--	A(1.3)

Base = No-Build scenario, Projected = Build scenario, ILOS = Overall Intersection Level of Service
Unsignalized ILOS calculated in accordance with Figure 5 of *Policies and Procedures for Transportation Impact Studies*.
1 = With Site- Related Improvements



TABLE II
LEVEL OF SERVICE DELAY (SECONDS)

Intersection	Movement	Weekday PM Peak Hour				
		2014 Existing	2016 Base	2016 Proj. ¹	2021 Base	2021 Proj. ¹
Rock Raymond Road (S.R. 4017) & Route 322 (S.R. 0322)	EBL	A	A	A	B	B
	EBT	A	A	A	A	A
	WBT	B	B	B	B	B
	WBR					
	SBL	D	D	D	D	D
	SBR	D	D	D	D	D
	ILOS	A(9.7)	B(10.6)	B(12.5)	B(13.6)	B(15.6)
Lloyd Avenue/ Proposed Driveway & Route 322 (S.R. 0322)	EBL	--	--	B	--	B
	EBT	B	B	B	C	B
	EBR	B	B	B	B	B
	WBL	A	B	A	B	B
	WBT	A	A	A	A	A
	WBR	--	--	A	--	A
	NBL	D	D	D	D	D
	NBT					
	NBR			C		C
	SBL	--	--	D	--	D
	SBT					
	SBR					
	ILOS	B(13.1)	B(13.9)	B(12.8)	B(16.0)	B(13.9)
EB Route 30 Ramps & Route 322 (S.R. 0322)	NBL	F(684.7)	F(999+)	F(260.3)	F(999+)	F(688.8)
	NBR	C	C	D	D	E
	WBL	A	B	B	B	B
	ILOS	C(16.0)	E(37.0)	A(8.4)	F(205.5)	C(19.8)
WB Route 30 Ramps & Route 322 (S.R. 0322)	EBL	A	C	C	D	D
	EBT	--	B	B	B	C
	WBT	--	B	B	C	C
	WBR	--				
	SBL	F(999+)	D	D	D	D
	SBR	F(449.3)	--	--	--	--
	ILOS	F(377.8)	C(21.5)	C(22.7)	C(26.2)	C(27.8)
Rock Raymond Road (S.R. 4017) & Proposed Driveway	EB	--	--	A	--	A
	NBL	--	--	A	--	A
	ILOS	--	--	A(1.8)	--	A(1.6)

Base = No-Build scenario, Projected = Build scenario, ILOS = Overall Intersection Level of Service
 Unsignalized ILOS calculated in accordance with Figure 5 of *Policies and Procedures for Transportation Impact Studies*.
 1 = With Site- Related Improvements

INTRODUCTION

Traffic Planning and Design, Inc. (TPD) has completed a Transportation Impact Study (TIS) for the proposed Caln Royal Farms in Caln Township, Chester County, Pennsylvania. The project site is located on the northwestern quadrant of the intersection of Route 322 (S.R. 0322) and Rock Raymond Road (S.R. 4017), as shown in **Figure 1**. As shown in **Figure 2**, the proposed site will consist of a 5,379 s.f. Royal Farms convenience market with sixteen (16) fueling positions. For the purposes of this study, TPD assumed a 2016 opening year and a 2021 design year.

This report has been prepared in accordance with PennDOT's *Policies and Procedures for Transportation Impact Studies*, dated January 28, 2009. This TIS has been revised based on review comments contained in the following letters:

- Caln Township (February 10, 2015 Letter);
- PennDOT (February 18, 2015 Letter);
- Two (2) project meetings with the Department on February 23, 2015, and July 9, 2015, respectively;
- Caln Township (October 4, 2015 Letter);

All relevant correspondence pertaining to this project has been included in **Appendix A**.

Site Access Locations

Access to the proposed site will be served by two (2) full-access driveway locations, as follows:

- One (1) full-access driveway on the northern side of Route 322 (S.R. 0322), opposite Lloyd Avenue. This driveway will form the fourth leg of the existing signal with Lloyd Avenue.
- One (1) full-access driveway on the western side of Rock Raymond Road (S.R. 4017), north of Route 322 (S.R. 0322).

EXISTING ROADWAY NETWORK

A field review of the existing roadway system in the study area was conducted. The existing roadway characteristics within the study area are summarized in **Table 1**. Photographs of the study area intersections are included in **Appendix B**.



TABLE 1
ROADWAY CHARACTERISTICS WITHIN STUDY AREA

Roadway	State Route	PennDOT Functional Classification/ Roadway Type	Predominant Directional Orientation	Posted Speed Limit	AADT ¹
Route 30	S.R. 0030	Urban Freeway	East-West	55 mph	EB = 11,970 ² WB = 28,476 ³
Route 322	S.R. 0322	Urban Principal Arterial	East-West	35-45 mph	18,186 ⁴ 10,907 ⁵
Rock Raymond Road	S.R. 4017	Urban Collector	North-South	35 mph	2,322
EB Route 30 Ramps	S.R. 8010	Ramps	North-South	N/P	9,865 ²
WB Route 30 Ramps	S.R. 8010	Ramps	North-South	N/P	9,250 ²
Lloyd Avenue	N/A	Collector	North-South	35 mph	4,490

1. PennDOT iTMS Website (March 2015)
2. ADT minus EB Ramp ADT
3. ADT minus WB Ramp ADT
4. North of Route 30 Interchange
5. South of Rock Raymond Road
6. Estimated Based on Peak Hour Counts

Land Use Context

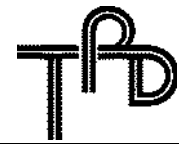
In Chapter 4 of the Smart Transportation Guidebook, dated March 2008, there is guidance pertaining to defining the land use context(s) for a given area. Based upon review of this information, the land uses surrounding the proposed site best fits the Suburban Neighborhood as described below:

Suburban Neighborhood, “predominately low density residential communities... typically arranged in a curvilinear internal system of streets with limited connections to regional road network or surrounding streets. . . .Neighborhoods can include community facilities such as schools, churches, recreational facilities, and some other stores and offices. When suburban houses line and arterial roadway but have their primary access to frontage roads or rear access roads, it is possible to classify this area as a suburban corridor.”

Roadway Type

In Chapter 5 of the Smart Transportation Guidebook, there is guidance pertaining to defining the transportation context(s) for a given area. Comparing the existing condition roadway characteristics to the various options presented in Table 5.1 of the Smart Transportation Guidebook, the study area roadways best fit the following categories, as described below:

Community Arterial, traffic volumes of 5,000 to 25,000 vehicles per day, intersection spacing of 300 to 1,320 feet, a desired operating speed of 25-55 mph, and a description as follows: “often classified as Minor Arterial in traditional classification but may include road segments classified as Principal Arterial.”



- Route 322 (S.R. 0322)

Neighborhood Collector, traffic volumes of <6,000 vehicles per day, intersection spacing of 300 to 660 feet, a desired operating speed of 25-35 mph, and a description as follows: “*similar in appearance to local roadways. Typically classified as Minor Collector.*”

- Rock Raymond Road (S.R. 4017)
- Lloyd Avenue

The applicable excerpts from the Smart Transportation Guidebook related to land use contexts, roadway types, and the associated design criteria are included in **Appendix C**.

Multi-Modal Facilities

Based on observations during field visits at the study area intersections, there are no specific pedestrian or bicycle facilities at the study area intersections.

The closest regional rail service is provided at the Downingtown Train Station located less than one (1) mile away. Bus service is provided along Lincoln Highway via KRAPF Route A.

Crash Data Investigation

Crash data were obtained from PennDOT for the study area intersections. PennDOT defines a reportable crash as follows, “A reportable (crash) is one in which an injury or fatality occurs or if at least one of the vehicles involved requires towing from the scene.” Reportable crashes were tabulated for the five-year time period beginning 1/1/2009 and ending 12/31/2013. For a given intersection, PennDOT considers a crash occurrence of 5 reportable, correctable crashes over a continuous twelve-month period during the past five years to be a threshold value, above which the intersection design should be reviewed to examine if corrective measures can be taken to enhance safety. The number of reportable crashes at the study area intersections is shown in **Table 2**.

TABLE 2
PENNDOT REPORTABLE (CORRECTIBLE) CRASH DATA

Study Area Intersection	Number of Reportable (Correctible) Crashes				
	2009	2010	2011	2012	2013
Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)	0(0)	0(0)	0(0)	0(0)	1(0)
Route 322 (S.R. 0322) & Lloyd Avenue	0(0)	0(0)	1(0)	0(0)	1(0)
Route 322 (S.R. 0322) & EB Route 30 Ramps	2(2)	5(2)	1(1)	3(1)	4(2)
Route 322 (S.R. 0322) & WB Route 30 Ramps	4(2)	1(0)	3(3)	4(0)	7(5)

Total Reportable (Correctible)



Based on a review of the crash data, there were no continuous twelve-month periods during the past five years where 5 or more crashes occurred that were deemed correctable at the study area intersections, with the exception of the intersection of Route 322 and the WB Route 30 Ramps. This intersection experienced high instances of tailgating. It should be noted that, signalization has been proposed at this intersection in conjunction with another project. *As requested by PennDOT, collision diagrams were prepared under separate cover at Route 322 and both Route 30 Ramps.*

EXISTING TRAFFIC CONDITIONS

Manual traffic counts were conducted on 15-minute intervals during the weekday morning (7:00 to 9:00 A.M.) and weekday evening (4:00 to 6:00 P.M.) peak periods. Data pertaining to heavy vehicles, pedestrians and transit vehicles were observed during the manual counts. Peak hours and count dates for the study area intersections are identified in **Table 3**.

TABLE 3
MANUAL TRAFFIC COUNT INFORMATION

Intersection	Date of Traffic Counts	Time Period	Intersection Peak Hour ¹
Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)	Thursday, September 4, 2014	Weekday A.M.	7:00 to 8:00 A.M.
	Wednesday, September 3, 2014	Weekday P.M.	5:00 to 6:00 P.M.
Route 322 (S.R. 0322) & Lloyd Avenue	Thursday, September 4, 2014	Weekday A.M.	7:00 to 8:00 A.M.
	Wednesday, September 3, 2014	Weekday P.M.	5:00 to 6:00 P.M.
Route 322 (S.R. 0322) & EB Route 30 Ramps	Thursday, September 4, 2014	Weekday A.M.	7:15 to 8:15 A.M.
	Wednesday, September 3, 2014	Weekday P.M.	5:00 to 6:00 P.M.
Route 322 (S.R. 0322) & WB Route 30 Ramps	Thursday, September 4, 2014	Weekday A.M.	7:00 to 8:00 A.M.
	Wednesday, September 3, 2014	Weekday P.M.	5:00 to 6:00 P.M.

¹ = Peak Hour consists of the four consecutive 15-minute intervals where the highest traffic volumes occur.

It should be noted that Downingtown School District was in session when these counts were performed. 2014 Existing Condition traffic volumes for the weekday A.M. and P.M. peak hours are illustrated in **Figures 3-4**. Manual traffic count data sheets are provided in **Appendix D**.



BASE (NO-BUILD) CONDITIONS

Background Growth

A background growth factor for the roadways in the study area was developed based on growth factors for July 2012 to July 2013 obtained from the PennDOT Bureau of Planning and Research (BPR). The PennDOT BPR suggests using a background growth trend factor of 1.91% per year in Chester County for urban non-interstate roadways. As such, the background growth factor was applied annually to yield overall growth percentage of 3.86% (1.91% per year compounded for 2 years) to develop 2016 future conditions, and 14.16% (1.91% per year compounded for 7 years) to develop 2021 future conditions.

Nearby Proposed Development

Base (no-build) traffic conditions were calculated to include traffic volumes from proposed developments, which though not operating under existing conditions, may be operating by the opening of the proposed development. Based on a meeting with Township Staff, the following nearby planned development was specifically included in this study:

Dwell at Caln PRD a 384-unit residential development located on the southern side of Route 322, west of Edges Mill Road. TPD generated and distributed for the proposed site based on a TIS prepared by McMahon Associates. The anticipated build-out for this development is 2019. Therefore, TPD assumed 40% build-out under 2016 and 100% build-out under 2021, for this study.

The additional traffic volumes due to background growth and nearby development were added to the existing traffic data to produce 2016 and 2021 Base (no-build) Condition traffic volumes, as illustrated in **Figures 5-8**. Nearby Development Data is included in **Appendix E**. The trip assignments assumed for each nearby development are itemized in the volume development spreadsheets provided in **Appendix F**.

SCHEDULED ROADWAY IMPROVEMENTS

Based on a review of the PennDOT 12-Year Program and the DVRPC Transportation Improvement Program (TIP), there are no planned roadway improvements at the study area intersections. Based on further correspondence with Township Staff, the signals along Route 322 (S.R. 0322) in the Study Area, were recently updated by the Township to optimize progression along Route 322 (S.R. 0322) due to recent pattern changes from school traffic. Therefore, TPD will optimize signal timings under base (future no build) conditions, for the purposes of the analysis presented in this TIS.

Based on a review of the TIS prepared for the Dwell at Caln PRD development, a signal is proposed at the intersection of Route 322 (S.R. 0322) and the WB Route 30 Ramps. A concept plan depicting this improvement is included in **Appendix E** with the Nearby Development Data. This improvement was included under base conditions.



PROPOSED SITE ACCESS

Site Access Locations

Access to the proposed site will be served by two (2) full-access driveway locations, as follows:

- One (1) full-access driveway on the northern side of Route 322 (S.R. 0322), opposite Lloyd Avenue. This driveway will form the fourth leg of the existing signal with Lloyd Avenue.
- One (1) full-access driveway on the western side of Rock Raymond Road (S.R. 4017), north of Route 322 (S.R. 0322).

Sight Distance Analysis

A sight distance analysis was prepared for the proposed site driveways. In general, recommended safe sight distances depend upon the posted speed limit and roadway grades. The existing sight distances at the proposed driveways were measured in accordance with PennDOT Publication 282 Highway Occupancy Permit Guidelines and compared to PennDOT's desirable sight distance standard, which is identified in 67 PA Code Chapter 441.8(h), "Access to and Occupancy of Highways by Driveways and Local Roads." In addition, measured sight distances at the proposed driveways were compared to PennDOT's safe stopping sight distance standard, which is calculated by the following equation.

$$SSSD = 1.47VT + V^2/[30(f \pm g)]$$

SSSD = safe stopping sight distance (acceptable sight distance)

V = Vehicle Speed

T = Perception Reaction Time of Driver (2.5 seconds)

f = Coefficient of Friction for Wet Pavements

g = Percent of Roadway Grade Divided by 100

Tables 4-5 show the measured, desirable, acceptable (SSSD), and required sight distances at the proposed site driveways for vehicles entering and exiting the site.

TABLE 4
SIGHT DISTANCE ANALYSIS
PROPOSED ROUTE 322 DRIVEWAY

	<i>Direction</i>	Posted Speed (mph)	<i>Sight Distances (feet)</i>			
			Grade ¹ (%)	DES ²	SSSD ³	EXIST
Exiting Movements	<i>To the left</i>	45	-1	635	471	635+⁴
	<i>To the right</i>	45	-2	570	481	800+
Entering Left Turns	<i>Approaching same direction</i>	45	-2	N/A	481	800+
	<i>Approaching opposite direction</i>	45	-1	445	471	670

DES = PennDOT Desirable Sight Distance

SSSD = PennDOT Acceptable Sight Distance

EXIST = Existing (measured) Sight Distance

N/A = Not Applicable

1 = Roadway Grade Approaching Driveway

2 = At Posted Speed Limit

3 = At Posted Speed Limit + 5mph

4 = With Removal of On-Site Vegetation

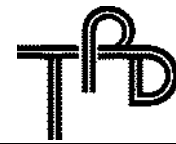


TABLE 5
SIGHT DISTANCE ANALYSIS
PROPOSED ROCK RAYOND ROAD DRIVEWAY

	<i>Direction</i>	Posted Speed (mph)	<i>Sight Distances (feet)</i>			
			Grade ¹ (%)	DES ²	SSSD ³	EXIST
Exiting Movements	<i>To the left</i>	35	+5	440	291	800+
	<i>To the right</i>	35	-5	350	345	435⁴
Entering Left Turns	<i>Approaching same direction</i>	35	-5	N/A	345	390⁴
	<i>Approaching opposite direction</i>	35	+5	300	291	800+

DES = PennDOT Desirable Sight Distance
 SSSD = PennDOT Acceptable Sight Distance
 EXIST = Existing (measured) Sight Distance
 N/A = Not Applicable

1 = Roadway Grade Approaching Driveway
 2 = At Posted Speed Limit
 3 = At Posted Speed Limit + 5mph
 4 = To Route 322

As shown in **Tables 4-5**, the measured sight distances at the proposed site driveways will satisfy all PennDOT's sight distance requirements.

TRIP GENERATION

The trip generation rates for the proposed site were obtained from the manual Trip Generation, Ninth Edition, 2012, an Institute of Transportation Engineers (ITE) Informational Report. The statistics in Trip Generation are empirical data based on more than 4,800 trip generation studies. The data are categorized by Land Use Codes, with total vehicular trips for a given land use estimated using an independent variable and statistically generated rates or equations.

Due to the close proximity of this site to the Route 30 interchange, PennDOT requested that the trip generation of the proposed site account for "diverted link" trips. **Table 6** shows the rates/equations and directional percentages utilized for the analyzed time periods.

TABLE 6
PROPOSED SITE
TRIP GENERATION DATA

Time Period	Rates	Entering	Primary ¹	Diverted Link ¹	Pass-By ¹
ITE #853 – Convenience Market with Gasoline					
Average Weekday	$T = 845.6 \cdot (X^2)$	50%	N/A	N/A	N/A
Weekday A.M.	$T = 16.57 \cdot (X^3)$	50%	11%	26%	63%
Weekday P.M.	$T = 19.07 \cdot (X^3)$	50%	17%	17%	66%

T = Total Trips, X = independent variable (ksf/fp)
 1 = Averages from Tables F.15 and F.16 from Trip Gen Handbook, 3rd Edition
 2 = ksf (used per PennDOT standards for average weekday)
 3 = fueling positions (generates highest during peak hour)

The calculated trip generation for the proposed development is shown in **Table 7**.



TABLE 7
TRIP GENERATION SUMMARY
PROPOSED SITE

Peak Hour	Size (X)	Total Trips	New Trips						Pass-By Trips		
			Primary Trips			Diverted Link Trips					
			Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Average Weekday	5.379 ksf	4548	2274	2274	4548	N/A	N/A	N/A	N/A	N/A	N/A
Weekday A.M.	16 fp	265	15	14	29	35	35	70	83	83	166
Weekday P.M.		305	26	25	51	26	26	52	101	101	202

X = Independent Variable (ksf, thousand square feet)

Based on the trip generation analysis summarized in **Table 7**, the proposed development will generate approximately **99 new trips** during the weekday A.M. peak hour and **103 new trips** during the weekday P.M. peak hour.

TRIP DISTRIBUTION

Primary Trips

The distribution of primary trips generated by the proposed development was based on the local road network, the existing traffic patterns, the proposed use of the site, and the site driveway locations. The primary trips for the proposed development were distributed to the local roadway network based on the percentages shown in **Table 8**.

TABLE 8
TRIP DISTRIBUTION PERCENTAGES – PRIMARY TRIPS

Direction - To/From	Assignment (To/From)	Distribution Percentage
		AM/PM
West	via Route 322	31%
East		19%
North	via Route 30	26%
	via Rock Raymond Road	8%
South	via Lloyd Avenue	11%
	via Route 30	5%

Diverted Link Trips

The distribution of diverted link trips generated by the proposed development was based on the ADT's of the local road network. The diverted link trips for the proposed development were distributed to the local roadway network based on the percentages shown in **Table 9**.



TABLE 9
TRIP DISTRIBUTION PERCENTAGES – DIVERTED LINK TRIPS

DIRECTION	Distribution Percentage
	AM/PM
Southbound via Route 30	49%
Northbound via Route 30	20%
Eastbound via Route 322 (To/From NB Route 30)	29%
Eastbound via Route 322 (To/From SB Route 30)	2%

Pass-By Trips

Pass-by trips were established based on the existing traffic patterns in the vicinity of the site and the location and configuration of the site driveways. The percentages used for the distribution of pass-by trips to the project site are shown below in **Table 10**.

TABLE 10
TRIP DISTRIBUTION PERCENTAGES – PASS-BY TRIPS

Direction	Pass-by Trip Distribution Percentages	
	Weekday A.M.	Weekday P.M.
Eastbound Route 322	42%	43%
Westbound Route 322	23%	39%
Southbound via Rock Raymond Road	19%	9%
Northbound via Rock Raymond Road	16%	9%

The assignment of site-generated trips for the proposed development during the weekday A.M. and P.M. peak hours are shown in **Figures 9-10**.

PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES

The site-generated trips were added to the 2016 and 2021 Base (no-build) Condition traffic volumes to develop 2016 and 2021 Projected (build) Condition traffic volumes as shown in **Figures 11-14**.

LEVELS OF SERVICE FOR AN INTERSECTION

For analysis of intersections, level of service is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS criteria is stated in terms of control delay per vehicle for a one-hour analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The criteria are shown in **Table 10**. Delay, as it relates to level of service, is a complex measure and is dependent upon a number of variables. For signalized intersections, these variables include the quality of vehicle progression, the cycle length, the green time ratio, and the volume/capacity ratio for the lane group in question. For unsignalized intersections, delay is related to the availability of gaps in the flow of



traffic on the major street and the driver's discretion in selecting an appropriate gap for a particular movement from the minor street (straight across, left or right turn).

TABLE 10
LEVEL OF SERVICE CRITERIA
UNSIGNALIZED AND SIGNALIZED INTERSECTIONS ¹

Level of Service	Control Delay Per Vehicle (Seconds)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	$> 80^2$	$> 50^2$

¹ Obtained from Exhibits 18-4 and 19-1 of the Transportation Research Board's *Highway Capacity Manual 2010*

² Or a V/C Ratio > 1.00

CAPACITY ANALYSIS METHODOLOGY

Capacity analyses were conducted for the weekday A.M. and P.M. peak hours at the study area intersections. These analyses were conducted according to the methodologies contained in the 2010 *Highway Capacity Manual* (HCM) using *Synchro 8* software, a Trafficware product. The following conditions were analyzed, as applicable:

- 2014 Existing Conditions;
- 2016 Base Conditions (Build-out year without development);
- 2016 Projected Conditions (Build-out year without development);
- 2021 Base Conditions (Design year without development);
- 2021 Projected Conditions (Design year without development).

In addition, capacity analyses were conducted at the proposed site driveway intersections under the projected conditions. The capacity analysis worksheets are included in **Appendix G**. The PennDOT-approved signal plans are included in **Appendix H**.

It should be noted that based on methodologies contained in Chapter 10 of PennDOT's Publication 46, TPD adjusted the following 2010 HCM default values in the *Synchro 8* capacity analysis. These adjustments were made at the signalized intersections within the study area for all time periods based on the study area location being classified as Suburban:

- The Pennsylvania default values for signalized intersections in a suburban land use context contained in Chapter 10 of PennDOT's *Publication 46* were utilized for the base saturation flow rate (1800 pcphpl), start-up lost time (2.5 seconds), extension of effective green time (3.5 seconds) and number of left turn sneakers (2 vehicles).



- The Pennsylvania default values for two-way stop controlled intersections in a suburban land use context contained in Chapter 10 of PennDOT's *Publication 46* were utilized for the base critical headway and base follow-up headways.

PennDOT's Transportation Impact Study Guidelines outlined in Strike-Off Letter 470-09-4, dated February 12, 2009 contain the following criteria regarding levels of service:

- Page 29 of the Guidelines state that if evaluation of the With Development Horizon Year Scenario to the Without Development Horizon Year Scenario indicates that the overall intersection level of service has dropped, the applicant will be required to mitigate the level of service if the increase in overall intersection delay is greater than 10-seconds. If the overall intersection delay increase is less than or equal to 10-seconds, mitigation of the intersection will not be required.
- Page 29 of the Guidelines state that for mitigation scenarios, applicants are expected to mitigate the overall intersection LOS to the original Without Development LOS; the 10-second delay variance is not applied to mitigation scenarios. Applicants may be required to address available storage and queue lengths at critical movements or approaches even if the overall LOS requirements are met.
- Page 31 of the Guidelines state that if signalization is the preferred alternative for mitigation, overall intersection LOS C in rural areas and LOS D in urban areas is acceptable.
- Page 31 of the Guidelines states new signalized or unsignalized intersection established to serve as access to the development shall be designed to operate at minimum LOS C for rural areas, and minimum LOS D for urban areas.

LEVELS OF SERVICE IN THE STUDY AREA

Levels of service (LOS) at the study area intersections for the weekday A.M. and P.M. peak hours are summarized in **Table I** contained within the Executive Summary. As shown in **Table I**, with the site-related recommendations, all levels of service at the study area intersection comply with the requirements outlined in PennDOT's TIS Guidelines. ***It should be noted that, with the proposed improvements at the intersection of Route 322 and Lloyd Avenue/Proposed Site Driveway, SYNCHRO shows an improvement in the operations at the adjacent intersection of Route 322 and the EB Route 30 Ramps, as it assumes an improvement in progression on Route 322. Although TPD believes these improvements will cause improved operations at the EB Ramps, TPD feels that the results shown in Table I exaggerate the benefit of these improvements.***

Township LOS Standards

Caln Township Ordinances set forth LOS Standards that define LOS D, E, or F as deficient. These ordinances also request that all TIS document the improvements needed in order to achieve LOS C or better (ILOS and movement). The February 10, 2015 Township Review Letter has requested this documentation "for future long-term traffic improvement planning." Based on this investigation, the following improvements would be needed under 2021 Projected Conditions:



- Route 322 & Rock Raymond Road – Widen WB Route 322 to provide an additional through/right lane. Shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & Lloyd Avenue/Proposed Driveway – Widen WB Route 322 to provide an additional through/right lane in lieu of the proposed right-turn lane into the proposed site. Widen EB Route 322 to provide an additional through/right lane in lieu of the existing right-turn lane onto Lloyd Avenue. Shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & WB Route 30 Ramps – In addition to the roadway improvements assumed under base conditions of this TIS (Signalization and Restriping), shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & EB Route 30 Ramps – Provide signalization with shortened cycle lengths during the AM and PM peak hours of 75-80 seconds. Restripe the existing Route 322 cross-section to revert to two lanes in the EB and WB directions of Route 322 (shared EB thru/right and shared WB left/thru).

This list is being provided at the request of the Township, for informational purposes only.

Weave Analysis

TPD prepared a weave analysis utilizing HCM 2010 for the EB Route 30 Off Ramp movements and the SB Route 322 movements. This analysis assumed the off ramp at the existing location, as well as a second location further west as part of future development, closer to where the left-turn from the EB Route 30 Off Ramp accesses Route 322. This second condition assumes potential modification of the off ramp in the future. These analyses are also included in **Appendix G**.

95TH PERCENTILE QUEUE ANALYSIS

Queue analyses were conducted at the signalized study area intersection using *Synchro 8* software. For this analysis, the 95th percentile queue is defined as the queue length that is exceeded in 5% of the signal cycles. As an example, for a signal with a 90-second cycle, this means that the 95th percentile queue length will be exceeded during 2 of the 40 signal cycles that occur during the peak hour. The queue analysis results are summarized in **Table 11** for the analyzed peak hours.



TABLE 11
95TH PERCENTILE QUEUE ANALYSIS

Intersection	Lane Group	Storage Length		Weekday AM		Weekday PM	
		Existing	Proposed	2021 Base	2021 Projected ¹	2021 Base	2021 Projected ¹
Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)	EBL	145	150 ²	115	160	93	110
	EBT	[578]		<25	38	<25	<25
	WBTR	--		300	315	715	758
	SBL	165		305	340	83	113
	SBR	[435]		255	280	190	213
Route 322 (S.R. 0322) & Lloyd Avenue/ Proposed Site Driveway	EBL	--	(175)	--	55	--	53
	EBT	[250]		1335	1065	513	468
	EBR	[250]		60	55	235	228
	WBL	165	150 ²	118	103	93	90
	WBT	[578]		<25	<25	28	<25
	WBR	--	(150)	--	<25	--	<25
	NBL	-- (100)	--	1695	420	343	250
	NBT		(150)		345		65
	NBR						
	SBL	--	--	--	93	--	95
	SBT	--	--	--		--	
	SBR	--	--	--		--	
Route 322 (S.R. 0322) & EB Route 30 Ramps	WBL	[495]		65	78	<25	25
	NBL	--		105	38	245	93
	NBR	--		45	55	100	118
Route 322 (S.R. 0322) & WB Route 30 Ramps	EBL	75 ³		130	<25	33	33
	EBT	--		265	588	443	458
	WBT	[485]		118	118	678	713
	WBR						
	SBL	--		1305	298	550	573
	SBR	--		--	--	--	--
Rock Raymond Road (S.R. 4017) & Proposed Site Driveway	NBL	--	[435]	--	<25	--	<25
	EB		--	--	<25	--	<25

[--] = Distance to Adjacent Study Intersection

(--)= Proposed Stacking

1 = With Site-Related Recommendations

2 = With Improvements a TWCLTL will be provided, A Total of 578' will be available between these two movements

3 = 75' Based on the Concept Plan. However, this lane is a TWCLTL that continues on to provide 500+'

Queue analysis worksheets are included with the capacity analysis worksheets provided in **Appendix G**.

AUXILIARY TURN LANE ANALYSIS

Methodology

TPD evaluated auxiliary turn lane warrants in the study area. The warrant analysis was conducted according to the methodologies contained in Chapter 11 of PennDOT's *Publication 46* and Strike-Off Letter 470-08-07.

Findings

Table 12 summarizes the results of the auxiliary turn lane analysis.

TABLE 12
AUXILIARY TURN LANE ANALYSIS SUMMARY

Intersection	Auxiliary Lane	Warrant Satisfied?	Required Lane Length	Proposed Lane Length
Route 322 & Lloyd Avenue/ Proposed Site Driveway	EB Left-Turn Lane	Yes	175'	175'
	WB Right-Turn Lane	Yes	150'	150'
	NB Right-Turn Lane	Not Evaluated	--	150'
Rock Raymond Road & Proposed Site Driveway	SB Right-Turn Lane	No	--	--
	NB Left-Turn Lane	No	--	--

Auxiliary turn lane warrant worksheets are included in **Appendix I**. In addition, contained within **Appendix J** is a concept plan outlining the proposed roadway improvements discussed above.

RECOMMENDATIONS

TPD has made the following recommendations in relation to the proposed development in Caln Township:

Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)

- Optimize signal timings.
- Work with Caln Township and PennDOT to provide adequate ADA facilities where applicable.

Route 322 (S.R. 0322) & Lloyd Avenue/Proposed Site Driveway

- Provide a 175-foot long left-turn lane on eastbound Route 322 (S.R. 0322).
- Provide a 150-foot long right-turn lane on westbound Route 322 (S.R. 0322).
- Provide a 150-foot long right-turn lane on northbound Lloyd Avenue.
- Provide adequate turning radii in order to optimize ingress/egress.



- Optimize signal timings.
- Work with Caln Township and PennDOT to provide adequate ADA facilities where applicable.
- Widen along Route 322 (S.R. 0322) to connect the left-turn lanes at Lloyd Ave and Rock Raymond Road with a two-way center left turn lane (TWCLTL), in order to maximize available left-turn stacking at both intersections.

Rock Raymond Road (S.R. 4017) & Proposed Site Driveway

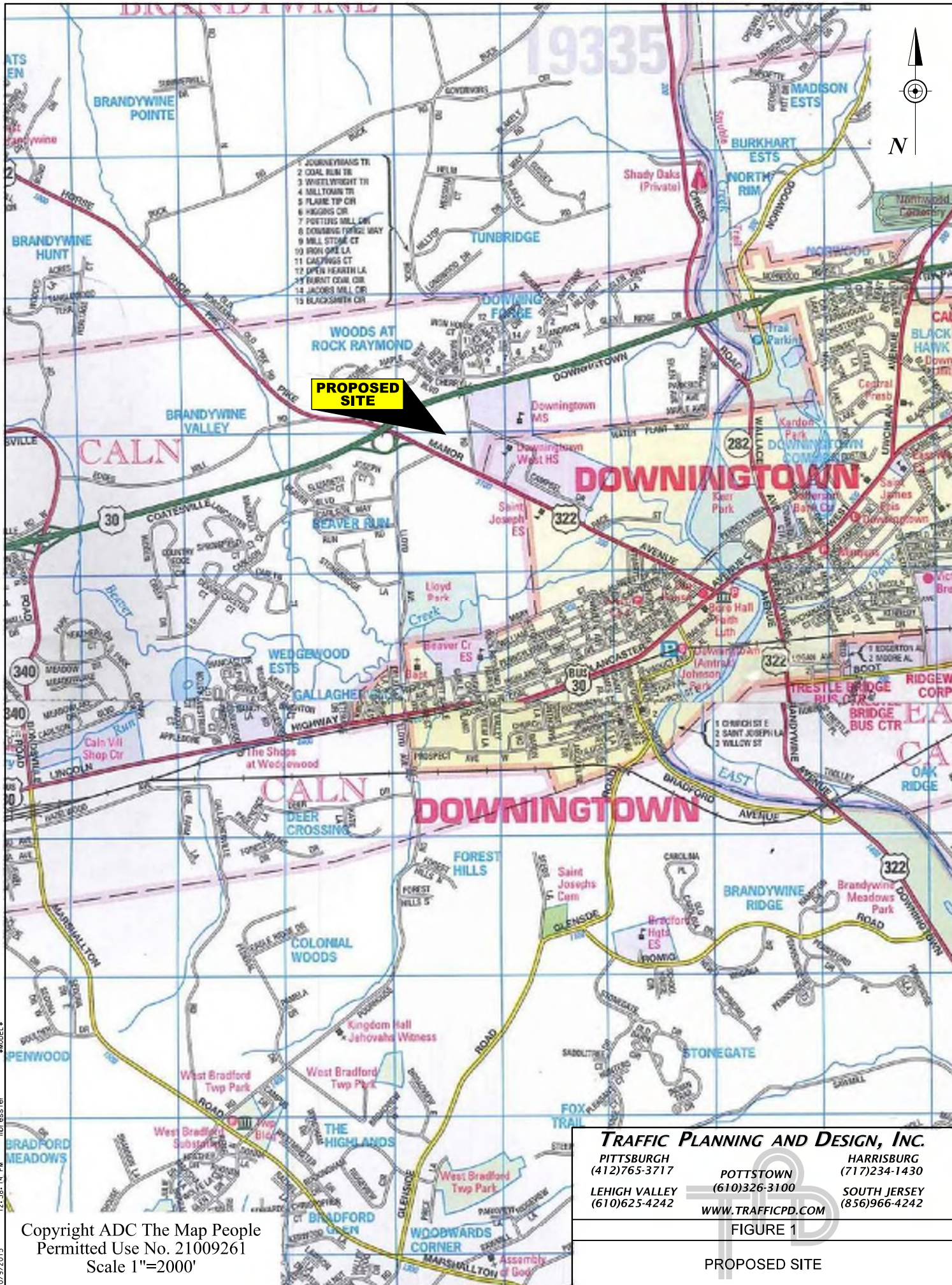
- Provide “STOP” signage on the eastbound driveway approach for vehicles exiting the proposed site.
- Provide “Do Not Block Intersection” signage along Rock Raymond Road for the proposed driveway.
- Provide adequate turning radii in order to optimize ingress/egress.
- Work with Caln Township, PennDOT, and Downingtown School District to provide adequate ADA facilities where applicable.

As part of PennDOT’s HOP process, the applicant will coordinate and fund the implementation of the recommended roadway improvements. Preliminary construction costs have not been determined at this time.

CONCLUSIONS

Based on the results of the transportation impact study, TPD offers the following conclusions:

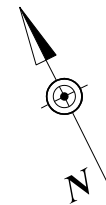
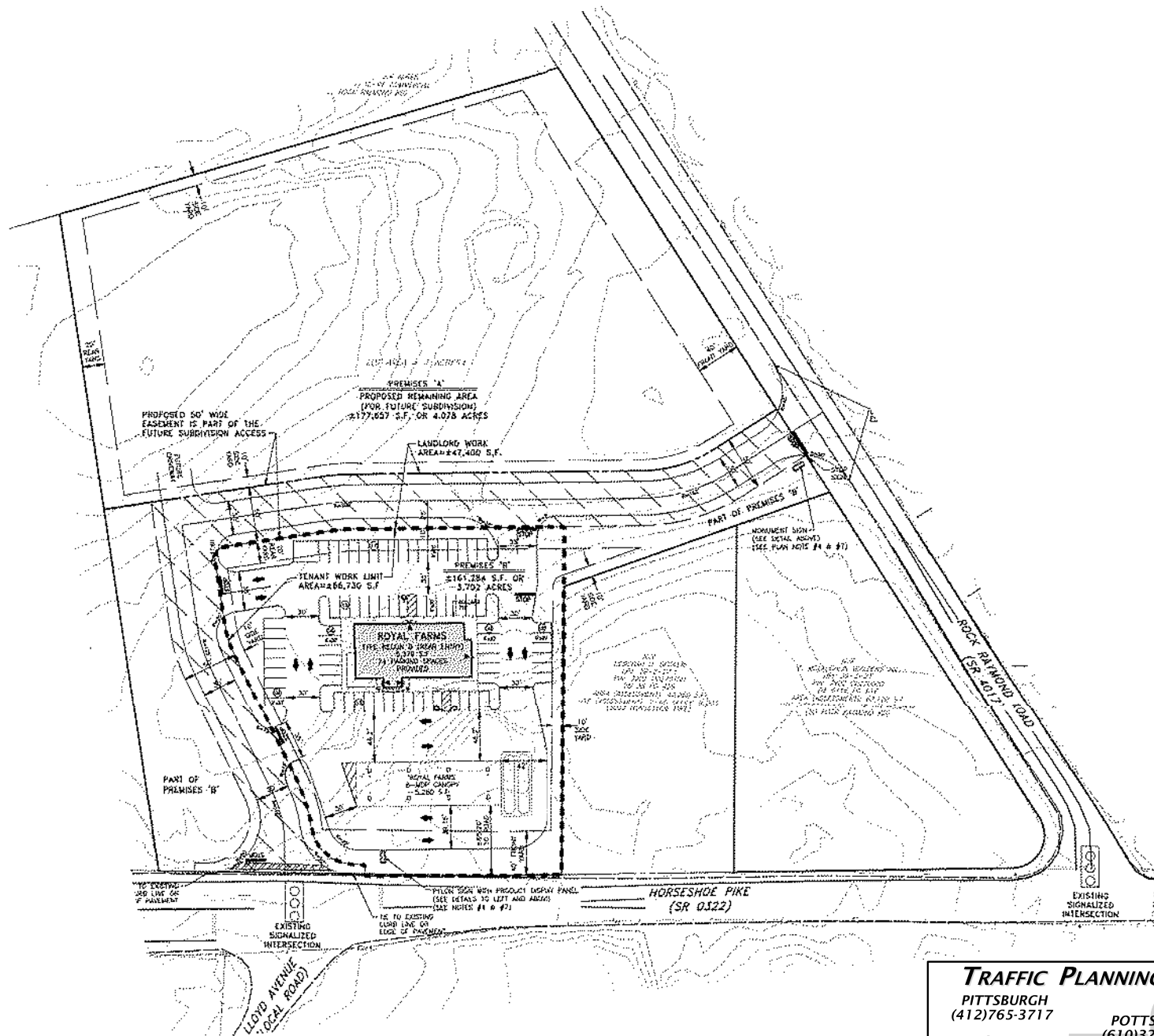
- The project site is located on the northwestern quadrant of the intersection of Route 322 (S.R. 0322) and Rock Raymond Road (S.R. 4017). The proposed site will consist of a 5,379 s.f. Royal Farms convenience market with sixteen (16) fueling positions.
- Access to the proposed site will be served by two (2) full-access driveway locations, as follows:
 - One (1) full-access driveway on the northern side of Route 322 (S.R. 0322), opposite Lloyd Avenue. This driveway will form the fourth leg of the existing signal with Lloyd Avenue.
 - One (1) full-access driveway on the western side of Rock Raymond Road (S.R. 4017), north of Route 322 (S.R. 0322).
- The measured sight distances at the proposed site driveways will satisfy all PennDOT’s sight distance requirements.
- The proposed development will generate approximately **99 new trips** during the weekday A.M. peak hour and **103 new trips** during the weekday P.M. peak hour.
- Under 2021 Projected Conditions, with the site-related recommendations, all levels of service at the study area intersection comply with the requirements outlined in PennDOT’s TIS Guidelines.



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 Scale 1"=2000'

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FIGURE 1		
PROPOSED SITE		



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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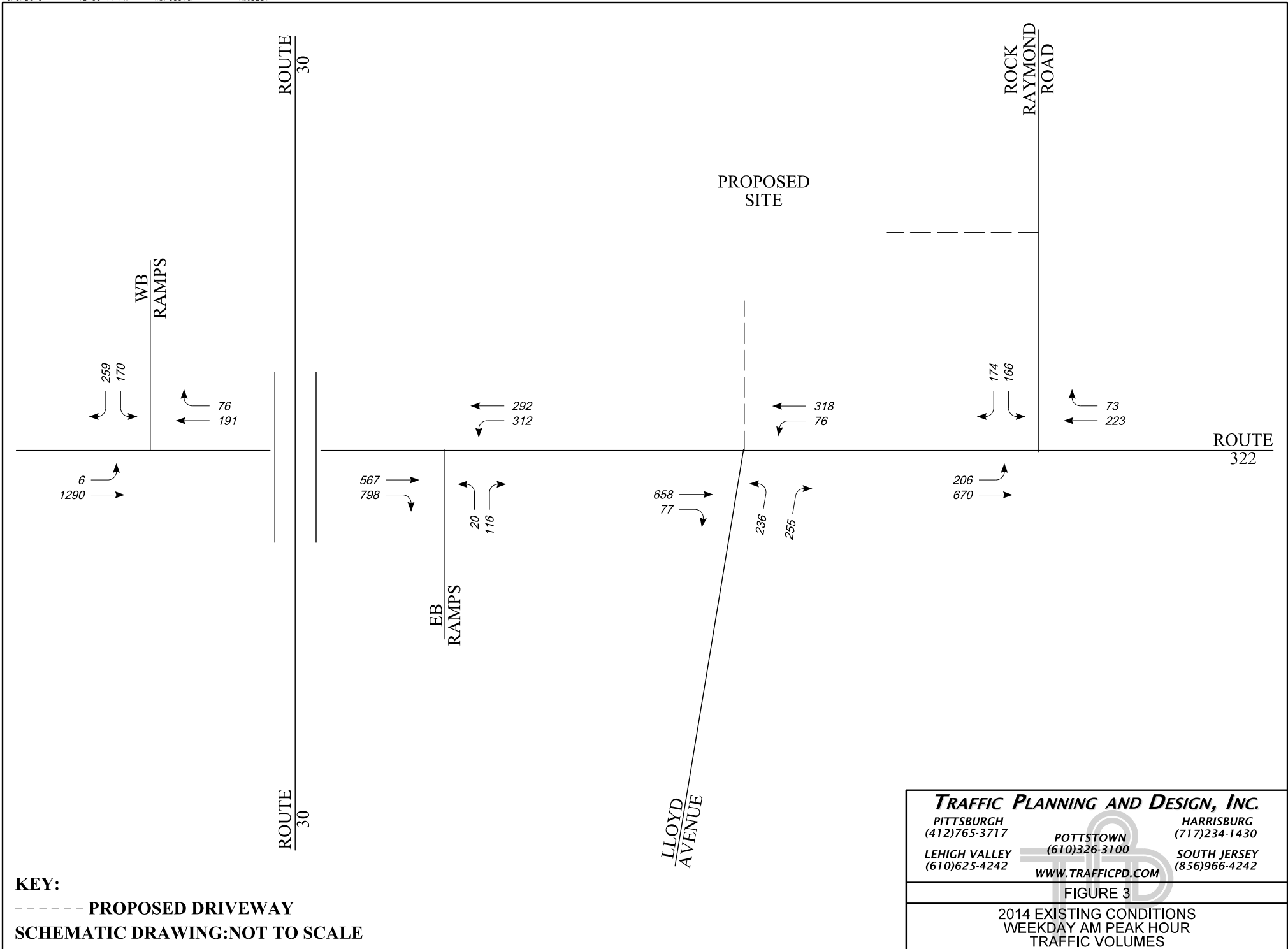
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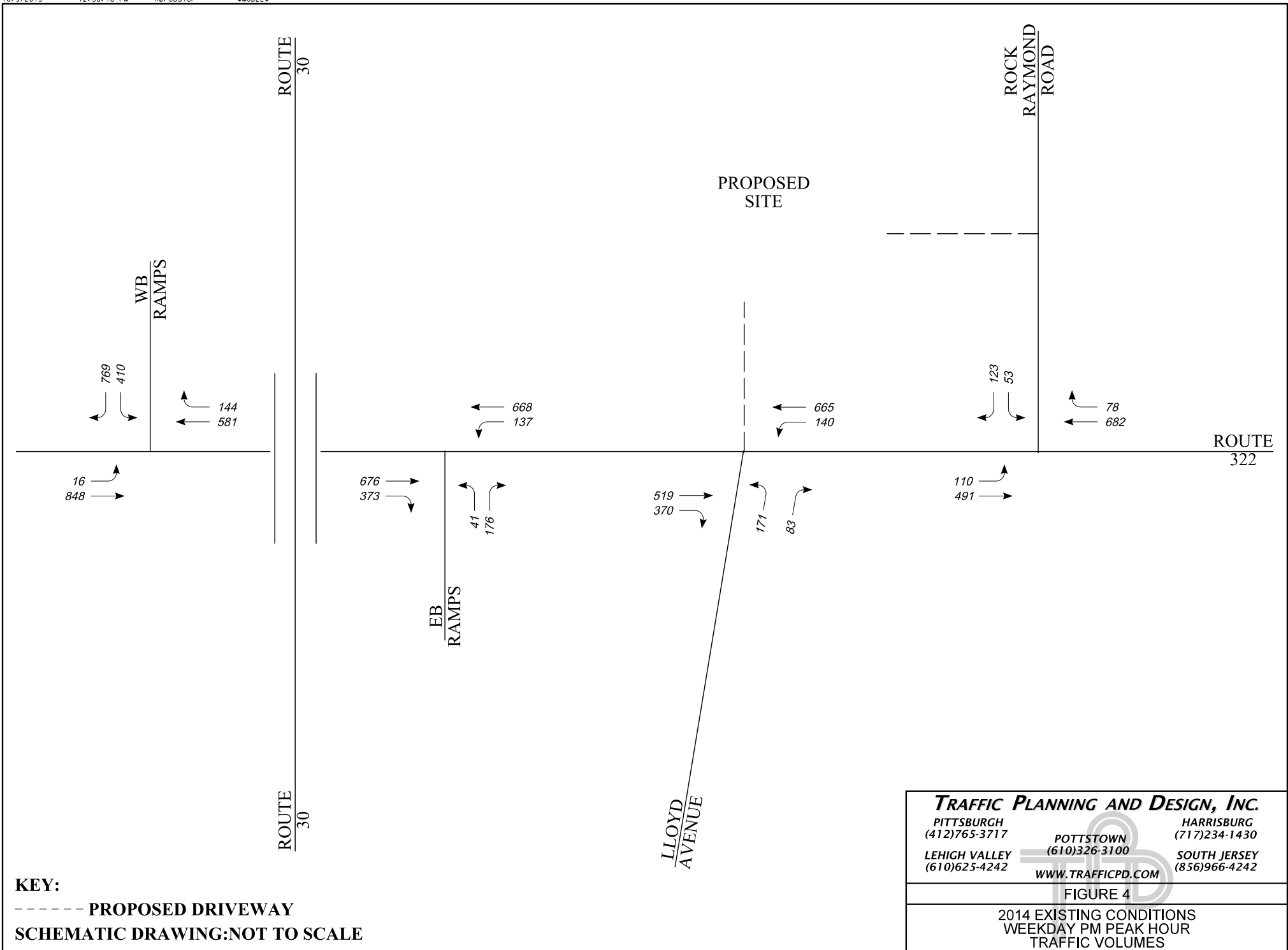
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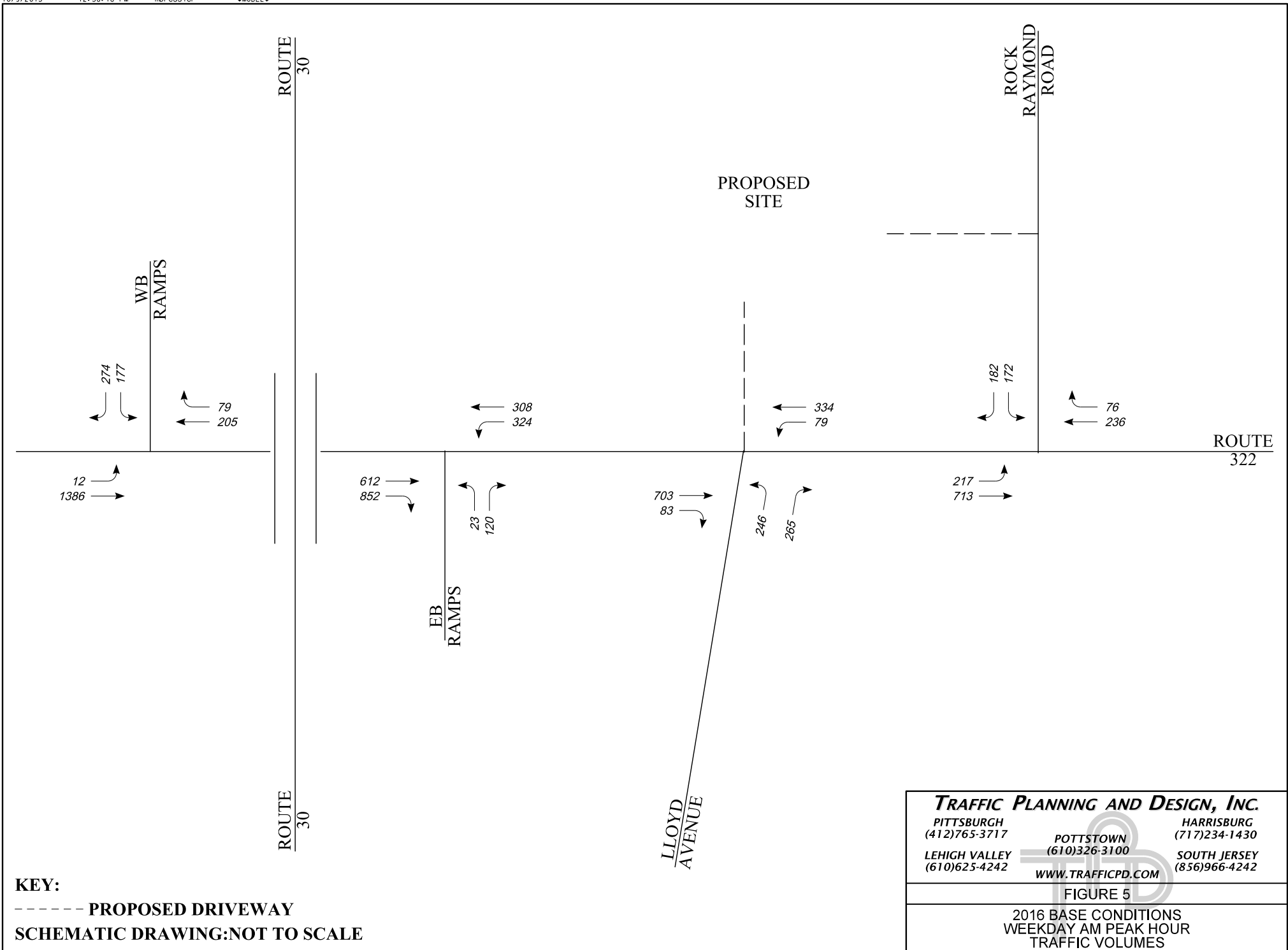
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FIGURE 2

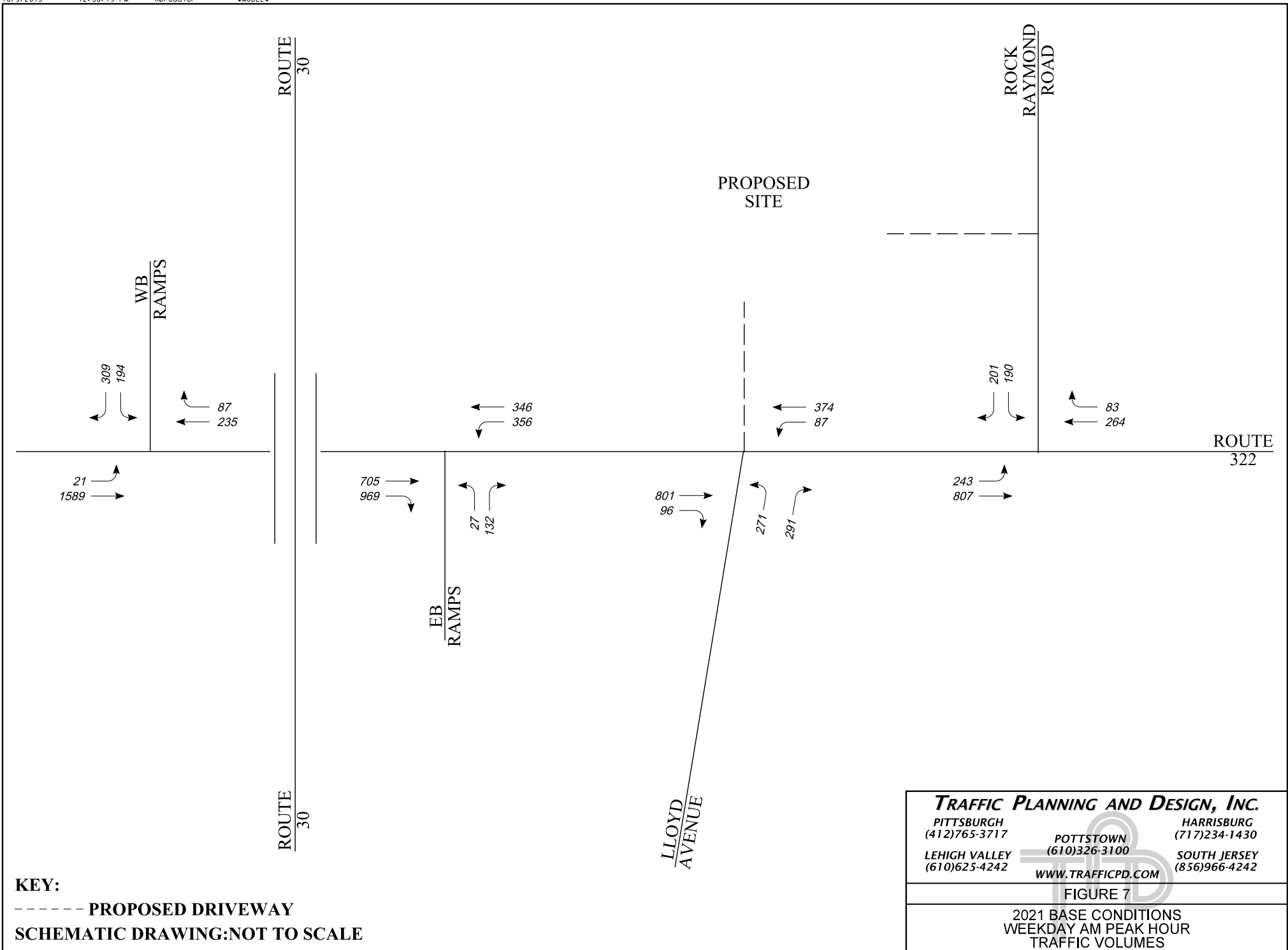
PROPOSED SITE PLAN







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FIGURE 5		
2016 BASE CONDITIONS WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES		



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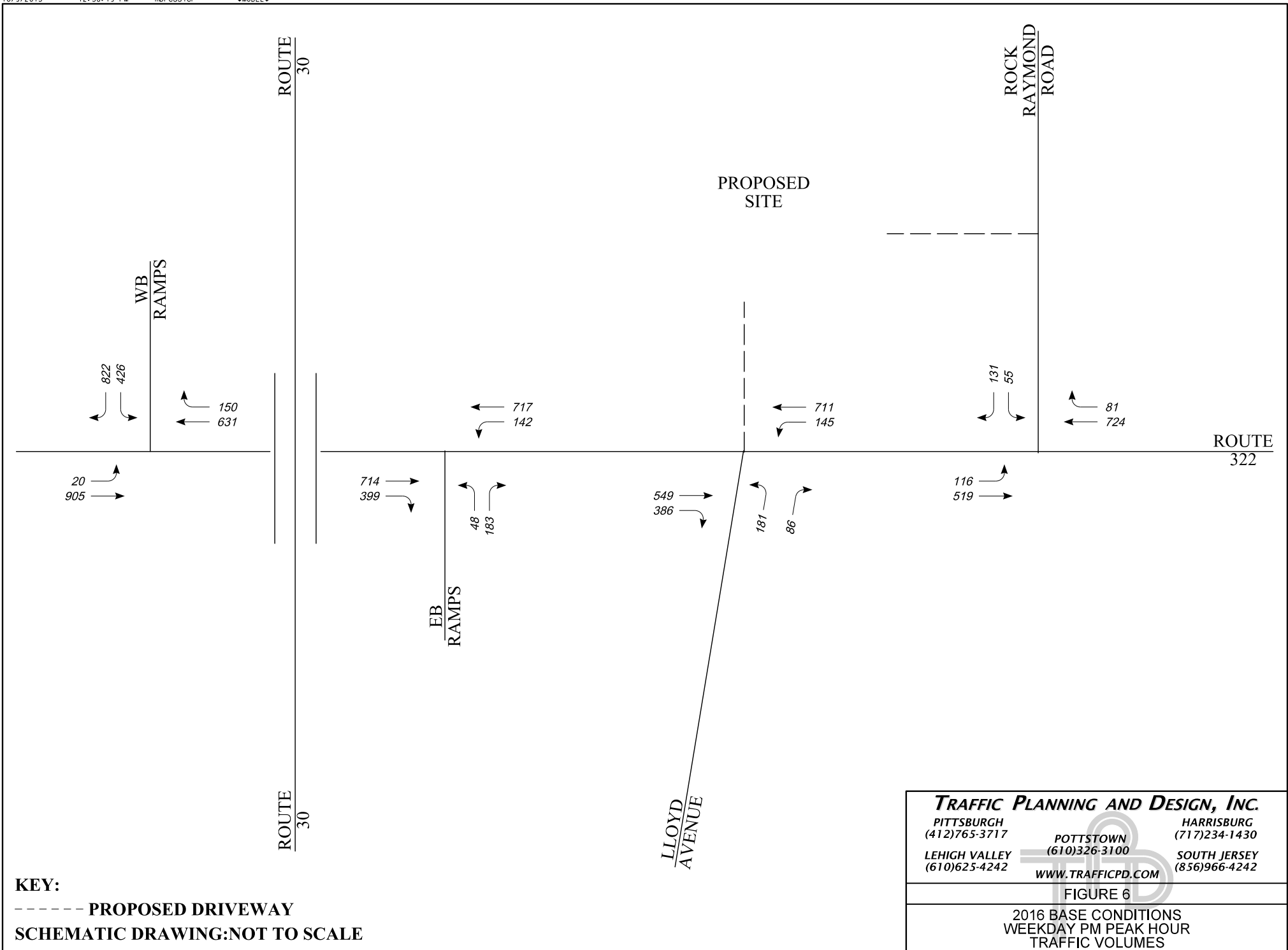
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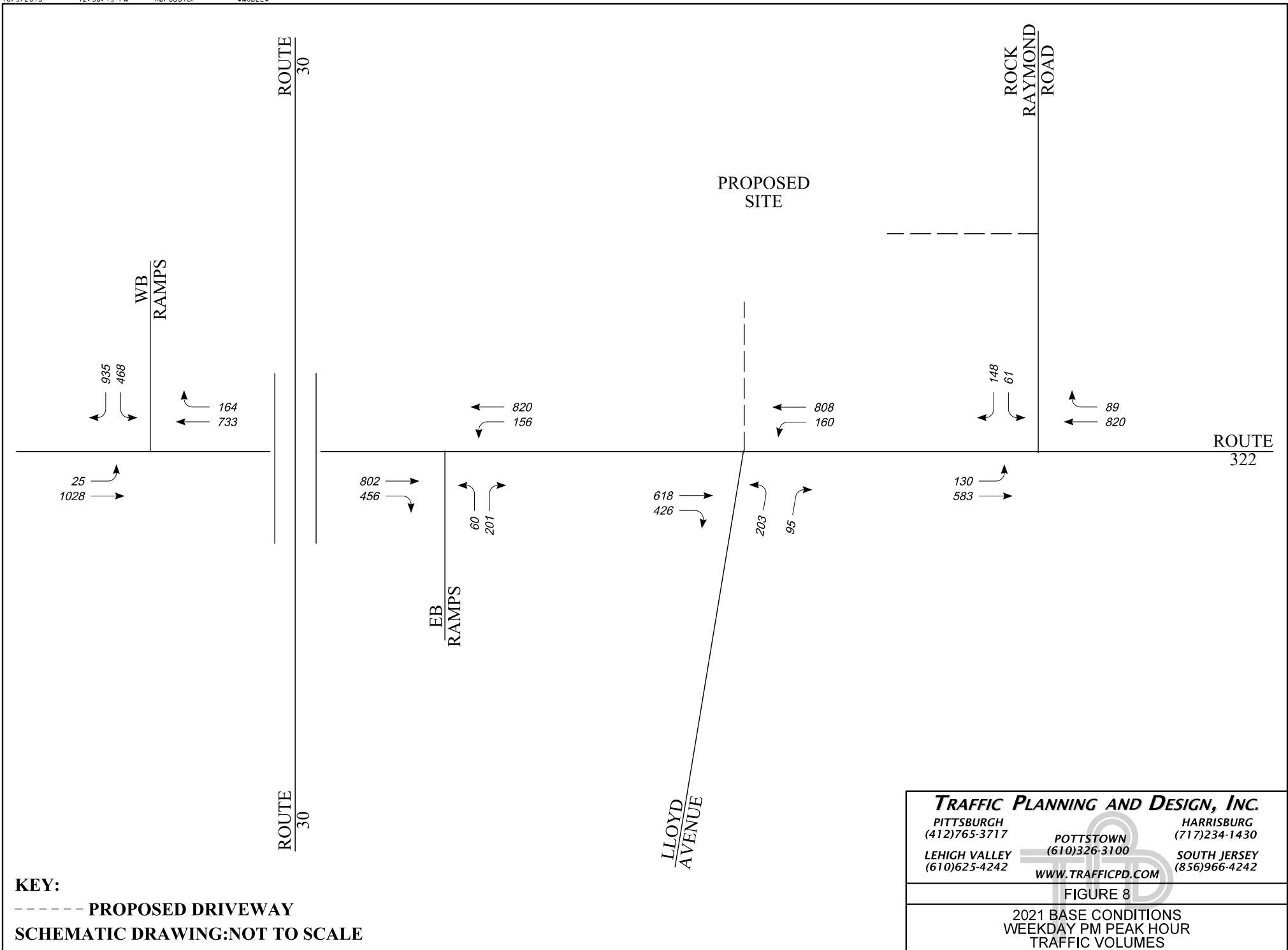
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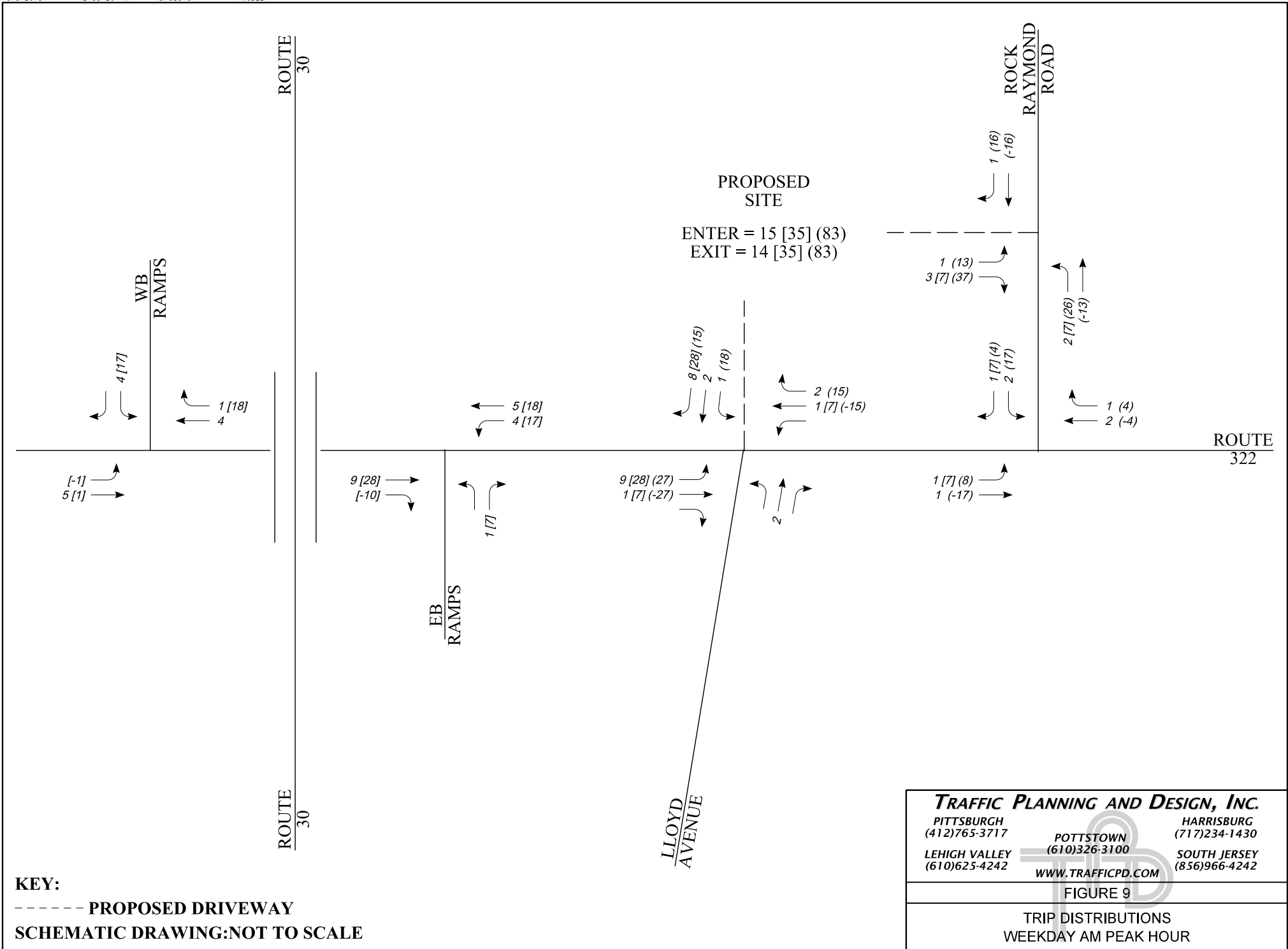
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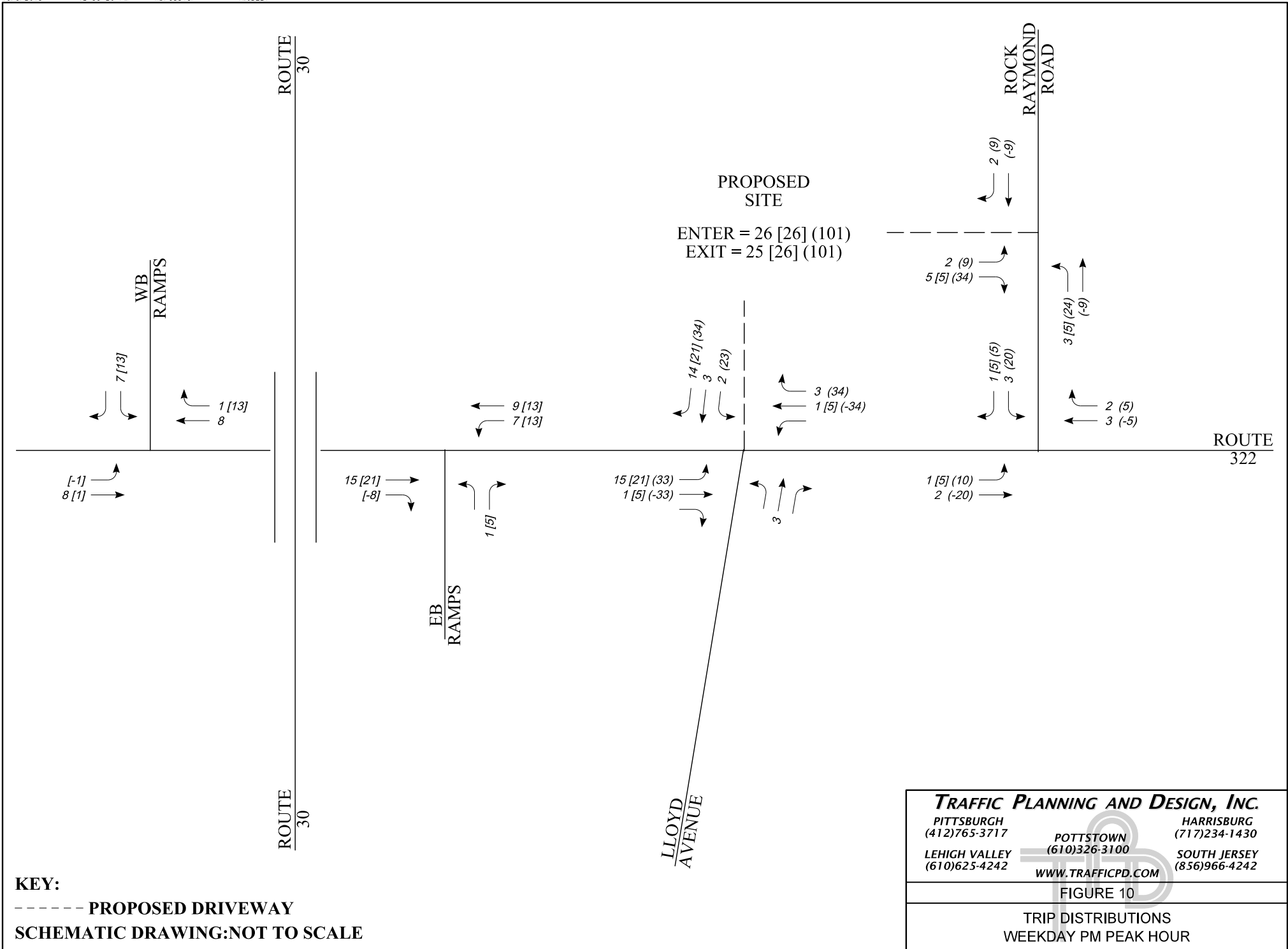
FIGURE 7

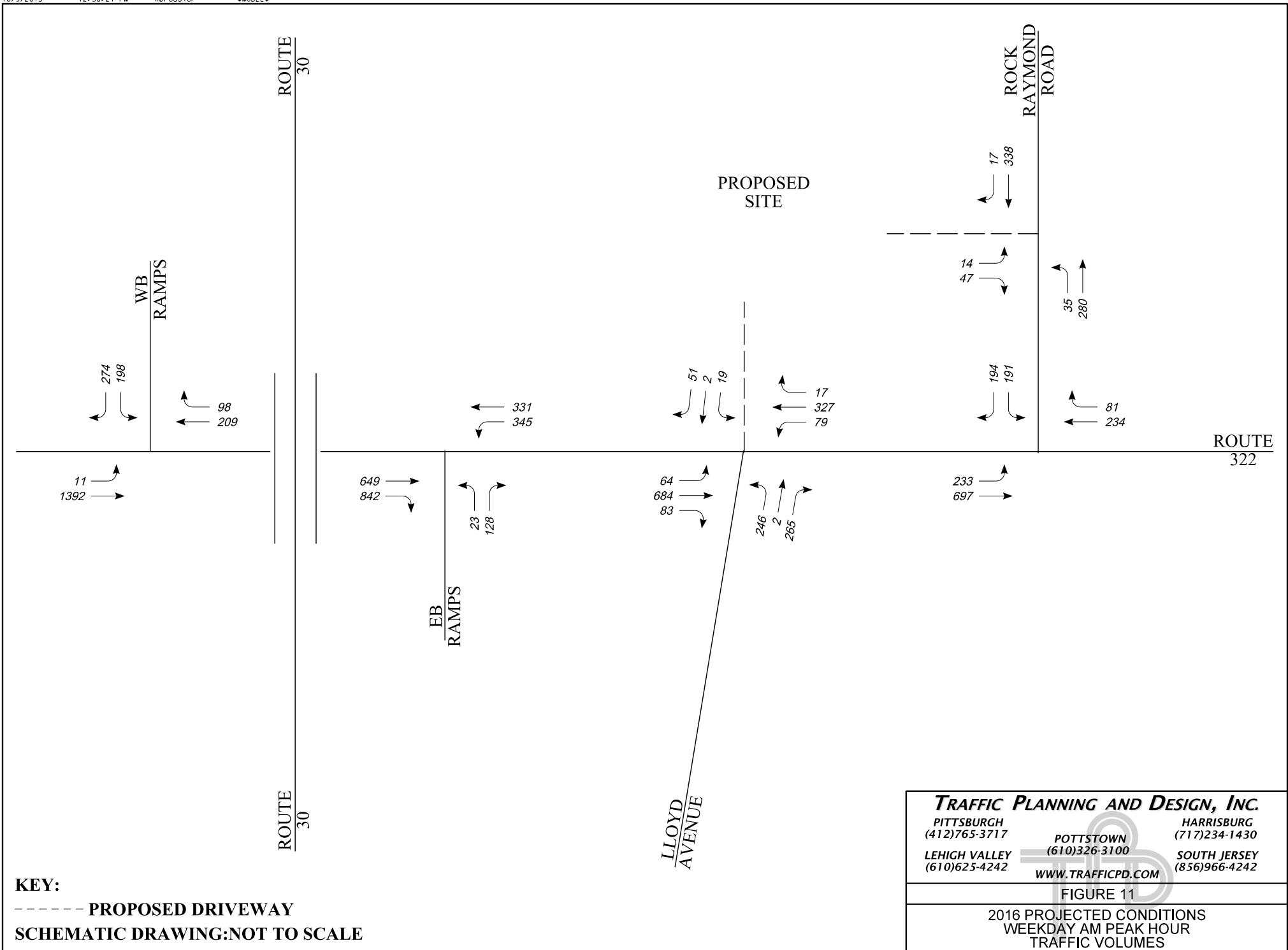
2021 BASE CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

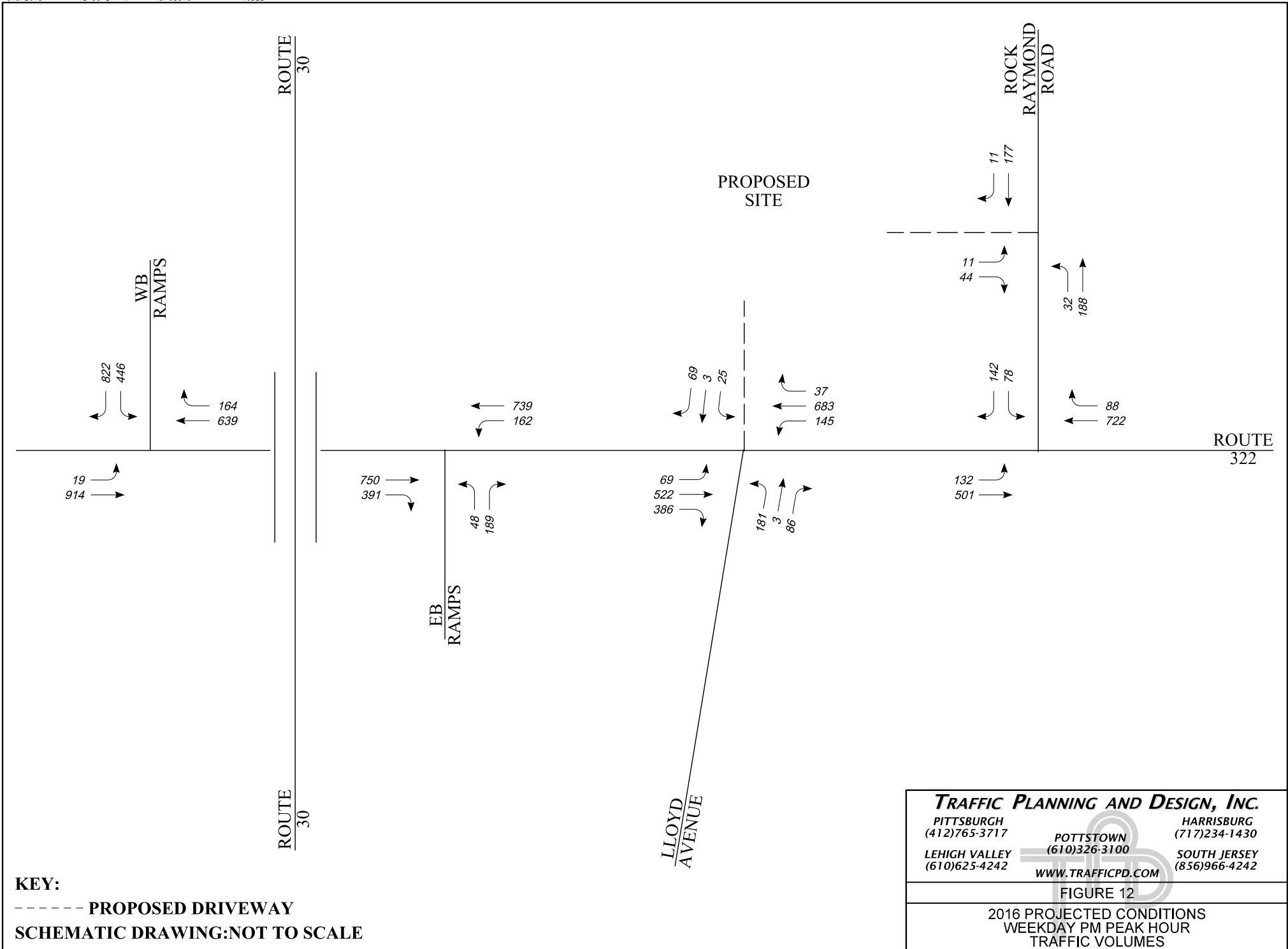


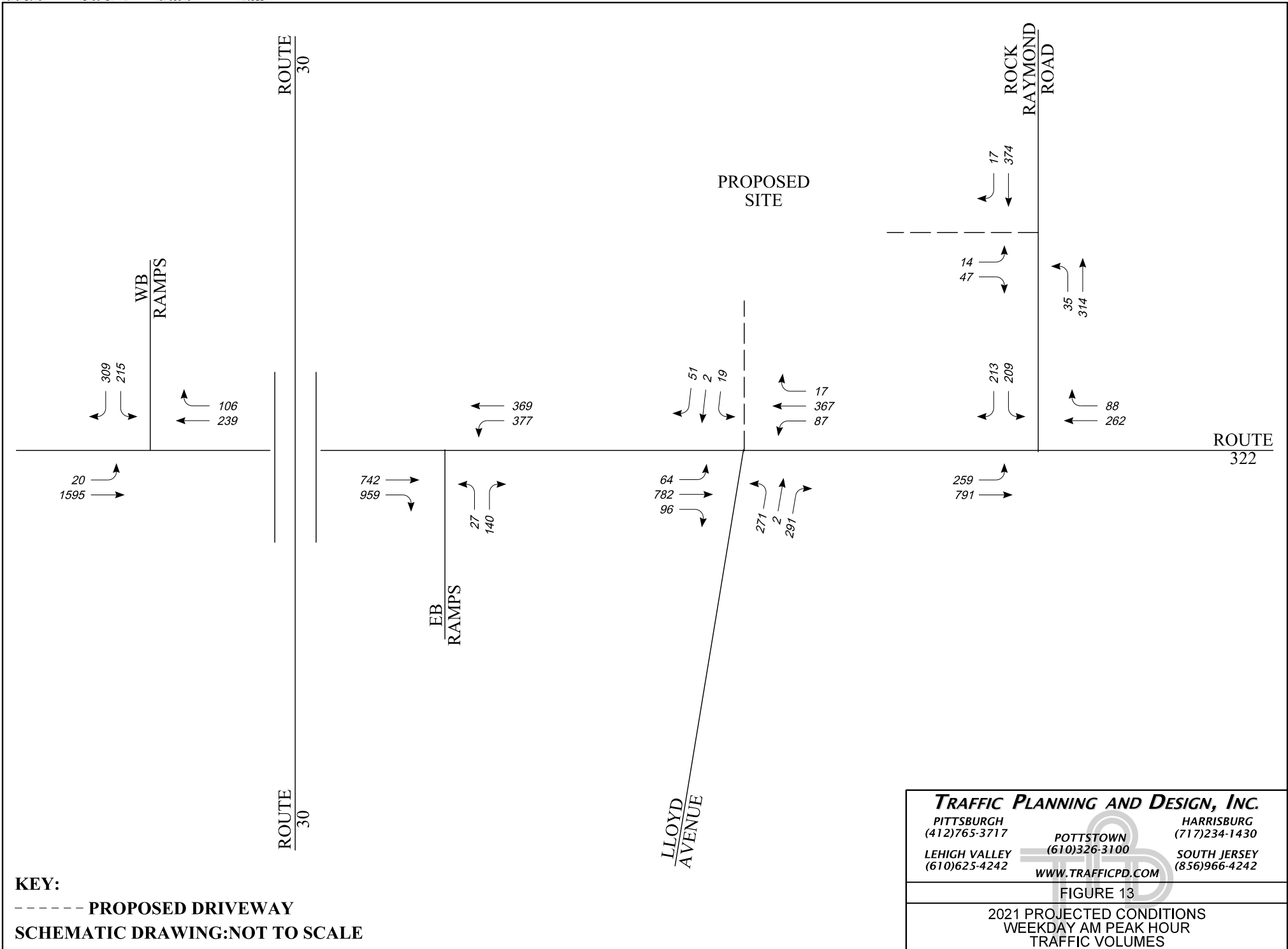


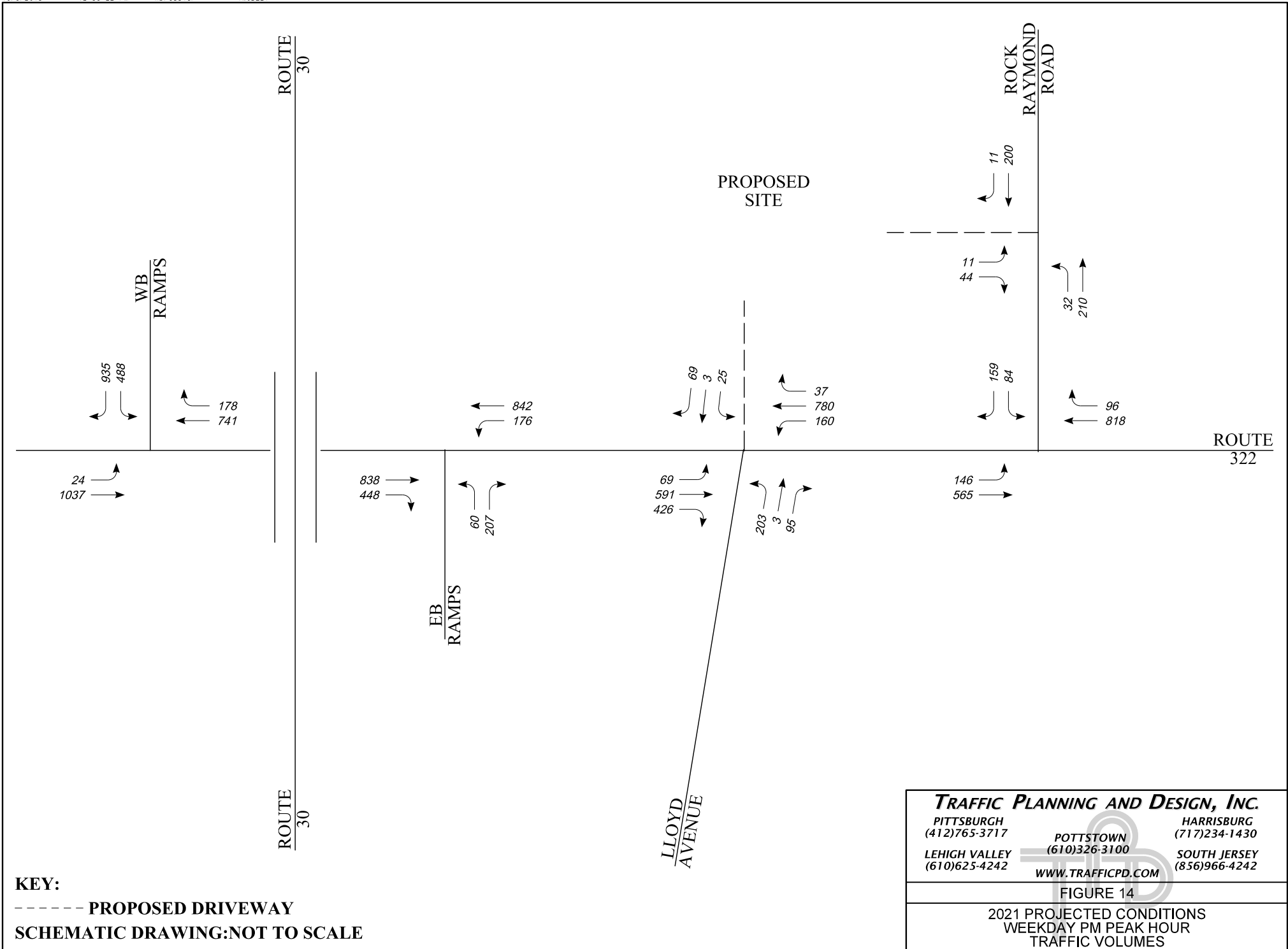












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FIGURE 14

2021 PROJECTED CONDITIONS
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

APPENDIX D

MANUAL TRAFFIC COUNT PRINTOUTS



Counter:: MIO
 Counted By:: JM/RK
 Weather:: Clear

Traffic Planning and Design, Inc
 2500 East High Street
 Suite 650
 Pottstown, Pennsylvania, United States 19464
 610.326.3100 mbressler@trafficpd.com

Count Name: Route 322 & Rock
 Raymond Road - AM & PM
 Site Code:
 Start Date: 09/03/2014
 Page No: 1

Turning Movement Data

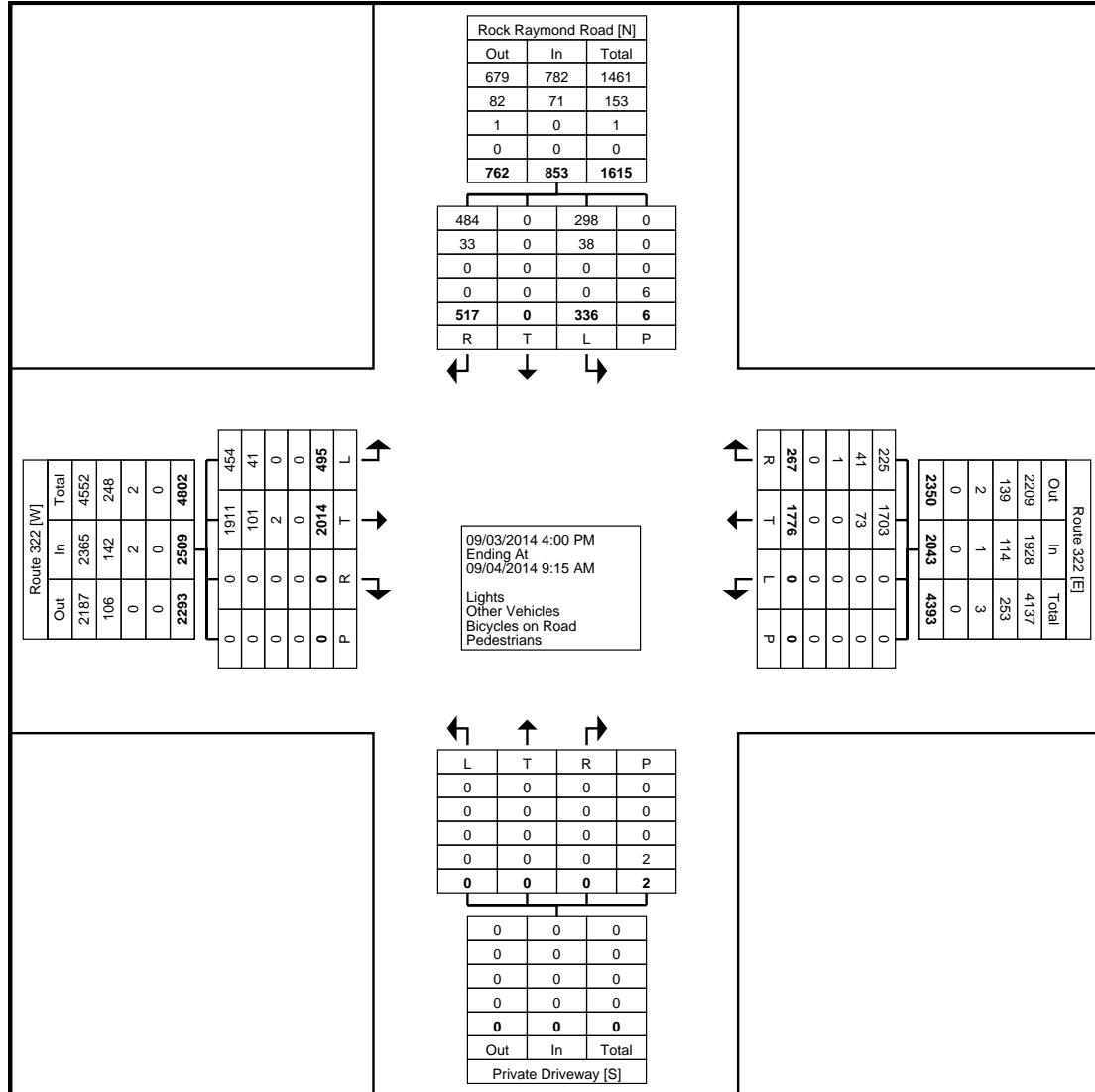
Start Time	Route 322 Eastbound					Route 322 Westbound					Private Driveway Northbound					Rock Raymond Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
4:00 PM	23	84	0	0	107	0	135	17	0	152	0	0	0	0	0	6	0	19	3	25	284
4:15 PM	49	93	0	0	142	0	138	30	0	168	0	0	0	0	0	8	0	24	0	32	342
4:30 PM	30	77	0	0	107	0	143	17	0	160	0	0	0	0	0	30	0	51	0	81	348
4:45 PM	27	95	0	0	122	0	166	20	0	186	0	0	0	0	0	16	0	33	0	49	357
Hourly Total	129	349	0	0	478	0	582	84	0	666	0	0	0	0	0	60	0	127	3	187	1331
5:00 PM	26	119	0	0	145	0	165	16	0	181	0	0	0	2	0	16	0	36	0	52	378
5:15 PM	35	112	0	0	147	0	158	23	0	181	0	0	0	0	0	19	0	39	0	58	386
5:30 PM	30	137	0	0	167	0	176	15	0	191	0	0	0	0	0	13	0	37	0	50	408
5:45 PM	19	123	0	0	142	0	183	24	0	207	0	0	0	0	0	5	0	11	0	16	365
Hourly Total	110	491	0	0	601	0	682	78	0	760	0	0	0	2	0	53	0	123	0	176	1537
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	74	185	0	0	259	0	27	14	0	41	0	0	0	0	0	58	0	36	1	94	394
7:15 AM	94	183	0	0	277	0	47	32	0	79	0	0	0	0	0	27	0	35	0	62	418
7:30 AM	28	136	0	0	164	0	93	18	0	111	0	0	0	0	0	62	0	76	0	138	413
7:45 AM	10	166	0	0	176	0	56	9	0	65	0	0	0	0	0	19	0	27	0	46	287
Hourly Total	206	670	0	0	876	0	223	73	0	296	0	0	0	0	0	166	0	174	1	340	1512
8:00 AM	10	165	0	0	175	0	90	2	0	92	0	0	0	0	0	9	0	26	0	35	302
8:15 AM	7	109	0	0	116	0	59	8	0	67	0	0	0	0	0	12	0	22	0	34	217
8:30 AM	11	107	0	0	118	0	60	6	0	66	0	0	0	0	0	13	0	19	2	32	216
8:45 AM	22	123	0	0	145	0	80	16	0	96	0	0	0	0	0	23	0	26	0	49	290
Hourly Total	50	504	0	0	554	0	289	32	0	321	0	0	0	0	0	57	0	93	2	150	1025
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	495	2014	0	0	2509	0	1776	267	0	2043	0	0	0	2	0	336	0	517	6	853	5405
Approach %	19.7	80.3	0.0	-	-	0.0	86.9	13.1	-	-	NaN	NaN	NaN	-	-	39.4	0.0	60.6	-	-	-
Total %	9.2	37.3	0.0	-	46.4	0.0	32.9	4.9	-	37.8	0.0	0.0	0.0	-	0.0	6.2	0.0	9.6	-	15.8	-
Lights	454	1911	0	-	2365	0	1703	225	-	1928	0	0	0	-	0	298	0	484	-	782	5075
% Lights	91.7	94.9	-	-	94.3	-	95.9	84.3	-	94.4	-	-	-	-	-	88.7	-	93.6	-	91.7	93.9
Other Vehicles	41	101	0	-	142	0	73	41	-	114	0	0	0	-	0	38	0	33	-	71	327
% Other Vehicles	8.3	5.0	-	-	5.7	-	4.1	15.4	-	5.6	-	-	-	-	-	11.3	-	6.4	-	8.3	6.0
Bicycles on Road	0	2	0	-	2	0	0	1	-	1	0	0	0	-	0	0	0	0	-	0	3
% Bicycles on Road	0.0	0.1	-	-	0.1	-	0.0	0.4	-	0.0	-	-	-	-	-	0.0	-	0.0	-	0.0	0.1
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-	-	-	6	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-



