



30 March 2020

Devin Tuohey
The Concordia Group
161 Leverington Avenue, SU 101
Philadelphia, PA 19127

VIA EMAIL ONLY

**RE: Traffic Engineering Investigations of
Eastern University West Campus Parking Lot
Radnor-Street Rd 20-unit Residential SFDU Site,
Radnor Township, Delaware County, PA**

FTA Job #220-006

Dear Mr. Tuohey:

Per recent email exchanges, F. Tavani and Associates, Inc. (FTA) has conducted traffic engineering investigations for the above-referenced project in Wayne. This report has been prepared in accordance with Radnor code requirements and follows the recommended outline as identified in said ordinance¹.

GENERAL SITE DESCRIPTION

This study considers the traffic impact of a proposed single family detached community of 20 units. The housing is proposed to be for sale and will feature a mix of 4 and 5 bedrooms. The housing is proposed to be market-rate and not age-restricted. The process of entitlements, construction, and occupancy (sale) of all 20 units is expected to take 2-4 years. The site is immediately surrounded by other residential properties and, beyond them, there is a mix of recreational (Cowan Park, Fenimore Woods Park) and institutional (Valley Forge Military Academy & College, Eastern University, Cabrini College) uses within a 1 mile radius of the site. Mass transit opportunities are also within a short distance of the site.

The site is located on the east side of Radnor Street Road, north of Walnut Road and presently features 14 single family detached homes – approximately 11 of which are occupied – plus a large off street parking lot known as the Eastern University West Campus Parking Lot.

The site location and surrounding area are presented in figures which are attached to the end of this report, namely **Figure 1** and **Figure 2**. A portion of a recent site plan is featured in **Figure 3**. There are no other known approved land development projects in the immediate vicinity of the site.

Several technical appendices are provided following the figures. **Appendix A** includes correspondence with Eastern University confirming normal class activities during data collection². Photodocumentation of the study area / surrounding intersections is provided in **Appendix B**.

¹ 255-20(B)(5) was followed even though it clearly outlines that a traffic study is not required for a development of this size.

² The data collection for this project was conducted before the Pennsylvania Governor declared that all schools in neighboring Montgomery County were to be closed for 2 weeks. This order began on Friday, 13 March 2020. Traffic counts were conducted on Tuesday, 10 March 2020 as further detailed on the next page as well as **Appendix A**.

TRANSPORTATION FACILITIES DESCRIPTION

The site is surrounded on all sides by existing, two-way, one-lane-per-direction, public roadways. The roadways closest to the site generally do not feature on-street public parking, though Beechtree Lane is an exception (it features on-street parking). Posted speed limit signs are present in the vicinity of the site along all streets and all are posted with 25 mph speed limits. There are limited sidewalk facilities in the study area. Major intersections closest to the site are all-way stop-controlled intersections with no painted crosswalks. There are existing SEPTA mass transit opportunities near the site: the SEPTA Paoli Thorndale Regional Rail line Wayne Station is within 0.50 miles of the site; the SEPTA Route 106 bus line is within 0.70 miles of the site. One traffic signal exists in the vicinity of the site, namely the signalized intersection of Radnor Street Road and Eagle Road. This intersection is four-legged and features one-lane approaches and pretimed, uncoordinated signal operation. More site driveway and surrounding intersection details can be seen in the photodocumentation provided in **Appendix B**.

The site as proposed has 20 fully detached single family home units, 12 of which are proposed to take access to Radnor Street Road via a proposed cul-de-sac which will be located opposite Beechtree Lane. The remaining 8 units will take direct driveway access to Walnut Avenue (5 homes), Radnor Street Road (2 homes), or Eagle Road (1 home). All homes will feature garage/driveway parking plus undefined visitor parking along the proposed cul-de-sac. New sidewalks are also proposed along the cul-de-sac, along Radnor Street Road, and along Walnut Avenue.

There are no known planned roadway improvements in the vicinity of the site. Only one of the streets surrounding the site is an “SR” (state roadway) – namely Eagle Road (SR 1042). It has an average daily traffic count of approximately 6,800 vehicles per day. More information is provided in **Appendix C**. All other streets are local roadways.

EXISTING TRAFFIC CONDITIONS

FTA conducted traffic counts at the intersections of:

- Radnor Street Road and Eagle Road,
- Radnor Street Road and Beechtree Lane/existing shared driveway,
- Radnor Street Road and existing parking lot driveway,
- Radnor Street Road and Walnut Avenue, and
- Walnut Avenue and Paul Road / Chamounix Road.

The counts were conducted on Tuesday, 10 March 2020 from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. The counts were conducted during the school year, in fair weather, on a typical weekday, and before COVID-19 healthcare concerns affected work or school schedules. Existing peak hours of 7:45 AM to 8:45 AM and 4:45 PM to 5:45 PM were the respective peak hours at 4 of the 5 count locations. Walnut Avenue and Paul Road / Chamounix Road had peak hours which were 15 minutes earlier. All individual peak hour volumes were used for subsequent level of service investigations. The corresponding existing peak hour traffic volumes are plotted and seen in **Figure 4**. Raw traffic volumes are attached in **Appendix D**.

With existing peak hour volumes established, present-day “levels of service” can be assessed. Level of service (or LOS) is a descriptive mechanism which is employed by traffic engineers to relate quality of traffic flow to both a letter grade and estimate of delay in seconds per vehicle. LOS results are assessed for traffic which must stop or yield to other traffic. Free-flowing traffic theoretically has no delay, and therefore no LOS rating. Existing levels of service were determined using *Synchro version 10* software,

with HCS2010-format outputs selected for performance reporting purposes. A **LOS Comparison Matrix** was prepared and is attached to the end of this report. A **Queue Comparison Matrix** is also provided. The matrices summarize AM and PM peak hour performance for existing and future (see next section) conditions for all intersections. As shown, existing levels of service are all LOS A and B, with all calculated delays being very low (10 seconds or less in most cases – an acceptable condition). No congestion locations (LOS E/F) are noted.

TRANSPORTATION IMPACT OF THE DEVELOPMENT

Site traffic was estimated using the Institute of Transportation Engineers (ITE) publication, Trip Generation, 10th edition. ITE website trip generation outputs are attached and provided in **Appendix E**. Note that these trip generation rates are higher than the rates which are suggested in Ordinance 255 Attachment 4, which is also provided in **Appendix E** for comparison. Raw trip generation could have been modified to reflect how this site is located in a setting which is within walking distance of various employers as well as SEPTA rail and bus opportunities, yet no such multimodal credits were taken. Instead, *all* site traffic was assigned (trip distributed) to the surrounding roadway network in accordance with existing traffic patterns as well as an understanding of existing road network connectivity, current traffic/congestion patterns, and relative locations of major highway interchanges (Interstates 476, 76, 202, and 422 as well as Business Route 30).

The trip distribution model for the community is shown in **Figure 6** and the resultant assignment of new, site-generated, vehicular peak hour traffic is shown in **Figure 7**. A site trip generation summary table follows below:

**TABLE 1
 PROJECTED VEHICULAR TRIP GENERATION – 20 SFDUs**

AM PEAK HOUR			PM PEAK HOUR		
<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
5	14	19	14	8	22

Average daily site traffic was also calculated and determined to be approximately 226 trips for the proposed community. See **Appendix E** for more details.

Please note that the existing site presently features 14 single family detached homes – approximately 11 of which are occupied. The site as proposed will raze all of these homes and construct 20 new, fully-detached single family homes. Even though taking some trip generation adjustment for the existing homes would have been appropriate and justifiable (e.g., there are really only 9 net new homes), no such adjustment was made. Instead, the site was evaluated as if was presently vacant and unoccupied land. The result of such adjustment to actual density is to eliminate any benefit to the developer from existing traffic conditions and to increase the burden on the developer in creating a net neutral development. It should also be noted that of the 20 new homes, 12 are proposed to take access to Radnor Street Road via a proposed cul-de-sac which will be located opposite Beechtree Lane; the remaining units will taking direct driveway access to other streets, as shown on the plan. Accordingly, assigning traffic associated with only the 12 proposed homes that will actually take access through the cul-de-sac homes to the proposed cul-de-sac would have been appropriate and justifiable, but FTA placed the trip generation associated with all 20 proposed homes at the proposed cul-de-sac. By assigning the trip generation for all 20 proposed homes to the cul-de-sac, FTA has, again, produced the most conservative level of service

investigations for the subject intersection by over estimating the proposed traffic generation (in this instance, by 8 homes that will not take access through the cul-de-sac).

ANALYSIS OF TRANSPORTATION IMPACT

Future traffic conditions are a function of three components: (1) existing traffic volumes, (2) additional traffic due to general background growth as well as other known approved developments in the immediate proximity of the site, and (3) site traffic.

As mentioned earlier, there are no other known approved land development projects in the vicinity of the site. Regarding background growth, the currently promulgated background growth rate for Delaware County is 0.00% per year as reported by PennDOT. However, to be conservative, FTA increased traffic throughout the study area at a rate of 0.20% per year compounded for 5 years – a conservative estimate when compared with actual due diligence projections (see **Appendix E** for more details). The resultant projected future ‘no build’ (existing plus background growth only) peak hour volumes are shown in **Figure 5**. The related projected levels of service are once again shown in **LOS and Queue Comparison Matrices**. As shown projected ‘no build’ levels of service remain essentially the same as they are today, and are all LOS B or better.

The projected future ‘build’ (no build plus site traffic) peak hour volumes are shown in **Figure 8**. The related projected levels of service are shown in **LOS and Queue Comparison Matrices**. As shown projected ‘build’ levels of service once again remain essentially the same as they are today, and are all LOS B or better. The impact of site traffic is no added delay at most intersections/turning movements. In fact, the impact of site traffic never amounts to more than one added second of delay at any impacted turning movement, and this again is while taking no credits for multi-modalism, incorporating a higher-than-recommended background growth rate, and using very conservative trip generation assumptions. Even with all these conservative approaches, no congestion locations (LOS E/F) are noted.

No road improvements are necessary to offset the impact of added site traffic. The proposed site driveway will not feature traffic volumes which warrant the installation of a traffic signal. The acceptable operation of the site driveway (LOS A and B) in unsignalized state underscores this conclusion. Level of service worksheets are provided in **Appendix F** if further detailed review is desired.

AUXILIARY LANE ANALYSIS

The need for new auxiliary left- and right-turn lanes at the site driveway was investigated. Investigations were based on PennDOT Strike Off Letter 560-08-4 as well as PennDOT *Publication 46* Chapter 11 page 11-46 (“Turn Lane Warrants”) using PennDOT-provided worksheets, and focusing on the highest peak hour. Investigations conclude that new auxiliary left- and right-turn lanes are not warranted at the site driveway. This conclusion is reached without taking some trip generation adjustment for the existing homes (which would have been reasonable) and with the assignment of trip generation for all 20 homes placed at the proposed cul-de-sac as mentioned earlier (which is nearly double the amount of traffic which will actually be found at that location). More details are provided in **Appendix G**.

CONCLUSIONS

As mentioned earlier, **Comparison Matrices** are provided to afford a simple means to review and assess site traffic impact in the study area. In locations where levels of service are not forecasted to change from one scenario to the next (i.e., from Existing to No Build, or from No Build to Build), hyphens are used. As shown, there are many instances in which the impact of site traffic results in essentially no measurable

change in traffic performance and the underlying traffic performance is already acceptable, and with very low delays and non-problematic queues.

Other key conclusions are as follows:

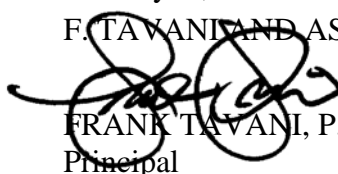
- The study area is presently served by transit opportunities.
- There are no streets or intersections operating below LOS C under existing or future conditions.
- The site driveway is forecasted to operate at LOS A/B during both peak hours, and for all turning movements.
- The site driveway does not require new left-turn or right-turn auxiliary lanes per investigations using standard PennDOT tools.
- The foregoing conclusions were reached:
 - taking no credits for walking or transit,
 - taking no credits for 11 existing occupied homes on the site,
 - incorporating a higher-than-recommended background growth rate for 5 years, and
 - incorporating the trip generation for all 20 homes at the proposed cul-de-sac (though only 12 will utilize this access).

all of which combines to produce considerable conservative measure in the preceding analyses.

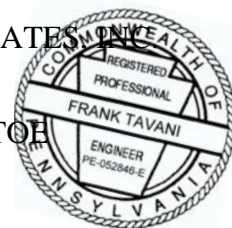
I hope this has been helpful. Please let me know if I can answer any questions.

Thank you,

F. TAVANI AND ASSOCIATES, INC.



FRANK TAVANI, P.E., PTOE
Principal



attachments

cc: David Falcone, Esq.

**LEVEL OF SERVICE AND EXPECTED DELAY
FOR SIGNALIZED INTERSECTIONS***

<u>LEVEL OF SERVICE</u>	<u>DESCRIPTION</u>	<u>CONTROL DELAY PER VEHICLE (IN SECONDS)</u>
A	Very short delay, good progression; most vehicles do not stop at intersection.	≤ 10.0
B	Generally good signal progression and/or short cycle length; more vehicles stop at intersection than Level of Service A.	10.1 to 20.0
C	Fair progression and/or longer cycle length; significant number of vehicles stop at intersection.	20.1 to 35.0
D	Congestion becomes noticeable; individual cycle failures; longer delays from unfavorable progression, long cycle length, or high volume/capacity ratios; most vehicles stop at intersection.	35.1 to 55.0
E	Usually considered <u>limit of acceptable delay</u> indication of poor progression, long cycle length, or high volume/capacity ratio; frequent individual cycle failures.	55.1 to 80.0
F	Could be considered excessive delay in some areas, frequently an indication of saturation (i.e., arrival flow exceeds capacity), or very long cycle lengths with minimal side street "green" time. Capacity is not necessarily exceeded under this level of service.	> 80.0

* Transportation Research Board's Highway Capacity Manual

**LEVEL OF SERVICE AND EXPECTED DELAY
FOR UNSIGNALIZED INTERSECTIONS***

<u>LEVEL OF SERVICE</u>	<u>CONTROL DELAY PER VEHICLE (SECONDS)</u>
a	0 to 10.0
b	10.1 to 15.0
c	15.1 to 25.0
d	25.1 to 35.0
e	35.1 to 50.0
f	Over 50.0

* Transportation Research Board's Highway Capacity Manual

LEVEL OF SERVICE COMPARISON TABLES

1. Eagle Rd & Radnor Street Rd							
Direction	Movement	AM Peak Hour			PM Peak Hour		
Eagle Rd		Existing (2020)	No Build (2025)	Build (2025)	Existing (2020)	No Build (2025)	Build (2025)
Eastbound	LTR	B 11	--	--	B 11	--	--
Westbound	LTR	B 11	--	--	B 12	--	--
Radnor Street Rd							
Northbound	LTR	B 12	--	--	B 11	--	--
Southbound	LTR	B 12	--	--	B 13	--	B 14
OVERALL:		B 12	--	--	B 12	--	--

Control Type: Signal

2. Beechtree Ln / Site Dr & Radnor Street Rd							
Direction	Movement	AM Peak Hour			PM Peak Hour		
Beechtree Ln / Site Dr		Existing (2020)	No Build (2025)	Build (2025)	Existing (2020)	No Build (2025)	Build (2025)
Eastbound	LTR	A 8	--	--	A 8	--	--
Westbound	LTR	A 8	--	--	A 8	--	--
Radnor Street Rd							
Northbound	LTR	A 9	--	--	A 9	--	--
Southbound	LTR	A 8	--	--	A 8	--	--
OVERALL:		A 9	--	--	A 8	--	--

Control Type: AWSC

3. Walnut Ave & Radnor Street Rd							
Direction	Movement	AM Peak Hour			PM Peak Hour		
Walnut Ave		Existing (2020)	No Build (2025)	Build (2025)	Existing (2020)	No Build (2025)	Build (2025)
Eastbound	LTR	A 8	--	--	A 8	--	--
Westbound	LTR	A 10	--	--	A 8	--	--
Radnor Street Rd							
Northbound	LTR	A 9	--	--	A 8	--	--
Southbound	LTR	A 10	--	--	A 9	--	--
OVERALL:		A 10	--	--	A 8	--	A 9

Control Type: AWSC

4. Walnut Ave / Chamounix Rd & Paul Rd							
Direction	Movement	AM Peak Hour			PM Peak Hour		
Walnut Ave		Existing (2020)	No Build (2025)	Build (2025)	Existing (2020)	No Build (2025)	Build (2025)
Eastbound	L	A 9	--	--	A 9	--	--
Paul Rd							
Southbound	LR	B 12	B 13	--	B 11	--	--
OVERALL:		A 3	--	--	A 3	--	--

Control Type: TWSC

5. Parking Lot Dr & Radnor Street Rd							
Direction	Movement	AM Peak Hour			PM Peak Hour		
Parking Lot Dr		Existing (2020)	No Build (2025)	Build (2025)	Existing (2020)	No Build (2025)	Build (2025)
Westbound	LR	A 10	--		A 9	--	
Radnor Street Rd							
Southbound	L	A 9	--		A 9	--	
OVERALL:		A 1	--		A 1	--	

Control Type: TWSC

-- indicates no change from the previous scenario

QUEUE COMPARISON TABLES

1. Eagle Rd & Radnor Street Rd

Direction	Movement	AM Peak Hour			PM Peak Hour		
Eagle Rd		Storage/Stacking	No Build (2025)	Build (2025)	Storage/Stacking	No Build (2025)	Build (2025)
Eastbound	LTR	470	90	--	470	73	75
Westbound	LTR	620	88	--	620	128	130
Radnor Street Rd							
Northbound	LTR	650	140	145	650	80	83
Southbound	LTR	320	135	--	320	170	173

Control Type: Signal

2. Beechtree Ln / Site Dr & Radnor Street Rd

Direction	Movement	AM Peak Hour			PM Peak Hour		
Beechtree Ln / Site Dr		Storage/Stacking	No Build (2025)	Build (2025)	Storage/Stacking	No Build (2025)	Build (2025)
Eastbound	LTR	530	25	--	530	25	--
Westbound	LTR	100+	25	--	100+	25	--
Radnor Street Rd							
Northbound	LTR	120	25	--	120	25	--
Southbound	LTR	650	25	--	650	25	--

Control Type: AWSC

3. Walnut Ave & Radnor Street Rd

Direction	Movement	AM Peak Hour			PM Peak Hour		
Walnut Ave		Storage/Stacking	No Build (2025)	Build (2025)	Storage/Stacking	No Build (2025)	Build (2025)
Eastbound	LTR	700+	25	--	700+	25	--
Westbound	LTR	650	40	--	650	25	--
Radnor Street Rd							
Northbound	LTR	450	25	--	450	25	--
Southbound	LTR	300	25	--	300	25	--

Control Type: AWSC

4. Walnut Ave / Chamounix Rd & Paul Rd

Direction	Movement	AM Peak Hour			PM Peak Hour		
Walnut Ave		Storage/Stacking	No Build (2025)	Build (2025)	Storage/Stacking	No Build (2025)	Build (2025)
Eastbound	L	450	25	--	450	25	--
Paul Rd							
Southbound	LR	500	25	--	500	25	--

Control Type: TWSC

5. Parking Lot Dr & Radnor Street Rd

Direction	Movement	AM Peak Hour			PM Peak Hour		
Parking Lot Dr		Storage/Stacking	No Build (2025)	Build (2025)	Storage/Stacking	No Build (2025)	Build (2025)
Westbound	LR	100+	25		100+	25	
Radnor Street Rd							
Southbound	L	120	25		120	25	

Control Type: TWSC

"available storage" is available storage if the movement in question is a turn lane with a dedicated bay, otherwise the distance to the next closest upstream intersection is shown.