Counter:: MIO
Counted By:: JM/RK
Weather:: Clear

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Count Name: Route 322 & Rock
Raymond Road - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 2



Turning Movement Data Plot



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 Weather:: Clear

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Count Name: Route 322 & Rock
 Raymond Road - AM & PM
 Site Code:
 Start Date: 09/03/2014
 Page No: 3

Turning Movement Peak Hour Data (5:00 PM)

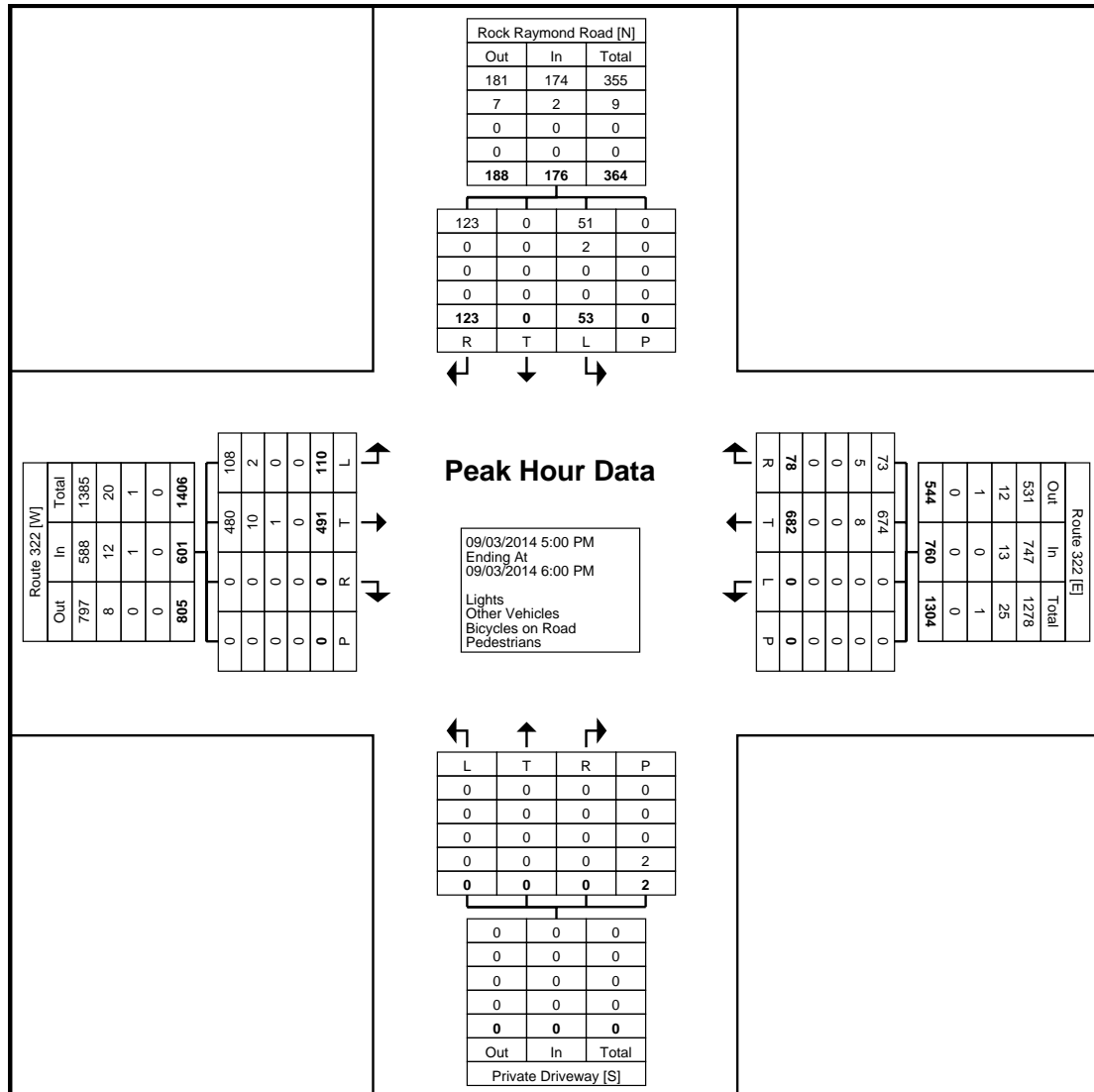
Start Time	Route 322 Eastbound					Route 322 Westbound					Private Driveway Northbound					Rock Raymond Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
5:00 PM	26	119	0	0	145	0	165	16	0	181	0	0	0	2	0	16	0	36	0	52	378
5:15 PM	35	112	0	0	147	0	158	23	0	181	0	0	0	0	0	19	0	39	0	58	386
5:30 PM	30	137	0	0	167	0	176	15	0	191	0	0	0	0	0	13	0	37	0	50	408
5:45 PM	19	123	0	0	142	0	183	24	0	207	0	0	0	0	0	5	0	11	0	16	365
Total	110	491	0	0	601	0	682	78	0	760	0	0	0	2	0	53	0	123	0	176	1537
Approach %	18.3	81.7	0.0	-	-	0.0	89.7	10.3	-	-	NaN	NaN	NaN	-	-	30.1	0.0	69.9	-	-	-
Total %	7.2	31.9	0.0	-	39.1	0.0	44.4	5.1	-	49.4	0.0	0.0	0.0	-	0.0	3.4	0.0	8.0	-	11.5	-
PHF	0.786	0.896	0.000	-	0.900	0.000	0.932	0.813	-	0.918	0.000	0.000	0.000	-	0.000	0.697	0.000	0.788	-	0.759	0.942
Lights	108	480	0	-	588	0	674	73	-	747	0	0	0	-	0	51	0	123	-	174	1509
% Lights	98.2	97.8	-	-	97.8	-	98.8	93.6	-	98.3	-	-	-	-	-	96.2	-	100.0	-	98.9	98.2
Other Vehicles	2	10	0	-	12	0	8	5	-	13	0	0	0	-	0	2	0	0	-	2	27
% Other Vehicles	1.8	2.0	-	-	2.0	-	1.2	6.4	-	1.7	-	-	-	-	-	3.8	-	0.0	-	1.1	1.8
Bicycles on Road	0	1	0	-	1	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.2	-	-	0.2	-	0.0	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0	-	0.0	0.1
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Route 322 & Rock
Raymond Road - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 4



Turning Movement Peak Hour Data Plot (5:00 PM)



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Count Name: Route 322 & Rock
 Raymond Road - AM & PM
 Site Code:
 Start Date: 09/03/2014
 Page No: 5

Turning Movement Peak Hour Data (7:00 AM)

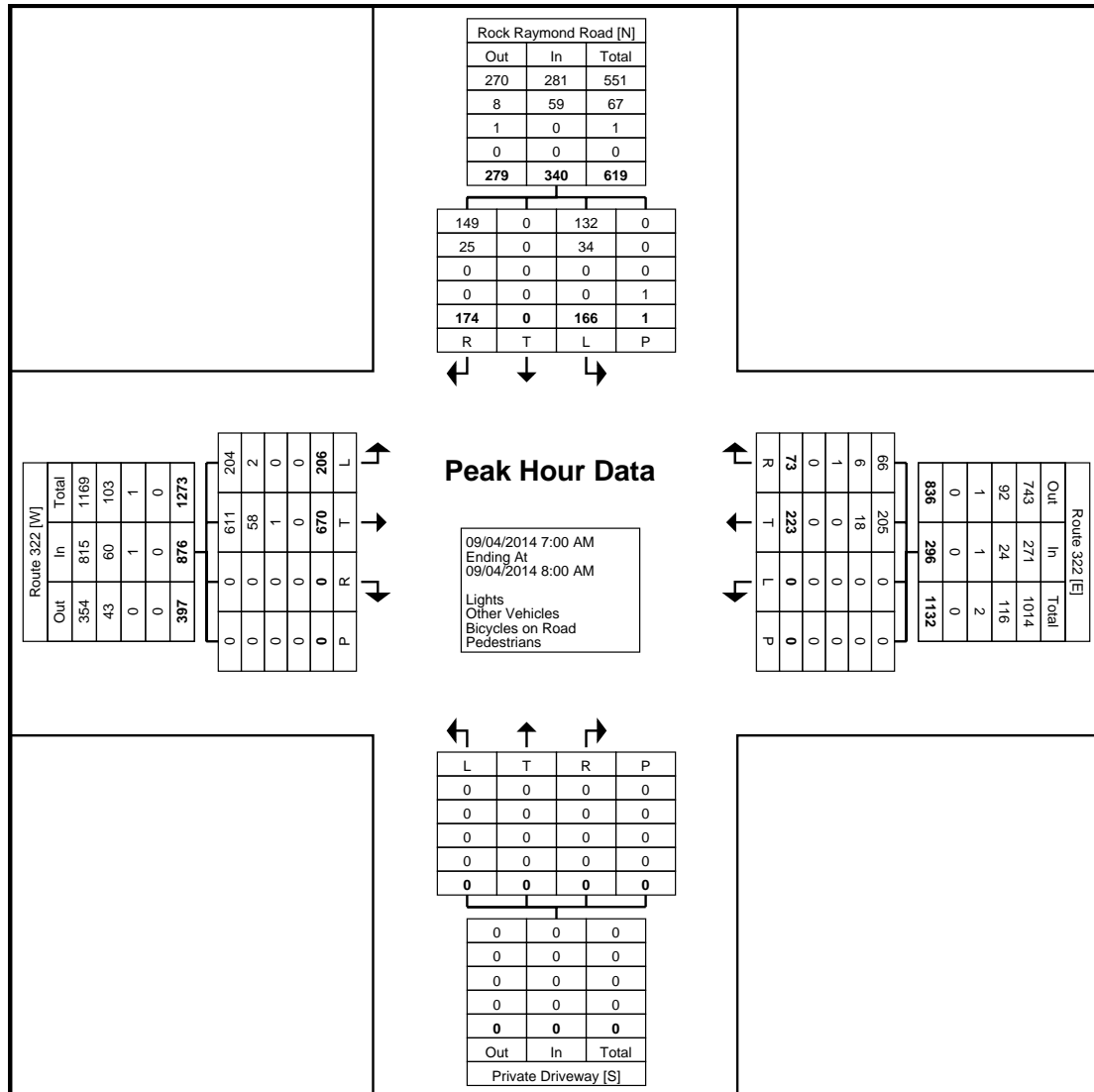
Start Time	Route 322 Eastbound					Route 322 Westbound					Private Driveway Northbound					Rock Raymond Road Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	74	185	0	0	259	0	27	14	0	41	0	0	0	0	0	58	0	36	1	94	394
7:15 AM	94	183	0	0	277	0	47	32	0	79	0	0	0	0	0	27	0	35	0	62	418
7:30 AM	28	136	0	0	164	0	93	18	0	111	0	0	0	0	0	62	0	76	0	138	413
7:45 AM	10	166	0	0	176	0	56	9	0	65	0	0	0	0	0	19	0	27	0	46	287
Total	206	670	0	0	876	0	223	73	0	296	0	0	0	0	0	166	0	174	1	340	1512
Approach %	23.5	76.5	0.0	-	-	0.0	75.3	24.7	-	-	NaN	NaN	NaN	-	-	48.8	0.0	51.2	-	-	-
Total %	13.6	44.3	0.0	-	57.9	0.0	14.7	4.8	-	19.6	0.0	0.0	0.0	-	0.0	11.0	0.0	11.5	-	22.5	-
PHF	0.548	0.905	0.000	-	0.791	0.000	0.599	0.570	-	0.667	0.000	0.000	0.000	-	0.000	0.669	0.000	0.572	-	0.616	0.904
Lights	204	611	0	-	815	0	205	66	-	271	0	0	0	-	0	132	0	149	-	281	1367
% Lights	99.0	91.2	-	-	93.0	-	91.9	90.4	-	91.6	-	-	-	-	-	79.5	-	85.6	-	82.6	90.4
Other Vehicles	2	58	0	-	60	0	18	6	-	24	0	0	0	-	0	34	0	25	-	59	143
% Other Vehicles	1.0	8.7	-	-	6.8	-	8.1	8.2	-	8.1	-	-	-	-	-	20.5	-	14.4	-	17.4	9.5
Bicycles on Road	0	1	0	-	1	0	0	1	-	1	0	0	0	-	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.1	-	-	0.1	-	0.0	1.4	-	0.3	-	-	-	-	-	0.0	-	0.0	-	0.0	0.1
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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Count Name: Route 322 & Rock
Raymond Road - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 6





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 Weather:: Clear

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Count Name: Route 322 & Lloyd
 Avenue - AM & PM
 Site Code:
 Start Date: 09/03/2014
 Page No: 1

Turning Movement Data

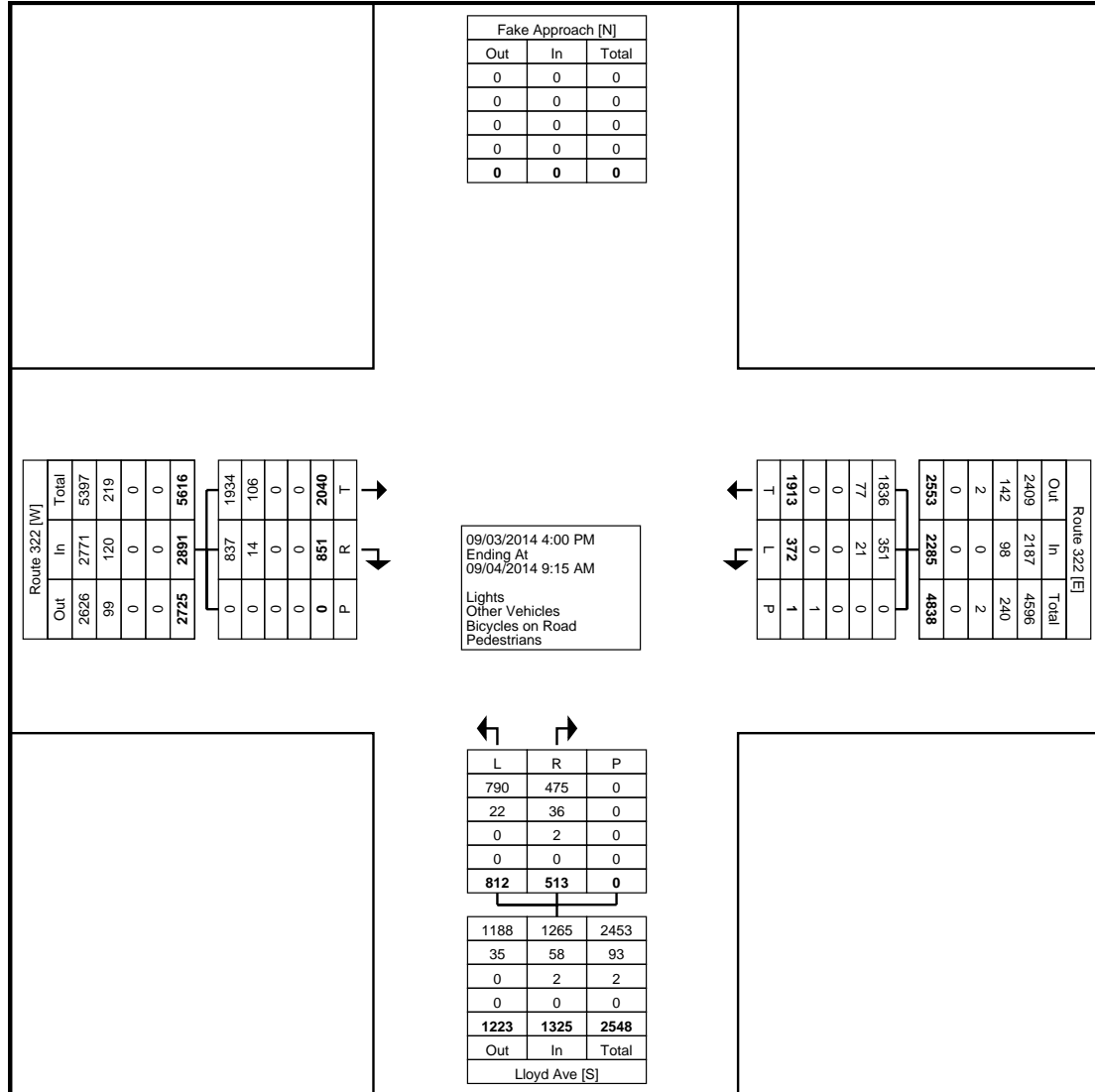
Start Time	Route 322 Eastbound				Route 322 Westbound				Lloyd Ave Northbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
4:00 PM	90	75	0	165	14	147	0	161	26	16	0	42	368
4:15 PM	117	67	0	184	28	140	0	168	55	24	0	79	431
4:30 PM	96	74	0	170	36	155	0	191	45	13	0	58	419
4:45 PM	99	73	0	172	33	159	0	192	41	25	0	66	430
Hourly Total	402	289	0	691	111	601	0	712	167	78	0	245	1648
5:00 PM	125	87	0	212	37	176	0	213	34	19	0	53	478
5:15 PM	140	96	0	236	31	157	0	188	45	22	0	67	491
5:30 PM	136	86	0	222	43	168	0	211	54	24	0	78	511
5:45 PM	118	101	0	219	29	164	0	193	38	18	0	56	468
Hourly Total	519	370	0	889	140	665	0	805	171	83	0	254	1948
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM	183	16	0	199	9	49	0	58	47	85	0	132	389
7:15 AM	170	14	0	184	22	51	0	73	61	106	0	167	424
7:30 AM	150	24	0	174	37	145	0	182	70	25	0	95	451
7:45 AM	155	23	0	178	8	73	0	81	58	39	0	97	356
Hourly Total	658	77	0	735	76	318	0	394	236	255	0	491	1620
8:00 AM	132	37	0	169	14	91	0	105	62	36	0	98	372
8:15 AM	108	28	0	136	11	78	0	89	61	13	0	74	299
8:30 AM	105	29	0	134	8	67	1	75	66	21	0	87	296
8:45 AM	116	21	0	137	12	93	0	105	49	27	0	76	318
Hourly Total	461	115	0	576	45	329	1	374	238	97	0	335	1285
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2040	851	0	2891	372	1913	1	2285	812	513	0	1325	6501
Approach %	70.6	29.4	-	-	16.3	83.7	-	-	61.3	38.7	-	-	-
Total %	31.4	13.1	-	44.5	5.7	29.4	-	35.1	12.5	7.9	-	20.4	-
Lights	1934	837	-	2771	351	1836	-	2187	790	475	-	1265	6223
% Lights	94.8	98.4	-	95.8	94.4	96.0	-	95.7	97.3	92.6	-	95.5	95.7
Other Vehicles	106	14	-	120	21	77	-	98	22	36	-	58	276
% Other Vehicles	5.2	1.6	-	4.2	5.6	4.0	-	4.3	2.7	7.0	-	4.4	4.2
Bicycles on Road	0	0	-	0	0	0	-	0	0	2	-	2	2
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.4	-	0.2	0.0
Pedestrians	-	-	0	-	-	-	1	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	100.0	-	-	-	-	-	-



Counter:: MIOVISION
Counted By:: JM/RK
Weather:: Clear

Traffic Planning and Design, Inc
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Count Name: Route 322 & Lloyd
Avenue - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 2



Turning Movement Data Plot



Counter:: MIOVISION
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Count Name: Route 322 & Lloyd
Avenue - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 3

Turning Movement Peak Hour Data (5:00 PM)

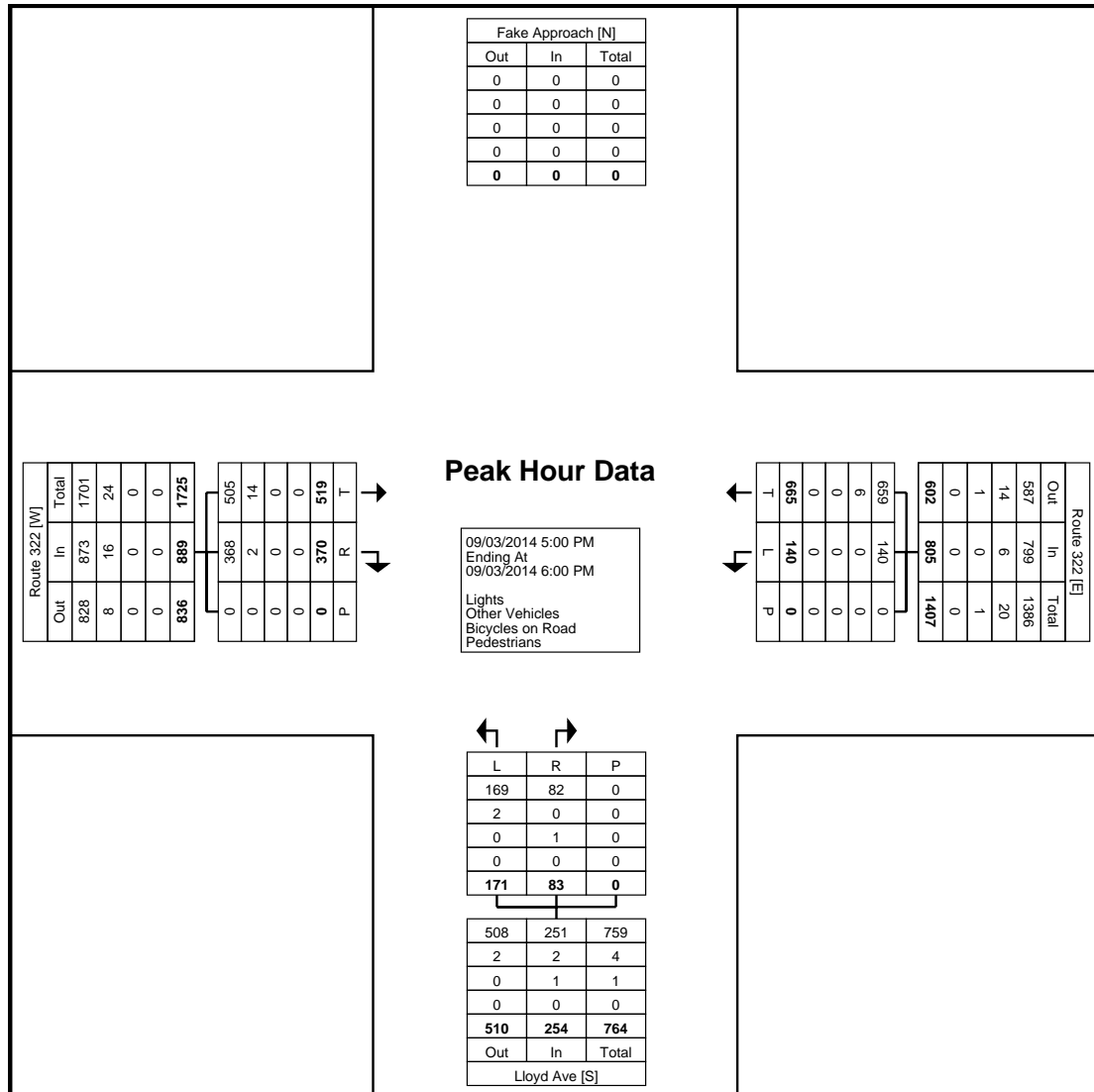
[illegible]



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Counter:: MIOVISION
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Count Name: Route 322 & Lloyd
Avenue - AM & PM
Site Code:
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Page No: 4



Turning Movement Peak Hour Data Plot (5:00 PM)



Counter:: MIOVISION
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Count Name: Route 322 & Lloyd
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Site Code:
Start Date: 09/03/2014
Page No: 5

Turning Movement Peak Hour Data (7:00 AM)

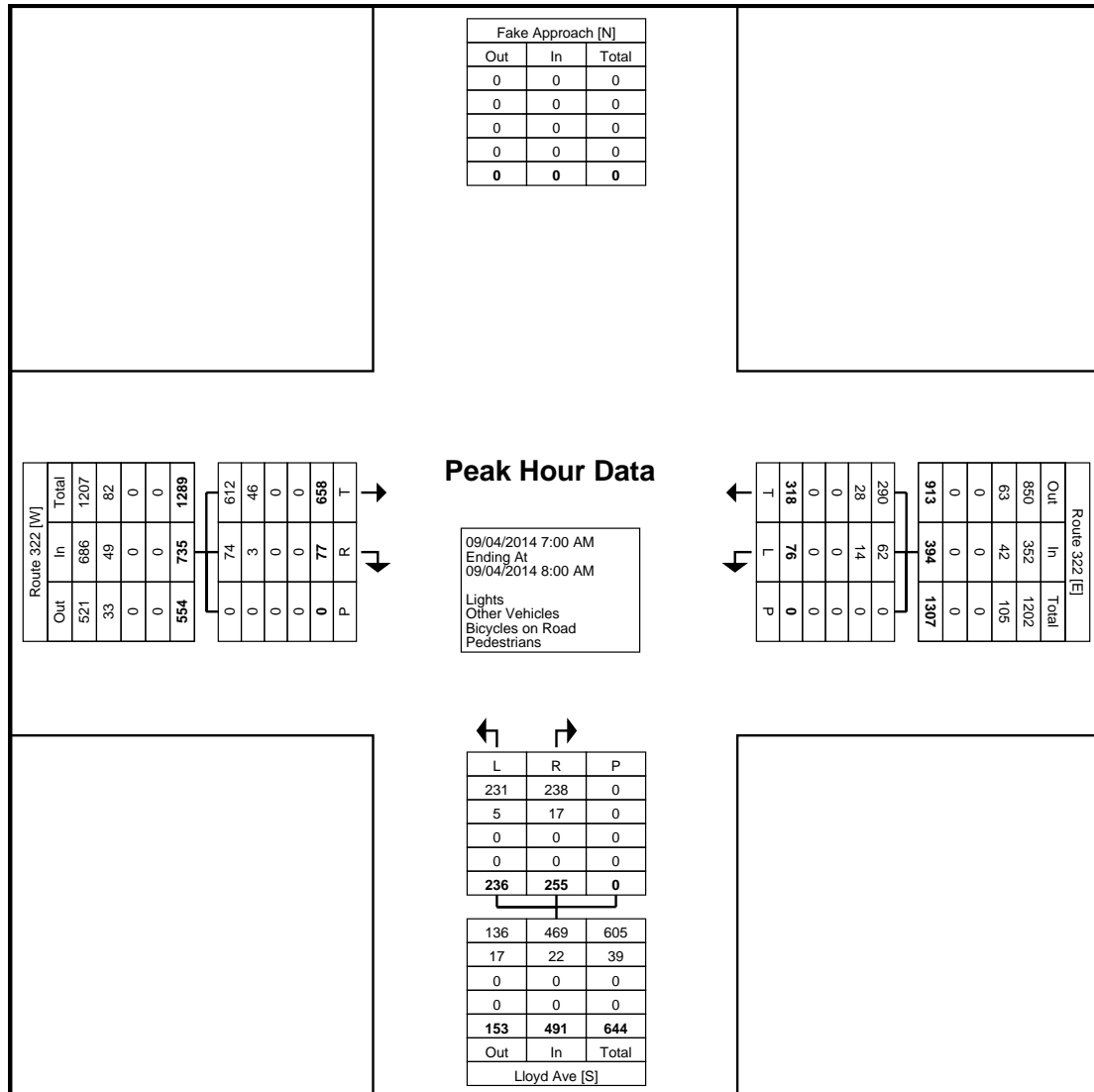
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Counter:: MIOVISION
Counted By:: JM/RK
Weather:: Clear

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Count Name: Route 322 & Lloyd
Avenue - AM & PM
Site Code:
Start Date: 09/03/2014
Page No: 6



Turning Movement Peak Hour Data Plot (7:00 AM)

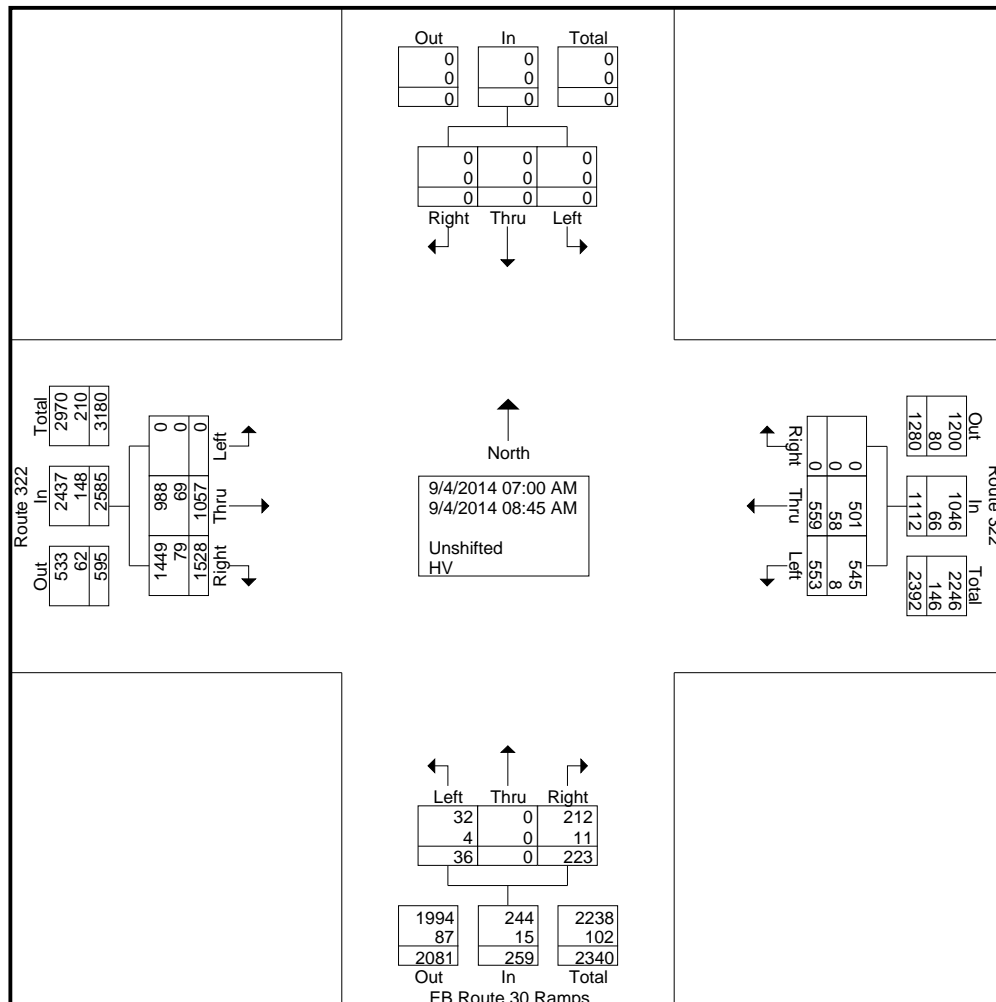
Route 322 & EB Route 30 Ramps
Caln Township, Chester County

Counter: 11
Counted by: R.Kearney
Weather: Clear

File Name : 2014-09-04 AM 322_EB Ramps
Site Code : 00000000
Start Date : 9/4/2014
Page No : 1

Groups Printed- Unshifted - HV

	Route 322 Eastbound					Route 322 Westbound					EB Route 30 Ramps Northbound					Southbound							
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	183	216	0	399	57	41	0	0	98	1	0	18	0	19	0	0	0	0	0	0	516	516
07:15 AM	0	159	175	0	334	49	42	0	0	91	4	0	27	0	31	0	0	0	0	0	0	456	456
07:30 AM	0	137	205	0	342	117	104	0	0	221	9	0	13	0	22	0	0	0	0	0	0	585	585
07:45 AM	0	127	229	0	356	81	71	0	0	152	5	0	31	0	36	0	0	0	0	0	0	544	544
Total	0	606	825	0	1431	304	258	0	0	562	19	0	89	0	108	0	0	0	0	0	0	2101	2101
08:00 AM	0	144	189	0	333	65	75	0	0	140	2	0	45	0	47	0	0	0	0	0	0	520	520
08:15 AM	0	97	169	0	266	67	73	0	0	140	4	0	27	0	31	0	0	0	0	0	0	437	437
08:30 AM	0	104	176	0	280	59	71	0	0	130	6	0	30	0	36	0	0	0	0	0	0	446	446
08:45 AM	0	106	169	0	275	58	82	0	0	140	5	0	32	0	37	0	0	0	0	0	0	452	452
Total	0	451	703	0	1154	249	301	0	0	550	17	0	134	0	151	0	0	0	0	0	0	1855	1855
Grand Total	0	1057	1528	0	2585	553	559	0	0	1112	36	0	223	0	259	0	0	0	0	0	0	3956	3956
Apprch %	0	40.9	59.1			49.7	50.3	0			13.9	0	86.1			0	0	0					
Total %	0	26.7	38.6		65.3	14	14.1	0		28.1	0.9	0	5.6		6.5	0	0	0			0	100	
Unshifted	0	988	1449		2437	545	501	0		1046	32	0	212		244	0	0	0			0	0	3727
% Unshifted	0	93.5	94.8	0	94.3	98.6	89.6	0	0	94.1	88.9	0	95.1	0	94.2	0	0	0	0	0	0	0	94.2
HV	0	69	79		148	8	58	0		66	4	0	11		15	0	0	0			0	0	229
% HV	0	6.5	5.2	0	5.7	1.4	10.4	0	0	5.9	11.1	0	4.9	0	5.8	0	0	0	0	0	0	0	5.8



Route 322 & EB Route 30 Ramps
Caln Township, Chester County

File Name : 2014-09-04 AM 322_EB Ramps

Site Code : 00000000

Start Date : 9/4/2014

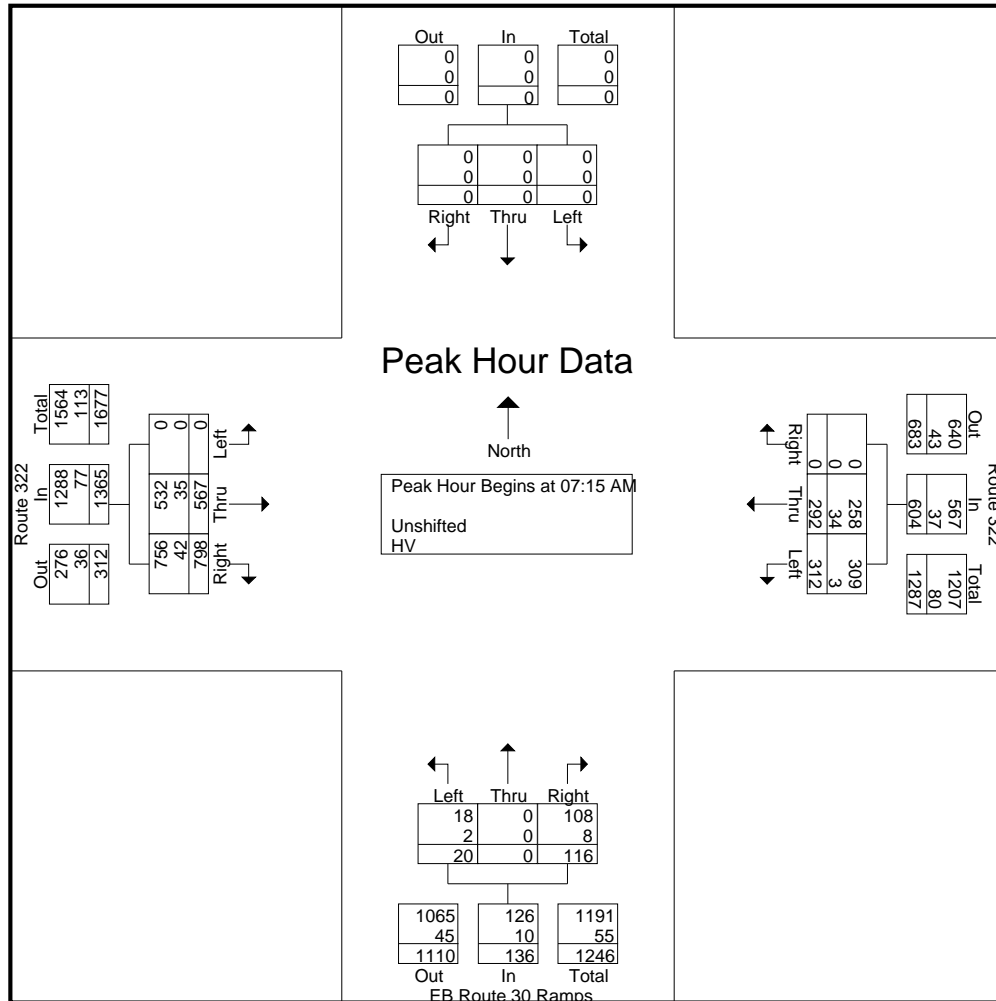
Page No : 2

	Route 322 Eastbound				Route 322 Westbound				EB Route 30 Ramps Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:15 AM

07:15 AM	0	159	175	334	49	42	0	91	4	0	27	31	0	0	0	0	456
07:30 AM	0	137	205	342	117	104	0	221	9	0	13	22	0	0	0	0	585
07:45 AM	0	127	229	356	81	71	0	152	5	0	31	36	0	0	0	0	544
08:00 AM	0	144	189	333	65	75	0	140	2	0	45	47	0	0	0	0	520
Total Volume	0	567	798	1365	312	292	0	604	20	0	116	136	0	0	0	0	2105
% App. Total	0	41.5	58.5		51.7	48.3	0		14.7	0	85.3		0	0	0		
PHF	.000	.892	.871	.959	.667	.702	.000	.683	.556	.000	.644	.723	.000	.000	.000	.000	.900
Unshifted	0	532	756	1288	309	258	0	567	18	0	108	126	0	0	0	0	1981
% Unshifted	0	93.8	94.7	94.4	99.0	88.4	0	93.9	90.0	0	93.1	92.6	0	0	0	0	94.1
HV	0	35	42	77	3	34	0	37	2	0	8	10	0	0	0	0	124
% HV	0	6.2	5.3	5.6	1.0	11.6	0	6.1	10.0	0	6.9	7.4	0	0	0	0	5.9



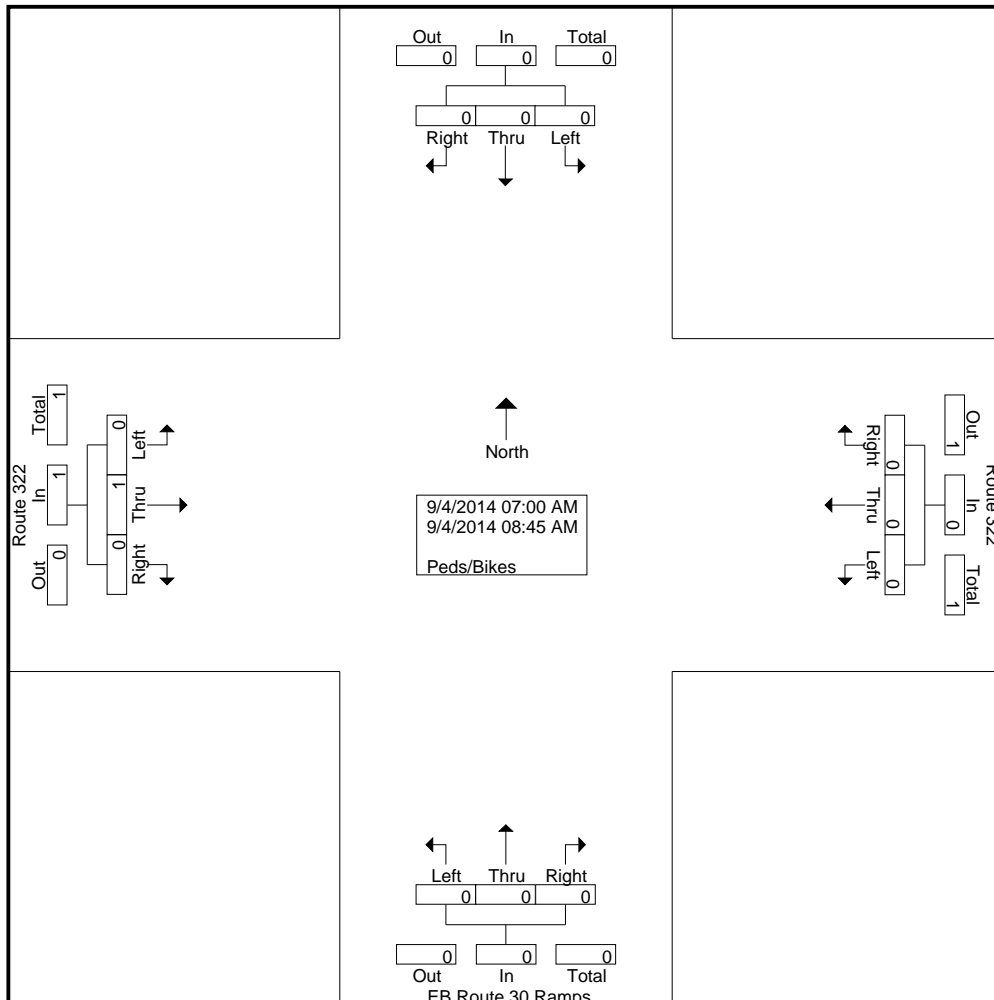
Route 322 & EB Route 30 Ramps
Caln Township, Chester County

Counter: 11
Counted by: R.Kearney
Weather: Clear

File Name : 2014-09-04 AM 322_EB Ramps
Site Code : 00000000
Start Date : 9/4/2014
Page No : 1

Groups Printed- Peds/Bikes

Start Time	Route 322 Eastbound					Route 322 Westbound					EB Route 30 Ramps Northbound					Southbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	Peds	App. Total			
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Apprch %	0	100	0			0	0	0			0	0	0			0	0	0			0		
Total %	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0			0	100	



Route 322 & EB Route 30 Ramps
Caln Township, Chester County

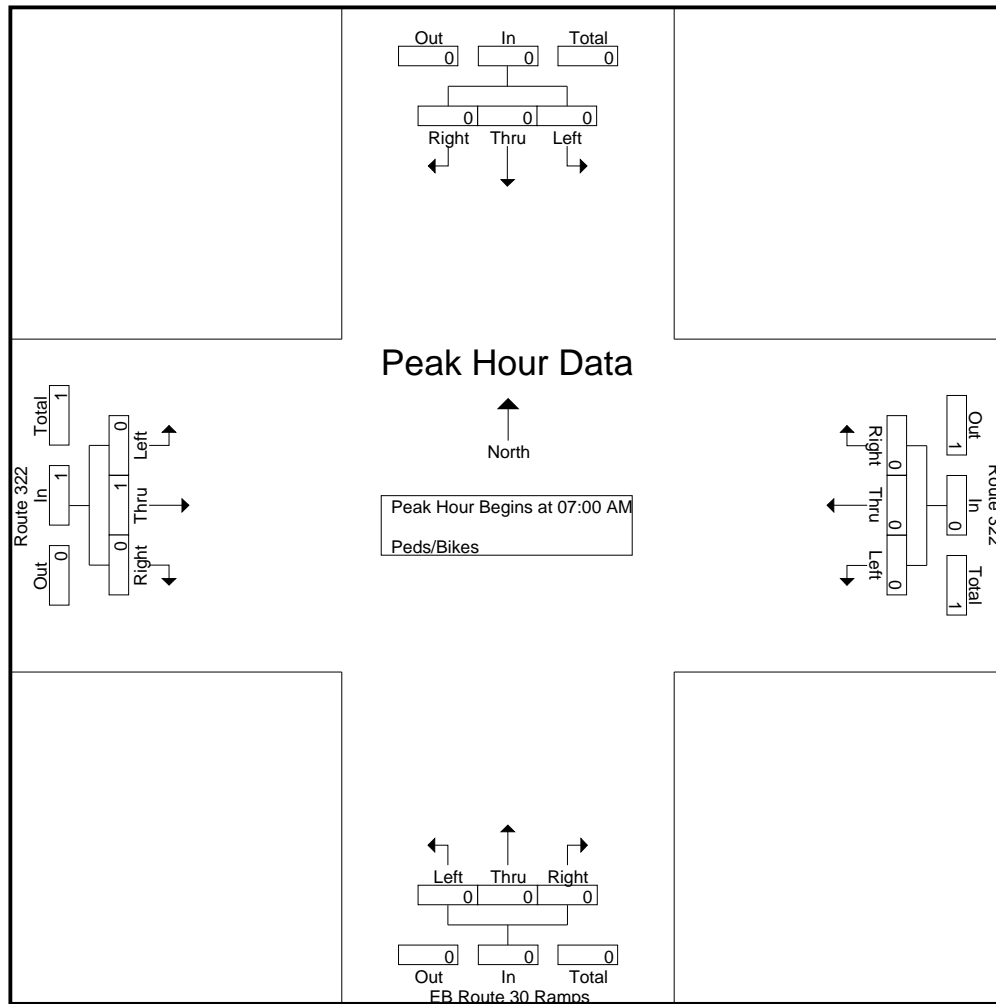
File Name : 2014-09-04 AM 322_EB Ramps

Site Code : 00000000

Start Date : 9/4/2014

Page No : 2

	Route 322 Eastbound				Route 322 Westbound				EB Route 30 Ramps Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	100	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



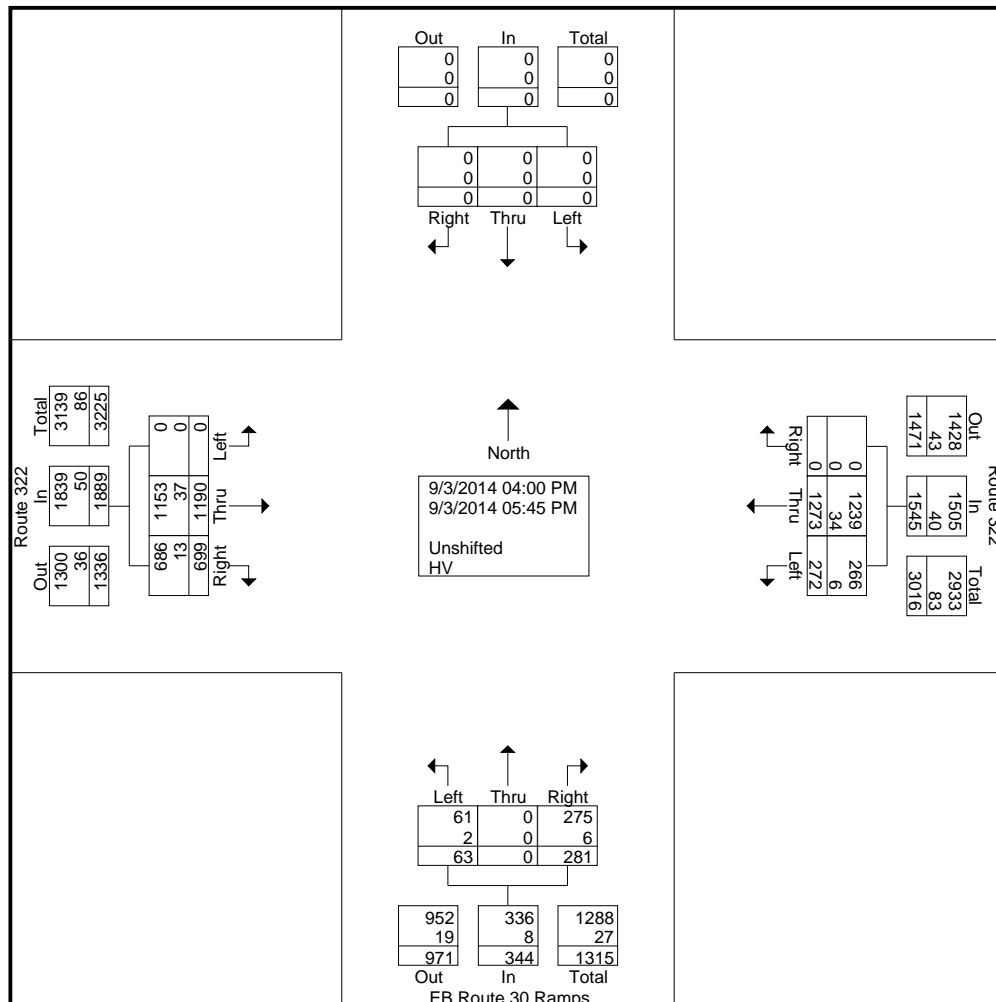
Route 322 & EB Route 30 Ramps
Caln Township, Chester County

Counter: 17
Counted by: JMutersbaugh
Weather: Clear

File Name : 2014-09-03 PM 322_EB Ramps
Site Code : 00000000
Start Date : 9/3/2014
Page No : 1

Groups Printed- Unshifted - HV

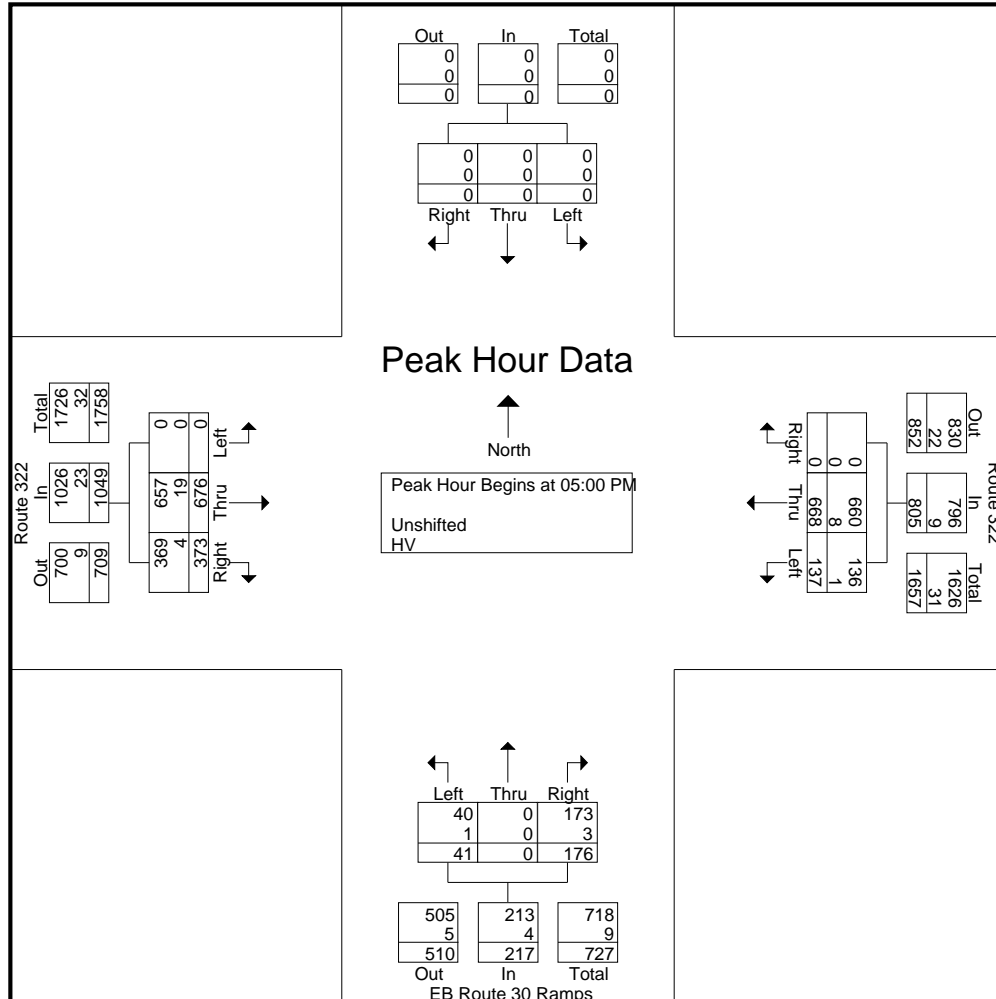
	Route 322 Eastbound						Route 322 Westbound						EB Route 30 Ramps Northbound						Southbound						Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	RTOR	App. Total		Left	Thru	Right	RTOR	App. Total		Left	Thru	Right	RTOR	App. Total		Left	Thru	Right	RTOR	App. Total				
04:00 PM	0	125	80	0	205		33	137	0	0	170		4	0	20	0	24		0	0	0	0	0		0	399	399
04:15 PM	0	140	81	0	221		43	162	0	0	205		3	0	38	0	41		0	0	0	0	0		0	467	467
04:30 PM	0	139	77	0	216		31	167	0	0	198		4	0	18	0	22		0	0	0	0	0		0	436	436
04:45 PM	0	110	88	0	198		28	139	0	0	167		11	0	29	0	40		0	0	0	0	0		0	405	405
Total	0	514	326	0	840		135	605	0	0	740		22	0	105	0	127		0	0	0	0	0		0	1707	1707
05:00 PM	0	154	93	0	247		31	164	0	0	195		4	0	37	0	41		0	0	0	0	0		0	483	483
05:15 PM	0	189	89	0	278		32	158	0	0	190		9	0	45	0	54		0	0	0	0	0		0	522	522
05:30 PM	0	147	112	0	259		44	176	0	0	220		14	0	55	0	69		0	0	0	0	0		0	548	548
05:45 PM	0	186	79	0	265		30	170	0	0	200		14	0	39	0	53		0	0	0	0	0		0	518	518
Total	0	676	373	0	1049		137	668	0	0	805		41	0	176	0	217		0	0	0	0	0		0	2071	2071
Grand Total	0	1190	699	0	1889		272	1273	0	0	1545		63	0	281	0	344		0	0	0	0	0		0	3778	3778
Apprch %	0	63	37				17.6	82.4	0				18.3	0	81.7				0	0	0				0		
Total %	0	31.5	18.5		50		7.2	33.7	0		40.9		1.7	0	7.4		9.1		0	0	0		0		0	100	
Unshifted	0	1153	686		1839		266	1239	0		1505		61	0	275		336		0	0	0		0		0	0	3680
% Unshifted	0	96.9	98.1	0	97.4		97.8	97.3	0	0	97.4		96.8	0	97.9	0	97.7		0	0	0	0	0		0	0	97.4
HV	0	37	13		50		6	34	0		40		2	0	6		8		0	0	0		0		0	0	98
% HV	0	3.1	1.9	0	2.6		2.2	2.7	0	0	2.6		3.2	0	2.1	0	2.3		0	0	0	0	0		0	0	2.6



Route 322 & EB Route 30 Ramps
Caln Township, Chester County

File Name : 2014-09-03 PM 322_EB Ramps
Site Code : 00000000
Start Date : 9/3/2014
Page No : 2

	Route 322 Eastbound				Route 322 Westbound				EB Route 30 Ramps Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	154	93	247	31	164	0	195	4	0	37	41	0	0	0	0	483
05:15 PM	0	189	89	278	32	158	0	190	9	0	45	54	0	0	0	0	522
05:30 PM	0	147	112	259	44	176	0	220	14	0	55	69	0	0	0	0	548
05:45 PM	0	186	79	265	30	170	0	200	14	0	39	53	0	0	0	0	518
Total Volume	0	676	373	1049	137	668	0	805	41	0	176	217	0	0	0	0	2071
% App. Total	0	64.4	35.6		17	83	0		18.9	0	81.1		0	0	0	0	
PHF	.000	.894	.833	.943	.778	.949	.000	.915	.732	.000	.800	.786	.000	.000	.000	.000	.945
Unshifted	0	657	369	1026	136	660	0	796	40	0	173	213	0	0	0	0	2035
% Unshifted	0	97.2	98.9	97.8	99.3	98.8	0	98.9	97.6	0	98.3	98.2	0	0	0	0	98.3
HV	0	19	4	23	1	8	0	9	1	0	3	4	0	0	0	0	36
% HV	0	2.8	1.1	2.2	0.7	1.2	0	1.1	2.4	0	1.7	1.8	0	0	0	0	1.7



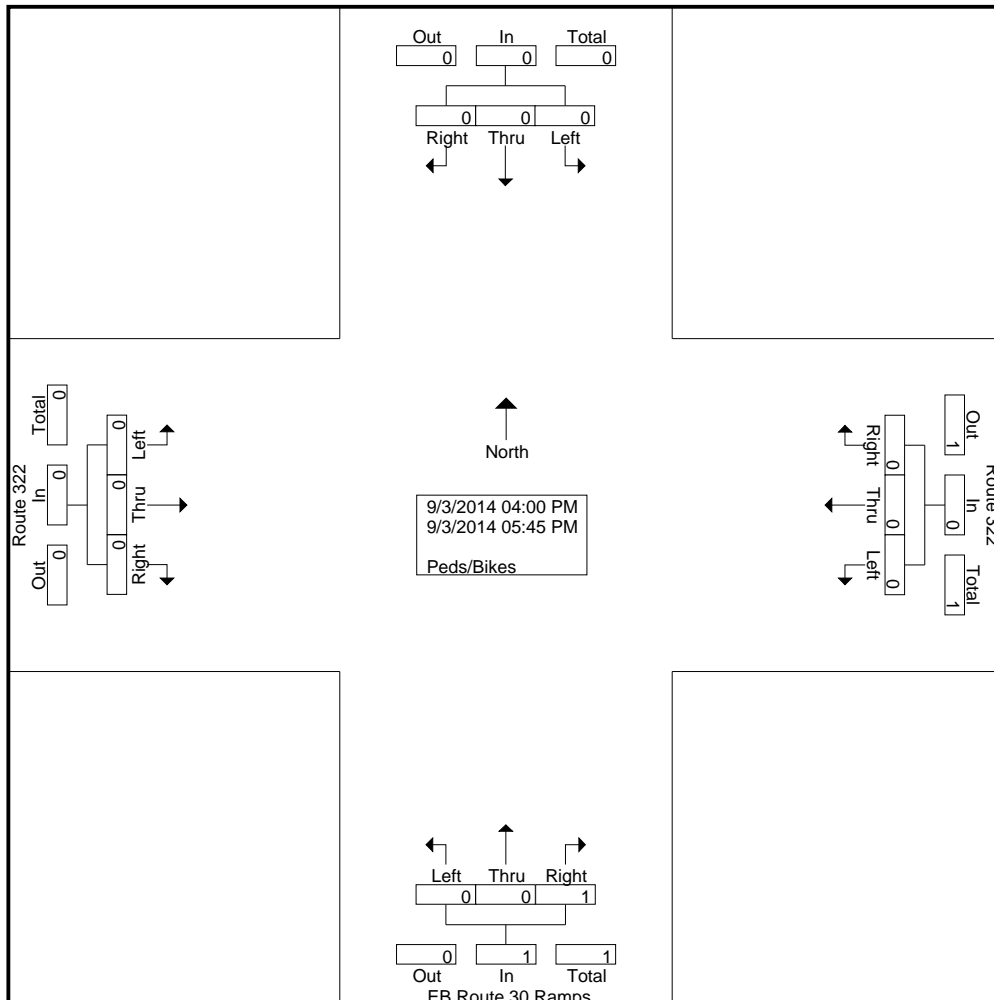
Route 322 & EB Route 30 Ramps
Caln Township, Chester County

Counter: 17
Counted by: JMuthersbaugh
Weather: Clear

File Name : 2014-09-03 PM 322_EB Ramps
Site Code : 00000000
Start Date : 9/3/2014
Page No : 1

Groups Printed- Peds/Bikes

	Route 322 Eastbound					Route 322 Westbound					EB Route 30 Ramps Northbound					Southbound							
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	2
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	2
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	2
Apprch %	0	0	0			0	0	0			0	0	100			0	0	0					
Total %	0	0	0		0	0	0	0		0	0	0	100		100	0	0	0		0	50	50	



Route 322 & EB Route 30 Ramps
Caln Township, Chester County

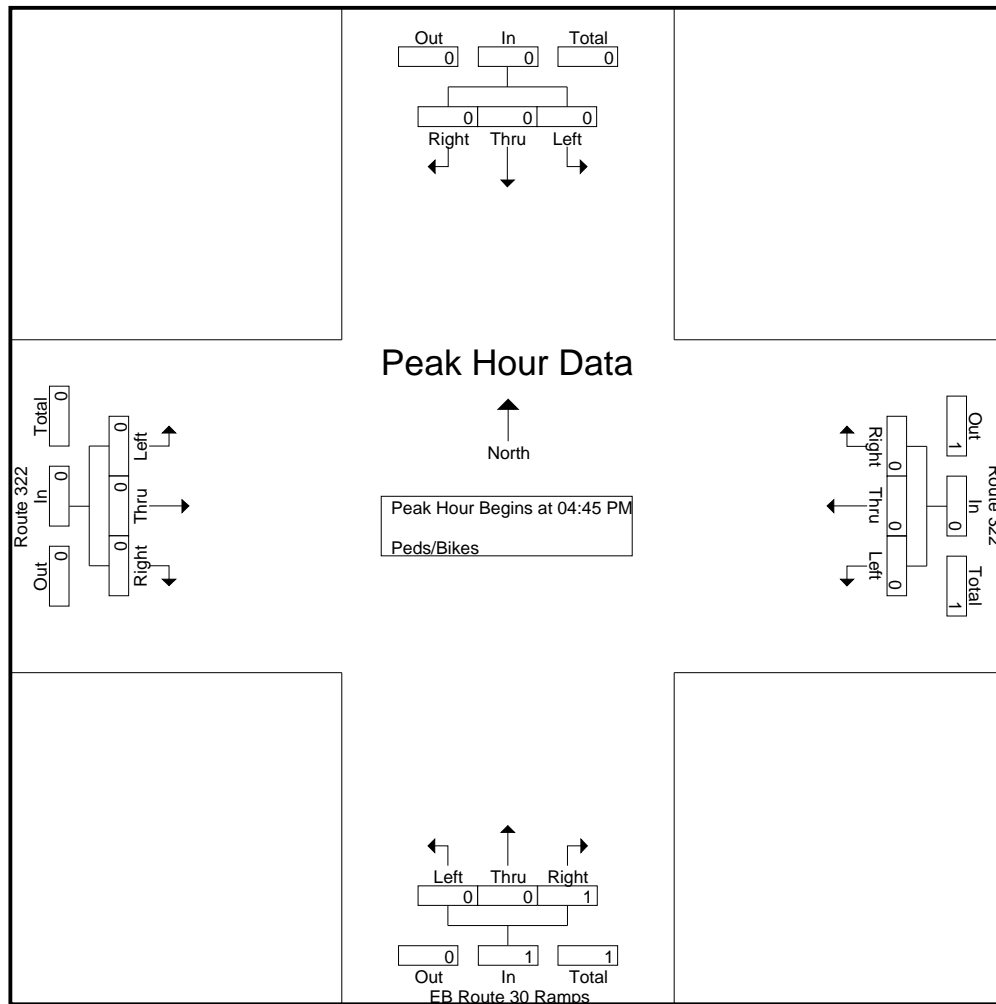
File Name : 2014-09-03 PM 322_EB Ramps

Site Code : 00000000

Start Date : 9/3/2014

Page No : 2

	Route 322 Eastbound				Route 322 Westbound				EB Route 30 Ramps Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
% App. Total	0	0	0	0	0	0	0	0	0	0	100		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000	.250



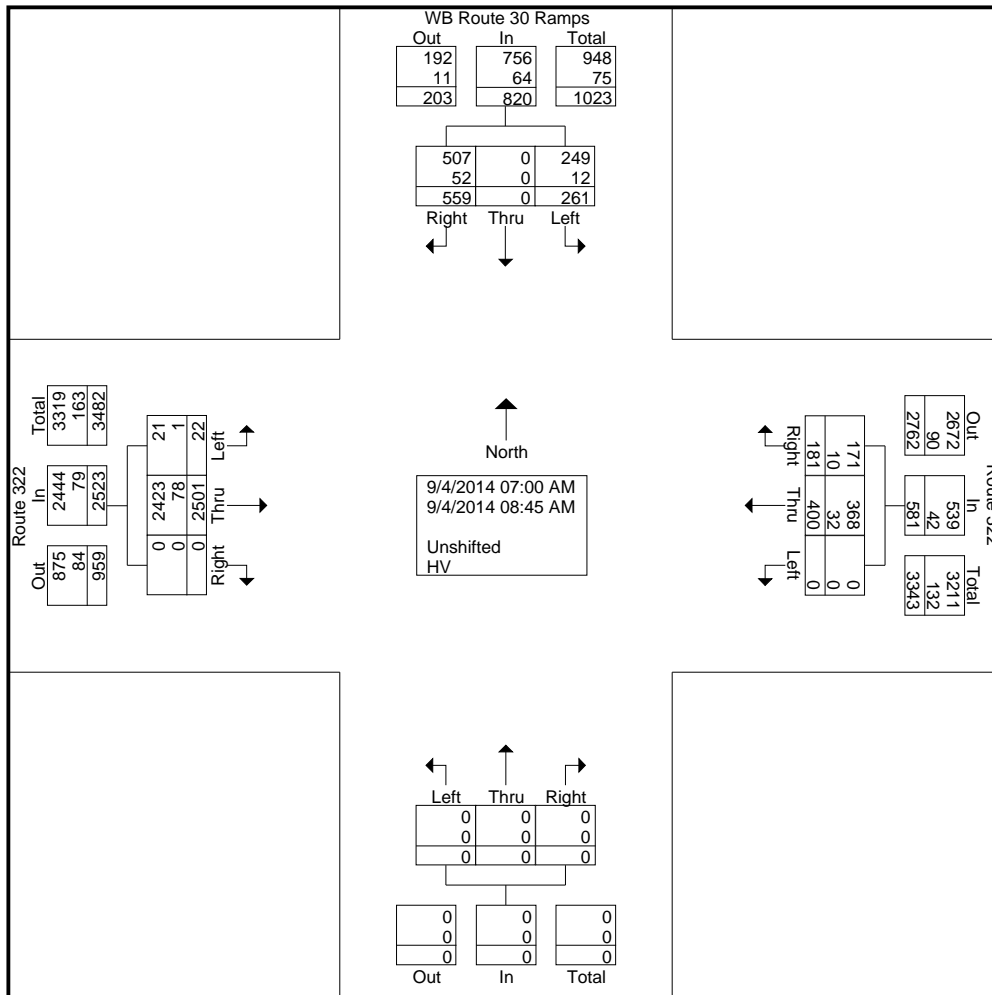
Route 322 & WB Route 30 Ramps
Caln Township, Chester County

Counter: 26
Counted by: M.Dao
Weather: Clear

File Name : 2014-09-04 AM 322_WB Ramps
Site Code : 00000000
Start Date : 9/4/2014
Page No : 1

Groups Printed- Unshifted - HV

Start Time	Route 322 Eastbound					Route 322 Westbound					Northbound					WB Route 30 Ramps Southbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total			
07:00 AM	2	375	0	0	377	0	26	18	0	44	0	0	0	0	0	63	0	44	0	107	0	528	528
07:15 AM	2	268	0	0	270	0	28	8	0	36	0	0	0	0	0	67	0	59	0	126	0	432	432
07:30 AM	0	332	0	0	332	0	77	25	0	102	0	0	0	0	0	17	0	67	0	84	0	518	518
07:45 AM	2	315	0	0	317	0	60	25	0	85	0	0	0	0	0	23	0	89	0	112	0	514	514
Total	6	1290	0	0	1296	0	191	76	0	267	0	0	0	0	0	170	0	259	0	429	0	1992	1992
08:00 AM	4	331	0	0	335	0	43	29	0	72	0	0	0	0	0	27	0	52	0	79	0	486	486
08:15 AM	5	265	0	0	270	0	50	35	0	85	0	0	0	0	0	25	0	76	0	101	0	456	456
08:30 AM	5	301	0	0	306	0	49	16	0	65	0	0	0	0	0	15	0	93	0	108	0	479	479
08:45 AM	2	314	0	0	316	0	67	25	0	92	0	0	0	0	0	24	0	79	0	103	0	511	511
Total	16	1211	0	0	1227	0	209	105	0	314	0	0	0	0	0	91	0	300	0	391	0	1932	1932
Grand Total	22	2501	0	0	2523	0	400	181	0	581	0	0	0	0	0	261	0	559	0	820	0	3924	3924
Apprch %	0.9	99.1	0			0	68.8	31.2			0	0	0			31.8	0	68.2					
Total %	0.6	63.7	0		64.3	0	10.2	4.6		14.8	0	0	0		0	6.7	0	14.2		20.9	0	100	
Unshifted	21	2423	0		2444	0	368	171		539	0	0	0		0	249	0	507		756	0	0	3739
% Unshifted	95.5	96.9	0	0	96.9	0	92	94.5	0	92.8	0	0	0	0	0	95.4	0	90.7	0	92.2	0	0	95.3
HV	1	78	0		79	0	32	10		42	0	0	0		0	12	0	52		64	0	0	185
% HV	4.5	3.1	0	0	3.1	0	8	5.5	0	7.2	0	0	0	0	0	4.6	0	9.3	0	7.8	0	0	4.7



Route 322 & WB Route 30 Ramps
Caln Township, Chester County

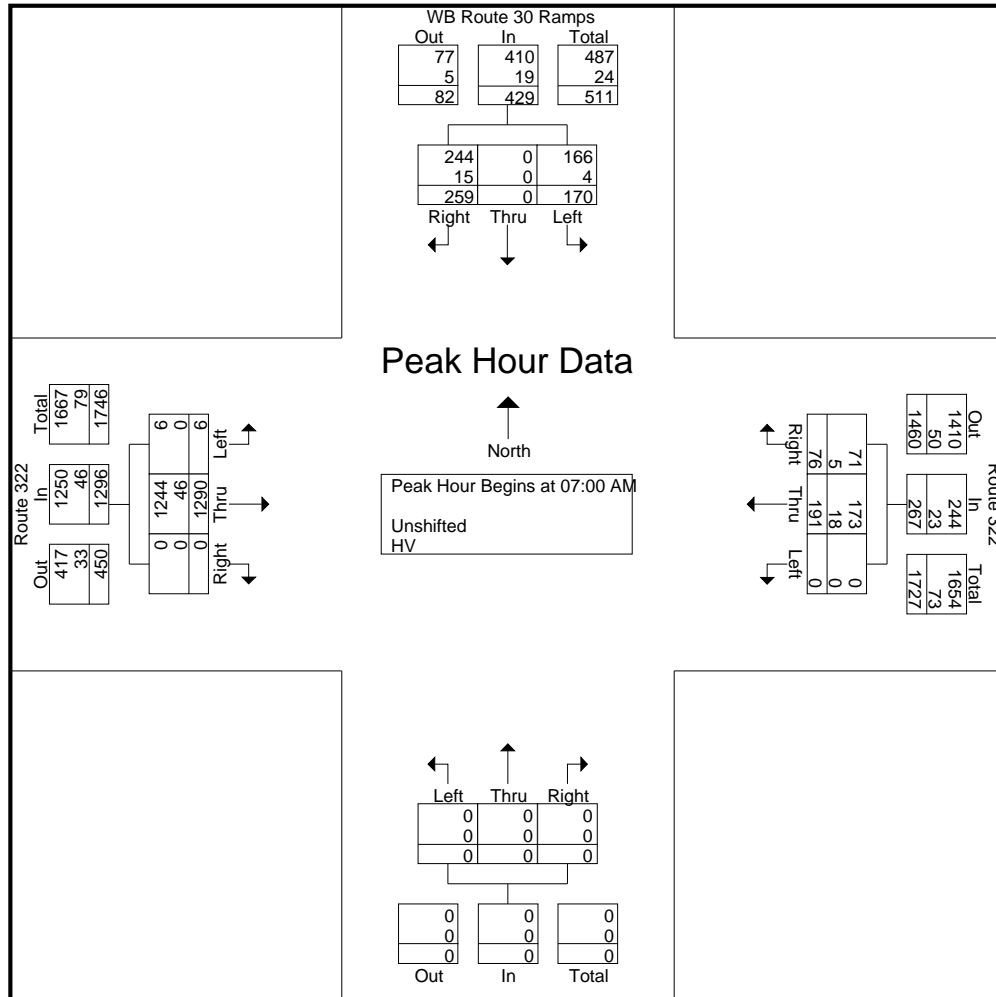
File Name : 2014-09-04 AM 322_WB Ramps
Site Code : 00000000
Start Date : 9/4/2014
Page No : 2

	Route 322 Eastbound				Route 322 Westbound				Northbound				WB Route 30 Ramps Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM

07:00 AM	2	375	0	377	0	26	18	44	0	0	0	0	63	0	44	107	528
07:15 AM	2	268	0	270	0	28	8	36	0	0	0	0	67	0	59	126	432
07:30 AM	0	332	0	332	0	77	25	102	0	0	0	0	17	0	67	84	518
07:45 AM	2	315	0	317	0	60	25	85	0	0	0	0	23	0	89	112	514
Total Volume	6	1290	0	1296	0	191	76	267	0	0	0	0	170	0	259	429	1992
% App. Total	0.5	99.5	0		0	71.5	28.5		0	0	0	0	39.6	0	60.4		
PHF	.750	.860	.000	.859	.000	.620	.760	.654	.000	.000	.000	.000	.634	.000	.728	.851	.943
Unshifted	6	1244	0	1250	0	173	71	244	0	0	0	0	166	0	244	410	1904
% Unshifted	100	96.4	0	96.5	0	90.6	93.4	91.4	0	0	0	0	97.6	0	94.2	95.6	95.6
HV	0	46	0	46	0	18	5	23	0	0	0	0	4	0	15	19	88
% HV	0	3.6	0	3.5	0	9.4	6.6	8.6	0	0	0	0	2.4	0	5.8	4.4	4.4



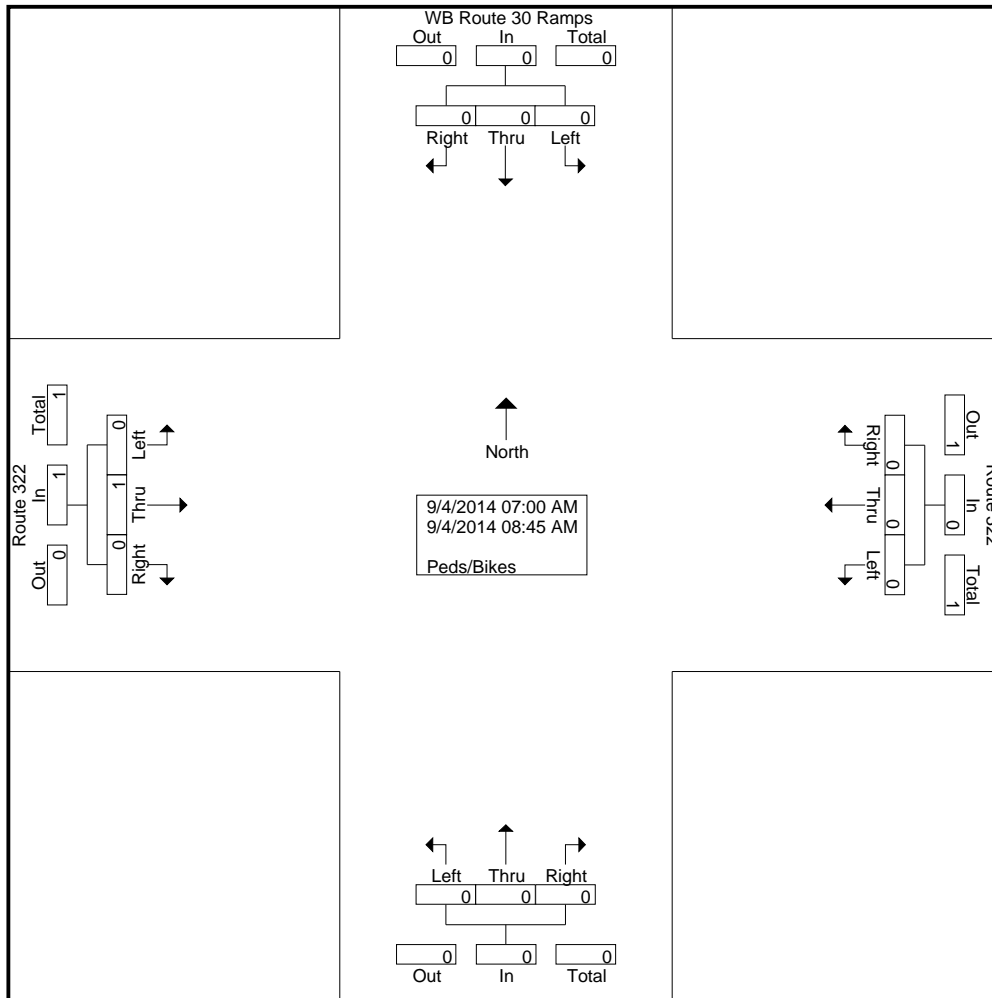
Route 322 & WB Route 30 Ramps
Caln Township, Chester County

Counter: 26
Counted by: M.Dao
Weather: Clear

File Name : 2014-09-04 AM 322_WB Ramps
Site Code : 00000000
Start Date : 9/4/2014
Page No : 1

Groups Printed- Peds/Bikes

Start Time	Route 322 Eastbound					Route 322 Westbound					Northbound					WB Route 30 Ramps Southbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total			
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Apprch %	0	100	0			0	0	0			0	0	0			0	0	0			0		
Total %	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		0	0	100	



Route 322 & WB Route 30 Ramps
Caln Township, Chester County

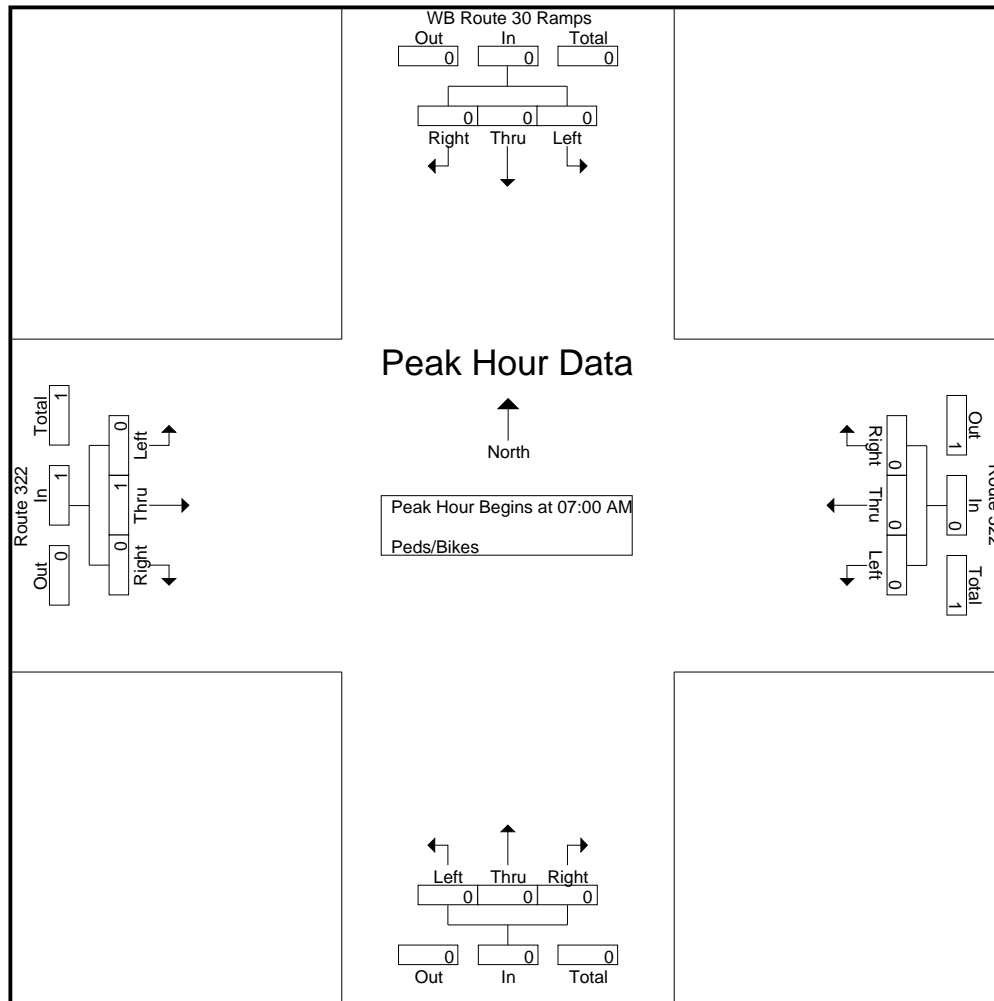
File Name : 2014-09-04 AM 322_WB Ramps

Site Code : 00000000

Start Date : 9/4/2014

Page No : 2

	Route 322 Eastbound				Route 322 Westbound				Northbound				WB Route 30 Ramps Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% App. Total	0	100	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



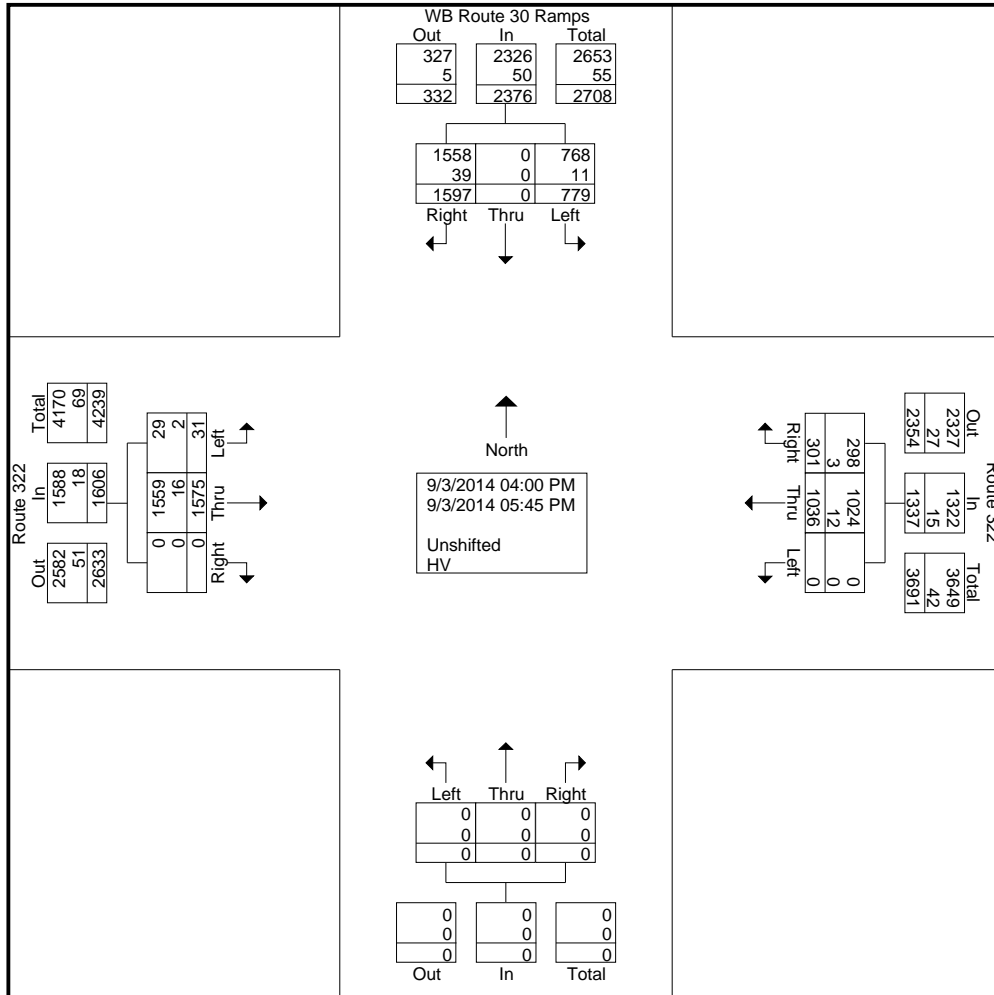
Route 322 & WB Route 30 Ramps
Caln Township, Chester County

Counter: 26
Counted by: M.Dao
Weather: Clear

File Name : 2014-09-03 PM 322_WB Ramps
Site Code : 00000000
Start Date : 9/3/2014
Page No : 1

Groups Printed- Unshifted - HV

Start Time	Route 322 Eastbound					Route 322 Westbound					Northbound					WB Route 30 Ramps Southbound					Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total			
04:00 PM	4	182	0	0	186	0	112	28	0	140	0	0	0	0	0	94	0	237	0	331	0	657	657
04:15 PM	5	179	0	0	184	0	122	36	0	158	0	0	0	0	0	88	0	214	0	302	0	644	644
04:30 PM	5	181	0	0	186	0	119	50	0	169	0	0	0	0	0	93	0	209	0	302	0	657	657
04:45 PM	1	185	0	0	186	0	102	43	0	145	0	0	0	0	0	94	0	168	0	262	0	593	593
Total	15	727	0	0	742	0	455	157	0	612	0	0	0	0	0	369	0	828	0	1197	0	2551	2551
05:00 PM	5	192	0	0	197	0	126	40	0	166	0	0	0	0	0	118	0	182	0	300	0	663	663
05:15 PM	3	282	0	0	285	0	161	41	0	202	0	0	0	0	0	96	0	185	0	281	0	768	768
05:30 PM	5	183	0	0	188	0	155	28	0	183	0	0	0	0	0	93	0	195	0	288	0	659	659
05:45 PM	3	191	0	0	194	0	139	35	0	174	0	0	0	0	0	103	0	207	0	310	0	678	678
Total	16	848	0	0	864	0	581	144	0	725	0	0	0	0	0	410	0	769	0	1179	0	2768	2768
Grand Total	31	1575	0	0	1606	0	1036	301	0	1337	0	0	0	0	0	779	0	1597	0	2376	0	5319	5319
Apprch %	1.9	98.1	0			0	77.5	22.5			0	0	0			32.8	0	67.2					
Total %	0.6	29.6	0		30.2	0	19.5	5.7		25.1	0	0	0			14.6	0	30		44.7	0	100	
Unshifted	29	1559	0		1588	0	1024	298		1322	0	0	0		0	768	0	1558		2326	0	0	5236
% Unshifted	93.5	99	0	0	98.9	0	98.8	99	0	98.9	0	0	0	0	0	98.6	0	97.6	0	97.9	0	0	98.4
HV	2	16	0		18	0	12	3		15	0	0	0		0	11	0	39		50	0	0	83
% HV	6.5	1	0	0	1.1	0	1.2	1	0	1.1	0	0	0	0	0	1.4	0	2.4	0	2.1	0	0	1.6



Route 322 & WB Route 30 Ramps
Caln Township, Chester County

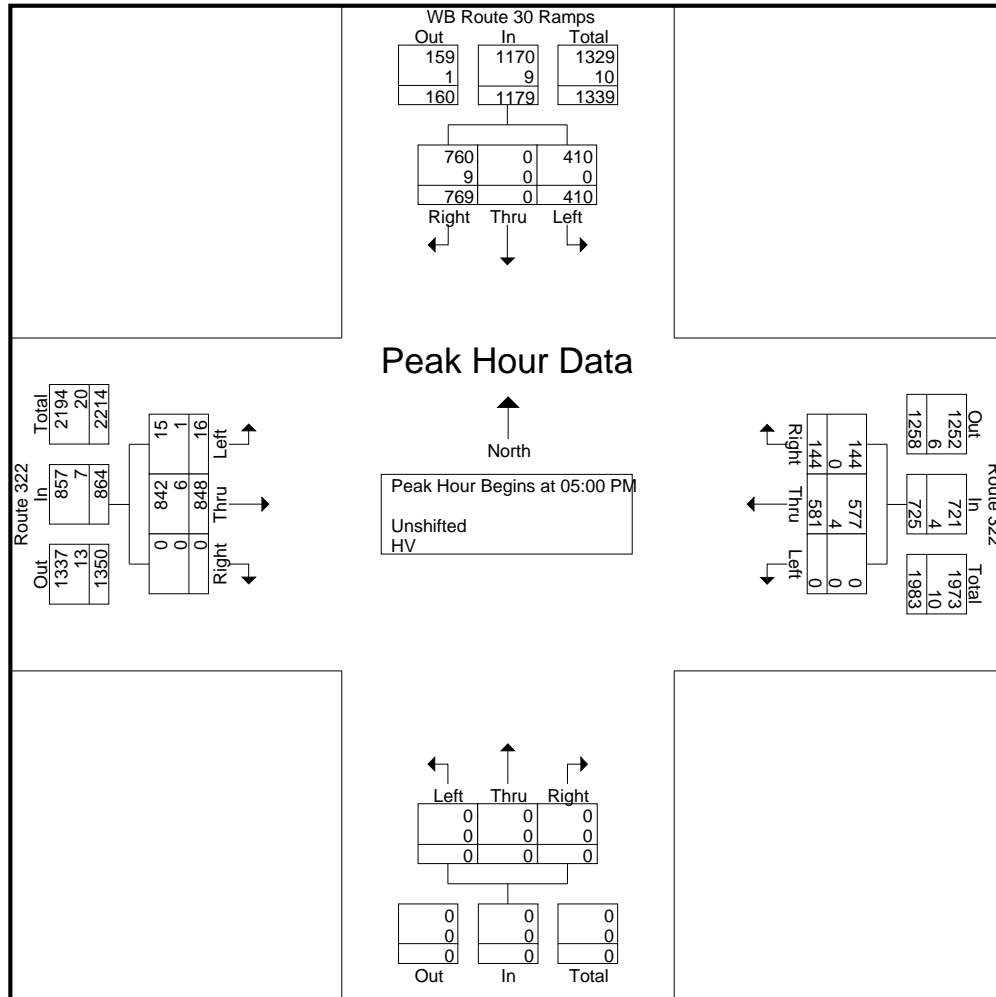
File Name : 2014-09-03 PM 322_WB Ramps
Site Code : 00000000
Start Date : 9/3/2014
Page No : 2

	Route 322 Eastbound				Route 322 Westbound				Northbound				WB Route 30 Ramps Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 05:00 PM

05:00 PM	5	192	0	197	0	126	40	166	0	0	0	0	118	0	182	300	663
05:15 PM	3	282	0	285	0	161	41	202	0	0	0	0	96	0	185	281	768
05:30 PM	5	183	0	188	0	155	28	183	0	0	0	0	93	0	195	288	659
05:45 PM	3	191	0	194	0	139	35	174	0	0	0	0	103	0	207	310	678
Total Volume	16	848	0	864	0	581	144	725	0	0	0	0	410	0	769	1179	2768
% App. Total	1.9	98.1	0		0	80.1	19.9		0	0	0	0	34.8	0	65.2		
PHF	.800	.752	.000	.758	.000	.902	.878	.897	.000	.000	.000	.000	.869	.000	.929	.951	.901
Unshifted	15	842	0	857	0	577	144	721	0	0	0	0	410	0	760	1170	2748
% Unshifted	93.8	99.3	0	99.2	0	99.3	100	99.4	0	0	0	0	100	0	98.8	99.2	99.3
HV	1	6	0	7	0	4	0	4	0	0	0	0	0	0	9	9	20
% HV	6.3	0.7	0	0.8	0	0.7	0	0.6	0	0	0	0	0	0	1.2	0.8	0.7



APPENDIX E

NEARBY DEVELOPMENT DATA

Site Characteristics

This section presents the details regarding the proposed site, including the incremental increase in traffic volumes generated by the development during the peak hours and the distribution of this site traffic to the study area roadways, as well as the proposed site access configuration, traffic control, and sight distance requirements.