-- indicates no change from the previous scenario

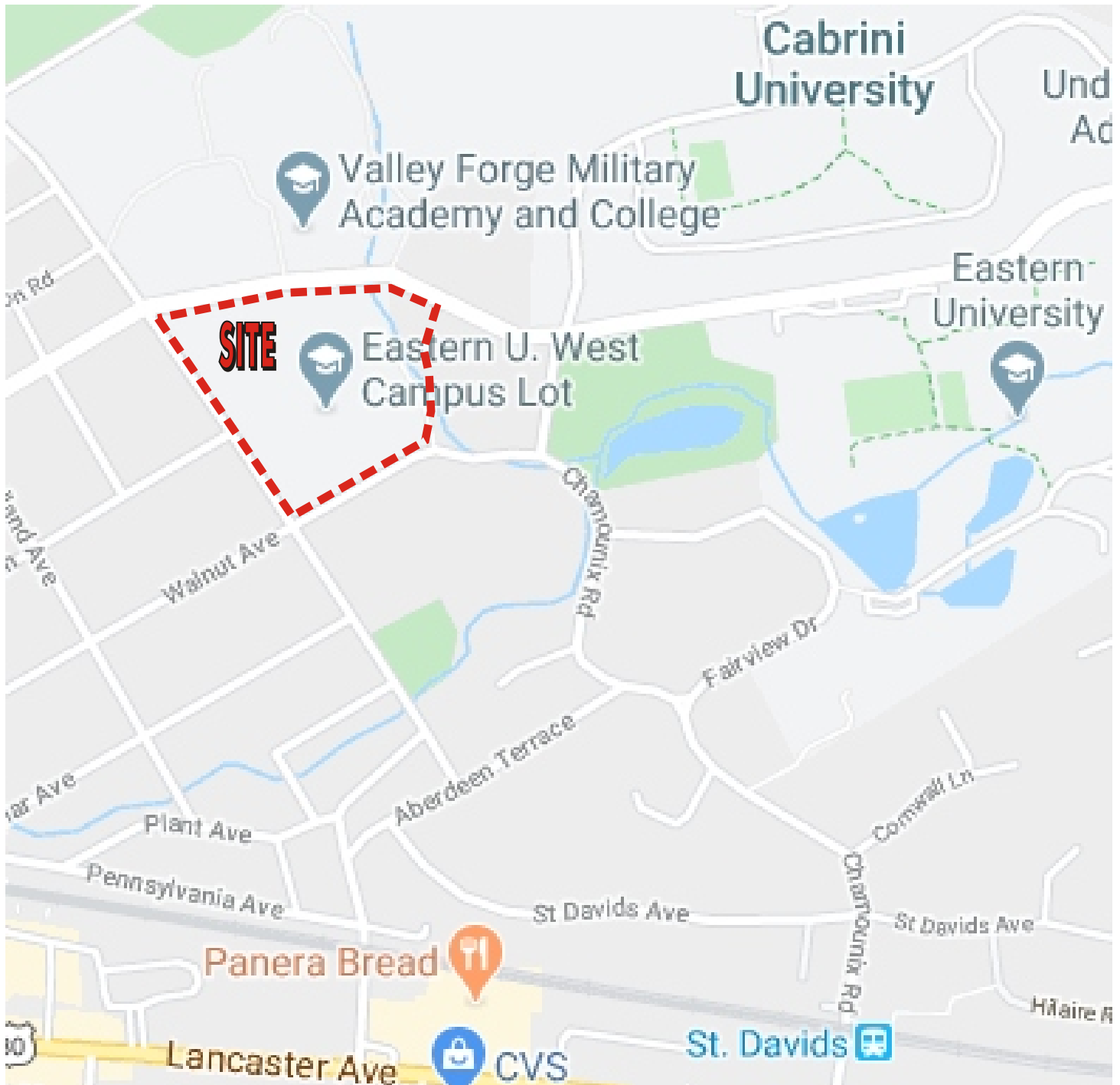
if a queue is < 1 vehicle it is rounded up to 25'

Site and Surrounding Area – Map View

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania



March 2020



Site and Surrounding Area – Aerial View

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania

March 2020



Site Plan Excerpt

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania

March 2020

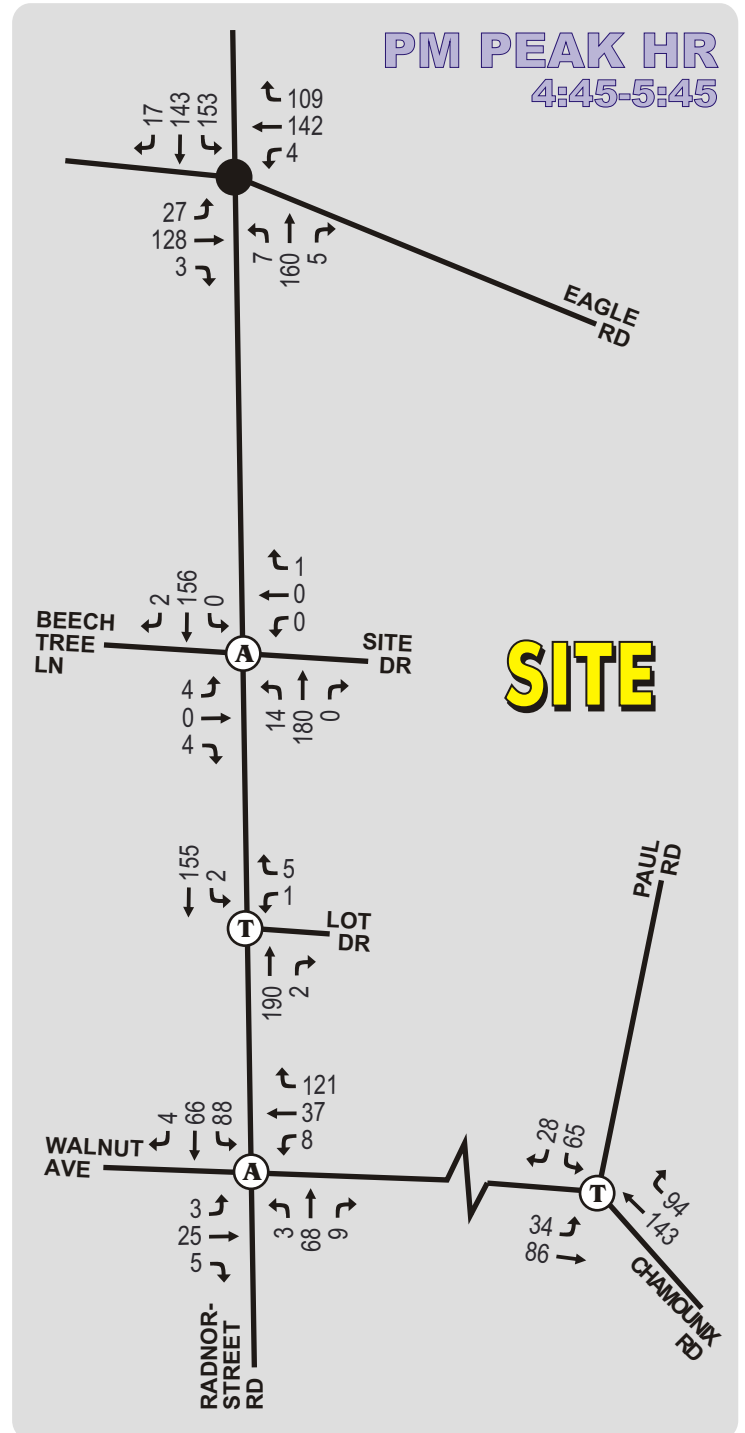
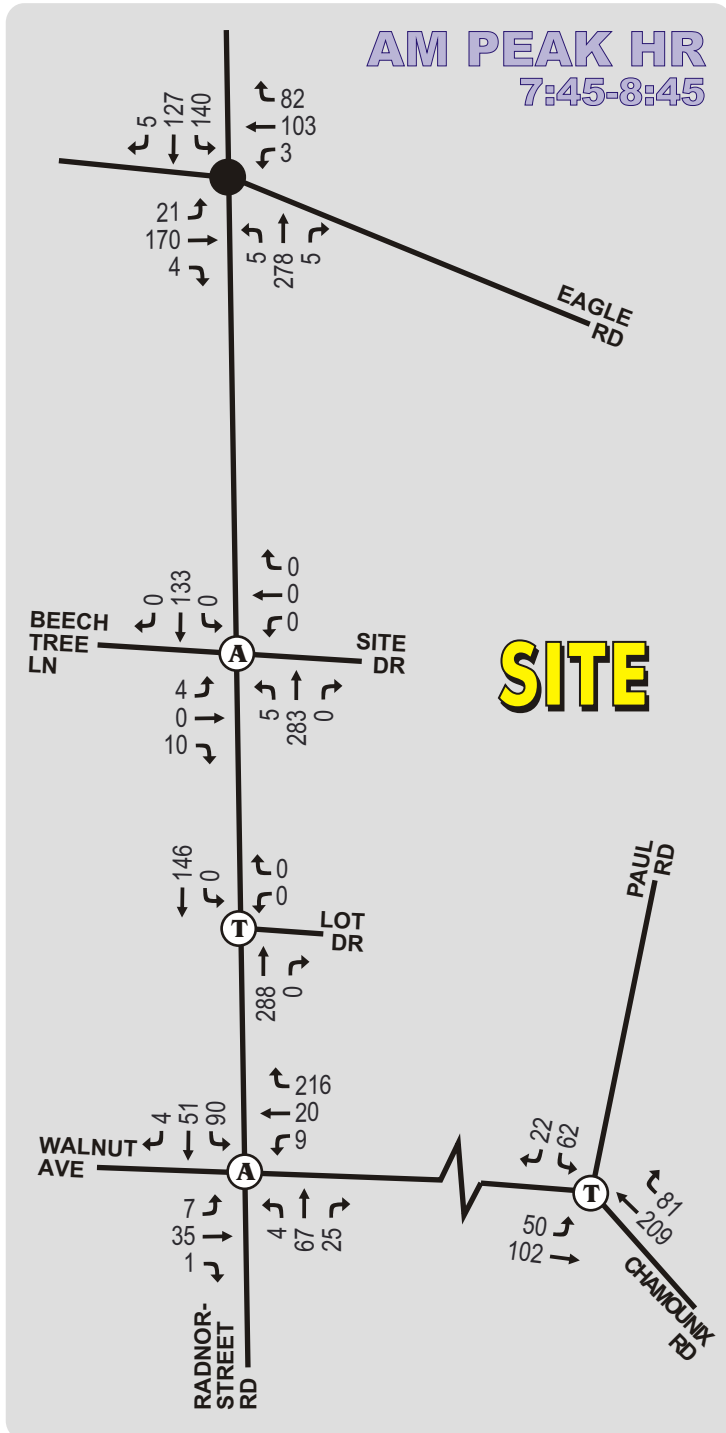


Existing (2020) Peak Hour Traffic Volumes

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania



March 2020



● Signalized Intersection

Ⓣ Unsignalized Intersection,
Two-Way Stop Control (Side Street Only)

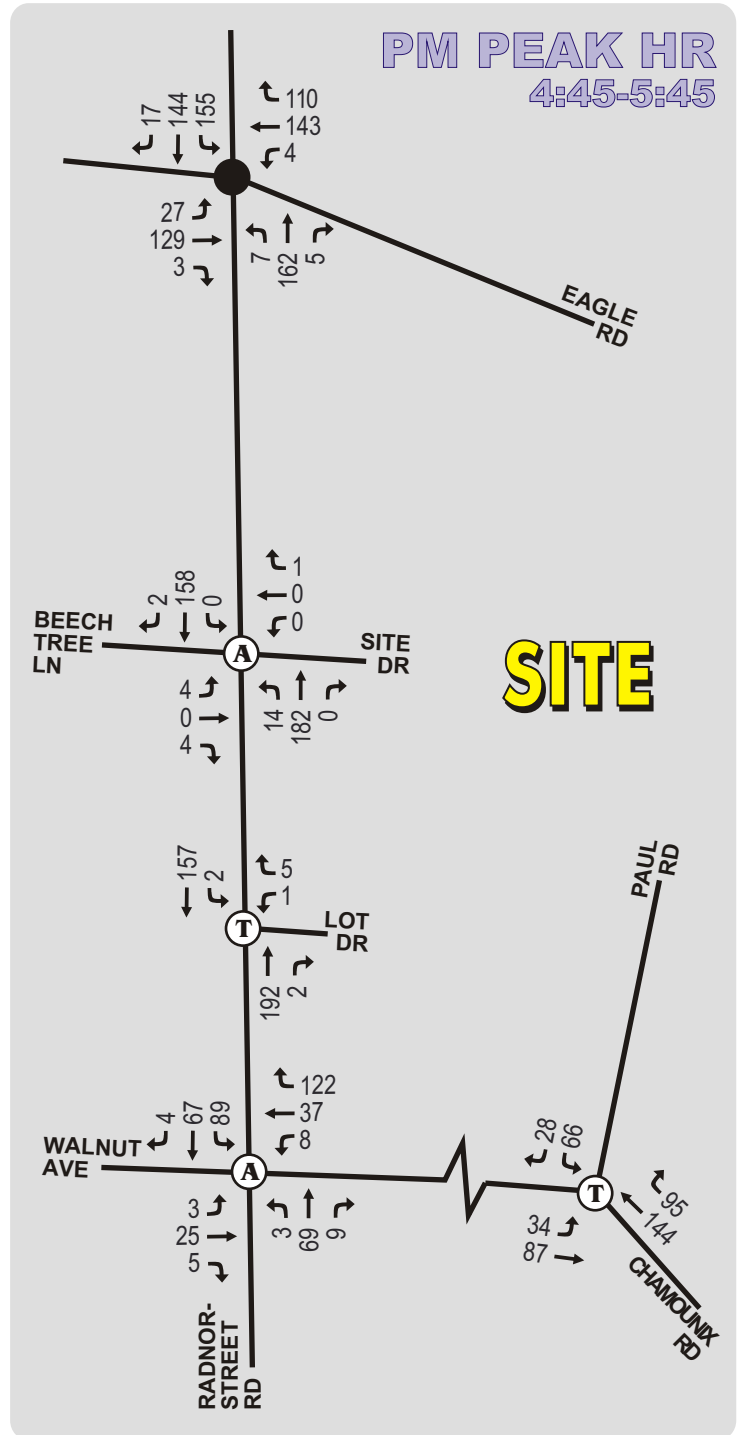
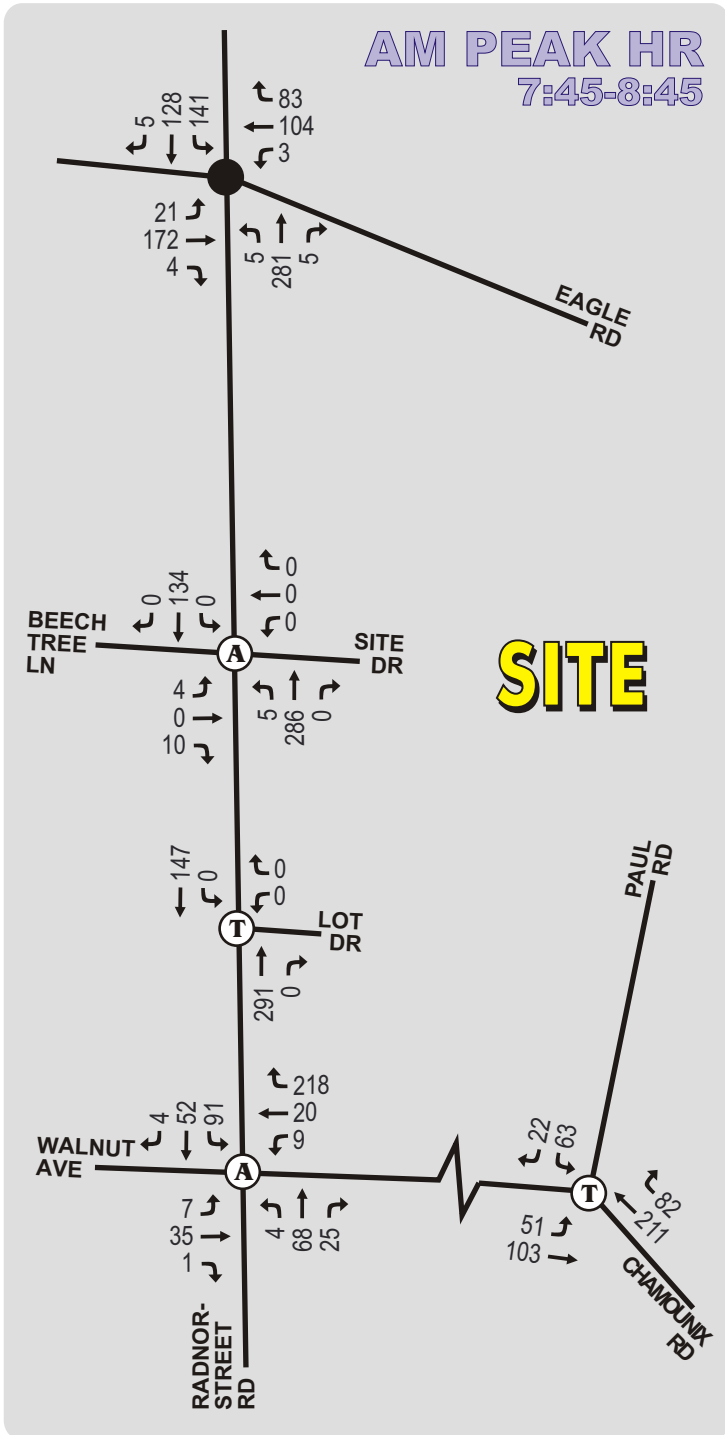
ⓐ Unsignalized Intersection,
All-Way Stop Control

Future (2025) No Build Peak Hour Traffic Volumes

Eastern University West Campus Lot Site
 Radnor Township,
 Delaware County, Pennsylvania



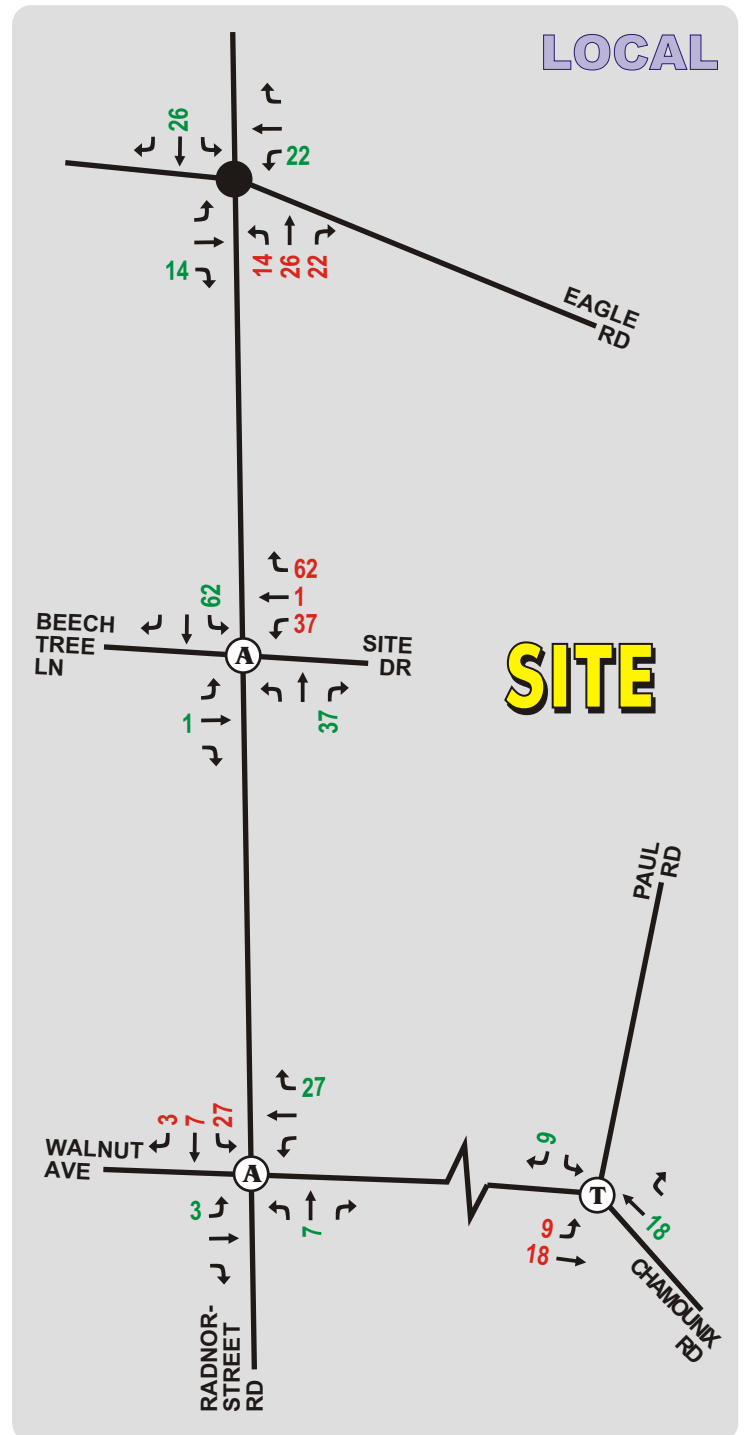
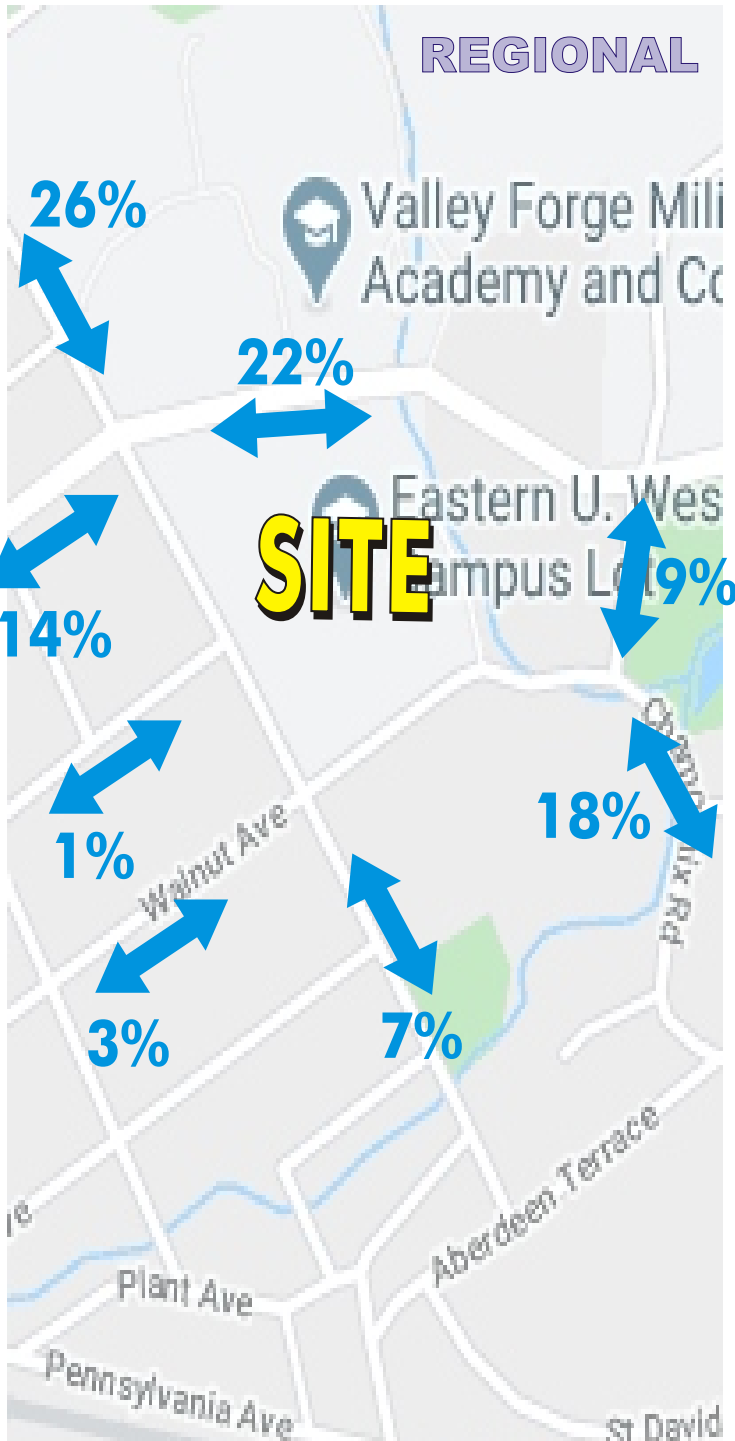
March 2020



Site Peak Hour Traffic – Model

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania

March 2020



● Signalized Intersection

Ⓣ Unsignalized Intersection, Two-Way Stop Control (Side Street Only)

Ⓐ Unsignalized Intersection, All-Way Stop Control

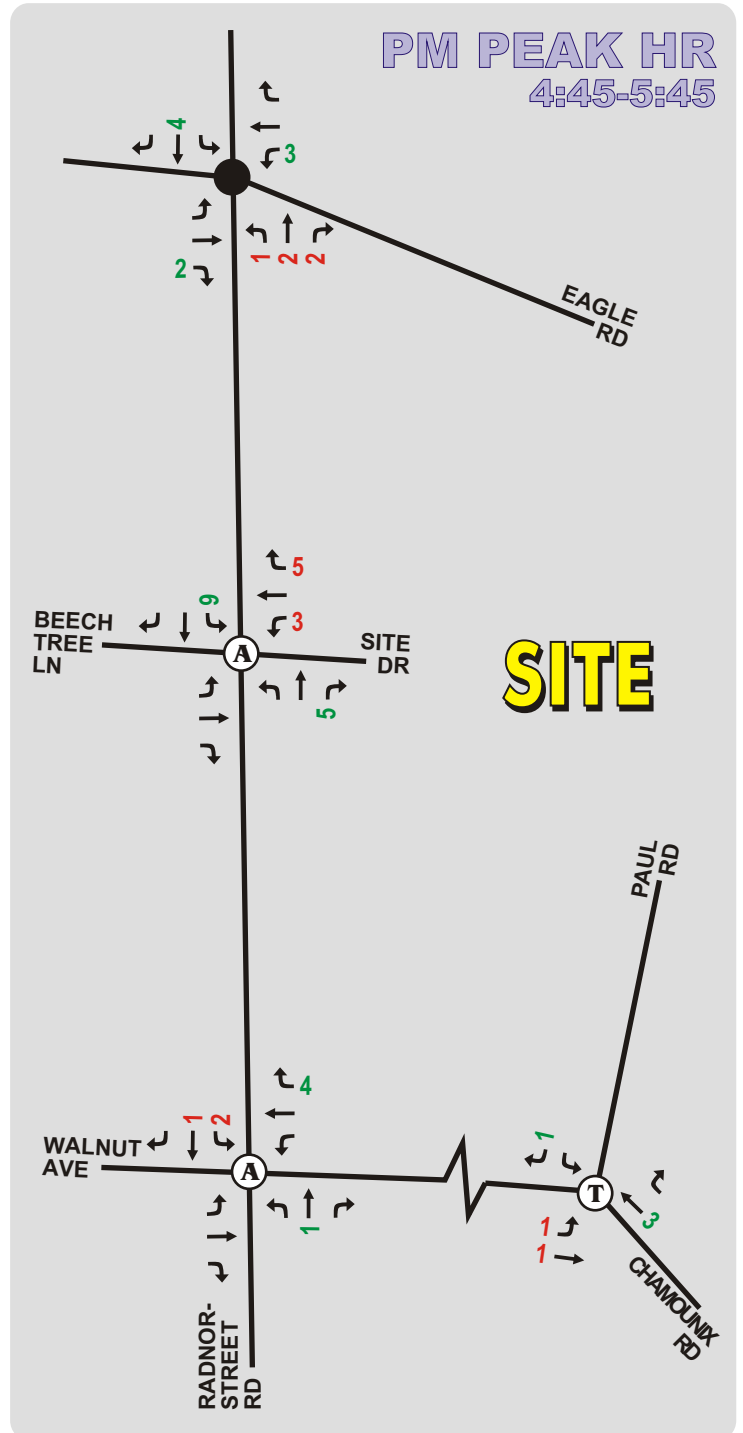
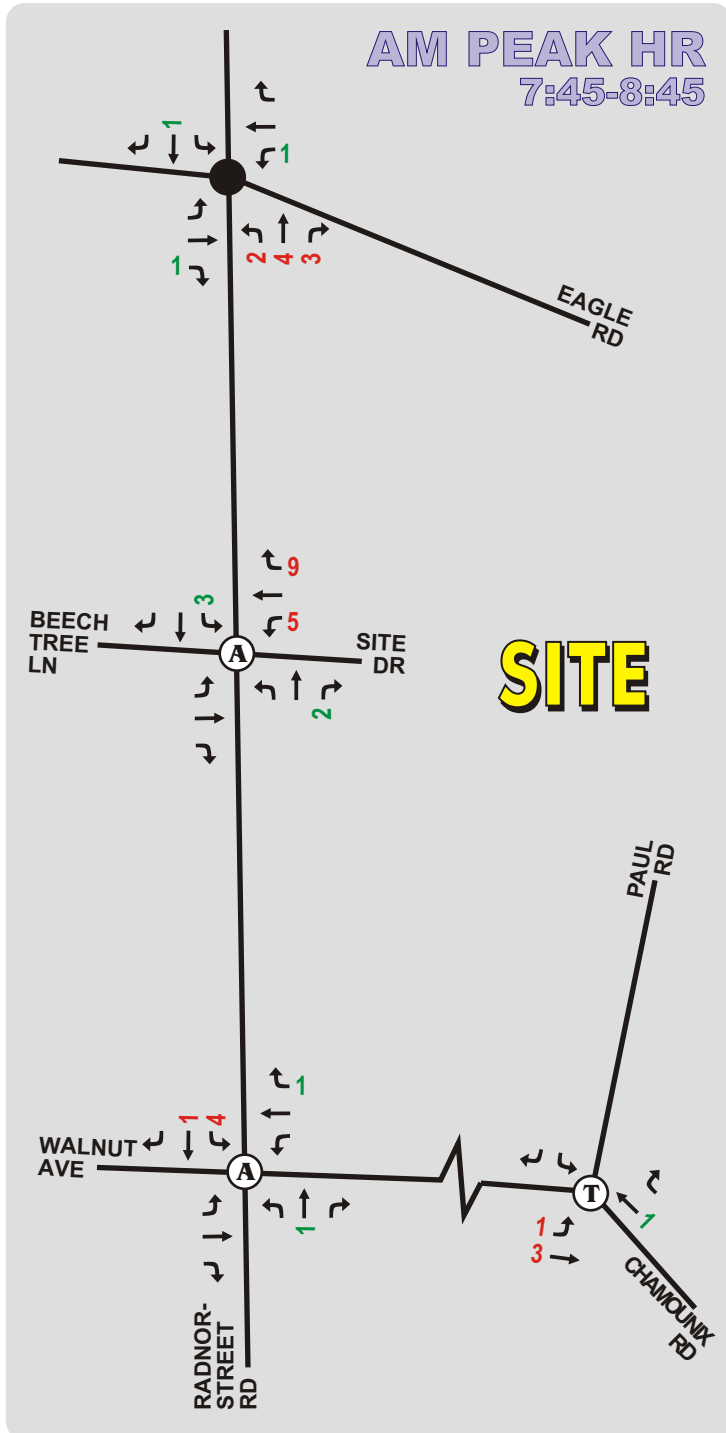
INBOUND
OUTBOUND

Site Peak Hour Traffic – Volumes

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania

March 2020

SITE TRAFFIC		
TIME	IN	OUT
AM	5	14
PM	14	8



● Signalized Intersection

Ⓣ Unsignalized Intersection, Two-Way Stop Control (Side Street Only)

ⓐ Unsignalized Intersection, All-Way Stop Control

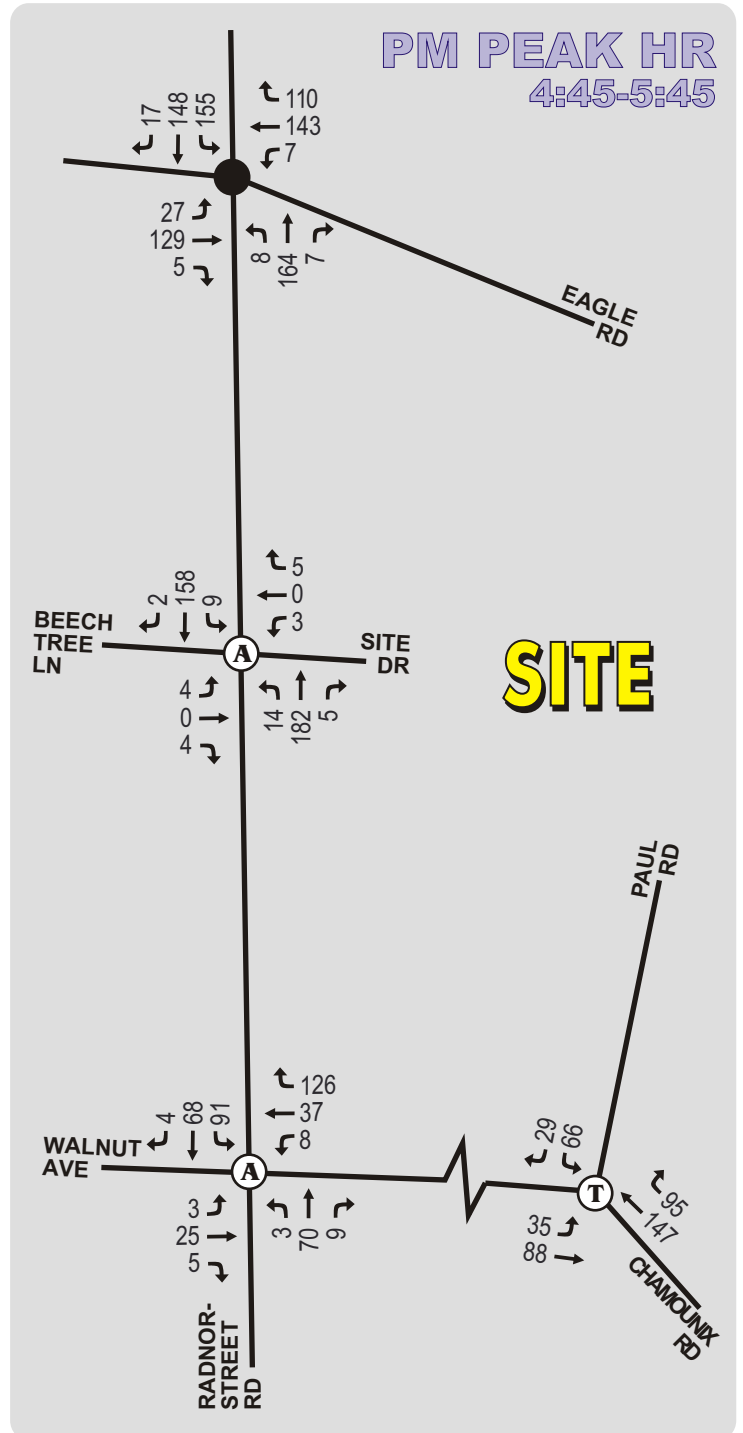
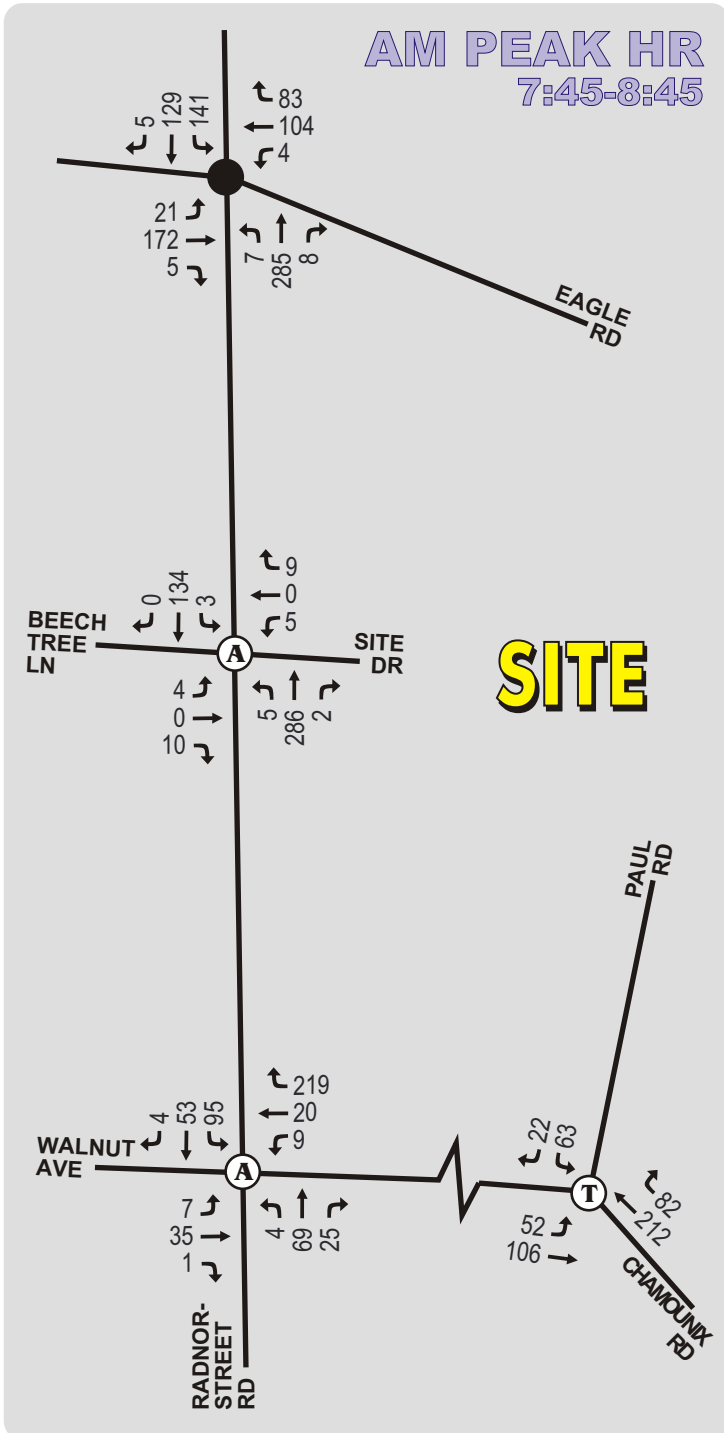
INBOUND
OUTBOUND

Future (2025) Build Peak Hour Traffic Volumes

Eastern University West Campus Lot Site
Radnor Township,
Delaware County, Pennsylvania



March 2020



APPENDIX A

Correspondence



Devin Tuohey <dtuohey@concordiagroup.biz>
To: 'frank@ftavaniassociates.com' <frank@ftavaniassociates.com>

Mar 19 at 3:09 PM

Frank,

Please see attached plan with the correct lot numbers. There are a total of 20 new homes on the attached plan and we are not keeping any of the existing homes. We will be demolishing the two existing homes located where lot 20 is located.

There are currently 14 homes on the site, 11 of which are occupied.

Below is the response from Eastern regarding campus activities last week:

"March 12th was when things got interesting on our campus. Everything was business as usual through March 11th. That evening, at 10:47 PM, we announced that classes on campus would be cancelled beginning March 12th and transitioning online March 13th; on that date, the campus was slated to remain open. Preponderantly all staff employees would have been on campus on March 12th, and probably 50% of faculty employees. There likely would have been increased traffic from our on-campus students as some of them would have been leaving to return home that day, and greatly reduced traffic from commuter students. Was March 12th one of your traffic study days? What other perspectives can I offer regarding that day."

Devin Tuohey
dtuohey@concordiagroup.biz
347-330-0048

From: Frank Tavani <frank@ftavaniassociates.com>
Sent: Thursday, March 19, 2020 11:34 AM
To: Devin Tuohey <dtuohey@concordiagroup.biz>
Subject: Eastern University Site -- some follow up questions /confirmation requests

Hi Devin. I was looking a little more closely at this plan which you sent me last month and notice a few things:

- there is no lot 17
- i assume lot 21 is an existing home
- 2 lots access Radnor Street directly
- 5 lots access Walnut directly
- 12 lots access the proposed cul de sac directly, 1 of which is a shared driveway (2 houses share 1 driveway)
- a total of 19 new homes are shown on the plan
- the cul de sac access out onto Radnor Street will be in substantially, if not identically, the same place as the existing shared driveway which is opposite Beechtree

also confirming that you previously told me there are 14 older homes on the site, 11 of which are currently in use. I don't plan to take any credit for these homes, but will mention them in my report, so i would like my statement to be accurate so pls confirm.

all this is of course in addition to the EU confirmation of classes being in session the week of 9 March 2020. Our counts were primarily conducted on Tues, 10 March 2020.

thx.