Trip Generation

Traffic volumes generated by the proposed development were prepared based on trip generation data compiled from numerous studies contained in the Institute of Transportation Engineers (ITE) publication, *Trip Generation, 9th Edition*. **Table 2** presents the anticipated vehicular trip generation for the proposed development.

Table 2. Vehicular Trip Generation

Land Use	Units	Daily	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
Apartments ¹	180	1,214	18	74	92	76	41	117
Townhouses ²	175	1,046	14	67	81	64	31	95
Single Family Homes ³	29	336	7	23	30	21	13	34
Total	384	2,596	39	164	203	161	85	246

1 – ITE Land Use Code 220 for Low-Rise Apartment Building.

2 – ITE Land Use Code 230 for Residential Condominium/Townhouse.

3 – ITE Land Use Code 210 for Single Family Detached Housing.

Trip Distribution and Assignment

Site-generated traffic will approach and depart the site via different routes depending on factors such as the existing traffic patterns, location of major roadways, and the location of the development's site access. The distribution percentages for the anticipated directions of approach and departure and traffic assignment percentages are illustrated in **Figure 4A**. Application of the percentages illustrated in **Figure 4A** to the new peak hour trips contained in **Table 2**, provides an estimate of site traffic to be added to the study area. The site-generated traffic is shown in **Figure 4B**.

Site Access Configuration and Traffic Control

Access to the Dwell at Caln community is proposed along U.S. Route 322 approximately 2,000 feet west of Edges Mill Road, based on the site plan, dated March 31, 2014, prepared by D. L. Howell and Associates, Inc.

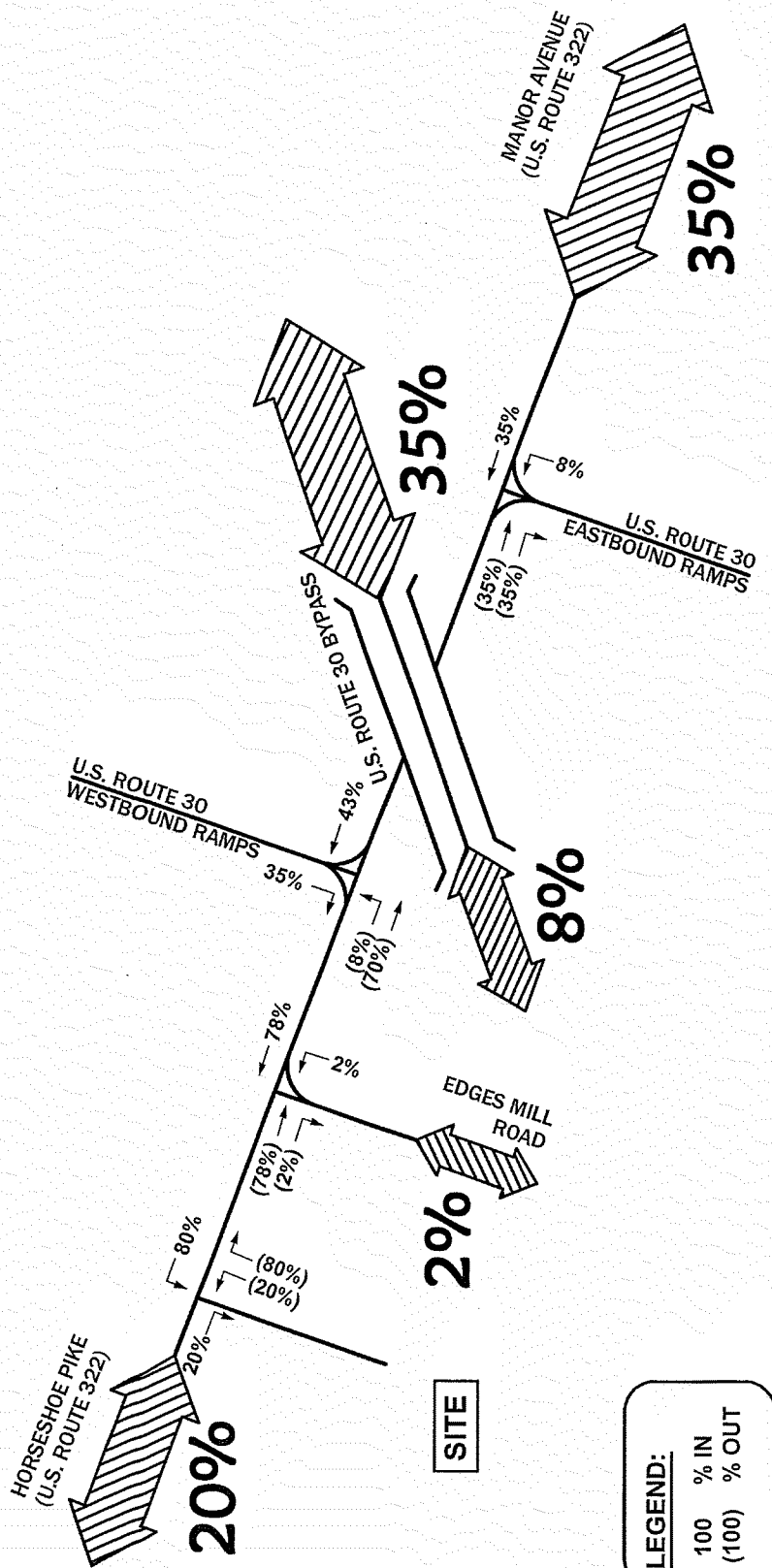
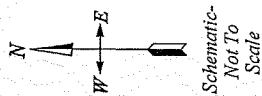
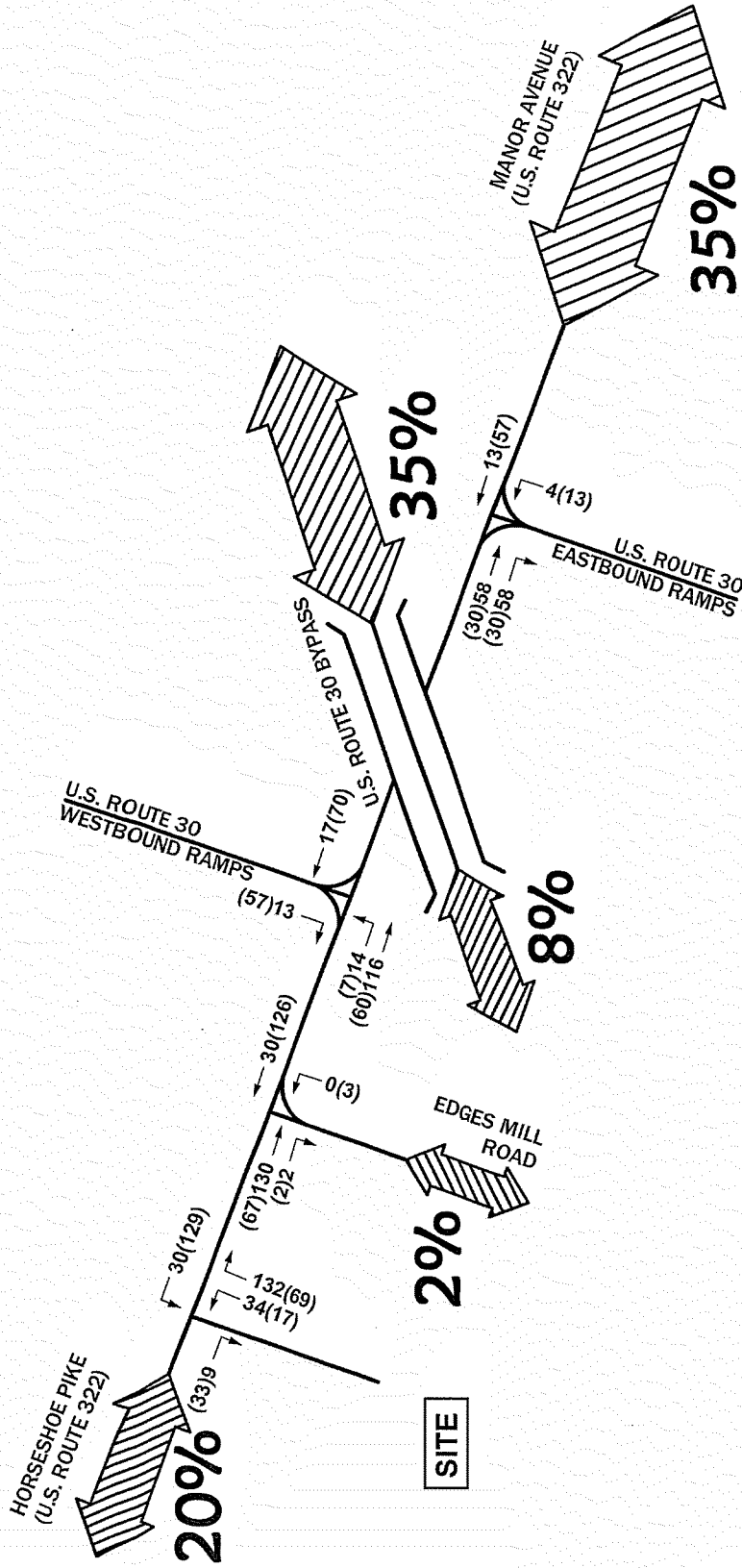
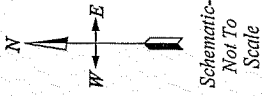


FIGURE 4A

Directions of Approach and Departure

DWELL AT CALN DEVELOPMENT **CALN TOWNSHIP, CHESTER COUNTY, PA**



LEGEND:

- 10 WEEKDAY AM PEAK HOUR
- (10) WEEKDAY PM PEAK HOUR

FIGURE 4B

Site Traffic Assignment

DWELL AT CALN DEVELOPMENT **CALN TOWNSHIP, CHESTER COUNTY, PA**

Proposed Development Improvements

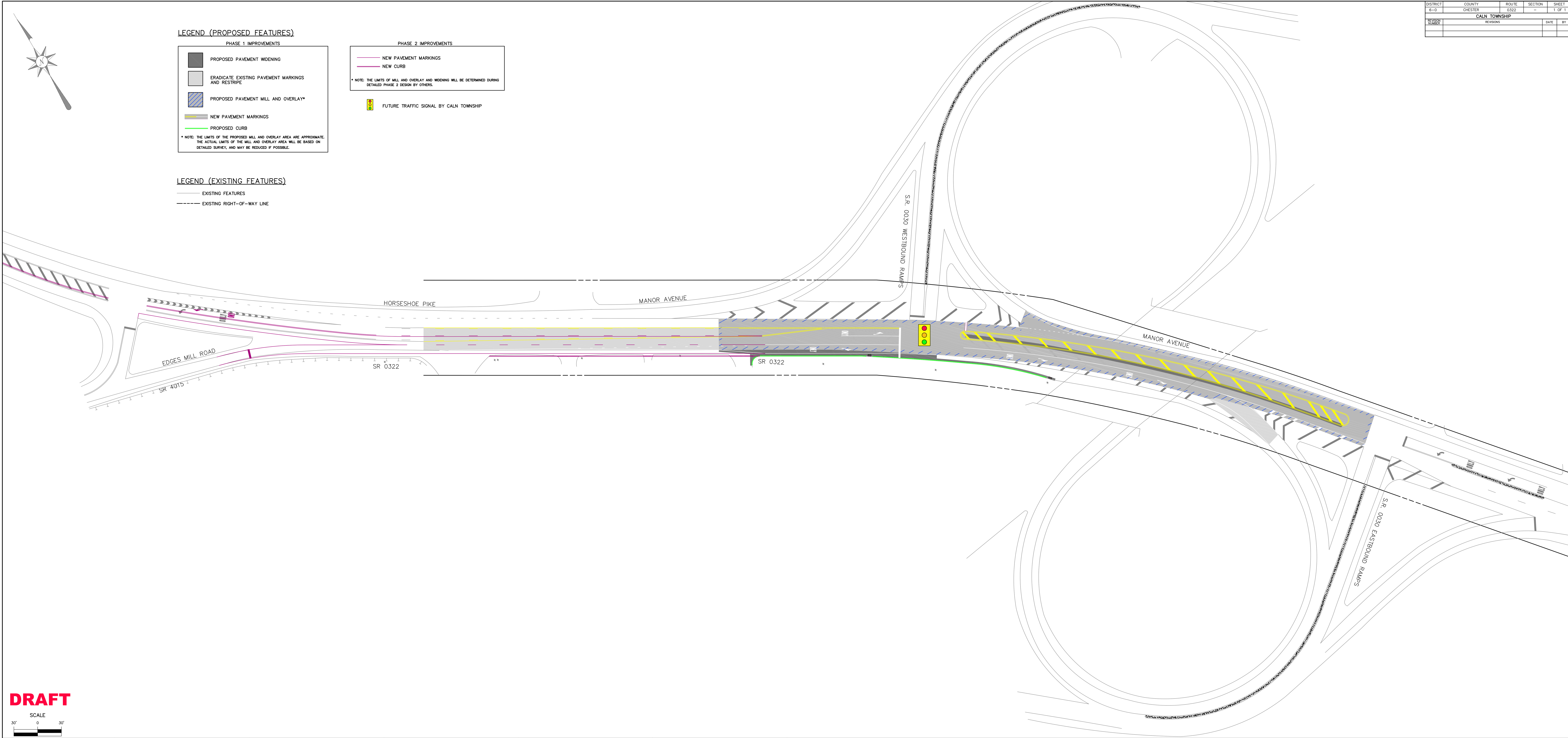
In conjunction with the Dwell at Caln residential development, the following improvements are recommended and proposed, and they are also consistent with prior approvals by Caln Township for this site.

Transportation Impact Study Improvements

- **Manor Avenue (U.S. Route 322) and Site Access** – signalize the site access; widen eastbound U.S. Route 322 for a right-turn deceleration lane; widen westbound U.S. Route 322 for a separate left-turn lane; and provide separate left- and right-turn lanes and one ingress lane on the site access in a boulevard style.
- **Manor Avenue (U.S. Route 322) and Westbound U.S Route 30 On/Off-ramps** – signalize the intersection, and restripe the eastbound U.S. Route 322 approach to provide a shared through/left-turn lane and a separate through lane. Also, provide traffic signal coordination and interconnection with the adjacent signalized intersections at Lloyd Avenue and the proposed traffic signal at the site access.

Qualitative Evaluation Improvements

- **Manor Avenue (U.S. Route 322) and Lloyd Avenue** – optimize the traffic signal timings and cycle length to improve overall traffic conditions, as well as provide traffic signal coordination and interconnection with the adjacent signalized intersections at Rock Raymond Road and with the proposed traffic signal at the westbound U.S. Route 30 On/Off-ramps.
- **Manor Avenue (U.S. Route 322) and Rock Raymond Road** – optimize the traffic signal timings and cycle length to improve overall traffic conditions along the U.S. Route 322 corridor, as well as provide traffic signal coordination and interconnection with the adjacent signalized intersections at Lloyd Avenue.



LEGEND (PROPOSED FEATURES)

PHASE 1 IMPROVEMENTS

- PROPOSED PAVEMENT WIDENING
- ERADICATE EXISTING PAVEMENT MARKINGS AND RESTRIPE
- PROPOSED PAVEMENT MILL AND OVERLAY*
- NEW PAVEMENT MARKINGS
- PROPOSED CURB

* NOTE: THE LIMITS OF THE PROPOSED MILL AND OVERLAY AREA ARE APPROXIMATE. THE ACTUAL LIMITS OF THE MILL AND OVERLAY AREA WILL BE BASED ON DETAILED SURVEY, AND MAY BE REDUCED IF POSSIBLE.

LEGEND (EXISTING FEATURES)

- EXISTING FEATURES
- EXISTING RIGHT-OF-WAY LINE

PHASE 2 IMPROVEMENTS

- NEW PAVEMENT MARKINGS
- NEW CURB

* NOTE: THE LIMITS OF MILL AND OVERLAY AND WIDENING WILL BE DETERMINED DURING DETAILED PHASE 2 DESIGN BY OTHERS.

FUTURE TRAFFIC SIGNAL BY CALN TOWNSHIP

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	CHESTER	0322	-	1 OF 1
CALN TOWNSHIP				
REVISION NUMBER	REVISIONS			DATE BY

APPENDIX J

CONCEPT PLANS

DISTRICT	COUNTY	ROUTE	SECTION	SHEET	
6-0	CHESTER	0322/4017		1 OF 1	
CALN TOWNSHIP					
REVISION NUMBER	REVISIONS			DATE	BY

LEGEND

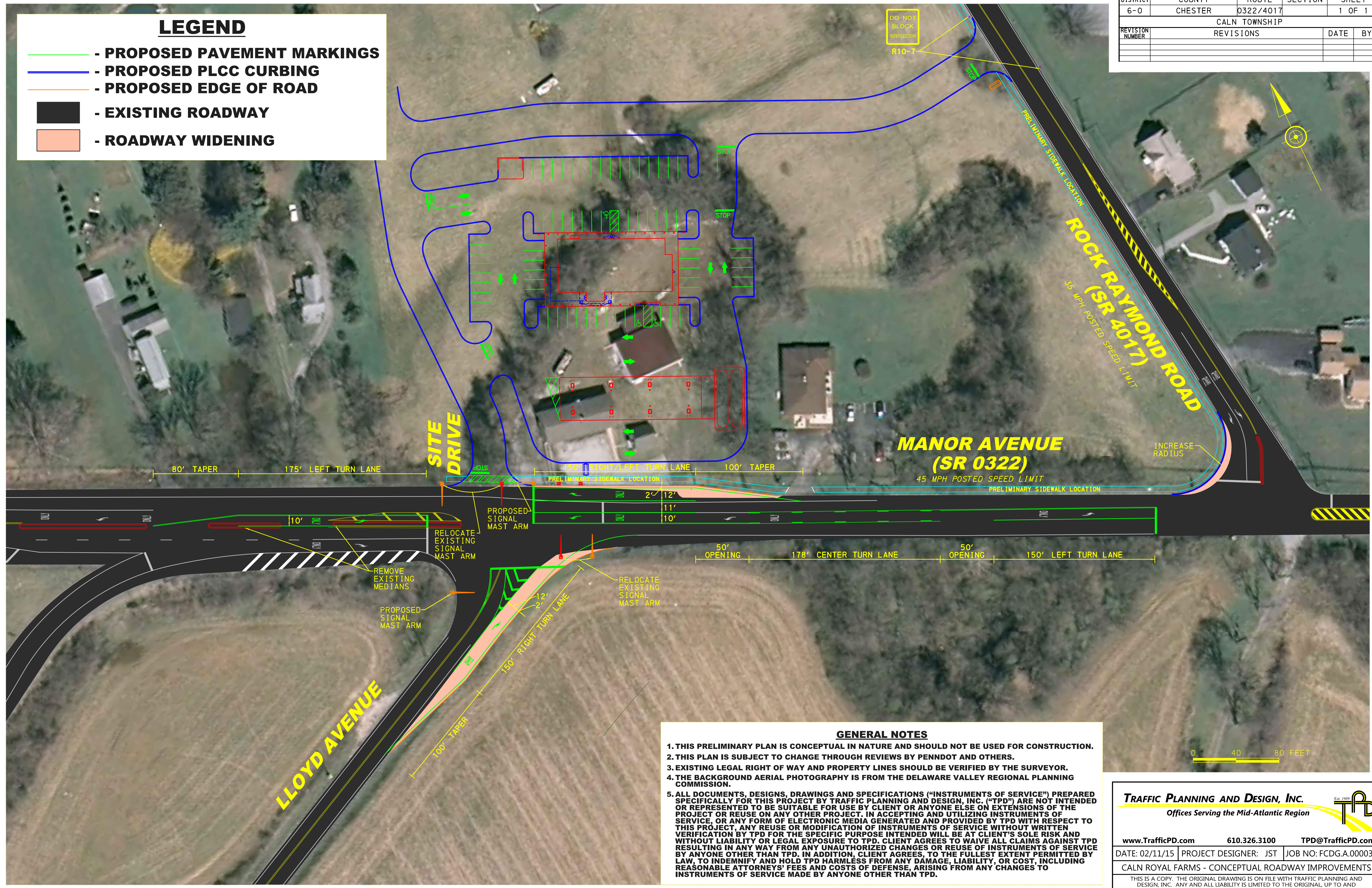
- PROPOSED PAVEMENT MARKINGS

- PROPOSED PLCC CURBING

- PROPOSED EDGE OF ROAD

- EXISTING ROADWAY

- ROADWAY WIDENING



- GENERAL NOTES
1. THIS PRELIMINARY PLAN IS CONCEPTUAL IN NATURE AND SHOULD NOT BE USED FOR CONSTRUCTION.

2. THIS PLAN IS SUBJECT TO CHANGE THROUGH REVIEWS BY PENNDOT AND OTHERS.

3. EXISTING LEGAL RIGHT OF WAY AND PROPERTY LINES SHOULD BE VERIFIED BY THE SURVEYOR.

4. THE BACKGROUND AERIAL PHOTOGRAPHY IS FROM THE DELAWARE VALLEY REGIONAL PLANNING COMMISSION.

5. ALL DOCUMENTS, DESIGNS, DRAWINGS AND SPECIFICATIONS ("INSTRUMENTS OF SERVICE") PREPARED SPECIFICALLY FOR THIS PROJECT BY TRAFFIC PLANNING AND DESIGN, INC. ("TPD") ARE NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR USE BY CLIENT OR ANYONE ELSE ON EXTENSIONS OF THE PROJECT OR REUSE ON ANY OTHER PROJECT. IN ACCEPTING AND UTILIZING INSTRUMENTS OF SERVICE, OR ANY FORM OF ELECTRONIC MEDIA GENERATED AND PROVIDED BY TPD WITH RESPECT TO THIS PROJECT, ANY REUSE OR MODIFICATION OF INSTRUMENTS OF SERVICE WITHOUT WRITTEN VERIFICATION BY TPD FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT CLIENT'S SOLE RISK AND WITHOUT LIABILITY OR LEGAL EXPOSURE TO TPD. CLIENT AGREES TO WAIVE ALL CLAIMS AGAINST TPD RESULTING IN ANY WAY FROM ANY UNAUTHORIZED CHANGES OR REUSE OF INSTRUMENTS OF SERVICE BY ANYONE OTHER THAN TPD. IN ADDITION, CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD TPD HARMLESS FROM ANY DAMAGE, LIABILITY, OR COST, INCLUDING REASONABLE ATTORNEYS' FEES AND COSTS OF DEFENSE, ARISING FROM ANY CHANGES TO INSTRUMENTS OF SERVICE MADE BY ANYONE OTHER THAN TPD.

TRAFFIC PLANNING AND DESIGN, INC.

Offices Serving the Mid-Atlantic Region

www.TrafficPD.com

610.326.3100

TPD@TrafficPD.com

DATE: 02/11/15 | PROJECT DESIGNER: JST | JOB NO: FCDGA.00003

CALN ROYAL FARMS - CONCEPTUAL ROADWAY IMPROVEMENTS

THIS IS A COPY. THE ORIGINAL DRAWING IS ON FILE WITH TRAFFIC PLANNING AND DESIGN, INC. ANY AND ALL LIABILITY IS LIMITED TO THE ORIGINAL, UP TO AND INCLUDING THE LAST REVISIONS.

DRN BY: JH

APPENDIX B

STUDY AREA PHOTOGRAPHS



Direction / Road: EB Manor Ave (SR 0322)
Approach / Departure: Approach
Distance: 50 feet



Direction / Road: EB Manor Ave (SR 0322)
Approach / Departure: Departure
Distance:



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Approach
Distance: 50 feet



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Departure
Distance:



Direction / Road: SB Rock Raymond Road
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: NB Rock Raymond Road
Approach / Departure: Departure
Distance:



Direction / Road:	EB Manor Ave (SR 0322)
Approach / Departure:	Approach
Distance:	50 feet



Direction / Road:	EB Manor Ave (SR 0322)
Approach / Departure:	Departure
Distance:	



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Approach
Distance: 50 feet



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Departure
Distance:



Direction / Road:	NB Lloyd Avenue
Approach / Departure:	Approach
Distance:	200 feet



Direction / Road:	NB Royal Farms Driveway
Approach / Departure:	Departure
Distance:	



Direction / Road: SB Royal Farms Driveway

Approach / Departure: Approach

Distance: 50 feet



Direction / Road: SB Lloyd Avenue

Approach / Departure: Departure

Distance:



Direction / Road:	EB Manor Ave (SR 0322)
Approach / Departure:	Approach
Distance:	200 feet



Direction / Road:	EB Manor Ave (SR 0322)
Approach / Departure:	Departure
Distance:	



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: WB Manor Ave (SR 0322)
Approach / Departure: Departure
Distance:



Direction / Road:	<u>SB Route 30 EB Ramps</u>
Approach / Departure:	<u>Approach</u>
Distance:	<u>200 feet</u>



Direction / Road:	<u>SB Route 30 EB Ramps</u>
Approach / Departure:	<u>Departure</u>
Distance:	<u></u>



Direction / Road: EB Lloyd Avenue
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: EB Lloyd Avenue
Approach / Departure: Departure
Distance:



Direction / Road: WB Lloyd Avenue
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: WB Lloyd Avenue
Approach / Departure: Departure
Distance:



Direction / Road: SB Park and Ride Driveway
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: NB Park and Ride Driveway
Approach / Departure: Departure
Distance:



Direction / Road: EB GO Carlson Boulevard
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: WB GO Carlson Boulevard
Approach / Departure: Departure
Distance:



Direction / Road: NB Lloyd Avenue
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: NB Lloyd Avenue
Approach / Departure: Departure
Distance:



Direction / Road: SB Lloyd Avenue
Approach / Departure: Approach
Distance: 200 feet



Direction / Road: SB Lloyd Avenue
Approach / Departure: Departure
Distance:



Direction / Road: EB Beaver Run Road
Approach / Departure: Approach
Distance: 50 feet



Direction / Road: WB Beaver Run Road
Approach / Departure: Departure
Distance:



Direction / Road:	NB Lloyd Avenue
Approach / Departure:	Approach
Distance:	50 feet



Direction / Road:	NB Lloyd Avenue
Approach / Departure:	Departure
Distance:	



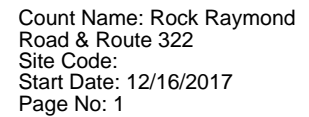
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Approach / Departure: Approach
Distance: 50 feet



Direction / Road: SB Lloyd Avenue
Approach / Departure: Departure
Distance:

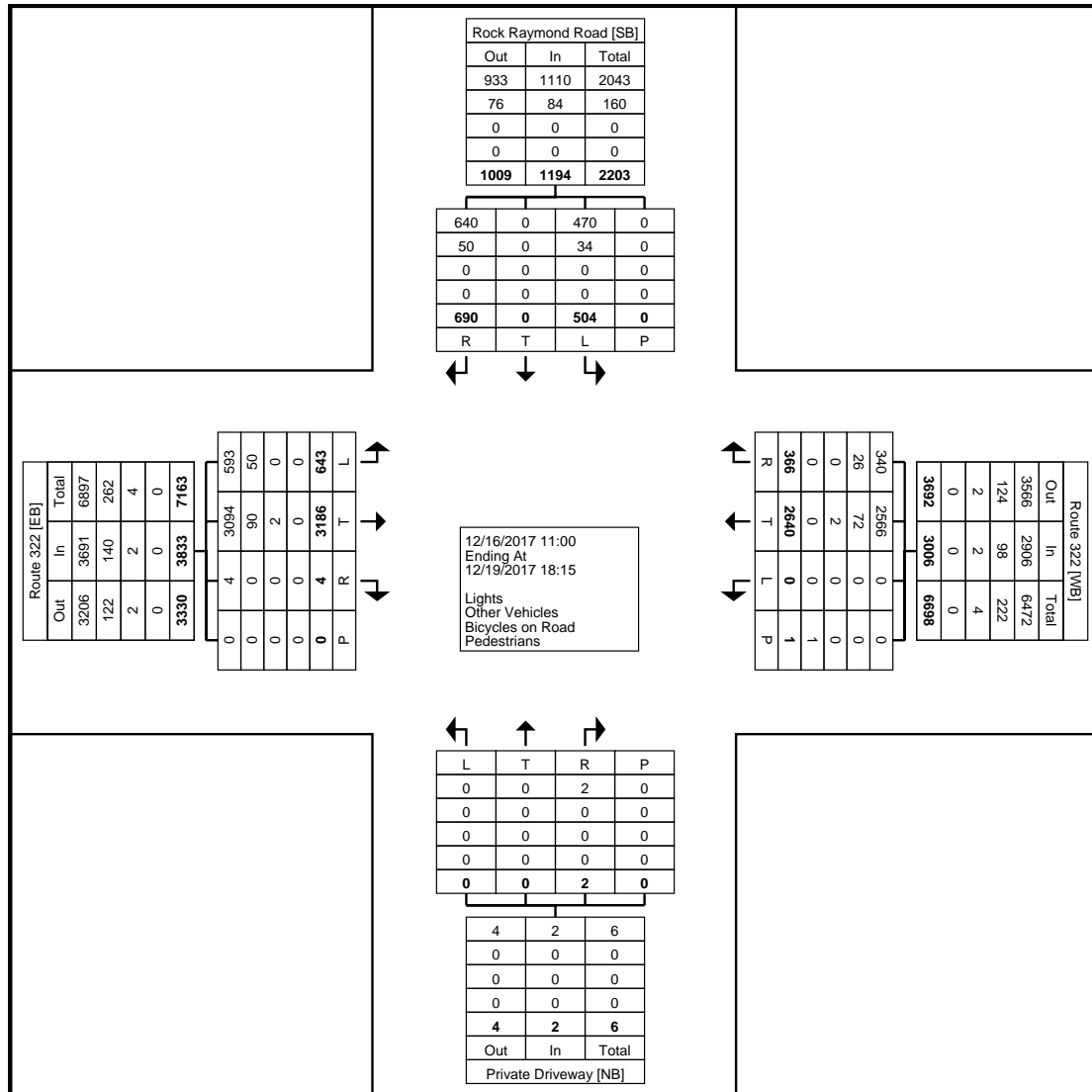
APPENDIX C

MANUAL COUNT PRINTOUTS

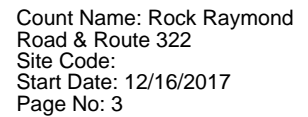
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Rock Raymond
Road & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 2

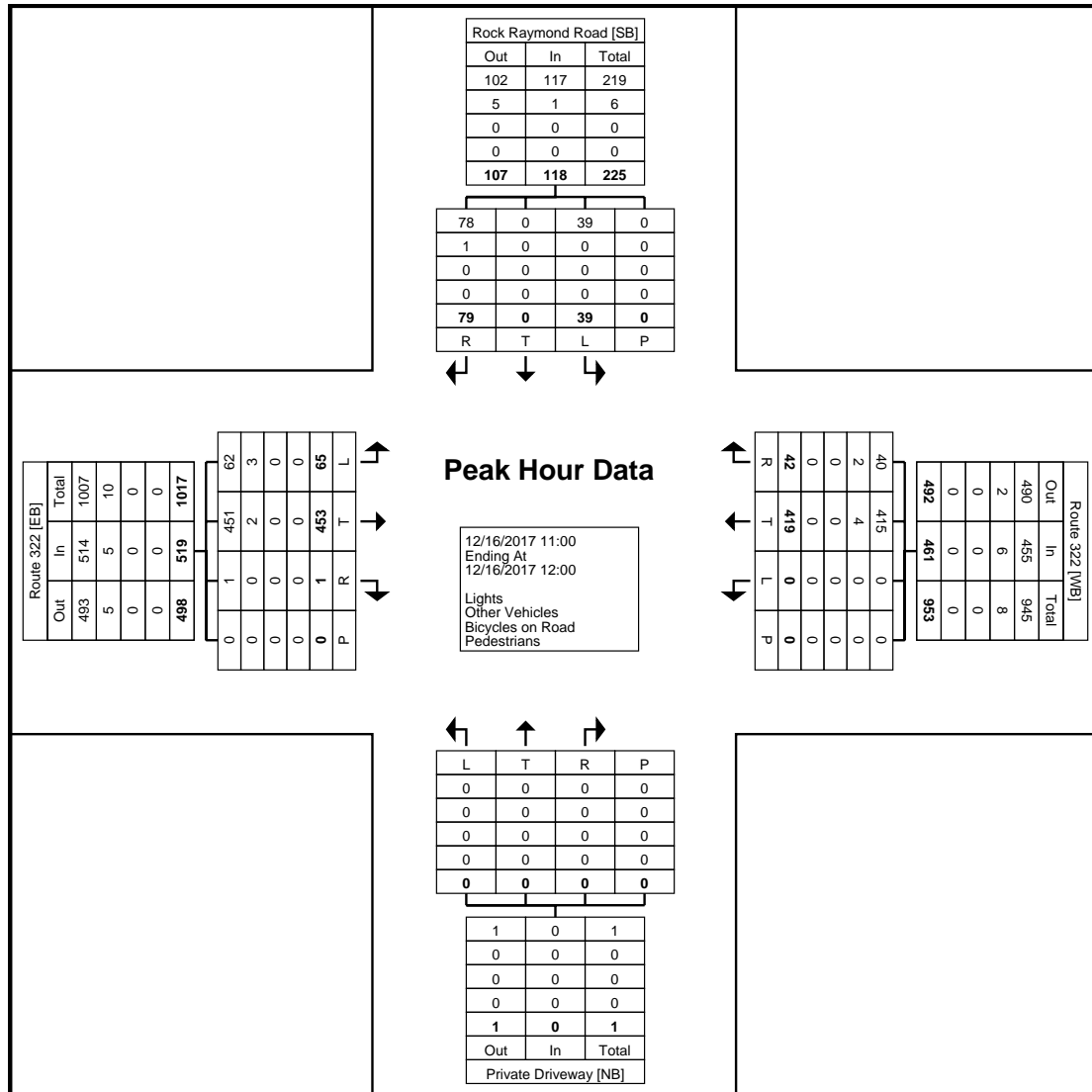


Turning Movement Data Plot

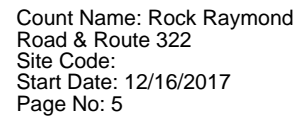


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Set Up By: JH:
Weather: Clear:

Count Name: Rock Raymond
Road & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 4

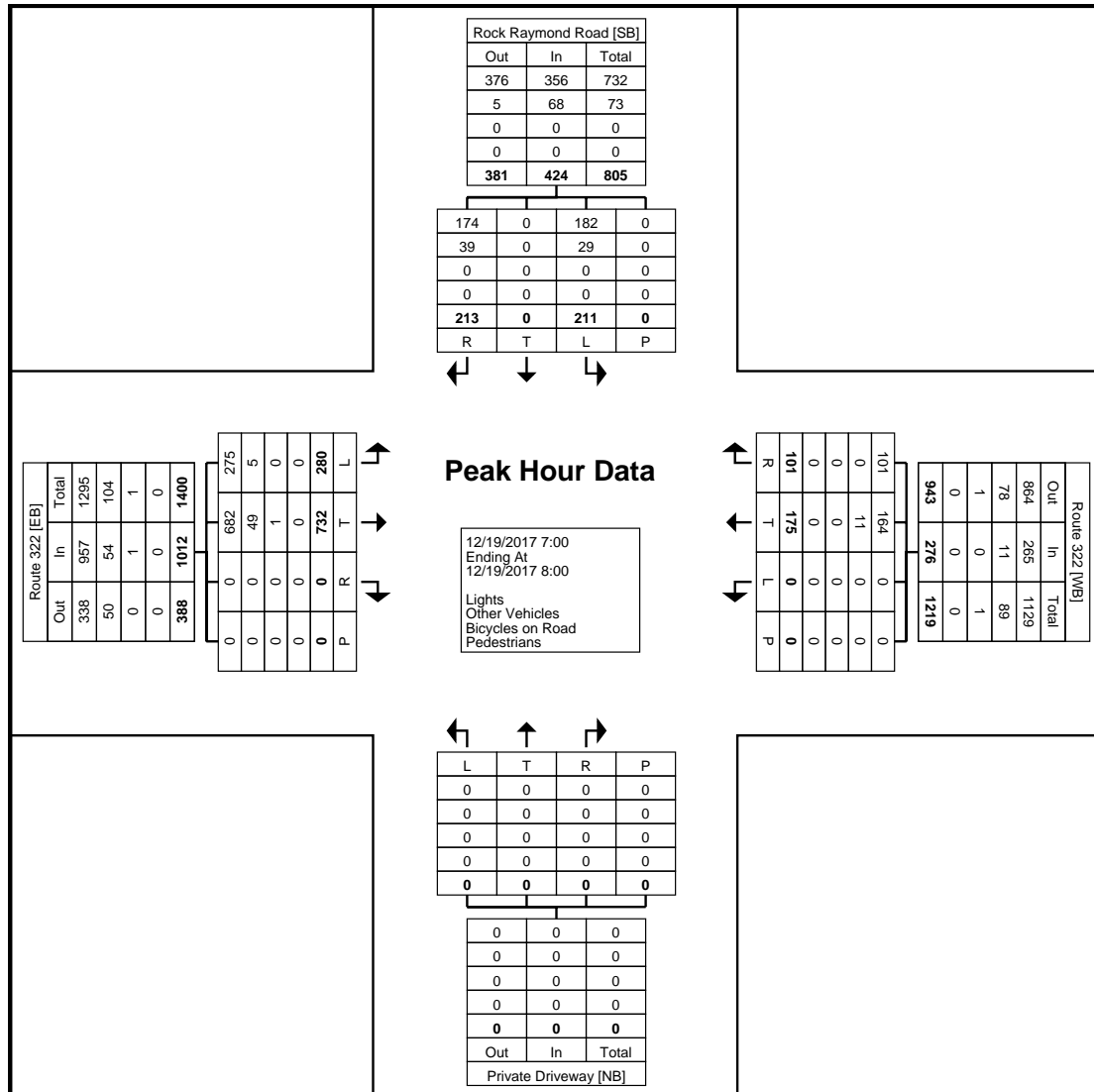


Turning Movement Peak Hour Data Plot (11:00)

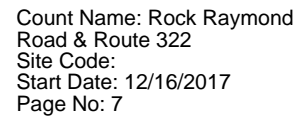


Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Rock Raymond
Road & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 6

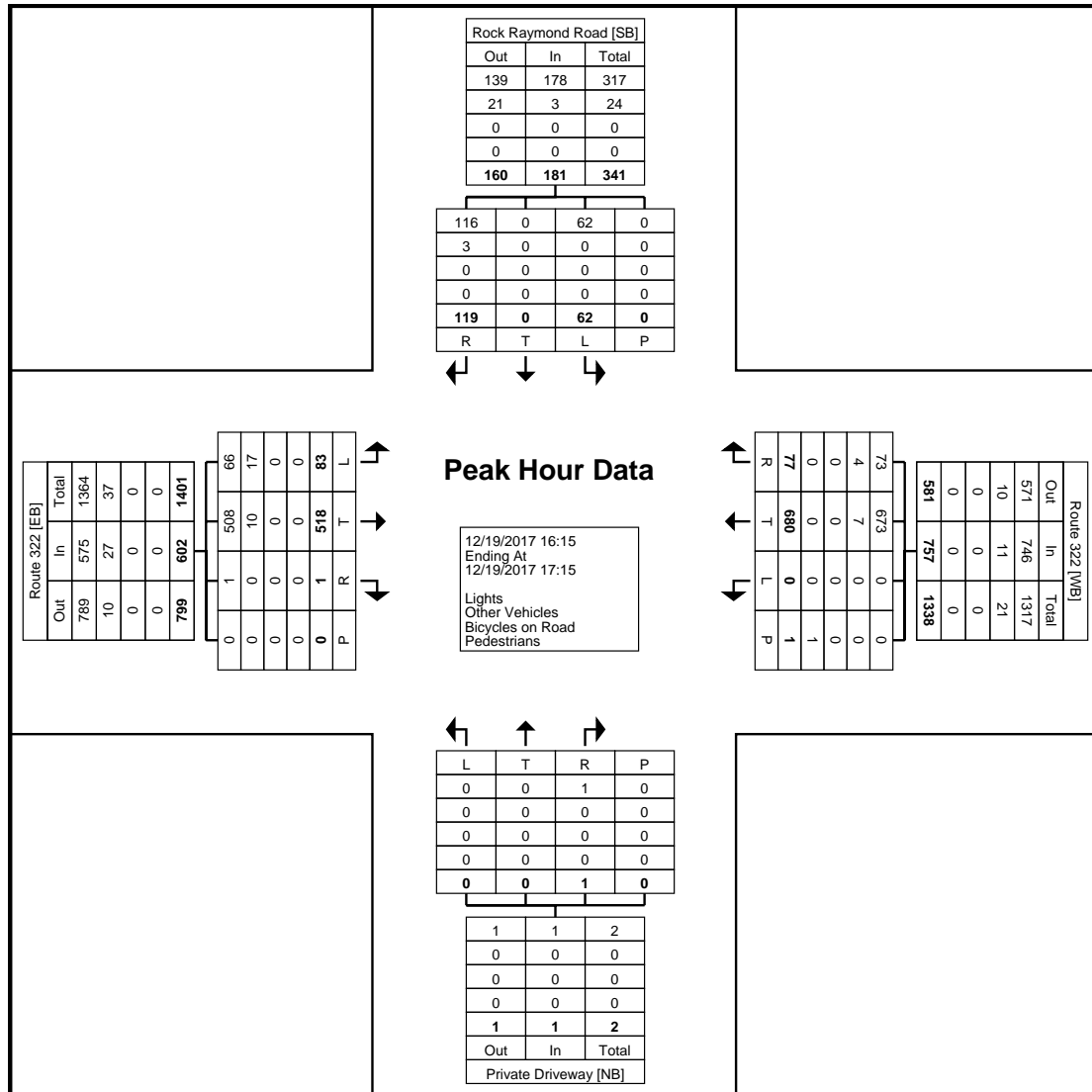


Turning Movement Peak Hour Data Plot (7:00)



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Set Up By: JH:
Weather: Clear:

Count Name: Rock Raymond
Road & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 8



Turning Movement Peak Hour Data Plot (16:15)



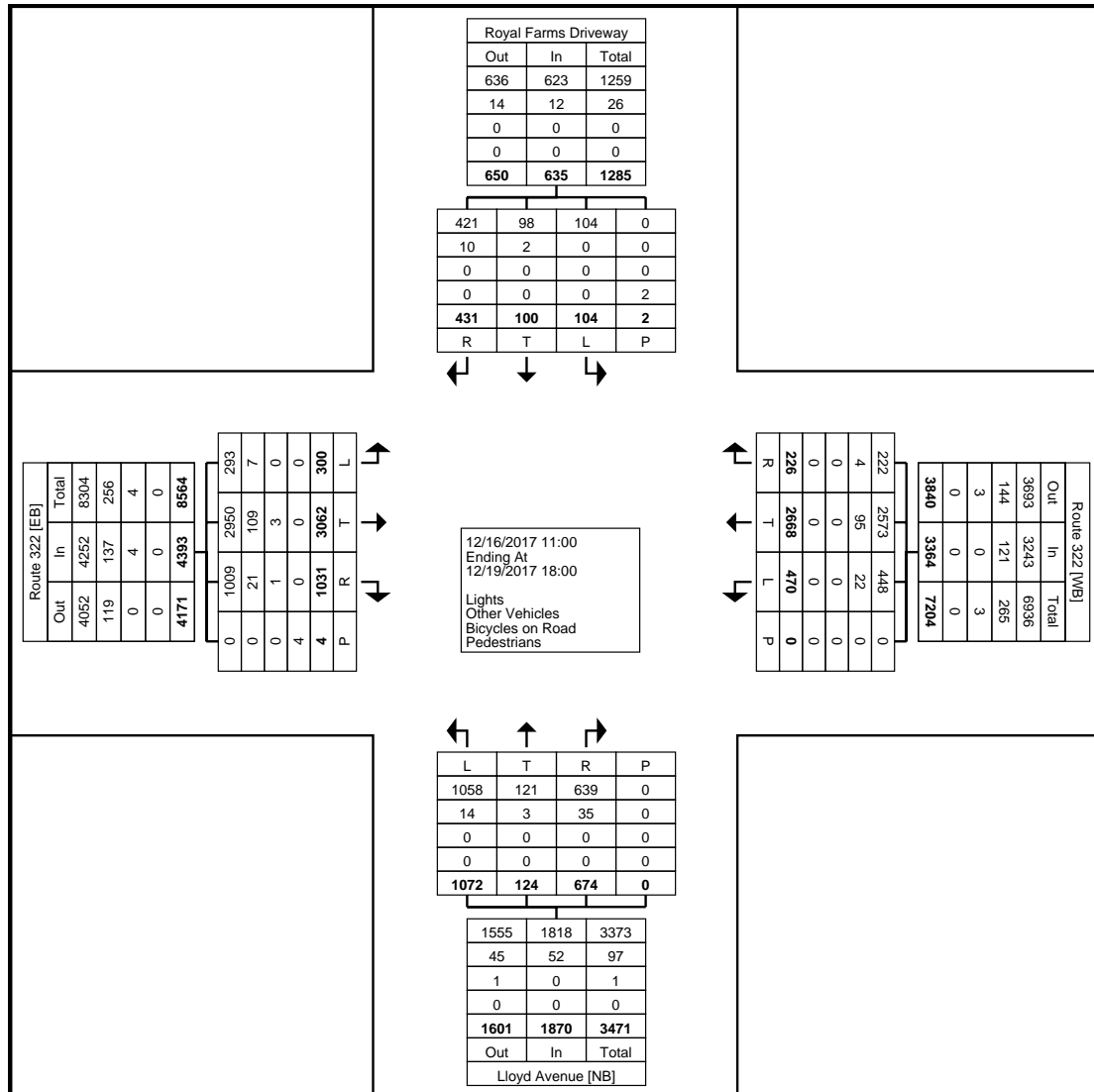
Traffic Planning and Design, Inc
2500 East High Street
Suite 650
Pottstown, Pennsylvania, United States 19464
610.326.3100 mbressler@trafficpd.com

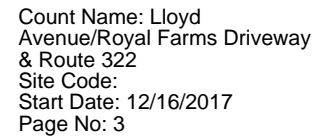
Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 1

Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Turning Movement Data

Start Time	Route 322 Eastbound						Route 322 Westbound						Lloyd Avenue Northbound						Royal Farms Driveway Southbound						Int. Total
	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	
11:00	18	121	35	14	0	188	19	96	6	0	0	121	43	8	8	8	0	67	5	4	13	4	0	26	402
11:15	15	107	32	11	2	165	21	100	9	1	0	131	48	7	5	10	0	70	5	3	9	11	0	28	394
11:30	9	111	31	12	0	163	11	96	13	2	0	122	39	3	5	5	0	52	8	4	15	8	0	35	372
11:45	14	102	40	21	0	177	11	110	6	1	0	128	48	4	6	6	0	64	4	2	10	4	0	20	389
Hourly Total	56	441	138	58	2	693	62	402	34	4	0	502	178	22	24	29	0	253	22	13	47	27	0	109	1557
12:00	16	113	43	15	0	187	18	100	12	2	0	132	44	7	4	9	0	64	2	6	8	13	0	29	412
12:15	10	105	24	19	0	158	15	105	5	6	0	131	46	5	4	8	0	63	5	8	13	10	0	36	388
12:30	18	102	45	10	0	175	11	98	9	1	0	119	48	3	5	5	0	61	5	5	5	8	0	23	378
12:45	14	97	38	14	0	163	11	97	7	4	0	119	42	5	9	5	0	61	10	4	15	9	0	38	381
Hourly Total	58	417	150	58	0	683	55	400	33	13	0	501	180	20	22	27	0	249	22	23	41	40	0	126	1559
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00	6	209	17	3	0	235	12	77	2	1	0	92	49	0	32	23	0	104	3	0	5	7	0	15	446
7:15	11	221	17	1	2	250	16	65	2	0	0	83	24	6	38	42	0	110	2	2	4	4	2	12	455
7:30	13	177	16	1	0	207	34	105	5	2	0	146	59	9	36	35	0	139	7	5	6	12	0	30	522
7:45	14	139	23	4	0	180	12	53	3	3	0	71	53	8	11	26	0	98	5	4	11	11	0	31	380
Hourly Total	44	746	73	9	2	872	74	300	12	6	0	392	185	23	117	126	0	451	17	11	26	34	2	88	1803
8:00	10	172	27	6	0	215	17	92	9	1	0	119	46	9	45	11	0	111	4	4	10	5	0	23	468
8:15	11	115	22	2	0	150	23	84	5	3	0	115	40	3	12	22	0	77	3	2	6	15	0	26	368
8:30	6	122	10	4	0	142	16	67	3	1	0	87	59	2	12	16	0	89	7	2	6	5	0	20	338
8:45	11	135	16	5	0	167	16	89	4	0	0	109	51	6	21	11	0	89	5	3	4	3	0	15	380
Hourly Total	38	544	75	17	0	674	72	332	21	5	0	430	196	20	90	60	0	366	19	11	26	28	0	84	1554
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16:00	11	110	37	10	0	168	25	149	7	5	0	186	34	3	11	10	0	58	5	3	2	20	0	30	442
16:15	15	120	44	8	0	187	22	158	9	6	0	195	40	5	11	9	0	65	2	3	15	8	0	28	475
16:30	15	138	52	6	0	211	34	157	6	8	0	205	46	3	8	12	0	69	1	5	17	8	0	31	516
16:45	12	137	50	7	0	206	28	157	2	2	0	189	40	6	21	13	0	80	5	8	12	5	0	30	505
Hourly Total	53	505	183	31	0	772	109	621	24	21	0	775	160	17	51	44	0	272	13	19	46	41	0	119	1938
17:00	15	101	61	7	0	184	28	172	12	6	0	218	34	6	11	17	0	68	1	6	10	6	0	23	493
17:15	11	101	52	6	0	170	27	142	8	5	0	182	39	7	14	5	0	65	4	7	14	11	0	36	453
17:30	13	101	48	10	0	172	17	163	5	2	0	187	53	5	6	10	0	74	2	6	9	12	0	29	462
17:45	12	106	47	8	0	173	26	136	9	6	0	177	47	4	10	11	0	72	4	4	7	6	0	21	443
Hourly Total	51	409	208	31	0	699	98	613	34	19	0	764	173	22	41	43	0	279	11	23	40	35	0	109	1851
Grand Total	300	3062	827	204	4	4393	470	2668	158	68	0	3364	1072	124	345	329	0	1870	104	100	226	205	2	635	10262
Approach %	6.8	69.7	18.8	4.6	-	-	14.0	79.3	4.7	2.0	-	-	57.3	6.6	18.4	17.6	-	-	16.4	15.7	35.6	32.3	-	-	-
Total %	2.9	29.8	8.1	2.0	-	42.8	4.6	26.0	1.5	0.7	-	32.8	10.4	1.2	3.4	3.2	-	18.2	1.0	1.0	2.2	2.0	-	6.2	-
Lights	293	2950	809	200	-	4252	448	2573	155	67	-	3243	1058	121	324	315	-	1818	104	98	219	202	-	623	9936
% Lights	97.7	96.3	97.8	98.0	-	96.8	95.3	96.4	98.1	98.5	-	96.4	98.7	97.6	93.9	95.7	-	97.2	100.0	98.0	96.9	98.5	-	98.1	96.8
Other Vehicles	7	109	18	3	-	137	22	95	3	1	-	121	14	3	21	14	-	52	0	2	7	3	-	12	322
% Other Vehicles	2.3	3.6	2.2	1.5	-	3.1	4.7	3.6	1.9	1.5	-	3.6	1.3	2.4	6.1	4.3	-	2.8	0.0	2.0	3.1	1.5	-	1.9	3.1
Bicycles on Road	0	3	0	1	-	4	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.1	0.0	0.5	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



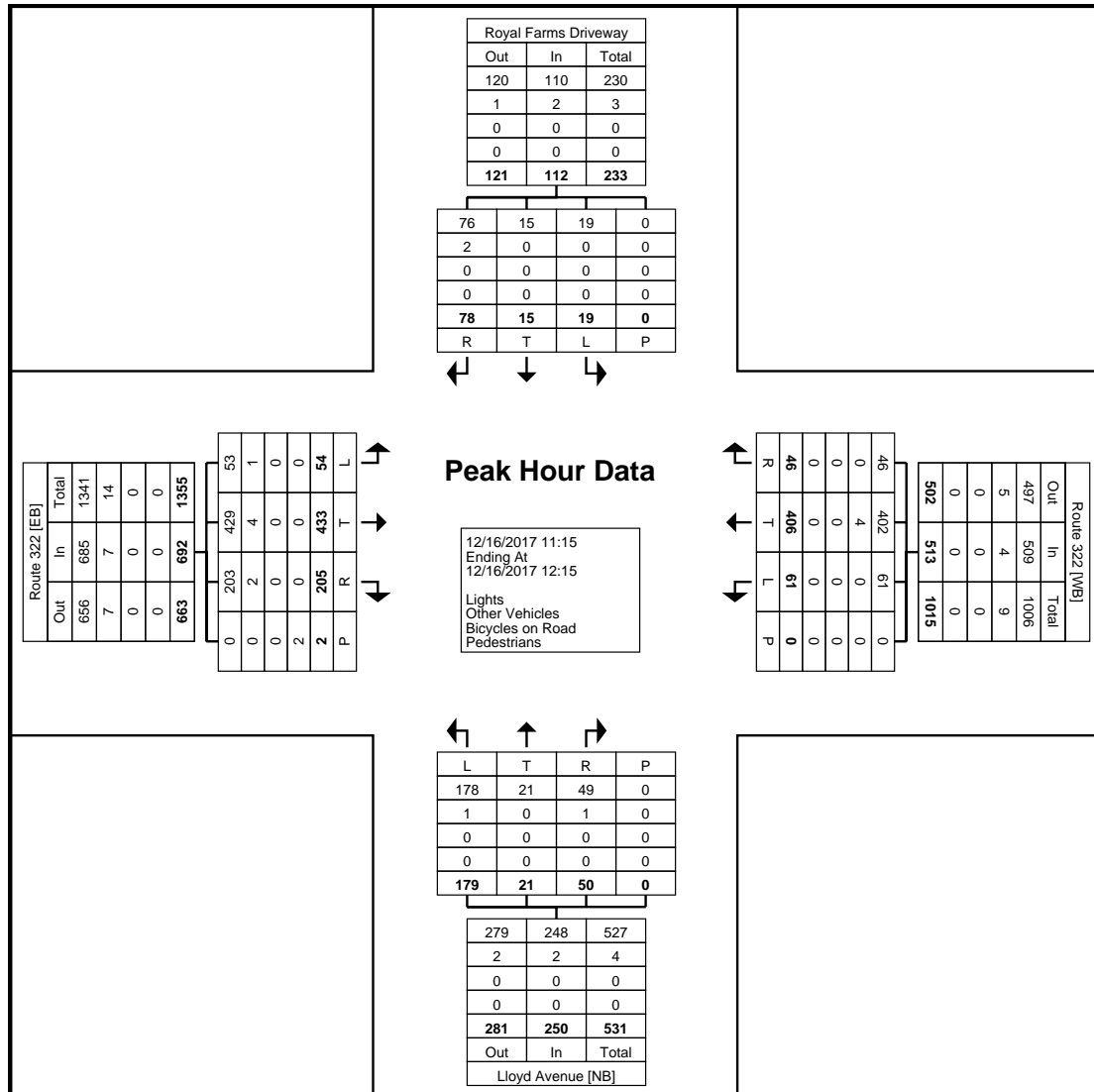
[illegible]



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Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 4

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Turning Movement Peak Hour Data Plot (11:15)



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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 5

Turning Movement Peak Hour Data (7:15)

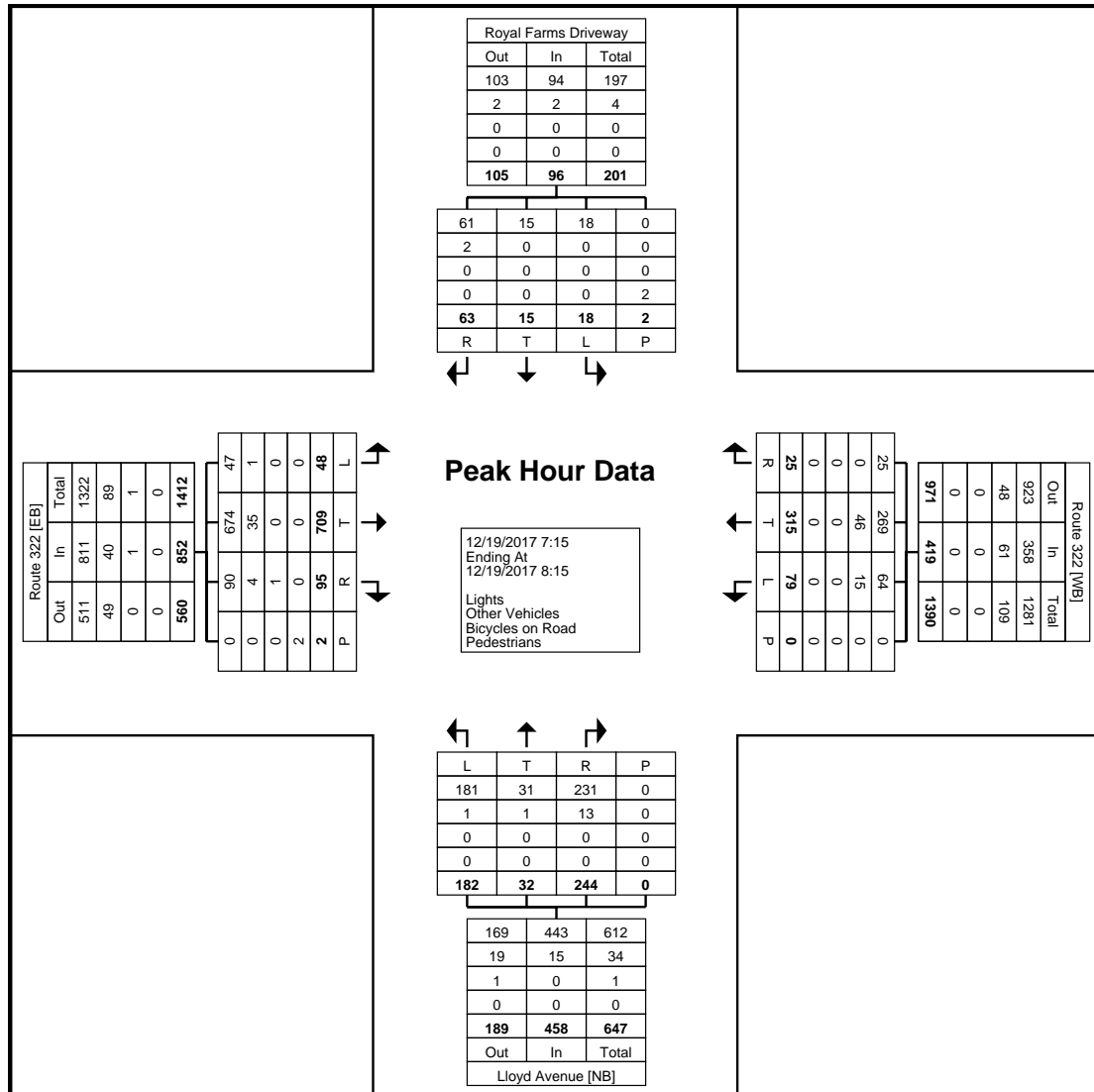
Start Time	Route 322 Eastbound						Route 322 Westbound						Lloyd Avenue Northbound						Royal Farms Driveway Southbound						Int. Total
	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	Left	Thru	Right	Right on Red	Peds	App. Total	
7:15	11	221	17	1	2	250	16	65	2	0	0	83	24	6	38	42	0	110	2	2	4	4	2	12	455
7:30	13	177	16	1	0	207	34	105	5	2	0	146	59	9	36	35	0	139	7	5	6	12	0	30	522
7:45	14	139	23	4	0	180	12	53	3	3	0	71	53	8	11	26	0	98	5	4	11	11	0	31	380
8:00	10	172	27	6	0	215	17	92	9	1	0	119	46	9	45	11	0	111	4	4	10	5	0	23	468
Total	48	709	83	12	2	852	79	315	19	6	0	419	182	32	130	114	0	458	18	15	31	32	2	96	1825
Approach %	5.6	83.2	9.7	1.4	-	-	18.9	75.2	4.5	1.4	-	-	39.7	7.0	28.4	24.9	-	-	18.8	15.6	32.3	33.3	-	-	-
Total %	2.6	38.8	4.5	0.7	-	46.7	4.3	17.3	1.0	0.3	-	23.0	10.0	1.8	7.1	6.2	-	25.1	1.0	0.8	1.7	1.8	-	5.3	-
PHF	0.857	0.802	0.769	0.500	-	0.852	0.581	0.750	0.528	0.500	-	0.717	0.771	0.889	0.722	0.679	-	0.824	0.643	0.750	0.705	0.667	-	0.774	0.874
Lights	47	674	79	11	-	811	64	269	19	6	-	358	181	31	123	108	-	443	18	15	30	31	-	94	1706
% Lights	97.9	95.1	95.2	91.7	-	95.2	81.0	85.4	100.0	100.0	-	85.4	99.5	96.9	94.6	94.7	-	96.7	100.0	100.0	96.8	96.9	-	97.9	93.5
Other Vehicles	1	35	4	0	-	40	15	46	0	0	-	61	1	1	7	6	-	15	0	0	1	1	-	2	118
% Other Vehicles	2.1	4.9	4.8	0.0	-	4.7	19.0	14.6	0.0	0.0	-	14.6	0.5	3.1	5.4	5.3	-	3.3	0.0	0.0	3.2	3.1	-	2.1	6.5
Bicycles on Road	0	0	0	1	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	8.3	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.1
Pedestrians	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 6

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 7

Turning Movement Peak Hour Data (16:15)

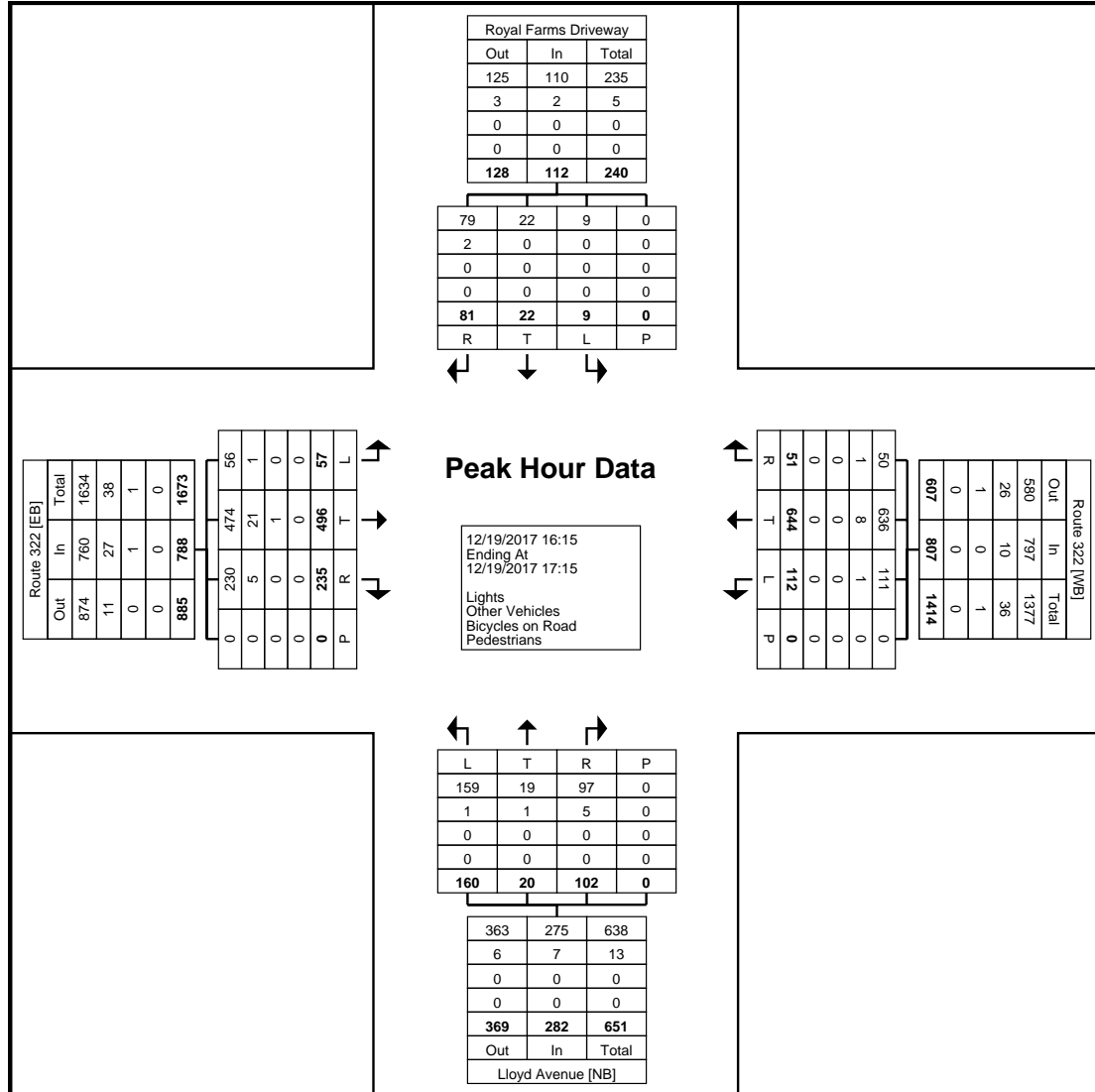
[illegible]



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Count Name: Lloyd
Avenue/Royal Farms Driveway
& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 8

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Turning Movement Peak Hour Data Plot (16:15)

Turning Movement Data

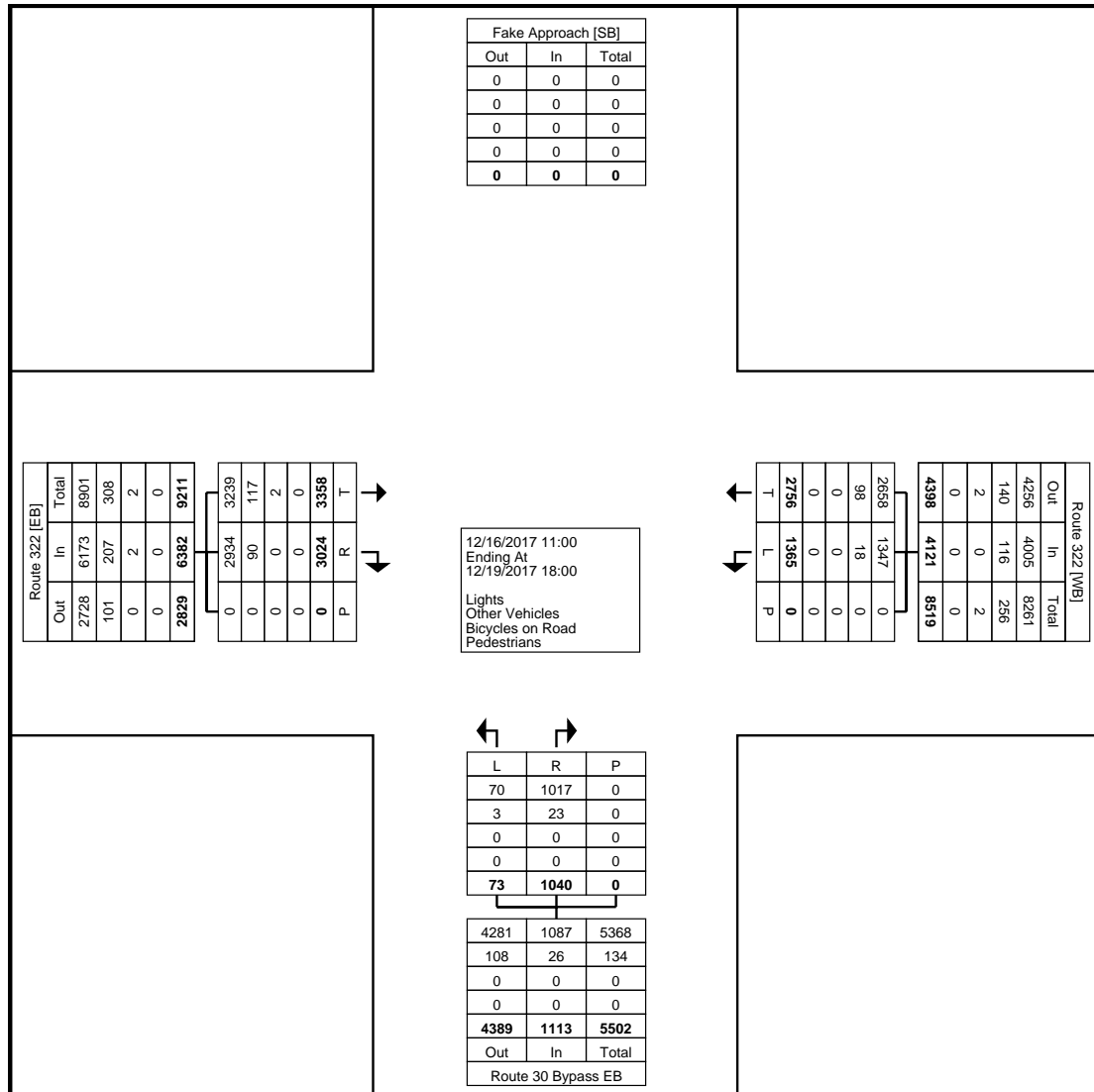
Start Time	Route 322 Eastbound				Route 322 Westbound				Route 30 Bypass EB Ramps Northbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
11:00	134	123	0	257	48	107	0	155	2	47	0	49	461
11:15	136	135	0	271	59	105	0	164	7	40	0	47	482
11:30	120	139	0	259	62	98	0	160	5	40	0	45	464
11:45	130	146	0	276	54	117	0	171	6	46	0	52	499
Hourly Total	520	543	0	1063	223	427	0	650	20	173	0	193	1906
12:00	134	113	0	247	57	95	0	152	2	53	0	55	454
12:15	131	148	0	279	51	125	0	176	2	31	0	33	488
12:30	126	124	0	250	55	106	0	161	3	46	0	49	460
12:45	129	134	0	263	47	98	0	145	5	40	0	45	453
Hourly Total	520	519	0	1039	210	424	0	634	12	170	0	182	1855
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00	184	138	0	322	77	54	0	131	1	42	0	43	496
7:15	202	116	0	318	49	53	0	102	1	49	0	50	470
7:30	181	163	0	344	73	90	0	163	3	35	0	38	545
7:45	143	170	0	313	74	58	0	132	5	34	0	39	484
Hourly Total	710	587	0	1297	273	255	0	528	10	160	0	170	1995
8:00	177	143	0	320	66	98	0	164	2	48	0	50	534
8:15	108	132	0	240	67	76	0	143	3	44	0	47	430
8:30	105	164	0	269	75	67	0	142	4	38	0	42	453
8:45	119	163	0	282	62	79	0	141	1	48	0	49	472
Hourly Total	509	602	0	1111	270	320	0	590	10	178	0	188	1889
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
16:00	117	78	0	195	52	142	0	194	2	49	0	51	440
16:15	129	93	0	222	53	183	0	236	0	47	0	47	505
16:30	159	132	0	291	42	180	0	222	3	55	0	58	571
16:45	149	80	0	229	51	164	0	215	3	51	0	54	498
Hourly Total	554	383	0	937	198	669	0	867	8	202	0	210	2014
17:00	134	85	0	219	42	177	0	219	2	47	0	49	487
17:15	150	94	0	244	52	158	0	210	4	36	0	40	494
17:30	124	106	0	230	55	188	0	243	6	36	0	42	515
17:45	137	105	0	242	42	138	0	180	1	38	0	39	461
Hourly Total	545	390	0	935	191	661	0	852	13	157	0	170	1957
Grand Total	3358	3024	0	6382	1365	2756	0	4121	73	1040	0	1113	11616
Approach %	52.6	47.4	-	-	33.1	66.9	-	-	6.6	93.4	-	-	-
Total %	28.9	26.0	-	54.9	11.8	23.7	-	35.5	0.6	9.0	-	9.6	-
Lights	3239	2934	-	6173	1347	2658	-	4005	70	1017	-	1087	11265
% Lights	96.5	97.0	-	96.7	98.7	96.4	-	97.2	95.9	97.8	-	97.7	97.0
Other Vehicles	117	90	-	207	18	98	-	116	3	23	-	26	349
% Other Vehicles	3.5	3.0	-	3.2	1.3	3.6	-	2.8	4.1	2.2	-	2.3	3.0
Bicycles on Road	2	0	-	2	0	0	-	0	0	0	-	0	2
% Bicycles on Road	0.1	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	0	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-



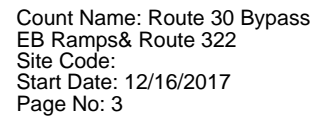
Traffic Planning and Design, Inc
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610.326.3100 mbressler@trafficpd.com

Count Name: Route 30 Bypass
EB Ramps & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 2

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Turning Movement Data Plot



Count Name: Route 30 Bypass
EB Ramps& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 3

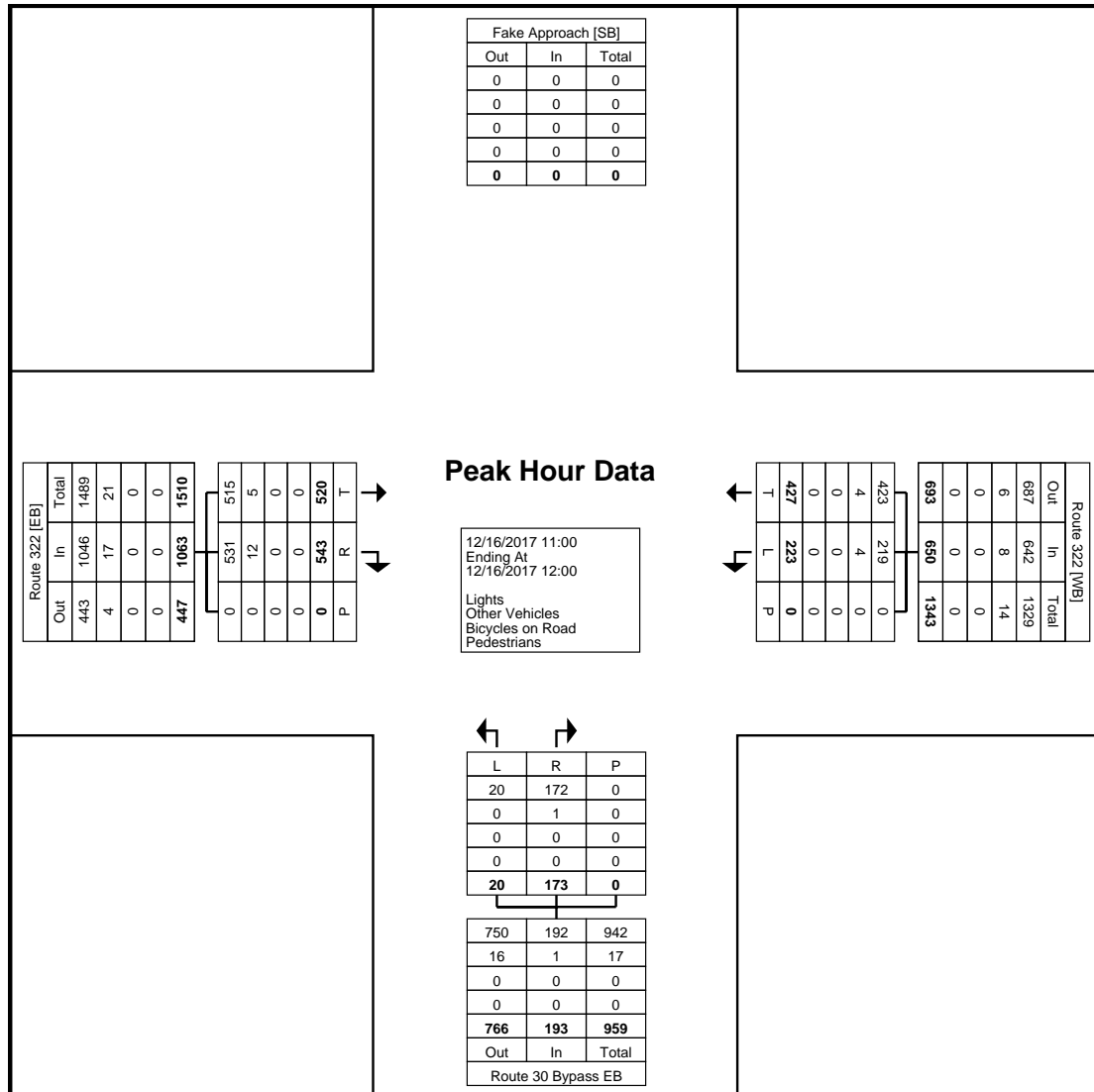
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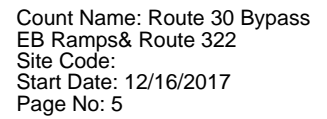
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Count Name: Route 30 Bypass
EB Ramps& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 4

Counted By: Mio:
Set Up By: JH:
Weather:Clear:



Turning Movement Peak Hour Data Plot (11:00)



Count Name: Route 30 Bypass
EB Ramps& Route 322
Site Code:
Start Date: 12/16/2017
Page No: 5

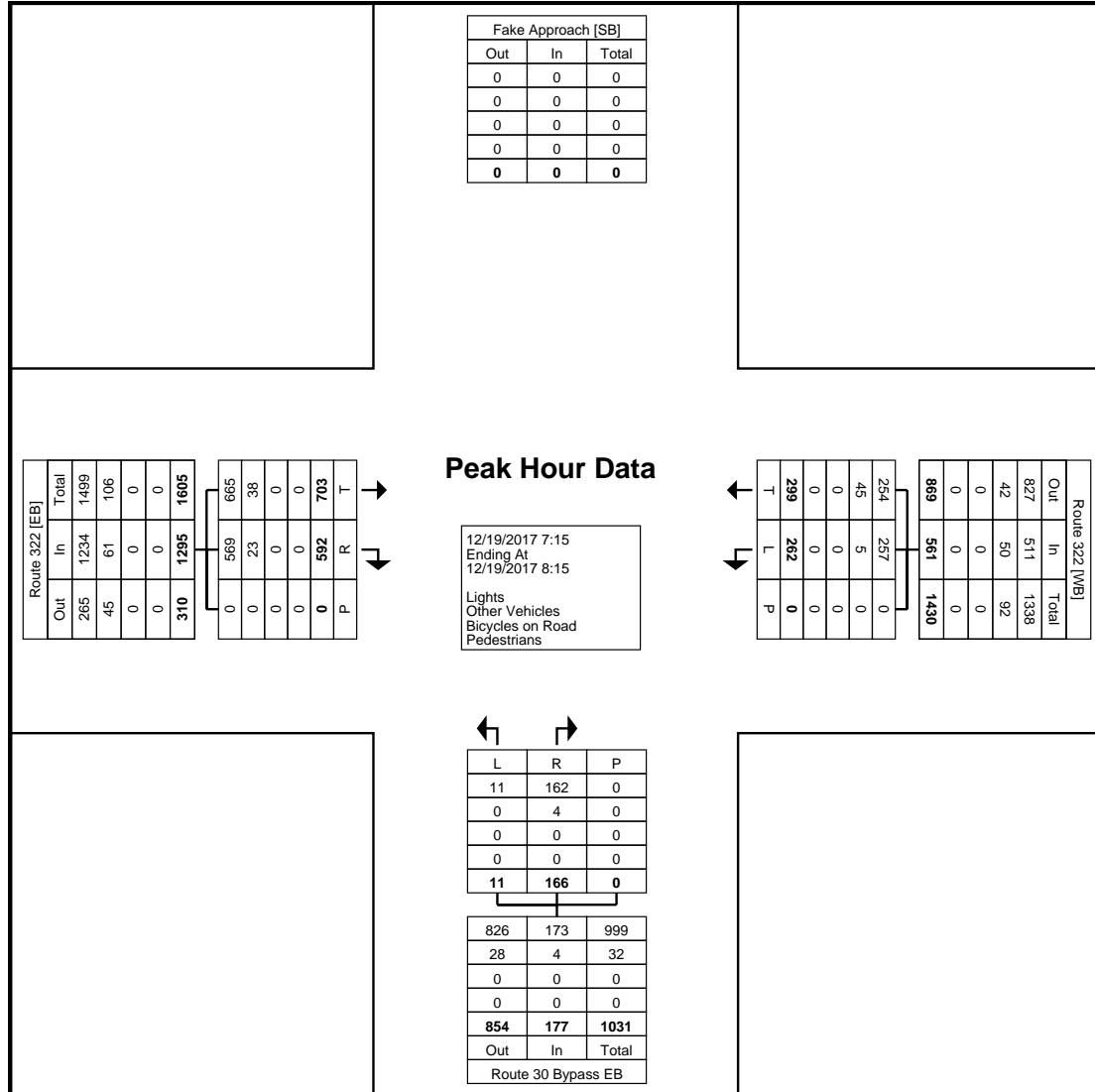
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Route 30 Bypass
EB Ramps & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 6



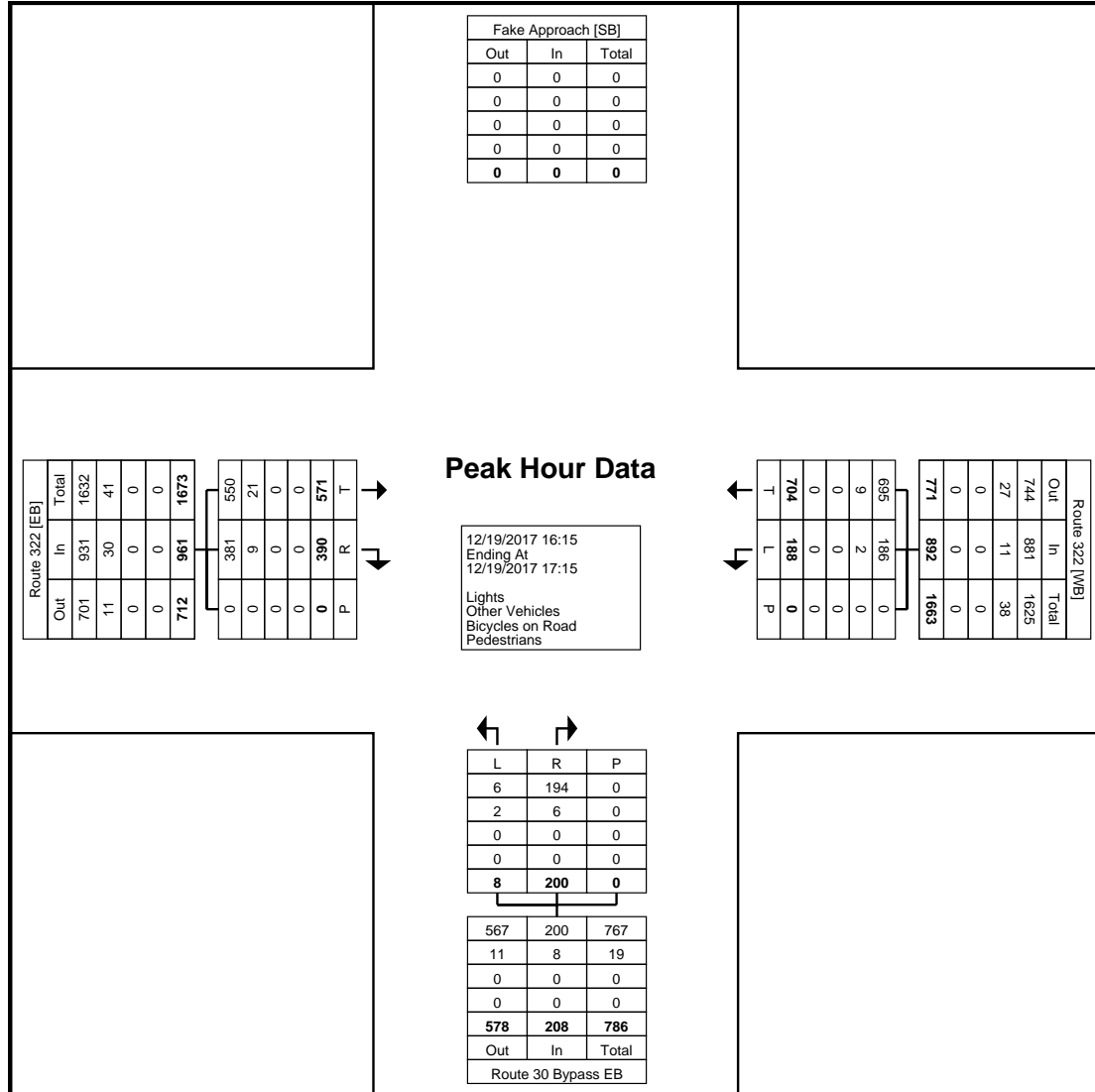
Turning Movement Peak Hour Data Plot (7:15)



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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Route 30 Bypass
EB Ramps & Route 322
Site Code:
Start Date: 12/16/2017
Page No: 8



Turning Movement Peak Hour Data Plot (16:15)



Traffic Planning and Design, Inc
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Count Name: Park and Ride
Driveways & Lloyd Avenue
Site Code:
Start Date: 12/16/2017
Page No: 1

Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Turning Movement Data

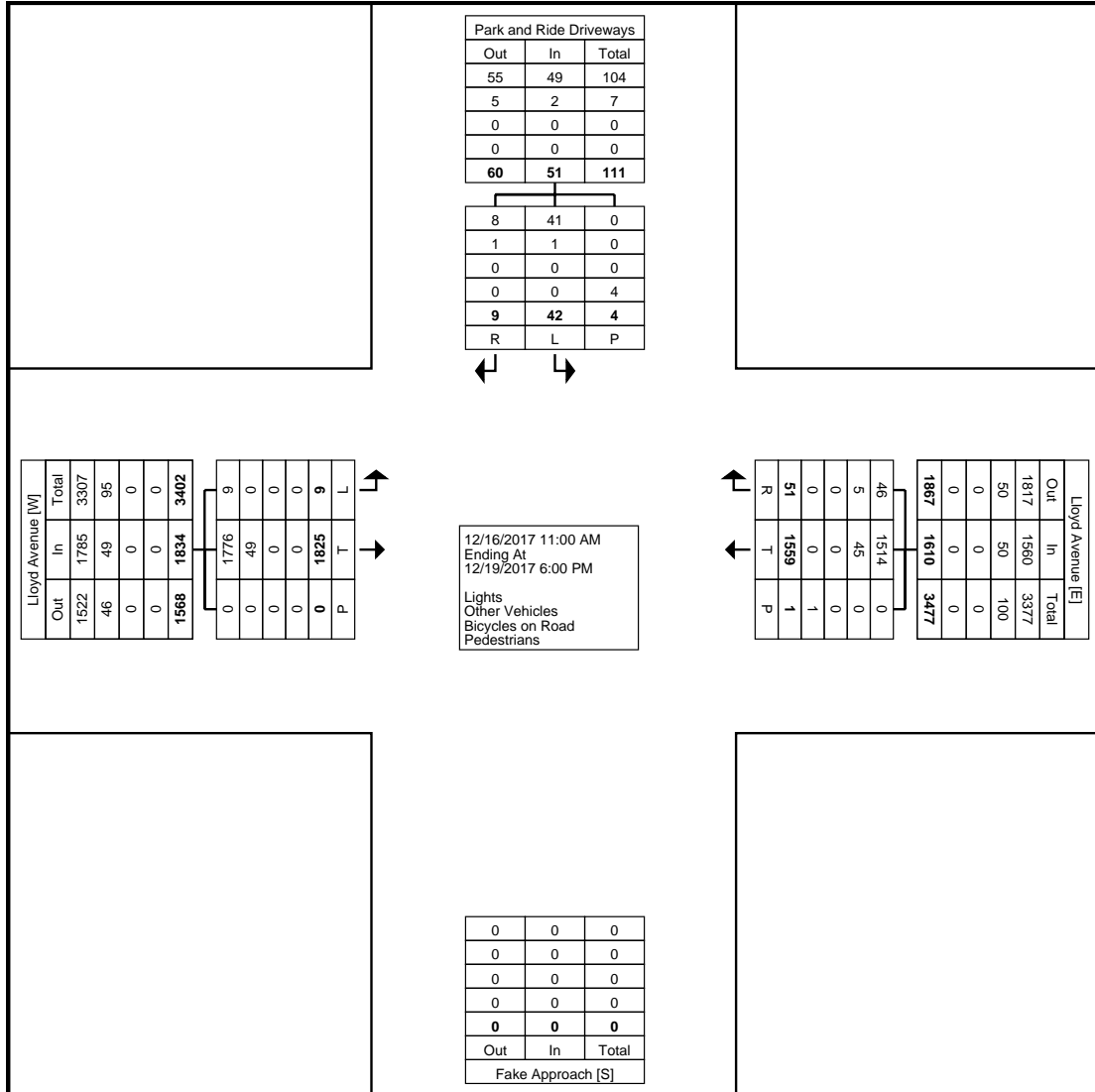
Start Time	Lloyd Avenue Eastbound				Lloyd Avenue Westbound				Park and Ride Driveways Southbound				Int. Total
	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	
11:00 AM	0	71	0	71	67	2	0	69	2	0	0	2	142
11:15 AM	0	70	0	70	72	0	0	72	1	0	0	1	143
11:30 AM	0	52	0	52	56	1	0	57	0	0	0	0	109
11:45 AM	1	63	0	64	70	1	0	71	2	0	0	2	137
Hourly Total	1	256	0	257	265	4	0	269	5	0	0	5	531
12:00 PM	1	59	0	60	75	2	0	77	0	0	0	0	137
12:15 PM	0	65	0	65	74	0	0	74	2	0	0	2	141
12:30 PM	0	61	0	61	71	1	0	72	0	1	0	1	134
12:45 PM	1	55	0	56	70	2	0	72	1	0	0	1	129
Hourly Total	2	240	0	242	290	5	0	295	3	1	0	4	541
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	1	109	0	110	31	2	0	33	1	0	0	1	144
7:15 AM	0	106	0	106	34	2	0	36	2	0	2	2	144
7:30 AM	2	137	0	139	55	3	0	58	2	0	0	2	199
7:45 AM	0	85	0	85	34	6	0	40	2	0	0	2	127
Hourly Total	3	437	0	440	154	13	0	167	7	0	2	7	614
8:00 AM	0	111	0	111	50	7	0	57	5	1	0	6	174
8:15 AM	0	78	0	78	43	4	0	47	3	1	0	4	129
8:30 AM	0	91	0	91	32	0	0	32	0	0	0	0	123
8:45 AM	1	88	0	89	39	1	0	40	1	1	0	2	131
Hourly Total	1	368	0	369	164	12	0	176	9	3	0	12	557
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	53	0	53	76	3	0	79	5	0	0	5	137
4:15 PM	0	65	0	65	71	2	0	73	1	1	0	2	140
4:30 PM	1	65	0	66	96	2	1	98	5	0	2	5	169
4:45 PM	0	80	0	80	95	2	0	97	2	1	0	3	180
Hourly Total	1	263	0	264	338	9	1	347	13	2	2	15	626
5:00 PM	0	65	0	65	89	2	0	91	0	2	0	2	158
5:15 PM	0	69	0	69	98	1	0	99	0	0	0	0	168
5:30 PM	1	69	0	70	76	2	0	78	3	1	0	4	152
5:45 PM	0	58	0	58	85	3	0	88	2	0	0	2	148
Hourly Total	1	261	0	262	348	8	0	356	5	3	0	8	626
Grand Total	9	1825	0	1834	1559	51	1	1610	42	9	4	51	3495
Approach %	0.5	99.5	-	-	96.8	3.2	-	-	82.4	17.6	-	-	-
Total %	0.3	52.2	-	52.5	44.6	1.5	-	46.1	1.2	0.3	-	1.5	-
Lights	9	1776	-	1785	1514	46	-	1560	41	8	-	49	3394
% Lights	100.0	97.3	-	97.3	97.1	90.2	-	96.9	97.6	88.9	-	96.1	97.1
Other Vehicles	0	49	-	49	45	5	-	50	1	1	-	2	101
% Other Vehicles	0.0	2.7	-	2.7	2.9	9.8	-	3.1	2.4	11.1	-	3.9	2.9
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	1	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	100.0	-	-	-	100.0	-	-



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Pottstown, Pennsylvania, United States 19464
610.326.3100 jhudak@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Park and Ride
Driveways & Lloyd Avenue
Site Code:
Start Date: 12/16/2017
Page No: 2



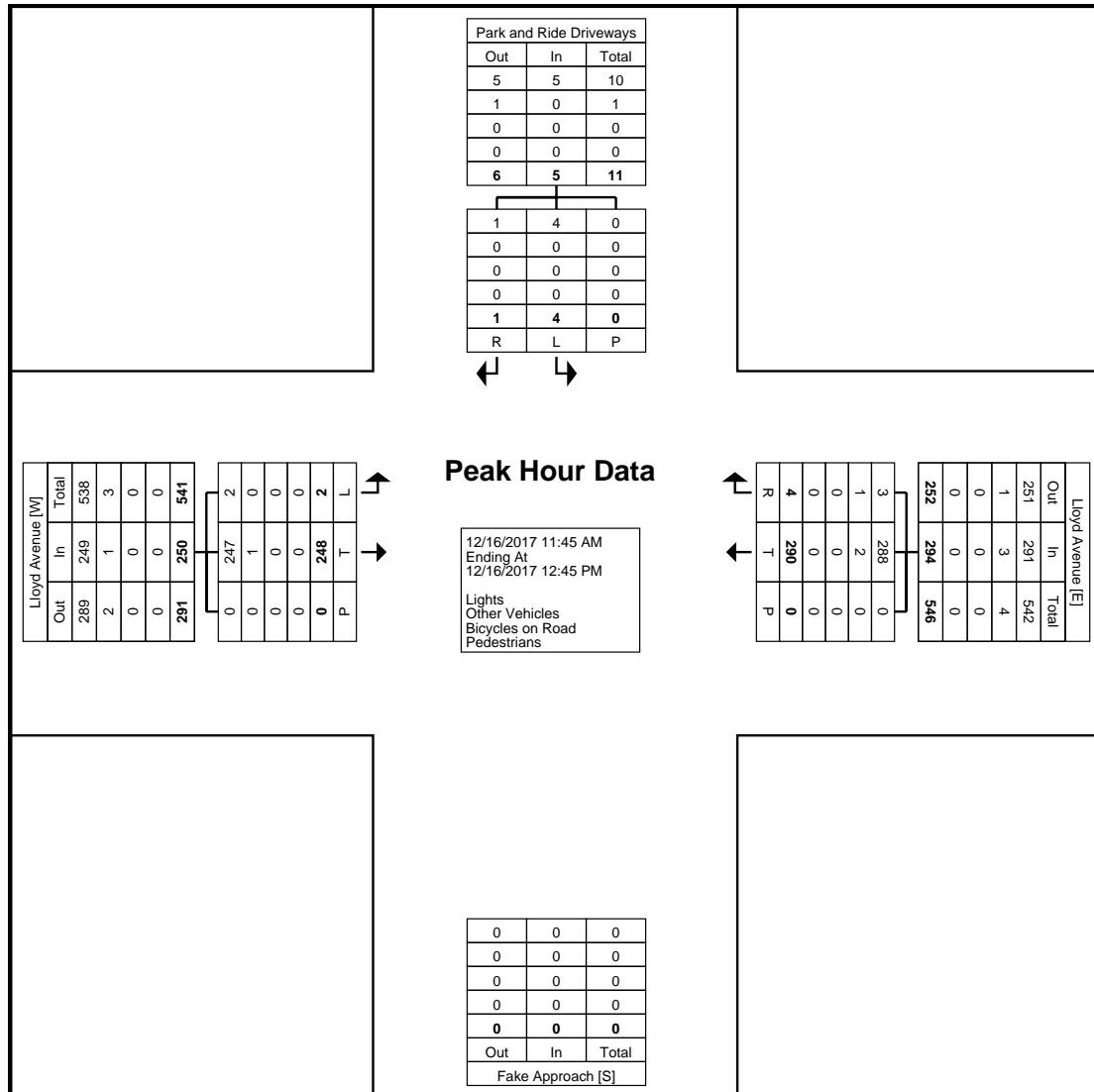
Turning Movement Data Plot



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Count Name: Park and Ride
Driveways & Lloyd Avenue
Site Code:
Start Date: 12/16/2017
Page No: 4



Turning Movement Peak Hour Data Plot (11:45 AM)



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 Set Up By: JH:
 Weather: Clear:

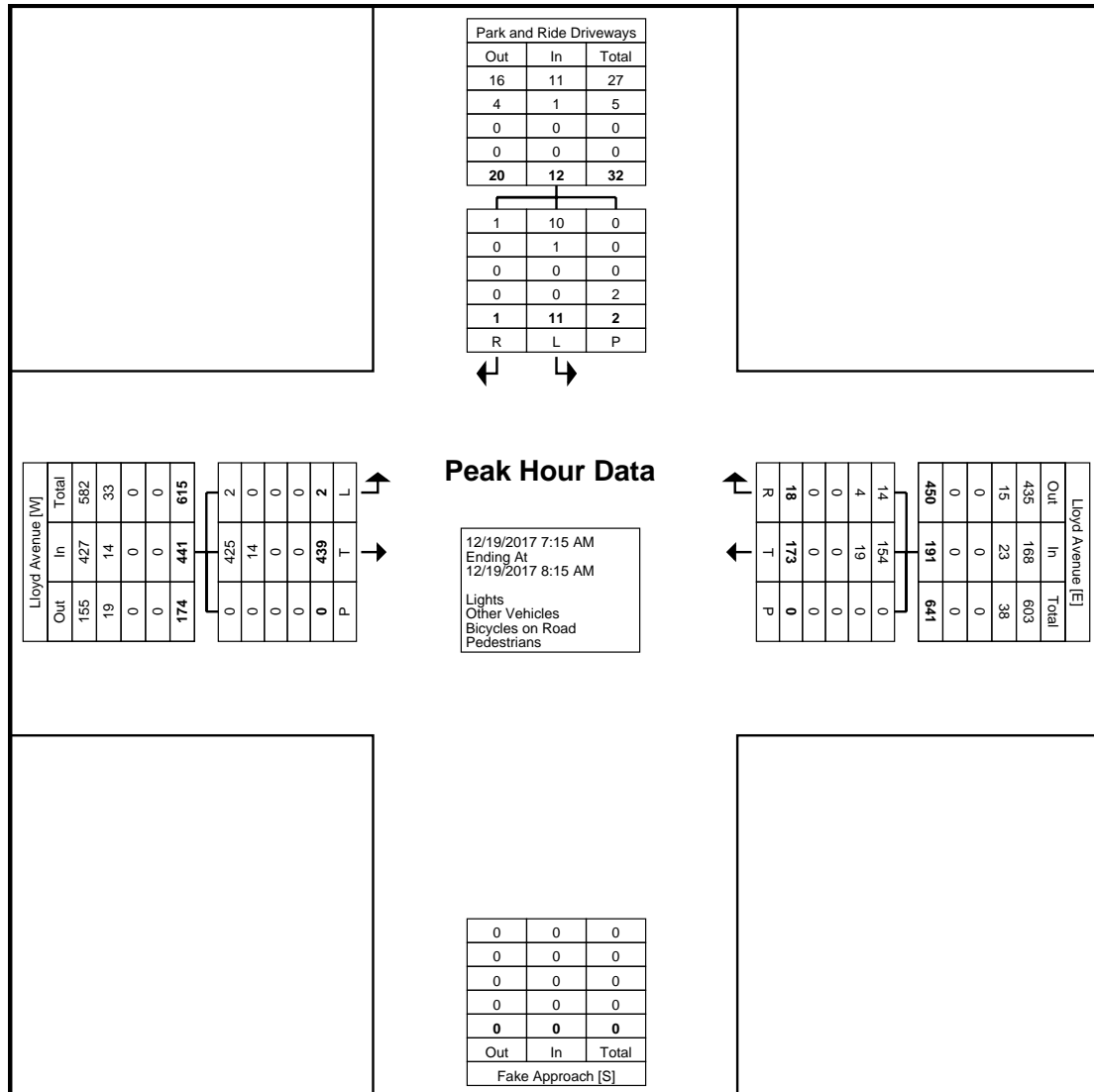
Count Name: Park and Ride
 Driveways & Lloyd Avenue
 Site Code:
 Start Date: 12/16/2017
 Page No: 5

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Lloyd Avenue Eastbound				Lloyd Avenue Westbound				Park and Ride Driveways Southbound				Int. Total
	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	
7:15 AM	0	106	0	106	34	2	0	36	2	0	2	2	144
7:30 AM	2	137	0	139	55	3	0	58	2	0	0	2	199
7:45 AM	0	85	0	85	34	6	0	40	2	0	0	2	127
8:00 AM	0	111	0	111	50	7	0	57	5	1	0	6	174
Total	2	439	0	441	173	18	0	191	11	1	2	12	644
Approach %	0.5	99.5	-	-	90.6	9.4	-	-	91.7	8.3	-	-	-
Total %	0.3	68.2	-	68.5	26.9	2.8	-	29.7	1.7	0.2	-	1.9	-
PHF	0.250	0.801	-	0.793	0.786	0.643	-	0.823	0.550	0.250	-	0.500	0.809
Lights	2	425	-	427	154	14	-	168	10	1	-	11	606
% Lights	100.0	96.8	-	96.8	89.0	77.8	-	88.0	90.9	100.0	-	91.7	94.1
Other Vehicles	0	14	-	14	19	4	-	23	1	0	-	1	38
% Other Vehicles	0.0	3.2	-	3.2	11.0	22.2	-	12.0	9.1	0.0	-	8.3	5.9
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	0	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-

Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Park and Ride
Driveways & Lloyd Avenue
Site Code:
Start Date: 12/16/2017
Page No: 6



Turning Movement Peak Hour Data Plot (7:15 AM)



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Counted By: Mio:
 Set Up By: JH:
 Weather: Clear:

Count Name: Park and Ride
 Driveways & Lloyd Avenue
 Site Code:
 Start Date: 12/16/2017
 Page No: 7

Turning Movement Peak Hour Data (4:30 PM)

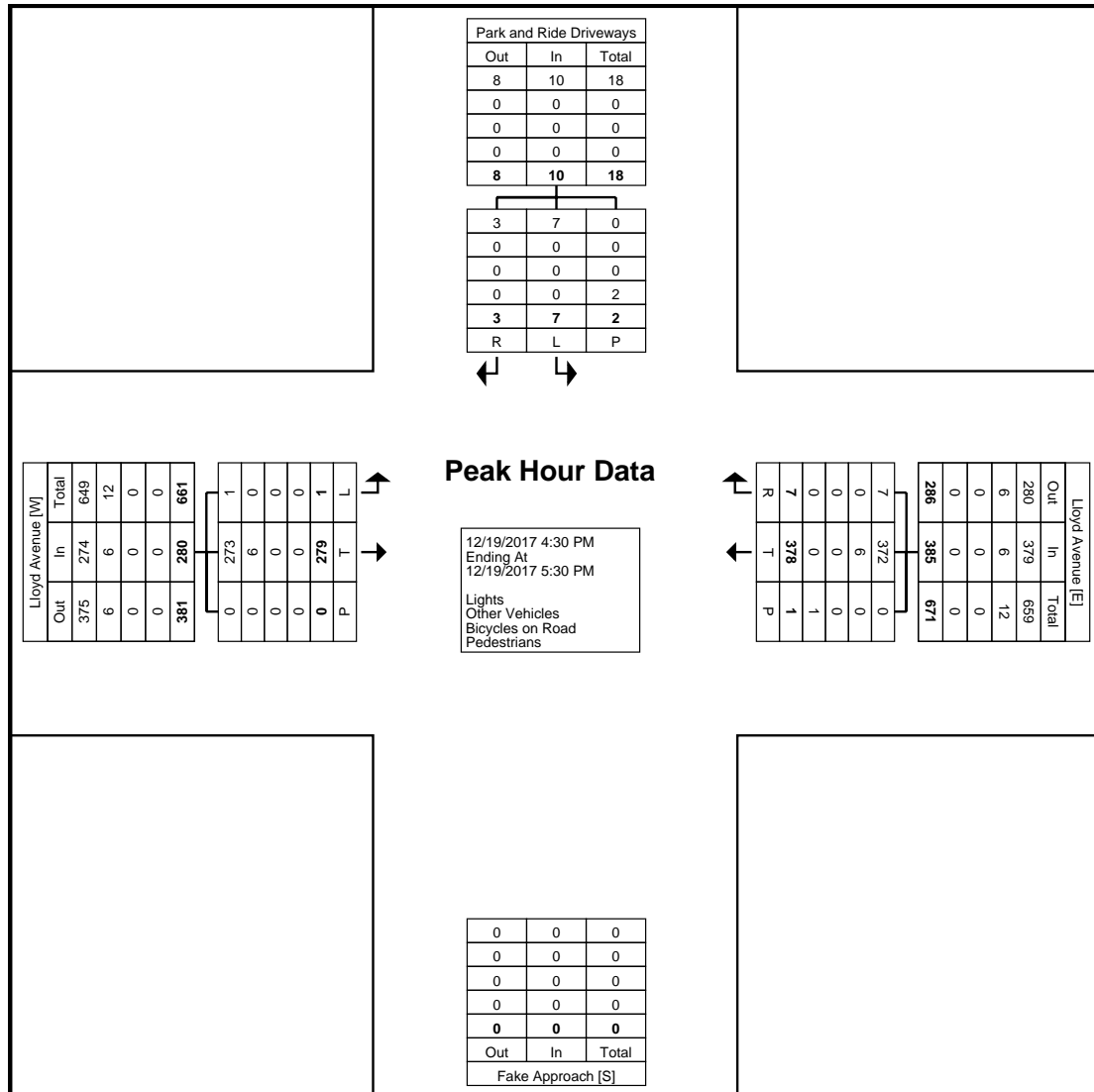
Start Time	Lloyd Avenue Eastbound				Lloyd Avenue Westbound				Park and Ride Driveways Southbound				Int. Total
	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	
4:30 PM	1	65	0	66	96	2	1	98	5	0	2	5	169
4:45 PM	0	80	0	80	95	2	0	97	2	1	0	3	180
5:00 PM	0	65	0	65	89	2	0	91	0	2	0	2	158
5:15 PM	0	69	0	69	98	1	0	99	0	0	0	0	168
Total	1	279	0	280	378	7	1	385	7	3	2	10	675
Approach %	0.4	99.6	-	-	98.2	1.8	-	-	70.0	30.0	-	-	-
Total %	0.1	41.3	-	41.5	56.0	1.0	-	57.0	1.0	0.4	-	1.5	-
PHF	0.250	0.872	-	0.875	0.964	0.875	-	0.972	0.350	0.375	-	0.500	0.938
Lights	1	273	-	274	372	7	-	379	7	3	-	10	663
% Lights	100.0	97.8	-	97.9	98.4	100.0	-	98.4	100.0	100.0	-	100.0	98.2
Other Vehicles	0	6	-	6	6	0	-	6	0	0	-	0	12
% Other Vehicles	0.0	2.2	-	2.1	1.6	0.0	-	1.6	0.0	0.0	-	0.0	1.8
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	1	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	100.0	-	-	-	100.0	-	-



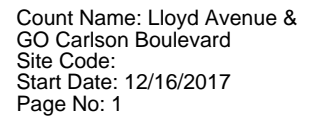
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Set Up By: JH:
Weather: Clear:

Count Name: Park and Ride
Driveways & Lloyd Avenue
Site Code:
Start Date: 12/16/2017
Page No: 8



Turning Movement Peak Hour Data Plot (4:30 PM)



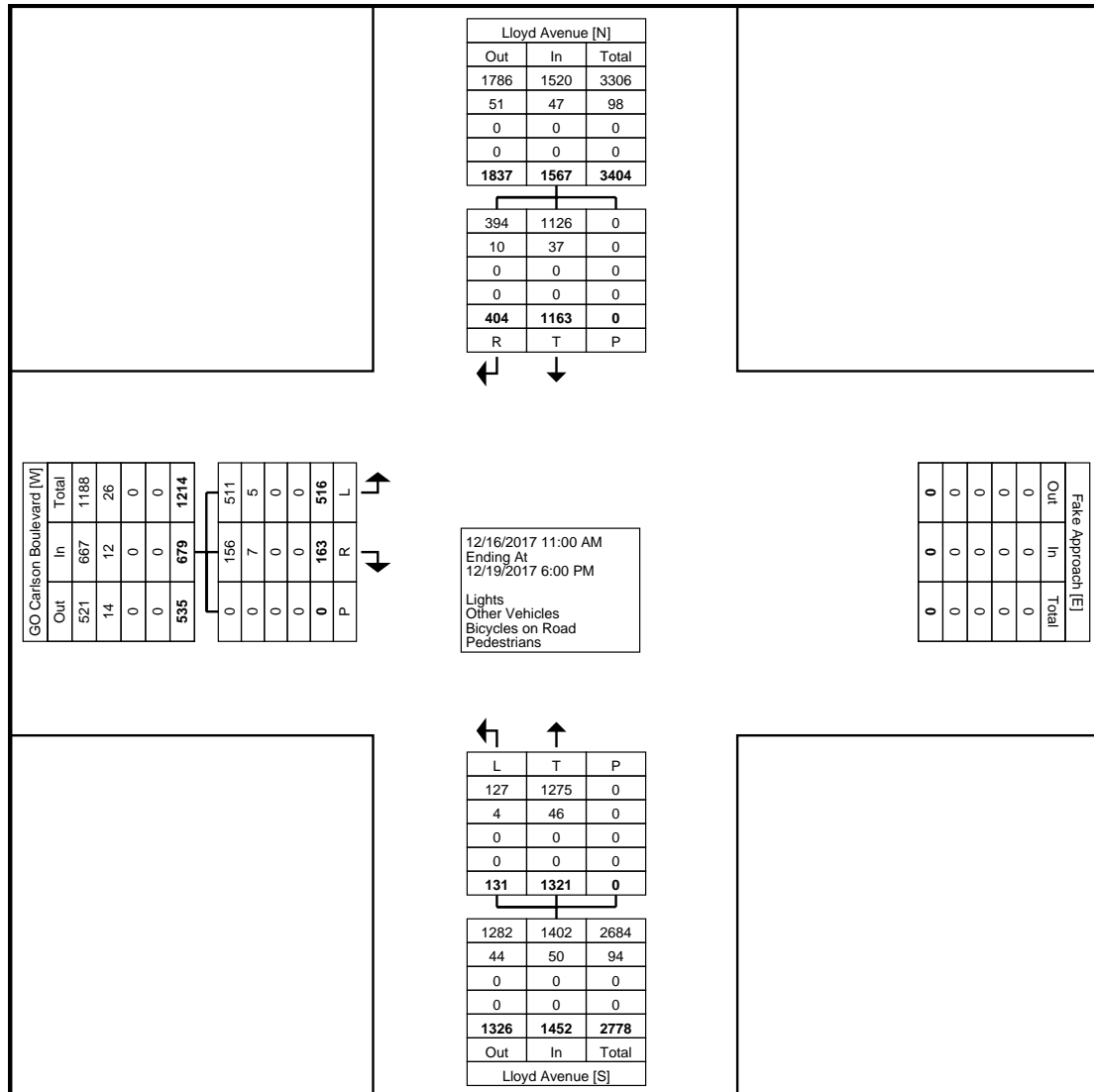
Start Time	GO Carlson Boulevard Eastbound				Lloyd Avenue Northbound				Lloyd Avenue Southbound				Int. Total
	Left	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	
11:00 AM	19	8	0	27	4	48	0	52	47	21	0	68	147
11:15 AM	20	6	0	26	2	53	0	55	53	15	0	68	149
11:30 AM	17	4	0	21	6	32	0	38	45	12	0	57	116
11:45 AM	14	5	0	19	2	46	0	48	49	24	0	73	140
Hourly Total	70	23	0	93	14	179	0	193	194	72	0	266	552
12:00 PM	17	8	0	25	5	49	0	54	52	21	0	73	152
12:15 PM	14	3	0	17	4	48	0	52	64	10	0	74	143
12:30 PM	17	6	0	23	8	45	0	53	60	13	0	73	149
12:45 PM	16	4	0	20	6	41	0	47	51	17	0	68	135
Hourly Total	64	21	0	85	23	183	0	206	227	61	0	288	579
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	31	15	0	46	3	86	0	89	27	4	0	31	166
7:15 AM	30	19	0	49	1	90	0	91	29	4	0	33	173
7:30 AM	37	7	0	44	5	80	0	85	51	5	0	56	185
7:45 AM	28	9	0	37	4	58	0	62	30	5	0	35	134
Hourly Total	126	50	0	176	13	314	0	327	137	18	0	155	658
8:00 AM	41	11	0	52	3	67	0	70	45	5	0	50	172
8:15 AM	23	9	0	32	1	60	0	61	37	8	0	45	138
8:30 AM	26	4	0	30	6	61	0	67	24	6	0	30	127
8:45 AM	29	3	0	32	1	60	0	61	35	6	0	41	134
Hourly Total	119	27	0	146	11	248	0	259	141	25	0	166	571
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	13	3	0	16	11	42	0	53	51	23	0	74	143
4:15 PM	12	7	0	19	10	54	0	64	55	20	0	75	158
4:30 PM	13	8	0	21	8	48	0	56	64	29	0	93	170
4:45 PM	11	7	0	18	5	70	0	75	68	29	0	97	190
Hourly Total	49	25	0	74	34	214	0	248	238	101	0	339	661
5:00 PM	14	5	0	19	6	51	0	57	59	35	0	94	170
5:15 PM	28	4	0	32	17	39	0	56	66	31	0	97	185
5:30 PM	25	3	0	28	9	47	0	56	48	29	0	77	161
5:45 PM	21	5	0	26	4	46	0	50	53	32	0	85	161
Hourly Total	88	17	0	105	36	183	0	219	226	127	0	353	677
Grand Total	516	163	0	679	131	1321	0	1452	1163	404	0	1567	3698
Approach %	76.0	24.0	-	-	9.0	91.0	-	-	74.2	25.8	-	-	-
Total %	14.0	4.4	-	18.4	3.5	35.7	-	39.3	31.4	10.9	-	42.4	-
Lights	511	156	-	667	127	1275	-	1402	1126	394	-	1520	3589
% Lights	99.0	95.7	-	98.2	96.9	96.5	-	96.6	96.8	97.5	-	97.0	97.1
Other Vehicles	5	7	-	12	4	46	-	50	37	10	-	47	109
% Other Vehicles	1.0	4.3	-	1.8	3.1	3.5	-	3.4	3.2	2.5	-	3.0	2.9
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	0	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-



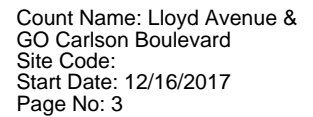
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Pottstown, Pennsylvania, United States 19464
610.326.3100 jhudak@trafficpd.com

Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue &
GO Carlson Boulevard
Site Code:
Start Date: 12/16/2017
Page No: 2



Turning Movement Data Plot

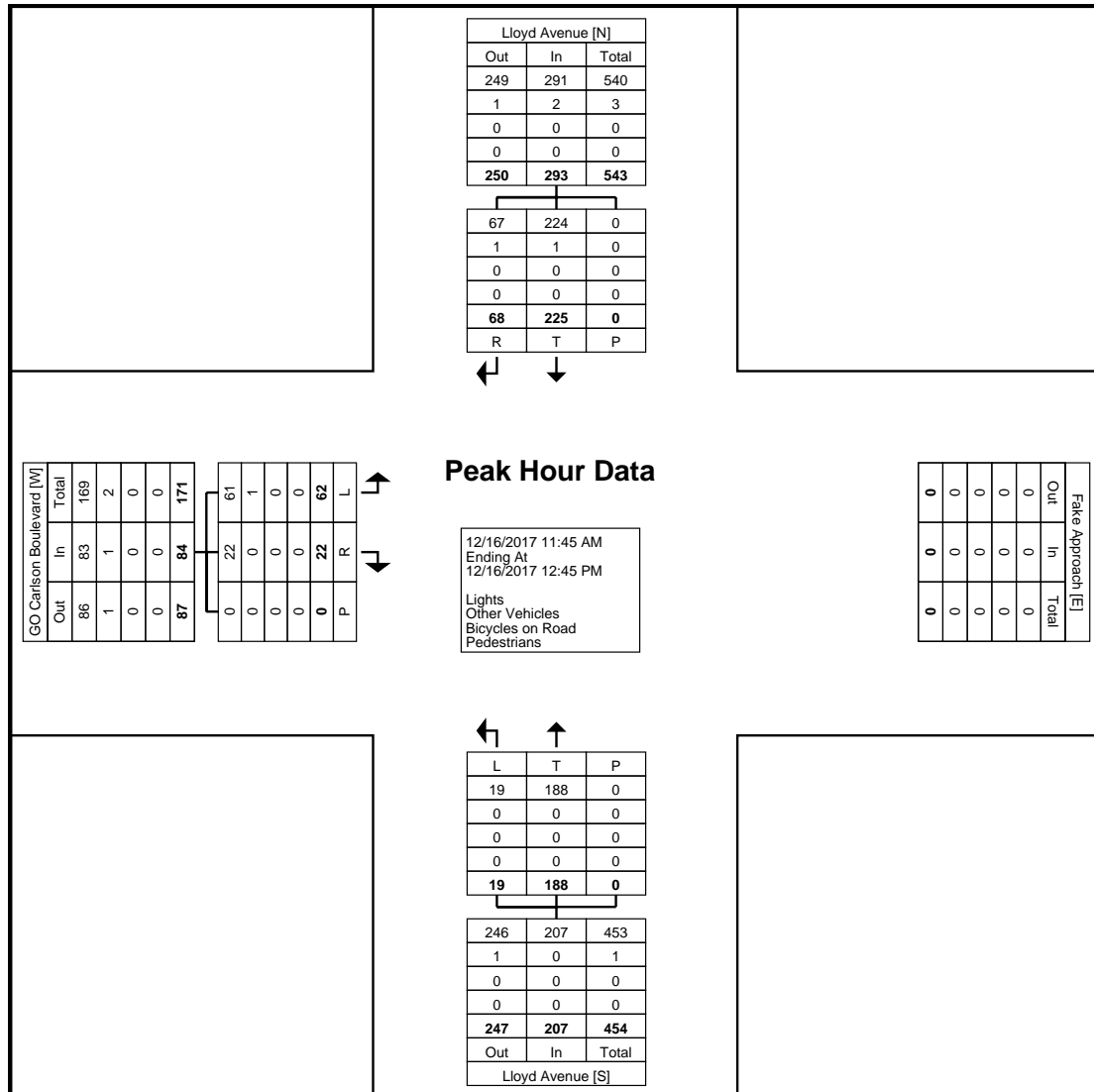
[illegible]



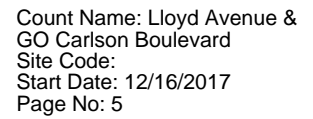
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue &
GO Carlson Boulevard
Site Code:
Start Date: 12/16/2017
Page No: 4



Turning Movement Peak Hour Data Plot (11:45 AM)

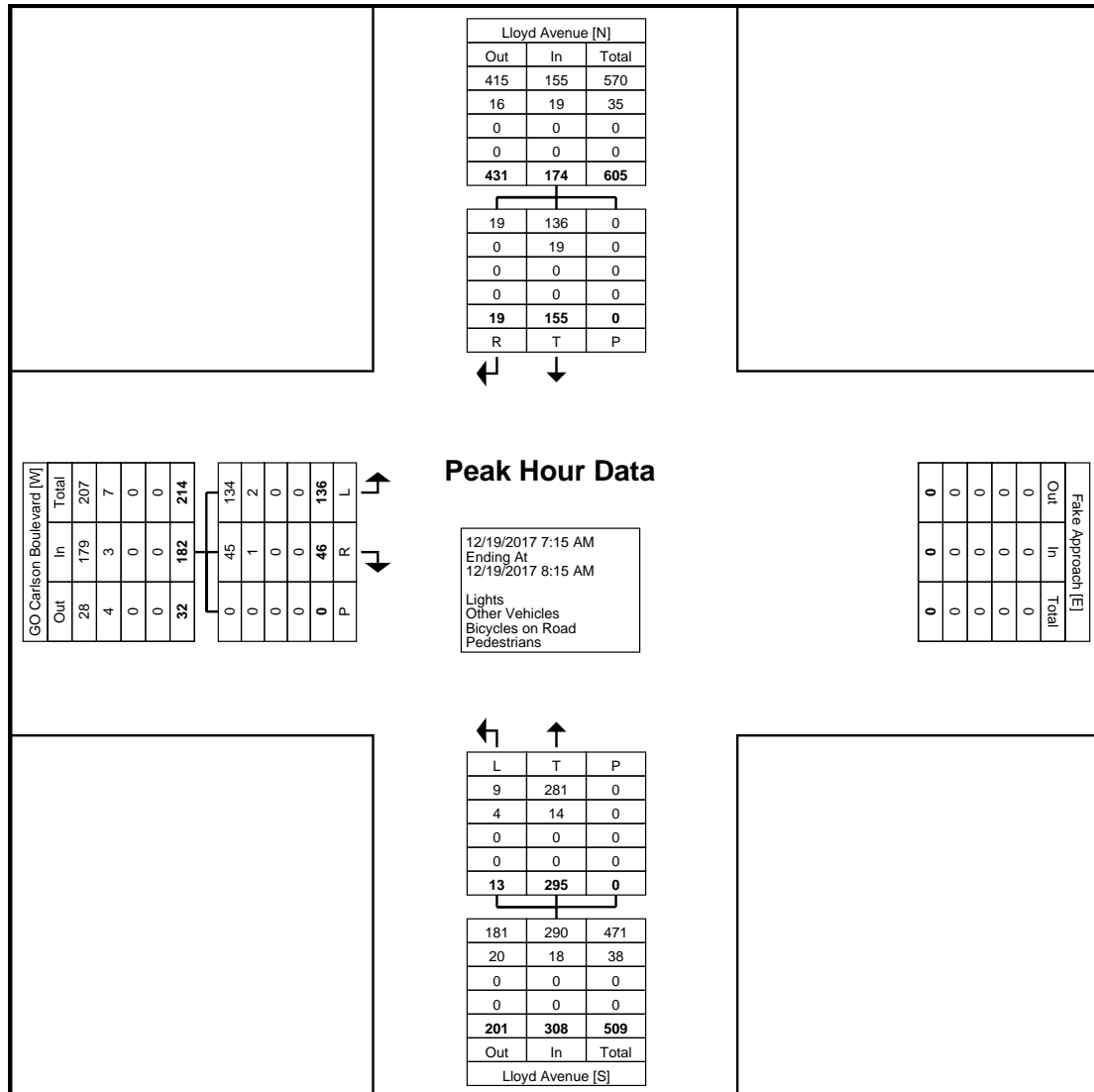
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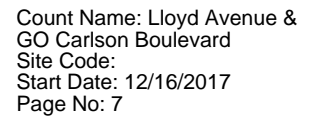
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue &
GO Carlson Boulevard
Site Code:
Start Date: 12/16/2017
Page No: 6



Turning Movement Peak Hour Data Plot (7:15 AM)

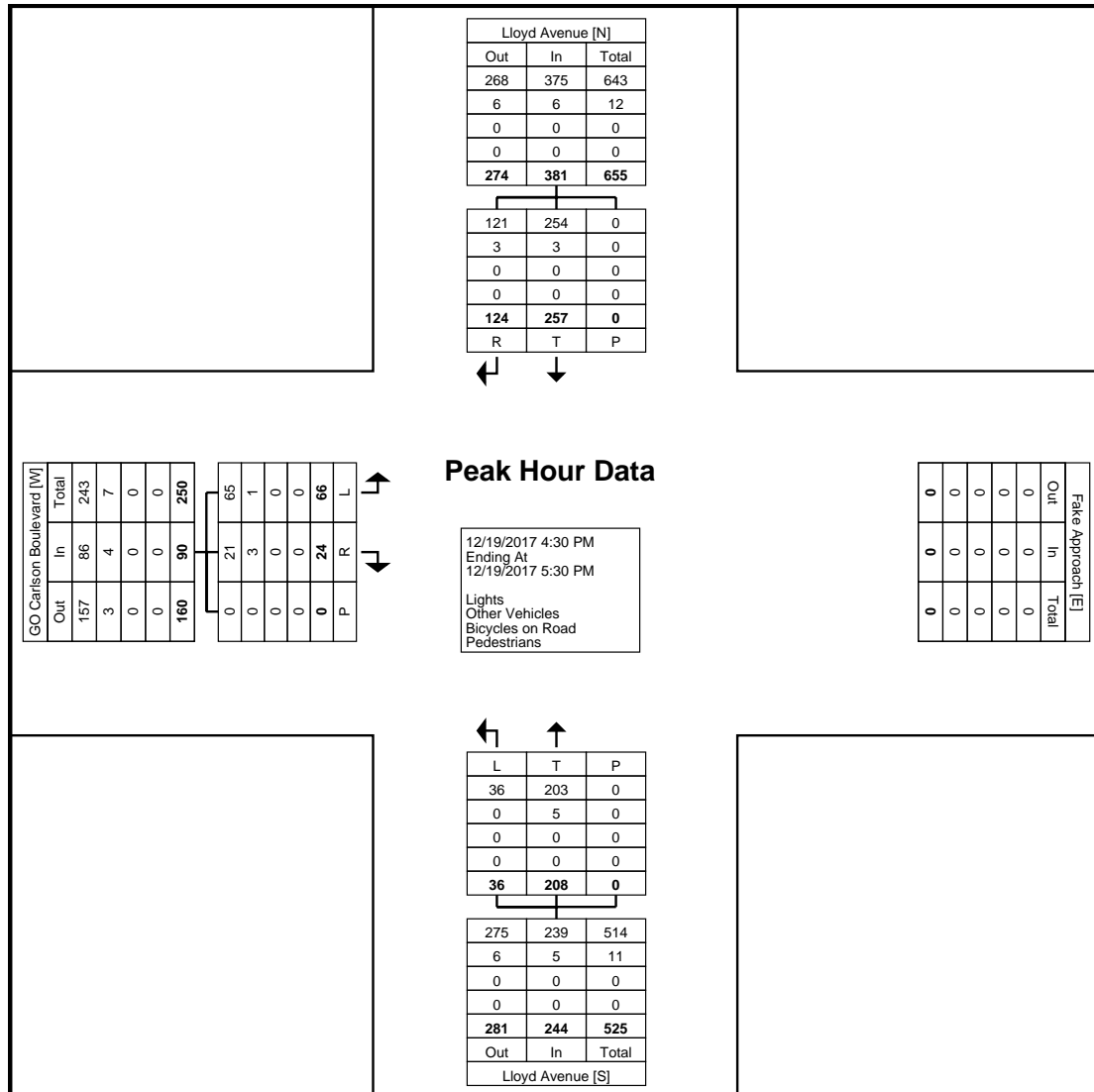
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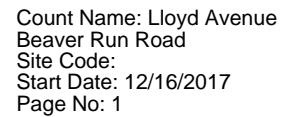
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Count Name: Lloyd Avenue &
GO Carlson Boulevard
Site Code:
Start Date: 12/16/2017
Page No: 8

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Turning Movement Peak Hour Data Plot (4:30 PM)



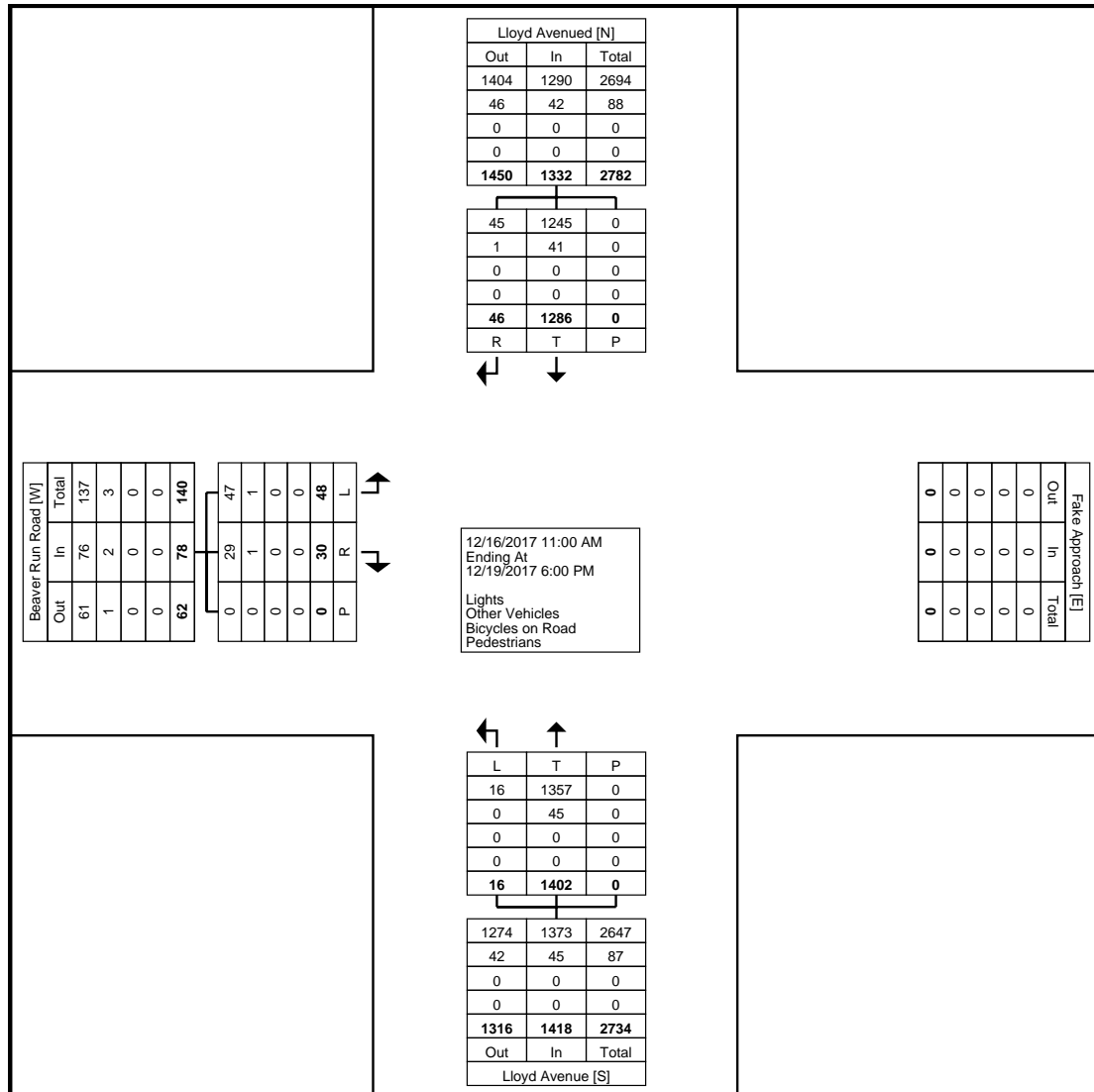
Start Time	Beaver Run Road Eastbound				Lloyd Avenue Northbound				Lloyd Avenued Southbound				Int. Total
	Left	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	
11:00 AM	4	1	0	5	0	46	0	46	57	3	0	60	111
11:15 AM	2	2	0	4	0	52	0	52	53	1	0	54	110
11:30 AM	2	0	0	2	3	41	0	44	55	2	0	57	103
11:45 AM	0	0	0	0	1	42	0	43	49	1	0	50	93
Hourly Total	8	3	0	11	4	181	0	185	214	7	0	221	417
12:00 PM	1	2	0	3	0	56	0	56	67	4	0	71	130
12:15 PM	3	4	0	7	0	48	0	48	57	3	0	60	115
12:30 PM	1	2	0	3	2	52	0	54	61	1	0	62	119
12:45 PM	0	2	0	2	1	48	0	49	53	1	0	54	105
Hourly Total	5	10	0	15	3	204	0	207	238	9	0	247	469
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
7:00 AM	6	1	0	7	0	94	0	94	44	0	0	44	145
7:15 AM	1	3	0	4	0	82	0	82	49	0	0	49	135
7:30 AM	4	1	0	5	0	78	0	78	54	0	0	54	137
7:45 AM	5	0	0	5	0	63	0	63	42	1	0	43	111
Hourly Total	16	5	0	21	0	317	0	317	189	1	0	190	528
8:00 AM	4	1	0	5	0	64	0	64	56	0	0	56	125
8:15 AM	2	2	0	4	0	56	0	56	44	1	0	45	105
8:30 AM	3	1	0	4	0	63	0	63	26	3	0	29	96
8:45 AM	1	3	0	4	0	50	0	50	41	0	0	41	95
Hourly Total	10	7	0	17	0	233	0	233	167	4	0	171	421
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	2	1	0	3	2	59	0	61	46	3	0	49	113
4:15 PM	2	1	0	3	0	58	0	58	64	4	0	68	129
4:30 PM	0	0	0	0	0	61	0	61	70	2	0	72	133
4:45 PM	0	1	0	1	0	73	0	73	66	4	0	70	144
Hourly Total	4	3	0	7	2	251	0	253	246	13	0	259	519
5:00 PM	1	0	0	1	1	55	0	56	66	4	0	70	127
5:15 PM	0	1	0	1	2	58	0	60	59	3	0	62	123
5:30 PM	2	1	0	3	1	48	0	49	50	4	0	54	106
5:45 PM	2	0	0	2	3	55	0	58	57	1	0	58	118
Hourly Total	5	2	0	7	7	216	0	223	232	12	0	244	474
Grand Total	48	30	0	78	16	1402	0	1418	1286	46	0	1332	2828
Approach %	61.5	38.5	-	-	1.1	98.9	-	-	96.5	3.5	-	-	-
Total %	1.7	1.1	-	2.8	0.6	49.6	-	50.1	45.5	1.6	-	47.1	-
Lights	47	29	-	76	16	1357	-	1373	1245	45	-	1290	2739
% Lights	97.9	96.7	-	97.4	100.0	96.8	-	96.8	96.8	97.8	-	96.8	96.9
Other Vehicles	1	1	-	2	0	45	-	45	41	1	-	42	89
% Other Vehicles	2.1	3.3	-	2.6	0.0	3.2	-	3.2	3.2	2.2	-	3.2	3.1
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	0	-	-	-	0	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-



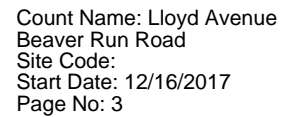
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue
Beaver Run Road
Site Code:
Start Date: 12/16/2017
Page No: 2



Turning Movement Data Plot

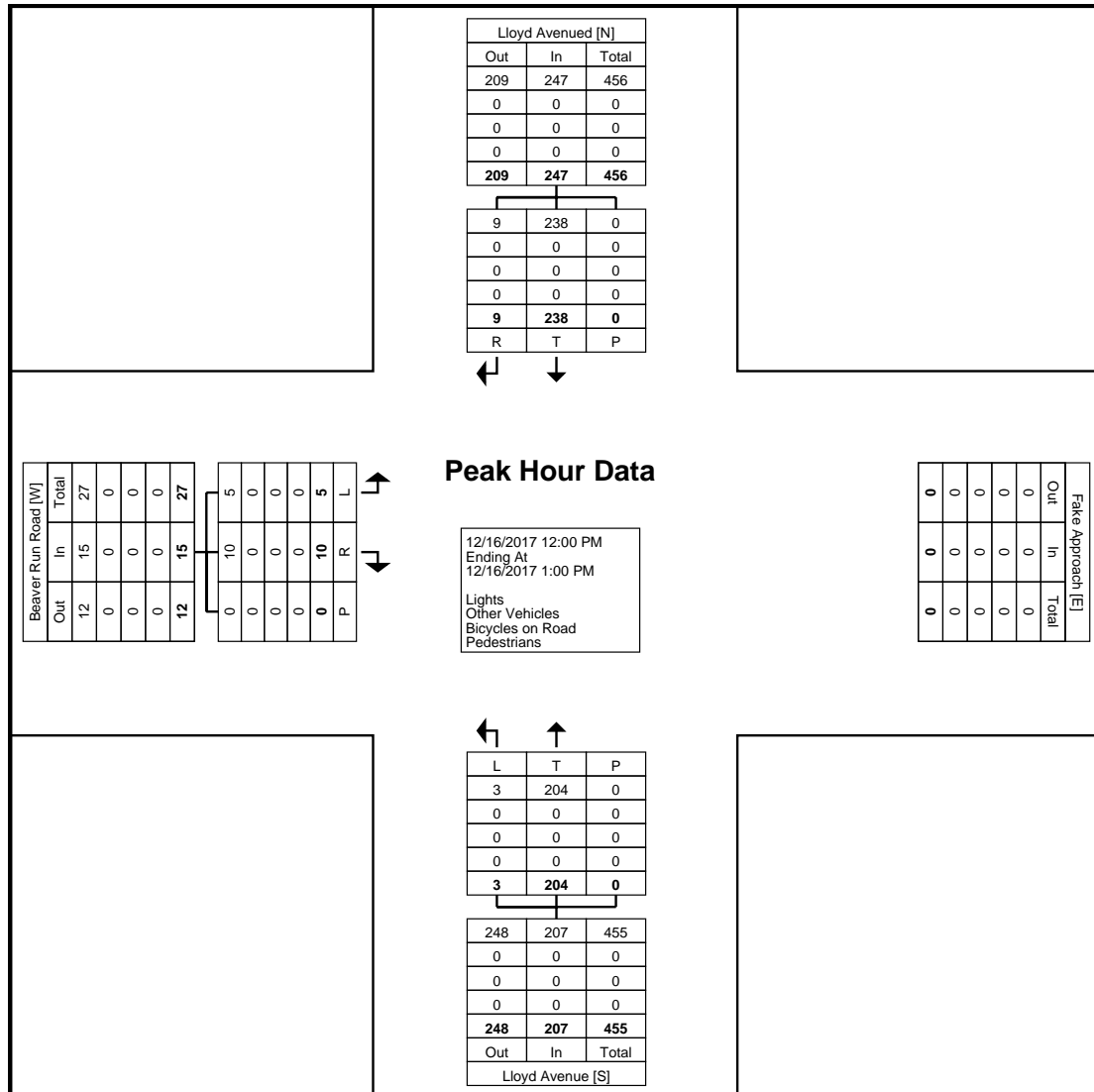
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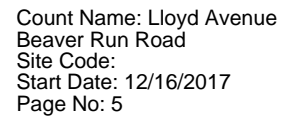
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Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue
Beaver Run Road
Site Code:
Start Date: 12/16/2017
Page No: 4



Turning Movement Peak Hour Data Plot (12:00 PM)



Count Name: Lloyd Avenue
Beaver Run Road
Site Code:
Start Date: 12/16/2017
Page No: 5

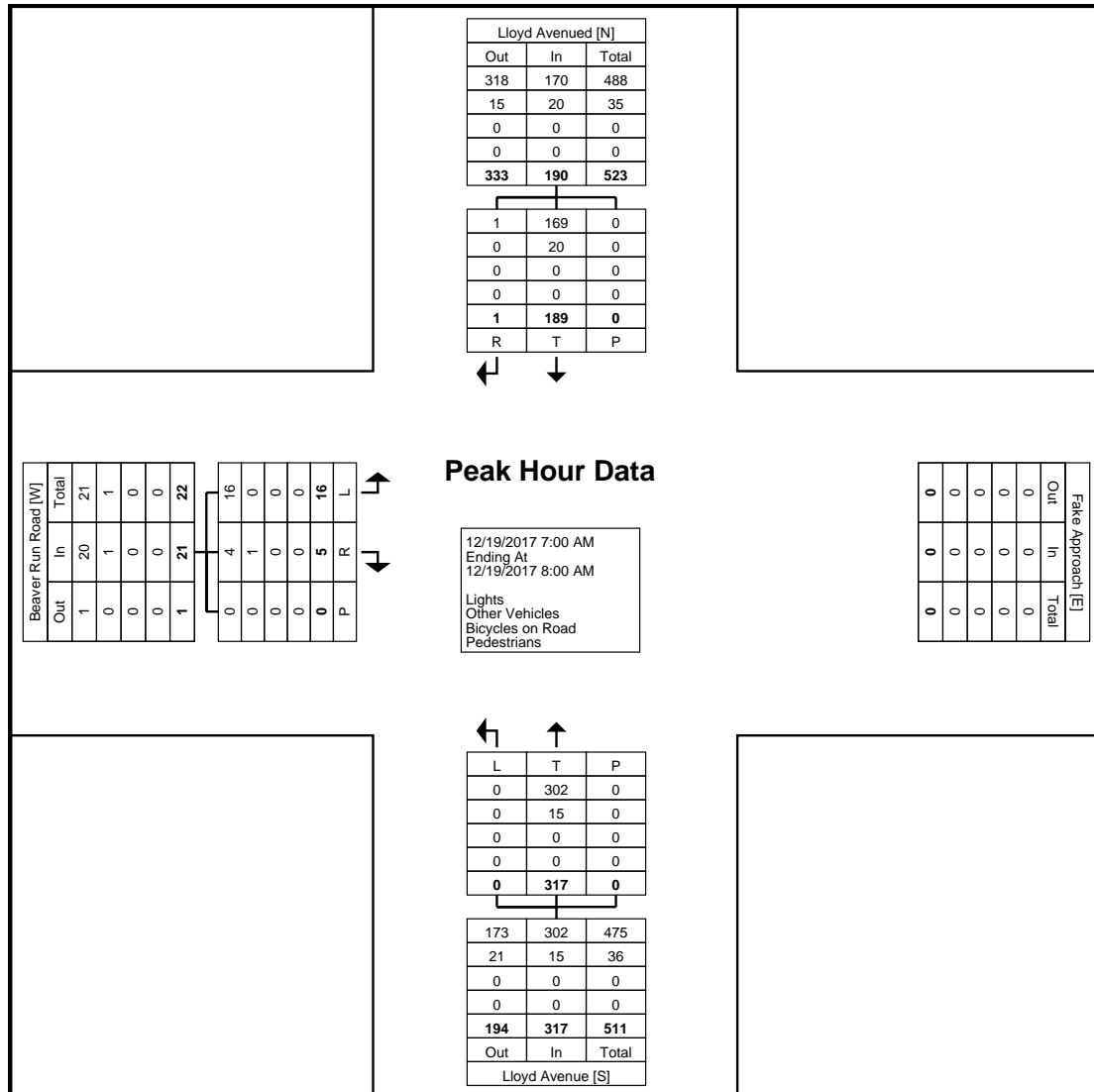
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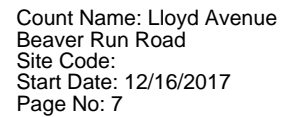
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Count Name: Lloyd Avenue
Beaver Run Road
Site Code:
Start Date: 12/16/2017
Page No: 6

Counted By: Mio:
Set Up By: JH:
Weather: Clear:



Turning Movement Peak Hour Data Plot (7:00 AM)

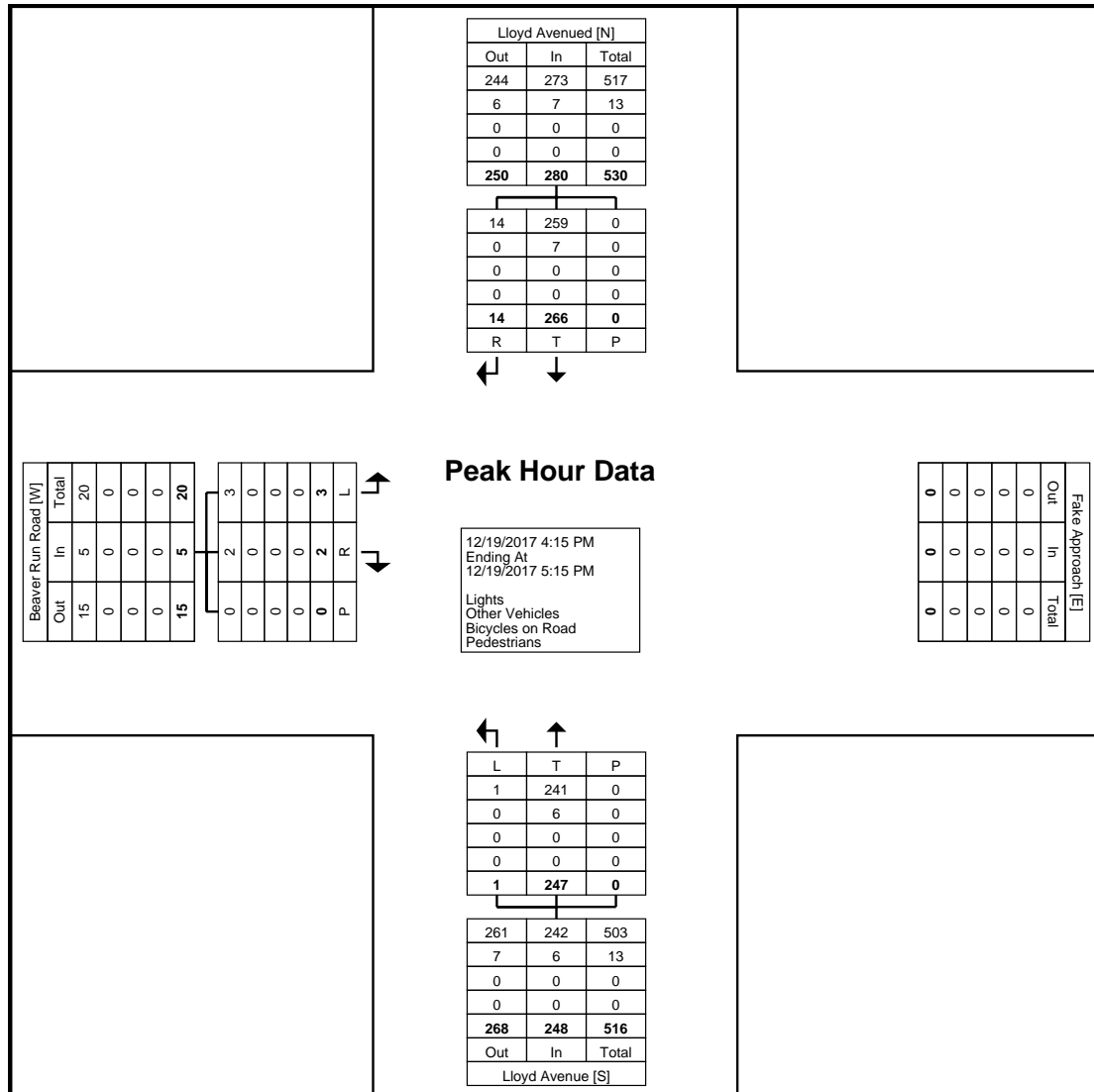
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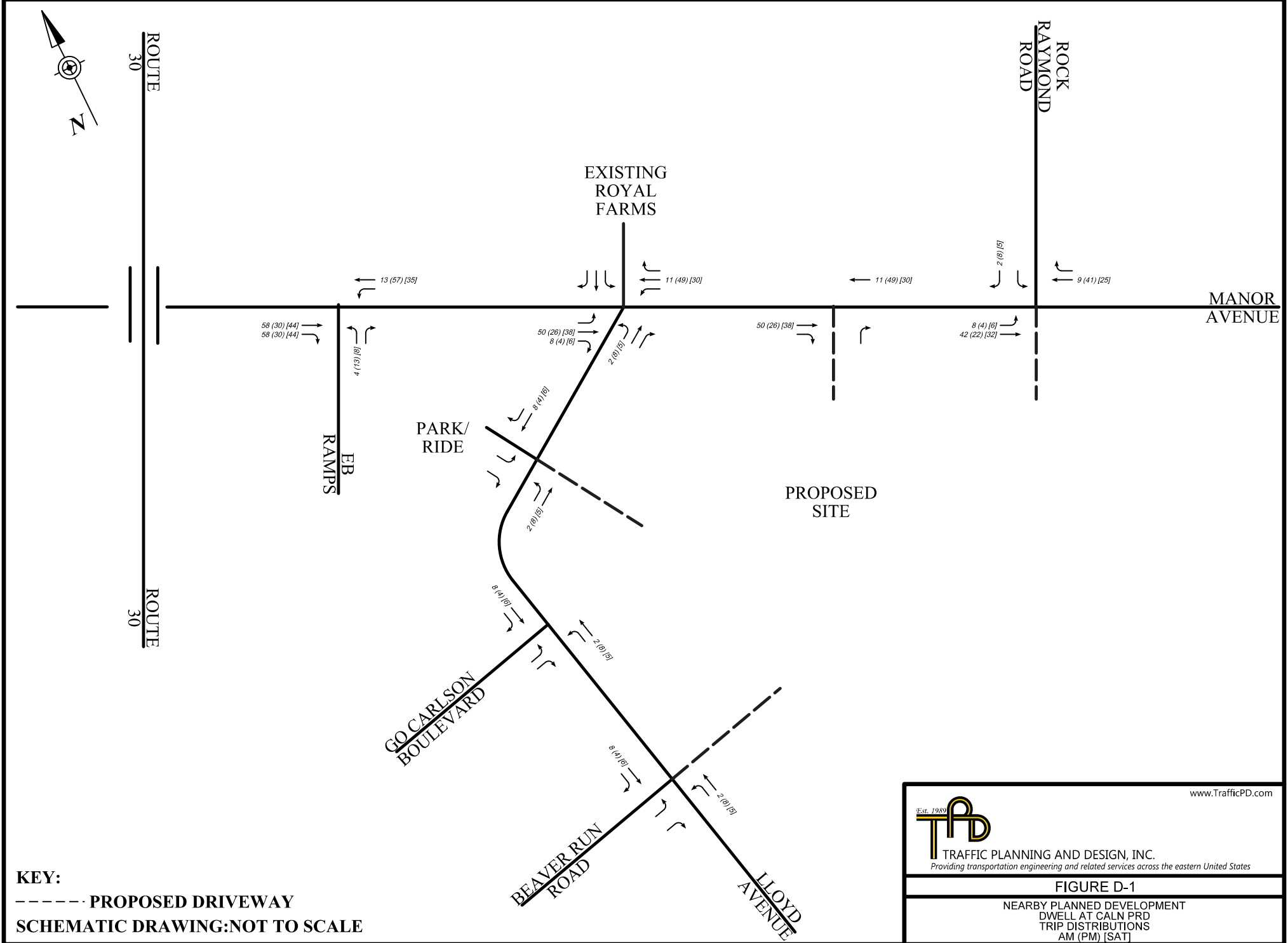
Counted By: Mio:
Set Up By: JH:
Weather: Clear:

Count Name: Lloyd Avenue
Beaver Run Road
Site Code:
Start Date: 12/16/2017
Page No: 8



APPENDIX D

NEARBY DEVELOPMENT TRIP DISTRIBUTIONS



KEY:

----- PROPOSED DRIVEWAY

SCHEMATIC DRAWING: NOT TO SCALE

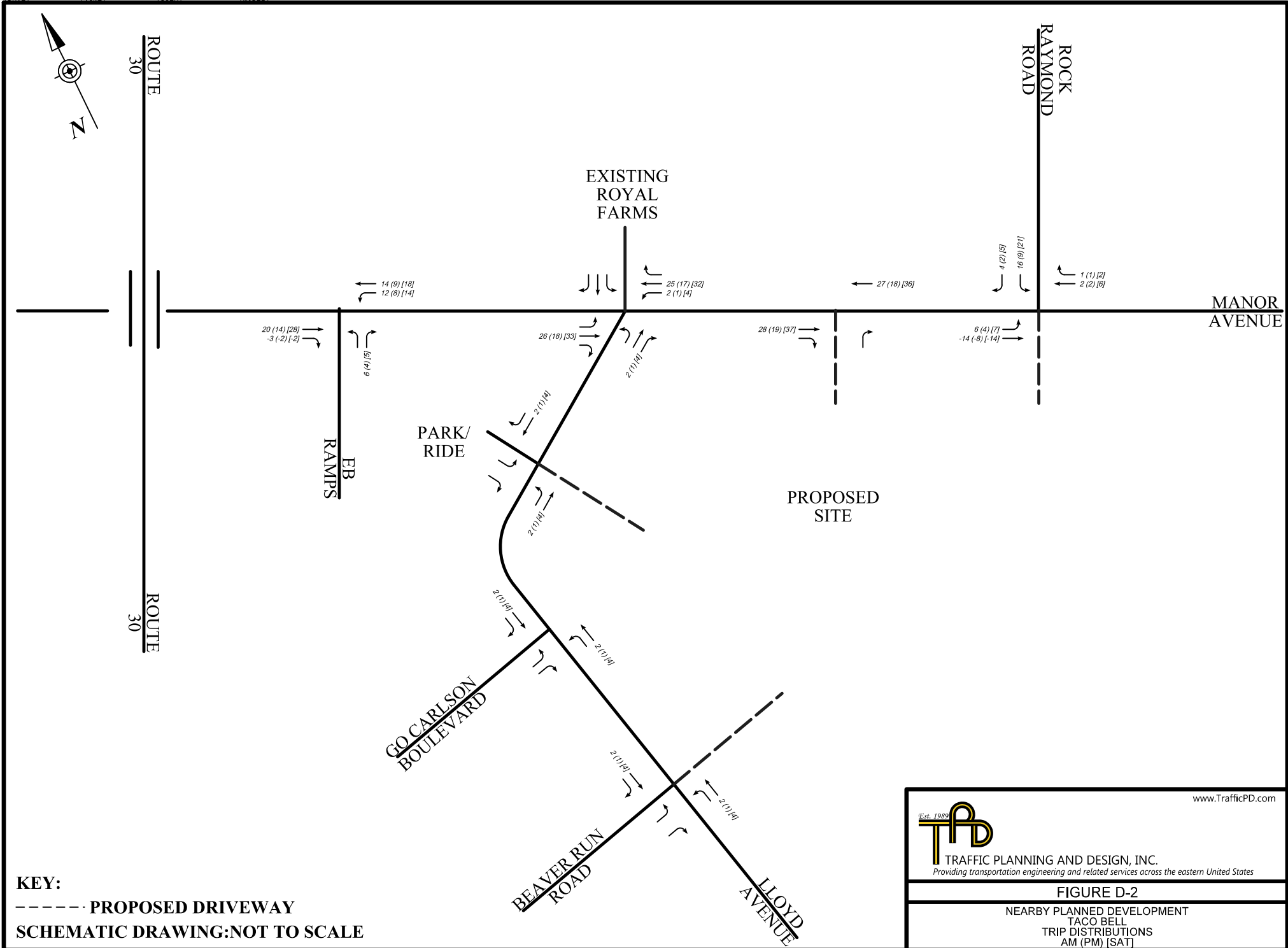


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FIGURE D-1

NEARBY PLANNED DEVELOPMENT
DWELL AT CALN PRD
TRIP DISTRIBUTIONS
AM (PM) [SAT]



APPENDIX E

PLANNED ROADWAY PROJECTS



Chesapeake Bay Bridge-Tunnel Authority
1000 North Point Road, Suite 100
Chesapeake, MD 20762-1000
410.326.7000

[HOME](#)[PROJECT INFORMATION](#)[NEWS AND OUTREACH](#)[COMMUTING](#)

US 322 Interchange

The existing interchange of US 30 and US 322 provides both eastbound and westbound on-ramps and off-ramps.

EXISTING CONDITIONS



CONCEPTUAL DESIGN ALTERNATIVES

Under the Conceptual Design phase, two potential alternatives are being evaluation for the US 322 Interchange:

US 322 ALTERNATIVE 1, MAY 2017



- US 30 Mainline is 3 lanes in each direction
- Similar to existing partial Cloverleaf Interchange configuration partial
- Westbound Ramps Intersection is signalized
- US 30 Eastbound Ramps Intersection Alternative 1a
 - Signalized along Eastbound Off-ramp approach
 - Eastbound Off ramp combines left and right turn lane at signal
- US 30 Eastbound Ramps Intersection Alternative 1b
 - Stop control along Eastbound Off-ramp approach
 - Eastbound Off ramp has right turn merge lane

US 322 ALTERNATIVE 2, MAY 2017



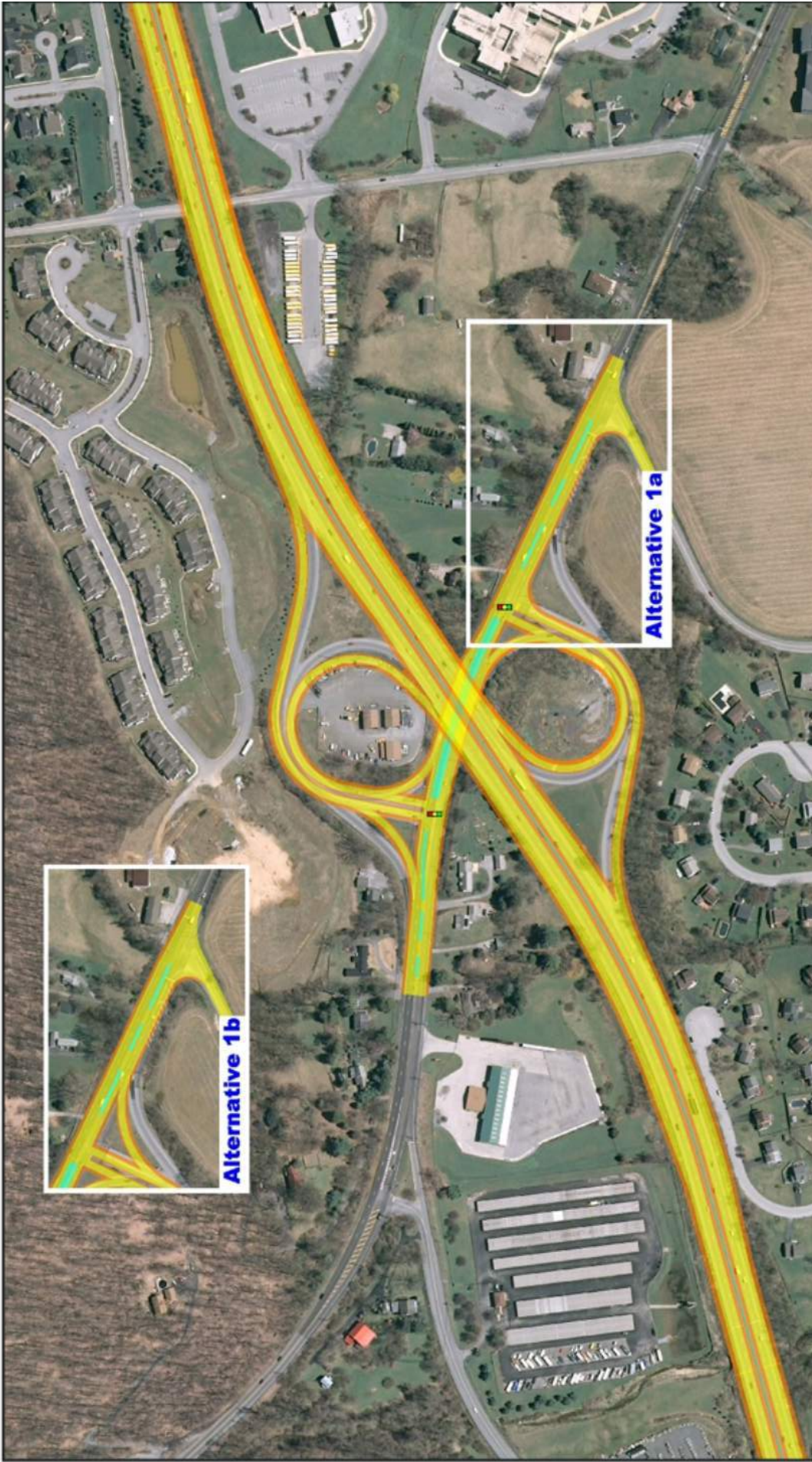
- US 30 Mainline is 3 lanes in each direction
- Diverging Diamond Interchange (DDI) at US 322
- Eliminates the need for left-turning vehicles traveling onto or off interstate to cross the paths of approaching through vehicles
- Two synced traffic signals for US 322 eastbound and westbound through movements
- Traffic signal for US 30 westbound off-ramp right turn at US 322

ENVIRONMENTAL RESOURCES

The significant environmental features of the section are relatively limited consisting include, potential historic properties, a school, and four streams. There are numerous older buildings found primarily along US 322 that may have historic significance and will require evaluation. The Downingtown Area School District complex is located to the south of US 30 east of the US 322 interchange. Within the complex the Downingtown Middle School and several athletic fields abut US 30. The streams in the section are all small, unnamed tributaries. The two found west of US 322 tributaries of Beaver Creek and the two east of US 322 tributaries of the East Branch of the Brandywine Creek.

CONTACT US

[Contact us](#) to tell us what you think.





TIP VISUALIZATION

January 30, 2018

Project Report



Federal Fiscal Year 2017 DVRPC TIP

County: Chester

Project ID: 87781

Municipality: Caln

Title: Reconstruct US 30 Bypass

Route: 30

Air Quality Status:

Improvement Type: Reconstruct

Exempt Code:

Work Can Begin: 02/09/2026 (Estimated)

Completion Date:

Project Limits East Reeceville Road (SR 4005) Interchanges to Business Route 30/Lincoln Hwy (SR 3070) overpass.

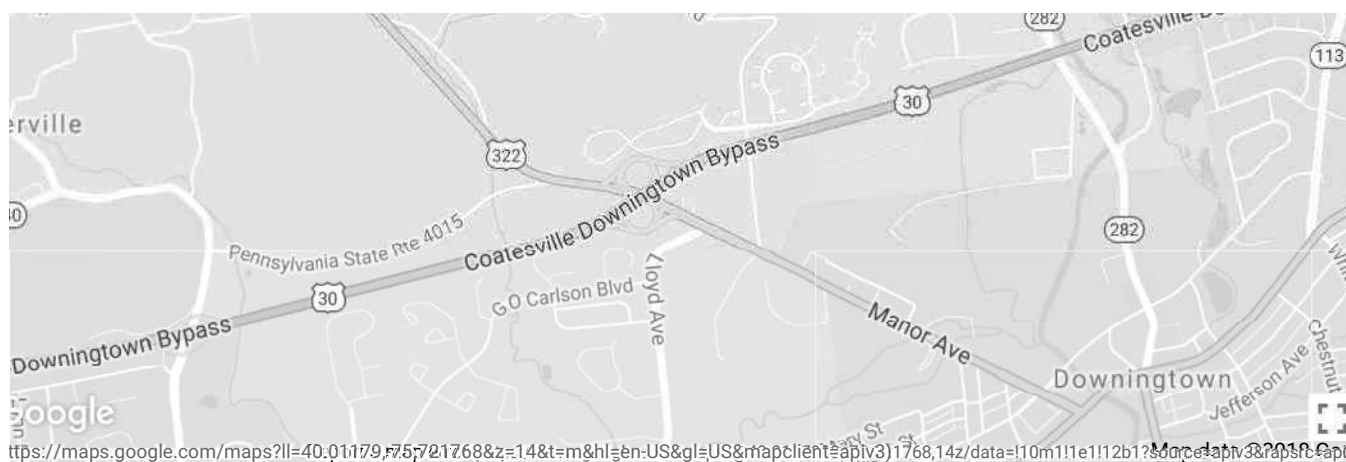
Narrative: Reconsturction of mainline pavement

East of Reeciville Road (SR 4005) Interchange to Business Route 30 Lincoln Highway
(SR 3070) pass

TIP Program Years

Phase	Fund	Fiscal Year 2017	Fiscal Year 2018	Fiscal Year 2019	Fiscal Year 2020	2nd 4 Years	3rd 4 Years
Final Design	STP	\$0	\$0	\$158,000	\$0	\$0	\$0
Final Design	STU	\$0	\$0	\$0	\$0	\$6,520,000	\$0
Final Design	NHPP	\$0	\$0	\$6,000,000	\$7,842,000	\$0	\$0
Utility	NHPP	\$0	\$0	\$0	\$0	\$752,000	\$0
Utility	581	\$0	\$0	\$0	\$0	\$187,000	\$0
Right of Way	581	\$0	\$0	\$0	\$0	\$3,810,000	\$0
Construction	NHPP	\$0	\$0	\$0	\$0	\$27,956,000	\$200,575,582
Construction	STP	\$0	\$0	\$0	\$0	\$0	\$37,006,000
Construction	STU	\$0	\$0	\$0	\$0	\$0	\$86,471,000
Construction	581	\$0	\$0	\$0	\$0	\$8,188,000	\$76,418,714
		\$0	\$0	\$6,158,000	\$7,842,000	\$47,413,000	\$400,471,296

Total Twelve Year Program Costs - \$461,884,296



TIP Project Details

MPMS 87781: US 30, Coatesville Downingtown Bypass (CER-Eastern Section)

East Caln Township, Chester County

AQ Code: 2045M

CMP Code: 7E (www.dvrpc.org/www.dvrpc.org/asp/cmp/PACMP2015Detail.asp?corridor=7&subcorridor=E)

Limits: US 30, from East of Reeceville Rd Interchange to Quarry Rd.

Sponsor:

This project provides for the final design, right-of-way, utility and construction phases of the Coatesville-Downingtown Bypass Reconstruction - eastern section - by reconstructing and widening the mainline shoulders; replacing and widening the mainline bridge superstructures; constructing new ramps (to complete partial interchanges); reconstructing, realigning, and lengthening all on and off ramps (to provide storage length for traffic signals and/or ramp metering); and reconstructing arterial overpasses. The overall corridor construction cost estimate is \$630 million. MPMS# 14532 provides for the preliminary design portion of this project and the western section, as well as additional study work to determine the approach for this eastern section. MPMS# 84884 contains the construction of the western section. Project CMP (Congestion Management Process) commitments include expansion of Intelligent Transportation Systems (ITS) equipment throughout the corridor, signal improvements on parallel arterials, numerous improvements to rail transit stations and services in consultation with SEPTA and Amtrak, improved access to rail stations, sidewalks and other improvements for pedestrians and bicyclists on parallel arterials, investigation of park-and-ride locations, and outreach to employers to promote transportation demand management strategies. See DVRPC's 2016-2017 memorandum on supplemental strategies for details related to this project.

		TIP Program Years (\$000)						Later FYs
Phase	Fund	2017	2018	2019	2020	2021-2024	2025-2028	
FD	TOLL	0	0	0	0	0	0	
FD	STP	0	0	158	0	0	0	
FD	STU	0	0	0	0	6520	0	
FD	NHPP	0	0	6000	7842	0	0	
ROW	581	0	0	0	0	3810	0	
UTL	581	0	0	0	0	187	0	
UTL	NHPP	0	0	0	0	752	0	
CON	581	0	0	0	0	8188	76420	
CON	STU	0	0	0	0	0	86471	
CON	STP	0	0	0	0	0	37006	
CON	NHPP	0	0	0	0	27956	201575	
Fiscal Year Total		0	0	6158	7842	47413	401472	
Total FY 2017-2020					14000	Later FY	448885	

APPENDIX F

CONFLICT FACTOR EVALUATION

LEFT TURN SIGNALIZATION DOCUMENTATION

2023 Projected Conditions

COUNTY: Chester County

MUNICIPALITY: Caln Township

INTERSECTION: Manor Avenue (E/W) @ Rock Raymond/Proposed Driveway

Time	Left Turn				Opposing		Calculated Conflict Factor	Required Conflict Factor
	Direction	Exclusive Lane	Per Cycle	Volume	Volume	# of Lanes		
AM PEAK	WB L	Y	0.22	7	808	1	5,656	50,000
PM PEAK	WB L	Y	0.42	15	583	1	8,745	50,000
SAT PEAK	WB L	Y	0.47	17	518	1	8,806	50,000

***Volumes based upon 2023 Projected Conditions**

AM Cycle Length (Seconds) - 115

PM Cycle Length (Seconds) - 100

SAT Cycle Length (Seconds) - 75

Protected/Permitted

No Turn Lane >35,000 one lane >45,000 two lane

Turn Lane >50,000 one lane >65,000 two lane

Protected/Prohibited

Turn Lane >67,500 one lane >90,000 two lane

DIRECTION	LEFT TURN PHASES	
	Warrant Satisfied	
	Prot/Perm	Prot/Proh
Eastbound	NO	NO
Westbound	NO	NO

APPENDIX G

INTERACTION WORKSHEETS

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	WIME.00001			Organization:	TPD
Project Location:	Calm Township/Chester County			Performed By:	mb
Scenario Description:	Projected Conditions			Date:	10/29/2018
Analysis Year:				Checked By:	
Analysis Period:	AM Street Peak Hour			Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	20	ksf	19	12	7
Restaurant				0		
Cinema/Entertainment				0		
Residential	251 / 252	346	du	96	33	63
Hotel				0		
All Other Land Uses ²				0		
				115	45	70

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	115	45	70
Internal Capture Percentage	3%	4%	3%
External Vehicle-Trips ⁵	111	43	68
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	8%	14%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	2%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	WIME.00001
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	12	12	1.00	7	7
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	33	33	1.00	63	63
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		1	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	13	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	0	0
Retail	0		0	0	1	0
Restaurant	0	1		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	1	11	12	11	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	32	33	32	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	1	6	7	6	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	62	63	62	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	WIME.00001			Organization:	TPD
Project Location:	Cain Township/Chester County			Performed By:	mb
Scenario Description:	Projected Conditions			Date:	10/29/2018
Analysis Year:				Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	20	ksf	74	36	38
Restaurant				0		
Cinema/Entertainment				0		
Residential	251 / 252	346	du	108	62	46
Hotel				0		
All Other Land Uses ²				0		
				182	98	84

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	10	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	182	98	84
Internal Capture Percentage	15%	14%	17%
External Vehicle-Trips ⁵	154	84	70
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	16%	9%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	WIME.00001
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	36	36	1.00	38	38
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	62	62	1.00	46	46
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		11	2	10	2
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	10	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	2	0
Retail	0		0	0	29	0
Restaurant	0	18		0	10	0
Cinema/Entertainment	0	1	0		2	0
Residential	0	4	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	4	32	36	32	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	10	52	62	52	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	10	28	38	28	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	42	46	42	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

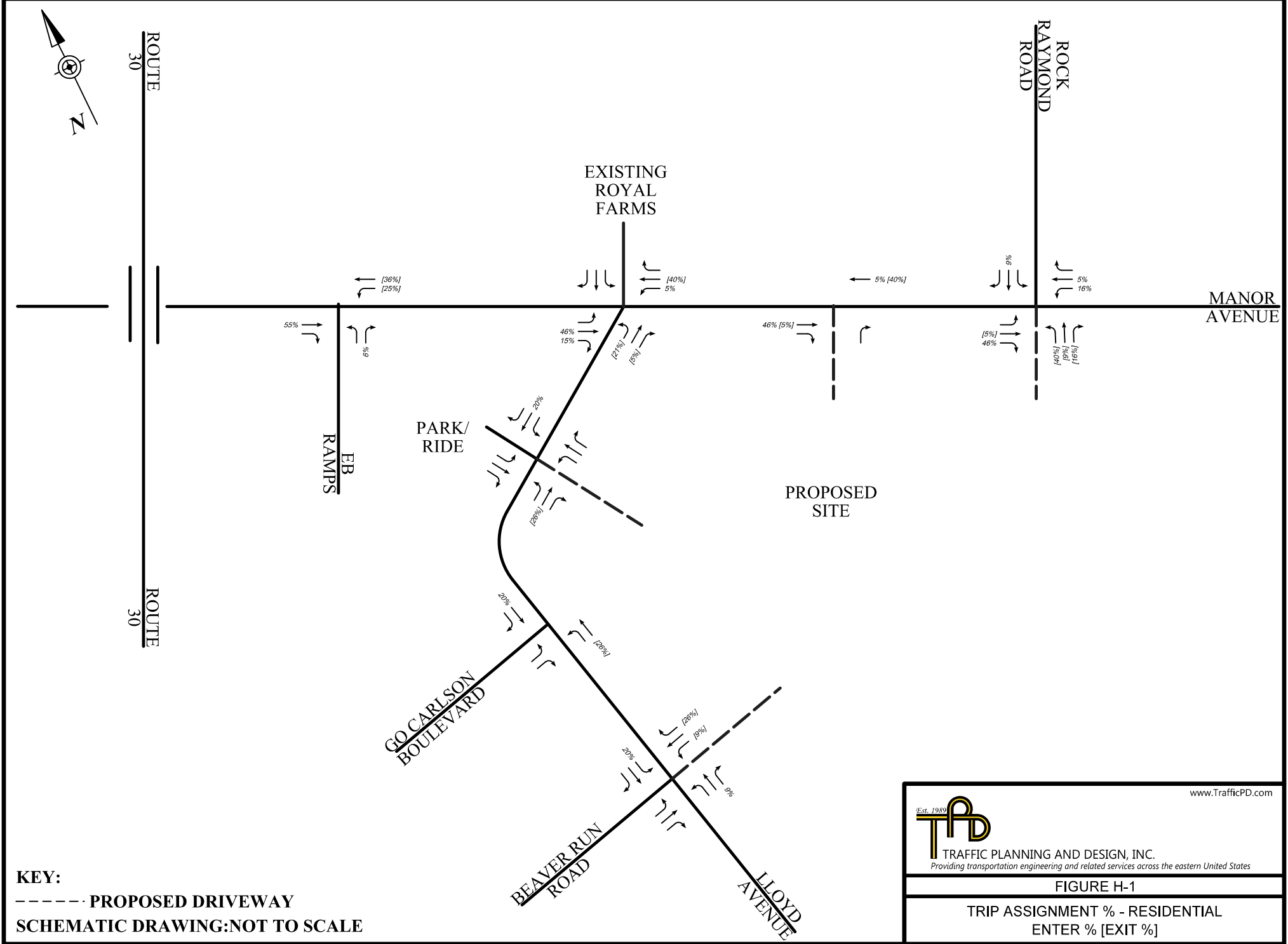
²Person-Trips

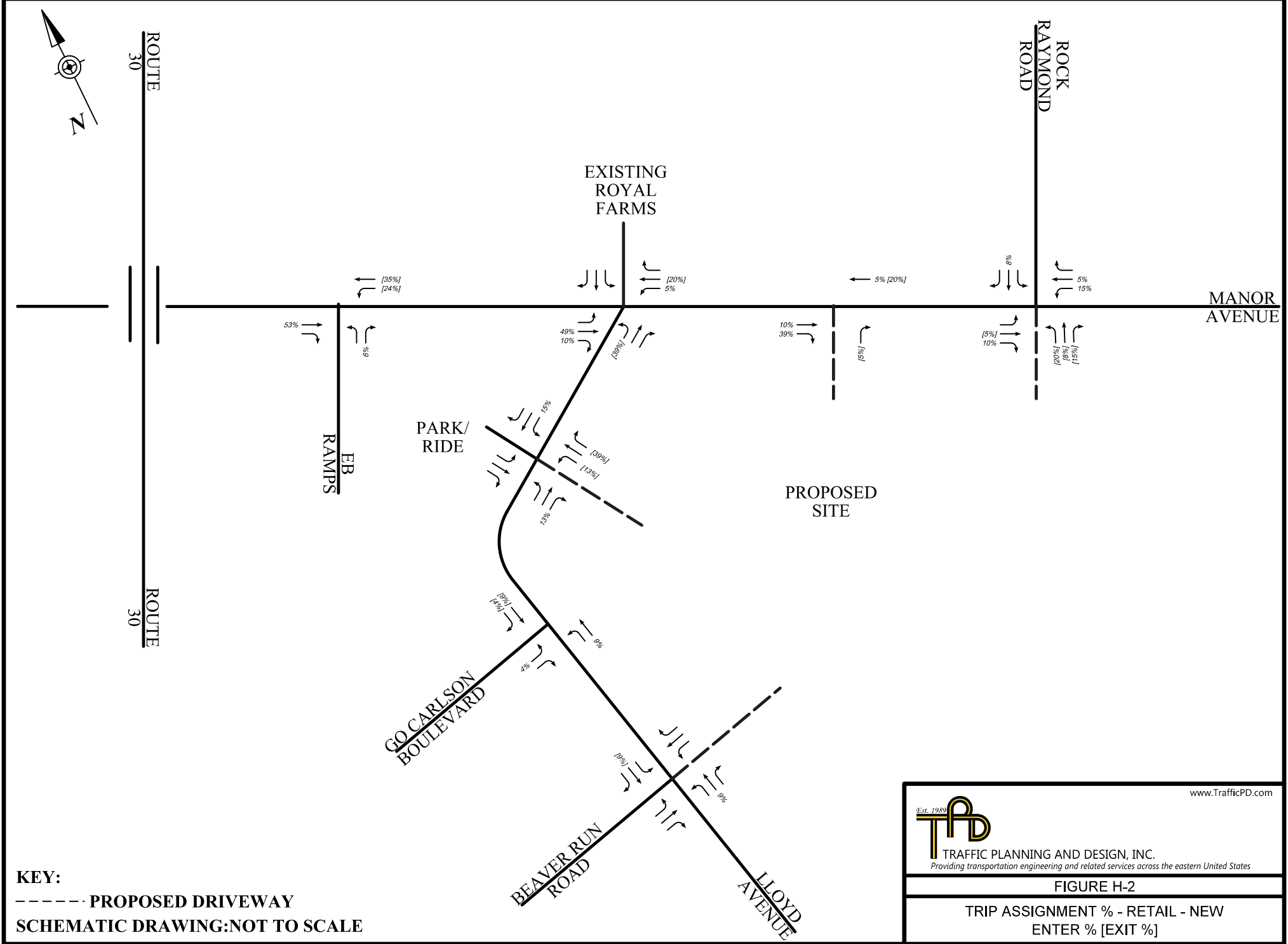
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

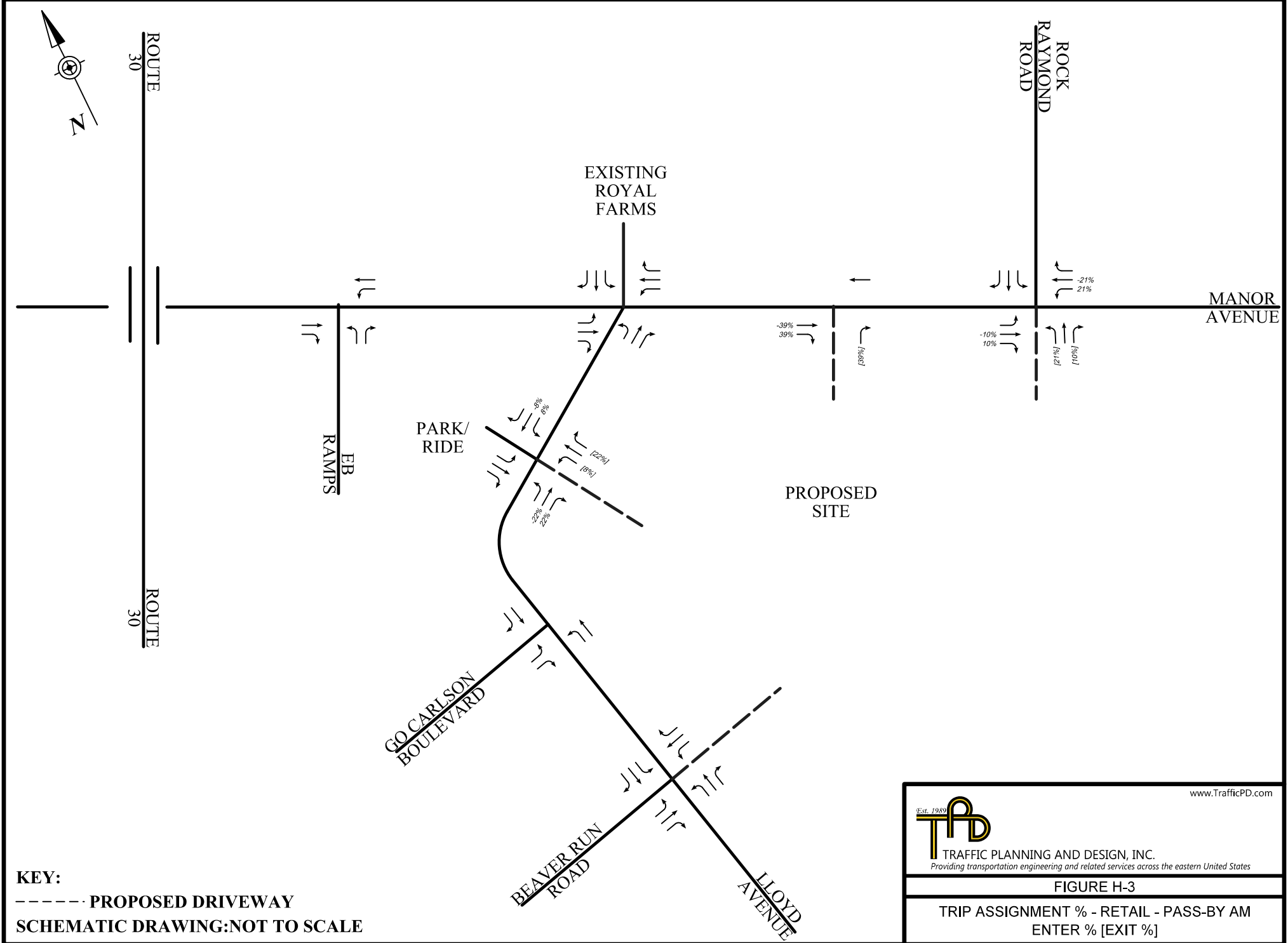
*Indicates computation that has been rounded to the nearest whole number.