Frank Tavani, P.E., PTOE
Principal

F. Tavani and Associates, Inc.
248 Beech Hill Road
Wynnewood, PA 19096

(215) 625-3821 phone
(484) 792-9495 fax
(267) 250-4858 cell

www.FTAVANIASSOCIATES.com

On Thursday, February 20, 2020, 03:24:30 PM EST, Devin Tuohey <dtuohey@concordiagroup.biz> wrote:

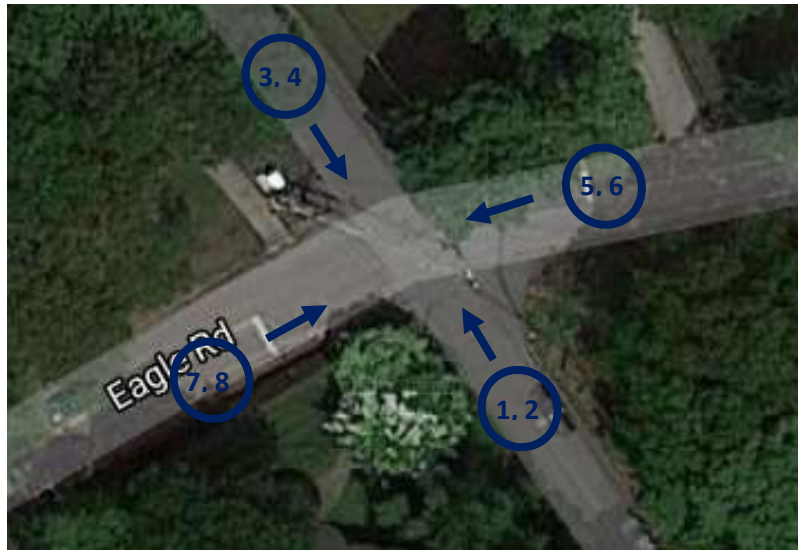
Frank,

APPENDIX B

Photodocumentation

Road name (# of pages)

1. Eagle Road and Radnor Street Road (5)
2. Radnor Street Road and Beechtree Lane (4)
3. Radnor Street Road and parking lot driveway (3)
4. Radnor Street Road and Walnut Avenue (5)
5. Walnut Avenue/Chamounix Avenue and Paul Road (4)



Aerial image of intersection



Photo # 1 - Description: Northbound Radnor Street Road approaching Eagle Road (~ 50')



Photo # 2 - Description: Northbound Radnor Street Road approaching Eagle Road (~200')



Photo # 3 - Description: Southbound Radnor Street Road approaching Eagle Road (~50')



Photo # 4 - Description: Southbound Radnor Street Road approaching Eagle Road (~200')



Photo # 5- Description: Westbound Eagle Road approaching Radnor Street Road (~50')



Photo # 6 - Description: Westbound Eagle Road approaching Radnor Street Road (~200')



Photo # 7- Description: Eastbound Eagle Road approaching Radnor Street Road (~50')



Photo # 8 - Description: Eastbound Eagle Road approaching Radnor Street Road (~200')



Aerial image of intersection



Photo # 1 - Description: Northbound Radnor Street Road approaching Beechtree Lane (~ 50')



Photo # 2 - Description: Northbound Radnor Street Road approaching Beechtree Lane (~200')



Photo # 3- Description: Southbound Radnor Street Road approaching Beechtree Lane (~50')



Photo # 4 - Description: Southbound Radnor Street Road approaching Beechtree Lane (~200')



Photo # 5- Description: Eastbound Beechtree Lane approaching Radnor Street Road (~50')



Photo # 6 - Description: Eastbound Beechtree Lane approaching Radnor Street Road (~200')



Aerial image of intersection



Photo # 1 - Description: Northbound Radnor Street Road approaching parking lot driveway (~ 50')



Photo # 2 - Description: Northbound Radnor Street Road approaching parking lot driveway (~200')



Photo # 3 - Description: Southbound Radnor Street Road approaching parking lot driveway (~150')



Photo # 4- Description: Westbound parking lot driveway approaching Radnor Street Road (~50')



Aerial image of intersection



Photo # 1 - Description: Northbound Radnor Street Road approaching Walnut Avenue (~ 50')



Photo # 2 - Description: Northbound Radnor Street Road approaching Walnut Avenue (~150')



Photo # 3 - Description: Southbound Radnor Street Road approaching Walnut Avenue (~50')



Photo # 4 - Description: Southbound Radnor Street Road approaching Walnut Avenue (~200')



Photo # 5- Description: Westbound Walnut Avenue approaching Radnor Street Road (~50')



Photo # 6 - Description: Westbound Walnut Avenue approaching Radnor Street Road (~200')



Photo # 5- Description: Eastbound Walnut Avenue approaching Radnor Street Road (~50')



Photo # 6 - Description: Eastbound Walnut Avenue approaching Radnor Street Road (~200')



Aerial image of intersection



Photo # 1 - Description: Southbound Paul Road approaching Walnut/Chamounix (~ 50')



Photo # 2 - Description: Southbound Paul Road approaching Walnut/Chamounix (~150')



Photo # 3 - Description: Westbound Chamounix approaching Paul Road (~50')



Photo # 4 - Description: Westbound Chamounix approaching Paul Road (~200')



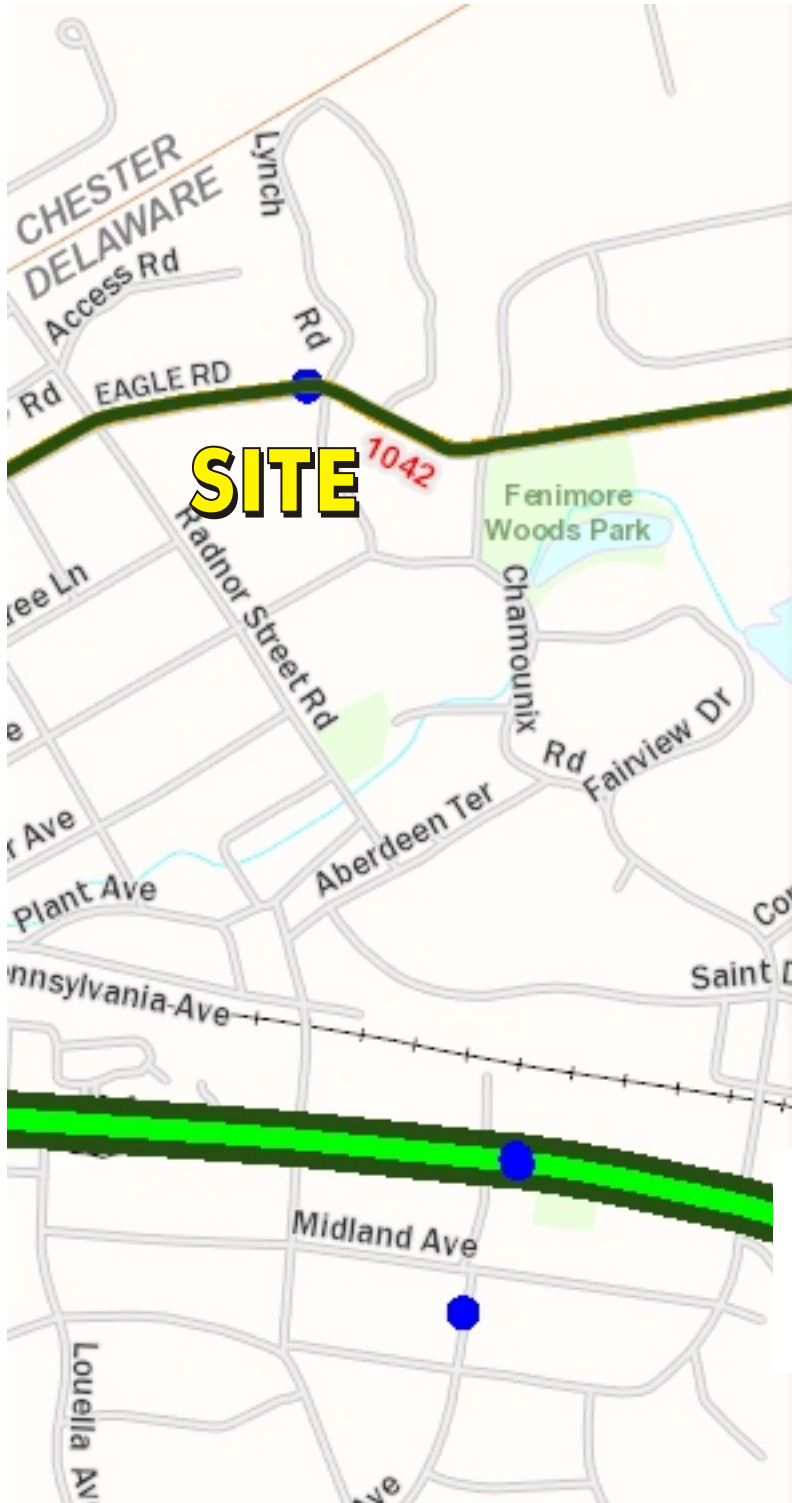
Photo # 5- Description: Eastbound Walnut Avenue approaching Paul Road (~50')



Photo # 6 - Description: Eastbound Walnut Avenue approaching Paul Road (~200')

APPENDIX C

TIRe Data



Avg. Daily Traffic: 6786

Avg. Daily Truck Traffic: 135

Count Date: 20151022

Count Duration: 24

County: 23 - DELAWARE

D Factor: 55

Daily Truck Vehicle Miles Traveled: 183

Daily Vehicle Miles Traveled: 9202

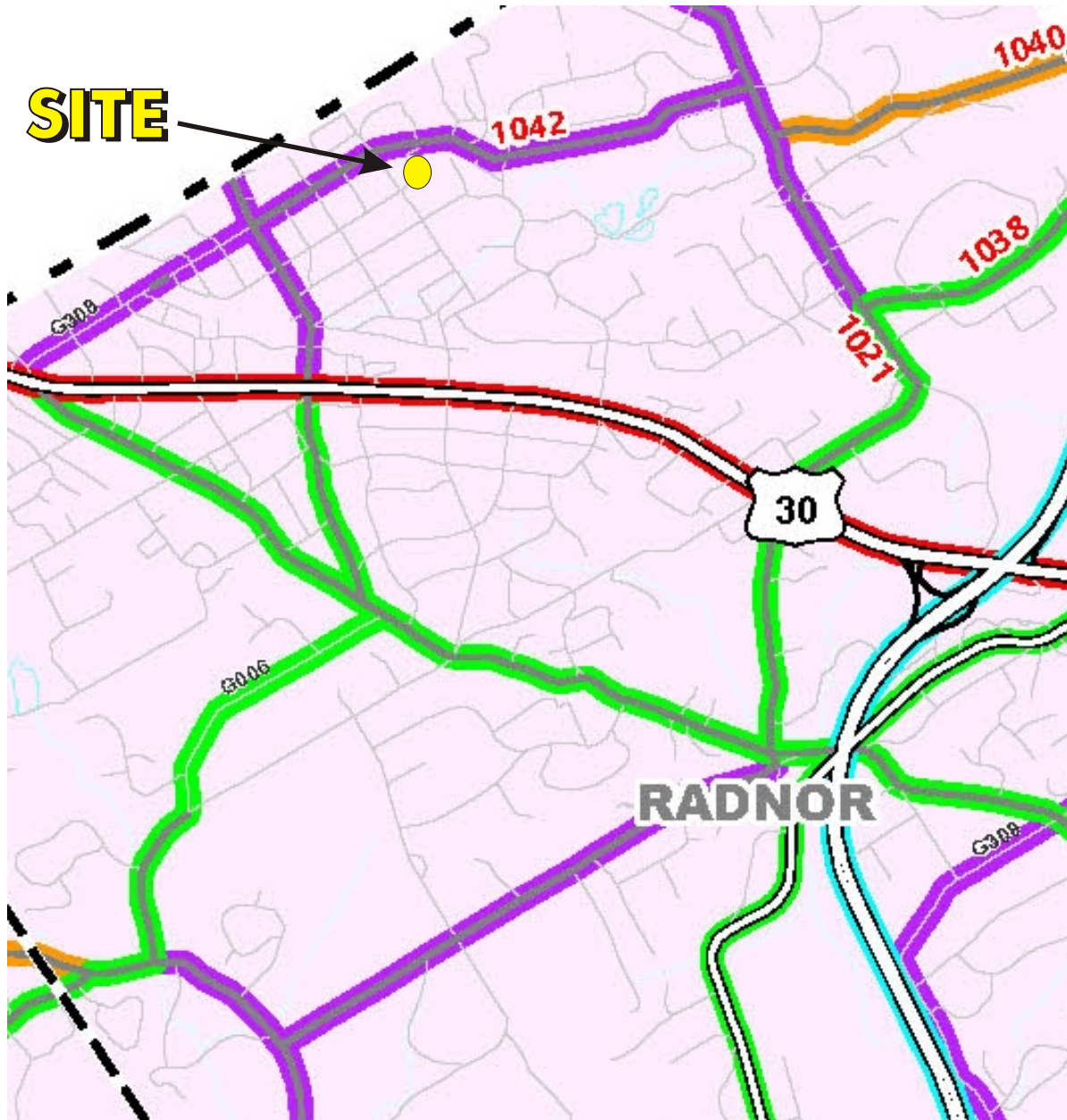
Direction: B - BOTH

District: 06

HAS_GEOMETRY: Y

Jurisdiction: 1 - STATE

K Factor: 11



- INTERSTATE HIGHWAYS (1, 11)
- OTHER FREEWAYS AND EXPRESSWAYS (12)
- OTHER PRINCIPAL ARTERIAL HIGHWAYS (2, 14)
- MINOR ARTERIALS (6, 16)
- URBAN COLLECTOR OR RURAL MAJOR COLLECTOR (7, 17)
- RURAL MINOR COLLECTOR (8)
- LOCAL ROADS (9, 19)

APPENDIX D

Data Collection

Groups Printed- Lights - Buses - Trucks

Start Time	Radnor Street Southbound					Eagle Westbound					Radnor Street Northbound					Eagle Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:00 AM	15	15	1	0	31	0	6	2	0	8	0	19	0	0	19	5	14	0	0	19	77
07:15 AM	20	12	1	0	33	0	18	13	0	31	1	59	0	0	60	2	18	0	0	20	144
07:30 AM	36	27	2	0	65	1	18	11	0	30	1	55	1	0	57	4	34	0	0	38	190
07:45 AM	41	36	0	0	77	3	19	20	0	42	0	62	3	0	65	3	50	0	0	53	237
Total	112	90	4	0	206	4	61	46	0	111	2	195	4	0	201	14	116	0	0	130	648
08:00 AM	38	32	1	0	71	0	24	22	0	46	2	69	1	0	72	5	41	2	0	48	237
08:15 AM	31	33	1	0	65	0	31	18	0	49	2	64	1	0	67	8	44	2	0	54	235
08:30 AM	30	26	3	0	59	0	29	22	0	51	1	83	0	0	84	5	35	0	0	40	234
08:45 AM	27	27	2	0	56	3	26	12	0	41	1	51	3	0	55	7	39	0	0	46	198
Total	126	118	7	0	251	3	110	74	0	187	6	267	5	0	278	25	159	4	0	188	904
04:00 PM	22	27	4	0	53	1	25	30	0	56	1	43	3	0	47	4	28	2	0	34	190
04:15 PM	24	36	11	0	71	1	26	29	0	56	1	31	4	0	36	7	31	1	0	39	202
04:30 PM	31	30	10	0	71	1	34	28	0	63	1	46	0	0	47	3	26	1	0	30	211
04:45 PM	46	35	3	0	84	2	34	25	0	61	1	43	0	0	44	9	33	0	0	42	231
Total	123	128	28	0	279	5	119	112	0	236	4	163	7	0	174	23	118	4	0	145	834
05:00 PM	38	39	8	0	85	0	33	37	0	70	2	38	2	0	42	4	27	1	0	32	229
05:15 PM	37	35	6	0	78	1	35	18	0	54	2	43	2	0	47	7	32	0	0	39	218
05:30 PM	32	34	0	0	66	1	40	29	0	70	2	36	1	0	39	7	36	2	0	45	220
05:45 PM	31	40	7	0	78	1	31	17	0	49	1	38	0	0	39	6	25	1	0	32	198
Total	138	148	21	0	307	3	139	101	0	243	7	155	5	0	167	24	120	4	0	148	865
Grand Total	499	484	60	0	1043	15	429	333	0	777	19	780	21	0	820	86	513	12	0	611	3251
Apprch %	47.8	46.4	5.8	0		1.9	55.2	42.9	0		2.3	95.1	2.6	0		14.1	84	2	0		
Total %	15.3	14.9	1.8	0	32.1	0.5	13.2	10.2	0	23.9	0.6	24	0.6	0	25.2	2.6	15.8	0.4	0	18.8	
Lights	497	479	58	0	1034	14	417	329	0	760	19	772	21	0	812	80	503	12	0	595	3201
% Lights	99.6	99	96.7	0	99.1	93.3	97.2	98.8	0	97.8	100	99	100	0	99	93	98.1	100	0	97.4	98.5
Buses	0	3	1	0	4	1	4	2	0	7	0	2	0	0	2	4	7	0	0	11	24
% Buses	0	0.6	1.7	0	0.4	6.7	0.9	0.6	0	0.9	0	0.3	0	0	0.2	4.7	1.4	0	0	1.8	0.7
Trucks	2	2	1	0	5	0	8	2	0	10	0	6	0	0	6	2	3	0	0	5	26
% Trucks	0.4	0.4	1.7	0	0.5	0	1.9	0.6	0	1.3	0	0.8	0	0	0.7	2.3	0.6	0	0	0.8	0.8

Start Time	Radnor Street Southbound					Eagle Westbound					Radnor Street Northbound					Eagle Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:45 AM	41	36	0	0	77	3	19	20	0	42	0	62	3	0	65	3	50	0	0	53	237
08:00 AM	38	32	1	0	71	0	24	22	0	46	2	69	1	0	72	5	41	2	0	48	237
08:15 AM	31	33	1	0	65	0	31									8	44	2	0	54	
08:30 AM	30	26	3	0	59	0	29	22	0	51	1	83	0	0	84	5	35	0	0	40	234
Total Volume	140	127	5	0	272	3	103	82	0	188	5	278	5	0	288	21	170	4	0	195	943
% App. Total	51.5	46.7	1.8	0		1.6	54.8	43.6	0		1.7	96.5	1.7	0		10.8	87.2	2.1	0		
PHF	.854	.882	.417	.000	.883	.250	.831	.932	.000	.922	.625	.837	.417	.000	.857	.656	.850	.500	.000	.903	.995
Lights	139	126	5	0	270	2	98	80	0	180	5	275	5	0	285	20	167	4	0	191	926
% Lights	99.3	99.2	100	0	99.3	66.7	95.1	97.6	0	95.7	100	98.9	100	0	99.0	95.2	98.2	100	0	97.9	98.2
Buses	0	0	0	0	0	1	3	1	0	5	0	2	0	0	2	0	3	0	0	3	10
% Buses	0	0	0	0	0	33.3	2.9	1.2	0	2.7	0	0.7	0	0	0.7	0	1.8	0	0	1.5	1.1
Trucks	1	1	0	0	2	0	2	1	0	3	0	1	0	0	1	1	0	0	0	1	7
% Trucks	0.7	0.8	0	0	0.7	0	1.9	1.2	0	1.6	0	0.4	0	0	0.3	4.8	0	0	0	0.5	0.7

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	46					2	34	25	0	61	1	43	0	0	44	9	33	0	0	42	231
05:00 PM	38	39	8	0	85	0	33	37	0	70	2	38	2	0	42	4	27	1	0	32	229
05:15 PM	37	35	6	0	78	1	35	18	0	54	2	43	2	0	47	7	32	0	0	39	218
05:30 PM	32	34	0	0	66	1	40									36	2	0	0	45	
Total Volume	153	143	17	0	313	4	142	109	0	255	7	160	5	0	172	27	128	3	0	158	898
% App. Total	48.9	45.7	5.4	0		1.6	55.7	42.7	0		4.1	93	2.9	0		17.1	81	1.9	0		
PHF	.832	.917	.531	.000	.921	.500	.888	.736	.000	.911	.875	.930	.625	.000	.915	.750	.889	.375	.000	.878	.972
Lights	153	142	16	0	311	4	142	108	0	254	7	159	5	0	171	27	126	3	0	156	892
% Lights	100	99.3	94.1	0	99.4	100	100	99.1	0	99.6	100	99.4	100	0	99.4	100	98.4	100	0	98.7	99.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	1	1	0	2	0	0	1	0	1	0	1	0	0	1	0	2	0	0	2	6
% Trucks	0	0.7	5.9	0	0.6	0	0	0.9	0	0.4	0	0.6	0	0	0.6	0	1.6	0	0	1.3	0.7