APPENDIX H


TRIP ASSIGNMENT DATA







KEY:
 ----- PROPOSED DRIVEWAY
 SCHEMATIC DRAWING:NOT TO SCALE

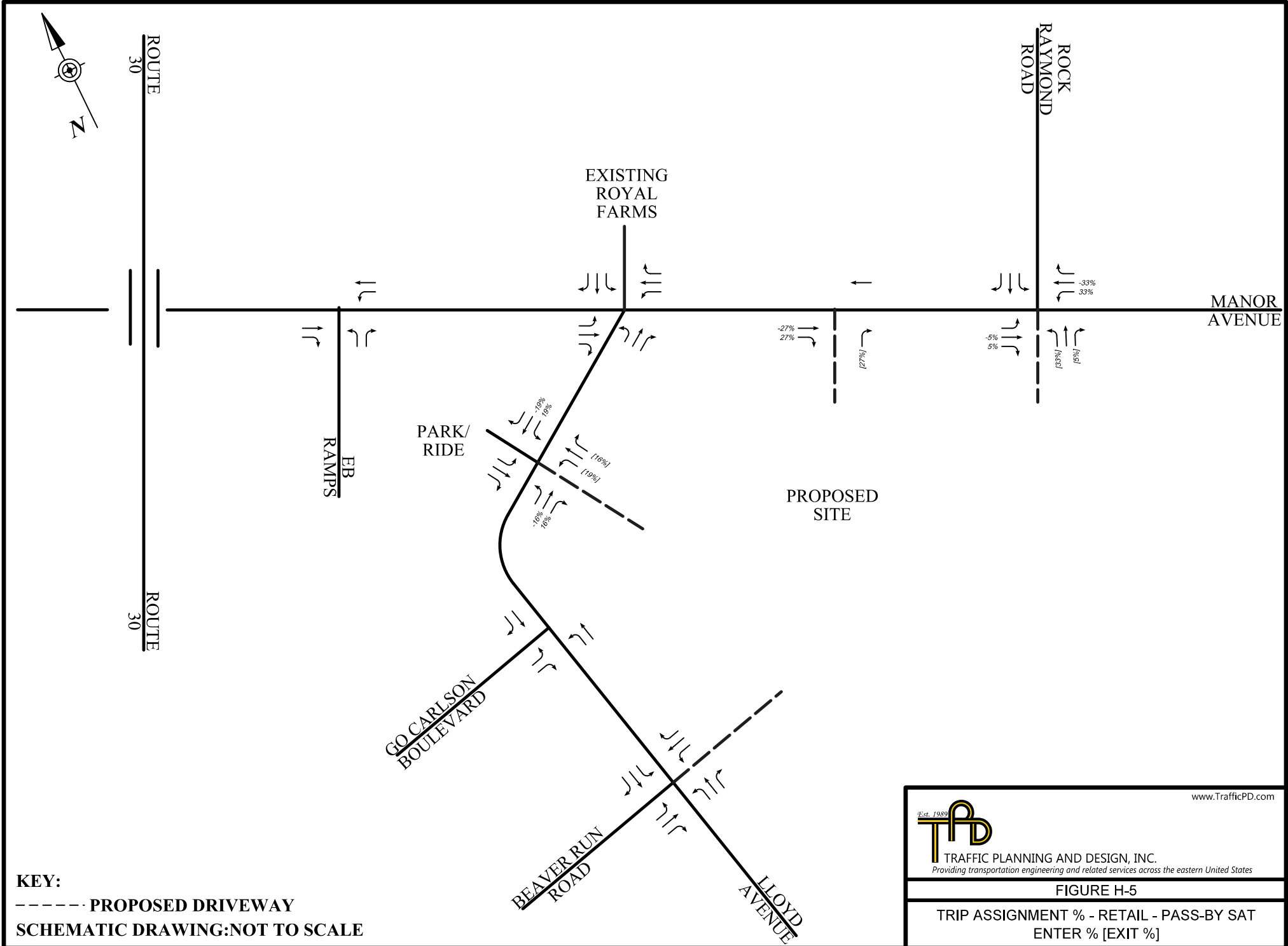


TRAFFIC PLANNING AND DESIGN, INC.
 Providing transportation engineering and related services across the eastern United States

www.TrafficPD.com

FIGURE H-3

TRIP ASSIGNMENT % - RETAIL - PASS-BY AM
 ENTER % [EXIT %]



----- PROPOSED DRIVEWAY
SCHEMATIC DRAWING: NOT TO SCALE



TRAFFIC PLANNING AND DESIGN, INC.
Providing transportation engineering and related services across the eastern United States

FIGURE H-5

TRIP ASSIGNMENT % - RETAIL - PASS-BY SAT
ENTER % [EXIT %]

APPENDIX I

VOLUME DEVELOPMENT SPREADSHEETS

TPD# WIME.00001
10/29/2018
Traffic Volumes Worksheet
Intersection:
Synchro Node:

Route 322 (S.R. 0322) & Rock Raymond Road (S.R. 4017)/Proposed Driveway									
1	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	280	732			175	101				211		213	1712
Balancing													0
2017 Existing Volumes (Balanced)	280	732			175	101				211		213	1712

Base growth (0.65% compounded for 6 yrs)	11	29			7	4				8		8	67
Dwell at Caln PRD (384 units)	8	42			9							2	61
Taco Bell (2.753ksf)	6	-14			2	1				16		4	15

2023 Base Volumes	305	789			193	106				235		227	1855
-------------------	-----	-----	--	--	-----	-----	--	--	--	-----	--	-----	------

	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter			46.0%	16.0%	5.0%						9.0%		
Trip Assignment % - Residential Exit		5.0%					40.0%	9.0%	16.0%				
Trip Assignment % - Retail New Enter			10.0%	15.0%	5.0%						8.0%		
Trip Assignment % - Retail New Exit		5.0%					20.0%	8.0%	15.0%				
Trip Assignment % - Retail Pass-by Enter		-10.0%	10.0%	21.0%	-21.0%								
Trip Assignment % - Retail Pass-by Exit							21.0%		10.0%				
Residential Trips		3	15	5	2		25	6	10		3		69
Retail New Trips			1	1			1		1		1		5
Retail Pass-by Trips				(1)	(-1)								0

2023 Projected Volumes	305	792	16	7	194	106	26	6	11	235	4	227	1929
------------------------	-----	-----	----	---	-----	-----	----	---	----	-----	---	-----	------

Time Period: Weekday P.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	83	519			680	77				62		119	1540
Balancing													0
2017 Existing Volumes (Balanced)	83	519			680	77				62		119	1540

Base growth (0.65% compounded for 6 yrs)	3	21			27	3				2		5	61
Dwell at Caln PRD (384 units)	4	22			41							8	75
Taco Bell (2.753ksf)	4	-8			2	1				9		2	10

2023 Base Volumes	94	554			750	81				73		134	1686
-------------------	----	-----	--	--	-----	----	--	--	--	----	--	-----	------

	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter			46.0%	16.0%	5.0%						9.0%		
Trip Assignment % - Residential Exit		5.0%					40.0%	9.0%	16.0%				
Trip Assignment % - Retail New Enter			10.0%	15.0%	5.0%						8.0%		
Trip Assignment % - Retail New Exit		5.0%					20.0%	8.0%	15.0%				
Trip Assignment % - Retail Pass-by Enter		-5.0%	5.0%	39.0%	-39.0%								
Trip Assignment % - Retail Pass-by Exit							39.0%		5.0%				
Residential Trips		2	24	8	3		17	4	7		5		70
Retail New Trips		1	2	3	1		4	2	3		2		18
Retail Pass-by Trips		(-1)	(1)	(4)	(-4)		(4)						4

2023 Projected Volumes	94	556	27	15	750	81	25	6	10	73	7	134	1778
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Time Period: Saturday Midday Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	65	453			419	42				39		79	1097
Balancing													0
2017 Existing Volumes (Balanced)	65	453			419	42				39		79	1097

Base growth (0.65% compounded for 6 yrs)	3	18			17	2				2		3	45
Dwell at Caln PRD (384 units)	6	32			25							5	68
Taco Bell (2.753ksf)	7	-14			6	2				21		5	27

2023 Base Volumes	81	489			467	46				62		92	1237
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	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter			46.0%	16.0%	5.0%						9.0%		
Trip Assignment % - Residential Exit		5.0%					40.0%	9.0%	16.0%				
Trip Assignment % - Retail New Enter			10.0%	15.0%	5.0%						8.0%		
Trip Assignment % - Retail New Exit		5.0%					20.0%	8.0%	15.0%				
Trip Assignment % - Retail Pass-by Enter		-5.0%	5.0%	33.0%	-33.0%								
Trip Assignment % - Retail Pass-by Exit							33.0%		5.0%				
Residential Trips		2	22	8	2		16	4	7		4		65
Retail New Trips		2	3	5	2		6	2	5		3		28
Retail Pass-by Trips		(-1)	(1)	(4)	(-4)		(4)		(1)				5

2023 Projected Volumes	81	492	26	17	467	46	26	6	13	62	7	92	1335
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TPD# WIME.00001
10/29/2018

Traffic Volumes Worksheet

Intersection:

Synchro Node:

Route 322 (S.R. 0322) & Lloyd Avenue/Royal Farms Driveway									
2	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	48	709	95	79	315	25	182	32	244	18	5	63	1815
Balancing													0
2017 Existing Volumes (Balanced)	48	709	95	79	315	25	182	32	244	18	5	63	1815

Base growth (0.65% compounded for 6 yrs)		28	4	3	12		7		10				64
Dwell at Caln PRD (384 units)		50	8		11		2						71
Taco Bell (2.753ksf)		26		2	25				2				55

2023 Base Volumes	48	813	107	84	363	25	191	32	256	18	5	63	2005
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	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter		46.0%	15.0%	5.0%			21.0%		5.0%				
Trip Assignment % - Residential Exit					40.0%								
Trip Assignment % - Retail New Enter		49.0%	10.0%	5.0%									
Trip Assignment % - Retail New Exit					20.0%		39.0%						
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		15	5	2	25		13		3				63
Retail New Trips		4	1		1		2						8
Retail Pass-by Trips													0

2023 Projected Volumes	48	832	113	86	389	25	206	32	259	18	5	63	2076
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Time Period: Weekday P.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	57	496	235	112	644	51	160	20	102	9	22	81	1989
Balancing													0
2017 Existing Volumes (Balanced)	57	496	235	112	644	51	160	20	102	9	22	81	1989

Base growth (0.65% compounded for 6 yrs)		20	9	4	26		6		4				69
Dwell at Caln PRD (384 units)		26	4		49		8						87
Taco Bell (2.753ksf)		18		1	17				1				37

2023 Base Volumes	57	560	248	117	736	51	174	20	107	9	22	81	2182
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	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter		46.0%	15.0%	5.0%			21.0%		5.0%				
Trip Assignment % - Residential Exit					40.0%								
Trip Assignment % - Retail New Enter		49.0%	10.0%	5.0%									
Trip Assignment % - Retail New Exit					20.0%		39.0%						
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		24	8	3	17		9		2				63
Retail New Trips		10	2	1	4		7						24
Retail Pass-by Trips													0

2023 Projected Volumes	57	594	258	121	757	51	190	20	109	9	22	81	2269
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Time Period: Saturday Midday Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	Volume
2017 Existing Counts	54	433	205	61	406	46	179	21	50	19	15	78	1567
Balancing													0
2017 Existing Volumes (Balanced)	54	433	205	61	406	46	179	21	50	19	15	78	1567

Base growth (0.65% compounded for 6 yrs)		17	8	2	16		7		2				52
Dwell at Caln PRD (384 units)		38	6		30		5						79
Taco Bell (2.753ksf)		33		4	32				4				73

2023 Base Volumes	54	521	219	67	484	46	191	21	56	19	15	78	1771
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	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter		46.0%	15.0%	5.0%			21.0%		5.0%				
Trip Assignment % - Residential Exit					40.0%								
Trip Assignment % - Retail New Enter		49.0%	10.0%	5.0%									
Trip Assignment % - Retail New Exit					20.0%		39.0%						
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		22	7	2	16		9		2				58
Retail New Trips		17	3	2	6		12						40
Retail Pass-by Trips													0

2023 Projected Volumes	54	560	229	71	506	46	212	21	58	19	15	78	1869
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TPD# WIME.00001
10/29/2018

Traffic Volumes Worksheet

Intersection:

Synchro Node:

Route 322 (S.R. 0322) & EB Route 30 Ramps									
3	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts		703	592	262	299		11		166				2033
Balancing													0
2017 Existing Volumes (Balanced)		703	592	262	299		11		166				2033
Base growth (0.65% compounded for 6 yrs)		28	23	10	12		0		7				80
Dwell at Caln PRD (384 units)		58	58		13		4						133
Taco Bell (2.753ksf)		20	-3	12	14				6				49
2023 Base Volumes		809	670	284	338		15		179				2295

	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter		55.0%		25.0%	36.0%				6.0%				
Trip Assignment % - Residential Exit													
Trip Assignment % - Retail New Enter		53.0%							6.0%				
Trip Assignment % - Retail New Exit				24.0%	35.0%								
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		18		16	22				2				58
Retail New Trips		4		1	2								7
Retail Pass-by Trips													0
2023 Projected Volumes		831	670	301	362		15		181				2360

Time Period: Weekday P.M. Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts		571	390	188	704		8		200				2061
Balancing													0
2017 Existing Volumes (Balanced)		571	390	188	704		8		200				2061
Base growth (0.65% compounded for 6 yrs)		23	15	7	28		0		8				81
Dwell at Caln PRD (384 units)		30	30		57		13						130
Taco Bell (2.753ksf)		14	-2	8	9				4				33
2023 Base Volumes		638	433	203	798		21		212				2305

	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter		55.0%		25.0%	36.0%				6.0%				
Trip Assignment % - Residential Exit													
Trip Assignment % - Retail New Enter		53.0%							6.0%				
Trip Assignment % - Retail New Exit				24.0%	35.0%								
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		29		11	15				3				58
Retail New Trips		11		5	7				1				24
Retail Pass-by Trips													0
2023 Projected Volumes		678	433	219	820		21		216				2387

Time Period: Saturday Midday Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts		520	543	223	427		20		173				1906
Balancing													0
2017 Existing Volumes (Balanced)		520	543	223	427		20		173				1906
Base growth (0.65% compounded for 6 yrs)		21	22	9	17		1		7				77
Dwell at Caln PRD (384 units)		44	44		35		8						131
Taco Bell (2.753ksf)		28	-2	14	18				5				63
2023 Base Volumes		613	607	246	497		29		185				2177

	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter		55.0%		25.0%	36.0%				6.0%				
Trip Assignment % - Residential Exit													
Trip Assignment % - Retail New Enter		53.0%							6.0%				
Trip Assignment % - Retail New Exit				24.0%	35.0%								
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips		26		10	15				3				54
Retail New Trips		18		7	11				2				38
Retail Pass-by Trips													0
2023 Projected Volumes		657	607	263	523		29		190				2269

TPD# WIME.00001
10/29/2018

Traffic Volumes Worksheet

Intersection:

Synchro Node:

Lloyd Avenue & Park and Ride Driveways/Proposed Retail Driveway									
8	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	2	439			173	18				11		1	644
Balancing													0
2017 Existing Volumes (Balanced)	2	439			173	18				11		1	644
Base growth (0.65% compounded for 6 yrs)		17			7								24
Dwell at Caln PRD (384 units)		2			8								10
Taco Bell (2.753ksf)		2			2								4
2023 Base Volumes	2	460			190	18				11		1	682

	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter					20.0%								
Trip Assignment % - Residential Exit		26.0%											
Trip Assignment % - Retail New Enter			13.0%	15.0%									
Trip Assignment % - Retail New Exit							13.0%		39.0%				
Trip Assignment % - Retail Pass-by Enter		-22.0%	22.0%	8.0%	-8.0%								
Trip Assignment % - Retail Pass-by Exit							8.0%		22.0%				
Residential Trips		16			6								22
Retail New Trips			1	1			1		2				5
Retail Pass-by Trips		(-1)	(1)										0
2023 Projected Volumes	2	475	2	1	196	18	1	0	2	11	0	1	709

Time Period: Weekday P.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	1	279			378	7						3	675
Balancing													0
2017 Existing Volumes (Balanced)	1	279			378	7				7		3	675
Base growth (0.65% compounded for 6 yrs)		11			15								26
Dwell at Caln PRD (384 units)		8			4								12
Taco Bell (2.753ksf)		1			1								2
2023 Base Volumes	1	299			398	7				7		3	715

	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter					20.0%								
Trip Assignment % - Residential Exit		26.0%											
Trip Assignment % - Retail New Enter			13.0%	15.0%									
Trip Assignment % - Retail New Exit							13.0%		39.0%				
Trip Assignment % - Retail Pass-by Enter		-14.0%	14.0%	18.0%	-18.0%								
Trip Assignment % - Retail Pass-by Exit							18.0%		14.0%				
Residential Trips		11			10								21
Retail New Trips			3	3			2		7				15
Retail Pass-by Trips		(-2)	(2)	(2)	(-2)		(2)		(1)				3
2023 Projected Volumes	1	308	5	5	406	7	4	0	8	7	0	3	754

Time Period: Saturday Midday Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	2	248			290	4				4		1	549
Balancing													0
2017 Existing Volumes (Balanced)	2	248			290	4				4		1	549
Base growth (0.65% compounded for 6 yrs)		10			11								21
Dwell at Caln PRD (384 units)		5			6								11
Taco Bell (2.753ksf)		4			4								8
2023 Base Volumes	2	267			311	4				4		1	589

	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter					20.0%								
Trip Assignment % - Residential Exit		26.0%											
Trip Assignment % - Retail New Enter			13.0%	15.0%									
Trip Assignment % - Retail New Exit							13.0%		39.0%				
Trip Assignment % - Retail Pass-by Enter		-16.0%	16.0%	19.0%	-19.0%								
Trip Assignment % - Retail Pass-by Exit							19.0%		16.0%				
Residential Trips		11			10								21
Retail New Trips			4	5			4		12				25
Retail Pass-by Trips		(-2)	(2)	(2)	(-2)		(2)		(2)				4
2023 Projected Volumes	2	276	6	7	319	4	6	0	14	4	0	1	639

TPD# WIME.00001
10/29/2018

Traffic Volumes Worksheet

Intersection:

Synchro Node:

Lloyd Avenue & GO Carlson Boulevard									
9	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	136		46				13	295			155	19	664
Balancing													0
2017 Existing Volumes (Balanced)	136		46				13	295			155	19	664
Base growth (0.65% compounded for 6 yrs)								12			6		18
Dwell at Caln PRD (384 units)								2			8		10
Taco Bell (2.753ksf)								2			2		4
2023 Base Volumes	136		46				13	311			171	19	696

	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter										20.0%			
Trip Assignment % - Residential Exit							26.0%						
Trip Assignment % - Retail New Enter	4.0%						9.0%						
Trip Assignment % - Retail New Exit										9.0%	4.0%		
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips							16			6			22
Retail New Trips							1						1
Retail Pass-by Trips													0
2023 Projected Volumes	136		46				13	328			177	19	719

Time Period: Weekday P.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	66		24				36	208			257	124	715
Balancing													0
2017 Existing Volumes (Balanced)	66		24				36	208			257	124	715
Base growth (0.65% compounded for 6 yrs)								8			10		18
Dwell at Caln PRD (384 units)								8			4		12
Taco Bell (2.753ksf)								1			1		2
2023 Base Volumes	66		24				36	225			272	124	747

	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter										20.0%			
Trip Assignment % - Residential Exit							26.0%						
Trip Assignment % - Retail New Enter	4.0%						9.0%						
Trip Assignment % - Retail New Exit										9.0%	4.0%		
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips							11			10			21
Retail New Trips	1						2			2	1		6
Retail Pass-by Trips													0
2023 Projected Volumes	67		24				36	238			284	125	774

Time Period: Saturday Midday Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	62		22				19	188			225	68	584
Balancing													0
2017 Existing Volumes (Balanced)	62		22				19	188			225	68	584
Base growth (0.65% compounded for 6 yrs)								7			9		16
Dwell at Caln PRD (384 units)								5			6		11
Taco Bell (2.753ksf)								4			4		8
2023 Base Volumes	62		22				19	204			244	68	619

	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter										20.0%			
Trip Assignment % - Residential Exit							26.0%						
Trip Assignment % - Retail New Enter	4.0%						9.0%						
Trip Assignment % - Retail New Exit										9.0%	4.0%		
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips							11			10			21
Retail New Trips	1						3			3	1		8
Retail Pass-by Trips													0
2023 Projected Volumes	63		22				19	218			257	69	648

TPD# WIME.00001
10/29/2018
Traffic Volumes Worksheet

Intersection:

Synchro Node:

Time Period: Weekday A.M. Peak Hour

Lloyd Avenue & Beaver Run Road/Proposed Driveway									
10	Adjacent Intersections:	West	0	East	0	North	0	South	0

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	16		5				0	317			189	1	528
Balancing													0
2017 Existing Volumes (Balanced)	16		5				0	317			189	1	528

Base growth (0.65% compounded for 6 yrs)								13			7		20
Dwell at Caln PRD (384 units)								2			8		10
Taco Bell (2.753ksf)								2			2		4

2023 Base Volumes	16		5				0	334			206	1	562
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	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter									9.0%	20.0%			
Trip Assignment % - Residential Exit				9.0%		26.0%							
Trip Assignment % - Retail New Enter							9.0%						
Trip Assignment % - Retail New Exit										9.0%			
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips				6		16		3		6			31
Retail New Trips							1						1
Retail Pass-by Trips													0

2023 Projected Volumes	16	0	5	6	0	16	0	335	3	6	206	1	594
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Time Period: Weekday P.M. Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	3		2				1	247			266	14	533
Balancing													0
2017 Existing Volumes (Balanced)	3		2				1	247			266	14	533

Base growth (0.65% compounded for 6 yrs)								10			11		21
Dwell at Caln PRD (384 units)								8			4		12
Taco Bell (2.753ksf)								1			1		2

2023 Base Volumes	3		2				1	266			282	14	568
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	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter									9.0%	20.0%			
Trip Assignment % - Residential Exit				9.0%		26.0%							
Trip Assignment % - Retail New Enter							9.0%						
Trip Assignment % - Retail New Exit										9.0%			
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips				4		11		5		10			30
Retail New Trips							2				2		4
Retail Pass-by Trips													0

2023 Projected Volumes	3	0	2	4	0	11	1	268	5	10	284	14	602
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Time Period: Saturday Midday Peak Hour

	Eastbound			Westbound			Northbound			Southbound			Intersection Volume
	left	thru	right	left	thru	right	left	thru	right	left	thru	right	
2017 Existing Counts	5		10				3	204			238	9	469
Balancing													0
2017 Existing Volumes (Balanced)	5		10				3	204			238	9	469

Base growth (0.65% compounded for 6 yrs)								8			9		17
Dwell at Caln PRD (384 units)								5			6		11
Taco Bell (2.753ksf)								4			4		8

2023 Base Volumes	5		10				3	221			257	9	505
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	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter									9.0%	20.0%			
Trip Assignment % - Residential Exit				9.0%		26.0%							
Trip Assignment % - Retail New Enter							9.0%						
Trip Assignment % - Retail New Exit										9.0%			
Trip Assignment % - Retail Pass-by Enter													
Trip Assignment % - Retail Pass-by Exit													
Residential Trips				4		11		4		10			29
Retail New Trips							3				3		6
Retail Pass-by Trips													0

2023 Projected Volumes	5	0	10	4	0	11	3	224	4	10	260	9	540
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TPD# WIME.00001
10/29/2018

Traffic Volumes Worksheet

Intersection:

Synchro Node:

Route 322 (S.R. 0322) & Proposed RIRO Retail Driveway									
11	Adjacent Intersections:	West	0	East	0	North	0	South	0

Time Period: Weekday A.M. Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts													0
Balancing		971			419								1390
2017 Existing Volumes (Balanced)		971			419								1390
Base growth (0.65% compounded for 6 yrs)		38			17								55
Dwell at Caln PRD (384 units)		50			11								61
Taco Bell (2.753ksf)		28			27								55
2023 Base Volumes		1087			474								1561

	Residential	New Retail	P-By Retail
ENTER =	32	8	3
EXIT =	62	5	1

Trip Assignment % - Residential Enter		46.0%			5.0%								
Trip Assignment % - Residential Exit		5.0%			40.0%								
Trip Assignment % - Retail New Enter		10.0%	39.0%		5.0%								
Trip Assignment % - Retail New Exit					20.0%								
Trip Assignment % - Retail Pass-by Enter		-39.0%	39.0%										
Trip Assignment % - Retail Pass-by Exit								39.0%					
Residential Trips		18			27								45
Retail New Trips		1	3		1								5
Retail Pass-by Trips		(-1)	(1)										0
2023 Projected Volumes		1105	4		502			0					1611

Time Period: Weekday P.M. Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts													0
Balancing		607			807								1414
2017 Existing Volumes (Balanced)		607			807								1414
Base growth (0.65% compounded for 6 yrs)		24			32								56
Dwell at Caln PRD (384 units)		26			49								75
Taco Bell (2.753ksf)		19			18								37
2023 Base Volumes		676			906								1582

	Residential	New Retail	P-By Retail
ENTER =	52	21	11
EXIT =	42	19	9

Trip Assignment % - Residential Enter		46.0%			5.0%								
Trip Assignment % - Residential Exit		5.0%			40.0%								
Trip Assignment % - Retail New Enter		10.0%	39.0%		5.0%								
Trip Assignment % - Retail New Exit					20.0%								
Trip Assignment % - Retail Pass-by Enter		-24.0%	24.0%										
Trip Assignment % - Retail Pass-by Exit								24.0%					
Residential Trips		26			20								46
Retail New Trips		2	8		5								15
Retail Pass-by Trips		(-3)	(3)					(2)					2
2023 Projected Volumes		701	11		931			2					1645

Time Period: Saturday Midday Peak Hour

	left	Eastbound thru	right	left	Westbound thru	right	left	Northbound thru	right	left	Southbound thru	right	Intersection Volume
2017 Existing Counts													0
Balancing		502			513								1015
2017 Existing Volumes (Balanced)		502			513								1015
Base growth (0.65% compounded for 6 yrs)		20			20								40
Dwell at Caln PRD (384 units)		38			30								68
Taco Bell (2.753ksf)		37			36								73
2023 Base Volumes		597			599								1196

	Residential	New Retail	P-By Retail
ENTER =	48	34	12
EXIT =	41	31	11

Trip Assignment % - Residential Enter		46.0%			5.0%								
Trip Assignment % - Residential Exit		5.0%			40.0%								
Trip Assignment % - Retail New Enter		10.0%	39.0%		5.0%								
Trip Assignment % - Retail New Exit					20.0%								
Trip Assignment % - Retail Pass-by Enter		-27.0%	27.0%										
Trip Assignment % - Retail Pass-by Exit								27.0%					
Residential Trips		24			18								42
Retail New Trips		3	13		8								24
Retail Pass-by Trips		(-3)	(3)					(3)					3
2023 Projected Volumes		621	16		625			3					1265

APPENDIX J

CRITICAL/FOLLOW-UP GAP DATA

**CRITICAL HEADWAY CALCULATIONS FOR TWSC INTERSECTION WITHIN SUBURBAN LAND USE CONTEXT
BASED ON PENNSYLVANIA DEFAULT VALUES FROM CHAPTER 10 OF PENNDOT PUBLICATION 46**

$$t_{c,x} = t_{c,base} + t_{c,HV} * P_{HV} + t_{c,G} * G - t_{3,LT}$$

where:

- $t_{c,x}$ = critical headway for movement x (s)
- $t_{c,base}$ = base critical headway from Chapter 10 of PennDOT Publication 46
- $t_{c,HV}$ = adjustment factor for heavy vehicles (1.0 for major streets with one lane in each direction;
2.0 for major streets with two or three lanes in each direction) (s)
- P_{HV} = proportion of heavy vehicles for movement (expressed as a decimal; e.g., $P_{HV}=0.02$ for 2% heavy vehicles)
- $t_{c,G}$ = adjustment factor for grade (0.1 for Movement 9 and 12; 0.2 for Movements 7,8,10, and 11) (s)
- G = percent grade (expressed as an integer; e.g., $G= -2$ for a 2% downhill grade)
- $t_{c,base}$ = adjustment factor for intersection geometry (0.7 for minor street left-turn movement at three-leg intersections; 0.0 otherwise) (s)

LEFT TURN FROM MAJOR ROADWAY - TWO LANES (t _{c, base} = 4.3)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
7	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
8	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
9	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
10	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4

LEFT TURN FROM MINOR ROADWAY - TWO LANES - 4-LEG INTERSECTION (t _{c, base} = 7.1)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	7.1	6.9	7.3	6.7	7.5	6.5	7.7	6.3	7.9	6.1	8.1	5.9	8.3	5.7	8.5	5.5	8.7	5.3	8.9	5.1	9.1
1	7.1	6.9	7.3	6.7	7.5	6.5	7.7	6.3	7.9	6.1	8.1	5.9	8.3	5.7	8.5	5.5	8.7	5.3	8.9	5.1	9.1
2	7.1	6.9	7.3	6.7	7.5	6.5	7.7	6.3	7.9	6.1	8.1	5.9	8.3	5.7	8.5	5.5	8.7	5.3	8.9	5.1	9.1
3	7.1	6.9	7.3	6.7	7.5	6.5	7.7	6.3	7.9	6.1	8.1	5.9	8.3	5.7	8.5	5.5	8.7	5.3	8.9	5.1	9.1
4	7.1	6.9	7.3	6.7	7.5	6.5	7.7	6.3	7.9	6.1	8.1	5.9	8.3	5.7	8.5	5.5	8.7	5.3	8.9	5.1	9.1
5	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2
6	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2
7	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2
8	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2
9	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2
10	7.2	7.0	7.4	6.8	7.6	6.6	7.8	6.4	8.0	6.2	8.2	6.0	8.4	5.8	8.6	5.6	8.8	5.4	9.0	5.2	9.2

THROUGH TRAFFIC ON MINOR ROADWAY - TWO LANES ($t_{c, base} = 6.5$)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
1	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
2	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
3	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
4	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
5	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6
6	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6
7	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6
8	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6
9	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6
10	6.6	6.4	6.8	6.2	7.0	6.0	7.2	5.8	7.4	5.6	7.6	5.4	7.8	5.2	8.0	5.0	8.2	4.8	8.4	4.6	8.6

RIGHT TURN FROM MINOR ROADWAY - TWO LANES ($t_{c, base} = 6.2$)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
1	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
2	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
3	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
4	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
5	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
6	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
7	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
8	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
9	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
10	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3

**CRITICAL HEADWAY CALCULATIONS FOR TWSC INTERSECTION WITHIN SUBURBAN LAND USE CONTEXT
BASED ON PENNSYLVANIA DEFAULT VALUES FROM CHAPTER 10 OF PENNDOT PUBLICATION 46**

$$t_{c,x} = t_{c,base} + t_{c,HV} * P_{HV} + t_{c,G} * G - t_{3,LT}$$

where:

$t_{c,x}$ = critical headway for movement x (s)

$t_{c,base}$ = base critical headway from Chapter 10 of PennDOT Publication 46

$t_{c,HV}$ = adjustment factor for heavy vehicles (1.0 for major streets with one lane in each direction;
2.0 for major streets with two or three lanes in each direction) (s)

P_{HV} = proportion of heavy vehicles for movement (expressed as a decimal; e.g., $P_{HV}=0.02$ for 2% heavy vehicles)

$t_{c,G}$ = adjustment factor for grade (0.1 for Movement 9 and 12; 0.2 for Movements 7,8,10, and 11) (s)

G = percent grade (expressed as an integer; e.g., $G= -2$ for a 2% downhill grade)

$t_{c,base}$ = adjustment factor for intersection geometry (0.7 for minor street left-turn movement at three-leg intersections; 0.0 otherwise) (s)

LEFT TURN FROM MAJOR ROADWAY - TWO LANES (t _{c, base} = 4.3)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
4	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
5	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
7	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
8	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
9	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
10	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4

LEFT TURN FROM MINOR ROADWAY - TWO LANES - 3-LEG INTERSECTION ($t_{c, base} = 7.1$)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	6.4	6.2	6.6	6.0	6.8	5.8	7.0	5.6	7.2	5.4	7.4	5.2	7.6	5.0	7.8	4.8	8.0	4.6	8.2	4.4	8.4
1	6.4	6.2	6.6	6.0	6.8	5.8	7.0	5.6	7.2	5.4	7.4	5.2	7.6	5.0	7.8	4.8	8.0	4.6	8.2	4.4	8.4
2	6.4	6.2	6.6	6.0	6.8	5.8	7.0	5.6	7.2	5.4	7.4	5.2	7.6	5.0	7.8	4.8	8.0	4.6	8.2	4.4	8.4
3	6.4	6.2	6.6	6.0	6.8	5.8	7.0	5.6	7.2	5.4	7.4	5.2	7.6	5.0	7.8	4.8	8.0	4.6	8.2	4.4	8.4
4	6.4	6.2	6.6	6.0	6.8	5.8	7.0	5.6	7.2	5.4	7.4	5.2	7.6	5.0	7.8	4.8	8.0	4.6	8.2	4.4	8.4
5	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
6	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
7	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
8	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
9	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5
10	6.5	6.3	6.7	6.1	6.9	5.9	7.1	5.7	7.3	5.5	7.5	5.3	7.7	5.1	7.9	4.9	8.1	4.7	8.3	4.5	8.5

RIGHT TURN FROM MINOR ROADWAY - TWO LANES ($t_{c, \text{base}} = 6.2$)																					
GRADE	0	-1	1	-2	2	-3	3	-4	4	-5	5	-6	6	-7	7	-8	8	-9	9	-10	10
HV %																					
0	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
1	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
2	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
3	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
4	6.2	6.1	6.3	6.0	6.4	5.9	6.5	5.8	6.6	5.7	6.7	5.6	6.8	5.5	6.9	5.4	7.0	5.3	7.1	5.2	7.2
5	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
6	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
7	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
8	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
9	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3
10	6.3	6.2	6.4	6.1	6.5	6.0	6.6	5.9	6.7	5.8	6.8	5.7	6.9	5.6	7.0	5.5	7.1	5.4	7.2	5.3	7.3

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APPENDIX K

CAPACITY ANALYSES

2017 EXISTING CONDITIONS

1: ROUTE 322 & ROCK RAYMOND ROAD
2017 EXISTING CONDITIONS

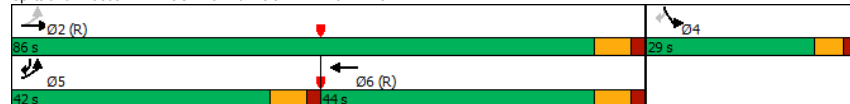
Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	280	732	175	101	211	213
Future Volume (vph)	280	732	175	101	211	213
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	7%	6%	0%	14%	22%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	42.0	86.0	44.0		29.0	42.0
Total Split (%)	36.5%	74.8%	38.3%		25.2%	36.5%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 112 (97%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	280	732	175	101	211	213
Future Volume (veh/h)	280	732	175	101	211	213
Number	5	2	6	16	7	14
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
Adj Sat Flow, veh/h/ln	1782	1767	1767	1764	1571	1468
Adj Flow Rate, veh/h	322	841	201	103	243	100
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh. %	2	7	6	6	14	22
Cap. veh/h	722	1262	594	304	285	391
Arrive On Green	0.25	1.00	0.54	0.53	0.19	0.19
Sat Flow, veh/h	1697	1767	1103	565	1496	1248
Grp Volume(v), veh/h	322	841	0	304	243	100
Grp Sat Flow(s),veh/h/ln	1697	1767	0	1668	1496	1248
Q Serve(g_s), s	9.6	0.0	0.0	11.9	18.1	6.9
Cycle Q Clear(g_c), s	9.6	0.0	0.0	11.9	18.1	6.9
Prop In Lane	1.00			0.34	1.00	1.00
Lane Grp Cap(c), veh/h	722	1262	0	899	285	391
V/C Ratio(X)	0.45	0.67	0.00	0.34	0.85	0.26
Avail Cap(c_a), veh/h	1045	1262	0	899	312	414
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.2	0.0	0.0	15.1	45.0	29.5
Incr Delay (d2), s/veh	0.4	2.8	0.0	1.0	18.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.7	1.8	0.0	9.6	13.9	9.2
LnGrp Delay(d),s/veh	7.7	2.8	0.0	16.1	63.7	29.8
LnGrp LOS	A	A		B	E	C
Approach Vol, veh/h	1163	304		343		
Approach Delay, s/veh	4.1	16.1		53.8		
Approach LOS	A	B		D		






















Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		88.1		26.9	20.1	68.0		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		79.0		23.0	35.0	37.0		
Max Q Clear Time (g_c+1), s		2.5		20.6	12.1	13.9		
Green Ext Time (p_c), s		3.9		0.3	1.1	1.1		

Intersection Summary

HCM 2010 Ctrl Delay 15.6
HCM 2010 LOS B

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	709	95	79	315	25	182	32	244	18	5	63
Future Volume (vph)	48	709	95	79	315	25	182	32	244	18	5	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			329			298			194	
Travel Time (s)		8.3			5.0			5.8			5.3	
Confl. Peds. (#/hr)	2		2							2		2
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	5%	5%	19%	15%	0%	1%	3%	5%	0%	0%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	67.0	67.0	67.0	12.0	79.0	79.0	36.0	36.0	12.0	36.0	36.0	
Total Split (%)	58.3%	58.3%	58.3%	10.4%	68.7%	68.7%	31.3%	31.3%	10.4%	31.3%	31.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 113 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2017 EXISTING CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 3

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	48	709	95	79	315	25	182	32	244	18	5	63
Future Volume (veh/h)	48	709	95	79	315	25	182	32	244	18	5	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	2	0	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1714	1714	1520	1573	1809	1809	1786	1723	1782	1814	1782
Adj Flow Rate, veh/h	55	815	95	91	362	22	209	37	149	21	6	35
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh. %	2	5	5	19	15	0	3	5	0	0	0	0
Cap. veh/h	619	1012	841	245	1090	1065	313	41	384	143	54	201
Arrive On Green	0.60	0.60	0.60	0.07	0.93	0.93	0.21	0.21	0.21	0.20	0.21	0.20
Sat Flow, veh/h	943	1714	1425	1448	1573	1538	1190	211	1464	471	256	942
Grp Volume(v), veh/h	55	815	95	91	362	22	246	0	149	62	0	0
Grp Sat Flow(s),veh/h/ln	943	1714	1425	1448	1573	1538	1400	0	1464	1670	0	0
Q Serve(g_s), s	2.9	42.2	3.3	2.6	2.7	0.1	16.2	0.0	9.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	42.2	3.3	2.6	2.7	0.1	19.3	0.0	9.7	3.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.85		1.00	0.34		0.56
Lane Grp Cap(c), veh/h	619	1012	841	245	1090	1065	353	0	384	383	0	0
V/C Ratio(X)	0.09	0.81	0.11	0.37	0.33	0.02	0.70	0.00	0.39	0.16	0.00	0.00
Avail Cap(c_a), veh/h	624	1021	848	252	1098	1073	432	0	469	465	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.3	18.5	10.4	18.1	1.5	1.4	43.6	0.0	34.9	37.6	0.0	0.0
Incr Delay (d2), s/veh	0.3	6.8	0.3	0.9	0.8	0.0	3.7	0.0	0.6	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	29.6	2.5	2.9	2.7	0.1	13.1	0.0	7.1	3.0	0.0	0.0
LnGrp Delay(d),s/veh	10.6	25.3	10.6	19.8	2.4	1.5	47.3	0.0	35.5	37.7	0.0	0.0
LnGrp LOS	B	C	B	B	A	A	D		D	D		
Approach Vol, veh/h	965		475		395		62					
Approach Delay, s/veh	23.0		5.7		42.8		37.7					
Approach LOS	C		A		D		D					

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	11.8	74.5		28.7		86.3		28.7
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0
Max Green Setting (Gmax), s	5.0	60.0		30.0		72.0		30.0
Max Q Clear Time (g_c+11), s	5.1	44.7		5.6		5.2		21.8
Green Ext Time (p_c), s	0.0	3.8		0.2		1.4		1.0

Intersection Summary






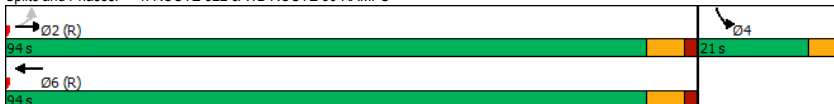
HCM 2010 Ctrl Delay	23.3
HCM 2010 LOS	C

2017 EXISTING CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 4












4: ROUTE 322 & WB ROUTE 30 RAMPS
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	1104	206	109	183	260
Future Volume (vph)	9	1104	206	109	183	260
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Peds. (#/hr)					1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	33%	4%	15%	15%	7%	12%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	94.0	94.0	94.0		21.0	
Total Split (%)	81.7%	81.7%	81.7%		18.3%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 115						
Actuated Cycle Length: 115						
Offset: 76 (66%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 75						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						
						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	9	1104	206	109	183	260		
Future Volume (veh/h)	9	1104	206	109	183	260		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	1		
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		
Adj Sat Flow, veh/h/ln	1429	1757	1550	1782	1750	1671		
Adj Flow Rate, veh/h	9	1150	215	0	191	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	33	4	15	15	7	12		
Cap. veh/h	711	1344	1186	0	232	198		
Arrive On Green	0.77	0.77	0.77	0.00	0.14	0.00		
Sat Flow, veh/h	891	1757	1550	0	1666	1421		
Grp Volume(v), veh/h	9	1150	215	0	191	0		
Grp Sat Flow(s),veh/h/ln	891	1757	1550	0	1666	1421		
Q Serve(g_s), s	0.3	51.2	4.3	0.0	12.8	0.0		
Cycle Q Clear(g_c), s	4.7	51.2	4.3	0.0	12.8	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	711	1344	1186	0	232	198		
V/C Ratio(X)	0.01	0.86	0.18	0.00	0.82	0.00		
Avail Cap(c_a), veh/h	711	1344	1186	0	232	198		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	4.3	9.2	3.7	0.0	48.3	0.0		
Incr Delay (d2), s/veh	0.0	7.1	0.3	0.0	21.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.8	0.0		
%ile BackOfQ(95%),veh/ln	0.2	35.5	3.5	0.0	11.9	0.0		
LnGrp Delay(d),s/veh	4.3	16.3	4.0	0.0	70.6	0.0		
LnGrp LOS	A	B	A		E			
Approach Vol, veh/h	1159		215		191			
Approach Delay, s/veh	16.2		4.0		70.6			
Approach LOS	B		A		E			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		6			
Phs Duration (G+Y+Rc), s	94.0		21.0		94.0			
Change Period (Y+Rc), s	7.0		6.0		7.0			
Max Green Setting (Gmax), s	87.0		15.0		87.0			
Max Q Clear Time (g_c+I1), s	53.7		15.3		6.8			
Green Ext Time (p_c), s	7.0		0.0		0.7			
Intersection Summary								
HCM 2010 Ctrl Delay			21.2					
HCM 2010 LOS			C					

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	703	592	262	299	11	166
Future Volume (vph)	703	592	262	299	11	166
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%			7%	-5%	
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	5%	4%	2%	15%	0%	2%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	3.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	703	592	262	299	11	166
Future Vol, veh/h	703	592	262	299	11	166
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	4	2	15	0	2
Mvmt Flow	756	637	282	322	12	178










Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	756
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	656
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	656
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	6.8	19.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	79	475	-	-	656	-
HCM Lane V/C Ratio	0.15	0.376	-	-	0.429	-
HCM Control Delay (s)	58.4	17.1	-	-	14.6	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	0.5	1.7	-	-	2.2	-

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: AM Peak




						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	439	173	18	11	1
Future Volume (vph)	2	439	173	18	11	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		301	298		184	
Travel Time (s)		5.9	5.8		5.0	
Confl. Peds. (#/hr)					2	2
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	0%	3%	11%	22%	9%	0%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	439	173	18	11	1
Future Vol, veh/h	2	439	173	18	11	1
Conflicting Peds, #/hr	0	0	0	0	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	0	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	3	11	22	9	0
Mvmt Flow	2	542	214	22	14	1










Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	236	0	773
Stage 1	-	-	225
Stage 2	-	-	548
Critical Hdwy	4.3	-	7.29
Critical Hdwy Stg 1	-	-	6.29
Critical Hdwy Stg 2	-	-	6.29
Follow-up Hdwy	3	-	3.1
Pot Cap-1 Maneuver	997	-	332
Stage 1	-	-	862
Stage 2	-	-	559
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	997	-	331
Mov Cap-2 Maneuver	-	-	331
Stage 1	-	-	859
Stage 2	-	-	559

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	997	-	-	-	349
HCM Lane V/C Ratio	0.002	-	-	-	0.042
HCM Control Delay (s)	8.6	0	-	-	15.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1




9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	136	46	13	295	155	19
Future Volume (vph)	136	46	13	295	155	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1310			446	202	
Travel Time (s)	25.5			8.7	3.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	31%	5%	12%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	136	46	13	295	155	19
Future Vol, veh/h	136	46	13	295	155	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	31	5	12	0
Mvmt Flow	151	51	14	328	172	21










Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	539	183	193
Stage 1	183	-	-
Stage 2	356	-	-
Critical Hdwy	6.82	6.42	4.41
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3	3.1	3.1
Pot Cap-1 Maneuver	537	906	995
Stage 1	962	-	-
Stage 2	780	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	528	906	995
Mov Cap-2 Maneuver	528	-	-
Stage 1	946	-	-
Stage 2	780	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.3	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	995	-	590	-
HCM Lane V/C Ratio	0.015	-	0.343	-
HCM Control Delay (s)	8.7	0	14.3	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	1.5	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	5	0	317	189	1
Future Volume (vph)	16	5	0	317	189	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1282			488	446	
Travel Time (s)	35.0			9.5	8.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	20%	0%	5%	11%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	16	5	0	317	189	1
Future Vol, veh/h	16	5	0	317	189	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	20	0	5	11	0
Mvmt Flow	18	5	0	348	208	1






Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	557	209	209	0	-	0
Stage 1	209	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Critical Hdwy	6.6	6.5	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.48	3	-	-	-
Pot Cap-1 Maneuver	540	783	1019	-	-	-
Stage 1	945	-	-	-	-	-
Stage 2	805	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	540	783	1019	-	-	-
Mov Cap-2 Maneuver	540	-	-	-	-	-
Stage 1	945	-	-	-	-	-
Stage 2	805	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1019	-	583	-
HCM Lane V/C Ratio	-	-	0.04	-
HCM Control Delay (s)	0	-	11.4	-
HCM Lane LOS	A	-	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

1: ROUTE 322 & ROCK RAYMOND ROAD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	83	519	680	77	62	119
Future Volume (vph)	83	519	680	77	62	119
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Confl. Peds. (#/hr)				1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	21%	2%	1%	5%	0%	5%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	16.0	79.0	63.0		21.0	16.0
Total Split (%)	16.0%	79.0%	63.0%		21.0%	16.0%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag		Lead	
Lead-Lag Optimize?	Yes		Yes		Yes	
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other

Cycle Length: 100

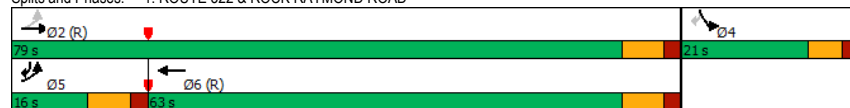
Actuated Cycle Length: 100

Offset: 13 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 65












Control Type: Actuated-Coordinated

Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	83	519	680	77	62	119		
Future Volume (veh/h)	83	519	680	77	62	119		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	1	0	1	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		
Adj Sat Flow, veh/h/ln	1502	1854	1809	1764	1791	1706		
Adj Flow Rate, veh/h	87	546	716	79	65	61		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	21	2	1	1	0	5		
Cap, veh/h	396	1513	1136	125	126	176		
Arrive On Green	0.09	1.00	0.71	0.70	0.07	0.07		
Sat Flow, veh/h	1431	1854	1601	177	1706	1450		
Grp Volume(v), veh/h	87	546	0	795	65	61		
Grp Sat Flow(s),veh/h/ln	1431	1854	0	1778	1706	1450		
Q Serve(g_s), s	1.4	0.0	0.0	23.6	3.7	3.9		
Cycle Q Clear(g_c), s	1.4	0.0	0.0	23.6	3.7	3.9		
Prop In Lane	1.00			0.10	1.00	1.00		
Lane Grp Cap(c), veh/h	396	1513	0	1261	126	176		
V/C Ratio(X)	0.22	0.36	0.00	0.63	0.52	0.35		
Avail Cap(c_a), veh/h	478	1513	0	1261	273	300		
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	6.9	0.0	0.0	7.8	44.6	40.3		
Incr Delay (d2), s/veh	0.3	0.7	0.0	2.4	3.2	1.2		
Initial Q Delay(d3),s/veh	0.1	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	1.6	0.5	0.0	18.1	3.3	5.8		
LnGrp Delay(d),s/veh	7.2	0.7	0.0	10.2	47.8	41.4		
LnGrp LOS	A	A		B	D	D		
Approach Vol, veh/h		633	795		126			
Approach Delay, s/veh		1.6	10.2		44.7			
Approach LOS		A	B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		87.6		12.4	10.7	77.0		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		72.0		15.0	9.0	56.0		
Max Q Clear Time (g_c+I1), s		2.5		6.4	3.9	25.6		
Green Ext Time (p_c), s		2.1		0.2	0.1	3.7		























Intersection Summary

HCM 2010 Ctrl Delay 9.5

HCM 2010 LOS A

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	496	235	112	644	51	160	20	102	9	22	81
Future Volume (vph)	57	496	235	112	644	51	160	20	102	9	22	81
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			315			307			194	
Travel Time (s)		8.3			4.8			6.0			5.3	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	4%	4%	1%	1%	3%	1%	5%	6%	0%	0%	4%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	55.0	55.0	55.0	14.0	69.0	69.0	31.0	31.0	14.0	31.0	31.0	
Total Split (%)	55.0%	55.0%	55.0%	14.0%	69.0%	69.0%	31.0%	31.0%	14.0%	31.0%	31.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 100

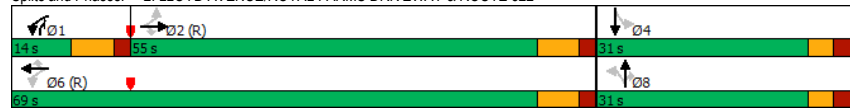
Actuated Cycle Length: 100

Offset: 14 (14%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩	↩
Traffic Volume (veh/h)	57	496	235	112	644	51	160	20	102	9	22	81
Future Volume (veh/h)	57	496	235	112	644	51	160	20	102	9	22	81
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	1	0	0	0	1	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1731	1731	1791	1791	1756	1809	1783	1707	1782	1801	1782
Adj Flow Rate, veh/h	59	517	216	117	671	30	167	21	53	9	23	56
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	4	4	1	1	3	5	5	6	0	0	0
Cap, veh/h	486	1037	863	467	1285	1070	278	26	335	53	92	183
Arrive On Green	0.60	0.60	0.60	0.11	1.00	1.00	0.17	0.17	0.17	0.16	0.17	0.16
Sat Flow, veh/h	703	1731	1441	1706	1791	1493	1207	152	1451	74	528	1055
Grp Volume(v), veh/h	59	517	216	117	671	30	188	0	53	88	0	0
Grp Sat Flow(s),veh/h/ln	703	1731	1441	1706	1791	1493	1359	0	1451	1657	0	0
Q Serve(g_s), s	3.7	17.0	7.0	2.4	0.0	0.0	8.8	0.0	2.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.7	17.0	7.0	2.4	0.0	0.0	13.1	0.0	2.9	4.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.89		1.00	0.10		0.64
Lane Grp Cap(c), veh/h	486	1037	863	467	1285	1070	304	0	335	311	0	0
V/C Ratio(X)	0.12	0.50	0.25	0.25	0.52	0.03	0.62	0.00	0.16	0.28	0.00	0.00
Avail Cap(c_a), veh/h	495	1040	866	507	1287	1072	416	0	460	446	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.4	11.5	9.5	7.3	0.0	0.0	39.5	0.0	30.7	36.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	1.7	0.7	0.3	1.5	0.0	2.1	0.0	0.2	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.6	13.4	5.3	2.0	1.0	0.0	9.0	0.0	2.1	4.0	0.0	0.0
LnGrp Delay(d),s/veh	10.0	13.2	10.2	7.5	1.5	0.0	41.5	0.0	30.9	37.0	0.0	0.0
LnGrp LOS	A	B	B	A	A	A	D		C	D		
Approach Vol, veh/h	792		818		241		88					
Approach Delay, s/veh	12.1		2.3		39.2		37.0					
Approach LOS	B		A		D		D					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	11.7	66.1		22.2		77.8		22.2				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	7.0	48.0		25.0		62.0		25.0				
Max Q Clear Time (g_c+1), s	4.9	19.5		6.8		2.5		15.6				
Green Ext Time (p_c), s	0.1	3.4		0.2		2.9		0.6				









Intersection Summary

HCM 2010 Ctrl Delay 12.5

HCM 2010 LOS B












4: ROUTE 322 & WB ROUTE 30 RAMPS
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	11	731	492	199	249	584
Future Volume (vph)	11	731	492	199	249	584
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Bikes (#/hr)						1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	3%	1%	2%	2%	3%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	51.0	51.0	51.0		49.0	
Total Split (%)	51.0%	51.0%	51.0%		49.0%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 100						
Offset: 97 (97%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 55						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						
 Ø2 (R)				 Ø4		
51 s				49 s		
 Ø6 (R)						
51 s						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	11	731	492	199	249	584		
Future Volume (veh/h)	11	731	492	199	249	584		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	1	4	1	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		
Adj Sat Flow, veh/h/ln	1900	1774	1759	1782	1835	1817		
Adj Flow Rate, veh/h	12	812	547	0	277	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	0	3	1	1	2	3		
Cap, veh/h	518	1221	1211	0	353	312		
Arrive On Green	0.69	0.69	0.69	0.00	0.20	0.00		
Sat Flow, veh/h	874	1774	1759	0	1748	1545		
Grp Volume(v), veh/h	12	812	547	0	277	0		
Grp Sat Flow(s),veh/h/ln	874	1774	1759	0	1748	1545		
Q Serve(g_s), s	0.6	26.3	14.1	0.0	15.0	0.0		
Cycle Q Clear(g_c), s	14.7	26.3	14.1	0.0	15.0	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	518	1221	1211	0	353	312		
V/C Ratio(X)	0.02	0.67	0.45	0.00	0.79	0.00		
Avail Cap(c_a), veh/h	550	1221	1211	0	769	680		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	13.0	9.2	7.1	0.0	37.9	0.0		
Incr Delay (d2), s/veh	0.1	2.9	1.2	0.0	5.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.2	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	0.5	20.7	11.7	0.0	12.3	0.0		
LnGrp Delay(d),s/veh	13.1	12.3	8.3	0.0	43.3	0.0		
LnGrp LOS	B	B	A		D			
Approach Vol, veh/h	824		547		277			
Approach Delay, s/veh	12.3		8.3		43.3			
Approach LOS	B		A		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		6			
Phs Duration (G+Y+Rc), s	74.8		25.2		74.8			
Change Period (Y+Rc), s	7.0		6.0		7.0			
Max Green Setting (Gmax), s	44.0		43.0		44.0			
Max Q Clear Time (g_c+1), s	28.8		17.5		16.6			
Green Ext Time (p_c), s	3.1		1.7		2.0			
Intersection Summary								
HCM 2010 Ctrl Delay	16.2							
HCM 2010 LOS	B							

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	571	390	188	704	8	200
Future Volume (vph)	571	390	188	704	8	200
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%			7%	-5%	
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	1%	1%	25%	3%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	3.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	571	390	188	704	8	200
Future Vol, veh/h	571	390	188	704	8	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	4	2	1	1	25	3
Mvmt Flow	634	433	209	782	9	222

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	634
Stage 1	-	-	634
Stage 2	-	-	1200
Critical Hdwy	-	4.3	5.65
Critical Hdwy Stg 1	-	-	4.65
Critical Hdwy Stg 2	-	-	4.65
Follow-up Hdwy	-	3	3
Pot Cap-1 Maneuver	-	724	37
Stage 1	-	-	681
Stage 2	-	-	257
Platoon blocked, %	-	-	1
Mov Cap-1 Maneuver	-	724	26
Mov Cap-2 Maneuver	-	-	26
Stage 1	-	-	484
Stage 2	-	-	257

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	23.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	26	549	-	-	724	-
HCM Lane V/C Ratio	0.342	0.405	-	-	0.289	-
HCM Control Delay (s)	203.3	15.9	-	-	12	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	1	1.9	-	-	1.2	-

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

	↖	→	←	↖	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		Y	
Traffic Volume (vph)	1	279	378	7	7	3
Future Volume (vph)	1	279	378	7	7	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		292	307		174	
Travel Time (s)		5.7	6.0		4.7	
Confl. Peds. (#/hr)				1	2	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		Y	
Traffic Vol, veh/h	1	279	378	7	7	3
Future Vol, veh/h	1	279	378	7	7	3
Conflicting Peds, #/hr	0	0	0	1	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	1	297	402	7	7	3










Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	410	0	708
Stage 1	-	-	407
Stage 2	-	-	301
Critical Hdwy	4.3	-	7.2
Critical Hdwy Stg 1	-	-	6.2
Critical Hdwy Stg 2	-	-	6.2
Follow-up Hdwy	3	-	3
Pot Cap-1 Maneuver	868	-	386
Stage 1	-	-	702
Stage 2	-	-	808
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	867	-	385
Mov Cap-2 Maneuver	-	-	385
Stage 1	-	-	701
Stage 2	-	-	807

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	867	-	-	-	439
HCM Lane V/C Ratio	0.001	-	-	-	0.024
HCM Control Delay (s)	9.2	0	-	-	13.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1




9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	66	24	36	208	257	124
Future Volume (vph)	66	24	36	208	257	124
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1323			450	217	
Travel Time (s)	25.8			8.8	4.2	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	13%	0%	2%	1%	2%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	66	24	36	208	257	124
Future Vol, veh/h	66	24	36	208	257	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	13	0	2	1	2
Mvmt Flow	70	26	38	221	273	132










Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	636	339	405	0	-	0
Stage 1	339	-	-	-	-	-
Stage 2	297	-	-	-	-	-
Critical Hdwy	6.82	6.53	4.3	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3	3.417	3	-	-	-
Pot Cap-1 Maneuver	463	666	872	-	-	-
Stage 1	796	-	-	-	-	-
Stage 2	838	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	440	666	872	-	-	-
Mov Cap-2 Maneuver	440	-	-	-	-	-
Stage 1	756	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.3	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	872	-	484	-
HCM Lane V/C Ratio	0.044	-	0.198	-
HCM Control Delay (s)	9.3	0	14.3	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	2	1	247	266	14
Future Volume (vph)	3	2	1	247	266	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1337			161	450	
Travel Time (s)	36.5			3.1	8.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	2%	3%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	2	1	247	266	14
Future Vol, veh/h	3	2	1	247	266	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	2	3	0
Mvmt Flow	3	2	1	266	286	15

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	562	294	301	0	-	0
Stage 1	294	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	536	786	947	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	883	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	535	786	947	-	-	-
Mov Cap-2 Maneuver	535	-	-	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	883	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	947	-	613	-
HCM Lane V/C Ratio	0.001	-	0.009	-
HCM Control Delay (s)	8.8	0	10.9	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0	-

1: ROUTE 322 & ROCK RAYMOND ROAD

2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

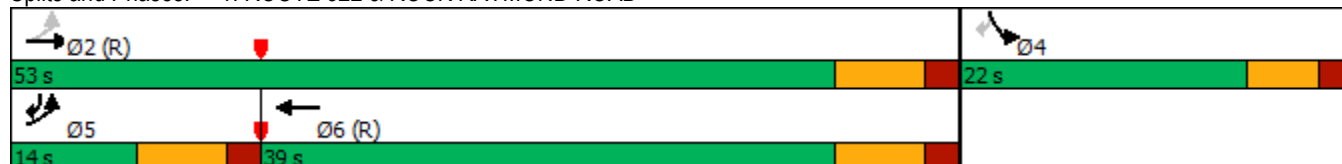


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	453	419	42	39	79
Future Volume (vph)	65	453	419	42	39	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	1%	1%	5%	0%	3%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	14.0	53.0	39.0		22.0	14.0
Total Split (%)	18.7%	70.7%	52.0%		29.3%	18.7%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 8 (11%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated












Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD

2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	65	453	419	42	39	79		
Future Volume (veh/h)	65	453	419	42	39	79		
Number	5	2	6	16	7	14		
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		
Adj Sat Flow, veh/h/ln	1731	1872	1810	1764	1791	1739		
Adj Flow Rate, veh/h	68	477	441	42	41	39		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	5	1	1	1	0	3		
Cap, veh/h	635	1482	1082	103	105	161		
Arrive On Green	0.03	0.53	0.66	0.65	0.06	0.06		
Sat Flow, veh/h	1649	1872	1628	155	1706	1478		
Grp Volume(v), veh/h	68	477	0	483	41	39		
Grp Sat Flow(s),veh/h/ln	1649	1872	0	1783	1706	1478		
Q Serve(g_s), s	0.8	10.8	0.0	9.4	1.7	1.8		
Cycle Q Clear(g_c), s	0.8	10.8	0.0	9.4	1.7	1.8		
Prop In Lane	1.00			0.09	1.00	1.00		
Lane Grp Cap(c), veh/h	635	1482	0	1185	105	161		
V/C Ratio(X)	0.11	0.32	0.00	0.41	0.39	0.24		
Avail Cap(c_a), veh/h	733	1482	0	1185	387	405		
HCM Platoon Ratio	0.67	0.67	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	3.5	6.2	0.0	5.8	33.8	30.6		
Incr Delay (d2), s/veh	0.1	0.6	0.0	1.0	2.4	0.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	0.7	9.8	0.0	8.5	1.6	2.8		
LnGrp Delay(d),s/veh	3.6	6.8	0.0	6.9	36.2	31.4		
LnGrp LOS	A	A		A	D	C		
Approach Vol, veh/h		545	483		80			
Approach Delay, s/veh		6.4	6.9		33.8			
Approach LOS		A	A		C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		65.4		9.6	9.5	55.8		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		46.0		16.0	7.0	32.0		
Max Q Clear Time (g_c+I1), s		13.3		4.3	3.3	11.4		
Green Ext Time (p_c), s		1.7		0.1	0.0	1.8		
Intersection Summary								
HCM 2010 Ctrl Delay			8.6					
HCM 2010 LOS			A					

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	433	205	61	406	46	179	21	50	19	15	78
Future Volume (vph)	54	433	205	61	406	46	179	21	50	19	15	78
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			297			312			194	
Travel Time (s)		8.3			4.5			6.1			5.3	
Confl. Peds. (#/hr)	2		2									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	0%	1%	0%	1%	0%	3%	0%	0%	5%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	40.0	40.0	40.0	13.0	53.0	53.0	22.0	22.0	13.0	22.0	22.0	
Total Split (%)	53.3%	53.3%	53.3%	17.3%	70.7%	70.7%	29.3%	29.3%	17.3%	29.3%	29.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 75

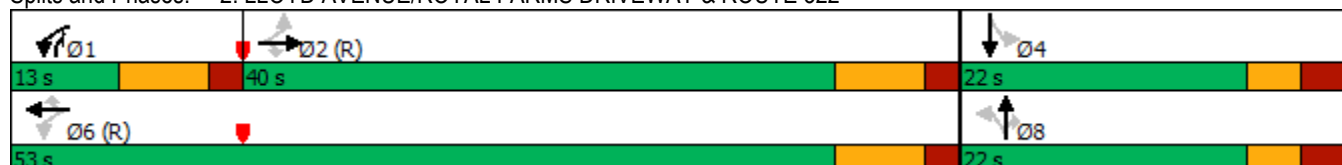
Actuated Cycle Length: 75

Offset: 48 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated























Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	433	205	61	406	46	179	21	50	19	15	78
Future Volume (veh/h)	54	433	205	61	406	46	179	21	50	19	15	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	1	0	0	6	1	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1782	1782	1809	1791	1809	1809	1793	1756	1782	1791	1782
Adj Flow Rate, veh/h	57	456	154	64	427	42	188	22	21	20	16	44
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	1	1	0	1	0	0	0	3	0	0	0
Cap, veh/h	561	951	807	474	1188	1020	327	30	358	109	93	174
Arrive On Green	0.53	0.53	0.53	0.05	0.66	0.66	0.19	0.19	0.19	0.18	0.19	0.18
Sat Flow, veh/h	872	1782	1512	1723	1791	1538	1253	147	1493	259	491	916
Grp Volume(v), veh/h	57	456	154	64	427	42	210	0	21	80	0	0
Grp Sat Flow(s),veh/h/ln	872	1782	1512	1723	1791	1538	1400	0	1493	1666	0	0
Q Serve(g_s), s	2.4	12.0	4.0	1.1	7.9	0.7	7.8	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.4	12.0	4.0	1.1	7.9	0.7	10.5	0.0	0.8	3.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.90		1.00	0.25		0.55
Lane Grp Cap(c), veh/h	561	951	807	474	1188	1020	357	0	358	354	0	0
V/C Ratio(X)	0.10	0.48	0.19	0.13	0.36	0.04	0.59	0.00	0.06	0.23	0.00	0.00
Avail Cap(c_a), veh/h	562	953	809	551	1189	1021	406	0	412	410	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.7	11.0	9.1	7.4	5.6	4.4	28.7	0.0	22.0	26.2	0.0	0.0
Incr Delay (d2), s/veh	0.4	1.7	0.5	0.1	0.8	0.1	1.7	0.0	0.1	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	10.4	3.1	1.1	7.3	0.6	7.9	0.0	0.6	2.6	0.0	0.0
LnGrp Delay(d),s/veh	9.1	12.7	9.6	7.5	6.4	4.4	30.5	0.0	22.1	26.6	0.0	0.0
LnGrp LOS	A	B	A	A	A	A	C		C	C		
Approach Vol, veh/h		667			533			231			80	
Approach Delay, s/veh		11.7			6.4			29.8			26.6	
Approach LOS		B			A			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	9.7	46.1		19.2		55.8		19.2				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	6.0	33.0		16.0		46.0		16.0				
Max Q Clear Time (g_c+I1), s	3.6	14.5		5.2		10.4		13.0				
Green Ext Time (p_c), s	0.0	2.4		0.1		1.7		0.2				
Intersection Summary												
HCM 2010 Ctrl Delay			13.4									
HCM 2010 LOS			B									
Notes												

4: ROUTE 322 & WB ROUTE 30 RAMPS 2017 EXISTING CONDITIONS

Timing Plan: SAT Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	829	332	138	219	486
Future Volume (vph)	15	829	332	138	219	486
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	1%	1%	0%	1%	2%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	54.0	54.0	54.0		21.0	
Total Split (%)	72.0%	72.0%	72.0%		28.0%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	

Intersection Summary












Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 75
 Offset: 17 (23%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS



4: ROUTE 322 & WB ROUTE 30 RAMPS 2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	15	829	332	138	219	486		
Future Volume (veh/h)	15	829	332	138	219	486		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	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		
Adj Sat Flow, veh/h/ln	1900	1809	1770	1782	1853	1835		
Adj Flow Rate, veh/h	16	882	353	0	233	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94		
Percent Heavy Veh, %	0	1	1	1	1	2		
Cap, veh/h	719	1224	1198	0	312	275		
Arrive On Green	0.68	0.68	0.68	0.00	0.18	0.00		
Sat Flow, veh/h	1044	1809	1770	0	1765	1560		
Grp Volume(v), veh/h	16	882	353	0	233	0		
Grp Sat Flow(s),veh/h/ln	1044	1809	1770	0	1765	1560		
Q Serve(g_s), s	0.5	23.0	6.0	0.0	9.4	0.0		
Cycle Q Clear(g_c), s	6.5	23.0	6.0	0.0	9.4	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	719	1224	1198	0	312	275		
V/C Ratio(X)	0.02	0.72	0.29	0.00	0.75	0.00		
Avail Cap(c_a), veh/h	720	1226	1199	0	377	333		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	6.2	7.6	4.9	0.0	29.4	0.0		
Incr Delay (d2), s/veh	0.1	3.7	0.6	0.0	7.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.3	0.0		
%ile BackOfQ(95%),veh/ln	0.3	18.4	5.5	0.0	9.2	0.0		
LnGrp Delay(d),s/veh	6.3	11.3	5.5	0.0	37.2	0.0		
LnGrp LOS	A	B	A		D			
Approach Vol, veh/h		898	353		233			
Approach Delay, s/veh		11.2	5.5		37.2			
Approach LOS		B	A		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		56.8		18.2		56.8		
Change Period (Y+Rc), s		7.0		6.0		7.0		
Max Green Setting (Gmax), s		47.0		15.0		47.0		
Max Q Clear Time (g_c+I1), s		25.5		11.9		8.5		
Green Ext Time (p_c), s		3.9		0.4		1.2		
Intersection Summary								
HCM 2010 Ctrl Delay			14.0					
HCM 2010 LOS			B					

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	520	543	223	427	20	173
Future Volume (vph)	520	543	223	427	20	173
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%			7%	-5%	
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	2%	2%	1%	0%	1%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	520	543	223	427	20	173
Future Vol, veh/h	520	543	223	427	20	173
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	2	2	1	0	1
Mvmt Flow	542	566	232	445	21	180

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	542
Stage 1	-	-	542
Stage 2	-	-	909
Critical Hdwy	-	4.3	5.4
Critical Hdwy Stg 1	-	-	4.4
Critical Hdwy Stg 2	-	-	4.4
Follow-up Hdwy	-	3	3
Pot Cap-1 Maneuver	-	781	166
Stage 1	-	-	769
Stage 2	-	-	487
Platoon blocked, %	-	-	1
Mov Cap-1 Maneuver	-	781	117
Mov Cap-2 Maneuver	-	-	117
Stage 1	-	-	541
Stage 2	-	-	487

Approach	EB	WB	NB
HCM Control Delay, s	0	4	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	117	615	-	-	781	-
HCM Lane V/C Ratio	0.178	0.293	-	-	0.297	-
HCM Control Delay (s)	42.3	13.3	-	-	11.5	-
HCM Lane LOS	E	B	-	-	B	-
HCM 95th %tile Q(veh)	0.6	1.2	-	-	1.2	-

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

	↖	→	←	↖	↘	↙
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	248	290	4	4	1
Future Volume (vph)	2	248	290	4	4	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		287	312		177	
Travel Time (s)		5.6	6.1		4.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	1%	25%	0%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

8: LLOYD AVENUE & PARK AND RIDE
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	248	290	4	4	1
Future Vol, veh/h	2	248	290	4	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	1	1	25	0	0
Mvmt Flow	2	256	299	4	4	1










Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	303	0	561
Stage 1	-	-	301
Stage 2	-	-	260
Critical Hdwy	4.3	-	7.2
Critical Hdwy Stg 1	-	-	6.2
Critical Hdwy Stg 2	-	-	6.2
Follow-up Hdwy	3	-	3
Pot Cap-1 Maneuver	946	-	489
Stage 1	-	-	808
Stage 2	-	-	853
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	946	-	488
Mov Cap-2 Maneuver	-	-	488
Stage 1	-	-	806
Stage 2	-	-	853

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	946	-	-	-	526
HCM Lane V/C Ratio	0.002	-	-	-	0.01
HCM Control Delay (s)	8.8	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0




9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	62	22	19	188	225	68
Future Volume (vph)	62	22	19	188	225	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1394			471	183	
Travel Time (s)	27.2			9.2	3.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	0%	0%	1%	2%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	62	22	19	188	225	68
Future Vol, veh/h	62	22	19	188	225	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	0	0	0	1	2
Mvmt Flow	65	23	20	196	234	71










Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	506	270	305
Stage 1	270	-	-
Stage 2	236	-	-
Critical Hdwy	6.82	6.4	4.3
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3	3.1	3
Pot Cap-1 Maneuver	564	805	944
Stage 1	866	-	-
Stage 2	903	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	550	805	944
Mov Cap-2 Maneuver	550	-	-
Stage 1	845	-	-
Stage 2	903	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	944	-	600	-
HCM Lane V/C Ratio	0.021	-	0.146	-
HCM Control Delay (s)	8.9	0	12	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	10	3	204	238	9
Future Volume (vph)	5	10	3	204	238	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1436			307	471	
Travel Time (s)	39.2			6.0	9.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2017 EXISTING CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	3	204	238	9
Future Vol, veh/h	5	10	3	204	238	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	6	11	3	227	264	10

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	502	269	274
Stage 1	269	-	-
Stage 2	233	-	-
Critical Hdwy	6.6	6.3	4.3
Critical Hdwy Stg 1	5.6	-	-
Critical Hdwy Stg 2	5.6	-	-
Follow-up Hdwy	3	3.1	3
Pot Cap-1 Maneuver	585	813	968
Stage 1	881	-	-
Stage 2	919	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	583	813	968
Mov Cap-2 Maneuver	583	-	-
Stage 1	877	-	-
Stage 2	919	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.1	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	968	-	719	-
HCM Lane V/C Ratio	0.003	-	0.023	-
HCM Control Delay (s)	8.7	0	10.1	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

2023 BASE CONDITIONS

1: ROUTE 322 & ROCK RAYMOND ROAD
2023 BASE CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	789	193	106	235	227
Future Volume (vph)	305	789	193	106	235	227
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	7%	6%	0%	14%	22%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	28.0	78.0	50.0		37.0	28.0
Total Split (%)	24.3%	67.8%	43.5%		32.2%	24.3%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 106 (92%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD
2023 BASE CONDITIONS

Timing Plan: AM Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	305	789	193	106	235	227
Future Volume (veh/h)	305	789	193	106	235	227
Number	5	2	6	16	7	14
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
Adj Sat Flow, veh/h/ln	1782	1767	1766	1764	1571	1468
Adj Flow Rate, veh/h	351	907	222	109	270	116
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh. %	2	7	6	6	14	22
Cap. veh/h	679	1223	563	276	318	436
Arrive On Green	0.27	1.00	0.50	0.49	0.21	0.21
Sat Flow, veh/h	1697	1767	1120	550	1496	1248
Grp Volume(v), veh/h	351	907	0	331	270	116
Grp Sat Flow(s),veh/h/ln	1697	1767	0	1669	1496	1248
Q Serve(g_s), s	11.5	0.0	0.0	14.2	19.9	7.7
Cycle Q Clear(g_c), s	11.5	0.0	0.0	14.2	19.9	7.7
Prop In Lane	1.00			0.33	1.00	1.00
Lane Grp Cap(c), veh/h	679	1223	0	839	318	436
V/C Ratio(X)	0.52	0.74	0.00	0.39	0.85	0.27
Avail Cap(c_a), veh/h	771	1223	0	839	416	518
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.5	0.0	0.0	17.9	43.5	26.8
Incr Delay (d2), s/veh	0.6	4.1	0.0	1.4	12.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	2.5	0.0	11.2	14.3	10.2
LnGrp Delay(d),s/veh	9.2	4.1	0.0	19.2	55.7	27.1
LnGrp LOS	A	A		B	E	C
Approach Vol, veh/h	1258	331		386		
Approach Delay, s/veh	5.5	19.2		47.1		
Approach LOS	A	B		D		























Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.6		29.4	21.8	63.8		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		71.0		31.0	21.0	43.0		
Max Q Clear Time (g_c+I1), s		2.5		22.4	14.0	16.2		
Green Ext Time (p_c), s		4.5		1.0	0.7	1.2		

Intersection Summary

HCM 2010 Ctrl Delay 15.9
HCM 2010 LOS B

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	813	107	84	363	25	191	32	256	18	5	63
Future Volume (vph)	48	813	107	84	363	25	191	32	256	18	5	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			329			298			194	
Travel Time (s)		8.3			5.0			5.8			5.3	
Confl. Peds. (#/hr)	2		2							2		2
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	5%	5%	19%	15%	0%	1%	3%	5%	0%	0%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	71.0	71.0	71.0	13.0	84.0	84.0	31.0	31.0	13.0	31.0	31.0	
Total Split (%)	61.7%	61.7%	61.7%	11.3%	73.0%	73.0%	27.0%	27.0%	11.3%	27.0%	27.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 74 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

























2023 BASE CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 3

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	813	107	84	363	25	191	32	256	18	5	63
Future Volume (veh/h)	48	813	107	84	363	25	191	32	256	18	5	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	1	0	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1714	1714	1520	1573	1809	1809	1786	1723	1782	1814	1782
Adj Flow Rate, veh/h	55	934	109	97	417	22	220	37	163	21	6	35
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	5	5	19	15	0	3	3	5	0	0	0
Cap, veh/h	589	1007	837	181	1090	1066	313	40	388	143	54	201
Arrive On Green	0.59	0.59	0.59	0.11	1.00	1.00	0.21	0.21	0.21	0.20	0.21	0.20
Sat Flow, veh/h	896	1714	1425	1448	1573	1538	1196	201	1464	476	256	948
Grp Volume(v), veh/h	55	934	109	97	417	22	257	0	163	62	0	0
Grp Sat Flow(s),veh/h/ln	896	1714	1425	1448	1573	1538	1397	0	1464	1680	0	0
Q Serve(g_s), s	3.1	56.6	3.9	2.8	0.0	0.0	17.2	0.0	10.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.1	56.6	3.9	2.8	0.0	0.0	20.3	0.0	10.6	3.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.86		1.00	0.34		0.56
Lane Grp Cap(c), veh/h	589	1007	837	181	1090	1066	353	0	388	383	0	0
V/C Ratio(X)	0.09	0.93	0.13	0.54	0.38	0.02	0.73	0.00	0.42	0.16	0.00	0.00
Avail Cap(c_a), veh/h	590	1009	839	193	1092	1067	373	0	409	404	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.4	21.5	10.6	24.6	0.0	0.0	43.7	0.0	35.0	37.6	0.0	0.0
Incr Delay (d2), s/veh	0.3	15.5	0.3	2.5	1.0	0.0	6.6	0.0	0.7	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	40.0	2.9	3.8	0.6	0.0	13.6	0.0	7.8	3.0	0.0	0.0
LnGrp Delay(d),s/veh	10.7	37.0	10.9	27.6	1.0	0.0	50.3	0.0	35.7	37.8	0.0	0.0
LnGrp LOS	B	D	B	C	A	A	D		D	D		
Approach Vol, veh/h	1098			536			420			62		
Approach Delay, s/veh	33.1			5.8			44.7			37.8		
Approach LOS	C			A			D			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	4		6		8					
Phs Duration (G+Y+Rc), s	12.1	73.7	29.2		85.8		29.2					
Change Period (Y+Rc), s	7.0	7.0	6.0		7.0		6.0					
Max Green Setting (Gmax), s	6.0	64.0	25.0		77.0		25.0					
Max Q Clear Time (g_c+11), s	5.3	59.1	5.6		2.5		22.8					
Green Ext Time (p_c), s	0.0	2.3	0.2		1.6		0.4					

Intersection Summary

HCM 2010 Ctrl Delay 28.6

HCM 2010 LOS C

2023 BASE CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 4












4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 BASE CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	23	1269	238	119	202	280
Future Volume (vph)	23	1269	238	119	202	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Peds. (#/hr)					1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	33%	4%	15%	15%	7%	12%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	93.0	93.0	93.0		22.0	
Total Split (%)	80.9%	80.9%	80.9%		19.1%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 115						
Actuated Cycle Length: 115						
Offset: 72 (63%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 90						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 BASE CONDITIONS

Timing Plan: AM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	23	1269	238	119	202	280		
Future Volume (veh/h)	23	1269	238	119	202	280		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	1		
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		
Adj Sat Flow, veh/h/ln	1429	1757	1550	1782	1750	1671		
Adj Flow Rate, veh/h	24	1322	248	0	210	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	33	4	15	15	7	12		
Cap. veh/h	677	1329	1172	0	246	210		
Arrive On Green	0.76	0.76	0.76	0.00	0.15	0.00		
Sat Flow, veh/h	864	1757	1550	0	1666	1421		
Grp Volume(v), veh/h	24	1322	248	0	210	0		
Grp Sat Flow(s),veh/h/ln	864	1757	1550	0	1666	1421		
Q Serve(g_s), s	1.0	85.1	5.3	0.0	14.1	0.0		
Cycle Q Clear(g_c), s	6.3	85.1	5.3	0.0	14.1	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	677	1329	1172	0	246	210		
V/C Ratio(X)	0.04	0.99	0.21	0.00	0.85	0.00		
Avail Cap(c_a), veh/h	677	1329	1172	0	246	210		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	5.0	13.8	4.1	0.0	47.9	0.0		
Incr Delay (d2), s/veh	0.1	23.5	0.4	0.0	24.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.8	0.0		
%ile BackOfQ(95%),veh/ln	0.4	60.5	4.3	0.0	13.1	0.0		
LnGrp Delay(d),s/veh	5.1	37.2	4.5	0.0	73.3	0.0		
LnGrp LOS	A	D	A		E			
Approach Vol, veh/h		1346	248		210			
Approach Delay, s/veh		36.7	4.5		73.3			
Approach LOS		D	A		E			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		93.0		22.0		93.0		
Change Period (Y+Rc), s		7.0		6.0		7.0		
Max Green Setting (Gmax), s		86.0		16.0		86.0		
Max Q Clear Time (g_c+I1), s		87.6		16.6		7.8		
Green Ext Time (p_c), s		0.0		0.0		0.8		
Intersection Summary								
HCM 2010 Ctrl Delay	36.5							
HCM 2010 LOS	D							

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: AM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	809	670	284	338	15	179
Future Volume (vph)	809	670	284	338	15	179
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	5%	4%	2%	15%	0%	2%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	4.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	809	670	284	338	15	179
Future Vol, veh/h	809	670	284	338	15	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	4	2	15	0	2
Mvmt Flow	870	720	305	363	16	192

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	870
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	597
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	597
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.8	28.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	47	414	-	-	597	-
HCM Lane V/C Ratio	0.343	0.465	-	-	0.512	-
HCM Control Delay (s)	117.3	21	-	-	17.2	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	1.2	2.4	-	-	2.9	-

8: LLOYD AVENUE & PARK AND RIDE
2023 BASE CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Volume (vph)	2	460	190	18	11	1
Future Volume (vph)	2	460	190	18	11	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		301	298		184	
Travel Time (s)		5.9	5.8		5.0	
Confl. Peds. (#/hr)					2	2
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	0%	3%	11%	22%	9%	0%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

8: LLOYD AVENUE & PARK AND RIDE
2023 BASE CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	2	460	190	18	11	1
Future Vol, veh/h	2	460	190	18	11	1
Conflicting Peds, #/hr	0	0	0	0	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	0	3	11	22	9	0
Mvmt Flow	2	568	235	22	14	1

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	257	0	0 820 248
Stage 1	-	-	- 246 -
Stage 2	-	-	- 574 -
Critical Hdwy	4.3	-	- 7.29 6.6
Critical Hdwy Stg 1	-	-	- 6.29 -
Critical Hdwy Stg 2	-	-	- 6.29 -
Follow-up Hdwy	3	-	- 3.1 3.1
Pot Cap-1 Maneuver	981	-	- 308 819
Stage 1	-	-	- 838 -
Stage 2	-	-	- 540 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	981	-	- 307 818
Mov Cap-2 Maneuver	-	-	- 307 -
Stage 1	-	-	- 835 -
Stage 2	-	-	- 540 -










Approach	EB	WB	SB
HCM Control Delay, s	0	0	16.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	981	-	-	-	324
HCM Lane V/C Ratio	0.003	-	-	-	0.046
HCM Control Delay (s)	8.7	0	-	-	16.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

9: LLOYD AVENUE & GO CARLSON BLVD

2023 BASE CONDITIONS




Timing Plan: AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	136	46	13	311	171	19
Future Volume (vph)	136	46	13	311	171	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1310			446	202	
Travel Time (s)	25.5			8.7	3.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	31%	5%	12%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD

2023 BASE CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	136	46	13	311	171	19
Future Vol, veh/h	136	46	13	311	171	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	31	5	12	0
Mvmt Flow	151	51	14	346	190	21










Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	575	201	211
Stage 1	201	-	-
Stage 2	374	-	-
Critical Hdwy	6.82	6.42	4.41
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3	3.1	3.1
Pot Cap-1 Maneuver	508	884	981
Stage 1	942	-	-
Stage 2	763	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	499	884	981
Mov Cap-2 Maneuver	499	-	-
Stage 1	925	-	-
Stage 2	763	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	981	-	561	-
HCM Lane V/C Ratio	0.015	-	0.36	-
HCM Control Delay (s)	8.7	0	15	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0	-	1.6	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	5	0	334	206	1
Future Volume (vph)	16	5	0	334	206	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1282			488	446	
Travel Time (s)	35.0			9.5	8.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	20%	0%	5%	11%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	16	5	0	334	206	1
Future Vol, veh/h	16	5	0	334	206	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	20	0	5	11	0
Mvmt Flow	18	5	0	367	226	1

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	594	227	227
Stage 1	227	-	-
Stage 2	367	-	-
Critical Hdwy	6.6	6.5	4.3
Critical Hdwy Stg 1	5.6	-	-
Critical Hdwy Stg 2	5.6	-	-
Follow-up Hdwy	3	3.48	3
Pot Cap-1 Maneuver	512	765	1004
Stage 1	925	-	-
Stage 2	787	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	512	765	1004
Mov Cap-2 Maneuver	512	-	-
Stage 1	925	-	-
Stage 2	787	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1004	-	556	-
HCM Lane V/C Ratio	-	-	0.042	-
HCM Control Delay (s)	0	-	11.8	-
HCM Lane LOS	A	-	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

1: ROUTE 322 & ROCK RAYMOND ROAD
2023 BASE CONDITIONS

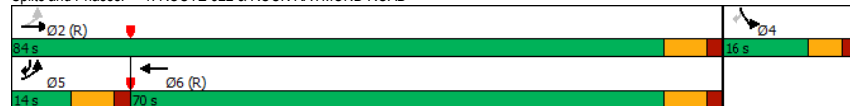
Timing Plan: PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	94	554	750	81	73	134
Future Volume (vph)	94	554	750	81	73	134
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Confl. Peds. (#/hr)				1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	21%	2%	1%	5%	0%	5%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	14.0	84.0	70.0		16.0	14.0
Total Split (%)	14.0%	84.0%	70.0%		16.0%	14.0%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag		Lead	
Lead-Lag Optimize?	Yes		Yes		Yes	
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 94 (94%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD
2023 BASE CONDITIONS