Groups Printed- Lights - Buses - Trucks

Start Time	Radnor Street Southbound					Site Westbound					Radnor Street Northbound					Beechtree Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:00 AM	0	13	0	0	13	0	0	0	0	0	0	18	0	0	18	0	0	1	0	1	32
07:15 AM	0	13	0	0	13	0	0	0	0	0	0	60	0	0	60	0	0	1	0	1	74
07:30 AM	0	26	1	0	27	0	0	0	0	0	1	57	0	0	58	1	0	1	0	2	87
07:45 AM	0	34	0	0	34	0	0	0	0	0	0	65	0	0	65	1	0	6	0	7	106
Total	0	86	1	0	87	0	0	0	0	0	1	200	0	0	201	2	0	9	0	11	299
08:00 AM	0	39	0	0	39	0	0	0	0	0	1	67	0	0	68	1	0	3	0	4	111
08:15 AM	0	35	0	0	35	0	0	0	0	0	2	68	0	0	70	0	0	2	0	2	107
08:30 AM	0	25	0	0	25	0	0	0	0	0	2	83	0	0	85	2	0	1	0	3	113
08:45 AM	0	33	0	0	33	0	0	0	0	0	1	56	0	0	57	0	0	0	0	0	90
Total	0	132	0	0	132	0	0	0	0	0	6	274	0	0	280	3	0	6	0	9	421
04:00 PM	0	26	0	0	26	0	0	0	0	0	0	48	0	0	48	2	0	0	0	2	76
04:15 PM	1	43	0	0	44	0	0	1	0	1	3	34	0	0	37	3	0	1	0	4	86
04:30 PM	0	29	2	0	31	0	0	0	0	0	1	45	1	0	47	2	0	0	0	2	80
04:45 PM	0	41	0	0	41	0	0	0	0	0	5	44	0	0	49	0	0	1	0	1	91
Total	1	139	2	0	142	0	0	1	0	1	9	171	1	0	181	7	0	2	0	9	333
05:00 PM	0	36	1	0	37	0	0	0	0	0	6	47	0	0	53	0	0	0	0	0	90
05:15 PM	0	39	1	0	40	0	0	1	0	1	2	47	0	0	49	2	0	1	0	3	93
05:30 PM	0	40	0	0	40	0	0	0	0	0	1	42	0	0	43	2	0	2	0	4	87
05:45 PM	0	41	0	0	41	0	0	0	0	0	0	41	0	0	41	1	0	1	0	2	84
Total	0	156	2	0	158	0	0	1	0	1	9	177	0	0	186	5	0	4	0	9	354
Grand Total	1	513	5	0	519	0	0	2	0	2	25	822	1	0	848	17	0	21	0	38	1407
Apprch %	0.2	98.8	1	0		0	0	100	0		2.9	96.9	0.1	0		44.7	0	55.3	0		
Total %	0.1	36.5	0.4	0	36.9	0	0	0.1	0	0.1	1.8	58.4	0.1	0	60.3	1.2	0	1.5	0	2.7	
Lights	1	508	5	0	514	0	0	2	0	2	24	815	1	0	840	17	0	18	0	35	1391
% Lights	100	99	100	0	99	0	0	100	0	100	96	99.1	100	0	99.1	100	0	85.7	0	92.1	98.9
Buses	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	3	0	3	10
% Buses	0	0.6	0	0	0.6	0	0	0	0	0	0	0.5	0	0	0.5	0	0	14.3	0	7.9	0.7
Trucks	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	6
% Trucks	0	0.4	0	0	0.4	0	0	0	0	0	4	0.4	0	0	0.5	0	0	0	0	0	0.4

Start Time	Radnor Street Southbound					Site Westbound					Radnor Street Northbound					Beechtree Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:45 AM	0	34	0	0	34	0	0	0	0	0	0	65	0	0	65	1	0	0	0	7	106
08:00 AM	0	39	0	0	39	0	0	0	0	0	2	68	0	0	70	0	0	2	0	2	107
08:15 AM	0	35	0	0	35	0	0	0	0	0	2	83	0	0	85	2	0	1	0	3	113
08:30 AM	0	25	0	0	25	0	0	0	0	0	2	83	0	0	85	2	0	1	0	3	113
Total Volume	0	133	0	0	133	0	0	0	0	0	5	283	0	0	288	4	0	12	0	16	437
% App. Total	0	100	0	0		0	0	0	0	0	1.7	98.3	0	0		25	0	75	0		
PHF	.000	.853	.000	.000	.853	.000	.000	.000	.000	.000	.625	.852	.000	.000	.847	.500	.000	.500	.000	.571	.967
Lights	0	131	0	0	131	0	0	0	0	0	5	280	0	0	285	4	0	10	0	14	430
% Lights	0	98.5	0	0	98.5	0	0	0	0	0	100	98.9	0	0	99.0	100	0	83.3	0	87.5	98.4
Buses	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	2	0	2	6
% Buses	0	0.8	0	0	0.8	0	0	0	0	0	0	1.1	0	0	1.0	0	0	16.7	0	12.5	1.4
Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Trucks	0	0.8	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2

Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1
 Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	0	41	0	0	41	0	0	0	0	0	5	44	0	0	49	0	0	1	0	1	91
05:00 PM	0	36	1	0	37	0	0	0	0	0	6	47	0	0	53	0	0	0	0	0	90
05:15 PM	0	39	1	0	40	0	0	1	0	1	2	42	0	0	44	2	0	1	0	3	93
05:30 PM	0	40	0	0	40	0	0	0	0	0	1	42	0	0	43	2	0	2	0	4	87
Total Volume	0	156	2	0	158	0	0	1	0	1	14	180	0	0	194	4	0	4	0	8	361
% App. Total	0	98.7	1.3	0		0	0	100	0	0	7.2	92.8	0	0		50	0	50	0		
PHF	.000	.951	.500	.000	.963	.000	.000	.250	.000	.250	.583	.957	.000	.000	.915	.500	.000	.500	.000	.500	.970
Lights	0	155	2	0	157	0	0	1	0	1	13	179	0	0	192	4	0	4	0	8	358
% Lights	0	99.4	100	0	99.4	0	0	100	0	100	92.9	99.4	0	0	99.0	100	0	100	0	100	99.2
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	3
% Trucks	0	0.6	0	0	0.6	0	0	0	0	0	7.1	0.6	0	0	1.0	0	0	0	0	0	0.8

Groups Printed- Lights - Buses - Trucks

Start Time	Radnor Street Southbound				Lot Westbound				Radnor Street Northbound				Int. Total
	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	
07:00 AM	0	16	0	16	0	0	0	0	21	0	0	21	37
07:15 AM	0	13	0	13	0	0	0	0	60	0	0	60	73
07:30 AM	0	28	0	28	0	1	0	1	58	0	0	58	87
07:45 AM	0	42	0	42	0	0	0	0	62	0	0	62	104
Total	0	99	0	99	0	1	0	1	201	0	0	201	301
08:00 AM	0	40	0	40	0	0	0	0	73	0	0	73	113
08:15 AM	0	37	0	37	0	0	0	0	69	0	0	69	106
08:30 AM	0	27	0	27	0	0	0	0	84	0	0	84	111
08:45 AM	0	31	0	31	0	0	0	0	58	0	0	58	89
Total	0	135	0	135	0	0	0	0	284	0	0	284	419
04:00 PM	1	26	0	27	0	1	0	1	47	0	0	47	75
04:15 PM	0	46	0	46	1	1	0	2	36	1	0	37	85
04:30 PM	1	27	0	28	0	1	0	1	45	0	0	45	74
04:45 PM	0	40	0	40	0	2	0	2	48	1	0	49	91
Total	2	139	0	141	1	5	0	6	176	2	0	178	325
05:00 PM	0	36	0	36	0	2	0	2	52	0	0	52	90
05:15 PM	1	40	0	41	1	0	0	1	49	1	0	50	92
05:30 PM	1	39	0	40	0	1	0	1	41	0	0	41	82
05:45 PM	1	42	0	43	0	3	0	3	39	0	0	39	85
Total	3	157	0	160	1	6	0	7	181	1	0	182	349
Grand Total	5	530	0	535	2	12	0	14	842	3	0	845	1394
Apprch %	0.9	99.1	0		14.3	85.7	0		99.6	0.4	0		
Total %	0.4	38	0	38.4	0.1	0.9	0	1	60.4	0.2	0	60.6	
Lights	5	521	0	526	2	12	0	14	835	3	0	838	1378
% Lights	100	98.3	0	98.3	100	100	0	100	99.2	100	0	99.2	98.9
Buses	0	7	0	7	0	0	0	0	3	0	0	3	10
% Buses	0	1.3	0	1.3	0	0	0	0	0.4	0	0	0.4	0.7
Trucks	0	2	0	2	0	0	0	0	4	0	0	4	6
% Trucks	0	0.4	0	0.4	0	0	0	0	0.5	0	0	0.5	0.4

Start Time	Radnor Street Southbound				Lot Westbound				Radnor Street Northbound				Int. Total
	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	42	0	42	0	0	0	0	62	0	0	62	104
08:00 AM	0	40	0	40	0	0	0	0	73	0	0	73	113
08:15 AM	0	37	0	37	0	0	0	0	69	0	0	69	106
08:30 AM	0	27	0	27	0	0	0	0	84	0	0	84	111
Total Volume	0	146	0	146	0	0	0	0	288	0	0	288	434
% App. Total	0	100	0		0	0	0		100	0	0		
PHF	.000	.869	.000	.869	.000	.000	.000	.000	.857	.000	.000	.857	.960
Lights	0	142	0	142	0	0	0	0	285	0	0	285	427
% Lights	0	97.3	0	97.3	0	0	0	0	99.0	0	0	99.0	98.4
Buses	0	3	0	3	0	0	0	0	2	0	0	2	5
% Buses	0	2.1	0	2.1	0	0	0	0	0.7	0	0	0.7	1.2
Trucks	0	1	0	1	0	0	0	0	1	0	0	1	2
% Trucks	0	0.7	0	0.7	0	0	0	0	0.3	0	0	0.3	0.5

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:45 PM													
04:45 PM	0	40	0	40	0	2	0	2	48	1	0	49	91
05:00 PM	0	36	0	36	0	2	0	2	52	0	0	52	90
05:15 PM	1	40	0	41	1								92
05:30 PM	1	39	0	40	0	1	0	1	41	0	0	41	82
Total Volume	2	155	0	157	1	5	0	6	190	2	0	192	355
% App. Total	1.3	98.7	0		16.7	83.3	0		99	1	0		
PHF	.500	.969	.000	.957	.250	.625	.000	.750	.913	.500	.000	.923	.965
Lights	2	154	0	156	1	5	0	6	189	2	0	191	353
% Lights	100	99.4	0	99.4	100	100	0	100	99.5	100	0	99.5	99.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	1	0	1	0	0	0	0	1	0	0	1	2
% Trucks	0	0.6	0	0.6	0	0	0	0	0.5	0	0	0.5	0.6

Groups Printed- Lights - Buses - Trucks

Start Time	Radnor Street Southbound					Walnut Westbound					Radnor Street Northbound					Walnut Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
07:00 AM	9	6	0	0	15	1	0	14	0	15	1	6	2	0	9	1	6	0	0	7	46
07:15 AM	10	3	2	0	15	3	4	44	0	51	0	16	3	0	19	0	1	0	0	1	86
07:30 AM	15	10	1	0	26	2	4	53	0	59	0	5	2	0	7	0	8	0	0	8	100
07:45 AM	20	18	2	0	40	3	4	42	0	49	1	19	5	0	25	1	11	0	0	12	126
Total	54	37	5	0	96	9	12	153	0	174	2	46	12	0	60	2	26	0	0	28	358
08:00 AM	28	15	1	0	44	3	7	56	0	66	2	17	12	0	31	1	10	0	0	11	152
08:15 AM	28	7	0	0	35	2	4	50	0	56	0	16	3	0	19	2	8	0	0	10	120
08:30 AM	14	11	1	0	26	1	5	68	0	74	1	15	5	0	21	3	6	1	0	10	131
08:45 AM	23	9	0	0	32	1	8	45	0	54	0	12	5	0	17	2	5	1	0	8	111
Total	93	42	2	0	137	7	24	219	0	250	3	60	25	0	88	8	29	2	0	39	514
04:00 PM	12	13	2	0	27	4	6	24	0	34	0	21	2	0	23	0	4	0	0	4	88
04:15 PM	33	12	0	0	45	3	4	25	0	32	1	12	3	0	16	1	9	0	0	10	103
04:30 PM	14	12	0	0	26	3	7	36	0	46	2	11	3	0	16	0	11	1	0	12	100
04:45 PM	25	16	1	0	42	1	3	27	0	31	0	22	3	0	25	0	4	1	0	5	103
Total	84	53	3	0	140	11	20	112	0	143	3	66	11	0	80	1	28	2	0	31	394
05:00 PM	15	19	1	0	35	3	9	36	0	48	0	14	1	0	15	2	10	4	0	16	114
05:15 PM	23	18	0	0	41	1	16	33	0	50	3	17	3	0	23	1	4	0	0	5	119
05:30 PM	25	13	2	0	40	3	9	25	0	37	0	15	2	0	17	0	7	0	0	7	101
05:45 PM	20	20	2	0	42	2	9	26	0	37	2	12	3	0	17	1	5	0	0	6	102
Total	83	70	5	0	158	9	43	120	0	172	5	58	9	0	72	4	26	4	0	34	436
Grand Total	314	202	15	0	531	36	99	604	0	739	13	230	57	0	300	15	109	8	0	132	1702
Apprch %	59.1	38	2.8	0		4.9	13.4	81.7	0		4.3	76.7	19	0		11.4	82.6	6.1	0		
Total %	18.4	11.9	0.9	0	31.2	2.1	5.8	35.5	0	43.4	0.8	13.5	3.3	0	17.6	0.9	6.4	0.5	0	7.8	
Lights	308	198	15	0	521	33	98	603	0	734	12	224	50	0	286	15	108	6	0	129	1670
% Lights	98.1	98	100	0	98.1	91.7	99	99.8	0	99.3	92.3	97.4	87.7	0	95.3	100	99.1	75	0	97.7	98.1
Buses	4	3	0	0	7	0	0	0	0	0	0	2	2	0	4	0	0	1	0	1	12
% Buses	1.3	1.5	0	0	1.3	0	0	0	0	0	0	0.9	3.5	0	1.3	0	0	12.5	0	0.8	0.7
Trucks	2	1	0	0	3	3	1	1	0	5	1	4	5	0	10	0	1	1	0	2	20
% Trucks	0.6	0.5	0	0	0.6	8.3	1	0.2	0	0.7	7.7	1.7	8.8	0	3.3	0	0.9	12.5	0	1.5	1.2

Start Time	Radnor Street Southbound					Walnut Westbound					Radnor Street Northbound					Walnut Eastbound					Int. Total
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1 Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	20	18	2	0	40	3	4	42	0	49	1	19	5	0	25	1	11	0	0	12	126
08:00 AM	28	15	1	0	44	3	7	56	0	66	2	17	12	0	31	1	10	0	0	11	152
08:15 AM	28	7	0	0	35	2	4	50	0	56	0	16	3	0	19	2	8	0	0	10	120
08:30 AM	14	11	1	0	26	1	5	68	0	74	1	15	5	0	21	3	6	1	0	10	131
Total Volume	90	51	4	0	145	9	20	216	0	245	4	67	25	0	96	7	35	1	0	43	529
% App. Total	62.1	35.2	2.8	0		3.7	8.2	88.2	0		4.2	69.8	26	0		16.3	81.4	2.3	0		
PHF	.804	.708	.500	.000	.824	.750	.714	.794	.000	.828	.500	.882	.521	.000	.774	.583	.795	.250	.000	.896	.870
Lights	87	49	4	0	140	7	19	215	0	241	4	64	18	0	86	7	35	0	0	42	509
% Lights	96.7	96.1	100	0	96.6	77.8	95.0	99.5	0	98.4	100	95.5	72.0	0	89.6	100	100	0	0	97.7	96.2
Buses	3	1	0	0	4	0	0	0	0	0	0	2	2	0	4	0	0	1	0	1	9
% Buses	3.3	2.0	0	0	2.8	0	0	0	0	0	0	3.0	8.0	0	4.2	0	0	100	0	2.3	1.7
Trucks	0	1	0	0	1	2	1	1	0	4	0	1	5	0	6	0	0	0	0	0	11
% Trucks	0	2.0	0	0	0.7	22.2	5.0	0.5	0	1.6	0	1.5	20.0	0	6.3	0	0	0	0	0	2.1

Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	25				42	1	3	27	0	31	0	22	3		25	0	4	1	0	5	103
05:00 PM	15	19	1	0	35	3	9	36	0	48	0	14	1	0	15	2	10	4	0	16	
05:15 PM	23	18	0	0	41	1	16	33	0	50	3	17	3	0	23	1	4	0	0	5	119
05:30 PM	25	13	2	0	40	3	9	25	0	37	0	15	2	0	17	0	7	0	0	7	101
Total Volume	88	66	4	0	158	8	37	121	0	166	3	68	9	0	80	3	25	5	0	33	437
% App. Total	55.7	41.8	2.5	0		4.8	22.3	72.9	0		3.8	85	11.2	0		9.1	75.8	15.2	0		
PHF	.880	.868	.500	.000	.940	.667	.578	.840	.000	.830	.250	.773	.750	.000	.800	.375	.625	.313	.000	.516	.918
Lights	87	66	4	0	157	8	37	121	0	166	3	67	9	0	79	3	25	5	0	33	435
% Lights	98.9	100	100	0	99.4	100	100	100	0	100	100	98.5	100	0	98.8	100	100	100	0	100	99.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Trucks	1.1	0	0	0	0.6	0	0	0	0	0	0	1.5	0	0	1.3	0	0	0	0	0	0.5

Groups Printed- Lights - Buses - Trucks

Start Time	Paul Southbound				Walnut Westbound				Walnut Eastbound				Int. Total
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	
07:00 AM	8	2	0	10	20	8	1	29	5	10	0	15	54
07:15 AM	8	4	0	12	50	10	0	60	3	10	0	13	85
07:30 AM	23	7	0	30	59	15	0	74	6	19	0	25	129
07:45 AM	17	5	0	22	42	18	0	60	17	24	0	41	123
Total	56	18	0	74	171	51	1	223	31	63	0	94	391
08:00 AM	16	6	0	22	55	26	0	81	15	33	0	48	151
08:15 AM	6	4	0	10	53	22	0	75	12	26	0	38	123
08:30 AM	8	2	0	10	64	27	0	91	7	18	0	25	126
08:45 AM	8	7	0	15	52	12	0	64	5	25	0	30	109
Total	38	19	0	57	224	87	0	311	39	102	0	141	509
04:00 PM	22	6	0	28	29	21	0	50	5	19	0	24	102
04:15 PM	19	7	1	27	27	21	0	48	6	31	0	37	112
04:30 PM	10	6	1	17	38	21	0	59	14	21	0	35	111
04:45 PM	18	2	1	21	28	27	0	55	8	19	0	27	103
Total	69	21	3	93	122	90	0	212	33	90	0	123	428
05:00 PM	18	9	0	27	41	25	0	66	7	20	0	27	120
05:15 PM	19	11	0	30	36	21	0	57	5	26	0	31	118
05:30 PM	12	8	0	20	36	23	0	59	6	24	0	30	109
05:45 PM	19	6	0	25	27	20	0	47	8	20	0	28	100
Total	68	34	0	102	140	89	0	229	26	90	0	116	447
Grand Total	231	92	3	326	657	317	1	975	129	345	0	474	1775
Apprch %	70.9	28.2	0.9		67.4	32.5	0.1		27.2	72.8	0		
Total %	13	5.2	0.2	18.4	37	17.9	0.1	54.9	7.3	19.4	0	26.7	
Lights	223	86	2	311	657	308	1	966	125	343	0	468	1745
% Lights	96.5	93.5	66.7	95.4	100	97.2	100	99.1	96.9	99.4	0	98.7	98.3
Buses	3	1	0	4	0	5	0	5	3	1	0	4	13
% Buses	1.3	1.1	0	1.2	0	1.6	0	0.5	2.3	0.3	0	0.8	0.7
Trucks	5	5	1	11	0	4	0	4	1	1	0	2	17
% Trucks	2.2	5.4	33.3	3.4	0	1.3	0	0.4	0.8	0.3	0	0.4	1

Start Time	Paul Southbound				Walnut Westbound				Walnut Eastbound				Int. Total
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	23	7	0	30	59	15	0	74	6	19	0	25	129
07:45 AM	17	5	0	22	42	18	0	60	17	24	0	41	123
08:00 AM	16	6	0	22	55	26	0	81	15	33	0	48	151
08:15 AM	6	4	0	10	53	22	0	75	12	26	0	38	123
Total Volume	62	22	0	84	209	81	0	290	50	102	0	152	526
% App. Total	73.8	26.2	0		72.1	27.9	0		32.9	67.1	0		
PHF	.674	.786	.000	.700	.886	.779	.000	.895	.735	.773	.000	.792	.871
Lights	59	19	0	78	209	79	0	288	46	101	0	147	513
% Lights	95.2	86.4	0	92.9	100	97.5	0	99.3	92.0	99.0	0	96.7	97.5
Buses	1	1	0	2	0	1	0	1	3	1	0	4	7
% Buses	1.6	4.5	0	2.4	0	1.2	0	0.3	6.0	1.0	0	2.6	1.3
Trucks	2	2	0	4	0	1	0	1	1	0	0	1	6
% Trucks	3.2	9.1	0	4.8	0	1.2	0	0.3	2.0	0	0	0.7	1.1
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	10	6	1	17	38	21	0	59	14	21	0	35	111
04:45 PM	18	2	1	21	28	27	0	55	8	19	0	27	103
05:00 PM	18	9	0	27	41			66	7	20	0	27	120
05:15 PM	19	11	0	30	36	21	0	57	5	26	0	31	118
Total Volume	65	28	2	95	143	94	0	237	34	86	0	120	452
% App. Total	68.4	29.5	2.1		60.3	39.7	0		28.3	71.7	0		
PHF	.855	.636	.500	.792	.872	.870	.000	.898	.607	.827	.000	.857	.942
Lights	63	27	1	91	143	94	0	237	34	85	0	119	447
% Lights	96.9	96.4	50.0	95.8	100	100	0	100	100	98.8	0	99.2	98.9
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	2	1	1	4	0	0	0	0	0	1	0	1	5
% Trucks	3.1	3.6	50.0	4.2	0	0	0	0	0	1.2	0	0.8	1.1

APPENDIX E

Trip Generation & Background Growth

Land Use: 210

Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Virginia.