Timing Plan: PM Peak

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	94	554	750	81	73	134
Future Volume (veh/h)	94	554	750	81	73	134
Number	5	2	6	16	7	14
Initial Q (Qb), veh	1	0	1	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
Adj Sat Flow, veh/h/ln	1502	1854	1809	1764	1791	1706
Adj Flow Rate, veh/h	99	583	789	83	77	77
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh. %	21	2	1	1	0	5
Cap. veh/h	345	1495	1121	117	143	195
Arrive On Green	0.10	1.00	0.70	0.69	0.08	0.08
Sat Flow, veh/h	1431	1854	1610	169	1706	1450
Grp Volume(v), veh/h	99	583	0	872	77	77
Grp Sat Flow(s),veh/h/ln	1431	1854	0	1779	1706	1450
Q Serve(g_s), s	1.7	0.0	0.0	29.3	4.3	4.9
Cycle Q Clear(g_c), s	1.7	0.0	0.0	29.3	4.3	4.9
Prop In Lane	1.00			0.10	1.00	1.00
Lane Grp Cap(c), veh/h	345	1495	0	1238	143	195
V/C Ratio(X)	0.29	0.39	0.00	0.70	0.54	0.39
Avail Cap(c_a), veh/h	395	1495	0	1239	188	232
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.4	0.0	0.0	9.2	44.0	39.5
Incr Delay (d2), s/veh	0.5	0.8	0.0	3.4	3.1	1.3
Initial Q Delay(d3),s/veh	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.2	0.6	0.0	21.9	3.9	7.3
LnGrp Delay(d),s/veh	9.9	0.8	0.0	12.6	47.1	40.8
LnGrp LOS	A	A		B	D	D
Approach Vol, veh/h	682	872		154		
Approach Delay, s/veh	2.1	12.6		44.0		
Approach LOS	A	B		D		























Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.6		13.4	11.0	75.6		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		77.0		10.0	7.0	63.0		
Max Q Clear Time (g_c+11), s		2.5		7.4	4.2	31.3		
Green Ext Time (p_c), s		2.3		0.1	0.1	4.4		

Intersection Summary

HCM 2010 Ctrl Delay 11.2
HCM 2010 LOS B

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	560	248	117	736	51	174	20	107	9	22	81
Future Volume (vph)	57	560	248	117	736	51	174	20	107	9	22	81
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			315			307			194	
Travel Time (s)		8.3			4.8			6.0			5.3	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	4%	4%	1%	1%	3%	1%	5%	6%	0%	0%	4%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	53.0	53.0	53.0	13.0	66.0	66.0	34.0	34.0	13.0	34.0	34.0	
Total Split (%)	53.0%	53.0%	53.0%	13.0%	66.0%	66.0%	34.0%	34.0%	13.0%	34.0%	34.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 100

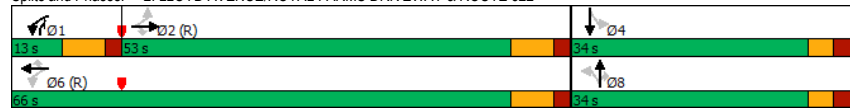
Actuated Cycle Length: 100

Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	57	560	248	117	736	51	174	20	107	9	22	81
Future Volume (veh/h)	57	560	248	117	736	51	174	20	107	9	22	81
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	1	0	0	0	1	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1731	1731	1791	1791	1756	1809	1784	1707	1782	1801	1782
Adj Flow Rate, veh/h	59	583	229	122	767	30	181	21	58	9	23	56
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	4	4	1	1	3	5	5	6	0	0	0
Cap, veh/h	334	986	821	401	1264	1030	316	22	378	55	106	212
Arrive On Green	0.59	0.59	0.59	0.12	1.00	1.00	0.18	0.18	0.18	0.17	0.18	0.17
Sat Flow, veh/h	643	1731	1441	1706	1791	1493	1216	141	1451	73	529	1054
Grp Volume(v), veh/h	59	583	229	122	767	30	202	0	58	88	0	0
Grp Sat Flow(s), veh/h/ln	643	1731	1441	1706	1791	1493	1357	0	1451	1657	0	0
Q Serve(g_s), s	4.2	20.9	7.8	2.6	0.0	0.0	9.8	0.0	3.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.2	20.9	7.8	2.6	0.0	0.0	14.1	0.0	3.2	4.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.90		1.00	0.10		0.64
Lane Grp Cap(c), veh/h	334	986	821	401	1264	1030	338	0	378	357	0	0
V/C Ratio(X)	0.18	0.59	0.28	0.30	0.61	0.03	0.60	0.00	0.15	0.25	0.00	0.00
Avail Cap(c_a), veh/h	450	1018	847	435	1267	1056	456	0	507	494	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.9	14.1	11.1	9.5	0.0	0.0	38.6	0.0	28.6	34.3	0.0	0.0
Incr Delay (d2), s/veh	1.2	2.6	0.8	0.4	2.2	0.1	1.7	0.0	0.2	0.4	0.0	0.0
Initial Q Delay(d3), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.2	16.5	6.1	2.3	1.4	0.0	10.9	0.0	2.3	3.8	0.0	0.0
LnGrp Delay(d), s/veh	23.1	16.7	12.0	9.9	2.2	0.1	40.3	0.0	28.8	34.6	0.0	0.0
LnGrp LOS	C	B	B	A	A	A	D		C	C		
Approach Vol, veh/h	871			919			260			88		
Approach Delay, s/veh	15.9			3.1			37.7			34.6		
Approach LOS	B			A			D			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	11.9	64.8		23.3		76.7		23.3				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	6.0	46.0		28.0		59.0		28.0				
Max Q Clear Time (g_c+1), s	5.1	23.4		6.7		2.5		16.6				
Green Ext Time (p_c), s	0.0	3.7		0.3		3.5		0.7				









Intersection Summary

HCM 2010 Ctrl Delay 13.8

HCM 2010 LOS B












4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 BASE CONDITIONS

Timing Plan: PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	18	824	586	211	267	662
Future Volume (vph)	18	824	586	211	267	662
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Bikes (#/hr)						1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	3%	1%	2%	2%	3%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	72.0	72.0	72.0		28.0	
Total Split (%)	72.0%	72.0%	72.0%		28.0%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 100						
Offset: 13 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						
						
						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 BASE CONDITIONS

Timing Plan: PM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	18	824	586	211	267	662		
Future Volume (veh/h)	18	824	586	211	267	662		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	1	4	1	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		
Adj Sat Flow, veh/h/ln	1900	1774	1760	1782	1835	1817		
Adj Flow Rate, veh/h	20	916	651	0	297	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	0	3	1	1	2	3		
Cap. veh/h	440	1218	1209	0	355	314		
Arrive On Green	0.69	0.69	0.69	0.00	0.20	0.00		
Sat Flow, veh/h	793	1774	1760	0	1748	1545		
Grp Volume(v), veh/h	20	916	651	0	297	0		
Grp Sat Flow(s),veh/h/ln	793	1774	1760	0	1748	1545		
Q Serve(g_s), s	1.3	33.4	18.4	0.0	16.3	0.0		
Cycle Q Clear(g_c), s	19.7	33.4	18.4	0.0	16.3	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	440	1218	1209	0	355	314		
V/C Ratio(X)	0.05	0.75	0.54	0.00	0.84	0.00		
Avail Cap(c_a), veh/h	471	1218	1209	0	402	355		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	15.5	10.4	7.8	0.0	38.3	0.0		
Incr Delay (d2), s/veh	0.2	4.3	1.7	0.0	13.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.3	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	0.8	25.5	14.7	0.0	14.2	0.0		
LnGrp Delay(d),s/veh	15.8	15.0	9.6	0.0	52.2	0.0		
LnGrp LOS	B	B	A		D			
Approach Vol, veh/h		936	651		297			
Approach Delay, s/veh		15.1	9.6		52.2			
Approach LOS		B	A		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		74.7		25.3		74.7		
Change Period (Y+Rc), s		7.0		6.0		7.0		
Max Green Setting (Gmax), s		65.0		22.0		65.0		
Max Q Clear Time (g_c+I1), s		35.9		18.8		20.9		
Green Ext Time (p_c), s		4.5		0.5		2.6		
Intersection Summary								
HCM 2010 Ctrl Delay					19.0			
HCM 2010 LOS					B			

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: PM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	638	433	203	798	21	212
Future Volume (vph)	638	433	203	798	21	212
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%			7%	-5%	
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	1%	1%	25%	3%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	16.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	638	433	203	798	21	212
Future Vol, veh/h	638	433	203	798	21	212
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	4	2	1	1	25	3
Mvmt Flow	709	481	226	887	23	236

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	709
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	681
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	681
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.6	155.1
HCM LOS			F





Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	9	502	-	-	681	-
HCM Lane V/C Ratio	2.593	0.469	-	-	0.331	-
HCM Control Delay (s)	\$ 1534.7	18.4	-	-	12.9	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	4	2.5	-	-	1.4	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

8: LLOYD AVENUE & PARK AND RIDE 2023 BASE CONDITIONS

Timing Plan: PM Peak





						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	1	299	398	7	7	3
Future Volume (vph)	1	299	398	7	7	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		292	307		174	
Travel Time (s)		5.7	6.0		4.7	
Confl. Peds. (#/hr)				1	2	2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	0%	0%	0%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

8: LLOYD AVENUE & PARK AND RIDE 2023 BASE CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	299	398	7	7	3
Future Vol, veh/h	1	299	398	7	7	3
Conflicting Peds, #/hr	0	0	0	1	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	2	2	0	0	0
Mvmt Flow	1	318	423	7	7	3










Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	431	0	-	0	750 430
Stage 1	-	-	-	-	428 -
Stage 2	-	-	-	-	322 -
Critical Hdwy	4.3	-	-	-	7.2 6.6
Critical Hdwy Stg 1	-	-	-	-	6.2 -
Critical Hdwy Stg 2	-	-	-	-	6.2 -
Follow-up Hdwy	3	-	-	-	3 3.1
Pot Cap-1 Maneuver	854	-	-	-	360 632
Stage 1	-	-	-	-	683 -
Stage 2	-	-	-	-	786 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	853	-	-	-	359 630
Mov Cap-2 Maneuver	-	-	-	-	359 -
Stage 1	-	-	-	-	682 -
Stage 2	-	-	-	-	785 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	853	-	-	-	412
HCM Lane V/C Ratio	0.001	-	-	-	0.026
HCM Control Delay (s)	9.2	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1




9: LLOYD AVENUE & GO CARLSON BLVD
2023 BASE CONDITIONS

Timing Plan: PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	66	24	36	225	272	124
Future Volume (vph)	66	24	36	225	272	124
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1323			450	217	
Travel Time (s)	25.8			8.8	4.2	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	13%	0%	2%	1%	2%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD
2023 BASE CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	66	24	36	225	272	124
Future Vol, veh/h	66	24	36	225	272	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	13	0	2	1	2
Mvmt Flow	70	26	38	239	289	132










Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	670	355	421
Stage 1	355	-	-
Stage 2	315	-	-
Critical Hdwy	6.82	6.53	4.3
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3	3.417	3
Pot Cap-1 Maneuver	440	652	860
Stage 1	781	-	-
Stage 2	820	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	418	652	860
Mov Cap-2 Maneuver	418	-	-
Stage 1	741	-	-
Stage 2	820	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.8	1.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	860	-	462	-
HCM Lane V/C Ratio	0.045	-	0.207	-
HCM Control Delay (s)	9.4	0	14.8	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	2	1	266	282	14
Future Volume (vph)	3	2	1	266	282	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1337			161	450	
Travel Time (s)	36.5			3.1	8.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	2%	3%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	2	1	266	282	14
Future Vol, veh/h	3	2	1	266	282	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	2	3	0
Mvmt Flow	3	2	1	286	303	15

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	599	311	318
Stage 1	311	-	-
Stage 2	288	-	-
Critical Hdwy	6.6	6.3	4.3
Critical Hdwy Stg 1	5.6	-	-
Critical Hdwy Stg 2	5.6	-	-
Follow-up Hdwy	3	3.1	3
Pot Cap-1 Maneuver	508	768	934
Stage 1	840	-	-
Stage 2	862	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	507	768	934
Mov Cap-2 Maneuver	507	-	-
Stage 1	839	-	-
Stage 2	862	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	934	-	587	-
HCM Lane V/C Ratio	0.001	-	0.009	-
HCM Control Delay (s)	8.9	0	11.2	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0	-

1: ROUTE 322 & ROCK RAYMOND ROAD

2023 BASE CONDITIONS

Timing Plan: SAT Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	81	489	467	46	62	92
Future Volume (vph)	81	489	467	46	62	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	13	12	10	11
Grade (%)		-2%	4%		1%	
Storage Length (ft)	145			0	230	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	35		35	
Link Distance (ft)		268	1016		359	
Travel Time (s)		4.1	19.8		7.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	1%	1%	5%	0%	3%
Shared Lane Traffic (%)						
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	5	2	6		4	5
Permitted Phases	2					4
Detector Phase	5	2	6		4	5
Switch Phase						
Minimum Initial (s)	3.0	11.0	11.0		3.0	3.0
Minimum Split (s)	14.0	18.0	18.0		13.0	14.0
Total Split (s)	14.0	62.0	48.0		13.0	14.0
Total Split (%)	18.7%	82.7%	64.0%		17.3%	18.7%
Yellow Time (s)	5.0	5.0	5.0		4.0	5.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0		5.0	6.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other

Cycle Length: 75

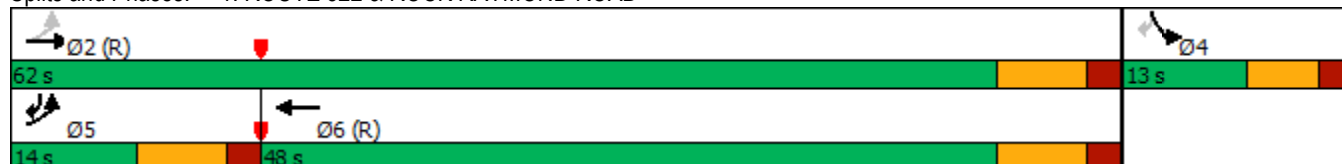
Actuated Cycle Length: 75

Offset: 48 (64%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated












Splits and Phases: 1: ROUTE 322 & ROCK RAYMOND ROAD



1: ROUTE 322 & ROCK RAYMOND ROAD

2023 BASE CONDITIONS

Timing Plan: SAT Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	81	489	467	46	62	92		
Future Volume (veh/h)	81	489	467	46	62	92		
Number	5	2	6	16	7	14		
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		
Adj Sat Flow, veh/h/ln	1731	1872	1810	1764	1791	1739		
Adj Flow Rate, veh/h	85	515	492	46	65	53		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95		
Percent Heavy Veh, %	5	1	1	1	0	3		
Cap, veh/h	581	1452	1046	98	133	195		
Arrive On Green	0.11	1.00	0.64	0.63	0.08	0.08		
Sat Flow, veh/h	1649	1872	1631	152	1706	1478		
Grp Volume(v), veh/h	85	515	0	538	65	53		
Grp Sat Flow(s),veh/h/ln	1649	1872	0	1783	1706	1478		
Q Serve(g_s), s	1.1	0.0	0.0	11.6	2.7	2.4		
Cycle Q Clear(g_c), s	1.1	0.0	0.0	11.6	2.7	2.4		
Prop In Lane	1.00			0.09	1.00	1.00		
Lane Grp Cap(c), veh/h	581	1452	0	1144	133	195		
V/C Ratio(X)	0.15	0.35	0.00	0.47	0.49	0.27		
Avail Cap(c_a), veh/h	668	1452	0	1144	182	237		
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	4.0	0.0	0.0	6.9	33.2	29.3		
Incr Delay (d2), s/veh	0.1	0.7	0.0	1.4	2.8	0.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	0.8	0.5	0.0	10.2	2.5	3.8		
LnGrp Delay(d),s/veh	4.2	0.7	0.0	8.3	35.9	30.1		
LnGrp LOS	A	A		A	D	C		
Approach Vol, veh/h		600	538		118			
Approach Delay, s/veh		1.2	8.3		33.3			
Approach LOS		A	A		C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		64.2		10.8	10.0	54.1		
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		
Max Green Setting (Gmax), s		55.0		7.0	7.0	41.0		
Max Q Clear Time (g_c+I1), s		2.5		5.2	3.6	13.6		
Green Ext Time (p_c), s		1.9		0.1	0.1	2.1		
Intersection Summary								
HCM 2010 Ctrl Delay			7.2					
HCM 2010 LOS			A					

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2023 BASE CONDITIONS

Timing Plan: SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	521	219	67	484	46	191	21	56	19	15	78
Future Volume (vph)	54	521	219	67	484	46	191	21	56	19	15	78
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			297			312			194	
Travel Time (s)		8.3			4.5			6.1			5.3	
Confl. Peds. (#/hr)	2		2									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	0%	1%	0%	1%	0%	3%	0%	0%	5%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	37.0	37.0	37.0	13.0	50.0	50.0	25.0	25.0	13.0	25.0	25.0	
Total Split (%)	49.3%	49.3%	49.3%	17.3%	66.7%	66.7%	33.3%	33.3%	17.3%	33.3%	33.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 75

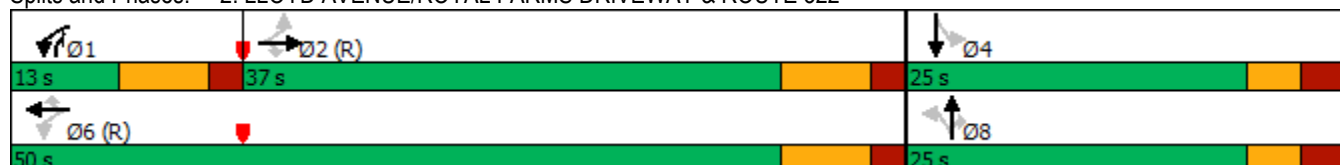
Actuated Cycle Length: 75

Offset: 50 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated























Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2023 BASE CONDITIONS

Timing Plan: SAT Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	521	219	67	484	46	191	21	56	19	15	78
Future Volume (veh/h)	54	521	219	67	484	46	191	21	56	19	15	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	1	0	0	6	1	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1782	1782	1809	1791	1809	1809	1793	1756	1782	1791	1782
Adj Flow Rate, veh/h	57	548	169	71	509	42	201	22	27	20	16	44
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	1	1	0	1	0	0	0	3	0	0	0
Cap, veh/h	515	924	784	403	1166	1001	342	30	381	114	98	185
Arrive On Green	0.52	0.52	0.52	0.10	1.00	1.00	0.20	0.20	0.20	0.19	0.20	0.19
Sat Flow, veh/h	808	1782	1512	1723	1791	1538	1255	137	1493	266	484	917
Grp Volume(v), veh/h	57	548	169	71	509	42	223	0	27	80	0	0
Grp Sat Flow(s),veh/h/ln	808	1782	1512	1723	1791	1538	1392	0	1493	1667	0	0
Q Serve(g_s), s	2.7	16.0	4.5	1.3	0.0	0.0	8.6	0.0	1.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.7	16.0	4.5	1.3	0.0	0.0	11.2	0.0	1.0	3.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.90		1.00	0.25		0.55
Lane Grp Cap(c), veh/h	515	924	784	403	1166	1001	373	0	381	374	0	0
V/C Ratio(X)	0.11	0.59	0.22	0.18	0.44	0.04	0.60	0.00	0.07	0.21	0.00	0.00
Avail Cap(c_a), veh/h	516	927	786	475	1168	1003	458	0	476	472	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.4	12.6	9.8	8.3	0.0	0.0	28.2	0.0	21.2	25.5	0.0	0.0
Incr Delay (d2), s/veh	0.4	2.8	0.6	0.2	1.2	0.1	1.5	0.0	0.1	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.2	13.3	3.6	1.2	0.7	0.0	8.2	0.0	0.8	2.6	0.0	0.0
LnGrp Delay(d),s/veh	9.8	15.4	10.4	8.5	1.2	0.1	29.8	0.0	21.3	25.7	0.0	0.0
LnGrp LOS	A	B	B	A	A	A	C		C	C		
Approach Vol, veh/h		774			622			250			80	
Approach Delay, s/veh		13.9			2.0			28.9			25.7	
Approach LOS		B			A			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	9.9	45.0		20.1		54.9		20.1				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	6.0	30.0		19.0		43.0		19.0				
Max Q Clear Time (g_c+I1), s	3.8	18.5		5.1		2.5		13.7				
Green Ext Time (p_c), s	0.0	2.5		0.2		2.0		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay			12.3									
HCM 2010 LOS			B									
Notes												

4: ROUTE 322 & WB ROUTE 30 RAMPS 2023 BASE CONDITIONS

Timing Plan: SAT Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	961	401	148	242	538
Future Volume (vph)	26	961	401	148	242	538
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	1%	1%	0%	1%	2%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	56.0	56.0	56.0		19.0	
Total Split (%)	74.7%	74.7%	74.7%		25.3%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	

Intersection Summary












Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 17 (23%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS



4: ROUTE 322 & WB ROUTE 30 RAMPS 2023 BASE CONDITIONS

Timing Plan: SAT Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	26	961	401	148	242	538		
Future Volume (veh/h)	26	961	401	148	242	538		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	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		
Adj Sat Flow, veh/h/ln	1900	1809	1769	1782	1853	1835		
Adj Flow Rate, veh/h	28	1022	427	0	257	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94		
Percent Heavy Veh, %	0	1	1	1	1	2		
Cap, veh/h	645	1209	1182	0	327	289		
Arrive On Green	0.67	0.67	0.67	0.00	0.18	0.00		
Sat Flow, veh/h	976	1809	1769	0	1765	1560		
Grp Volume(v), veh/h	28	1022	427	0	257	0		
Grp Sat Flow(s),veh/h/ln	976	1809	1769	0	1765	1560		
Q Serve(g_s), s	1.0	32.3	7.9	0.0	10.4	0.0		
Cycle Q Clear(g_c), s	8.9	32.3	7.9	0.0	10.4	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	645	1209	1182	0	327	289		
V/C Ratio(X)	0.04	0.85	0.36	0.00	0.79	0.00		
Avail Cap(c_a), veh/h	645	1209	1182	0	330	291		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	7.4	9.5	5.4	0.0	29.2	0.0		
Incr Delay (d2), s/veh	0.1	7.4	0.9	0.0	12.5	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.3	0.0		
%ile BackOfQ(95%),veh/ln	0.5	25.1	7.3	0.0	10.4	0.0		
LnGrp Delay(d),s/veh	7.5	16.8	6.3	0.0	42.1	0.0		
LnGrp LOS	A	B	A		D			
Approach Vol, veh/h		1050	427		257			
Approach Delay, s/veh		16.6	6.3		42.1			
Approach LOS		B	A		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		56.1		18.9		56.1		
Change Period (Y+Rc), s		7.0		6.0		7.0		
Max Green Setting (Gmax), s		49.0		13.0		49.0		
Max Q Clear Time (g_c+I1), s		34.8		12.9		10.4		
Green Ext Time (p_c), s		4.4		0.0		1.5		
Intersection Summary								
HCM 2010 Ctrl Delay			17.8					
HCM 2010 LOS			B					

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: SAT Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	613	607	246	497	29	185
Future Volume (vph)	613	607	246	497	29	185
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%			7%	-5%	
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	2%	2%	1%	0%	1%
Shared Lane Traffic (%)						

Intersection Summary

Area Type: Other

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 BASE CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	3.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	613	607	246	497	29	185
Future Vol, veh/h	613	607	246	497	29	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	2	2	1	0	1
Mvmt Flow	639	632	256	518	30	193

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	639
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	721
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	721
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.2	25.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	69	548	-	-	721	-
HCM Lane V/C Ratio	0.438	0.352	-	-	0.355	-
HCM Control Delay (s)	92.8	15.1	-	-	12.7	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	1.7	1.6	-	-	1.6	-

8: LLOYD AVENUE & PARK AND RIDE


2023 BASE CONDITIONS

Timing Plan: SAT Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	267	311	4	4	1
Future Volume (vph)	2	267	311	4	4	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	10	12	16	12
Grade (%)		-2%	1%		4%	
Link Speed (mph)		35	35		25	
Link Distance (ft)		287	312		177	
Travel Time (s)		5.6	6.1		4.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	1%	25%	0%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

8: LLOYD AVENUE & PARK AND RIDE

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	267	311	4	4	1
Future Vol, veh/h	2	267	311	4	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-2	1	-	4	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	1	1	25	0	0
Mvmt Flow	2	275	321	4	4	1










Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	325	0	-	0	602 323
Stage 1	-	-	-	-	323 -
Stage 2	-	-	-	-	279 -
Critical Hdwy	4.3	-	-	-	7.2 6.6
Critical Hdwy Stg 1	-	-	-	-	6.2 -
Critical Hdwy Stg 2	-	-	-	-	6.2 -
Follow-up Hdwy	3	-	-	-	3 3.1
Pot Cap-1 Maneuver	929	-	-	-	458 736
Stage 1	-	-	-	-	785 -
Stage 2	-	-	-	-	832 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	929	-	-	-	457 736
Mov Cap-2 Maneuver	-	-	-	-	457 -
Stage 1	-	-	-	-	783 -
Stage 2	-	-	-	-	832 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	929	-	-	-	494
HCM Lane V/C Ratio	0.002	-	-	-	0.01
HCM Control Delay (s)	8.9	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0




9: LLOYD AVENUE & GO CARLSON BLVD
2023 BASE CONDITIONS

Timing Plan: SAT Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	62	22	19	204	244	68
Future Volume (vph)	62	22	19	204	244	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1394			471	183	
Travel Time (s)	27.2			9.2	3.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	0%	0%	1%	2%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

9: LLOYD AVENUE & GO CARLSON BLVD
2023 BASE CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	62	22	19	204	244	68
Future Vol, veh/h	62	22	19	204	244	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	0	0	0	1	2
Mvmt Flow	65	23	20	213	254	71










Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	543	290	325	0	-	0
Stage 1	290	-	-	-	-	-
Stage 2	253	-	-	-	-	-
Critical Hdwy	6.82	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	533	784	929	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	520	784	929	-	-	-
Mov Cap-2 Maneuver	520	-	-	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	884	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	0.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	929	-	570	-
HCM Lane V/C Ratio	0.021	-	0.154	-
HCM Control Delay (s)	9	0	12.5	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-




10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: SAT Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	5	10	3	221	257	9
Future Volume (vph)	5	10	3	221	257	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	10	10	12
Grade (%)	1%			1%	-1%	
Link Speed (mph)	25			35	35	
Link Distance (ft)	1436			307	471	
Travel Time (s)	39.2			6.0	9.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Intersection Summary						
Area Type:	Other					

10: LLOYD AVENUE & BEAVER RUN ROAD
2023 BASE CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	10	3	221	257	9
Future Vol, veh/h	5	10	3	221	257	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	1	-1	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	6	11	3	246	286	10

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	543	291	296	0	-	0
Stage 1	291	-	-	-	-	-
Stage 2	252	-	-	-	-	-
Critical Hdwy	6.6	6.3	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	551	789	951	-	-	-
Stage 1	859	-	-	-	-	-
Stage 2	899	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	549	789	951	-	-	-
Mov Cap-2 Maneuver	549	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	899	-	-	-	-	-



















Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	951	-	689	-
HCM Lane V/C Ratio	0.004	-	0.024	-
HCM Control Delay (s)	8.8	0	10.4	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

2023 PROJECTED CONDITIONS

1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	792	16	7	194	106	26	6	11	235	4	227
Future Volume (vph)	305	792	16	7	194	106	26	6	11	235	4	227
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	12	12	13	12	12	12	12	10	12	11
Grade (%)		-2%			4%			0%			1%	
Storage Length (ft)	145		0	75		0	0		0	230		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			35			25			35	
Link Distance (ft)		268			1016			224			359	
Travel Time (s)		4.1			19.8			6.1			7.0	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	7%	2%	2%	6%	0%	2%	2%	2%	14%	2%	22%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	11.0		11.0	11.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	14.0	18.0		18.0	18.0		13.0	13.0		13.0	13.0	
Total Split (s)	34.0	75.0		41.0	41.0		40.0	40.0		40.0	40.0	
Total Split (%)	29.6%	65.2%		35.7%	35.7%		34.8%	34.8%		34.8%	34.8%	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			5.0		5.0	5.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	

Intersection Summary

Area Type: Other

Cycle Length: 115

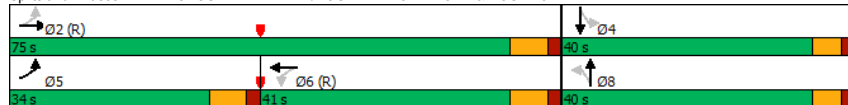
Actuated Cycle Length: 115

Offset: 106 (92%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Spits and Phases: 1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322



1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↰	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	305	792	16	7	194	106	26	6	11	235	4	227
Future Volume (veh/h)	305	792	16	7	194	106	26	6	11	235	4	227
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1769	1818	1729	1766	1764	1800	1765	1800	1571	1473	1791
Adj Flow Rate, veh/h	351	910	18	8	223	109	30	7	13	270	5	116
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	7	7	2	6	6	2	2	2	14	2	2
Cap, veh/h	610	1092	22	300	477	233	200	50	70	366	14	329
Arrive On Green	0.31	1.00	1.00	0.43	0.43	0.42	0.26	0.27	0.26	0.27	0.27	0.27
Sat Flow, veh/h	1697	1728	34	557	1121	548	550	183	258	1169	52	1207
Grp Volume(v), veh/h	351	0	928	8	0	332	50	0	0	270	0	121
Grp Sat Flow(s),veh/h/ln	1697	0	1763	557	0	1669	991	0	0	1169	0	1259
Q Serve(g_s), s	13.2	0.0	0.0	1.0	0.0	16.5	1.9	0.0	0.0	16.3	0.0	8.9
Cycle Q Clear(g_c), s	13.2	0.0	0.0	1.0	0.0	16.5	11.3	0.0	0.0	27.1	0.0	8.9
Prop In Lane	1.00		0.02	1.00		0.33	0.60		0.26	1.00		0.96
Lane Grp Cap(c), veh/h	610	0	1113	300	0	711	312	0	0	366	0	344
V/C Ratio(X)	0.58	0.00	0.83	0.03	0.00	0.47	0.16	0.00	0.00	0.74	0.00	0.35
Avail Cap(c_a), veh/h	763	0	1113	300	0	711	354	0	0	403	0	383
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	0.0	0.0	19.2	0.0	23.8	35.0	0.0	0.0	40.7	0.0	33.6
Incr Delay (d2), s/veh	0.9	0.0	7.4	0.2	0.0	2.2	0.2	0.0	0.0	6.3	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.1	0.0	4.1	0.3	0.0	12.7	2.5	0.0	0.0	13.8	0.0	5.7
LnGrp Delay(d),s/veh	12.2	0.0	7.4	19.4	0.0	26.0	35.2	0.0	0.0	47.0	0.0	34.3
LnGrp LOS	B		A	B		C	D			D		C
Approach Vol, veh/h	1279		340		50		391					
Approach Delay, s/veh	8.7		25.9		35.2		43.1					
Approach LOS	A		C		D		D					

Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4	5	6		8	
Phs Duration (G+Y+Rc), s	78.6		36.4	23.7	55.0		36.4	
Change Period (Y+Rc), s	7.0		6.0	7.0	7.0		6.0	
Max Green Setting (Gmax), s	68.0		34.0	27.0	34.0		34.0	
Max Q Clear Time (g_c+11), s	2.5		29.6	15.7	18.5		13.3	
Green Ext Time (p_c), s	4.7		0.8	0.9	1.2		0.2	























Intersection Summary

HCM 2010 Ctrl Delay

HCM 2010 LOS

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	832	113	86	389	25	206	32	259	18	5	63
Future Volume (vph)	48	832	113	86	389	25	206	32	259	18	5	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			329			298			194	
Travel Time (s)		8.3			5.0			5.8			5.3	
Confl. Peds. (#/hr)	2		2							2		2
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	2%	5%	5%	19%	15%	0%	1%	3%	5%	0%	0%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	71.0	71.0	71.0	13.0	84.0	84.0	31.0	31.0	13.0	31.0	31.0	
Total Split (%)	61.7%	61.7%	61.7%	11.3%	73.0%	73.0%	27.0%	27.0%	11.3%	27.0%	27.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 74 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2023 PROJECTED CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 3

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↑	↪	↩	↑	↪	↩	↑	↪	↩	↑	↪
Traffic Volume (veh/h)	48	832	113	86	389	25	206	32	259	18	5	63
Future Volume (veh/h)	48	832	113	86	389	25	206	32	259	18	5	63
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	1	0	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1714	1714	1520	1573	1809	1809	1786	1723	1782	1814	1782
Adj Flow Rate, veh/h	55	956	116	99	447	22	237	37	167	21	6	35
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh. %	2	5	5	19	15	0	3	5	0	0	0	0
Cap. veh/h	565	987	820	159	1074	1050	327	39	405	150	56	212
Arrive On Green	0.58	0.58	0.58	0.11	1.00	1.00	0.22	0.22	0.22	0.21	0.22	0.21
Sat Flow, veh/h	872	1714	1425	1448	1573	1538	1204	188	1464	484	252	953
Grp Volume(v), veh/h	55	956	116	99	447	22	274	0	167	62	0	0
Grp Sat Flow(s),veh/h/ln	872	1714	1425	1448	1573	1538	1392	0	1464	1689	0	0
Q Serve(g_s), s	3.3	61.4	4.3	3.0	0.0	0.0	18.8	0.0	10.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.3	61.4	4.3	3.0	0.0	0.0	21.8	0.0	10.7	3.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.86		1.00	0.34		0.56
Lane Grp Cap(c), veh/h	565	987	820	159	1074	1050	367	0	405	403	0	0
V/C Ratio(X)	0.10	0.97	0.14	0.62	0.42	0.02	0.75	0.00	0.41	0.15	0.00	0.00
Avail Cap(c_a), veh/h	565	988	821	169	1074	1050	373	0	411	408	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.1	23.4	11.3	26.3	0.0	0.0	43.3	0.0	34.0	36.6	0.0	0.0
Incr Delay (d2), s/veh	0.3	22.0	0.4	6.3	1.2	0.0	7.9	0.0	0.7	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	44.7	3.2	4.1	0.6	0.0	14.5	0.0	7.8	3.0	0.0	0.0
LnGrp Delay(d),s/veh	11.4	45.4	11.6	33.3	1.2	0.0	51.2	0.0	34.6	36.8	0.0	0.0
LnGrp LOS	B	D	B	C	A	A	D		C	D		
Approach Vol, veh/h	1127		568		441		62					
Approach Delay, s/veh	40.3		6.7		44.9		36.8					
Approach LOS	D		A		D		D					

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	12.3	72.3		30.5		84.5		30.5
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0
Max Green Setting (Gmax), s	6.0	64.0		25.0		77.0		25.0
Max Q Clear Time (g_c+11), s	5.5	63.9		5.5		2.5		24.3
Green Ext Time (p_c), s	0.0	0.1		0.2		1.7		0.1

Intersection Summary

HCM 2010 Ctrl Delay 32.5






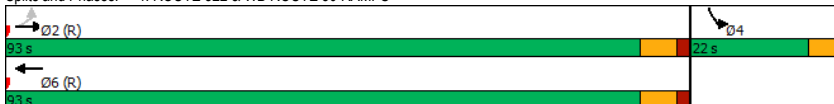
HCM 2010 LOS C

2023 PROJECTED CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 4












4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	23	1280	256	122	211	280
Future Volume (vph)	23	1280	256	122	211	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Peds. (#/hr)					1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	33%	4%	15%	15%	7%	12%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	93.0	93.0	93.0		22.0	
Total Split (%)	80.9%	80.9%	80.9%		19.1%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 115						
Actuated Cycle Length: 115						
Offset: 72 (63%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 90						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						
						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	23	1280	256	122	211	280		
Future Volume (veh/h)	23	1280	256	122	211	280		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	1		
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		
Adj Sat Flow, veh/h/ln	1429	1757	1550	1782	1750	1671		
Adj Flow Rate, veh/h	24	1333	267	0	220	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96		
Percent Heavy Veh, %	33	4	15	15	7	12		
Cap. veh/h	662	1329	1172	0	246	210		
Arrive On Green	0.76	0.76	0.76	0.00	0.15	0.00		
Sat Flow, veh/h	850	1757	1550	0	1666	1421		
Grp Volume(v), veh/h	24	1333	267	0	220	0		
Grp Sat Flow(s),veh/h/ln	850	1757	1550	0	1666	1421		
Q Serve(g_s), s	1.0	87.0	5.8	0.0	14.9	0.0		
Cycle Q Clear(g_c), s	6.8	87.0	5.8	0.0	14.9	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	662	1329	1172	0	246	210		
V/C Ratio(X)	0.04	1.00	0.23	0.00	0.89	0.00		
Avail Cap(c_a), veh/h	662	1329	1172	0	246	210		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	5.1	14.0	4.1	0.0	48.2	0.0		
Incr Delay (d2), s/veh	0.1	25.4	0.5	0.0	31.5	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	1.1	0.0		
%ile BackOfQ(95%),veh/ln	0.4	90.6	4.7	0.0	14.2	0.0		
LnGrp Delay(d),s/veh	5.2	39.4	4.6	0.0	80.8	0.0		
LnGrp LOS	A	F	A		F			
Approach Vol, veh/h	1357		267	220				
Approach Delay, s/veh	38.8		4.6	80.8				
Approach LOS	D		A	F				
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		6			
Phs Duration (G+Y+Rc), s	93.0		22.0		93.0			
Change Period (Y+Rc), s	7.0		6.0		7.0			
Max Green Setting (Gmax), s	86.0		16.0		86.0			
Max Q Clear Time (g_c+11), s	89.5		17.4		8.3			
Green Ext Time (p_c), s	0.0		0.0		0.9			
Intersection Summary								
HCM 2010 Ctrl Delay			38.9					
HCM 2010 LOS			D					

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	831	670	301	362	15	181
Future Volume (vph)	831	670	301	362	15	181
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	5%	4%	2%	15%	0%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	5.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	831	670	301	362	15	181
Future Vol, veh/h	831	670	301	362	15	181
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	5	4	2	15	0	2
Mvmt Flow	894	720	324	389	16	195

















Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	894
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	585
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	585
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	8.4	33.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	36	402	-	-	585	-
HCM Lane V/C Ratio	0.448	0.484	-	-	0.553	-
HCM Control Delay (s)	169.4	22.1	-	-	18.5	-
HCM Lane LOS	F	C	-	-	C	-
HCM 95th %tile Q(veh)	1.5	2.6	-	-	3.4	-

8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	475	2	1	196	18	1	0	2	11	0	1
Future Volume (vph)	2	475	2	1	196	18	1	0	2	11	0	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	12	12	10	12	12	12	12	16	12	12
Grade (%)		-2%			1%			0%			4%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		301			298			205			184	
Travel Time (s)		5.9			5.8			5.6			5.0	
Confl. Peds. (#/hr)										2		2
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	0%	3%	2%	2%	11%	22%	2%	2%	2%	9%	2%	0%
Shared Lane Traffic (%)												
Sign Control	Free			Free			Stop			Stop		
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											










8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	2	475	2	1	196	18	1	0	2	11	0	1
Future Vol, veh/h	2	475	2	1	196	18	1	0	2	11	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	1	-	-	0	-	-	4	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	0	3	2	2	11	22	2	2	2	9	2	0
Mvmt Flow	2	586	2	1	242	22	1	0	2	14	0	1
Major/Minor												
	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	264	0	0	588	0	0	849	857	589	849	847	255
Stage 1	-	-	-	-	-	-	591	591	-	255	255	-
Stage 2	-	-	-	-	-	-	258	266	-	594	592	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.12	6.52	6.22	7.99	7.32	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.99	6.32	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.99	6.32	-
Follow-up Hdwy	3	-	-	3	-	-	3	4.018	3.1	3.1	4.018	3.1
Pot Cap-1 Maneuver	975	-	-	752	-	-	312	295	535	249	247	810
Stage 1	-	-	-	-	-	-	556	494	-	788	658	-
Stage 2	-	-	-	-	-	-	860	689	-	468	433	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	975	-	-	752	-	-	310	294	534	247	246	809
Mov Cap-2 Maneuver	-	-	-	-	-	-	310	294	-	247	246	-
Stage 1	-	-	-	-	-	-	554	493	-	786	657	-
Stage 2	-	-	-	-	-	-	856	688	-	464	432	-
Approach	EB	WB		NB		SB						
HCM Control Delay, s	0	0		13.4		19.6						
HCM LOS				B		C						
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	430	975	-	-	752	-	-	262				
HCM Lane V/C Ratio	0.009	0.003	-	-	0.002	-	-	0.057				
HCM Control Delay (s)	13.4	8.7	0	-	9.8	0	-	19.6				
HCM Lane LOS	B	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2				




9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	136	46	13	328	177	19
Future Volume (vph)	136	46	13	328	177	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1310			446	202	
Travel Time (s)	25.5			8.7	3.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	31%	5%	12%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	136	46	13	328	177	19
Future Vol, veh/h	136	46	13	328	177	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	31	5	12	0
Mvmt Flow	151	51	14	364	197	21
Major/Minor						
	Minor2	Major1	Major2			
Conflicting Flow All	600	208	218	0	-	0
Stage 1	208	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.82	6.42	4.41	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3	3.1	3.1	-	-	-
Pot Cap-1 Maneuver	489	875	975	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	480	875	975	-	-	-
Mov Cap-2 Maneuver	480	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Approach						
	EB	NB	SB			
HCM Control Delay, s	15.5	0.3	0			
HCM LOS	C					
Minor Lane/Major Mvmt						
	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	975	-	542	-	-	
HCM Lane V/C Ratio	0.015	-	0.373	-	-	
HCM Control Delay (s)	8.7	0	15.5	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0	-	1.7	-	-	

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations		↔			↔			↔			↔				
Traffic Volume (vph)	16	0	5	6	0	16	0	335	3	6	206	1			
Future Volume (vph)	16	0	5	6	0	16	0	335	3	6	206	1			
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800			
Lane Width (ft)	13	12	12	12	12	12	12	10	12	12	10	12			
Grade (%)		1%			0%			1%			-1%				
Link Speed (mph)		25			25			35			35				
Link Distance (ft)		1282			461			488			446				
Travel Time (s)		35.0			12.6			9.5			8.7				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91			
Heavy Vehicles (%)	0%	2%	20%	2%	2%	2%	0%	5%	2%	2%	11%	0%			
Shared Lane Traffic (%)															
Sign Control		Stop			Stop			Free			Free				
Intersection Summary															
Area Type:	Other														
Control Type:	Unsignalized														

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	16	0	5	6	0	16	0	335	3	6	206	1
Future Vol, veh/h	16	0	5	6	0	16	0	335	3	6	206	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-1	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	2	20	2	2	2	0	5	2	2	11	0
Mvmt Flow	18	0	5	7	0	18	0	368	3	7	226	1
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	620	612	227	613	611	370	227	0	0	371	0	0
Stage 1	241	241	-	370	370	-	-	-	-	-	-	-
Stage 2	379	371	-	243	241	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.72	6.5	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.48	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	437	395	765	456	409	716	1004	-	-	896	-	-
Stage 1	869	697	-	743	620	-	-	-	-	-	-	-
Stage 2	721	607	-	877	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	423	391	765	450	405	716	1004	-	-	896	-	-
Mov Cap-2 Maneuver	423	391	-	450	405	-	-	-	-	-	-	-
Stage 1	869	691	-	743	620	-	-	-	-	-	-	-
Stage 2	703	607	-	863	700	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	13		11.1		0		0.3					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1004	-	-	473	617	896	-	-				
HCM Lane V/C Ratio	-	-	-	0.049	0.039	0.007	-	-				
HCM Control Delay (s)	0	-	-	13	11.1	9	0	-				
HCM Lane LOS	A	-	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-				

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗		↖
Traffic Volume (vph)	1105	4	0	502	0	0
Future Volume (vph)	1105	4	0	502	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	-2%			-1%	0%	
Link Speed (mph)	45			35	25	
Link Distance (ft)	329			134	155	
Travel Time (s)	5.0			2.6	4.2	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	7%	2%	2%	6%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: AM Peak

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗		↖
Traffic Vol, veh/h	1105	4	0	502	0	0
Future Vol, veh/h	1105	4	0	502	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-1	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	7	2	2	6	2	2
Mvmt Flow	1270	5	0	577	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 1273
Stage 1	-	-	- -
Stage 2	-	-	- -
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	- -
Critical Hdwy Stg 2	-	-	- -
Follow-up Hdwy	-	-	- 3.1
Pot Cap-1 Maneuver	-	- 0	- 0 *156
Stage 1	-	- 0	- 0 -
Stage 2	-	- 0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- *156
Mov Cap-2 Maneuver	-	-	- -
Stage 1	-	-	- -
Stage 2	-	-	- -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A








Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	556	27	15	750	81	25	6	10	73	7	134
Future Volume (vph)	94	556	27	15	750	81	25	6	10	73	7	134
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	12	12	13	12	12	12	12	10	12	11
Grade (%)	-2%				4%		0%				1%	
Storage Length (ft)	145		0	75		0	0		0	230		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red	Yes			Yes			Yes			Yes		
Link Speed (mph)	45			35			25			35		
Link Distance (ft)	268			1016			212			359		
Travel Time (s)	4.1			19.8			5.8			7.0		
Confl. Peds. (#/hr)	1											
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	21%	2%	2%	2%	1%	5%	2%	2%	2%	0%	2%	5%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	11.0		11.0	11.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	14.0	18.0		18.0	18.0		22.0	22.0		13.0	13.0	
Total Split (s)	14.0	73.0		59.0	59.0		27.0	27.0		27.0	27.0	
Total Split (%)	14.0%	73.0%		59.0%	59.0%		27.0%	27.0%		27.0%	27.0%	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			5.0		5.0	5.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 94 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322



1: PROPOSED DRIVEWAY/ROCK RAYMOND ROAD & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	556	27	15	750	81	25	6	10	73	7	134
Future Volume (veh/h)	94	556	27	15	750	81	25	6	10	73	7	134
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	1	0	0	0	1	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1502	1854	1818	1729	1809	1764	1800	1765	1800	1791	1708	1791
Adj Flow Rate, veh/h	99	585	28	16	789	83	26	6	11	77	7	77
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	21	2	2	2	1	1	2	2	2	0	2	2
Cap, veh/h	325	1378	66	575	1085	113	90	25	20	210	13	141
Arrive On Green	0.10	1.00	1.00	0.67	0.67	0.66	0.09	0.10	0.09	0.10	0.10	0.10
Sat Flow, veh/h	1431	1755	84	748	1610	169	308	242	189	1337	123	1348
Grp Volume(v), veh/h	99	0	613	16	0	872	43	0	0	77	0	84
Grp Sat Flow(s),veh/h/ln	1431	0	1839	748	0	1779	739	0	0	1337	0	1470
Q Serve(g_s), s	1.9	0.0	0.0	0.7	0.0	31.4	1.5	0.0	0.0	0.0	0.0	5.4
Cycle Q Clear(g_c), s	1.9	0.0	0.0	0.7	0.0	31.4	7.4	0.0	0.0	5.6	0.0	5.4
Prop In Lane	1.00		0.05	1.00		0.10	0.60		0.26	1.00		0.92
Lane Grp Cap(c), veh/h	325	0	1444	575	0	1198	128	0	0	210	0	154
V/C Ratio(X)	0.30	0.00	0.42	0.03	0.00	0.73	0.34	0.00	0.00	0.37	0.00	0.54
Avail Cap(c_a), veh/h	372	0	1444	576	0	1198	284	0	0	364	0	323
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.6	0.0	0.0	5.5	0.0	10.6	43.6	0.0	0.0	42.6	0.0	42.5
Incr Delay (d2), s/veh	0.5	0.0	0.9	0.1	0.0	3.9	1.5	0.0	0.0	1.1	0.0	3.0
Initial Q Delay(d3),s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.3	0.0	0.7	0.3	0.0	23.5	2.2	0.0	0.0	3.8	0.0	4.2
LnGrp Delay(d),s/veh	11.2	0.0	0.9	5.6	0.0	14.5	45.2	0.0	0.0	43.7	0.0	45.5
LnGrp LOS	B		A	A		B	D			D		D
Approach Vol, veh/h	712			888			43			161		
Approach Delay, s/veh	2.3			14.3			45.2			44.6		
Approach LOS	A			B			D			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4	5	6		8				
Phs Duration (G+Y+Rc), s	84.5			15.5	11.2	73.3		15.5				
Change Period (Y+Rc), s	7.0			6.0	7.0	7.0		6.0				
Max Green Setting (Gmax), s	66.0			21.0	7.0	52.0		21.0				
Max Q Clear Time (g_c+1), s	2.5			8.1	4.4	33.4		9.4				
Green Ext Time (p_c), s	2.4			0.5	0.1	4.0		0.1				























Intersection Summary

HCM 2010 Ctrl Delay

HCM 2010 LOS

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	594	258	121	757	51	190	20	109	9	22	81
Future Volume (vph)	57	594	258	121	757	51	190	20	109	9	22	81
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			315			307			194	
Travel Time (s)		8.3			4.8			6.0			5.3	
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	4%	4%	1%	1%	3%	1%	5%	6%	0%	0%	4%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases	2			1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	53.0	53.0	53.0	13.0	66.0	66.0	34.0	34.0	13.0	34.0	34.0	
Total Split (%)	53.0%	53.0%	53.0%	13.0%	66.0%	66.0%	34.0%	34.0%	13.0%	34.0%	34.0%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 100

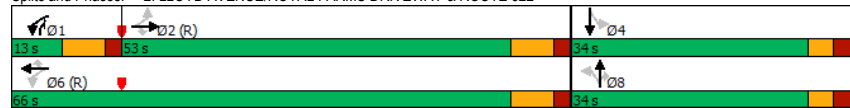
Actuated Cycle Length: 100

Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2023 PROJECTED CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 3

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Lane Configurations	↰	↱	↱	↰	↱	↱	↰	↱	↱	↰	↱	↱
Traffic Volume (veh/h)	57	594	258	121	757	51	190	20	109	9	22	81
Future Volume (veh/h)	57	594	258	121	757	51	190	20	109	9	22	81
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	1	0	0	0	1	0	6	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1731	1731	1791	1791	1756	1809	1784	1707	1782	1801	1782
Adj Flow Rate, veh/h	59	619	240	126	789	30	198	21	61	9	23	56
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	4	4	1	1	3	5	5	6	0	0	0
Cap, veh/h	322	964	803	370	1242	1014	330	22	396	56	112	223
Arrive On Green	0.57	0.57	0.57	0.12	1.00	1.00	0.20	0.20	0.20	0.19	0.20	0.19
Sat Flow, veh/h	630	1731	1441	1706	1791	1493	1225	130	1451	72	531	1054
Grp Volume(v), veh/h	59	619	240	126	789	30	219	0	61	88	0	0
Grp Sat Flow(s),veh/h/ln	630	1731	1441	1706	1791	1493	1355	0	1451	1657	0	0
Q Serve(g_s), s	4.4	23.7	8.5	2.8	0.0	0.0	11.1	0.0	3.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.4	23.7	8.5	2.8	0.0	0.0	15.3	0.0	3.3	4.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.90		1.00	0.10		0.64
Lane Grp Cap(c), veh/h	322	964	803	370	1242	1014	353	0	396	374	0	0
V/C Ratio(X)	0.18	0.64	0.30	0.34	0.64	0.03	0.62	0.00	0.15	0.24	0.00	0.00
Avail Cap(c_a), veh/h	433	993	826	398	1244	1037	456	0	509	495	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.3	15.4	11.8	10.7	0.0	0.0	38.1	0.0	27.7	33.3	0.0	0.0
Incr Delay (d2), s/veh	1.2	3.3	1.0	0.5	2.5	0.1	1.8	0.0	0.2	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.3	18.3	6.7	2.5	1.5	0.0	11.4	0.0	2.3	3.8	0.0	0.0
LnGrp Delay(d),s/veh	23.7	18.7	12.8	11.3	2.5	0.1	39.9	0.0	27.9	33.7	0.0	0.0
LnGrp LOS	C	B	B	B	A	A	D		C	C		
Approach Vol, veh/h	918				945		280				88	
Approach Delay, s/veh	17.4				3.6		37.3				33.7	
Approach LOS	B				A		D				C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	12.1	63.4		24.5		75.5		24.5				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	6.0	46.0		28.0		59.0		28.0				
Max Q Clear Time (g_c+1), s	5.3	26.2		6.7		2.5		17.8				
Green Ext Time (p_c), s	0.0	3.9		0.3		3.6		0.7				

Intersection Summary

HCM 2010 Ctrl Delay 14.7






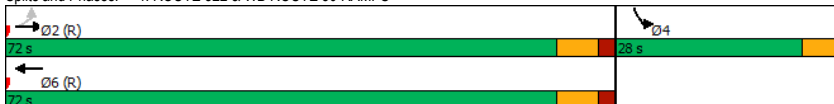
HCM 2010 LOS B

2023 PROJECTED CONDITIONS 11/21/2017
MB

Synchro 10 Report
Page 4












4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	18	844	602	214	284	662
Future Volume (vph)	18	844	602	214	284	662
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Confl. Bikes (#/hr)						1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	3%	1%	2%	2%	3%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	72.0	72.0	72.0		28.0	
Total Split (%)	72.0%	72.0%	72.0%		28.0%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 100						
Offset: 13 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						
Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS						
						

4: ROUTE 322 & WB ROUTE 30 RAMPS
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	18	844	602	214	284	662		
Future Volume (veh/h)	18	844	602	214	284	662		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	1	4	1	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		
Adj Sat Flow, veh/h/ln	1900	1774	1760	1782	1835	1817		
Adj Flow Rate, veh/h	20	938	669	0	316	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	0	3	1	1	2	3		
Cap, veh/h	417	1202	1192	0	372	328		
Arrive On Green	0.68	0.68	0.68	0.00	0.21	0.00		
Sat Flow, veh/h	780	1774	1760	0	1748	1545		
Grp Volume(v), veh/h	20	938	669	0	316	0		
Grp Sat Flow(s),veh/h/ln	780	1774	1760	0	1748	1545		
Q Serve(g_s), s	1.4	36.2	19.8	0.0	17.4	0.0		
Cycle Q Clear(g_c), s	21.2	36.2	19.8	0.0	17.4	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	417	1202	1192	0	372	328		
V/C Ratio(X)	0.05	0.78	0.56	0.00	0.85	0.00		
Avail Cap(c_a), veh/h	446	1202	1192	0	402	355		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	16.7	11.3	8.5	0.0	37.8	0.0		
Incr Delay (d2), s/veh	0.2	5.1	1.9	0.0	15.7	0.0		
Initial Q Delay(d3),s/veh	0.0	0.4	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	0.8	27.5	15.6	0.0	15.1	0.0		
LnGrp Delay(d),s/veh	16.9	16.8	10.4	0.0	53.6	0.0		
LnGrp LOS	B	B	B		D			
Approach Vol, veh/h	958		669		316			
Approach Delay, s/veh	16.8		10.4		53.6			
Approach LOS	B		B		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		6			
Phs Duration (G+Y+Rc), s	73.7		26.3		73.7			
Change Period (Y+Rc), s	7.0		6.0		7.0			
Max Green Setting (Gmax), s	65.0		22.0		65.0			
Max Q Clear Time (g_c+I1), s	38.7		19.9		22.3			
Green Ext Time (p_c), s	4.6		0.4		2.7			
Intersection Summary								
HCM 2010 Ctrl Delay			20.6					
HCM 2010 LOS			C					

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	678	433	219	820	21	216
Future Volume (vph)	678	433	219	820	21	216
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	1%	1%	25%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	29.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	678	433	219	820	21	216
Future Vol, veh/h	678	433	219	820	21	216
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	4	2	1	1	25	3
Mvmt Flow	753	481	243	911	23	240

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	753
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	657
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	657
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	286.8
HCM LOS			F

















Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	5	476	-	-	657	-
HCM Lane V/C Ratio	4.667	0.504	-	-	0.37	-
HCM Control Delay (s)	\$ 3030.8	20	-	-	13.7	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	4.3	2.8	-	-	1.7	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	308	5	5	406	7	4	0	8	7	0	3
Future Volume (vph)	1	308	5	5	406	7	4	0	8	7	0	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	12	12	10	12	12	12	12	16	12	12
Grade (%)		-2%			1%			0%			4%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		292			307			162			174	
Travel Time (s)		5.7			6.0			4.4			4.7	
Confl. Peds. (#/hr)						1				2		2
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	2%	2%	2%	2%	0%	2%	2%	2%	0%	2%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS










Timing Plan: PM Peak

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	1	308	5	5	406	7	4	0	8	7	0	3
Future Vol, veh/h	1	308	5	5	406	7	4	0	8	7	0	3
Conflicting Peds, #/hr	0	0	0	0	0	1	0	0	0	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	1	-	-	0	-	-	4	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	2	2	2	2	0	2	2	2	0	2	0
Mvmt Flow	1	328	5	5	432	7	4	0	9	7	0	3

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	440	0	0	333	0	0	782	783	333	786	782	439
Stage 1	-	-	-	-	-	-	333	333	-	447	447	-
Stage 2	-	-	-	-	-	-	449	450	-	339	335	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.12	6.52	6.22	7.9	7.32	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.9	6.32	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.9	6.32	-
Follow-up Hdwy	3	-	-	3	-	-	3	4.018	3.1	3	4.018	3.1
Pot Cap-1 Maneuver	847	-	-	923	-	-	348	325	751	291	274	624
Stage 1	-	-	-	-	-	-	780	644	-	610	519	-
Stage 2	-	-	-	-	-	-	671	572	-	719	596	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	846	-	-	923	-	-	343	322	750	285	272	623
Mov Cap-2 Maneuver	-	-	-	-	-	-	343	322	-	285	272	-
Stage 1	-	-	-	-	-	-	779	643	-	609	515	-
Stage 2	-	-	-	-	-	-	662	567	-	709	595	-
Approach	EB	WB		NB		SB						
HCM Control Delay, s	0	0.1		11.9		15.9						
HCM LOS				B		C						
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	537	846	-	-	923	-	-	340				
HCM Lane V/C Ratio	0.024	0.001	-	-	0.006	-	-	0.031				
HCM Control Delay (s)	11.9	9.3	0	-	8.9	0	-	15.9				
HCM Lane LOS	B	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1				




9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	67	24	36	238	284	125
Future Volume (vph)	67	24	36	238	284	125
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1323			450	217	
Travel Time (s)	25.8			8.8	4.2	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	13%	0%	2%	1%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

















9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	67	24	36	238	284	125
Future Vol, veh/h	67	24	36	238	284	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	13	0	2	1	2
Mvmt Flow	71	26	38	253	302	133
Major/Minor						
Conflicting Flow All	698	369	435	0	-	0
Stage 1	369	-	-	-	-	-
Stage 2	329	-	-	-	-	-
Critical Hdwy	6.82	6.53	4.3	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3	3.417	3	-	-	-
Pot Cap-1 Maneuver	422	639	851	-	-	-
Stage 1	768	-	-	-	-	-
Stage 2	806	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	400	639	851	-	-	-
Mov Cap-2 Maneuver	400	-	-	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	806	-	-	-	-	-
Approach						
HCM Control Delay, s	15.4		1.2		0	
HCM LOS	C					
Minor Lane/Major Mvmt						
Capacity (veh/h)	851	-	444	-	-	-
HCM Lane V/C Ratio	0.045	-	0.218	-	-	-
HCM Control Delay (s)	9.4	0	15.4	-	-	-
HCM Lane LOS	A	A	C	-	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-	-

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	2	4	0	11	1	268	5	10	284	14
Future Volume (vph)	3	0	2	4	0	11	1	268	5	10	284	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	12	12	12	12	10	12	12	10	12
Grade (%)		1%			0%			1%			-1%	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		1337			430			161			450	
Travel Time (s)		36.5			11.7			3.1			8.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	2%	2%	2%	3%	0%
Shared Lane Traffic (%)												
Sign Control	Stop			Stop			Free			Free		
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	3	0	2	4	0	11	1	268	5	10	284	14
Future Vol, veh/h	3	0	2	4	0	11	1	268	5	10	284	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-1	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	2	0	2	2	2	0	2	2	2	3	0
Mvmt Flow	3	0	2	4	0	12	1	288	5	11	305	15
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	634	630	313	629	635	291	320	0	0	293	0	0
Stage 1	335	335	-	293	293	-	-	-	-	-	-	-
Stage 2	299	295	-	336	342	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.72	6.3	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	427	385	766	444	396	794	933	-	-	953	-	-
Stage 1	765	631	-	822	670	-	-	-	-	-	-	-
Stage 2	803	658	-	777	638	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	416	379	766	438	390	794	933	-	-	953	-	-
Mov Cap-2 Maneuver	416	379	-	438	390	-	-	-	-	-	-	-
Stage 1	764	622	-	821	669	-	-	-	-	-	-	-
Stage 2	790	657	-	764	629	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	12.1		10.7		0		0.3					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	933	-	-	509	653	953	-	-				
HCM Lane V/C Ratio	0.001	-	-	0.011	0.025	0.011	-	-				
HCM Control Delay (s)	8.9	0	-	12.1	10.7	8.8	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-				

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗		↖
Traffic Volume (vph)	701	11	0	931	0	2
Future Volume (vph)	701	11	0	931	0	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	-2%			-1%	0%	
Link Speed (mph)	45			35	25	
Link Distance (ft)	315			148	219	
Travel Time (s)	4.8			2.9	6.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	1%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: PM Peak

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖			↗		↖
Traffic Vol, veh/h	701	11	0	931	0	2
Future Vol, veh/h	701	11	0	931	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-1	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	1	2	2
Mvmt Flow	738	12	0	980	0	2

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 744
Stage 1	-	-	- -
Stage 2	-	-	- -
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	- -
Critical Hdwy Stg 2	-	-	- -
Follow-up Hdwy	-	-	- 3.1
Pot Cap-1 Maneuver	-	- 0	- 0 *563
Stage 1	-	- 0	- 0 -
Stage 2	-	- 0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *563
Mov Cap-2 Maneuver	-	-	- -
Stage 1	-	-	- -
Stage 2	-	-	- -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	563	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-
HCM Control Delay (s)	11.4	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

1: PROPOSED DRIVEWAYS/ROCK RAYMOND ROAD & ROUTE 322

2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	492	22	15	467	46	23	5	11	62	7	92
Future Volume (vph)	81	492	22	15	467	46	23	5	11	62	7	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	14	12	12	13	12	12	12	12	10	12	11
Grade (%)		-2%			4%			0%			1%	
Storage Length (ft)	145		0	75		0	0		0	230		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			35			25			35	
Link Distance (ft)		268			1016			301			359	
Travel Time (s)		4.1			19.8			8.2			7.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	5%	1%	2%	2%	1%	5%	2%	2%	2%	0%	2%	3%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	11.0		11.0	11.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	14.0	18.0		18.0	18.0		13.0	13.0		13.0	13.0	
Total Split (s)	14.0	60.0		46.0	46.0		15.0	15.0		15.0	15.0	
Total Split (%)	18.7%	80.0%		61.3%	61.3%		20.0%	20.0%		20.0%	20.0%	
Yellow Time (s)	5.0	5.0		5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			5.0		5.0	5.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	

Intersection Summary

Area Type: Other

Cycle Length: 75

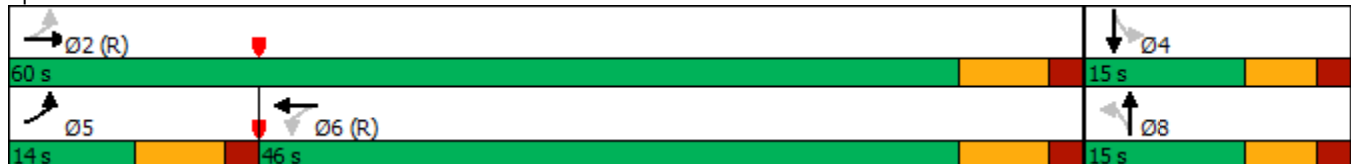
Actuated Cycle Length: 75

Offset: 48 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated




















Splits and Phases: 1: PROPOSED DRIVEWAYS/ROCK RAYMOND ROAD & ROUTE 322



1: PROPOSED DRIVEWAYS/ROCK RAYMOND ROAD & ROUTE 322

2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	492	22	15	467	46	23	5	11	62	7	92
Future Volume (veh/h)	81	492	22	15	467	46	23	5	11	62	7	92
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1731	1871	1818	1729	1810	1764	1800	1765	1800	1791	1740	1791
Adj Flow Rate, veh/h	85	518	23	16	492	46	24	5	12	65	7	53
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	1	1	2	1	1	2	2	2	0	2	2
Cap, veh/h	567	1357	60	599	1026	96	107	31	25	233	16	120
Arrive On Green	0.11	1.00	1.00	0.63	0.63	0.62	0.08	0.09	0.08	0.09	0.09	0.09
Sat Flow, veh/h	1649	1778	79	800	1631	152	339	339	281	1337	176	1330
Grp Volume(v), veh/h	85	0	541	16	0	538	41	0	0	65	0	60
Grp Sat Flow(s),veh/h/ln	1649	0	1857	800	0	1783	959	0	0	1337	0	1505
Q Serve(g_s), s	1.2	0.0	0.0	0.6	0.0	12.1	0.6	0.0	0.0	0.0	0.0	2.8
Cycle Q Clear(g_c), s	1.2	0.0	0.0	0.6	0.0	12.1	3.9	0.0	0.0	2.7	0.0	2.8
Prop In Lane	1.00		0.04	1.00		0.09	0.59		0.29	1.00		0.88
Lane Grp Cap(c), veh/h	567	0	1418	599	0	1121	150	0	0	233	0	136
V/C Ratio(X)	0.15	0.00	0.38	0.03	0.00	0.48	0.27	0.00	0.00	0.28	0.00	0.44
Avail Cap(c_a), veh/h	653	0	1418	599	0	1121	209	0	0	291	0	201
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.4	0.0	0.0	5.3	0.0	7.4	32.8	0.0	0.0	32.3	0.0	32.3
Incr Delay (d2), s/veh	0.1	0.0	0.8	0.1	0.0	1.5	1.0	0.0	0.0	0.6	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.0	0.0	0.6	0.2	0.0	10.4	1.6	0.0	0.0	2.3	0.0	2.3
LnGrp Delay(d),s/veh	4.5	0.0	0.8	5.4	0.0	8.9	33.7	0.0	0.0	32.9	0.0	34.6
LnGrp LOS	A		A	A		A	C			C		C
Approach Vol, veh/h		626			554			41			125	
Approach Delay, s/veh		1.3			8.8			33.7			33.7	
Approach LOS		A			A			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		63.2		11.8	10.1	53.2		11.8				
Change Period (Y+Rc), s		7.0		6.0	7.0	7.0		6.0				
Max Green Setting (Gmax), s		53.0		9.0	7.0	39.0		9.0				
Max Q Clear Time (g_c+I1), s		2.5		5.3	3.7	14.1		5.9				
Green Ext Time (p_c), s		2.1		0.1	0.1	2.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				8.4								
HCM 2010 LOS				A								

2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	556	228	71	503	46	210	21	58	19	15	78
Future Volume (vph)	54	556	228	71	503	46	210	21	58	19	15	78
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	12	12	10	11	12	12	11	11	12	15	12
Grade (%)		0%			-1%			-1%			2%	
Storage Length (ft)	190		0	150		150	0		150	0		0
Storage Lanes	1		1	1		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			35			25	
Link Distance (ft)		551			297			312			194	
Travel Time (s)		8.3			4.5			6.1			5.3	
Confl. Peds. (#/hr)	2		2									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	1%	1%	0%	1%	0%	1%	0%	3%	0%	0%	5%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA	
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2		2	6		6	8		8	4		
Detector Phase	2	2	2	1	6	6	8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	13.0	13.0	13.0	3.0	13.0	13.0	3.0	3.0	3.0	3.0	3.0	
Minimum Split (s)	40.0	40.0	40.0	10.0	40.0	40.0	13.0	13.0	10.0	13.0	13.0	
Total Split (s)	37.0	37.0	37.0	13.0	50.0	50.0	25.0	25.0	13.0	25.0	25.0	
Total Split (%)	49.3%	49.3%	49.3%	17.3%	66.7%	66.7%	33.3%	33.3%	17.3%	33.3%	33.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	5.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		5.0	6.0		5.0	
Lead/Lag	Lag	Lag	Lag	Lead					Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes			
Recall Mode	C-Max	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	

Intersection Summary

Area Type: Other

Cycle Length: 75

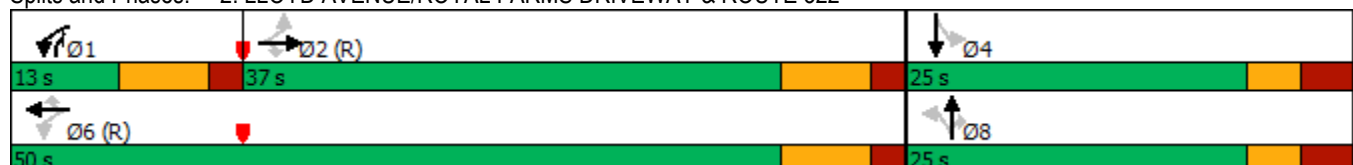
Actuated Cycle Length: 75

Offset: 50 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated























Splits and Phases: 2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322



2: LLOYD AVENUE/ROYAL FARMS DRIVEWAY & ROUTE 322

2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	556	228	71	503	46	210	21	58	19	15	78
Future Volume (veh/h)	54	556	228	71	503	46	210	21	58	19	15	78
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	1	0	0	6	1	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1765	1782	1782	1809	1791	1809	1809	1793	1756	1782	1791	1782
Adj Flow Rate, veh/h	57	585	178	75	529	42	221	22	29	20	16	44
Adj No. of Lanes	1	1	1	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	1	1	0	1	0	0	0	3	0	0	0
Cap, veh/h	494	894	758	367	1140	979	362	30	406	119	103	199
Arrive On Green	0.50	0.50	0.50	0.11	1.00	1.00	0.22	0.22	0.22	0.20	0.22	0.20
Sat Flow, veh/h	794	1782	1512	1723	1791	1538	1258	125	1493	275	478	920
Grp Volume(v), veh/h	57	585	178	75	529	42	243	0	29	80	0	0
Grp Sat Flow(s),veh/h/ln	794	1782	1512	1723	1791	1538	1383	0	1493	1672	0	0
Q Serve(g_s), s	2.9	18.2	5.0	1.4	0.0	0.0	9.7	0.0	1.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	18.2	5.0	1.4	0.0	0.0	12.3	0.0	1.1	3.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.91		1.00	0.25		0.55
Lane Grp Cap(c), veh/h	494	894	758	367	1140	979	392	0	406	399	0	0
V/C Ratio(X)	0.12	0.65	0.23	0.20	0.46	0.04	0.62	0.00	0.07	0.20	0.00	0.00
Avail Cap(c_a), veh/h	495	897	761	434	1142	980	457	0	479	476	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.0	13.9	10.6	9.3	0.0	0.0	27.6	0.0	20.3	24.5	0.0	0.0
Incr Delay (d2), s/veh	0.5	3.7	0.7	0.3	1.4	0.1	2.0	0.0	0.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.3	15.0	4.0	1.3	0.8	0.0	8.8	0.0	0.8	2.6	0.0	0.0
LnGrp Delay(d),s/veh	10.5	17.6	11.3	9.7	1.4	0.1	29.7	0.0	20.4	24.8	0.0	0.0
LnGrp LOS	B	B	B	A	A	A	C		C	C		
Approach Vol, veh/h		820			646			272			80	
Approach Delay, s/veh		15.7			2.2			28.7			24.8	
Approach LOS		B			A			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	10.1	43.7		21.2		53.8		21.2				
Change Period (Y+Rc), s	7.0	7.0		6.0		7.0		6.0				
Max Green Setting (Gmax), s	6.0	30.0		19.0		43.0		19.0				
Max Q Clear Time (g_c+I1), s	3.9	20.7		5.1		2.5		14.8				
Green Ext Time (p_c), s	0.0	2.4		0.2		2.1		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay			13.3									
HCM 2010 LOS			B									
Notes												

4: ROUTE 322 & WB ROUTE 30 RAMPS 2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	983	420	152	260	538
Future Volume (vph)	26	983	420	152	260	538
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	16	12	12	12	15	15
Grade (%)		-3%	2%		0%	
Storage Length (ft)	75			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				Yes		Yes
Link Speed (mph)		45	45		25	
Link Distance (ft)		830	280		317	
Travel Time (s)		12.6	4.2		8.6	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	1%	1%	0%	1%	2%
Shared Lane Traffic (%)						
Turn Type	Perm	NA	NA		Prot	Free
Protected Phases		2	6		4	
Permitted Phases	2					Free
Detector Phase	2	2	6		4	
Switch Phase						
Minimum Initial (s)	15.0	15.0	15.0		3.0	
Minimum Split (s)	22.0	22.0	22.0		13.0	
Total Split (s)	56.0	56.0	56.0		19.0	
Total Split (%)	74.7%	74.7%	74.7%		25.3%	
Yellow Time (s)	5.0	5.0	5.0		4.0	
All-Red Time (s)	2.0	2.0	2.0		2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)	6.0	6.0	6.0		5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max		None	

Intersection Summary












Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 17 (23%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 4: ROUTE 322 & WB ROUTE 30 RAMPS



4: ROUTE 322 & WB ROUTE 30 RAMPS 2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

								
Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	26	983	420	152	260	538		
Future Volume (veh/h)	26	983	420	152	260	538		
Number	5	2	6	16	7	14		
Initial Q (Qb), veh	0	0	0	0	1	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		
Adj Sat Flow, veh/h/ln	1900	1809	1769	1782	1853	1835		
Adj Flow Rate, veh/h	28	1046	447	0	277	0		
Adj No. of Lanes	1	1	1	0	1	1		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94		
Percent Heavy Veh, %	0	1	1	1	1	2		
Cap, veh/h	627	1206	1179	0	330	291		
Arrive On Green	0.67	0.67	0.67	0.00	0.19	0.00		
Sat Flow, veh/h	958	1809	1769	0	1765	1560		
Grp Volume(v), veh/h	28	1046	447	0	277	0		
Grp Sat Flow(s),veh/h/ln	958	1809	1769	0	1765	1560		
Q Serve(g_s), s	1.0	34.3	8.5	0.0	11.4	0.0		
Cycle Q Clear(g_c), s	9.5	34.3	8.5	0.0	11.4	0.0		
Prop In Lane	1.00			0.00	1.00	1.00		
Lane Grp Cap(c), veh/h	627	1206	1179	0	330	291		
V/C Ratio(X)	0.04	0.87	0.38	0.00	0.84	0.00		
Avail Cap(c_a), veh/h	627	1206	1179	0	330	291		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	0.00		
Uniform Delay (d), s/veh	7.7	9.9	5.6	0.0	29.5	0.0		
Incr Delay (d2), s/veh	0.1	8.5	0.9	0.0	18.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.4	0.0		
%ile BackOfQ(95%),veh/ln	0.5	26.6	7.8	0.0	11.7	0.0		
LnGrp Delay(d),s/veh	7.8	18.4	6.5	0.0	47.9	0.0		
LnGrp LOS	A	B	A		D			
Approach Vol, veh/h		1074	447		277			
Approach Delay, s/veh		18.1	6.5		47.9			
Approach LOS		B	A		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		56.0		19.0		56.0		
Change Period (Y+Rc), s		7.0		6.0		7.0		
Max Green Setting (Gmax), s		49.0		13.0		49.0		
Max Q Clear Time (g_c+I1), s		36.8		13.9		11.0		
Green Ext Time (p_c), s		4.3		0.0		1.6		
Intersection Summary								
HCM 2010 Ctrl Delay			19.8					
HCM 2010 LOS			B					

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	652	607	261	520	29	189
Future Volume (vph)	652	607	261	520	29	189
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	2%	2%	1%	0%	1%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	4.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	652	607	261	520	29	189
Future Vol, veh/h	652	607	261	520	29	189
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Stop
Storage Length	-	0	250	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	7	-5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	1	2	2	1	0	1
Mvmt Flow	679	632	272	542	30	197

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	679
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.3
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3
Pot Cap-1 Maneuver	-	-	698
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	698
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.5	34.3
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	50	522	-	-	698	-
HCM Lane V/C Ratio	0.604	0.377	-	-	0.39	-
HCM Control Delay (s)	153.8	16	-	-	13.4	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	2.3	1.7	-	-	1.9	-

8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	274	6	7	317	4	6	0	14	4	0	1
Future Volume (vph)	2	274	6	7	317	4	6	0	14	4	0	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	10	12	12	10	12	12	12	12	16	12	12
Grade (%)		-2%			1%			0%			4%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		287			312			263			177	
Travel Time (s)		5.6			6.1			7.2			4.8	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	2%	2%	1%	25%	2%	2%	2%	0%	2%	0%
Shared Lane Traffic (%)												
Sign Control	Free			Free			Stop			Stop		

Intersection Summary

Area Type: Other
Control Type: Unsignalized

8: PROPOSED DRIVEWAY/PARK AND RIDE & LLOYD AVENUE
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	274	6	7	317	4	6	0	14	4	0	1
Future Vol, veh/h	2	274	6	7	317	4	6	0	14	4	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	1	-	-	0	-	-	4	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	1	2	2	1	25	2	2	2	0	2	0
Mvmt Flow	2	282	6	7	327	4	6	0	14	4	0	1










Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	331	0	0	288	0	0	633	634	285	639	635	329
Stage 1	-	-	-	-	-	-	289	289	-	343	343	-
Stage 2	-	-	-	-	-	-	344	345	-	296	292	-
Critical Hdwy	4.3	-	-	4.3	-	-	7.12	6.52	6.22	7.9	7.32	6.6
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.9	6.32	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.9	6.32	-
Follow-up Hdwy	3	-	-	3	-	-	3	4.018	3.1	3	4.018	3.1
Pot Cap-1 Maneuver	925	-	-	957	-	-	442	397	800	381	344	730
Stage 1	-	-	-	-	-	-	826	673	-	715	591	-
Stage 2	-	-	-	-	-	-	769	636	-	768	629	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	925	-	-	957	-	-	437	392	800	371	340	730
Mov Cap-2 Maneuver	-	-	-	-	-	-	437	392	-	371	340	-
Stage 1	-	-	-	-	-	-	824	671	-	713	586	-
Stage 2	-	-	-	-	-	-	761	630	-	752	627	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			0.2			10.8			13.9		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	640	925	-	-	957	-	-	411
HCM Lane V/C Ratio	0.032	0.002	-	-	0.008	-	-	0.013
HCM Control Delay (s)	10.8	8.9	0	-	8.8	0	-	13.9
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0




9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	63	22	19	216	255	69
Future Volume (vph)	63	22	19	216	255	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1000
Lane Width (ft)	12	12	12	10	10	12
Grade (%)	2%			1%	-2%	
Link Speed (mph)	35			35	35	
Link Distance (ft)	1394			471	183	
Travel Time (s)	27.2			9.2	3.6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	0%	0%	1%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

















9: LLOYD AVENUE & GO CARLSON BLVD
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	22	19	216	255	69
Future Vol, veh/h	63	22	19	216	255	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	1	-2	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	0	0	0	1	2
Mvmt Flow	66	23	20	225	266	72
Major/Minor						
Conflicting Flow All	567	302	338	0	-	0
Stage 1	302	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Critical Hdwy	6.82	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.82	-	-	-	-	-
Critical Hdwy Stg 2	5.82	-	-	-	-	-
Follow-up Hdwy	3	3.1	3	-	-	-
Pot Cap-1 Maneuver	514	771	920	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	501	771	920	-	-	-
Mov Cap-2 Maneuver	501	-	-	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Approach						
HCM Control Delay, s	12.8		0.7		0	
HCM LOS	B					
Minor Lane/Major Mvmt						
Capacity (veh/h)	920	-	551	-	-	-
HCM Lane V/C Ratio	0.022	-	0.161	-	-	-
HCM Control Delay (s)	9	0	12.8	-	-	-
HCM Lane LOS	A	A	B	-	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-	-

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	10	3	0	9	3	224	4	8	260	9
Future Volume (vph)	5	0	10	3	0	9	3	224	4	8	260	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	12	12	12	12	10	12	12	10	12
Grade (%)		1%			0%			1%			-1%	
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		1436			296			307			471	
Travel Time (s)		39.2			8.1			6.0			9.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	2%	2%	0%	0%
Shared Lane Traffic (%)												
Sign Control	Stop			Stop			Free			Free		
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

10: LLOYD AVENUE & BEAVER RUN ROAD/PROPOSED DRIVEWAY
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	5	0	10	3	0	9	3	224	4	8	260	9
Future Vol, veh/h	5	0	10	3	0	9	3	224	4	8	260	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	1	-	-	0	-	-	1	-	-	-1	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	2	0	2	2	2	0	0	2	2	0	0
Mvmt Flow	6	0	11	3	0	10	3	249	4	9	289	10
Major/Minor												
	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	574	571	294	575	574	251	299	0	0	253	0	0
Stage 1	312	312	-	257	257	-	-	-	-	-	-	-
Stage 2	262	259	-	318	317	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.72	6.3	7.12	6.52	6.22	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.72	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3	4.018	3.1	3	4.018	3.1	3	-	-	3	-	-
Pot Cap-1 Maneuver	471	417	786	484	429	837	949	-	-	984	-	-
Stage 1	789	646	-	861	695	-	-	-	-	-	-	-
Stage 2	845	684	-	796	654	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	460	411	786	472	423	837	949	-	-	984	-	-
Mov Cap-2 Maneuver	460	411	-	472	423	-	-	-	-	-	-	-
Stage 1	786	639	-	858	692	-	-	-	-	-	-	-
Stage 2	832	681	-	776	647	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.8		10.2		0.1		0.3					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	949	-	-	636	701	984	-	-				
HCM Lane V/C Ratio	0.004	-	-	0.026	0.019	0.009	-	-				
HCM Control Delay (s)	8.8	0	-	10.8	10.2	8.7	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-				

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔		↔
Traffic Volume (vph)	617	16	0	622	0	3
Future Volume (vph)	617	16	0	622	0	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Grade (%)	-2%			-1%	0%	
Link Speed (mph)	45			35	25	
Link Distance (ft)	297			166	205	
Travel Time (s)	4.5			3.2	5.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	1%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

11: PROPOSED RIRO DRIVEWAY & ROUTE 322
2023 PROJECTED CONDITIONS

Timing Plan: SAT Peak

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔		↔
Traffic Vol, veh/h	617	16	0	622	0	3
Future Vol, veh/h	617	16	0	622	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	-1	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	2	2	1	2	2
Mvmt Flow	649	17	0	655	0	3

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- 658
Stage 1	-	-	- -
Stage 2	-	-	- -
Critical Hdwy	-	-	- 6.22
Critical Hdwy Stg 1	-	-	- -
Critical Hdwy Stg 2	-	-	- -
Follow-up Hdwy	-	-	- 3.1
Pot Cap-1 Maneuver	-	- 0	- 0 *626
Stage 1	-	- 0	- 0 -
Stage 2	-	- 0	- 0 -
Platoon blocked, %	-	-	- 1
Mov Cap-1 Maneuver	-	-	- - *626
Mov Cap-2 Maneuver	-	-	- -
Stage 1	-	-	- -
Stage 2	-	-	- -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	626	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-
HCM Control Delay (s)	10.8	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

***2023 PROJECTED CONDITIONS
WITH SIGNALIZATION***

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

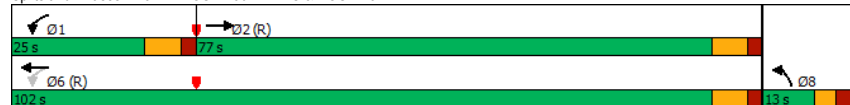
Timing Plan: AM Peak

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	831	670	301	362	15	181
Future Volume (vph)	831	670	301	362	15	181
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	5%	4%	2%	15%	0%	2%
Shared Lane Traffic (%)						
Turn Type	NA	Free	pm+pt	NA	Prot	Free
Protected Phases	2		1	6	8	
Permitted Phases		Free	6			Free
Detector Phase	2		1	6	8	
Switch Phase						
Minimum Initial (s)	15.0		3.0	15.0	3.0	
Minimum Split (s)	22.0		13.0	22.0	13.0	
Total Split (s)	77.0		25.0	102.0	13.0	
Total Split (%)	67.0%		21.7%	88.7%	11.3%	
Yellow Time (s)	5.0		5.0	5.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	3.0	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	6.0		6.0	6.0	5.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	C-Max		None	C-Max	None	

Intersection Summary













Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 73 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 3: EB ROUTE 30 RAMPS & ROUTE 322



3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

Timing Plan: AM Peak

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	831	670	301	362	15	181		
Future Volume (veh/h)	831	670	301	362	15	181		
Number	2	12	1	6	3	18		
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		
Adj Sat Flow, veh/h/ln	1836	1783	1703	1571	1919	1881		
Adj Flow Rate, veh/h	894	0	324	389	16	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	5	4	2	15	0	2		
Cap, veh/h	1376	1135	485	1388	38	33		
Arrive On Green	0.75	0.00	0.16	1.00	0.02	0.00		
Sat Flow, veh/h	1836	1515	1622	1571	1827	1599		
Grp Volume(v), veh/h	894	0	324	389	16	0		
Grp Sat Flow(s),veh/h/ln	1836	1515	1622	1571	1827	1599		
Q Serve(g_s), s	27.4	0.0	5.1	0.0	1.0	0.0		
Cycle Q Clear(g_c), s	27.4	0.0	5.1	0.0	1.0	0.0		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1376	1135	485	1388	38	33		
V/C Ratio(X)	0.65	0.00	0.67	0.28	0.42	0.00		
Avail Cap(c_a), veh/h	1376	1135	620	1388	127	111		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	0.91	0.91	1.00	0.00		
Uniform Delay (d), s/veh	7.0	0.0	8.8	0.0	55.6	0.0		
Incr Delay (d2), s/veh	2.4	0.0	1.7	0.5	7.2	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(95%),veh/ln	20.8	0.0	8.8	0.3	1.0	0.0		
LnGrp Delay(d),s/veh	9.4	0.0	10.5	0.5	62.8	0.0		
LnGrp LOS	A		B	A	E			
Approach Vol, veh/h	894			713	16			
Approach Delay, s/veh	9.4			5.0	62.8			
Approach LOS	A			A	E			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.4	92.2				107.6		7.4
Change Period (Y+Rc), s	7.0	7.0				7.0		6.0
Max Green Setting (Gmax), s	18.0	70.0				95.0		7.0
Max Q Clear Time (g_c+1), s	7.6	29.9				2.5		3.5
Green Ext Time (p_c), s	0.8	4.3				1.4		0.0

Intersection Summary

HCM 2010 Ctrl Delay 8.0
HCM 2010 LOS A

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

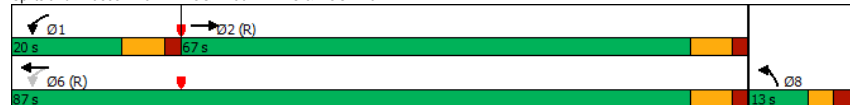
Timing Plan: PM Peak

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	678	433	219	820	21	216
Future Volume (vph)	678	433	219	820	21	216
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	2%	1%	1%	25%	3%
Shared Lane Traffic (%)						
Turn Type	NA	Free	pm+pt	NA	Prot	Free
Protected Phases	2		1	6	8	
Permitted Phases		Free	6			Free
Detector Phase	2		1	6	8	
Switch Phase						
Minimum Initial (s)	15.0		3.0	15.0	3.0	
Minimum Split (s)	22.0		13.0	22.0	13.0	
Total Split (s)	67.0		20.0	87.0	13.0	
Total Split (%)	67.0%		20.0%	87.0%	13.0%	
Yellow Time (s)	5.0		5.0	5.0	3.0	
All-Red Time (s)	2.0		2.0	2.0	3.0	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	6.0		6.0	6.0	5.0	
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	C-Max		None	C-Max	None	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 3: EB ROUTE 30 RAMPS & ROUTE 322



3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

Timing Plan: PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	678	433	219	820	21	216
Future Volume (veh/h)	678	433	219	820	21	216
Number	2	12	1	6	3	18
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
Adj Sat Flow, veh/h/ln	1854	1818	1720	1789	1535	1863
Adj Flow Rate, veh/h	753	0	243	911	23	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh. %	4	2	1	1	25	3
Cap. veh/h	1349	1124	545	1540	43	46
Arrive On Green	0.73	0.00	0.15	1.00	0.03	0.00
Sat Flow, veh/h	1854	1545	1638	1789	1462	1583
Grp Volume(v), veh/h	753	0	243	911	23	0
Grp Sat Flow(s),veh/h/ln	1854	1545	1638	1789	1462	1583
Q Serve(g_s), s	18.6	0.0	3.4	0.0	1.6	0.0
Cycle Q Clear(g_c), s	18.6	0.0	3.4	0.0	1.6	0.0
Prop In Lane	1.00		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1349	1124	545	1540	43	46
V/C Ratio(X)	0.56	0.00	0.45	0.59	0.54	0.00
Avail Cap(c_a), veh/h	1349	1124	655	1540	117	127
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.65	0.65	1.00	0.00
Uniform Delay (d), s/veh	6.2	0.0	4.8	0.0	47.9	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.4	1.1	10.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	15.2	0.0	3.6	0.8	1.3	0.0
LnGrp Delay(d),s/veh	7.9	0.0	5.2	1.1	58.1	0.0
LnGrp LOS	A		A		E	
Approach Vol, veh/h	753			1154	23	
Approach Delay, s/veh	7.9			1.9	58.1	
Approach LOS	A			A	E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.3	78.8				92.1		7.9
Change Period (Y+Rc), s	7.0	7.0				7.0		6.0
Max Green Setting (Gmax), s	13.0	60.0				80.0		7.0
Max Q Clear Time (g_c+1), s	5.9	21.1				2.5		4.1
Green Ext Time (p_c), s	0.4	3.2				4.4		0.0

Intersection Summary

HCM 2010 Ctrl Delay 4.9
HCM 2010 LOS A

3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

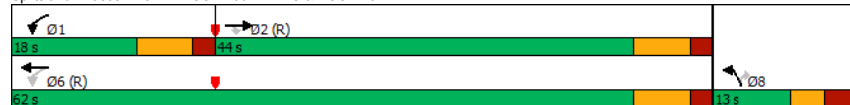
Timing Plan: SAT Peak

	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	657	607	263	523	29	190
Future Volume (vph)	657	607	263	523	29	190
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	13	12	12	13	13	14
Grade (%)	-6%		7%	-5%		
Storage Length (ft)		0	250		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	45			45	25	
Link Distance (ft)	353			551	313	
Travel Time (s)	5.3			8.3	8.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	2%	2%	1%	0%	1%
Shared Lane Traffic (%)						
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	1	6	8	8
Switch Phase						
Minimum Initial (s)	15.0	15.0	3.0	15.0	3.0	3.0
Minimum Split (s)	22.0	22.0	13.0	22.0	13.0	13.0
Total Split (s)	44.0	44.0	18.0	62.0	13.0	13.0
Total Split (%)	58.7%	58.7%	24.0%	82.7%	17.3%	17.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	3.0	3.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	C-Max	C-Max	None	C-Max	None	None

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 33 (44%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 3: EB ROUTE 30 RAMPS & ROUTE 322



3: EB ROUTE 30 RAMPS & ROUTE 322
2023 PROJECTED CONDITIONS - WITH SIGNALIZATION

Timing Plan: SAT Peak

	EBT	EBR	WBL	WBT	NBL	NBR
Movement	↑	↑	↑	↑	↑	↑
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	657	607	263	523	29	190
Future Volume (veh/h)	657	607	263	523	29	190
Number	2	12	1	6	3	18
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
Adj Sat Flow, veh/h/ln	1909	1818	1703	1789	1919	1900
Adj Flow Rate, veh/h	684	0	274	545	30	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh. %	1	2	2	1	0	1
Cap. veh/h	1211	980	559	1461	66	59
Arrive On Green	0.63	0.00	0.21	1.00	0.04	0.00
Sat Flow, veh/h	1909	1545	1622	1789	1827	1615
Grp Volume(v), veh/h	684	0	274	545	30	0
Grp Sat Flow(s),veh/h/ln	1909	1545	1622	1789	1827	1615
Q Serve(g_s), s	15.3	0.0	3.9	0.0	1.2	0.0
Cycle Q Clear(g_c), s	15.3	0.0	3.9	0.0	1.2	0.0
Prop In Lane	1.00	1.00	1.00	1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1211	980	559	1461	66	59
V/C Ratio(X)	0.56	0.00	0.49	0.37	0.45	0.00
Avail Cap(c_a), veh/h	1211	980	652	1461	195	172
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.85	0.85	1.00	0.00
Uniform Delay (d), s/veh	7.8	0.0	5.0	0.0	35.4	0.0
Incr Delay (d2), s/veh	1.9	0.0	0.6	0.6	4.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.4	0.0	3.4	0.5	1.3	0.0
LnGrp Delay(d),s/veh	9.7	0.0	5.6	0.6	40.1	0.0
LnGrp LOS	A		A	A	D	
Approach Vol, veh/h	684			819	30	
Approach Delay, s/veh	9.7			2.3	40.1	
Approach LOS	A			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.7	53.6				67.3		7.7
Change Period (Y+Rc), s	7.0	7.0				7.0		6.0
Max Green Setting (Gmax), s	11.0	37.0				55.0		7.0
Max Q Clear Time (g_c+1), s	6.4	17.8				2.5		3.7
Green Ext Time (p_c), s	0.3	4.1				3.5		0.0

Intersection Summary

HCM 2010 Ctrl Delay 6.3
HCM 2010 LOS A

Notes

APPENDIX L

PENNDOT SIGNAL DIAGRAMS

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

The figure displays three signal timing diagrams (I, II, III) and a Flash signal. Each diagram plots signal state (G, Y, R) against time (T). The diagrams are arranged horizontally, with the Flash signal on the right.

- Diagram I:** Shows a sequence of G (Green), Y (Yellow), and R (Red) signals. The timing is indicated by a vertical line labeled 'I'.
- Diagram II:** Shows a sequence of G (Green), Y (Yellow), and R (Red) signals. The timing is indicated by a vertical line labeled 'II'.
- Diagram III:** Shows a sequence of G (Green), Y (Yellow), and R (Red) signals. The timing is indicated by a vertical line labeled 'III'.
- Flash:** A vertical line labeled 'FLASH' indicating the timing of the flash signal.

PHASE INTERVAL	2+5			2+6			4			FLASH
	1	2	3	4	5	6	7	8	9	
SIGNALS	G	Y①	R②	G	Y	R	R	R	R	Y
1	G	Y②	R②	G	Y	R	R	R	R	Y
2	G	Y	R	G	Y	R	R	R	R	Y
3,4	R	R	R	G	Y	R	R	R	R	Y
5,6	R	R	R	R	R	R	G	Y	R	R
7	R	Y	R	R	R	R	G	Y	R	OFF

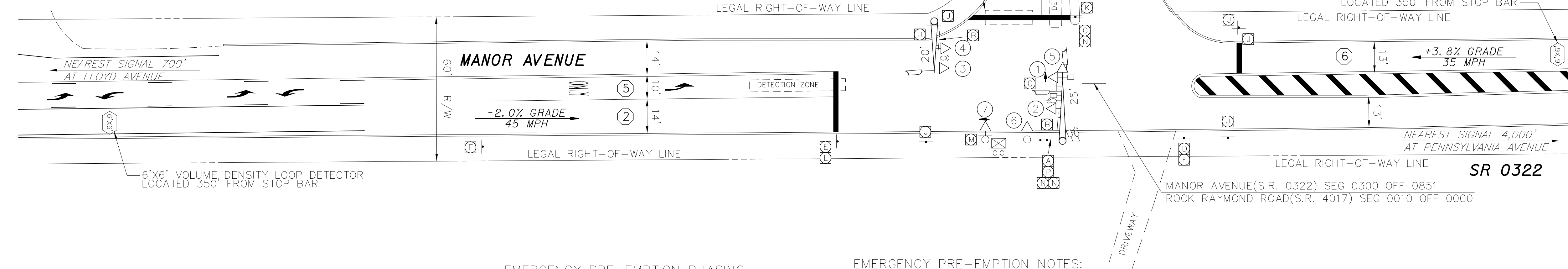
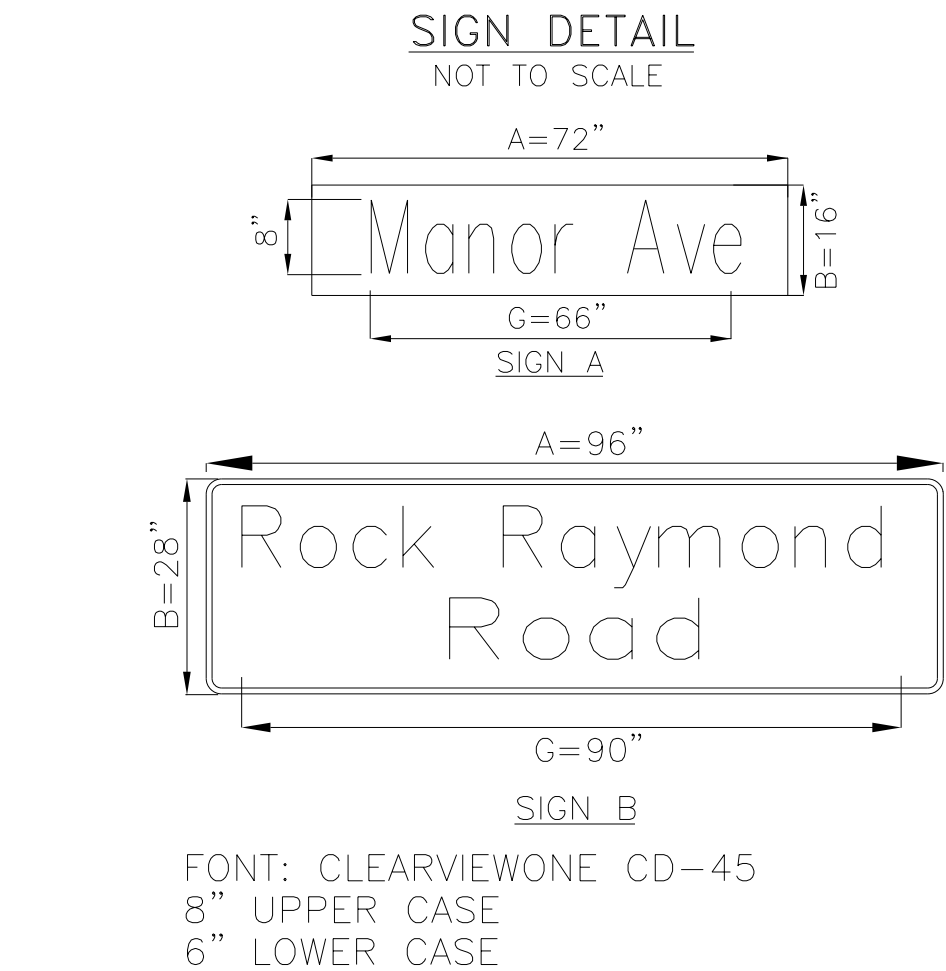
FIXED	3	5	2		5	2		4	2	
MINIMUM				11				3		
SEC/ACT				2						
MAXIMUM INITIAL				37						
PASSAGE	3			5				3		
TBR				37						
TTR				19						
MIN GAP				2						
MAX 1	8			56				12		
MAX 2	19			66				20		
MAX 3								50		
MAX EXT								10 ³		
MEMORY	NL			MR				NL		

- CONTROLLER TO DWELL IN PHASE 2+6 UNTIL ACTUATED BY PHASE 4.

REFER TO SYSTEM PERMIT #I-0262 FOR PROGRAM TIMINGS AND WEEKLY PROGRAM CHART

OPERATION NOTES:

- G/➤ IF FOLLOWED BY 2+6
- G IF FOLLOWED BY 2+6
- MAXIMUM EXTENSION (MAXIMUM GREEN EXTENSION) IF A GREEN INTERVAL IS TERMINATED DUE TO A VEHICLE EXTENSION MAX-OUT FOR TWO SUCCESSIVE CYCLES, THE MAX TIME IN EFFECT (FREE AND MAX 2) IS AUTOMATICALLY EXTENDED BY SUCCESSIVE INCREMENTS OF MAX EXTENSION TIME (MAX EXT). MAX TIME INCREASES BY MAX EXT EACH TIME THE PHASE MAXES-OUT, BUT STOPS ADDING MAX EXT WHEN THE TOTAL MAX TIME IS EQUAL TO MAX 3. IF, HOWEVER, THE PHASE GAPS OUT ON TWO SUCCESSIVE CYCLES BEFORE MAX TIME REACHES MAX 3, THE MAX TIMER IS RESET. WHEN MAX EXT IS USED (MAX EXT>0), MAX 3 BECOMES THE MAXIMUM GREEN TIME AND MUST BE GREATER THAN MAX 2. WHEN MAX EXT IS NOT USED (MAX EXT =0), THE MAXIMUM GREEN TIME IS EQUAL TO THE SELECTED MAX TIMER (FREE OR MAX 2).

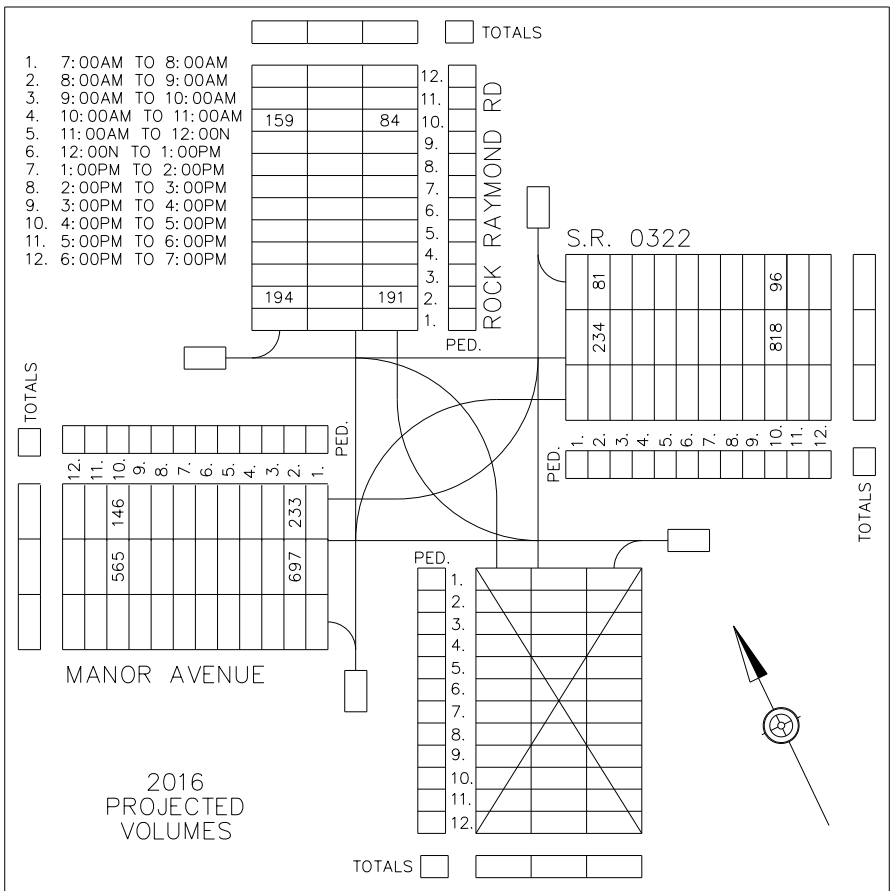
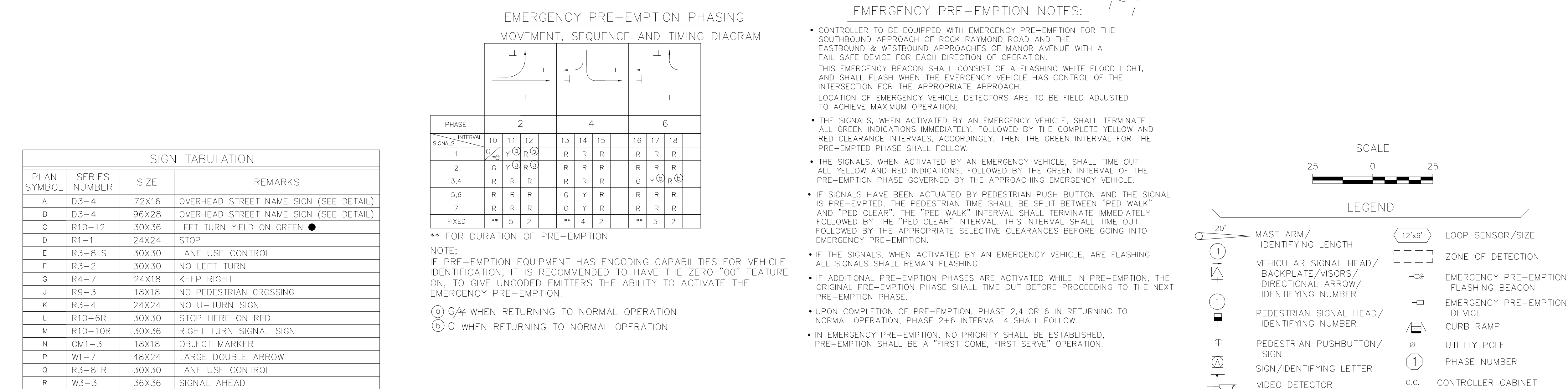


EMERGENCY PRE-EMPTION PHASING
MOVEMENT, SEQUENCE AND TIMING DIAGRAM

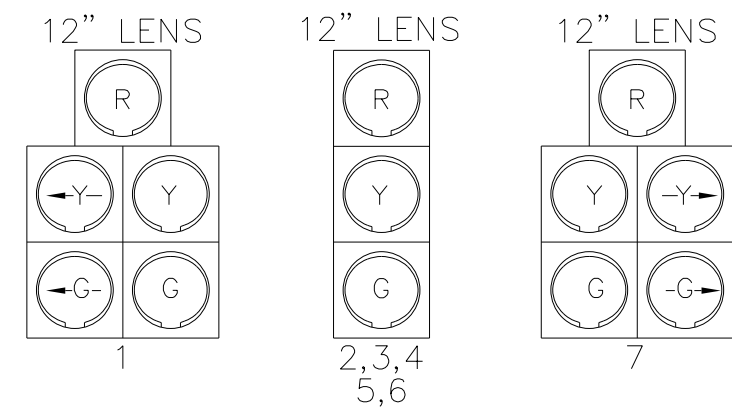
			T			T			T		
PHASE			2			4			6		
SIGNALS			10	11	12	13	14	15	16	17	18
1			G ⊕	Y ⊕	R ⊕	R	R	R	R	R	R
2			G ⊕	Y ⊕	R ⊕	R	R	R	R	R	R
3,4			R	R	R	R	R	R	G ⊕	Y ⊕	R ⊕
5,6			R	R	R	G	Y	R	R	R	R
7			R	R	R	G	Y	R	R	R	R
FIXED			**	5	2	**	4	2	**	5	2

- ** FOR DURATION OF PRE-EMPTION
NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.
- ⓐ G/➤ WHEN RETURNING TO NORMAL OPERATION
ⓑ G WHEN RETURNING TO NORMAL OPERATION

SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	D3-4	72X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
B	D3-4	96X28	OVERHEAD STREET NAME SIGN (SEE DETAIL)
C	R10-12	30X36	LEFT TURN YIELD ON GREEN ●
D	R1-1	24X24	STOP
E	R3-BLS	30X30	LANE USE CONTROL
F	R3-2	30X30	NO LEFT TURN
G	R4-7	24X18	KEEP RIGHT
J	R9-3	18X18	NO PEDESTRIAN CROSSING
K	R3-4	24X24	NO U-TURN SIGN
L	R10-6R	30X30	STOP HERE ON RED
M	R10-10R	30X36	RIGHT TURN SIGNAL SIGN
N	OM1-3	18X18	OBJECT MARKER
P	W1-7	48X24	LARGE DOUBLE ARROW
Q	R3-BLR	30X30	LANE USE CONTROL
R	W3-3	36X36	SIGNAL AHEAD



SIGNAL INDICATIONS



GENERAL NOTES

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ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 212.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

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THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE LATEST AMENDMENT TO ACT 181, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE MARCH 29, 2007.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

SYSTEM PERMIT # I-0262	
PENNSYLVANIA DEPARTMENT OF TRANSPORTATION ENGINEERING DISTRICT 6-0	
COUNTY:	CHESTER
MUNICIPALITY:	CALN TOWNSHIP
INTERSECTION:	MANOR AVENUE (S.R. 0322) AND ROCK RAYMOND ROAD (S.R. 4017)

REVIEWED:

DATE

MUNICIPAL OFFICIAL

DATE

RECOMMENDED:

MARK L. KRAY

2-27-97

DOUGLAS MAY

2-28-97

DISTRICT TRAFFIC ENGINEER

DATE

NO.	REVISION	DES./REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	ADD MAX III & PHASE 4	JPS	8/6/99	MLK	8/9/99	DWM	8/9/99
2	REMOVE SIGN K ROCK RAYMOND - CB	CB	9/18/00	MLK	9/19/00	LRB	9/19/00
3	TIMING CHANGE	SHG	8/6/04	ABP	8/9/04	LRB	8/10/04
4	CHANGE MIN TIME TO 3 SEC FOR PHASE 4	SHG	9/27/04	MLK	9/27/04	LRB	10/1/04
5	ADDED PRE-EMPTION AND VIDEO DETECTION	BJD	2/10/14	LUTZ	3/19/14	LRB	3/27/14
6	ADD CENTER LT LANE FOR EB APPROACH, EXTEND SB LT LANE, ADD SH 7 AND SB RT OVERLAP, RE-TIME.	TPD					
7							
8							

SHEET 2 OF 2

PERMIT # 62-2954

FILE # 2954

MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

PHASE	1+6	2+6	4+8	FLASH
SIGNAL	1 2 3 4	5 6 7 8	9 10 11	
1	G Y R	G Y R	R R R	Y
2	G Y R	G Y R	R R R	Y
3,4,5	R R R	G G Y	R R R	Y
6,7	R R R	R R R	G Y R	R
8	R R R	R R R	G Y R	R
9,10	R R R	R R R	G Y R	R
11,12	M FH H	M FH H	H H H	OFF

FIXED		5	2		5	2		3	3
MINIMUM	3			13				3	
PASSAGE	3			**				3	
MAX 1	9			48				23	
MAX 2	13			58				25	
PEDESTRIAN*	(3)			7	26				
MEMORY	NL			MN				NL	

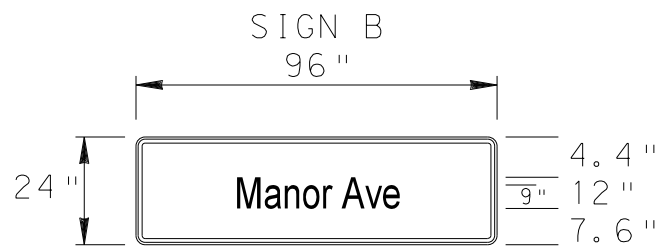
REFER TO SYSTEM PERMIT #I-0262 FOR PROGRAM TIMINGS AND WEEKLY PROGRAM CHART

- **DENSITY ZONE NOTES**
- RANGE OF DETECTION: 0-100 FEET FROM STOP BAR
 - SPEED BOUNDARY: 5-30 MPH
- **ADVANCE DILEMMA ZONE NOTES**
- ESTIMATED TIME OF ARRIVAL: MIN 2.5-MAX 5.5 SEC
 - RANGE OF DETECTION: 0-450 FEET
 - SPEED BOUNDARY: 27-100 MPH

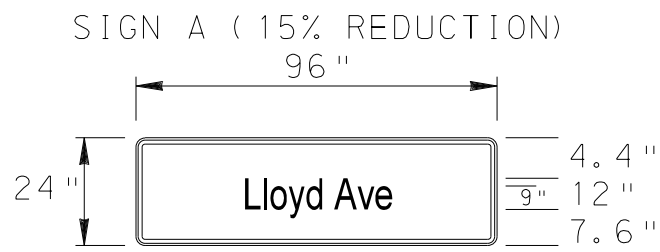
OPERATION NOTES

- ① G IF FOLLOWED BY 2+6
 - ② G IF FOLLOWED BY 2+6
 - ③ TIMING WILL BE AS SHOWN IN PHASE 2+6. IT MAY TIME OUT IN THIS PHASE OR BE COMPLETED IN PHASE 2+6
- CONTROLLER TO DWELL IN PHASE 2+6 UNTIL ACTUATED BY PHASE 4+8
 - * UPON PEDESTRIAN ACTUATION, OTHERWISE HAND SYMBOL AT ALL TIMES
- PEDESTRIAN COUNTDOWN TIMER TO COUNTDOWN DURING FLASHING HAND INTERVAL

CLEARVIEW-2-W
12" UPPER CASE
9" LOWER CASE LETTERS



CLEARVIEW-3-W
12" UPPER CASE
9" LOWER CASE LETTERS



NOTE:
STREET SIGNS TO HAVE GREEN BACKGROUND WITH WHITE LETTERS AND BORDER

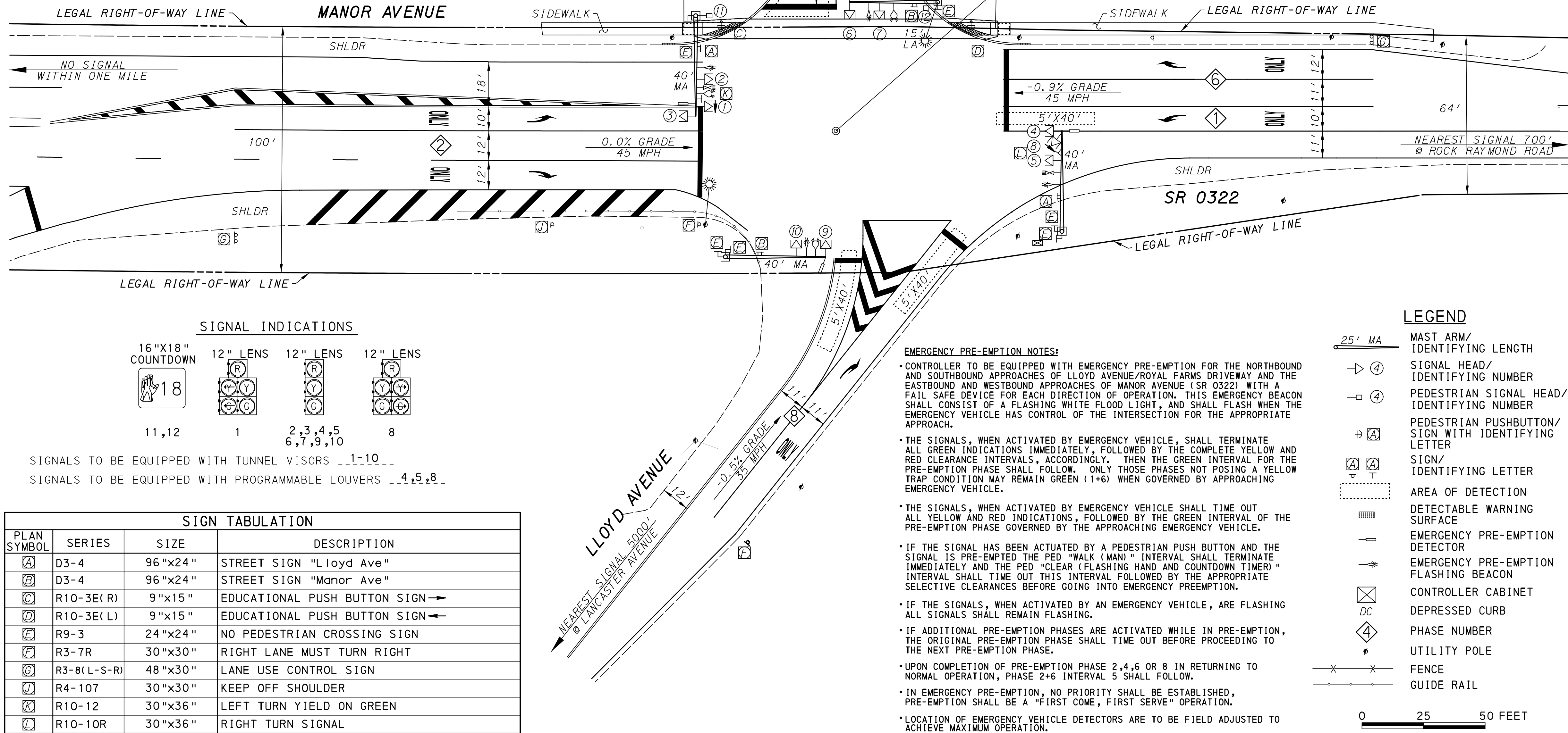
EMERGENCY PRE-EMPTION PHASING
MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
INTERVAL	12	13	14	15	16	17	18	19	20	21	22	23
SIGNALS	R R R	R R R	R R R	R R R	R R R	R R R	R R R	R R R	R R R	R R R	R R R	R R R
1	R	R	R	R	R	R	R	R	R	R	R	R
2	R	R	R	R	R	R	R	R	R	R	R	R
3,4,5	G	Y	R	G	Y	R	G	Y	R	G	Y	R
6,7	R	R	R	R	R	R	R	R	R	R	R	R
8	R	R	R	R	R	R	R	R	R	R	R	R
9,10	R	R	R	R	R	R	R	R	R	R	R	R
11,12	H	H	H	H	H	H	H	H	H	H	H	H
FIXED	▲	5	2	▲	5	2	▲	5	2	▲	5	2

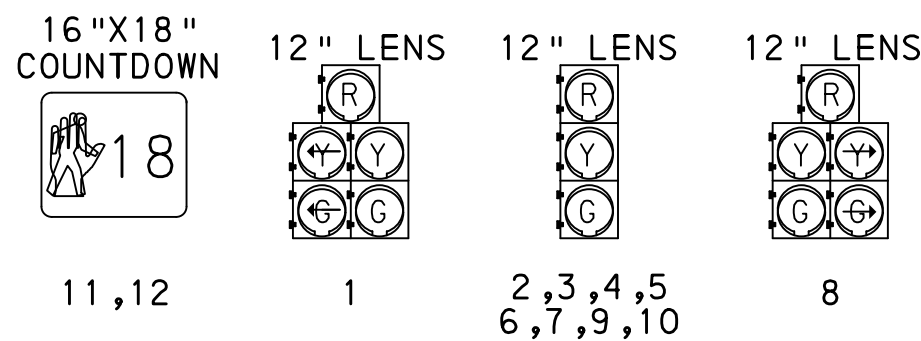
▲ FOR DURATION OF PRE-EMPTION

EMERGENCY PRE-EMPTION
OPERATION NOTES

- SIGNAL TO INDICATE G WHEN RETURNING TO NORMAL OPERATION
- SIGNAL TO INDICATE G WHEN RETURNING TO NORMAL OPERATION



SIGNAL INDICATIONS



SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 11,10,1
SIGNALS TO BE EQUIPPED WITH PROGRAMMABLE LOUVERS 4,5,8

SIGN TABULATION

PLAN SYMBOL	SERIES	SIZE	DESCRIPTION
ⓐ	D3-4	96"x24"	STREET SIGN "Lloyd Ave"
ⓑ	D3-4	96"x24"	STREET SIGN "Manor Ave"
ⓒ	R10-3E(R)	9"x15"	EDUCATIONAL PUSH BUTTON SIGN →
ⓓ	R10-3E(L)	9"x15"	EDUCATIONAL PUSH BUTTON SIGN ←
ⓔ	R9-3	24"x24"	NO PEDESTRIAN CROSSING SIGN
ⓕ	R3-7R	30"x30"	RIGHT LANE MUST TURN RIGHT
ⓖ	R3-8(L-S-R)	48"x30"	LANE USE CONTROL SIGN
ⓗ	R4-107	30"x30"	KEEP OFF SHOULDER
ⓘ	R10-12	30"x36"	LEFT TURN YIELD ON GREEN
ⓙ	R10-10R	30"x36"	RIGHT TURN SIGNAL

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND AND SOUTHBOUND APPROACHES OF LLOYD AVENUE/ROYAL FARMS DRIVEWAY AND THE EASTBOUND AND WESTBOUND APPROACHES OF MANOR AVENUE (SR 0322) WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION. THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY, FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTION PHASE SHALL FOLLOW. ONLY THOSE PHASES NOT POSING A YELLOW TRAP CONDITION MAY REMAIN GREEN (1+6) WHEN GOVERNED BY APPROACHING EMERGENCY VEHICLE.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLE SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF THE SIGNAL HAS BEEN ACTUATED BY A PEDESTRIAN PUSH BUTTON AND THE SIGNAL IS PRE-EMPTED THE PED "WALK (MAN)" INTERVAL SHALL TERMINATE IMMEDIATELY AND THE PED "CLEAR (FLASHING HAND AND COUNTDOWN TIMER)" INTERVAL SHALL TIME OUT THIS INTERVAL FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE GOING INTO EMERGENCY PREEMPTION.
- IF THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, ARE FLASHING ALL SIGNALS SHALL REMAIN FLASHING.
- IF ADDITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE ORIGINAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+6 INTERVAL 5 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.
- LOCATION OF EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.

LEGEND

- 25' MA MAST ARM/ IDENTIFYING LENGTH
- ➔ ④ SIGNAL HEAD/ IDENTIFYING NUMBER
- ➔ ④ PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- ⓐ ④ PEDESTRIAN PUSHBUTTON/ SIGN WITH IDENTIFYING LETTER
- ⓐ ④ SIGN/ IDENTIFYING LETTER
- ⓐ ④ AREA OF DETECTION
- ⓐ ④ DETECTABLE WARNING SURFACE
- ⓐ ④ EMERGENCY PRE-EMPTION DETECTOR
- ⓐ ④ EMERGENCY PRE-EMPTION FLASHING BEACON
- ⓐ ④ CONTROLLER CABINET
- ⓐ ④ DEPRESSED CURB
- ⓐ ④ PHASE NUMBER
- ⓐ ④ UTILITY POLE
- ⓐ ④ FENCE
- ⓐ ④ GUIDE RAIL

0 25 50 FEET

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POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

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SYSTEM PERMIT # I-0262

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: CHESTER
MUNICIPALITY: CALN TOWNSHIP
INTERSECTION: MANOR AVENUE (SR 0322) &
LLOYD AVENUE/ROYAL FARMS DRIVEWAY

REVIEWED: _____ DATE _____
MUNICIPAL OFFICIAL _____ DATE _____

RECOMMENDED: PAUL M. LUTZ 4/28/95
DOUGLAS MAY 5/2/95
DISTRICT TRAFFIC ENGINEER DATE

NO	REVISION	DES/ REVW	DATE	REVW	DATE	RECOM	DATE
1	ADD LEFT PHASE, STREET NAME "G"	JPS	8/5/99	MLK	8/9/99	DWM	8/9/99
2	CHANGE LANE CONFIGURE FOR EB MANOR & TIMING CHANGES & ADD SIGN "H"	SHG	8/5/04	ABP	8/9/04	LRB	8/10/04
3	ADD DRIVEWAY & SIGN "K"	MCM	1/22/10	LUTZ	1/22/10	LRB	1/23/10
4	REVISED LAYOUT OF INTERSECTION, ADDED EMERGENCY PRE-EMPTION/VIDEO DET	BJD	12/19/13	LUTZ	3/17/14	LRB	3/27/14
5	ADD NORTHERN LEG, FULL MODERNIZATION	TPD					
6							
7							
8							

SHEET 2 OF 2 PERMIT # 62-0483 FILE # 0483

\\eng\513215 - SR 322 and US 30 WB Ramps\Drawg\2155\SR322.dwg 7/20/2016 10:42:27 AM

TIME OF DAY SYSTEM
CYCLE/SPLIT/OFFSET

Program 1		File #	Phase								Cycle	Offset # 1
Intersections			1	2	3	4	5	6	7	8		
1	MANOR AVE AND W.B. U.S. 0030 RAMPS	3882		94		21		94			115	76
2	MANOR AVE AND LLOYD AVE	2954	12	67				79		36	115	113
3	MANOR AVE AND ROCK RAYMOND RD	0483		86		29	42	44			115	112
4												
5												
6												
Program 2		File #	Phase								Cycle	Offset # 1
Intersections			1	2	3	4	5	6	7	8		
1	MANOR AVE AND W.B. U.S. 0030 RAMPS	3882		54		21		54			75	17
2	MANOR AVE AND LLOYD AVE	2954	13	39				52		23	75	48
3	MANOR AVE AND ROCK RAYMOND RD	0483		53		22	14	39			75	8
4												
5												
6												
Program 3		File #	Phase								Cycle	Offset # 1
Intersections			1	2	3	4	5	6	7	8		
1	MANOR AVE AND W.B. U.S. 0030 RAMPS	3882		79		21		79			100	40
2	MANOR AVE AND LLOYD AVE	0483	18	51				69		31	100	76
3	MANOR AVE AND ROCK RAYMOND RD	2954		63		37	16	47			100	10
4												
5												
6												
Program 4		File #	Phase								Cycle	Offset # 1
Intersections			1	2	3	4	5	6	7	8		
1	MANOR AVE AND W.B. U.S. 0030 RAMPS	3882		51				51			100	97
2	MANOR AVE AND LLOYD AVE	0483	14	51				69		31	100	14
3	MANOR AVE AND ROCK RAYMOND RD	2954		79		21	16	63			100	13
4												
5												
6												

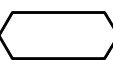
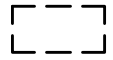


NOTE: DWELL IN CALN TOWNSHIP DEVELOPMENT TO
INSTALL FIBER OPTIC INTERCONNECT.

WEEKLY PROGRAM CHART					
EVENT	DAY	TIME	CYCLE	PROGRAM	REMARKS
1	1-5	06:00	115	1	AM PEAK
2	1-5	09:00	75	2	OFF PEAK
3	1-5	14:45-15:15	100	3	PM SCHOOL
4	1-5	15:15	100	4	PM PEAK
5	1-5	19:00	FREE	MAX 2	FREE
6	6-7	9:00	75	2	WEEKEND
7	6-7	18:00	FREE	MAX 2	FREE

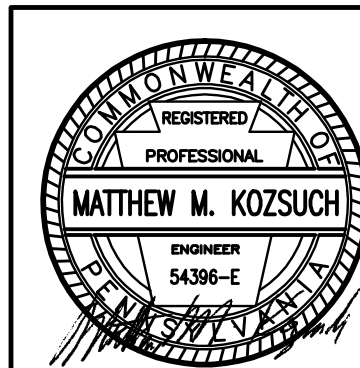
MONDAY = DAY 1
OFFSET IN SECONDS

OFFSET REFERENCE TO START
OF GREEN ON MANOR AVENUE

LEGEND

- Ø2 PHASE
- ↕ APPROACH LANES
- 1-1  LOOP SENSOR/IDENTIFYING NUMBER
- 1-1  ZONE OF DETECTION/IDENTIFYING NUMBER
-  CONTROLLER CABINET
-  SIGNAL IDENTIFICATION NUMBER

N.T.S



GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS
PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF
THE DEPARTMENT OF TRANSPORTATION.

REFER TO TRAFFIC SIGNAL PERMIT DRAWING FOR INDIVIDUAL
INTERSECTION OPERATION, GEOMETRY, PHASING AND CRITICAL TIMES.

FOR CONSTRUCTION AND INSPECTION THE SYSTEM PERMIT
SHOULD ALWAYS BE ACCOMPANIED WITH TRAFFIC SIGNAL PERMIT
DRAWING.

TEST THE SYSTEM AT LOCAL INTERSECTION LEVEL, SUBSYSTEM LEVEL
MASTER CONTROLLER LEVEL AND PERSONAL COMPUTER REMOTE
DIAL UP LEVEL.

GATHER THE SYSTEM FAILURE CRITICAL ALARMS REPORT AND
ARCHIVE THEM WHERE APPLICABLE.

SET UP PENNDOT DISTRICT 6-0 COMPUTER WITH THE SYSTEM
DATABASE AND GRAPHICS. MODIFY THE DATABASE AND GRAPHICS
FOR SYSTEMS REVISIONS.

ASSIGN LOOP DETECTORS AND PROGRAM THE CONTROLLERS TO
GATHER TRAFFIC VOLUMES IN 15 MINUTE INTERVAL, WHERE APPLICABLE.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO
INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

OBTAIN POLE ATTACHMENT PERMIT FOR AERIAL FIBER OPTIC
INSTALLATION.

MAINTAIN MASTER CONTROLLER COMMUNICATION SUCH AS PHONE
DROPS.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH
THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY
PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF
UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING
UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE
LATEST AMENDMENT TO ACT 287, PREVENTION OF DAMAGE TO
UNDERGROUND UTILITIES, DATED DECEMBER 20, 1974.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST
CONFORM TO FORM 408 AND A COPY OF THE PROPOSED
SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC
UNIT FOR REVIEW PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR
ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS
OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED
OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH
TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

SYSTEM PERMIT PLAN

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: **CHESTER**

MUNICIPALITY: **CALN TOWNSHIP**

INTERSECTION: **MANOR AVENUE (S.R. 0322)**

TRAFFIC SIGNAL SYSTEM

REVIEWED: _____

DATE

MUNICIPAL OFFICIAL _____

DATE

RECOMMENDED: _____

DISTRICT TRAFFIC ENGINEER _____

DATE

NO.	REVISION	DES./ REVW.	DATE	REVW.	DATE	RECOM.	DATE
1							
2							
3							
4							
5							
6							
7							
8							

SHEET 1 OF 1

PERMIT # **I-0262**

APPENDIX M

AUXILIARY LANE WARRANT ANALYSIS

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: AM Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	2.0%	8
	Through	-	194	6.0%	200
	Right	Yes	106	20.0%	117
Opposing	Left	No	305	2.0%	N/A
	Through	-	792	7.0%	820
	Right	Yes	16	2.0%	17
Advancing Volume: 325 Opposing Volume: 837 Left Turn Volume: 8 % Left Turns in Advancing Volume: 2.46%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	305	2.0%	N/A
	Through	-	792	7.0%	N/A
	Right	-	16	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

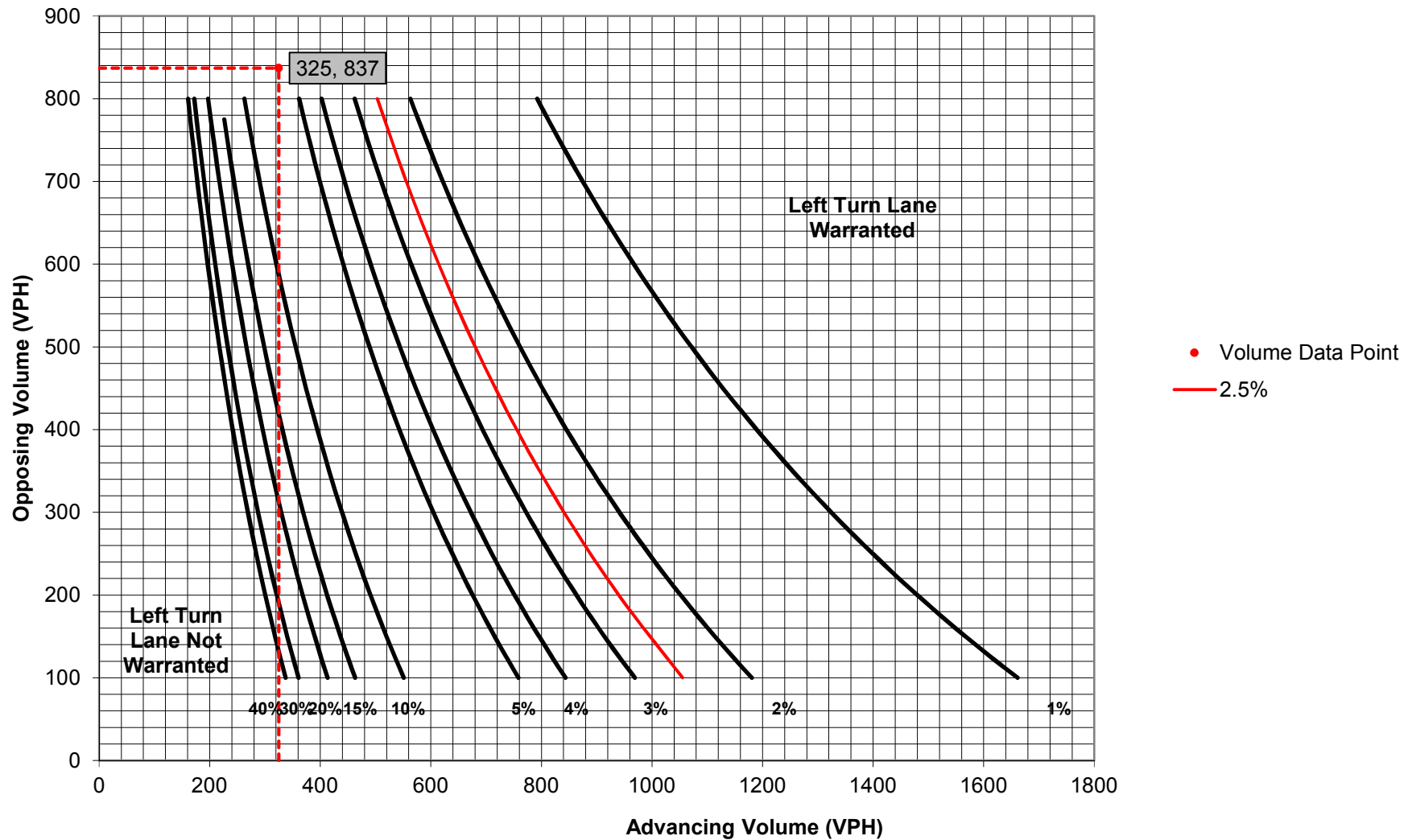
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 8 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 31.3	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: PM Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	15	2.0%	16
	Through	-	750	1.0%	754
	Right	Yes	81	5.0%	84
Opposing	Left	No	94	21.0%	N/A
	Through	-	556	2.0%	562
	Right	Yes	27	2.0%	28
<div style="display: flex; justify-content: space-between;"> <div>Advancing Volume: 854</div> <div>Opposing Volume: 590</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Left Turn Volume: 16</div> <div>% Left Turns in Advancing Volume: 1.87%</div> </div>					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	94	21.0%	N/A
	Through	-	556	2.0%	N/A
	Right	-	27	2.0%	N/A
<div style="display: flex; justify-content: space-between;"> <div>Advancing Volume: N/A</div> <div>Right Turn Volume: N/A</div> </div>					

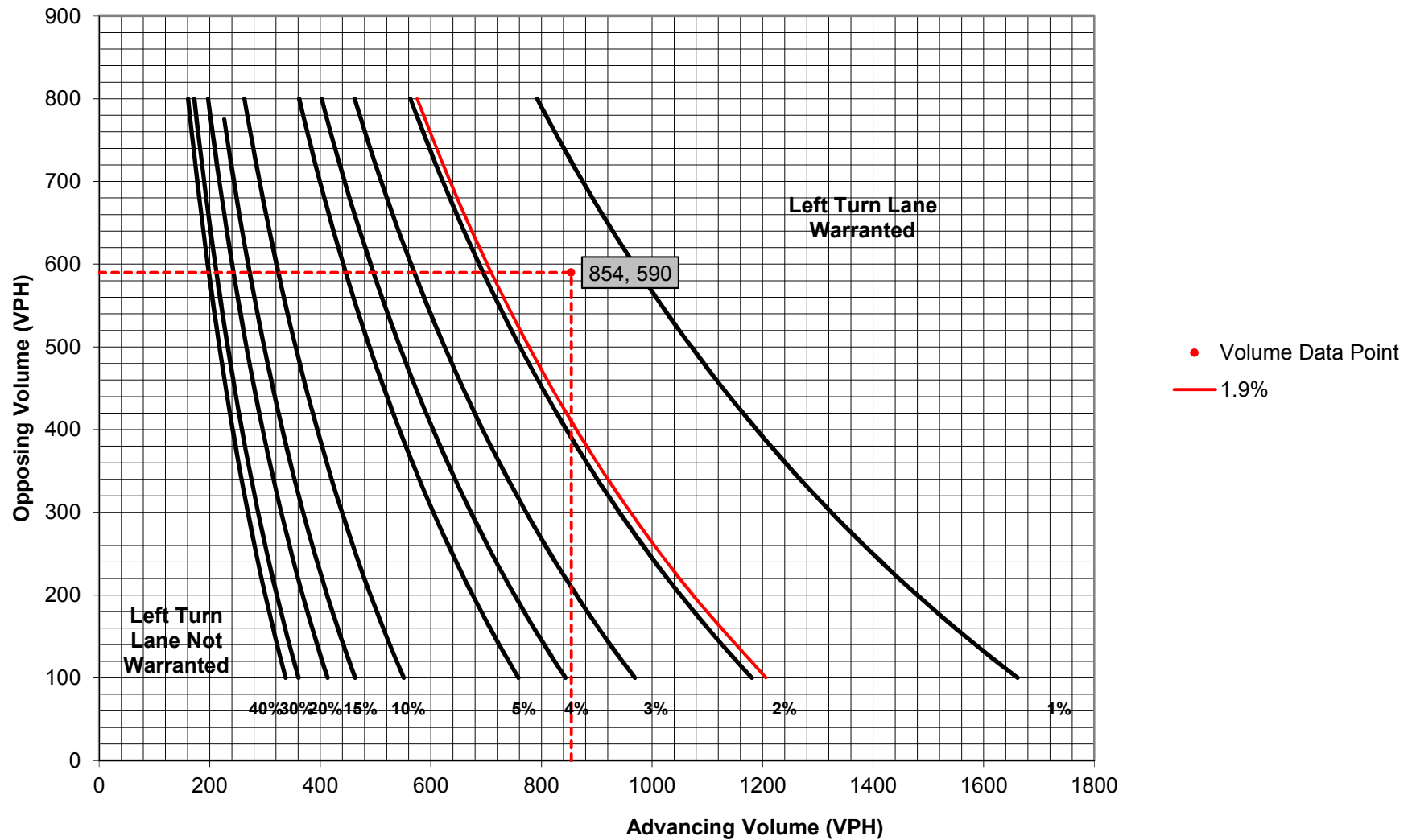
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: Yes	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 16 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 36	Average # of Vehicles/Cycle: 1.0																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td><td>A</td> <td>B or C</td><td>B or C</td> <td>B or C</td><td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td><td>A</td> <td>C</td><td>B</td> <td>B or C</td><td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
<div style="display: flex; justify-content: space-between;"> <div>Left Turn Lane Storage Length, Condition A: 0</div> <div>Feet</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Condition B: N/A</div> <div>Feet</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Condition C: N/A</div> <div>Feet</div> </div> <div style="display: flex; justify-content: space-between;"> <div>Required Left Turn Lane Storage Length: 0</div> <div>Feet</div> </div>																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: SAT Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	17	2.0%	18
	Through	-	467	1.0%	470
	Right	Yes	46	5.0%	48
Opposing	Left	No	81	5.0%	N/A
	Through	-	492	1.0%	495
	Right	Yes	26	2.0%	27
Advancing Volume: 536 Opposing Volume: 522 Left Turn Volume: 18 % Left Turns in Advancing Volume: 3.36%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	81	5.0%	N/A
	Through	-	492	1.0%	N/A
	Right	-	26	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

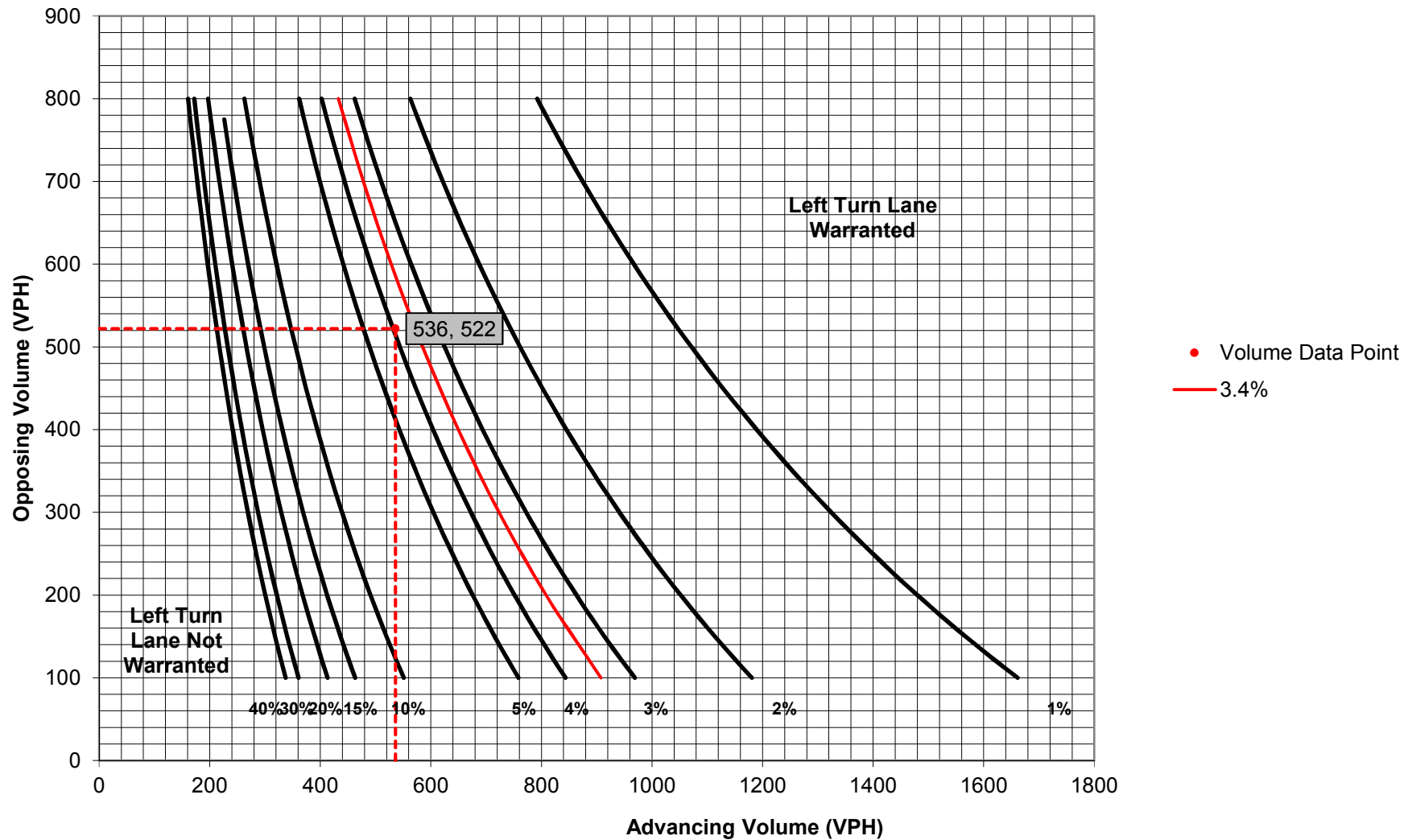
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 18 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 48	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td><td>A</td> <td>B or C</td><td>B or C</td> <td>B or C</td><td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td><td>A</td> <td>C</td><td>B</td> <td>B or C</td><td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: AM Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	2.0%	N/A
	Through	-	194	6.0%	N/A
	Right	Yes	106	20.0%	N/A
Opposing	Left	No	305	2.0%	N/A
	Through	-	792	7.0%	N/A
	Right	Yes	16	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	305	2.0%	N/A
	Through	-	792	7.0%	820
	Right	-	16	2.0%	17
Advancing Volume: 837 Right Turn Volume: 17					

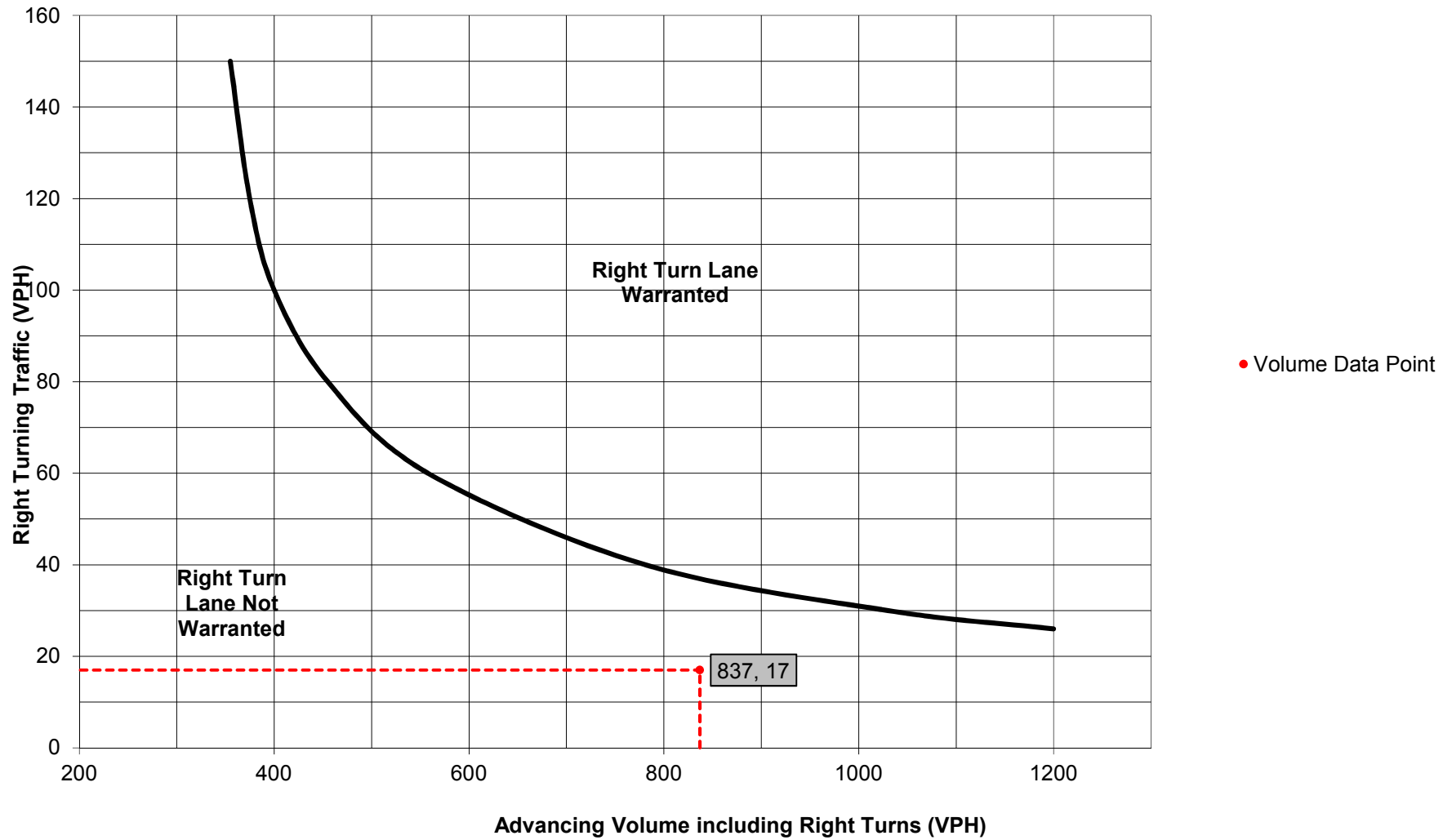
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 17 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 31.3	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> <th>High</th><th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td><td>A</td> <td>B or C</td><td>B or C</td> <td>B or C</td><td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td><td>A</td> <td>C</td><td>B</td> <td>B or C</td><td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: PM Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	15	2.0%	N/A
	Through	-	750	1.0%	N/A
	Right	Yes	81	5.0%	N/A
Opposing	Left	No	94	21.0%	N/A
	Through	-	556	2.0%	N/A
	Right	Yes	27	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	94	21.0%	N/A
	Through	-	556	2.0%	562
	Right	-	27	2.0%	28
Advancing Volume: 590 Right Turn Volume: 28					

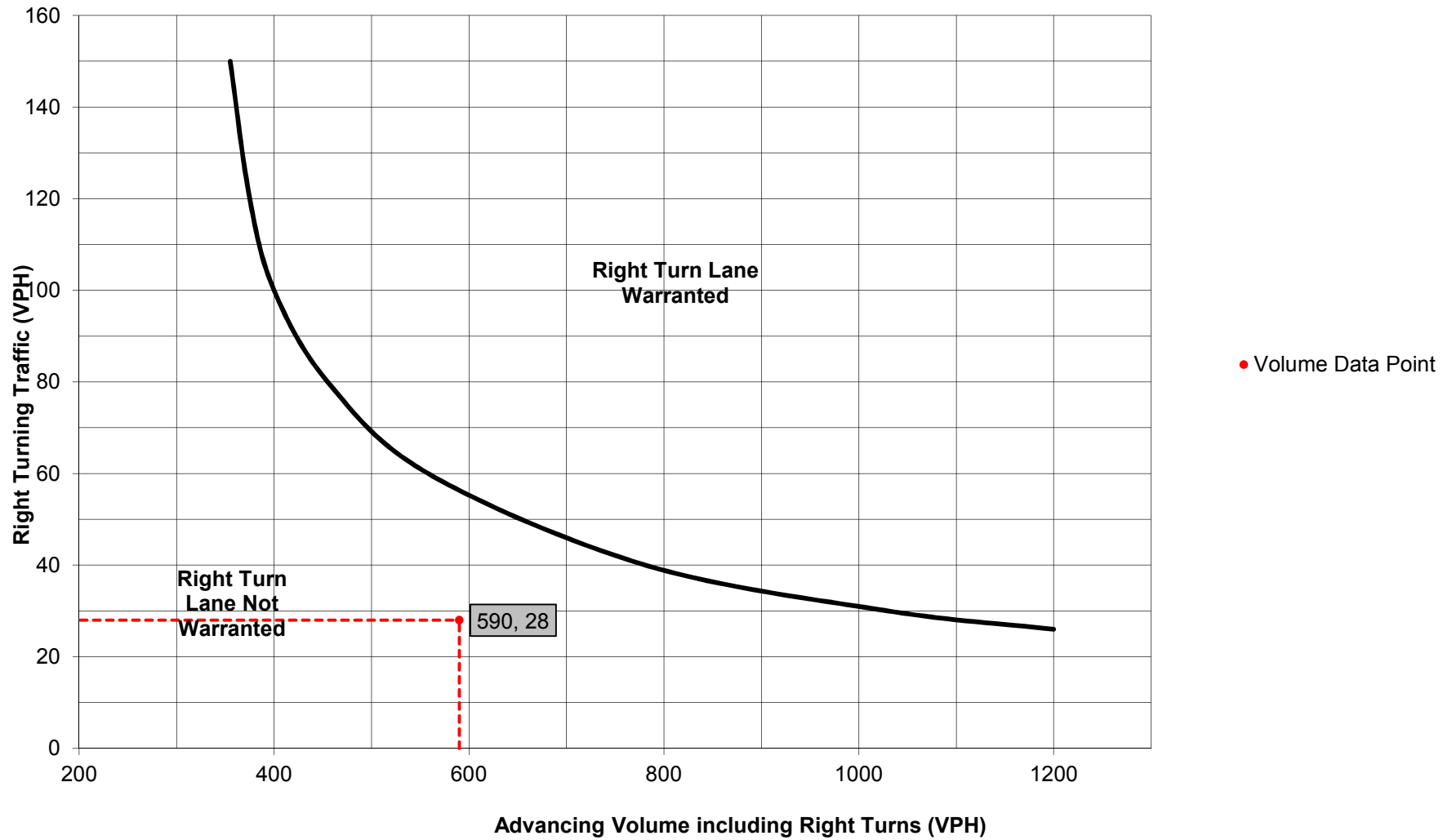
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 28 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 36	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
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Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



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Intersection & Approach Description: Manor Avenue & Rock Raymond Road/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: SAT Peak Intersection Control: Signalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	17	2.0%	N/A
	Through	-	467	1.0%	N/A
	Right	Yes	46	5.0%	N/A
Opposing	Left	No	81	5.0%	N/A
	Through	-	492	1.0%	N/A
	Right	Yes	26	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	81	5.0%	N/A
	Through	-	492	1.0%	495
	Right	-	26	2.0%	27
Advancing Volume: 522 Right Turn Volume: 27					

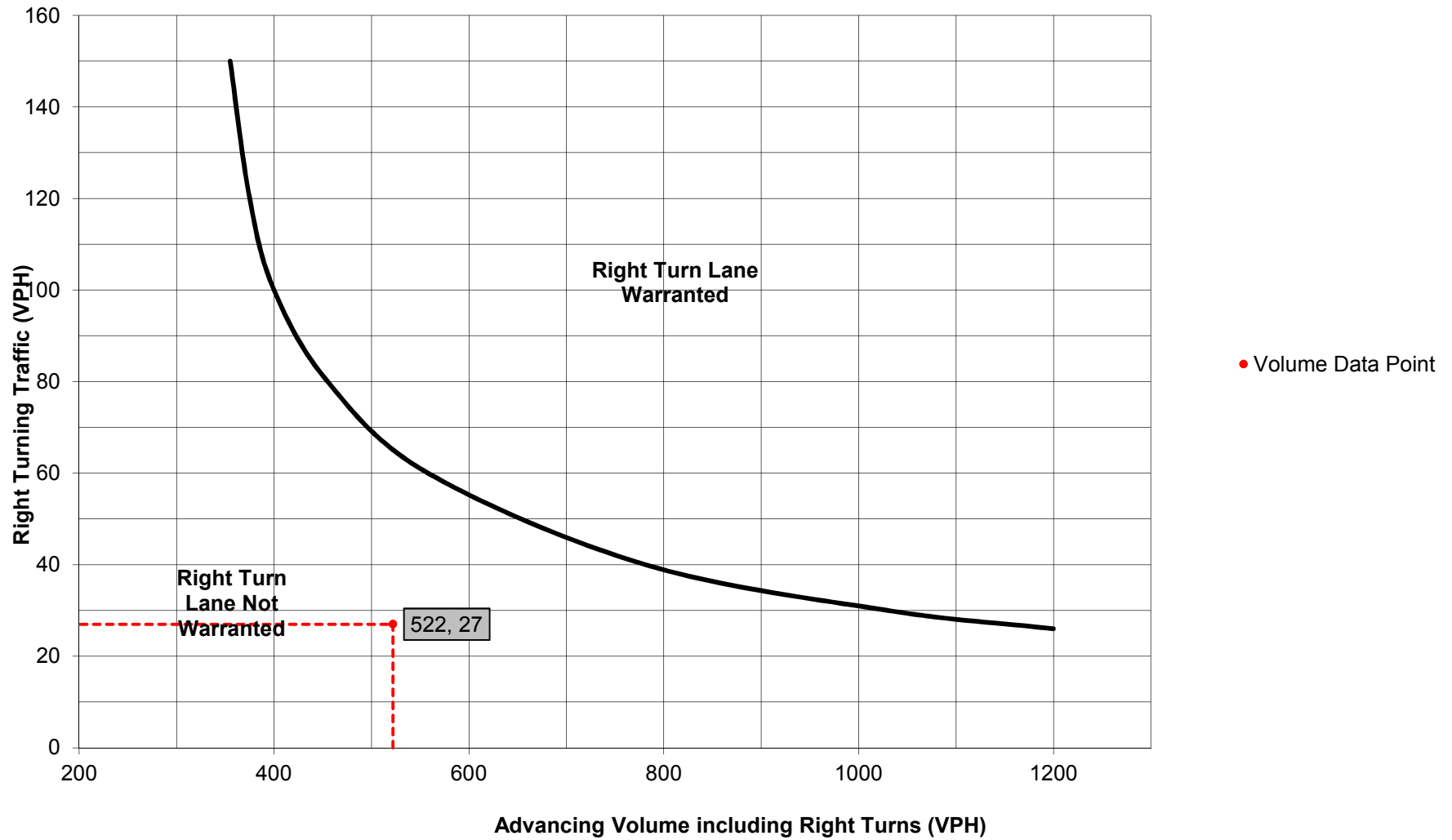
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Signalized Design Hour Volume of Turning Lane: 27 Cycles Per Hour (Assumed): Known Cycles Per Hour (If Known): 48	Average # of Vehicles/Cycle: N/A																																							
PennDOT Publication 46, Exhibit 11-6																																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="4" style="width: 20%;">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume						High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



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Intersection & Approach Description: Manor Avenue & Proposed RIRO Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: AM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 45 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	No			N/A
	Through	-			N/A
	Right	Yes			N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No			N/A
	Through	-	1105	7.0%	1144
	Right	-	4	2.0%	5
Advancing Volume: 1149 Right Turn Volume: 5					

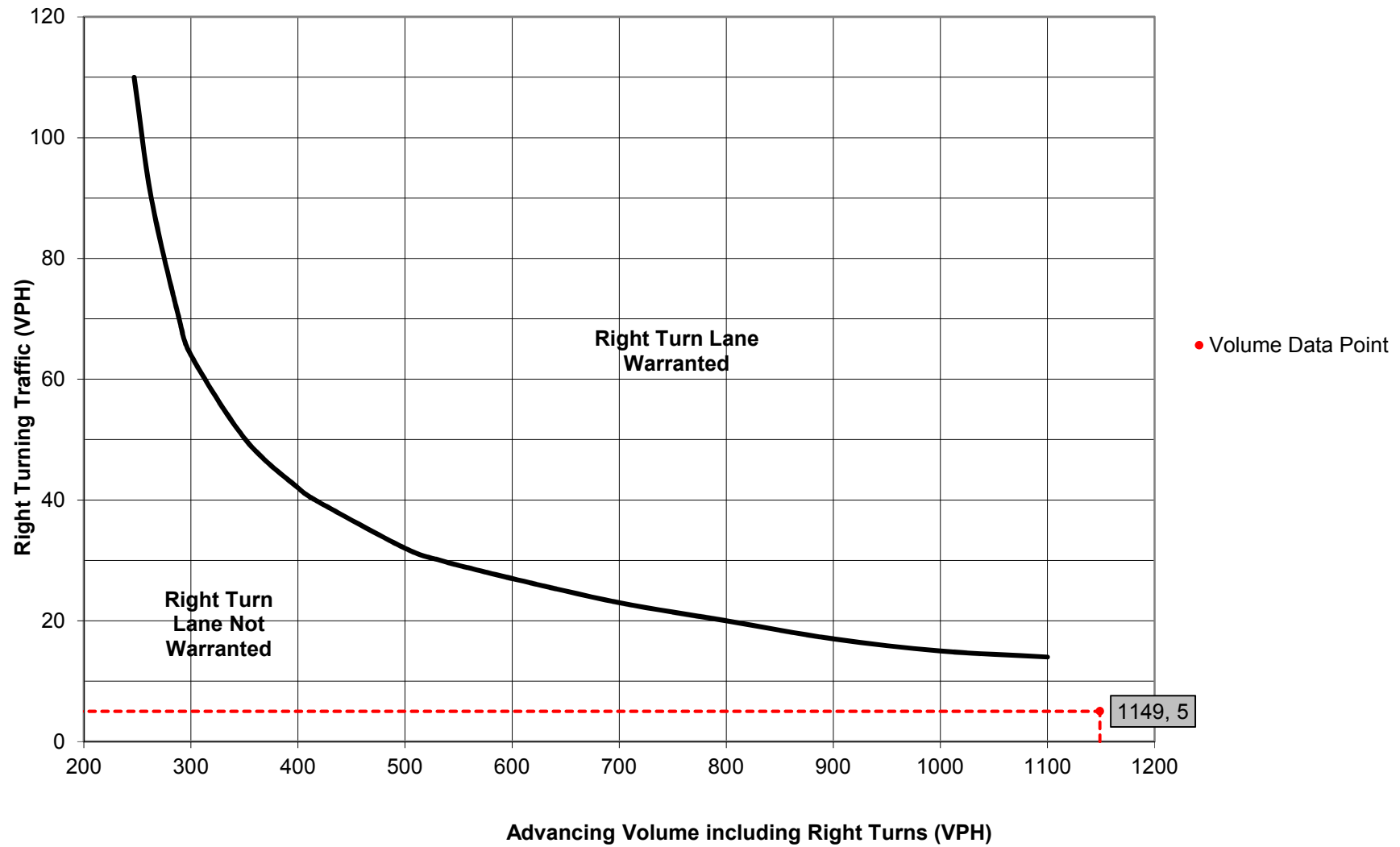
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 10 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 5 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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**Figure 10. Warrant for right turn lanes on two-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



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Analysis Period: 2023 Projected Conditions Design Hour: PM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 45 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	No			N/A
	Through	-			N/A
	Right	Yes			N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No			N/A
	Through	-	701	2.0%	709
	Right	-	11	2.0%	12
Advancing Volume: 721 Right Turn Volume: 12					

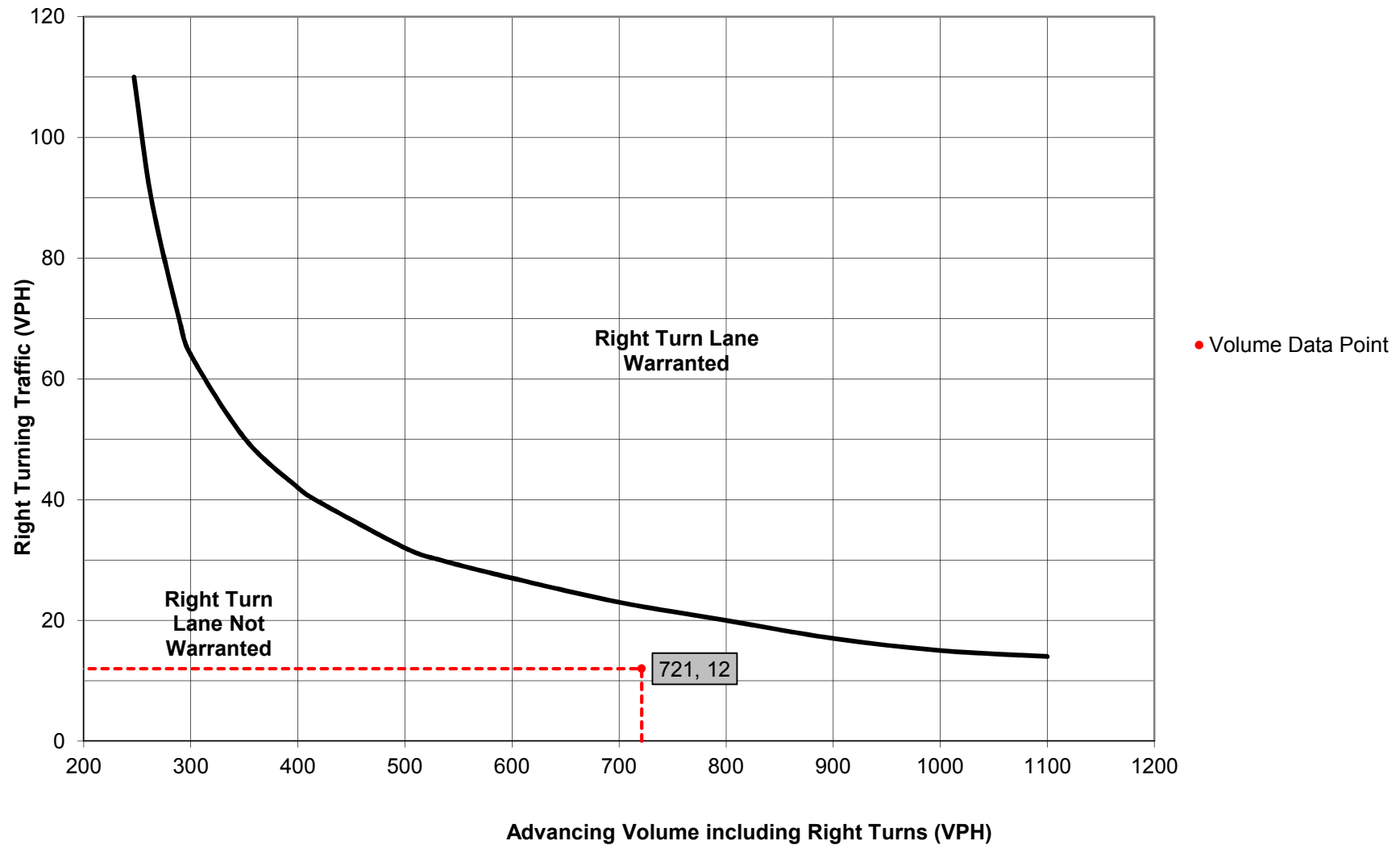
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 10 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 12 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
PennDOT Publication 46, Exhibit 11-6																																								
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="4">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume						High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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	High	Low	High	Low	High	Low																																		
Signalized	A	A	B or C	B or C	B or C	B or C																																		
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**Figure 10. Warrant for right turn lanes on two-lane roadways
(45 mph or greater speeds, unsignalized and signalized intersections)**



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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes			N/A
	Through	-			N/A
	Right	Yes			N/A
Opposing	Left	No			N/A
	Through	-			N/A
	Right	Yes			N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No			N/A
	Through	-	621	1.0%	625
	Right	-	16	2.0%	17
Advancing Volume: 642 Right Turn Volume: 17					

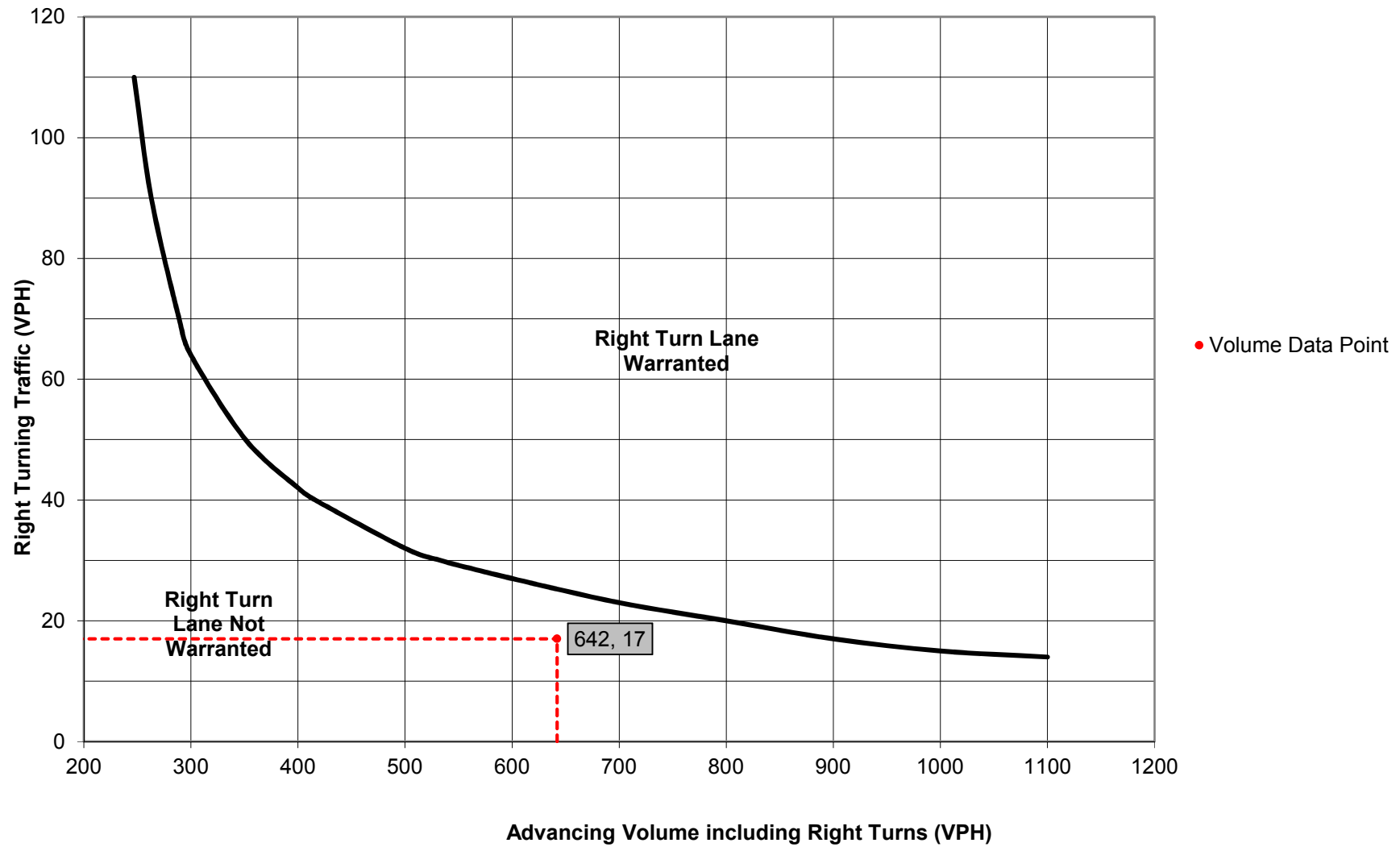
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 10 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 17 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="4" style="width: 15%;">Type of Traffic Control</th> <th colspan="6" style="background-color: #f5deb3;">Speed (MPH)</th> </tr> <tr> <th colspan="2" style="background-color: #f5deb3;">25-35</th> <th colspan="2" style="background-color: #f5deb3;">40-45</th> <th colspan="2" style="background-color: #f5deb3;">50-60</th> </tr> <tr> <th colspan="6" style="background-color: #f5deb3;">Turn Demand Volume</th> </tr> <tr> <th style="background-color: #f5deb3;">High</th> <th style="background-color: #f5deb3;">Low</th> <th style="background-color: #f5deb3;">High</th> <th style="background-color: #f5deb3;">Low</th> <th style="background-color: #f5deb3;">High</th> <th style="background-color: #f5deb3;">Low</th> </tr> <tr> <td style="text-align: center;">Signalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B or C</td> </tr> <tr> <td style="text-align: center;">Unsignalized</td> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> <td style="text-align: center;">C</td> <td style="text-align: center;">B</td> <td style="text-align: center;">B or C</td> <td style="text-align: center;">B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume						High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
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**Figure 10. Warrant for right turn lanes on two-lane roadways
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Intersection & Approach Description: Lloyd Avenue & Park and Ride/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: AM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	1	2.0%	2
	Through	-	196	11.0%	207
	Right	Yes	18	22.0%	20
Opposing	Left	Yes	2	0.0%	2
	Through	-	475	3.0%	483
	Right	Yes	2	2.0%	3
<div style="display: flex; justify-content: space-between;"> <div> Advancing Volume: 229 Opposing Volume: 488 Left Turn Volume: 2 </div> <div> % Left Turns in Advancing Volume: 0.87% </div> </div>					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	2	0.0%	N/A
	Through	-	475	3.0%	N/A
	Right	-	2	2.0%	N/A
<div style="display: flex; justify-content: space-between;"> <div> Advancing Volume: N/A Right Turn Volume: N/A </div> </div>					

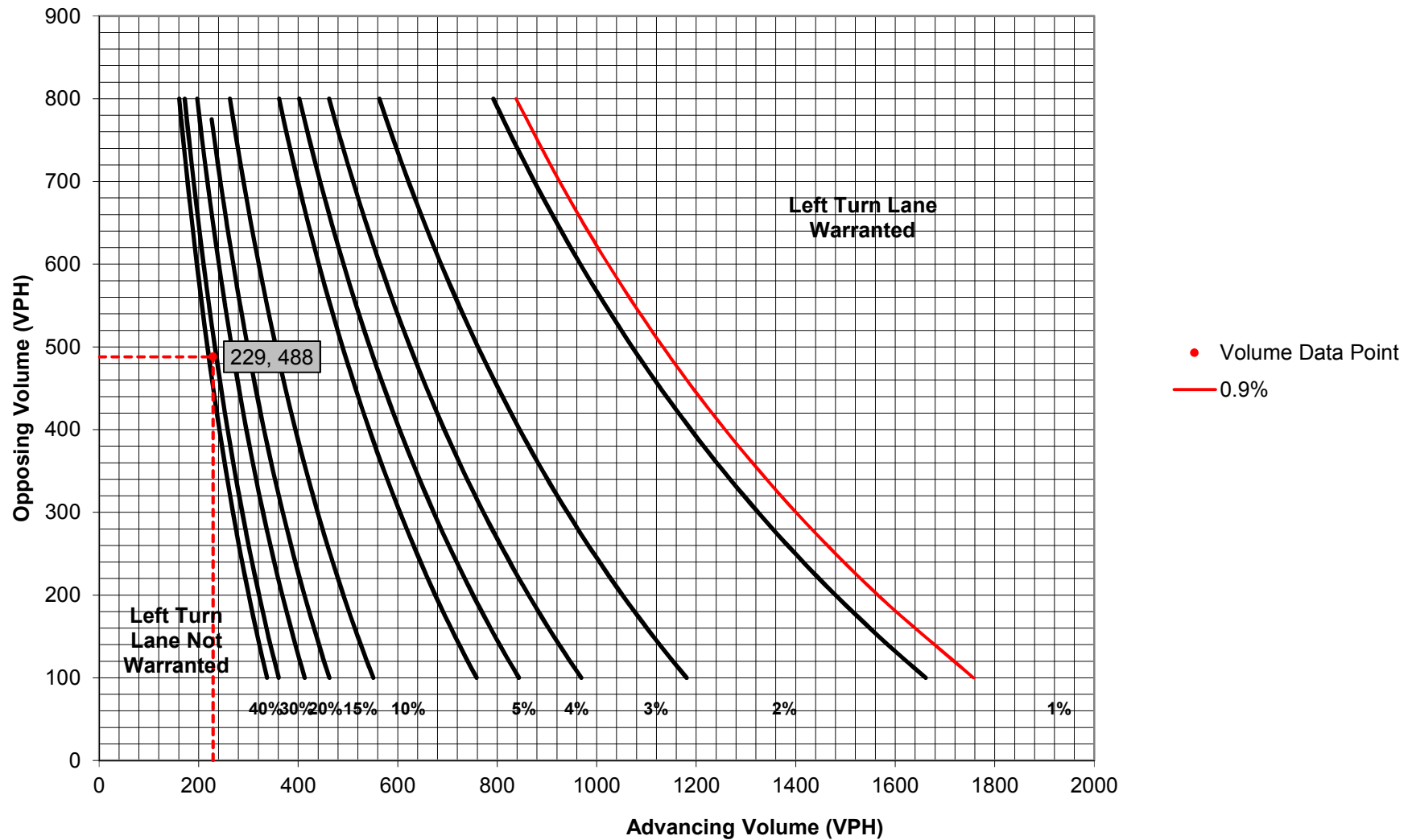
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 2 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
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Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Lloyd Avenue & Park and Ride/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: PM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 2px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	5	2.0%	6
	Through	-	406	2.0%	411
	Right	Yes	7	0.0%	7
Opposing	Left	Yes	1	0.0%	1
	Through	-	308	2.0%	312
	Right	Yes	5	2.0%	6
Advancing Volume: 424 Opposing Volume: 319 Left Turn Volume: 6 % Left Turns in Advancing Volume: 1.42%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	1	0.0%	N/A
	Through	-	308	2.0%	N/A
	Right	-	5	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

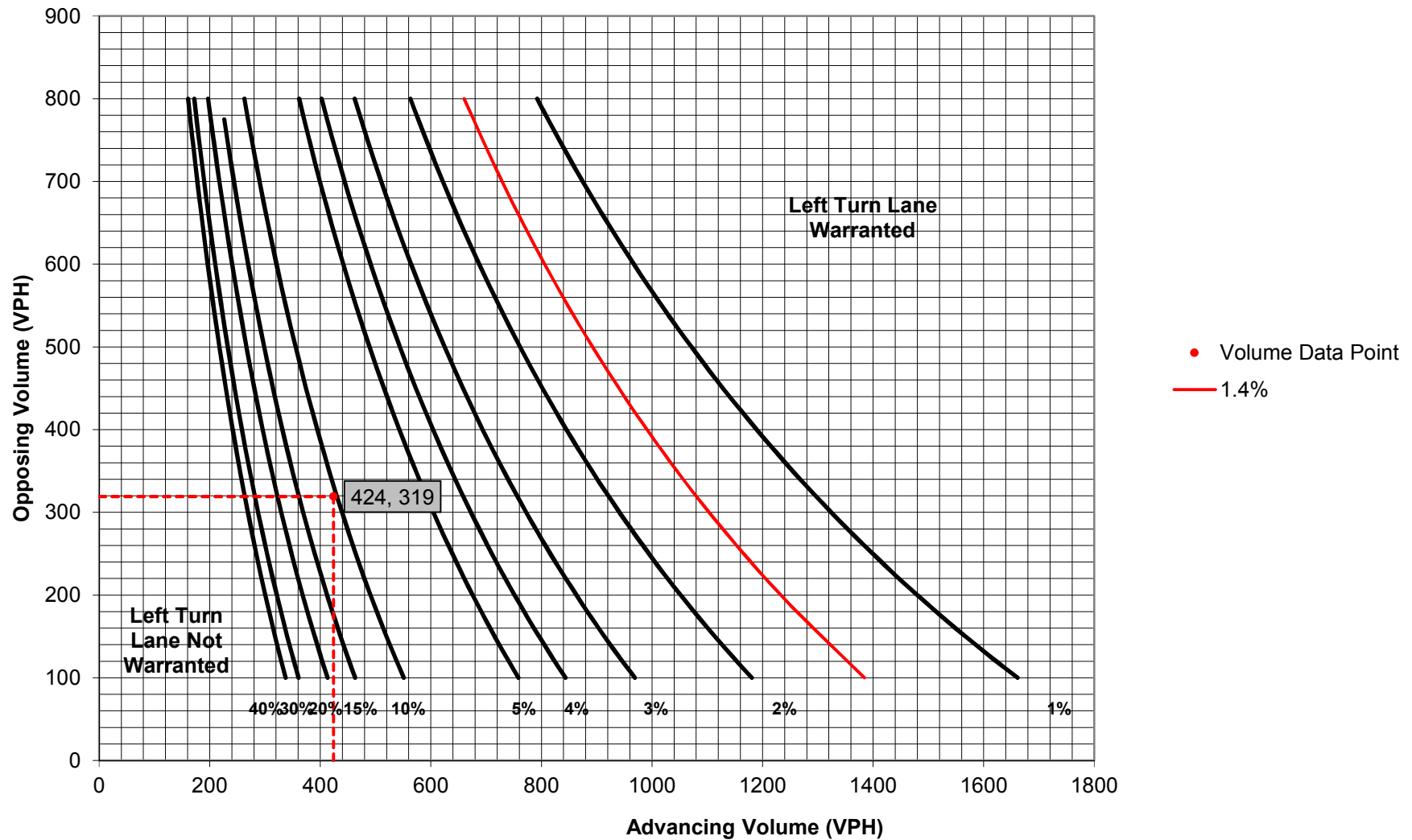
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 6 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
Penndot Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <td></td> <td>High</td> <td>Low</td> <td>High</td> <td>Low</td> <td>High</td> <td>Low</td> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
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Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet																																									
Additional Findings: <div style="border: 1px solid black; padding: 2px; display: inline-block;">N/A</div>																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



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Intersection & Approach Description: Lloyd Avenue & Park and Ride/Proposed Driveway

Analysis Period: 2023 Projected Conditions Design Hour: SAT Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided Type of Analysis: Left Turn Lane Left or Right-Turn Lane Analysis?: Left Turn Lane
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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV		
Advancing	Left	Yes	7	2.0%	8	Advancing Volume:	334
	Through	-	319	1.0%	321	Opposing Volume:	287
	Right	Yes	4	25.0%	5	Left Turn Volume:	8
Opposing	Left	Yes	2	0.0%	2		
	Through	-	276	1.0%	278		
	Right	Yes	6	2.0%	7	% Left Turns in Advancing Volume:	2.40%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV			
Advancing	Left	No	2	0.0%	N/A	Advancing Volume:	N/A	
	Through	-	276	1.0%	N/A		Right Turn Volume:	N/A
	Right	-	6	2.0%	N/A			

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 1**

Warrant Met?: **No**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 8 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A
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PennDOT Publication 46, Exhibit 11-6