Source Numbers

100, 105, 114, 126, 157, 167, 177, 197, 207, 211, 217, 267, 275, 293, 300, 319, 320, 356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 903, 925, 936

Single-Family Detached Housing (210)

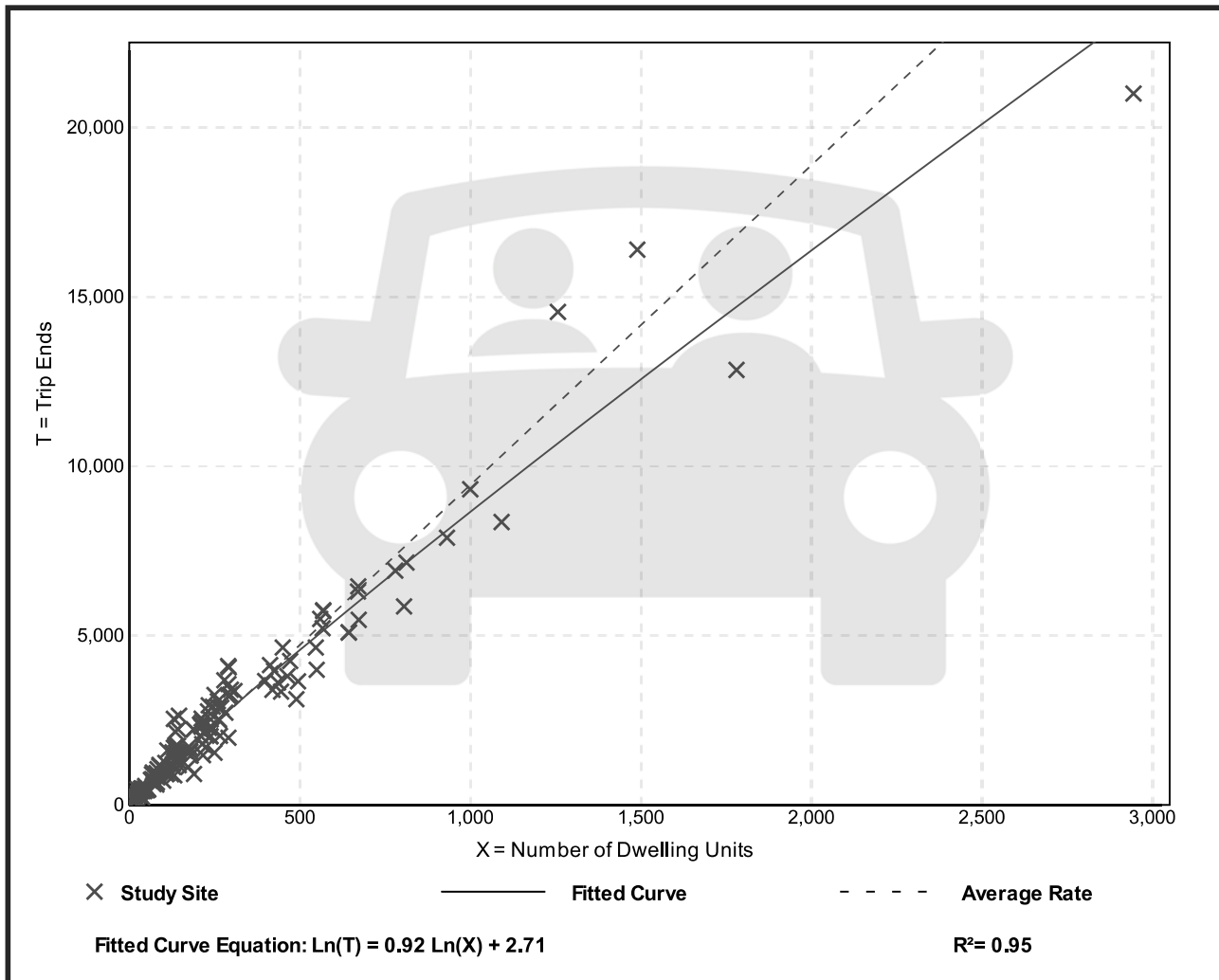
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 173

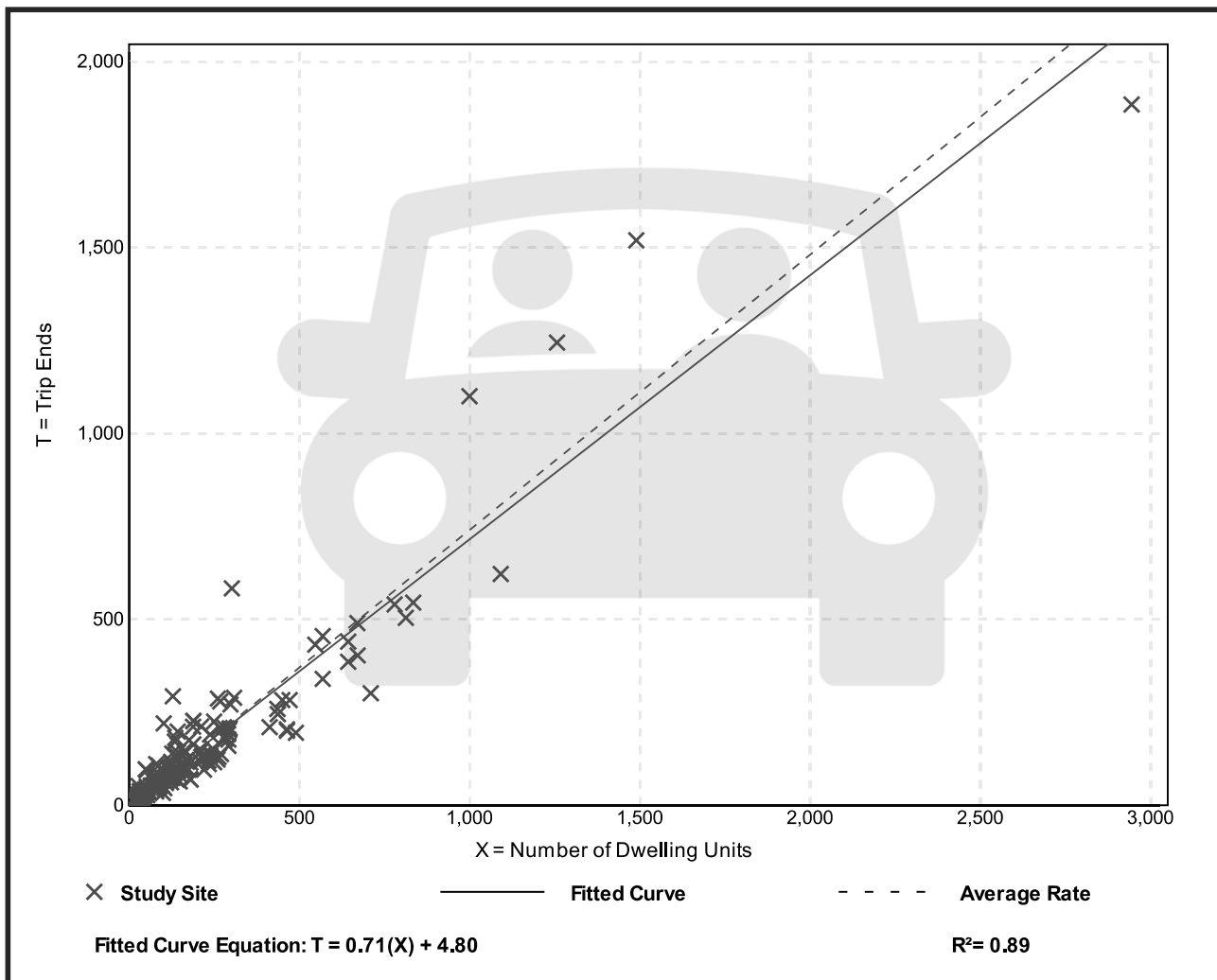
Avg. Num. of Dwelling Units: 219

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

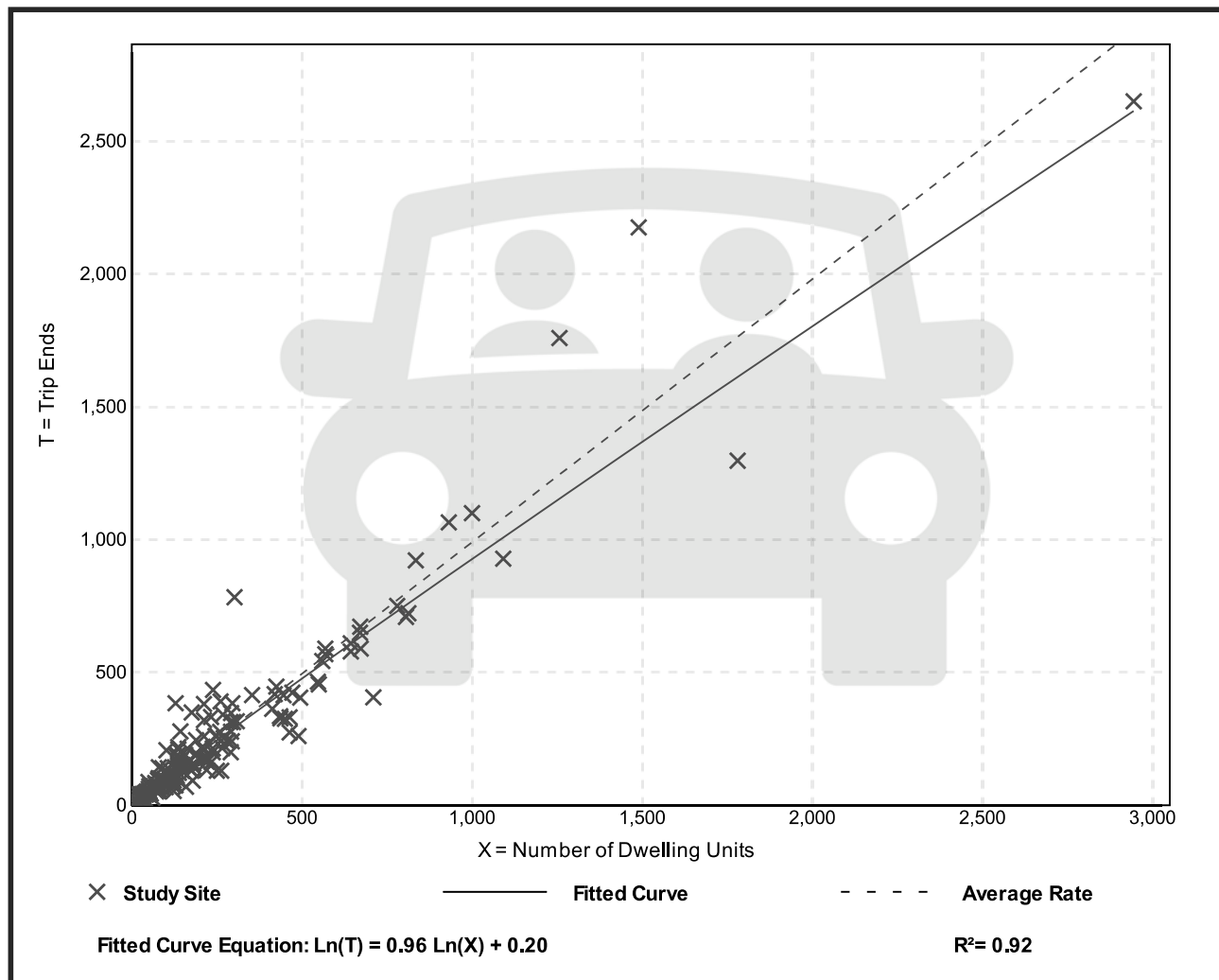
Setting/Location: General Urban/Suburban

Number of Studies: 190
 Avg. Num. of Dwelling Units: 242
 Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



SUBDIVISION OF LAND

255 Attachment 4

Township of Radnor

Trip Generation Rates (4)(5)(6)

Type of Land Use	Type of Development	Average Weekday Generation Rates	Peak-Hour Rates			Peak Shopping Hour Generated Rates		
			A.M. Total	In	P.M. Out	Total	In	Out
Residential	Single-family detached	9.5 per occupied D.U.	0.21	0.77	0.32	1.09	0.29	0.58
	Single-family attached	8.1 per occupied D.U.	0.18	0.65	0.28	0.93	0.25	0.50
	Apartment	6.9 per occupied D.U.	0.15	0.55	0.23	0.78	0.21	0.42
	Mobile home	6.1 per occupied D.U.	0.14	0.49	0.21	0.70	0.18	0.36
	Retirement village	3.3 per occupied D.U.	0.14	0.27	0.11	0.38	0.10	0.20
Commercial	Shopping center							
	Regional (GFA over 400,000 square feet)	33 per 1,000 square feet GFA	0.40	1.70	1.30	3.00	2.50	4.50
	Community (GFA 100,000 to 400,000 square feet)	58 per 1,000 square feet GFA	0.80	2.80	2.10	4.90	3.50	7.00
	Neighborhood (GFA less than 100,000 square feet)	84 per 1,000 square feet GFA	1.00	7.20	6.60	13.80	7.50	14.60
	Freestanding retail store	69 per 1,000 square feet GFA	0.60	4.70	5.00	9.70	5.40	10.90
	Fast-food restaurant	2,100 per restaurant	(2)	1.40	1.20	2.60	1.75	1.40
	Motel	10 per unit	0.30	0.38	0.22	0.60	0.40	0.80
	Medical offices	53 per 1,000 square feet GFA	(2)	2.80	2.80	5.60	1.00	2.00
	Business offices	10.3 per 1,000 square feet GFA	0.20	0.40	1.90	2.30	(1)	(1)
	Single building over 500,000 square feet GFA	4.2 per 1,000 square feet GFA	0.16	0.30	0.13	0.43	(1)	(1)
Industrial	Single building over 500,000 square feet GFA	4.9 per 1,000 square feet GFA	0.45	0.36	0.15	0.51	(1)	(1)
	Warehouse	5.5 per 1,000 square feet GFA	0.57	0.82	0.16	0.55	(1)	(1)
	Colleges	2.5 per student	0.17	0.05	0.12	0.17	(1)	(1)
Institutional	Junior college	1.4 per student	0.17	0.20	0.12	0.17	(1)	(1)
	High schools	1.4 per student	0.21	0.28	(2)	(2)	(1)	(1)
	Elementary schools	0.5 per student	(2)	(2)	(2)	(2)	(1)	(1)
	Hospitals	14 per bed	0.56	0.66	0.24	0.90	0.38	0.91

NOTES:

- (1) Not applicable; Peak coincides with a.m. or p.m. street peak hours.
- (2) Data not available.
- (3) Store peak, noon to 1:00 p.m.
- (4) The rates shall be reviewed biennially by the Township Planner and the Planning Commission for any changes that may be appropriate. The applicant is required to use the rates where applicable. Where the appropriate data is not available, the developer shall provide the rates and document the appropriate source. If the developer requests to use significantly different rates than those given, he shall submit the rates and the specific justification to the Planning Commission prior to submission of the transportation impact study for its approval or denial.
- (5) D.U. – dwelling unit; GFA – gross floor area.
- (6) Sources:
 - A. "Guidelines for Driveway Design and Location," Traffic Engineering, February 1973.
 - B. Trip Generation by Land Use. Maricopa Assoc. of Governments, Urban Area of Maricopa County, Arizona, April 1974.
 - C. Caltrans Progress Reports on Trip Ends Generation Research Counis. Dept. of Transportation, State of California, 1970 through 1974.
 - D. "Trip Generation Study Provides Useful Preliminary Data," Traffic Engineering, March 1974.
 - E. "Traffic Generation and Fast Food Restaurants," Traffic Engineering, March 1975.

Growth Factors for August 2019 to July 2020				
County	Urban Interstate	Rural Interstate	Urban Non-Interstate	Rural Non-Interstate
ADAMS	*	*	0.93	0.73
ALLEGHENY	0.81	*	0.00	0.37
ARMSTRONG	0.79	*	0.00	0.36
BEAVER	0.73	1.93	0.00	0.33
BEDFORD	*	2.10	0.00	0.42
BERKS	1.10	2.41	0.20	0.57
BLAIR	0.75	1.91	0.00	0.36
BRADFORD	1.08	*	0.01	0.49
BUCKS	1.31	2.31	0.54	0.59
BUTLER	1.75	2.74	0.65	0.75
CAMBRIA	0.34	*	0.00	0.18
CAMERON	*	*	*	0.14
CARBON	1.30	2.58	0.33	0.62
CENTRE	1.49	2.53	0.65	0.68
CHESTER	1.70	2.99	0.52	0.80
CLARION	0.90	2.00	0.00	0.40
CLEARFIELD	0.93	2.06	0.00	0.42
CLINTON	0.88	2.21	0.00	0.45
COLUMBIA	1.14	2.25	0.30	0.54
CRAWFORD	0.89	1.96	0.03	0.42
CUMBERLAND	1.53	2.55	0.74	0.69
DAUPHIN	1.31	*	0.41	0.63
DELAWARE	0.93	*	0.00	*
ELK	*	*	0.00	0.29
ERIE	0.95	2.14	0.00	0.43
FAYETTE	0.77	*	0.00	0.38
FOREST	*	*	*	0.65
FRANKLIN	1.31	2.54	0.47	0.65
FULTON	*	2.10	*	0.50
GREENE	1.19	2.62	0.00	0.56
HUNTINGDON	*	1.91	0.00	0.37
INDIANA	1.17	*	0.11	0.52
JEFFERSON	*	2.11	0.00	0.42
JUNIATA	*	*	*	0.55
LACKAWANNA	0.78	2.27	0.00	0.42
LANCASTER	1.74	2.64	1.08	0.78
LAWRENCE	0.74	2.05	0.00	0.35
LEBANON	*	2.44	0.39	0.61
LEHIGH	1.54	2.86	0.43	0.73
LUZERNE	0.71	2.14	0.00	0.39
LYCOMING	0.96	2.16	0.00	0.45
MCKEAN	0.60	*	0.00	0.33
MERCER	0.63	1.96	0.00	0.33
MIFFLIN	0.73	*	0.00	0.37
MONROE	1.40	2.46	0.68	0.67
MONTGOMERY	1.17	*	0.28	0.57
MONTOUR	1.48	2.61	0.28	0.65
NORTHAMPTON	1.28	2.53	0.41	0.63
NORTHUMBERLAND	0.75	2.04	0.00	0.39
PERRY	*	*	0.92	0.63
PHILADELPHIA	0.69	*	0.00	*
PIKE	2.14	2.79	1.59	0.96
POTTER	*	*	*	0.46
SCHUYLKILL	0.58	1.89	0.00	0.33
SNYDER	1.15	*	0.35	0.55
SOMERSET	0.59	1.72	0.00	0.32
SULLIVAN	*	*	*	0.42
SUSQUEHANNA	1.11	2.23	0.27	0.53
TIOGA	*	*	*	0.48
UNION	1.52	2.42	0.82	0.69
VENANGO	*	1.67	0.00	0.28
WARREN	*	*	0.00	0.36
WASHINGTON	1.28	2.62	0.10	0.59
WAYNE	*	2.22	0.16	0.51
WESTMORELAND	0.89	2.05	0.00	0.40
WYOMING	*	*	0.00	0.43
YORK	1.34	2.53	0.54	0.66

* = Functional Class Doesn't Exist in County

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

NOTE: The projected growth factors are derived using historical VMT (Vehicle Miles Traveled) data (1994 to 2018), as well as Woods and Poole demographic and economic data. The factors should be compounded when calculating future values. The factors should not be used to project traffic beyond a 20-year period. Please be aware that these factors are estimates, and unforeseen events (opening of shopping centers, fast food franchises, gas stations, etc) could cause growth to change over time.



This spreadsheet calculates background growth for all non-driveway turning movements in the study area. Driveway movements (& dead-end / cul-de-sac movements) and nonexisting movements are not grown.

PennDOT recommended rate 0.00%
 Utilized rate 0.20%
 Assumed Years of Growth 5 Year: 2025
 Effective Growth Rate Incorporated in Study 1.00%

AM			PM		
	22	22	28	28	
	62	63	65	66	
Walnut &	81	82	94	95	
Paul	209	211	143	144	
	102	103	86	87	
	50	51	34	34	
<hr/>					
	4	4	4	4	
	51	52	66	67	
	90	91	88	89	
	216	218	121	122	
Walnut &	20	20	37	37	
Radnor-Street	9	9	8	8	
	25	25	9	9	
	67	68	68	69	
	4	4	3	3	
	1	1	5	5	
	35	35	25	25	
	7	7	3	3	
<hr/>					
	0	0	2	2	
	133	134	156	158	
	0	0	0	0	
	0	0	1	1	
Beechtree &	0	0	0	0	
Radnor-Street	0	0	0	0	
	0	0	0	0	
	283	286	180	182	
	5	5	14	14	
	10	10	4	4	
	0	0	0	0	
	4	4	4	4	
<hr/>					
	5	5	17	17	
	127	128	143	144	
	140	141	153	155	
	82	83	109	110	
	103	104	142	143	
Eagle &	3	3	4	4	
Radnor-Street	5	5	5	5	
	278	281	160	162	
	5	5	7	7	
	4	4	3	3	
	170	172	128	129	
	21	21	27	27	

















APPENDIX F

Capacity Analyses

HCM 2010 Signalized Intersection Summary

3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	170	4	3	103	82	5	278	5	140	127	5
Future Volume (veh/h)	21	170	4	3	103	82	5	278	5	140	127	5
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	1800	1760	1800	1800	1728	1800	1800	1783	1800	1800	1783	1800
Adj Flow Rate, veh/h	21	170	4	3	103	82	5	278	5	140	127	5
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	5	5	5	1	1	1	1	1	1
Cap, veh/h	113	638	14	76	359	280	77	694	12	375	307	11
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	83	1596	35	6	897	699	9	1734	31	665	768	27
Grp Volume(v), veh/h	195	0	0	188	0	0	288	0	0	272	0	0
Grp Sat Flow(s),veh/h/ln	1714	0	0	1602	0	0	1774	0	0	1460	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.8	0.0	0.0	4.0	0.0	0.0	5.8	0.0	0.0	5.6	0.0	0.0
Prop In Lane	0.11		0.02	0.02		0.44	0.02		0.02	0.51		0.02
Lane Grp Cap(c), veh/h	765	0	0	714	0	0	783	0	0	693	0	0
V/C Ratio(X)	0.25	0.00	0.00	0.26	0.00	0.00	0.37	0.00	0.00	0.39	0.00	0.00
Avail Cap(c_a), veh/h	765	0	0	714	0	0	783	0	0	693	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.1	0.0	0.0	10.2	0.0	0.0	10.7	0.0	0.0	10.7	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.9	0.0	0.0	1.3	0.0	0.0	1.7	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	3.5	0.0	0.0	3.4	0.0	0.0	5.6	0.0	0.0	5.3	0.0	0.0
LnGrp Delay(d),s/veh	10.9	0.0	0.0	11.1	0.0	0.0	12.1	0.0	0.0	12.3	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		195			188			288			272	
Approach Delay, s/veh		10.9			11.1			12.1			12.3	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.8		7.6		6.0		7.8				
Green Ext Time (p_c), s		0.9		1.4		0.9		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay				11.7								
HCM 2010 LOS				B								

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	10	1	0	0	5	283	0	1	133	0
Future Vol, veh/h	4	0	10	1	0	0	5	283	0	1	133	0
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	0	17	0	0	0	0	1	0	0	2	0
Mvmt Flow	4	0	10	1	0	0	5	292	0	1	137	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.5	8.1	9.1	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	29%	100%	1%
Vol Thru, %	98%	0%	0%	99%
Vol Right, %	0%	71%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	288	14	1	134
LT Vol	5	4	1	1
Through Vol	283	0	0	133
RT Vol	0	10	0	0
Lane Flow Rate	297	14	1	138
Geometry Grp	1	1	1	1
Degree of Util (X)	0.333	0.018	0.001	0.159
Departure Headway (Hd)	4.034	4.454	5.048	4.15
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	888	809	713	855
Service Time	2.074	2.454	3.049	2.219
HCM Lane V/C Ratio	0.334	0.017	0.001	0.161
HCM Control Delay	9.1	7.5	8.1	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.5	0.1	0	0.6

Intersection

Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	35	1	9	20	216	4	67	25	90	51	4
Future Vol, veh/h	7	35	1	9	20	216	4	67	25	90	51	4
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, %	0	0	0	22	5	1	0	5	28	3	4	0
Mvmt Flow	8	40	1	10	23	248	5	77	29	103	59	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	10	8.6	9.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	16%	4%	62%
Vol Thru, %	70%	81%	8%	35%
Vol Right, %	26%	2%	88%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	43	245	145
LT Vol	4	7	9	90
Through Vol	67	35	20	51
RT Vol	25	1	216	4
Lane Flow Rate	110	49	282	167
Geometry Grp	1	1	1	1
Degree of Util (X)	0.145	0.068	0.351	0.23
Departure Headway (Hd)	4.741	4.935	4.493	4.966
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	753	722	800	720
Service Time	2.794	2.992	2.533	3.015
HCM Lane V/C Ratio	0.146	0.068	0.353	0.232
HCM Control Delay	8.6	8.4	10	9.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.2	1.6	0.9

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	50	102	209	81	62	22
Future Vol, veh/h	50	102	209	81	62	22
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, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	8	1	0	2	5	14
Mvmt Flow	57	117	240	93	71	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	333	0	-	0	518 287
Stage 1	-	-	-	-	287 -
Stage 2	-	-	-	-	231 -
Critical Hdwy	4.3	-	-	-	6.45 6.2
Critical Hdwy Stg 1	-	-	-	-	5.45 -
Critical Hdwy Stg 2	-	-	-	-	5.45 -
Follow-up Hdwy	3	-	-	-	3.1 3
Pot Cap-1 Maneuver	923	-	-	-	569 823
Stage 1	-	-	-	-	849 -
Stage 2	-	-	-	-	903 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	923	-	-	-	531 823
Mov Cap-2 Maneuver	-	-	-	-	531 -
Stage 1	-	-	-	-	793 -
Stage 2	-	-	-	-	903 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	923	-	-	-	585
HCM Lane V/C Ratio	0.062	-	-	-	0.165
HCM Control Delay (s)	9.2	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.6

HCM 2010 TWSC
7: Radnor Street & Parking Lot

03/21/2020

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	1	288	0	1	146
Future Vol, veh/h	0	1	288	0	1	146
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, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	0	0	3
Mvmt Flow	0	1	300	0	1	152

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	454	300	0	0	300
Stage 1	300	-	-	-	-
Stage 2	154	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	643	786	-	-	948
Stage 1	865	-	-	-	-
Stage 2	1015	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	642	786	-	-	948
Mov Cap-2 Maneuver	642	-	-	-	-
Stage 1	864	-	-	-	-
Stage 2	1015	-	-	-	-

















Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	786	948
HCM Lane V/C Ratio	-	-	0.001	0.001
HCM Control Delay (s)	-	-	9.6	8.8
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 2010 Signalized Intersection Summary

3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	128	3	4	142	109	7	160	5	153	143	17
Future Volume (veh/h)	27	128	3	4	142	109	7	160	5	153	143	17
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	1800	1771	1800	1800	1792	1800	1800	1783	1800	1800	1786	1800
Adj Flow Rate, veh/h	28	132	3	4	146	112	7	165	5	158	147	18
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
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
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	1	1	1
Cap, veh/h	150	591	12	76	378	285	84	677	20	364	309	33
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	163	1477	31	7	946	711	22	1693	50	643	772	84
Grp Volume(v), veh/h	163	0	0	262	0	0	177	0	0	323	0	0
Grp Sat Flow(s),veh/h/ln	1671	0	0	1664	0	0	1765	0	0	1499	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0
Cycle Q Clear(g_c), s	3.1	0.0	0.0	5.6	0.0	0.0	3.3	0.0	0.0	7.7	0.0	0.0
Prop In Lane	0.17		0.02	0.02		0.43	0.04		0.03	0.49		0.06
Lane Grp Cap(c), veh/h	753	0	0	739	0	0	781	0	0	707	0	0
V/C Ratio(X)	0.22	0.00	0.00	0.35	0.00	0.00	0.23	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	753	0	0	739	0	0	781	0	0	707	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.9	0.0	0.0	10.7	0.0	0.0	10.0	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	1.3	0.0	0.0	0.7	0.0	0.0	2.1	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	2.9	0.0	0.0	5.1	0.0	0.0	3.2	0.0	0.0	6.7	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	12.0	0.0	0.0	10.7	0.0	0.0	13.3	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		163			262			177			323	
Approach Delay, s/veh		10.6			12.0			10.7			13.3	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.1		9.7		7.6		5.3				
Green Ext Time (p_c), s		0.7		1.4		1.2		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				11.9								
HCM 2010 LOS				B								

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	4	1	0	1	14	180	0	1	156	2
Future Vol, veh/h	4	0	4	1	0	1	14	180	0	1	156	2
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	0	0	0	0	0	7	1	0	0	1	0
Mvmt Flow	4	0	4	1	0	1	14	186	0	1	161	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.5	7.5	8.5	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	50%	50%	1%
Vol Thru, %	93%	0%	0%	98%
Vol Right, %	0%	50%	50%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	194	8	2	159
LT Vol	14	4	1	1
Through Vol	180	0	0	156
RT Vol	0	4	1	2
Lane Flow Rate	200	8	2	164
Geometry Grp	1	1	1	1
Degree of Util (X)	0.232	0.01	0.003	0.185
Departure Headway (Hd)	4.173	4.488	4.497	4.06
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	858	802	801	877
Service Time	2.214	2.489	2.497	2.114
HCM Lane V/C Ratio	0.233	0.01	0.002	0.187
HCM Control Delay	8.5	7.5	7.5	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0	0	0.7

Intersection

Intersection Delay, s/veh 8.4
Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	25	5	8	37	121	3	68	9	88	66	4
Future Vol, veh/h	3	25	5	8	37	121	3	68	9	88	66	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	1	0	0
Mvmt Flow	3	27	5	9	40	132	3	74	10	96	72	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	8.2	8.1	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	9%	5%	56%
Vol Thru, %	85%	76%	22%	42%
Vol Right, %	11%	15%	73%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	33	166	158
LT Vol	3	3	8	88
Through Vol	68	25	37	66
RT Vol	9	5	121	4
Lane Flow Rate	87	36	180	172
Geometry Grp	1	1	1	1
Degree of Util (X)	0.109	0.046	0.207	0.219
Departure Headway (Hd)	4.51	4.631	4.121	4.581
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	795	773	872	785
Service Time	2.537	2.66	2.142	2.607
HCM Lane V/C Ratio	0.109	0.047	0.206	0.219
HCM Control Delay	8.1	7.9	8.2	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.8	0.8

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Vol, veh/h	34	86	143	94	65	28
Future Vol, veh/h	34	86	143	94	65	28
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, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	1	0	0	4	3
Mvmt Flow	36	91	152	100	69	30

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	252	0	-	0	365
Stage 1	-	-	-	-	202
Stage 2	-	-	-	-	163
Critical Hdwy	4.3	-	-	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	3	-	-	-	3.1
Pot Cap-1 Maneuver	985	-	-	-	704
Stage 1	-	-	-	-	932
Stage 2	-	-	-	-	973
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	985	-	-	-	677
Mov Cap-2 Maneuver	-	-	-	-	677
Stage 1	-	-	-	-	896
Stage 2	-	-	-	-	973

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	985	-	-	-	736
HCM Lane V/C Ratio	0.037	-	-	-	0.134
HCM Control Delay (s)	8.8	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

HCM 2010 TWSC
7: Radnor Street & Parking Lot

03/21/2020

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	5	190	2	2	155
Future Vol, veh/h	1	5	190	2	2	155
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, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	0	0	0
Mvmt Flow	1	5	198	2	2	161

















Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	364	199	0	0	200
Stage 1	199	-	-	-	-
Stage 2	165	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	728	897	-	-	1026
Stage 1	966	-	-	-	-
Stage 2	1003	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	727	897	-	-	1026
Mov Cap-2 Maneuver	727	-	-	-	-
Stage 1	964	-	-	-	-
Stage 2	1003	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	863	1026
HCM Lane V/C Ratio	-	-	0.007	0.002
HCM Control Delay (s)	-	-	9.2	8.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 2010 Signalized Intersection Summary
 3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	172	4	3	104	83	5	281	5	141	128	5
Future Volume (veh/h)	21	172	4	3	104	83	5	281	5	141	128	5
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	1800	1760	1800	1800	1729	1800	1800	1783	1800	1800	1783	1800
Adj Flow Rate, veh/h	21	172	4	3	104	83	5	281	5	141	128	5
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	5	5	5	1	1	1	1	1	1
Cap, veh/h	112	639	14	76	358	280	77	694	12	374	307	11
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	82	1598	35	6	896	700	9	1734	30	663	766	27
Grp Volume(v), veh/h	197	0	0	190	0	0	291	0	0	274	0	0
Grp Sat Flow(s),veh/h/ln	1714	0	0	1602	0	0	1774	0	0	1456	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.8	0.0	0.0	4.0	0.0	0.0	5.9	0.0	0.0	5.7	0.0	0.0
Prop In Lane	0.11		0.02	0.02		0.44	0.02		0.02	0.51		0.02
Lane Grp Cap(c), veh/h	765	0	0	714	0	0	783	0	0	692	0	0
V/C Ratio(X)	0.26	0.00	0.00	0.27	0.00	0.00	0.37	0.00	0.00	0.40	0.00	0.00
Avail Cap(c_a), veh/h	765	0	0	714	0	0	783	0	0	692	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.1	0.0	0.0	10.2	0.0	0.0	10.8	0.0	0.0	10.7	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.9	0.0	0.0	1.4	0.0	0.0	1.7	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	3.6	0.0	0.0	3.5	0.0	0.0	5.6	0.0	0.0	5.4	0.0	0.0
LnGrp Delay(d),s/veh	11.0	0.0	0.0	11.1	0.0	0.0	12.1	0.0	0.0	12.4	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		197			190			291				274
Approach Delay, s/veh		11.0			11.1			12.1				12.4
Approach LOS		B			B			B				B
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.8		7.7		6.0		7.9				
Green Ext Time (p_c), s		0.9		1.4		0.9		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay				11.8								
HCM 2010 LOS				B								

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	10	1	0	0	5	286	0	1	134	0
Future Vol, veh/h	4	0	10	1	0	0	5	286	0	1	134	0
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	0	17	0	0	0	0	1	0	0	2	0
Mvmt Flow	4	0	10	1	0	0	5	295	0	1	138	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.5	8.1	9.1	8
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	29%	100%	1%
Vol Thru, %	98%	0%	0%	99%
Vol Right, %	0%	71%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	14	1	135
LT Vol	5	4	1	1
Through Vol	286	0	0	134
RT Vol	0	10	0	0
Lane Flow Rate	300	14	1	139
Geometry Grp	1	1	1	1
Degree of Util (X)	0.336	0.018	0.001	0.161
Departure Headway (Hd)	4.035	4.463	5.057	4.153
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	888	807	712	855
Service Time	2.076	2.463	3.058	2.221
HCM Lane V/C Ratio	0.338	0.017	0.001	0.163
HCM Control Delay	9.1	7.5	8.1	8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.5	0.1	0	0.6

Intersection

Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	35	1	9	20	218	4	68	25	91	52	4
Future Vol, veh/h	7	35	1	9	20	218	4	68	25	91	52	4
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, %	0	0	0	22	5	1	0	5	28	3	4	0
Mvmt Flow	8	40	1	10	23	251	5	78	29	105	60	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	10	8.6	9.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	16%	4%	62%
Vol Thru, %	70%	81%	8%	35%
Vol Right, %	26%	2%	88%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	97	43	247	147
LT Vol	4	7	9	91
Through Vol	68	35	20	52
RT Vol	25	1	218	4
Lane Flow Rate	111	49	284	169
Geometry Grp	1	1	1	1
Degree of Util (X)	0.147	0.068	0.355	0.233
Departure Headway (Hd)	4.752	4.947	4.5	4.973
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	750	720	798	720
Service Time	2.807	3.006	2.542	3.025
HCM Lane V/C Ratio	0.148	0.068	0.356	0.235
HCM Control Delay	8.6	8.4	10	9.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.2	1.6	0.9

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	51	103	211	82	63	22
Future Vol, veh/h	51	103	211	82	63	22
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, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	8	1	0	2	5	14
Mvmt Flow	59	118	243	94	72	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	337	0	-	0	526 290
Stage 1	-	-	-	-	290 -
Stage 2	-	-	-	-	236 -
Critical Hdwy	4.3	-	-	-	6.45 6.2
Critical Hdwy Stg 1	-	-	-	-	5.45 -
Critical Hdwy Stg 2	-	-	-	-	5.45 -
Follow-up Hdwy	3	-	-	-	3.1 3
Pot Cap-1 Maneuver	920	-	-	-	563 820
Stage 1	-	-	-	-	846 -
Stage 2	-	-	-	-	898 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	920	-	-	-	524 820
Mov Cap-2 Maneuver	-	-	-	-	524 -
Stage 1	-	-	-	-	788 -
Stage 2	-	-	-	-	898 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	920	-	-	-	578
HCM Lane V/C Ratio	0.064	-	-	-	0.169
HCM Control Delay (s)	9.2	0	-	-	12.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.6

HCM 2010 TWSC
7: Radnor Street & Parking Lot

03/21/2020

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	0	1	291	0	1	147
Future Vol, veh/h	0	1	291	0	1	147
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, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	0	0	3
Mvmt Flow	0	1	303	0	1	153

















Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	458	303	0	0	303	0
Stage 1	303	-	-	-	-	-
Stage 2	155	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.3	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3	-
Pot Cap-1 Maneuver	639	783	-	-	946	-
Stage 1	862	-	-	-	-	-
Stage 2	1014	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	638	783	-	-	946	-
Mov Cap-2 Maneuver	638	-	-	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	1014	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	783	946
HCM Lane V/C Ratio	-	-	0.001	0.001
HCM Control Delay (s)	-	-	9.6	8.8
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 2010 Signalized Intersection Summary
 3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	129	3	4	143	110	7	162	5	155	144	17
Future Volume (veh/h)	27	129	3	4	143	110	7	162	5	155	144	17
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	1800	1771	1800	1800	1792	1800	1800	1783	1800	1800	1786	1800
Adj Flow Rate, veh/h	28	133	3	4	147	113	7	167	5	160	148	18
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
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
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	1	1	1
Cap, veh/h	149	592	12	76	378	285	84	677	20	365	308	33
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	162	1480	31	7	945	712	22	1694	49	645	770	83
Grp Volume(v), veh/h	164	0	0	264	0	0	179	0	0	326	0	0
Grp Sat Flow(s),veh/h/ln	1672	0	0	1664	0	0	1765	0	0	1498	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0
Cycle Q Clear(g_c), s	3.1	0.0	0.0	5.6	0.0	0.0	3.4	0.0	0.0	7.8	0.0	0.0
Prop In Lane	0.17		0.02	0.02		0.43	0.04		0.03	0.49		0.06
Lane Grp Cap(c), veh/h	753	0	0	739	0	0	781	0	0	706	0	0
V/C Ratio(X)	0.22	0.00	0.00	0.36	0.00	0.00	0.23	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	753	0	0	739	0	0	781	0	0	706	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.9	0.0	0.0	10.7	0.0	0.0	10.0	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	1.3	0.0	0.0	0.7	0.0	0.0	2.2	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	2.9	0.0	0.0	5.1	0.0	0.0	3.2	0.0	0.0	6.8	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	12.0	0.0	0.0	10.7	0.0	0.0	13.4	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		164			264			179			326	
Approach Delay, s/veh		10.6			12.0			10.7			13.4	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.1		9.8		7.6		5.4				
Green Ext Time (p_c), s		0.7		1.4		1.2		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				12.0								
HCM 2010 LOS				B								

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	4	1	0	1	14	182	0	1	158	2
Future Vol, veh/h	4	0	4	1	0	1	14	182	0	1	158	2
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	0	0	0	0	0	7	1	0	0	1	0
Mvmt Flow	4	0	4	1	0	1	14	188	0	1	163	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.5	7.5	8.5	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	50%	50%	1%
Vol Thru, %	93%	0%	0%	98%
Vol Right, %	0%	50%	50%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	196	8	2	161
LT Vol	14	4	1	1
Through Vol	182	0	0	158
RT Vol	0	4	1	2
Lane Flow Rate	202	8	2	166
Geometry Grp	1	1	1	1
Degree of Util (X)	0.234	0.01	0.003	0.187
Departure Headway (Hd)	4.175	4.496	4.504	4.062
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	857	801	799	878
Service Time	2.216	2.497	2.504	2.115
HCM Lane V/C Ratio	0.236	0.01	0.003	0.189
HCM Control Delay	8.5	7.5	7.5	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0	0	0.7

Intersection

Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	25	5	8	37	122	3	69	9	89	67	4
Future Vol, veh/h	3	25	5	8	37	122	3	69	9	89	67	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	1	0	0
Mvmt Flow	3	27	5	9	40	133	3	75	10	97	73	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	8.2	8.1	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	9%	5%	56%
Vol Thru, %	85%	76%	22%	42%
Vol Right, %	11%	15%	73%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	81	33	167	160
LT Vol	3	3	8	89
Through Vol	69	25	37	67
RT Vol	9	5	122	4
Lane Flow Rate	88	36	182	174
Geometry Grp	1	1	1	1
Degree of Util (X)	0.11	0.046	0.208	0.221
Departure Headway (Hd)	4.514	4.64	4.128	4.585
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	794	772	871	784
Service Time	2.542	2.667	2.147	2.61
HCM Lane V/C Ratio	0.111	0.047	0.209	0.222
HCM Control Delay	8.1	7.9	8.2	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.8	0.8