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

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

Condition B: **N/A** Feet

Condition C: **N/A** Feet

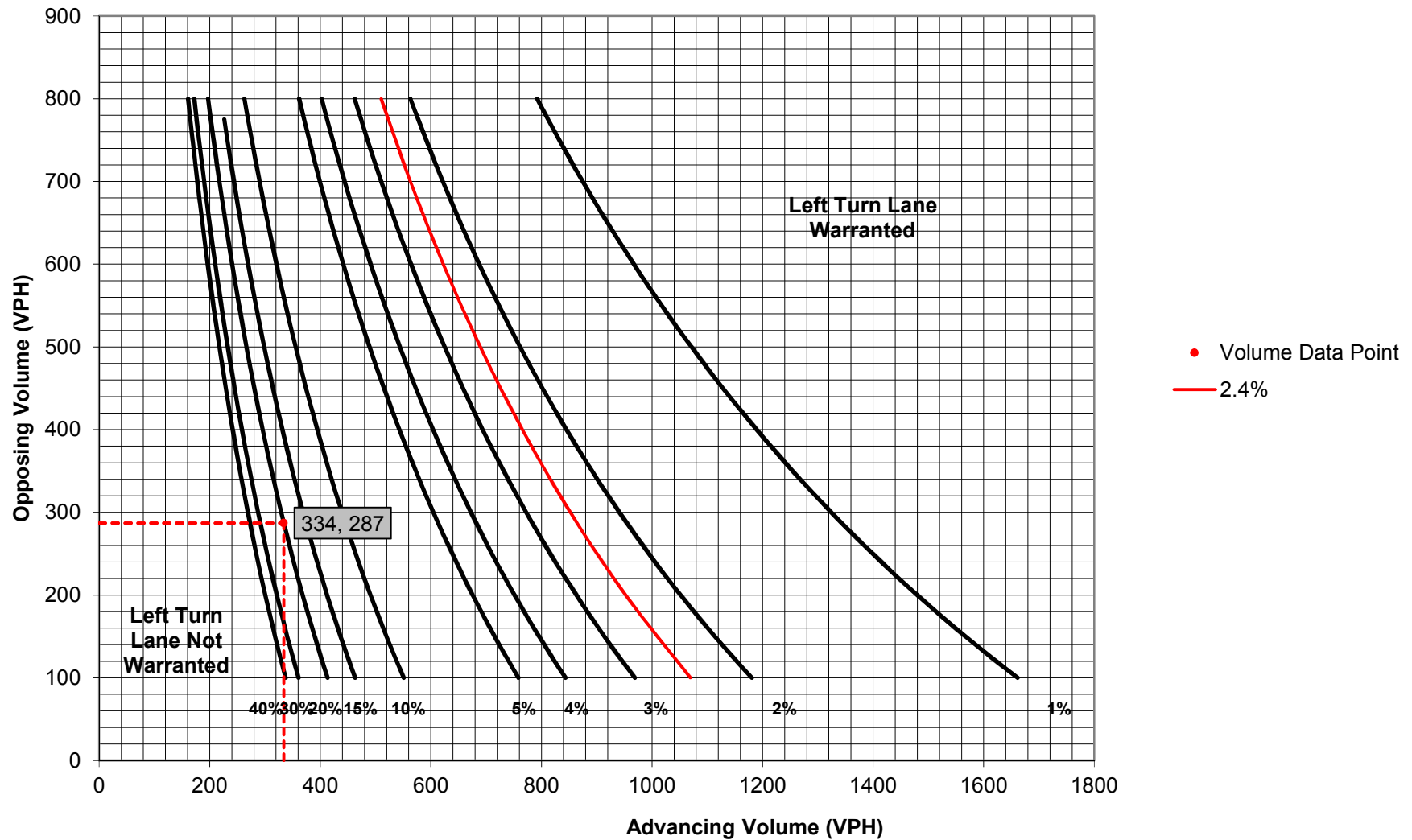
Required Left Turn Lane Storage Length: **N/A** Feet

Additional Findings:

N/A

Additional Comments / Justifications:

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	1	2.0%	N/A
	Through	-	196	11.0%	N/A
	Right	Yes	18	22.0%	N/A
Opposing	Left	Yes	2	0.0%	N/A
	Through	-	475	3.0%	N/A
	Right	Yes	2	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	2	0.0%	N/A
	Through	-	475	3.0%	483
	Right	-	2	2.0%	3
Advancing Volume: 486 Right Turn Volume: 3					

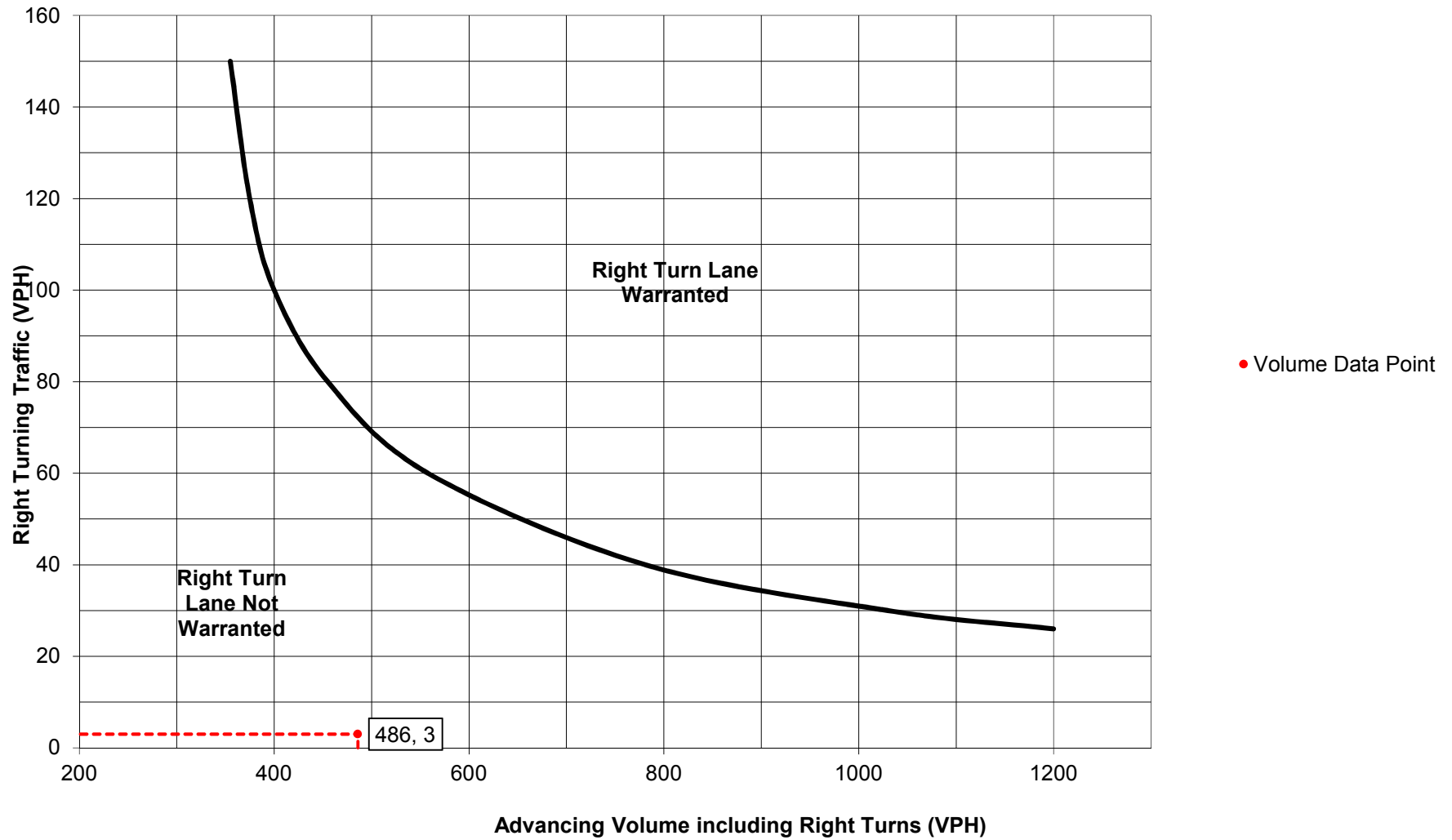
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 3 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
PennDOT Publication 46, Exhibit 11-6																																								
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Type of Traffic Control	Speed (MPH)																																							
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	Turn Demand Volume																																							
	High	Low	High	Low	High	Low																																		
Signalized	A	A	B or C	B or C	B or C	B or C																																		
Unsignalized	A	A	C	B	B or C	B																																		
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																								
Additional Findings: N/A																																								
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; width: 100%;"></div>																																								

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	5	2.0%	N/A
	Through	-	406	2.0%	N/A
	Right	Yes	7	0.0%	N/A
Opposing	Left	Yes	1	0.0%	N/A
	Through	-	308	2.0%	N/A
	Right	Yes	5	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	1	0.0%	N/A
	Through	-	308	2.0%	312
	Right	-	5	2.0%	6
Advancing Volume: 318 Right Turn Volume: 6					

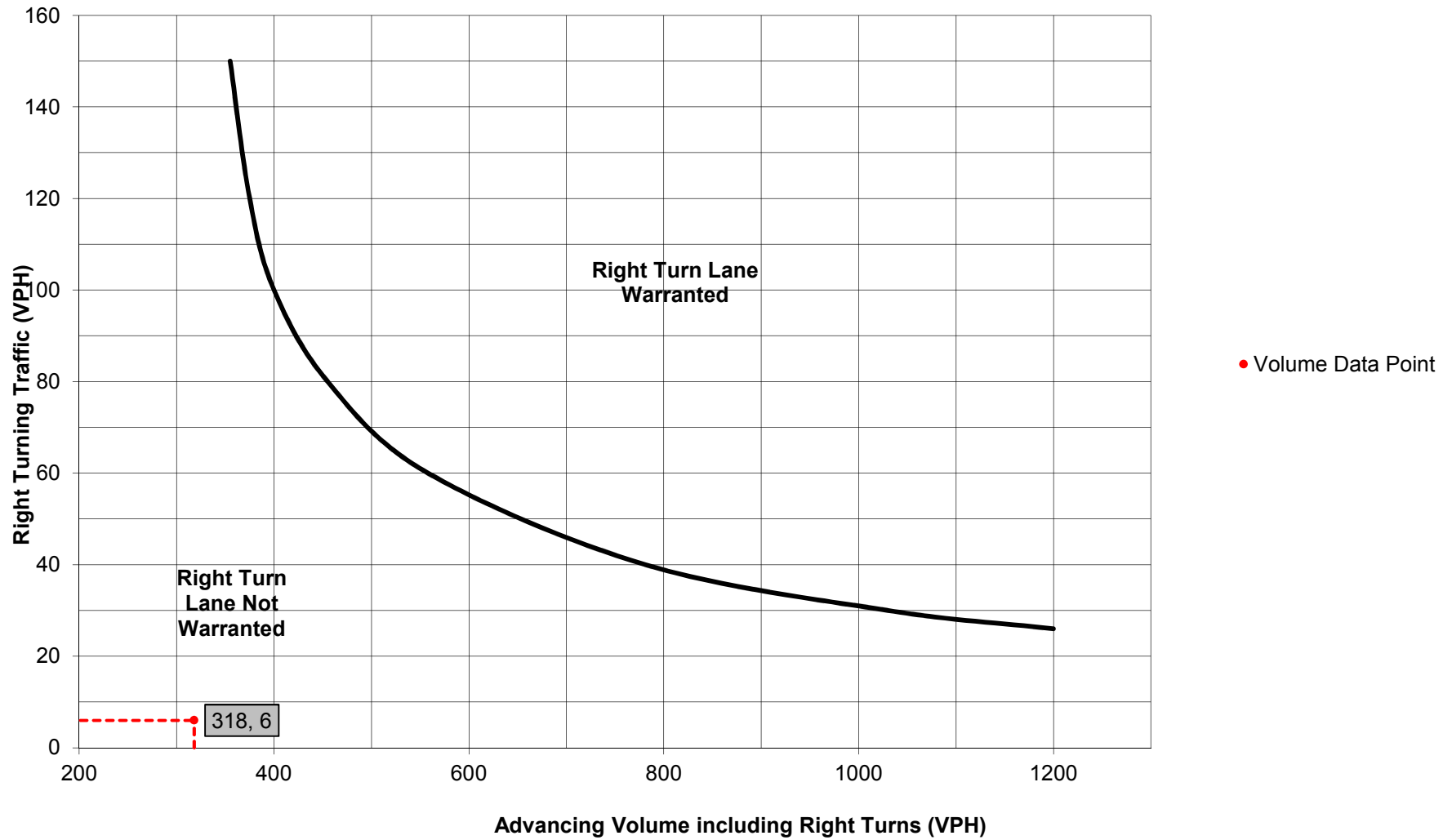
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 6 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
PennDOT Publication 46, Exhibit 11-6																																								
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	Turn Demand Volume																																							
	High	Low	High	Low	High	Low																																		
Signalized	A	A	B or C	B or C	B or C	B or C																																		
Unsignalized	A	A	C	B	B or C	B																																		
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																								
Additional Findings: N/A																																								
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**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	7	2.0%	N/A
	Through	-	319	1.0%	N/A
	Right	Yes	4	25.0%	N/A
Opposing	Left	Yes	2	0.0%	N/A
	Through	-	276	1.0%	N/A
	Right	Yes	6	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	2	0.0%	N/A
	Through	-	276	1.0%	278
	Right	-	6	2.0%	7
Advancing Volume: 285 Right Turn Volume: 7					

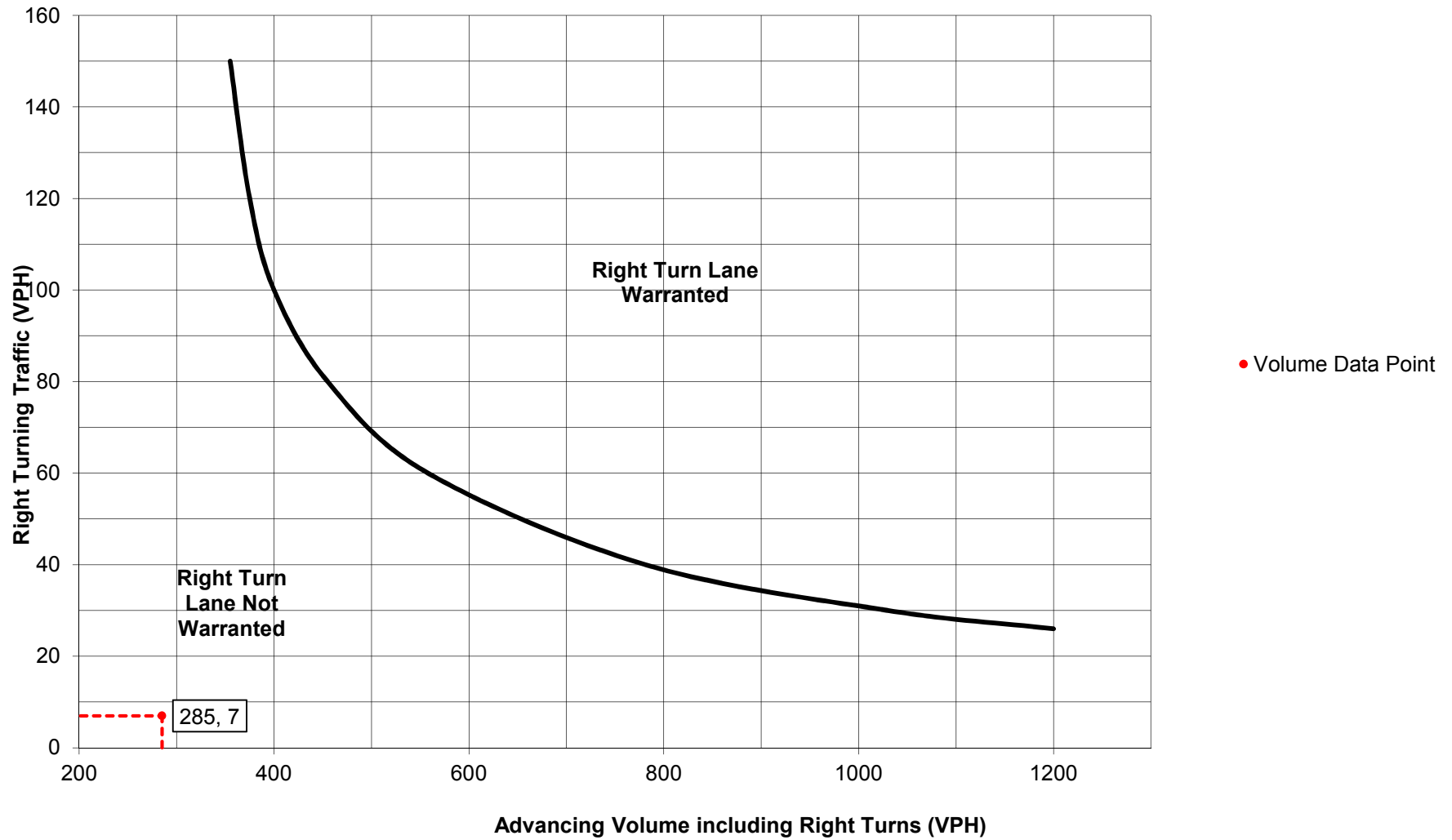
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 7 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	6	2.0%	7
	Through	-	206	11.0%	218
	Right	Yes	1	0.0%	1
Opposing	Left	Yes	0	0.0%	0
	Through	-	335	5.0%	344
	Right	Yes	3	2.0%	4
Advancing Volume: 226 Opposing Volume: 348 Left Turn Volume: 7 % Left Turns in Advancing Volume: 3.10%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	0	0.0%	N/A
	Through	-	335	5.0%	N/A
	Right	-	3	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

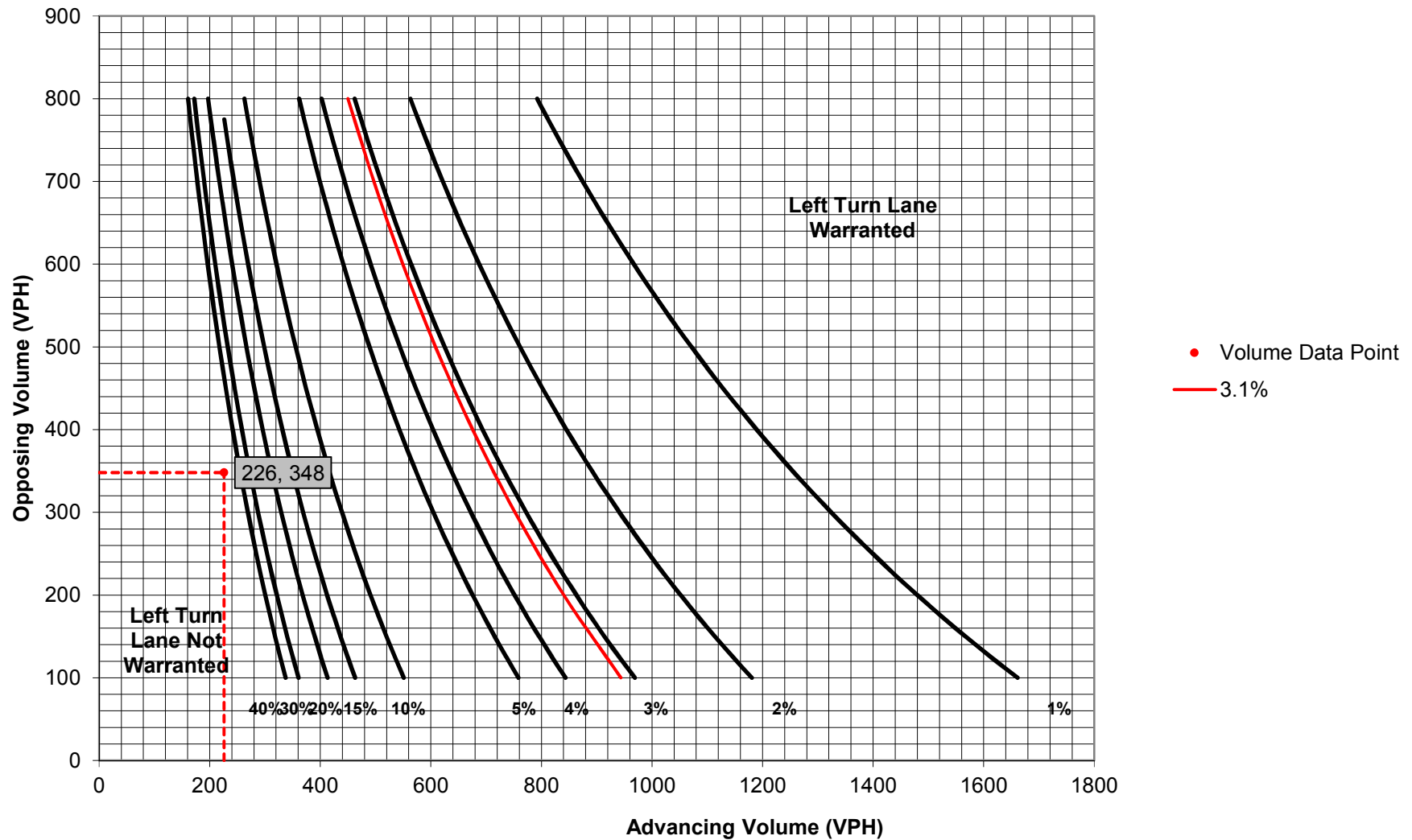
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Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 7 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
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Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



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VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	2.0%	11
	Through	-	284	3.0%	289
	Right	Yes	14	0.0%	14
Opposing	Left	Yes	1	0.0%	1
	Through	-	268	2.0%	271
	Right	Yes	5	2.0%	6
Advancing Volume: 314 Opposing Volume: 278 Left Turn Volume: 11 % Left Turns in Advancing Volume: 3.50%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	1	0.0%	N/A
	Through	-	268	2.0%	N/A
	Right	-	5	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	11
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	60
Average # of Vehicles/Cycle:	N/A

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

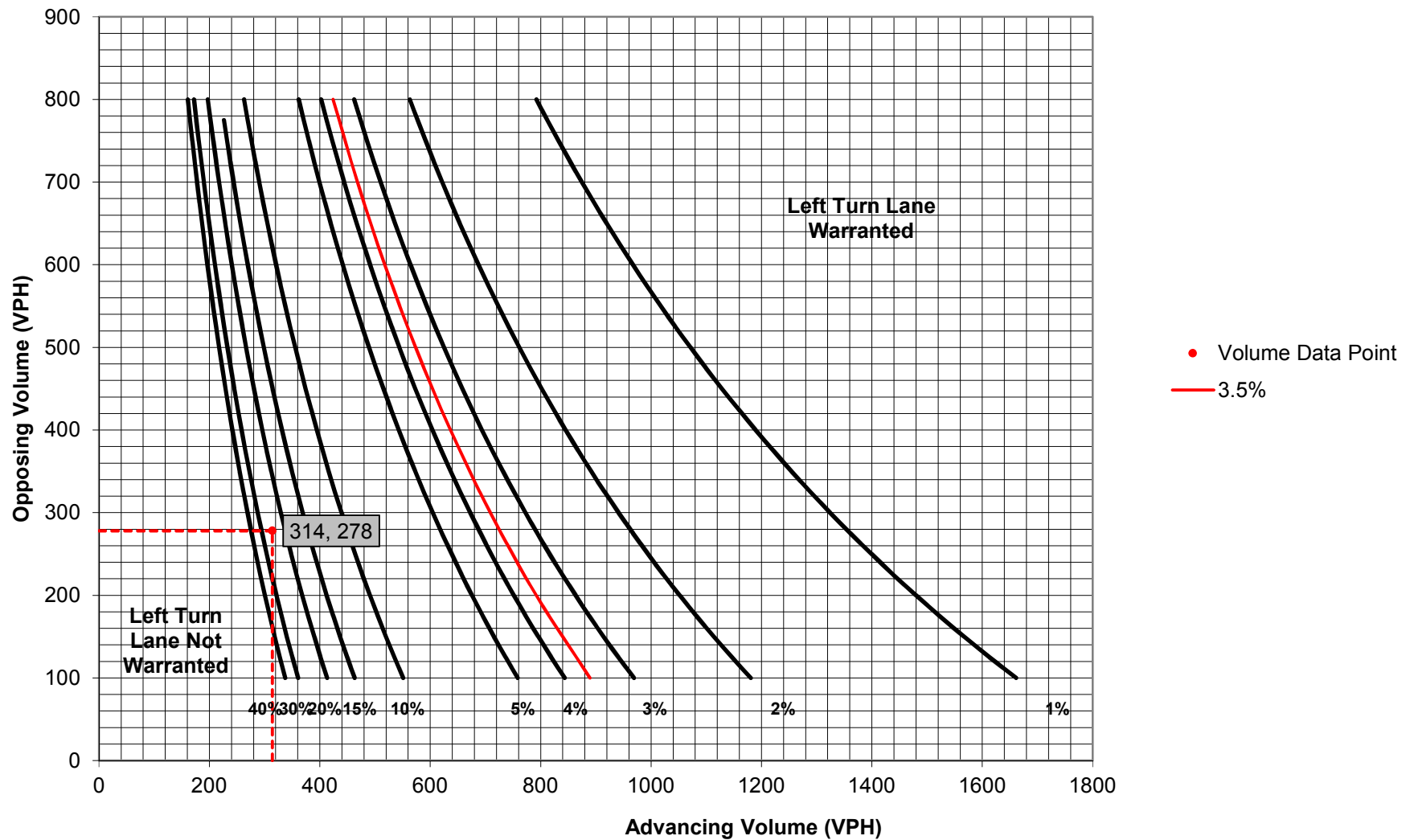
Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

Additional Findings:

N/A

Additional Comments / Justifications:

(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Lloyd Avenue & Beaver Run/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: SAT Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	2.0%	11
	Through	-	260	0.0%	260
	Right	Yes	9	0.0%	9
Opposing	Left	Yes	3	0.0%	3
	Through	-	224	0.0%	224
	Right	Yes	4	2.0%	5
Advancing Volume: 280 Opposing Volume: 232 Left Turn Volume: 11 % Left Turns in Advancing Volume: 3.93%					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	3	0.0%	N/A
	Through	-	224	0.0%	N/A
	Right	-	4	2.0%	N/A
Advancing Volume: N/A Right Turn Volume: N/A					

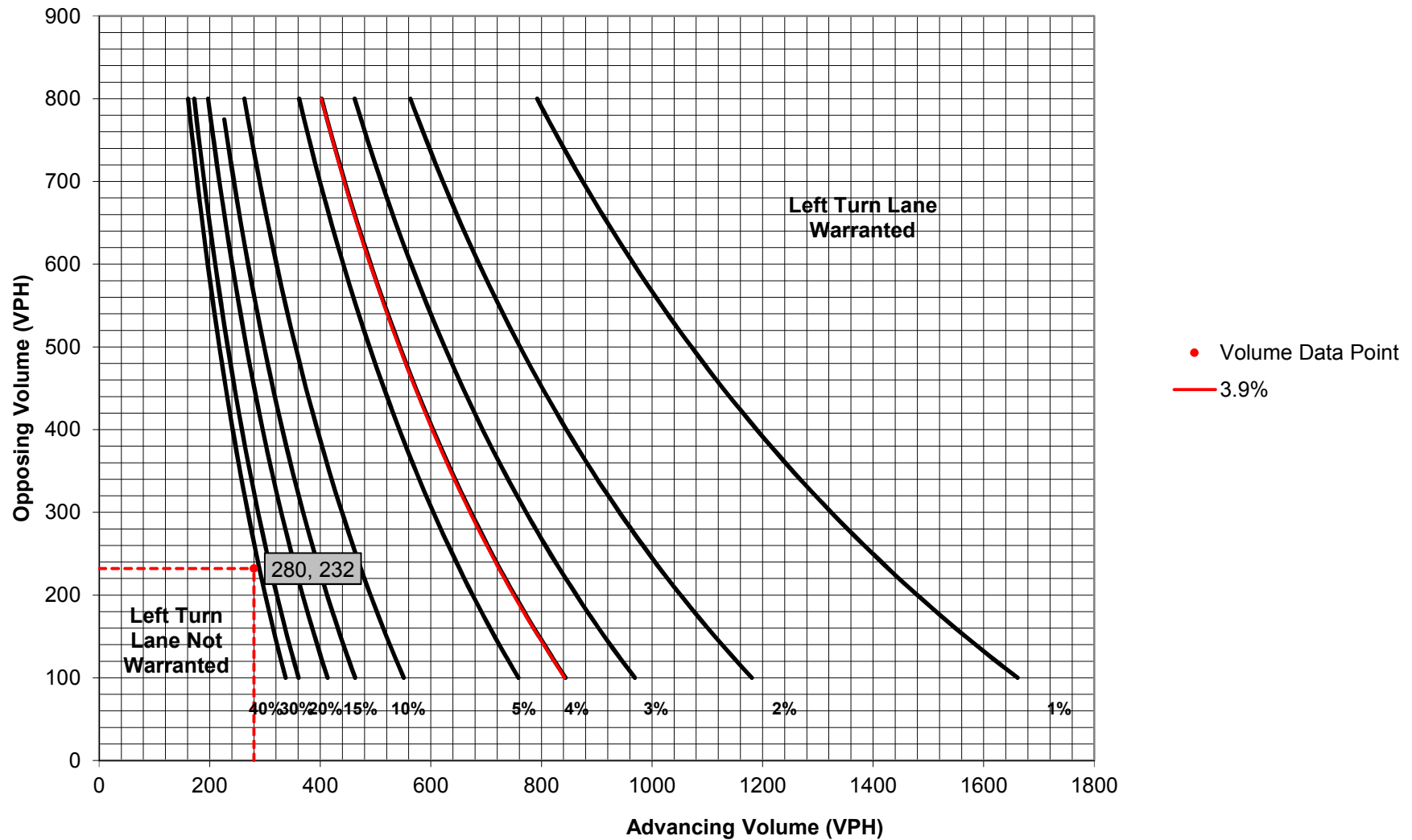
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: Figure 1 Warrant Met?: No	Applicable Warrant Figure: N/A Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 11 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
Penndot Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Left Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Left Turn Lane Storage Length: N/A Feet Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

Figure 1. Warrant for left turn lanes on two-lane roadways
 (speeds to 35 mph, unsignalized and signalized intersections)
 (L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Lloyd Avenue & Beaver Run/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: AM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	6	2.0%	N/A
	Through	-	206	11.0%	N/A
	Right	Yes	1	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	335	5.0%	N/A
	Right	Yes	3	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	0	0.0%	N/A
	Through	-	335	5.0%	344
	Right	-	3	2.0%	4
Advancing Volume: 348 Right Turn Volume: 4					

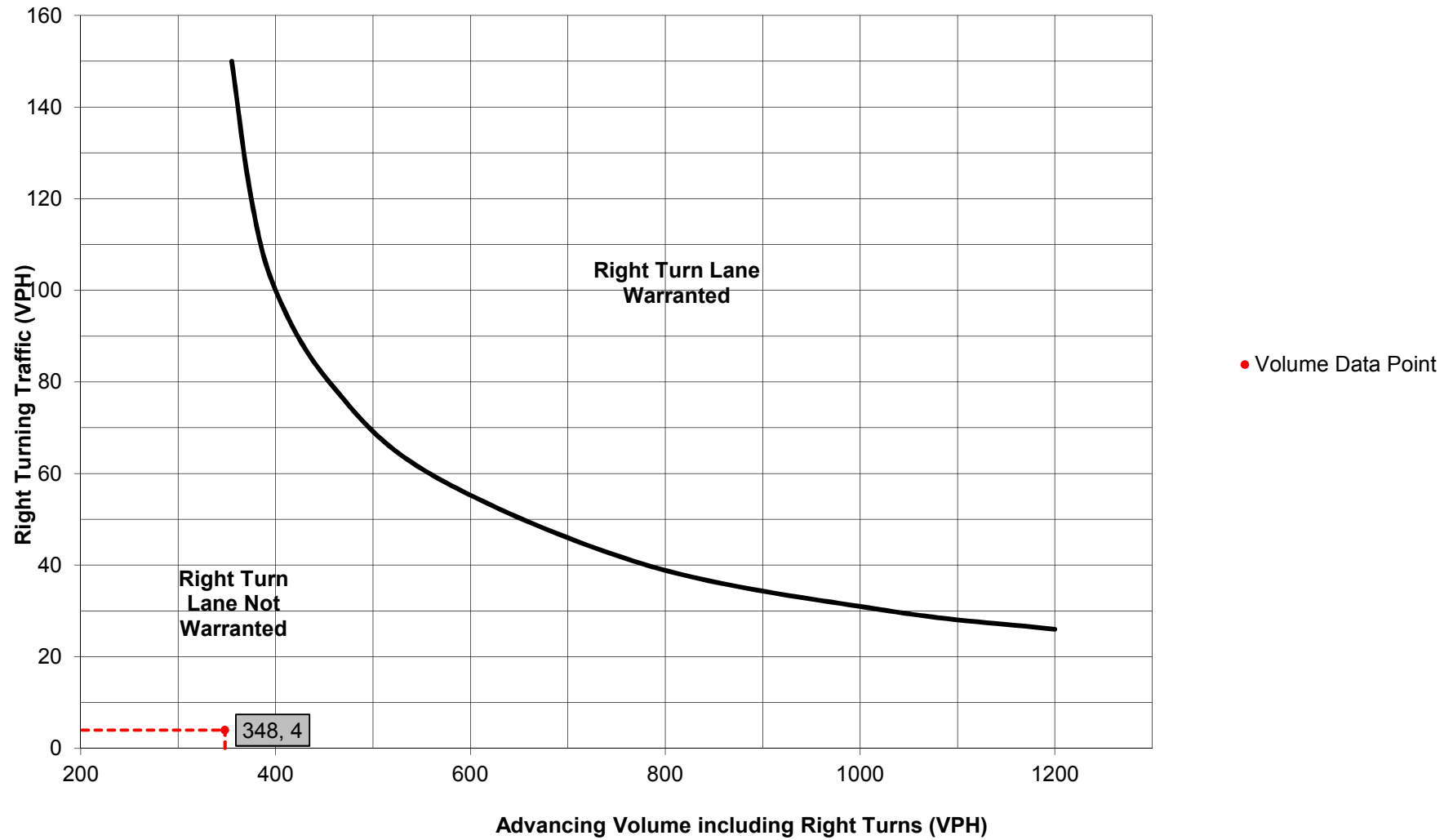
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 4 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																							
PennDOT Publication 46, Exhibit 11-6																																								
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th rowspan="4">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2" rowspan="2">40-45</th> <th colspan="2" rowspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume						High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																							
	25-35		40-45		50-60																																			
	Turn Demand Volume																																							
	High	Low	High	Low	High	Low																																		
Signalized	A	A	B or C	B or C	B or C	B or C																																		
Unsignalized	A	A	C	B	B or C	B																																		
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																								
Additional Findings: N/A																																								
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																								

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
--	--

Intersection & Approach Description: Lloyd Avenue & Beaver Run/Proposed Driveway

Analysis Period: 2023 Projected Conditions Design Hour: PM Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 2px solid red; padding: 2px; display: inline-block;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane
--	---

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	2.0%	N/A
	Through	-	284	3.0%	N/A
	Right	Yes	14	0.0%	N/A
Opposing	Left	Yes	1	0.0%	N/A
	Through	-	268	2.0%	N/A
	Right	Yes	5	2.0%	N/A

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

% Left Turns in Advancing Volume: N/A

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	1	0.0%	N/A
	Through	-	268	2.0%	271
	Right	-	5	2.0%	6

Advancing Volume: 277
Right Turn Volume: 6

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	6
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

Right Turn Lane Storage Length, Condition A:

N/A

Feet

Condition B:

N/A

Feet

Condition C:

N/A

Feet

Required Right Turn Lane Storage Length:

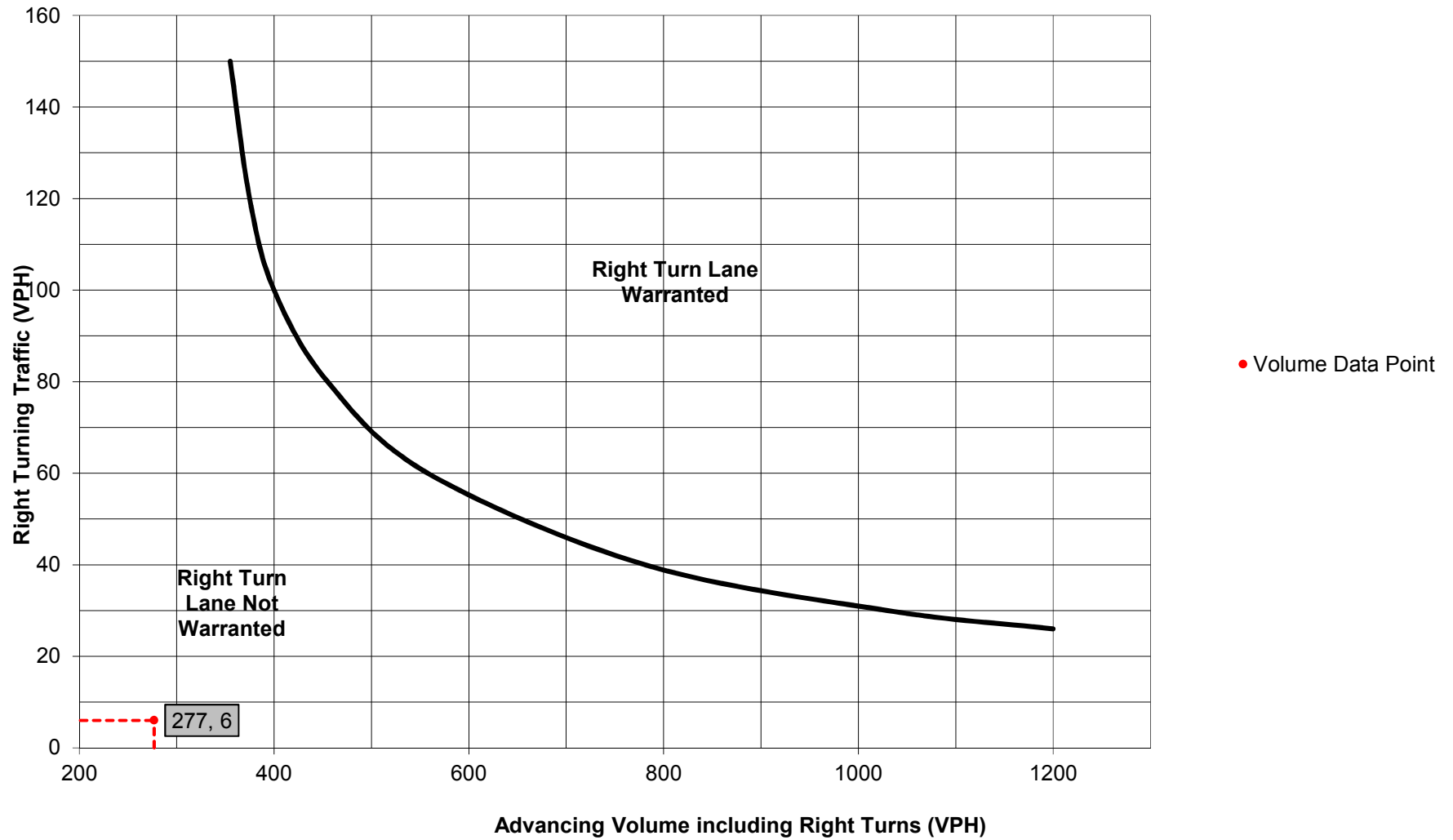
N/A

Feet

Additional Findings:
N/A

Additional Comments / Justifications:

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Caln Township County: Chester County PennDOT Engineering District: 6	Analysis Date: 10/30/2018 Conducted By: MB Checked By: Agency/Company Name: TPD
Intersection & Approach Description: Lloyd Avenue & Beaver Run/Proposed Driveway	
Analysis Period: 2023 Projected Conditions Design Hour: SAT Peak Intersection Control: Unsignalized Posted Speed Limit (MPH): 35 Type of Terrain: Level	Number of Approach Lanes: 1 Undivided or Divided Highway: Undivided <div style="border: 1px solid red; padding: 2px; display: inline-block; color: red;">Type of Analysis</div> Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	10	2.0%	N/A
	Through	-	260	0.0%	N/A
	Right	Yes	9	0.0%	N/A
Opposing	Left	Yes	3	0.0%	N/A
	Through	-	224	0.0%	N/A
	Right	Yes	4	2.0%	N/A
Advancing Volume: N/A Opposing Volume: N/A Left Turn Volume: N/A % Left Turns in Advancing Volume: N/A					
Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	3	0.0%	N/A
	Through	-	224	0.0%	224
	Right	-	4	2.0%	5
Advancing Volume: 229 Right Turn Volume: 5					

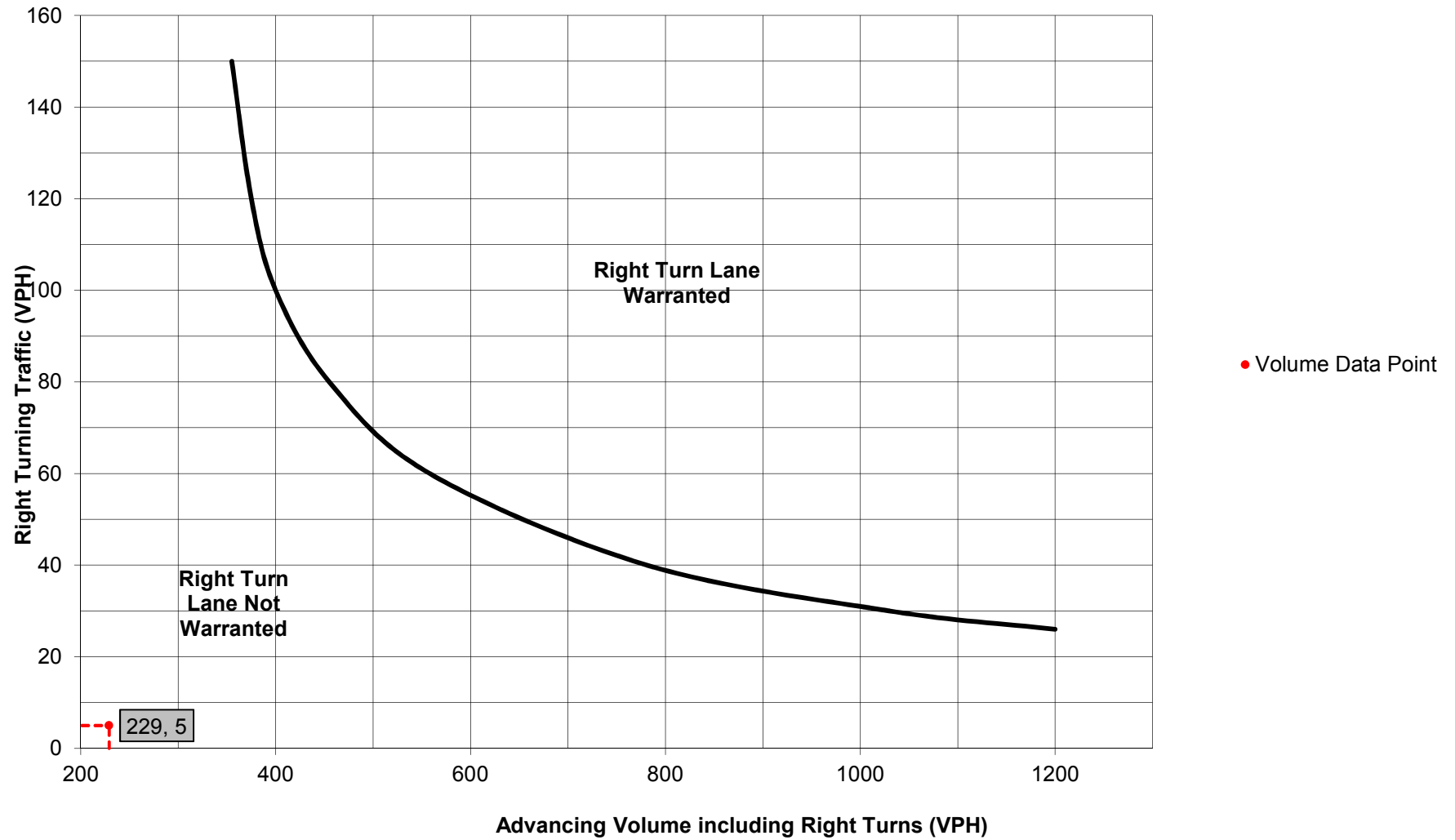
TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A Warrant Met?: N/A	Applicable Warrant Figure: Figure 9 Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized Design Hour Volume of Turning Lane: 5 Cycles Per Hour (Assumed): 60 Cycles Per Hour (If Known): 60	Average # of Vehicles/Cycle: N/A																																								
PennDOT Publication 46, Exhibit 11-6																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3">Type of Traffic Control</th> <th colspan="6">Speed (MPH)</th> </tr> <tr> <th colspan="2">25-35</th> <th colspan="2">40-45</th> <th colspan="2">50-60</th> </tr> <tr> <th colspan="6">Turn Demand Volume</th> </tr> <tr> <th></th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> <th>High</th> <th>Low</th> </tr> </thead> <tbody> <tr> <td>Signalized</td> <td>A</td> <td>A</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> <td>B or C</td> </tr> <tr> <td>Unsignalized</td> <td>A</td> <td>A</td> <td>C</td> <td>B</td> <td>B or C</td> <td>B</td> </tr> </tbody> </table>		Type of Traffic Control	Speed (MPH)						25-35		40-45		50-60		Turn Demand Volume							High	Low	High	Low	High	Low	Signalized	A	A	B or C	B or C	B or C	B or C	Unsignalized	A	A	C	B	B or C	B
Type of Traffic Control	Speed (MPH)																																								
	25-35		40-45		50-60																																				
	Turn Demand Volume																																								
	High	Low	High	Low	High	Low																																			
Signalized	A	A	B or C	B or C	B or C	B or C																																			
Unsignalized	A	A	C	B	B or C	B																																			
Right Turn Lane Storage Length, Condition A: N/A Feet Condition B: N/A Feet Condition C: N/A Feet Required Right Turn Lane Storage Length: N/A Feet																																									
Additional Findings: N/A																																									
Additional Comments / Justifications: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																																									

**Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)**



APPENDIX N

SIGNAL WARRANT ANALYSIS

EB/WB MANOR AVE (MAJOR) & NB RAMPS (MINOR)
2023 PROJECTED

STUDY AND ANALYSIS INFORMATION

Municipality: Caln Township
 County: Chester County
 PennDOT Engineering District: 6

Analysis Date: 10/30/2018
 Conducted By: mb
 Agency/Company Name: TPD

Analysis Information

Data Collection Date: 12/19/2017
 Day of the Week: Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number: Manor Avenue (S.R. 0322)
 Major Street Approach #1 Direction: E-Bound
 Major Street Approach #2 Direction: W-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach: 1 LANE(S)
 Speed Limit or 85th Percentile Speed on the Major Street: 45 MPH

Minor Street Information

Minor Street Name and Route Number: EB Route 30 Ramps
 Minor Street Approach #1 Direction: N-Bound
 Minor Street Approach #2 Direction:

Number of Lanes for Moving Traffic on Each Minor Street Approach: 1 LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	Yes	No
Warrant 3, Peak Hour	Yes	No
Warrant 4, Pedestrian Volume	No	N/A
Warrant 5, School Crossing	No	N/A
Warrant 6, Coordinated Signal System	No	N/A
Warrant 7, Crash Experience	Yes	No
Warrant 8, Roadway Network	No	N/A
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	No	N/A
Warrant PA-2, Midblock and Trail Crossings	No	N/A

Traffic Signal Warrant Analysis Workbook

10/30/2018

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (E-Bound)	Major Street Approach #2 (W-Bound)	Major Street Combined	Minor Street Approach #1 (N-Bound)	Minor Street Approach #2 (S-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM	839	624	1463	14	
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM			0		
8:00 AM	8:14 AM	599	696	1295	14	
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM			0		
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM	657	786	1443	29	
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		

Traffic Signal Warrant Analysis Workbook

10/30/2018

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (E-Bound)	Major Street Approach #2 (W-Bound)	Major Street Combined	Minor Street Approach #1 (N-Bound)	Minor Street Approach #2 (S-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM	657	770	1427	17	
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM	658	1008	1666	21	
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM			0		
5:00 PM	5:14 PM	644	998	1642	34	
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM			0		
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		4054	4882	8936	129	0

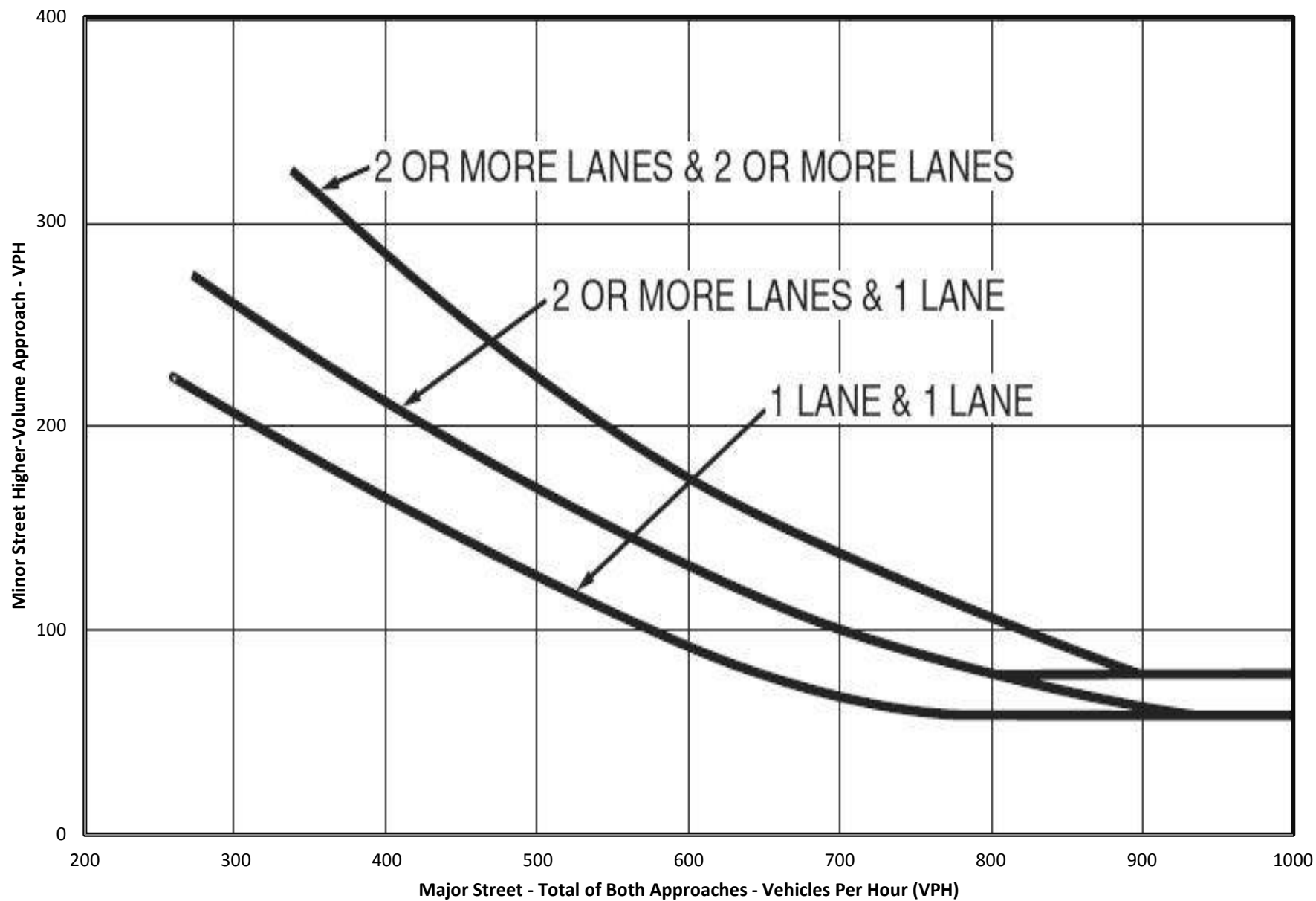
MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach		Total Number of Unique Hours Met On Figure 4C-2
Major Street:	1 Lane	0
Minor Street:	1 Lane	

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes
---	-----

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	1463	14	
6:30 AM	1463	14	
6:45 AM	1463	14	
7:00 AM	1463	14	
7:15 AM	1295	14	
7:30 AM	1295	14	
7:45 AM	1295	14	
8:00 AM	1295	14	
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	1443	29	
10:30 AM	1443	29	
10:45 AM	1443	29	
11:00 AM	1443	29	
11:15 AM	1427	17	
11:30 AM	1427	17	
11:45 AM	1427	17	

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 PM	1427	17	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	1666	21	
3:30 PM	1666	21	
3:45 PM	1666	21	
4:00 PM	1666	21	
4:15 PM	1642	34	
4:30 PM	1642	34	
4:45 PM	1642	34	
5:00 PM	1642	34	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes
---	-----

Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?

Yes

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*

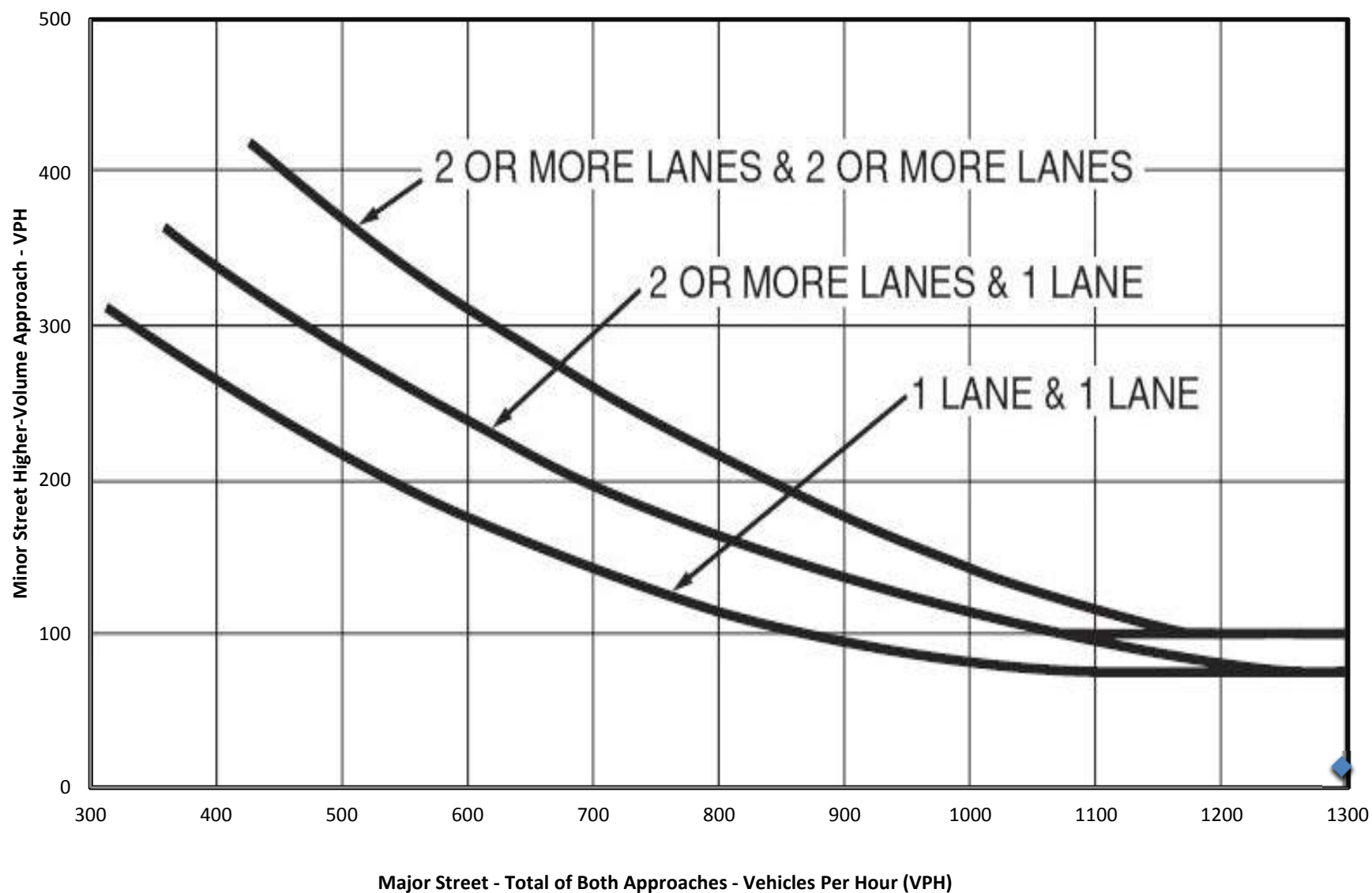
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	No
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes

**If applicable, attach all supporting calculations and documentation.*

Total Number of Unique Hours Met On Figure 4C-4
0

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	1463	14	
6:30 AM	1463	14	
6:45 AM	1463	14	
7:00 AM	1463	14	
7:15 AM	1295	14	
7:30 AM	1295	14	
7:45 AM	1295	14	
8:00 AM	1295	14	
8:15 AM	0	0	

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	1443	29	
10:30 AM	1443	29	
10:45 AM	1443	29	
11:00 AM	1443	29	
11:15 AM	1427	17	
11:30 AM	1427	17	
11:45 AM	1427	17	
12:00 PM	1427	17	
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	1666	21	
3:30 PM	1666	21	
3:45 PM	1666	21	
4:00 PM	1666	21	
4:15 PM	1642	34	
4:30 PM	1642	34	
4:45 PM	1642	34	
5:00 PM	1642	34	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

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

MUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000
Population or Above 40 MPH on Major Street?

Yes

Number of Lanes for Moving Traffic on Each
Approach

Major Street: 1 Lane

Minor Street: 1 Lane

Has adequate trial of alternatives with satisfactory observance and enforcement failed to reduce the crash frequency?

No

Five or more reportable and/or non-reportable crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period during the most recent 3 years of available crash data.*

No

**If applicable, attach a summary of the crash data analysis used for this criterion.*

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.

No

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.

No

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.*

No

**If applicable, attach all supporting calculations and documentation.*

MUTCD WARRANT 8, ROADWAY NETWORK*

Is the major street classified as an Urban Extension, Principal Arterial, or Minor Arterial that is a reasonable connection between two Principal Arterials and/or Urban Extensions as shown on the official Functional Classification Map?

No

Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1,2, and 3 during an average weekday?

No

Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?

No

Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow?

No

Does the major street include rural or suburban highways outside, entering, or traversing a city?

No

Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?

No

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

EB MANOR AVE (MAJOR) & WBL MANOR AVE (MINOR)
2018 EXISTING

STUDY AND ANALYSIS INFORMATION

Municipality: Caln Township
 County: Chester County
 PennDOT Engineering District: 6

Analysis Date: 2/2/2018
 Conducted By: mb
 Agency/Company Name: TPD

Analysis Information

Data Collection Date: 12/19/2017
 Day of the Week: Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number: Manor Avenue (S.R. 0322)

Major Street Approach #1 Direction: E-Bound

Major Street Approach #2 Direction: W-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach: 1 LANE(S)
 Speed Limit or 85th Percentile Speed on the Major Street: 45 MPH

Minor Street Information

Minor Street Name and Route Number: EB Route 30 Ramps

Minor Street Approach #1 Direction: N-Bound

Minor Street Approach #2 Direction:

Number of Lanes for Moving Traffic on Each Minor Street Approach: 1 LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	Yes	Yes
Warrant 3, Peak Hour	Yes	Yes
Warrant 4, Pedestrian Volume	No	N/A
Warrant 5, School Crossing	No	N/A
Warrant 6, Coordinated Signal System	No	N/A
Warrant 7, Crash Experience	Yes	No
Warrant 8, Roadway Network	No	N/A
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	No	N/A
Warrant PA-2, Midblock and Trail Crossings	No	N/A

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (E-Bound)	Major Street Approach #2 (W-Bound)	Major Street Combined	Minor Street Approach #1 (N-Bound)	Minor Street Approach #2 (S-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM	710		710	273	
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM			0		
8:00 AM	8:14 AM	509		509	270	
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM			0		
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM	520		520	223	
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		

Traffic Signal Warrant Analysis Workbook

2/2/2018

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (E-Bound)	Major Street Approach #2 (W-Bound)	Major Street Combined	Minor Street Approach #1 (N-Bound)	Minor Street Approach #2 (S-Bound)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 PM	12:14 PM	520		520	210	
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM	554		554	198	
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM			0		
5:00 PM	5:14 PM	545		545	191	
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM			0		
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		3358	0	3358	1365	0

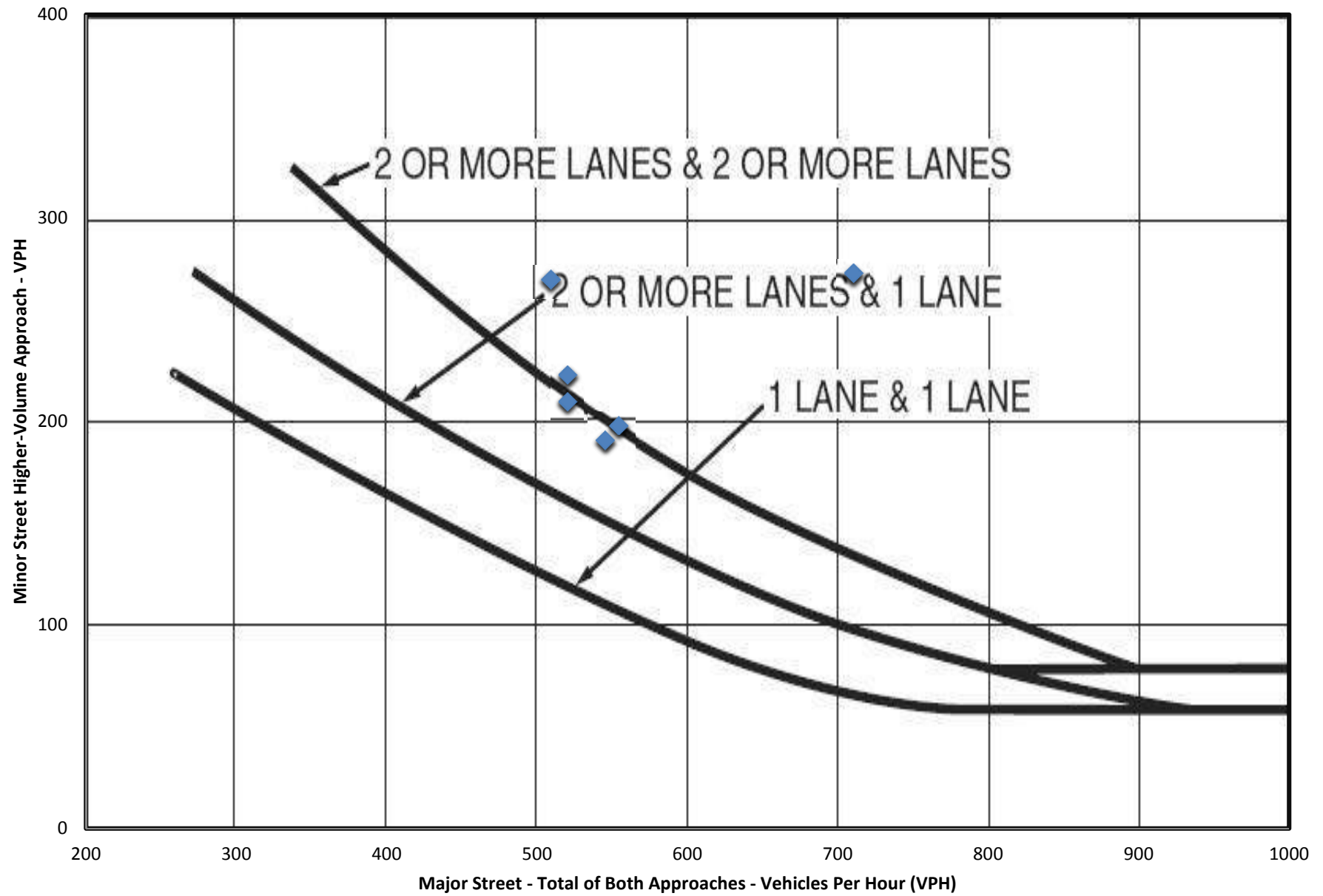
MUTCD WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

Number of Lanes for Moving Traffic on Each Approach		Total Number of Unique Hours Met On Figure 4C-2
Major Street:	1 Lane	6
Minor Street:	1 Lane	

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes
---	-----

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	710	273	Met
6:30 AM	710	273	Met
6:45 AM	710	273	Met
7:00 AM	710	273	Met
7:15 AM	509	270	Met
7:30 AM	509	270	Met
7:45 AM	509	270	Met
8:00 AM	509	270	Met
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	520	223	Met
10:30 AM	520	223	Met
10:45 AM	520	223	Met
11:00 AM	520	223	Met
11:15 AM	520	210	Met
11:30 AM	520	210	Met
11:45 AM	520	210	Met

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 PM	520	210	Met
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	554	198	Met
3:30 PM	554	198	Met
3:45 PM	554	198	Met
4:00 PM	554	198	Met
4:15 PM	545	191	Met
4:30 PM	545	191	Met
4:45 PM	545	191	Met
5:00 PM	545	191	Met
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	1 Lane
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	Yes
---	-----

Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?

Yes

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*

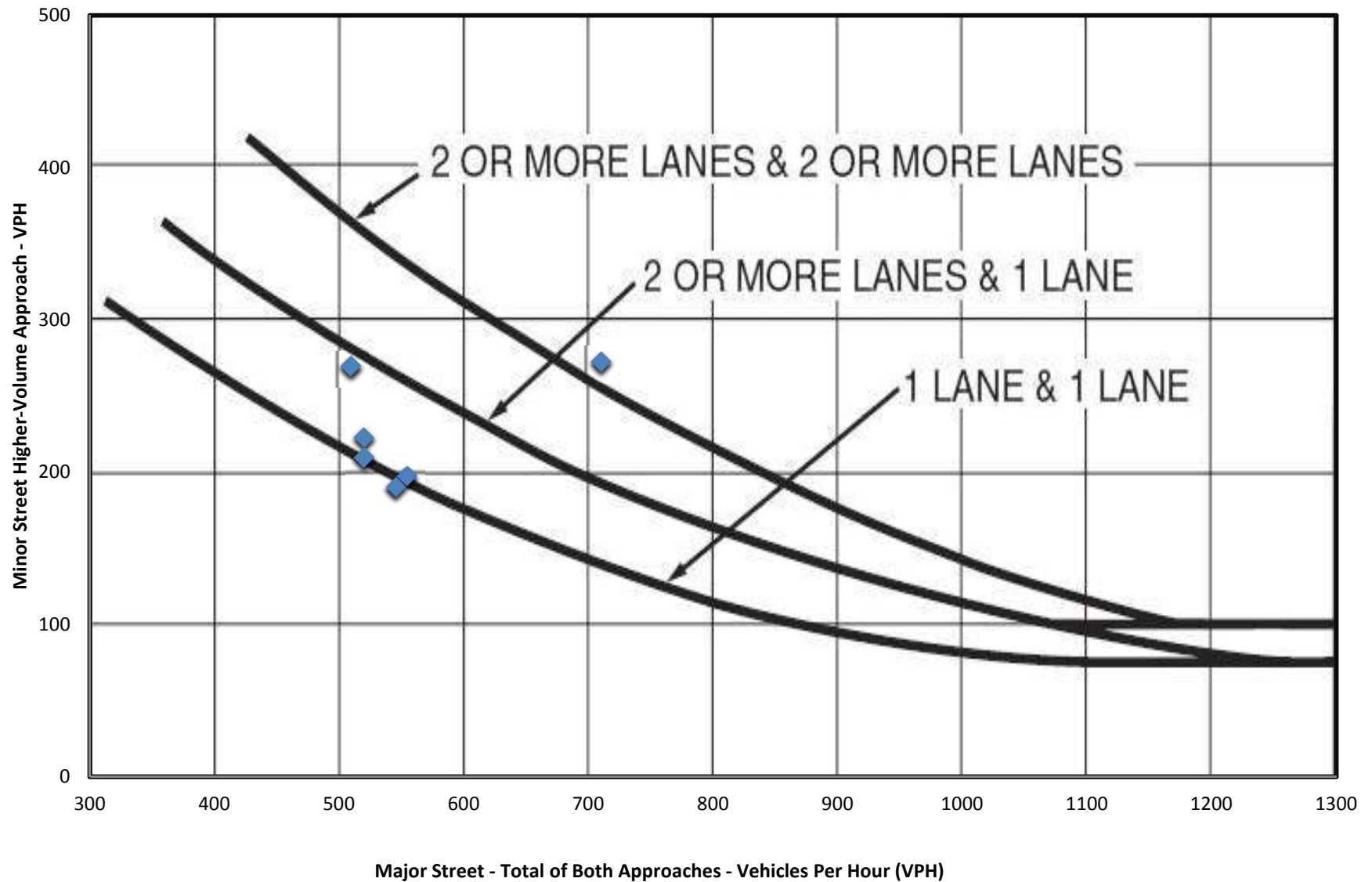
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	No
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes

*If applicable, attach all supporting calculations and documentation.

Total Number of Unique Hours Met On Figure 4C-4
5

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	710	273	Met
6:30 AM	710	273	Met
6:45 AM	710	273	Met
7:00 AM	710	273	Met
7:15 AM	509	270	Met
7:30 AM	509	270	Met
7:45 AM	509	270	Met
8:00 AM	509	270	Met
8:15 AM	0	0	

Hourly Vehicular Volume			
Hour Interval	Major Street Combined	Highest Minor Street Approach	Hour Met?
Beginning At	Vehicles Per Hour (VPH)	Vehicles Per Hour (VPH)	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
9:15 AM	0	0	
9:30 AM	0	0	
9:45 AM	0	0	
10:00 AM	0	0	
10:15 AM	520	223	Met
10:30 AM	520	223	Met
10:45 AM	520	223	Met
11:00 AM	520	223	Met
11:15 AM	520	210	Met
11:30 AM	520	210	Met
11:45 AM	520	210	Met
12:00 PM	520	210	Met
12:15 PM	0	0	
12:30 PM	0	0	
12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	554	198	Met
3:30 PM	554	198	Met
3:45 PM	554	198	Met
4:00 PM	554	198	Met
4:15 PM	545	191	
4:30 PM	545	191	
4:45 PM	545	191	
5:00 PM	545	191	
5:15 PM	0	0	
5:30 PM	0	0	
5:45 PM	0	0	
6:00 PM	0	0	
6:15 PM	0	0	
6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
7:15 PM	0	0	
7:30 PM	0	0	
7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

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

MUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000
Population or Above 40 MPH on Major Street?

Yes

Number of Lanes for Moving Traffic on Each
Approach

Major Street: 1 Lane

Minor Street: 1 Lane

Has adequate trial of alternatives with satisfactory observance and enforcement failed to reduce the crash frequency?

No

Five or more reportable and/or non-reportable crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period during the most recent 3 years of available crash data.*

No

**If applicable, attach a summary of the crash data analysis used for this criterion.*

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.

No

For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.

No

The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.*

No

**If applicable, attach all supporting calculations and documentation.*

MUTCD WARRANT 8, ROADWAY NETWORK*

Is the major street classified as an Urban Extension, Principal Arterial, or Minor Arterial that is a reasonable connection between two Principal Arterials and/or Urban Extensions as shown on the official Functional Classification Map?

No

Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1,2, and 3 during an average weekday?

No

Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?

No

Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow?

No

Does the major street include rural or suburban highways outside, entering, or traversing a city?

No

Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?

No

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

APPENDIX O

WEAVE ANALYSIS

TRAFFIC PLANNING

AND DESIGN, INC.



Caln Royal Farms

Transportation Impact Study

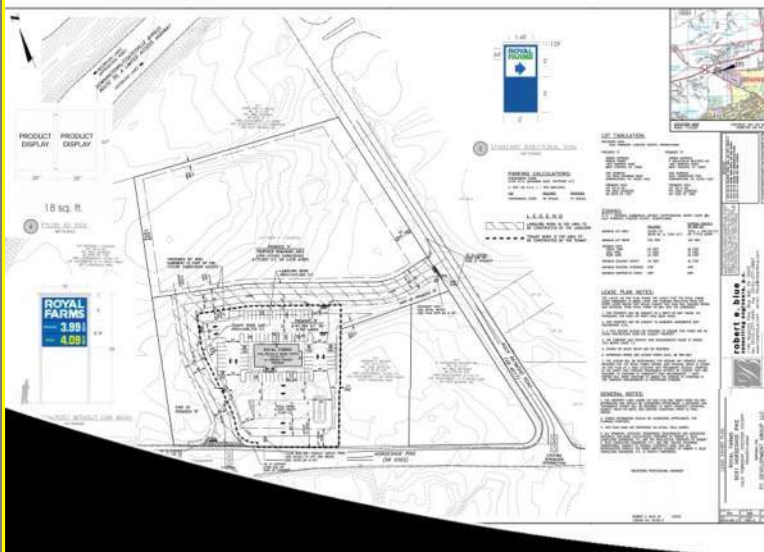
Caln Township, Chester County

For Submission To:

PennDOT District 6-0 & Caln Township

January 9, 2015 (Last Revised: November 20, 2015)

TPD# FCDG.A.00003



CALN ROYAL FARMS TRANSPORTATION IMPACT STUDY

For Submission to:

**Caln Township, Chester County, PA
& PennDOT District 6-0**

Prepared For:

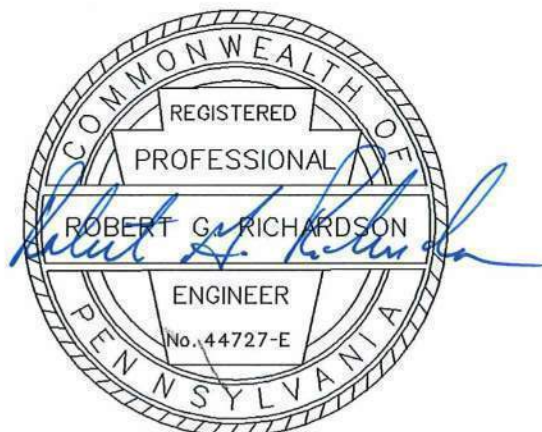
**Mr. Carl Freedman
Caln Horseshoe, L.P.
201A Berlin Road
Cherry Hill, NJ 08034**

**January 9, 2015
(Last Revised November 20,
2015)
TPD # FCDG.A.00003**

Prepared By:

**Traffic Planning and Design, Inc.
Sanatoga Commons
2500 East High Street, Suite 650
Pottstown, Pennsylvania 19464**

**Phone: (610) 326-3100
Fax: (610) 326-9410
E-mail: TPD@TrafficPD.com
Web Site: www.trafficpd.com**



**Robert G. Richardson, P.E.
Senior Vice President
Pennsylvania License No. 044727-E**



- Route 322 & Rock Raymond Road – Widen WB Route 322 to provide an additional through/right lane. Shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & Lloyd Avenue/Proposed Driveway – Widen WB Route 322 to provide an additional through/right lane in lieu of the proposed right-turn lane into the proposed site. Widen EB Route 322 to provide an additional through/right lane in lieu of the existing right-turn lane onto Lloyd Avenue. Shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & WB Route 30 Ramps – In addition to the roadway improvements assumed under base conditions of this TIS (Signalization and Restriping), shorten the existing cycle lengths during the AM and PM peak hours to 75-80 seconds.
- Route 322 & EB Route 30 Ramps – Provide signalization with shortened cycle lengths during the AM and PM peak hours of 75-80 seconds. Restripe the existing Route 322 cross-section to revert to two lanes in the EB and WB directions of Route 322 (shared EB thru/right and shared WB left/thru).

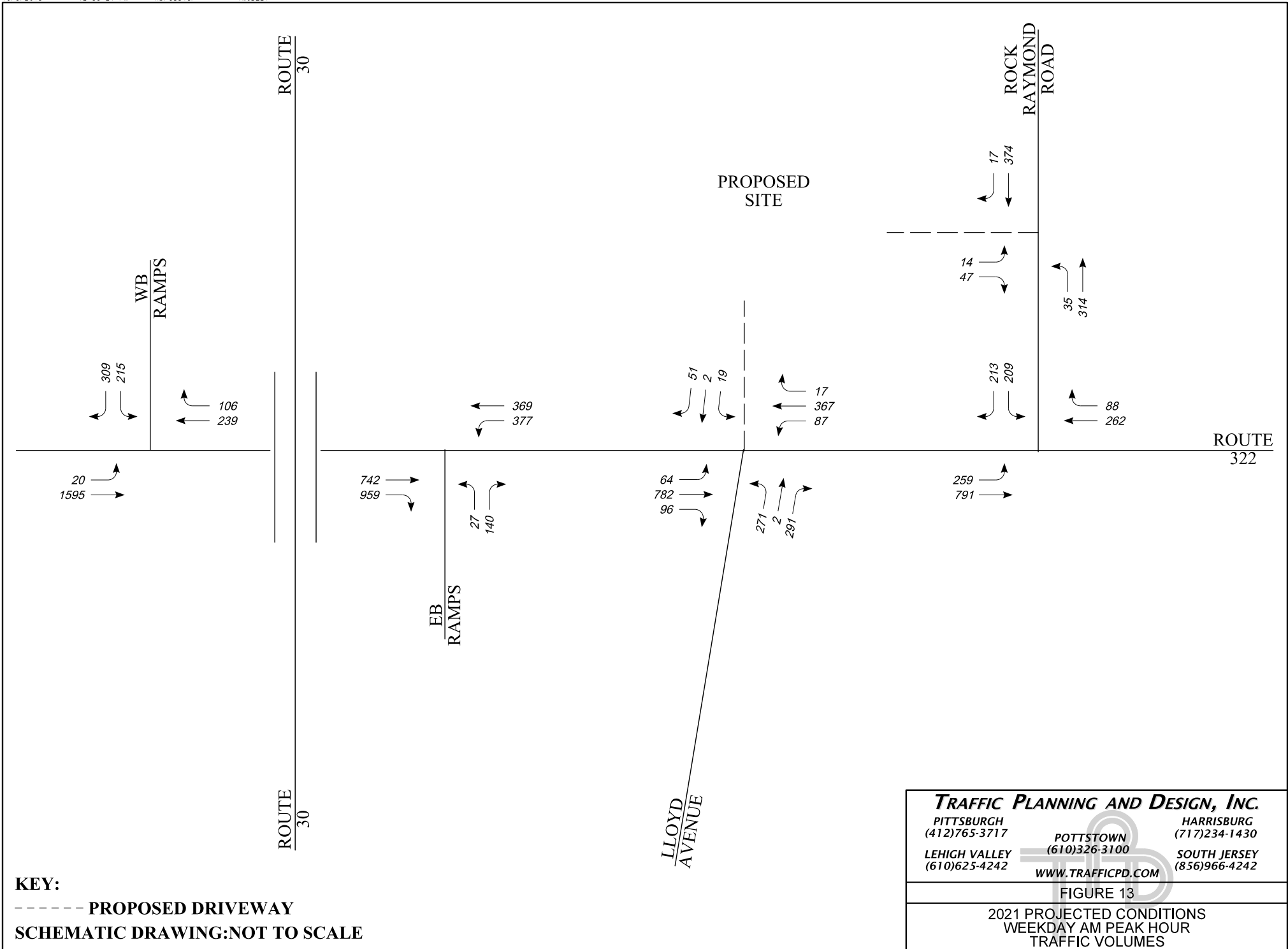
This list is being provided at the request of the Township, for informational purposes only.

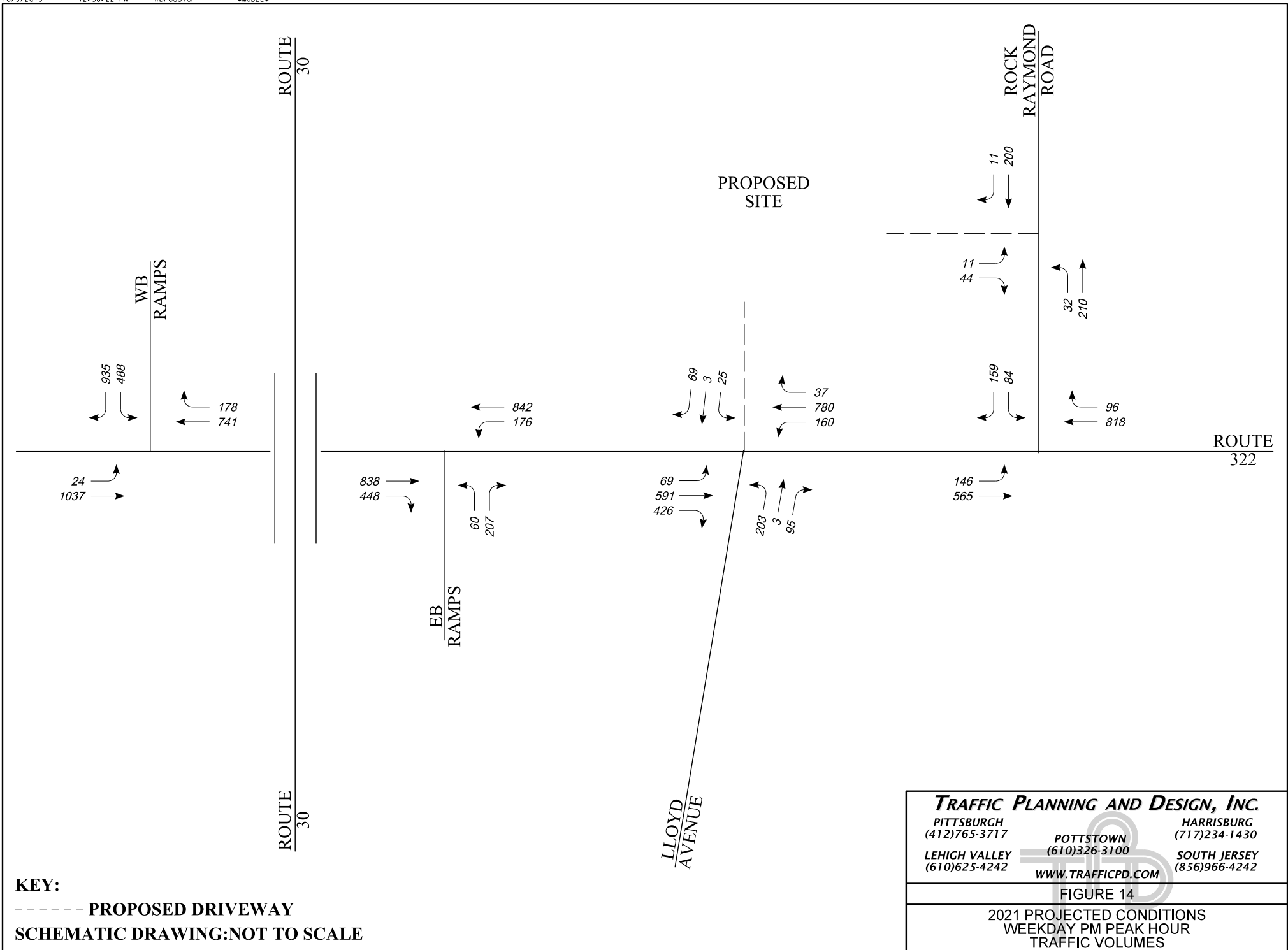
Weave Analysis

TPD prepared a weave analysis utilizing HCM 2010 for the EB Route 30 Off Ramp movements and the SB Route 322 movements. This analysis assumed the off ramp at the existing location, as well as a second location further west as part of future development, closer to where the left-turn from the EB Route 30 Off Ramp accesses Route 322. This second condition assumes potential modification of the off ramp in the future. These analyses are also included in **Appendix G**.

95TH PERCENTILE QUEUE ANALYSIS

Queue analyses were conducted at the signalized study area intersection using *Synchro 8* software. For this analysis, the 95th percentile queue is defined as the queue length that is exceeded in 5% of the signal cycles. As an example, for a signal with a 90-second cycle, this means that the 95th percentile queue length will be exceeded during 2 of the 40 signal cycles that occur during the peak hour. The queue analysis results are summarized in **Table 11** for the analyzed peak hours.





APPENDIX G

CAPACITY ANALYSES

WEAVE ANALYSIS

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	MB				Freeway/Dir of Travel		EB		
Agency/Company	TPD				Weaving Segment Location		Route 322		
Date Performed	3/3/2015				Analysis Year		2021 Projected - Existing		
Analysis Time Period	WEEKDAY AM								
Project Description FCDG.A.00003									
Inputs									
Weaving configuration					C-D Roadway/				
Weaving number of lanes, N					Multilane				
Weaving segment length, L _S					Highways				
Freeway free-flow speed, FFS					15				
					1800				
					Level				
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E _T	E _R	f _{HV}	f _p	v (pc/h)
V _{FF}	712	0.90	7	0	1.5	1.2	0.966	1.00	819
V _{RF}	134	0.90	2	0	1.5	1.2	0.990	1.00	150
V _{FR}	81	0.90	4	0	1.5	1.2	0.980	1.00	92
V _{RR}	15	0.90	4	0	1.5	1.2	0.980	1.00	17
V _{NW}	836							V =	1042
V _W	242								
VR	0.224								
Configuration Characteristics									
Minimum maneuver lanes, N _{WL}					392 lc/h				
Interchange density, ID					392 lc/h				
Minimum RF lane changes, LC _{RF}					0 lc/h				
Minimum FR lane changes, LC _{FR}					392 lc/h				
Minimum RR lane changes, LC _{RR}					25				
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v					0.279				
Weaving segment capacity, c _w					39.3 mph				
Weaving segment v/c ratio					38.5 mph				
Weaving segment density, D					39.6 mph				
Level of Service, LOS					4788 ft				
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	MB				Freeway/Dir of Travel	EB			
Agency/Company	TPD				Weaving Segment Location	Route 322			
Date Performed	3/3/2015				Analysis Year	2021 Projected - Relocated			
Analysis Time Period	WEEKDAY AM								
Project Description FCDG.A.00003									
Inputs									
Weaving configuration	One-Sided				Segment type	C-D Roadway/			
Weaving number of lanes, N	2					Multilane			
Weaving segment length, L_S	440ft					Highways			
Freeway free-flow speed, FFS	45 mph				Freeway minimum speed, S_{MIN}	15			
					Freeway maximum capacity, C_{IFL}	1800			
					Terrain type	Level			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	712	0.90	7	0	1.5	1.2	0.966	1.00	819
V_{RF}	134	0.90	2	0	1.5	1.2	0.990	1.00	150
V_{FR}	81	0.90	4	0	1.5	1.2	0.980	1.00	92
V_{RR}	15	0.90	4	0	1.5	1.2	0.980	1.00	17
V_{NW}	836							V =	1042
V_W	242								
VR	0.224								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	392 lc/h			
Interchange density, ID	1.0 int/mi				Weaving lane changes, LC_W	424 lc/h			
Minimum RF lane changes, LC_{RF}	2 lc/pc				Non-weaving lane changes, LC_{NW}	25 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	449 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	37			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	1042 veh/h				Weaving intensity factor, W	0.230			
Weaving segment capacity, c_w	2835 veh/h				Weaving segment speed, S	39.5 mph			
Weaving segment v/c ratio	0.367				Average weaving speed, S_W	39.4 mph			
Weaving segment density, D	13.6 pc/mi/ln				Average non-weaving speed, S_{NW}	39.6 mph			
Level of Service, LOS	B				Maximum weaving length, L_{MAX}	4788 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	MB				Freeway/Dir of Travel	EB			
Agency/Company	TPD				Weaving Segment Location	Route 322			
Date Performed	3/3/2015				Analysis Year	2021 Projected - Existing			
Analysis Time Period	WEEKDAY PM								
Project Description FCDG.A.00003									
Inputs									
Weaving configuration	One-Sided				Segment type	C-D Roadway/			
Weaving number of lanes, N	2					Multilane			
Weaving segment length, L_S	300ft					Highways			
Freeway free-flow speed, FFS	45 mph				Freeway minimum speed, S_{MIN}	15			
					Freeway maximum capacity, C_{IFL}	1800			
					Terrain type	Level			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	529	0.95	3	0	1.5	1.2	0.985	1.00	565
V_{RF}	131	0.95	2	0	1.5	1.2	0.990	1.00	139
V_{FR}	342	0.95	1	0	1.5	1.2	0.995	1.00	362
V_{RR}	84	0.94	1	0	1.5	1.2	0.995	1.00	90
V_{NW}	655							V =	1139
V_W	501								
VR	0.433								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	640 lc/h			
Interchange density, ID	1.0 int/mi				Weaving lane changes, LC_W	640 lc/h			
Minimum RF lane changes, LC_{RF}	2 lc/pc				Non-weaving lane changes, LC_{NW}	0 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	640 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	20			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	1139 veh/h				Weaving intensity factor, W	0.411			
Weaving segment capacity, c_w	2528 veh/h				Weaving segment speed, S	37.0 mph			
Weaving segment v/c ratio	0.451				Average weaving speed, S_W	36.3 mph			
Weaving segment density, D	15.6 pc/mi/ln				Average non-weaving speed, S_{NW}	37.6 mph			
Level of Service, LOS	B				Maximum weaving length, L_{MAX}	7058 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									

FREEWAY WEAVING WORKSHEET									
General Information					Site Information				
Analyst	MB				Freeway/Dir of Travel	EB			
Agency/Company	TPD				Weaving Segment Location	Route 322			
Date Performed	3/3/2015				Analysis Year	2021 Projected - Existing			
Analysis Time Period	WEEKDAY PM								
Project Description FCDG.A.00003									
Inputs									
Weaving configuration	One-Sided				Segment type	C-D Roadway/			
Weaving number of lanes, N	2					Multilane			
Weaving segment length, L_S	440ft					Highways			
Freeway free-flow speed, FFS	45 mph				Freeway minimum speed, S_{MIN}	15			
					Freeway maximum capacity, C_{IFL}	1800			
					Terrain type	Level			
Conversions to pc/h Under Base Conditions									
	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	529	0.95	3	0	1.5	1.2	0.985	1.00	565
V_{RF}	131	0.95	2	0	1.5	1.2	0.990	1.00	139
V_{FR}	342	0.95	1	0	1.5	1.2	0.995	1.00	362
V_{RR}	84	0.94	1	0	1.5	1.2	0.995	1.00	90
V_{NW}	655							V =	1139
V_W	501								
VR	0.433								
Configuration Characteristics									
Minimum maneuver lanes, N_{WL}	2 lc				Minimum weaving lane changes, LC_{MIN}	640 lc/h			
Interchange density, ID	1.0 int/mi				Weaving lane changes, LC_W	672 lc/h			
Minimum RF lane changes, LC_{RF}	2 lc/pc				Non-weaving lane changes, LC_{NW}	0 lc/h			
Minimum FR lane changes, LC_{FR}	1 lc/pc				Total lane changes, LC_{ALL}	672 lc/h			
Minimum RR lane changes, LC_{RR}	lc/pc				Non-weaving vehicle index, I_{NW}	29			
Weaving Segment Speed, Density, Level of Service, and Capacity									
Weaving segment flow rate, v	1139 veh/h				Weaving intensity factor, W	0.316			
Weaving segment capacity, c_w	2550 veh/h				Weaving segment speed, S	37.7 mph			
Weaving segment v/c ratio	0.447				Average weaving speed, S_W	37.8 mph			
Weaving segment density, D	15.3 pc/mi/ln				Average non-weaving speed, S_{NW}	37.6 mph			
Level of Service, LOS	B				Maximum weaving length, L_{MAX}	7058 ft			
Notes									
a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".									
b. For volumes that exceed the weaving segment capacity, the level of service is "F".									