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	34	87	144	95	66	28
Future Vol, veh/h	34	87	144	95	66	28
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, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	1	0	0	4	3
Mvmt Flow	36	93	153	101	70	30

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	254	0	0	369	204
Stage 1	-	-	-	204	-
Stage 2	-	-	-	165	-
Critical Hdwy	4.3	-	-	6.44	6.2
Critical Hdwy Stg 1	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	5.44	-
Follow-up Hdwy	3	-	-	3.1	3
Pot Cap-1 Maneuver	983	-	-	701	918
Stage 1	-	-	-	930	-
Stage 2	-	-	-	971	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	983	-	-	674	918
Mov Cap-2 Maneuver	-	-	-	674	-
Stage 1	-	-	-	894	-
Stage 2	-	-	-	971	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	983	-	-	-	732
HCM Lane V/C Ratio	0.037	-	-	-	0.137
HCM Control Delay (s)	8.8	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	1	5	192	2	2	157
Future Vol, veh/h	1	5	192	2	2	157
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, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	1	0	0	0
Mvmt Flow	1	5	200	2	2	164

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	369	201	0	0	202
Stage 1	201	-	-	-	-
Stage 2	168	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.3
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3	3.1	-	-	3
Pot Cap-1 Maneuver	723	895	-	-	1024
Stage 1	964	-	-	-	-
Stage 2	1000	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	722	895	-	-	1024
Mov Cap-2 Maneuver	722	-	-	-	-
Stage 1	962	-	-	-	-
Stage 2	1000	-	-	-	-

















Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	861	1024
HCM Lane V/C Ratio	-	-	0.007	0.002
HCM Control Delay (s)	-	-	9.2	8.5
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

HCM 2010 Signalized Intersection Summary

3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	172	5	4	104	83	7	285	8	141	129	5
Future Volume (veh/h)	21	172	5	4	104	83	7	285	8	141	129	5
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	1800	1760	1800	1800	1726	1800	1800	1783	1800	1800	1782	1800
Adj Flow Rate, veh/h	21	172	5	4	104	83	7	285	8	141	129	5
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	5	5	5	1	1	1	1	1	1
Cap, veh/h	112	635	17	77	358	278	79	684	19	371	306	11
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	81	1589	43	9	895	695	13	1709	47	656	766	26
Grp Volume(v), veh/h	198	0	0	191	0	0	300	0	0	275	0	0
Grp Sat Flow(s),veh/h/ln	1713	0	0	1599	0	0	1769	0	0	1448	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.8	0.0	0.0	4.1	0.0	0.0	6.1	0.0	0.0	5.8	0.0	0.0
Prop In Lane	0.11		0.03	0.02		0.43	0.02		0.03	0.51		0.02
Lane Grp Cap(c), veh/h	765	0	0	713	0	0	781	0	0	688	0	0
V/C Ratio(X)	0.26	0.00	0.00	0.27	0.00	0.00	0.38	0.00	0.00	0.40	0.00	0.00
Avail Cap(c_a), veh/h	765	0	0	713	0	0	781	0	0	688	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.1	0.0	0.0	10.2	0.0	0.0	10.8	0.0	0.0	10.7	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.9	0.0	0.0	1.4	0.0	0.0	1.7	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	3.6	0.0	0.0	3.5	0.0	0.0	5.8	0.0	0.0	5.4	0.0	0.0
LnGrp Delay(d),s/veh	11.0	0.0	0.0	11.1	0.0	0.0	12.3	0.0	0.0	12.4	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		198			191			300			275	
Approach Delay, s/veh		11.0			11.1			12.3			12.4	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.8		7.8		6.1		8.1				
Green Ext Time (p_c), s		0.9		1.4		0.9		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay				11.8								
HCM 2010 LOS				B								

Intersection

Intersection Delay, s/veh 8.8

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	10	5	0	9	5	286	2	3	134	0
Future Vol, veh/h	4	0	10	5	0	9	5	286	2	3	134	0
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	0	17	0	0	0	0	1	0	0	2	0
Mvmt Flow	4	0	10	5	0	9	5	295	2	3	138	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.6	9.2	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	2%	29%	36%	2%
Vol Thru, %	98%	0%	0%	98%
Vol Right, %	1%	71%	64%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	293	14	14	137
LT Vol	5	4	5	3
Through Vol	286	0	0	134
RT Vol	2	10	9	0
Lane Flow Rate	302	14	14	141
Geometry Grp	1	1	1	1
Degree of Util (X)	0.34	0.018	0.018	0.164
Departure Headway (Hd)	4.056	4.493	4.551	4.181
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	882	801	791	846
Service Time	2.109	2.495	2.552	2.263
HCM Lane V/C Ratio	0.342	0.017	0.018	0.167
HCM Control Delay	9.2	7.6	7.6	8.1
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.5	0.1	0.1	0.6

Intersection

Intersection Delay, s/veh 9.6

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	35	1	9	20	219	4	69	25	95	53	4
Future Vol, veh/h	7	35	1	9	20	219	4	69	25	95	53	4
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, %	0	0	0	22	5	1	0	5	28	3	4	0
Mvmt Flow	8	40	1	10	23	252	5	79	29	109	61	5
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	10.1	8.7	9.6
HCM LOS	A	B	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	16%	4%	62%
Vol Thru, %	70%	81%	8%	35%
Vol Right, %	26%	2%	88%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	43	248	152
LT Vol	4	7	9	95
Through Vol	69	35	20	53
RT Vol	25	1	219	4
Lane Flow Rate	113	49	285	175
Geometry Grp	1	1	1	1
Degree of Util (X)	0.149	0.068	0.358	0.242
Departure Headway (Hd)	4.765	4.969	4.519	4.981
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	748	716	792	718
Service Time	2.824	3.032	2.562	3.035
HCM Lane V/C Ratio	0.151	0.068	0.36	0.244
HCM Control Delay	8.7	8.4	10.1	9.6
HCM Lane LOS	A	A	B	A
HCM 95th-tile Q	0.5	0.2	1.6	0.9

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	↷
Traffic Vol, veh/h	52	106	212	82	63	22
Future Vol, veh/h	52	106	212	82	63	22
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, %	-	0	0	-	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	8	1	0	2	5	14
Mvmt Flow	60	122	244	94	72	25

















Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	338	0	-	0	533 291
Stage 1	-	-	-	-	291 -
Stage 2	-	-	-	-	242 -
Critical Hdwy	4.3	-	-	-	6.45 6.2
Critical Hdwy Stg 1	-	-	-	-	5.45 -
Critical Hdwy Stg 2	-	-	-	-	5.45 -
Follow-up Hdwy	3	-	-	-	3.1 3
Pot Cap-1 Maneuver	920	-	-	-	557 819
Stage 1	-	-	-	-	845 -
Stage 2	-	-	-	-	892 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	920	-	-	-	518 819
Mov Cap-2 Maneuver	-	-	-	-	518 -
Stage 1	-	-	-	-	786 -
Stage 2	-	-	-	-	892 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	920	-	-	-	572
HCM Lane V/C Ratio	0.065	-	-	-	0.171
HCM Control Delay (s)	9.2	0	-	-	12.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.6

HCM 2010 Signalized Intersection Summary
 3: Radnor Street & Eagle

03/21/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	129	5	7	143	110	8	164	7	155	148	17
Future Volume (veh/h)	27	129	5	7	143	110	8	164	7	155	148	17
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	1800	1772	1800	1800	1792	1800	1800	1784	1800	1800	1786	1800
Adj Flow Rate, veh/h	28	133	5	7	147	113	8	169	7	160	153	18
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
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
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	1	1	1
Cap, veh/h	147	585	20	79	378	281	85	667	27	360	314	33
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	158	1462	50	14	945	704	25	1668	67	634	785	82
Grp Volume(v), veh/h	166	0	0	267	0	0	184	0	0	331	0	0
Grp Sat Flow(s),veh/h/ln	1670	0	0	1662	0	0	1760	0	0	1501	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
Cycle Q Clear(g_c), s	3.1	0.0	0.0	5.7	0.0	0.0	3.5	0.0	0.0	7.9	0.0	0.0
Prop In Lane	0.17		0.03	0.03		0.42	0.04		0.04	0.48		0.05
Lane Grp Cap(c), veh/h	752	0	0	739	0	0	779	0	0	707	0	0
V/C Ratio(X)	0.22	0.00	0.00	0.36	0.00	0.00	0.24	0.00	0.00	0.47	0.00	0.00
Avail Cap(c_a), veh/h	752	0	0	739	0	0	779	0	0	707	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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.9	0.0	0.0	10.7	0.0	0.0	10.0	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	1.4	0.0	0.0	0.7	0.0	0.0	2.2	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	3.0	0.0	0.0	5.2	0.0	0.0	3.3	0.0	0.0	6.9	0.0	0.0
LnGrp Delay(d),s/veh	10.6	0.0	0.0	12.1	0.0	0.0	10.8	0.0	0.0	13.5	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		166			267			184			331	
Approach Delay, s/veh		10.6			12.1			10.8			13.5	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		25.0		25.0		25.0		25.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		19.0		19.0		19.0		19.0				
Max Q Clear Time (g_c+I1), s		5.1		9.9		7.7		5.5				
Green Ext Time (p_c), s		0.7		1.4		1.2		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				12.0								
HCM 2010 LOS				B								

Intersection												
Intersection Delay, s/veh	8.4											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	4	3	0	5	14	182	5	9	158	2
Future Vol, veh/h	4	0	4	3	0	5	14	182	5	9	158	2
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	0	0	0	0	0	7	1	0	0	1	0
Mvmt Flow	4	0	4	3	0	5	14	188	5	9	163	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.5	8.6	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	50%	38%	5%
Vol Thru, %	91%	0%	0%	93%
Vol Right, %	2%	50%	62%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	201	8	8	169
LT Vol	14	4	3	9
Through Vol	182	0	0	158
RT Vol	5	4	5	2
Lane Flow Rate	207	8	8	174
Geometry Grp	1	1	1	1
Degree of Util (X)	0.24	0.01	0.01	0.198
Departure Headway (Hd)	4.176	4.535	4.434	4.085
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	856	794	812	871
Service Time	2.224	2.535	2.434	2.145
HCM Lane V/C Ratio	0.242	0.01	0.01	0.2
HCM Control Delay	8.6	7.6	7.5	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0	0	0.7

Intersection

Intersection Delay, s/veh 8.5

Intersection LOS A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	25	5	8	37	126	3	70	9	91	68	4
Future Vol, veh/h	3	25	5	8	37	126	3	70	9	91	68	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	1	0	0
Mvmt Flow	3	27	5	9	40	137	3	76	10	99	74	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	8.3	8.1	9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	9%	5%	56%
Vol Thru, %	85%	76%	22%	42%
Vol Right, %	11%	15%	74%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	82	33	171	163
LT Vol	3	3	8	91
Through Vol	70	25	37	68
RT Vol	9	5	126	4
Lane Flow Rate	89	36	186	177
Geometry Grp	1	1	1	1
Degree of Util (X)	0.112	0.046	0.213	0.226
Departure Headway (Hd)	4.53	4.657	4.135	4.597
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	791	769	870	781
Service Time	2.558	2.686	2.156	2.622
HCM Lane V/C Ratio	0.113	0.047	0.214	0.227
HCM Control Delay	8.1	7.9	8.3	9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.8	0.9

Intersection						
Int Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Vol, veh/h	35	88	147	95	66	29
Future Vol, veh/h	35	88	147	95	66	29
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, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	1	0	0	4	3
Mvmt Flow	37	94	156	101	70	31

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	257	0	-	0	375
Stage 1	-	-	-	-	207
Stage 2	-	-	-	-	168
Critical Hdwy	4.3	-	-	-	6.44
Critical Hdwy Stg 1	-	-	-	-	5.44
Critical Hdwy Stg 2	-	-	-	-	5.44
Follow-up Hdwy	3	-	-	-	3.1
Pot Cap-1 Maneuver	981	-	-	-	695
Stage 1	-	-	-	-	927
Stage 2	-	-	-	-	968
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	981	-	-	-	667
Mov Cap-2 Maneuver	-	-	-	-	667
Stage 1	-	-	-	-	890
Stage 2	-	-	-	-	968

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	981	-	-	-	727
HCM Lane V/C Ratio	0.038	-	-	-	0.139
HCM Control Delay (s)	8.8	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

APPENDIX G

Auxiliary Turn Lane Warrant Analyses

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Radnor	Analysis Date: 3/20/2020
County: Delaware County	Conducted By: FT
PennDOT Engineering District: 6	Checked By: NB Approach
	Agency/Company Name: FTA
Intersection & Approach Description: Radnor Street & Site Driveway	
Analysis Period: 2025	Number of Approach Lanes: 1
Design Hour: PM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	
Posted Speed Limit (MPH): 25	Type of Analysis
Type of Terrain: Level	Left or Right-Turn Lane Analysis?: Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes		0.0%	N/A
	Through	-		0.0%	N/A
	Right	Yes		0.0%	N/A
Opposing	Left	Yes		0.0%	N/A
	Through	-		0.0%	N/A
	Right	Yes		0.0%	N/A

Advancing Volume:	N/A
Opposing Volume:	N/A
Left Turn Volume:	N/A
% Left Turns in Advancing Volume:	N/A

Right Turn Lane Volume Calculations					
Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	14	7.0%	15
	Through	-	182	1.0%	183
	Right	-	5	0.0%	5

Advancing Volume:	203
Right Turn Volume:	5

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings	Right Turn Lane Warrant Findings
Applicable Warrant Figure: N/A	Applicable Warrant Figure: Figure 9
Warrant Met?: N/A	Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control: Unsignalized	
Design Hour Volume of Turning Lane: 5	
Cycles Per Hour (Assumed): 60	
Cycles Per Hour (If Known):	Average # of Vehicles/Cycle: N/A

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

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:

AM peak hour inbound volumes are lower than PM, so only PM was evaluated. Note also that -- as mentioned in the report -- this analysis assumes a hypothetical, very conservative situation of all 20 homes sharing one access, which, as the site plan reveals, is not the case.

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality: Radnor	Analysis Date: 3/20/2020
County: Delaware County	Conducted By: FT
PennDOT Engineering District: 6	Checked By: SB Approach
	Agency/Company Name: FTA
Intersection & Approach Description: Radnor Street & Site Driveway	
Analysis Period: 2025	Number of Approach Lanes: 1
Design Hour: PM Peak Hour	Undivided or Divided Highway: Undivided
Intersection Control: Unsignalized	Type of Analysis
Posted Speed Limit (MPH): 25	
Type of Terrain: Level	Left or Right-Turn Lane Analysis?: Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations							
Movement	Include?	Volume	% Trucks	PCEV			
Advancing	Left	Yes	9	0.0%	9	Advancing Volume: 170	
	Through	-	158	1.0%	159		Opposing Volume: 203
	Right	Yes	2	0.0%	2		Left Turn Volume: 9
Opposing	Left	Yes	14	7.0%	15	% Left Turns in Advancing Volume: 5.29%	
	Through	-	182	1.0%	183		
	Right	Yes	5	0.0%	5		

Right Turn Lane Volume Calculations							
Movement	Include?	Volume	% Trucks	PCEV			
Advancing	Left	No	0	0.0%	N/A	Advancing Volume: N/A	
	Through	-	0	0.0%	N/A		Right Turn Volume: N/A
	Right	-	0	0.0%	N/A		

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings		Right Turn Lane Warrant Findings	
Applicable Warrant Figure:	Figure 1	Applicable Warrant Figure:	N/A
Warrant Met?:	No	Warrant Met?:	N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	9
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	
Average # of Vehicles/Cycle:	N/A

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

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

Additional Findings:

N/A

Additional Comments / Justifications:

AM peak hour inbound volumes are lower than PM, so only PM was evaluated. Note also that -- as mentioned in the report -- this analysis assumes a hypothetical, very conservative situation of all 20 homes sharing one access, which, as the site plan reveals, is not the case.

APPENDIX H

Misc

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED WITHOUT THE APPROVAL OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION. APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MANHOLES OF THE SIGNALS INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER INSTALLATION OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVERS 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 SIGNALS ON THE SIDE OF THE ROADWAY. 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 SURFACE AND A MINIMUM CLEARANCE 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. CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE OR GRANITE SPECIFICATIONS FROM PUB 404.

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.

ALL ADA RAMPS & PUSH BUTTON ACCESS MUST MEET FEDERAL AND STATE GUIDELINES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DOCUMENT UNLESS IT IS PERMITTED TO BE USED WITH THE PROVISIONS OF THE PERMIT. ANY CHANGES TO THE DRAWING SHALL BE MADE BY THE ENGINEER PRIOR TO THE EFFECTIVE DATE DECEMBER 20, 2017.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO PUB 406 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 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-800 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: RADNOR STREET ROAD (TWP) & EAGLE ROAD (SR 1042)

REMEMBER: DATE DATE
UNUSUAL CIRCUMSTANCES DATE DATE
RECOMMENDED: DATE DATE

DISTRICT TRAFFIC ENGINEER: DATE
DATE
DATE
DATE
DATE
DATE
DATE
DATE
DATE
DATE

NO. 1042
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17
DATE 10/20/17

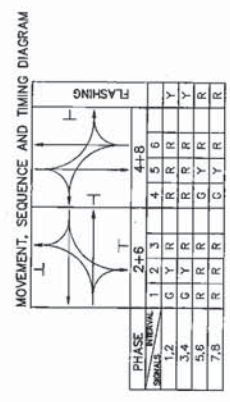
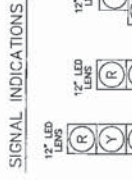
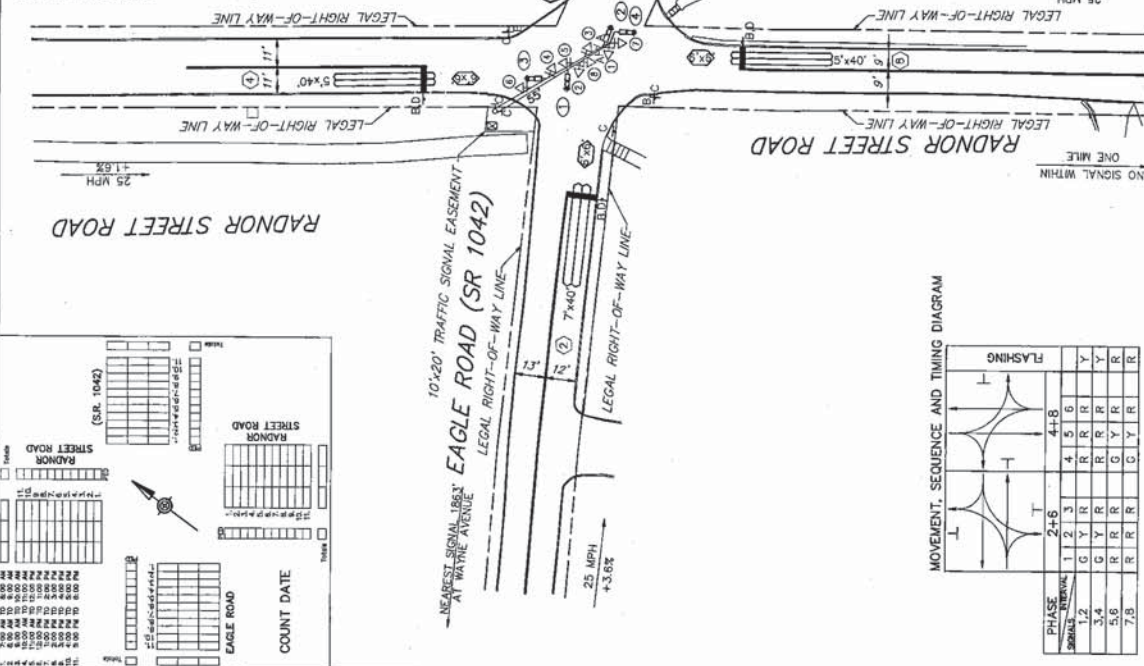
SHEET 2 OF 2 PERMIT # 63-5294 FILE # 0130

SIGN TABULATION

PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-11	36"x36"	NO TURN ON RED SYMBOL
B	R10-11	24"x30"	NO TURN ON RED SYMBOL
C	RS-3	18"x18"	NO PEDESTRIAN CROSSING
D	R10-DAL	24"x36"	STOP HERE ON RED, (LEFT)

EMERGENCY PRE-EMPTION NOTES:

- CONTROL TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE EASTBOUND AND WESTBOUND APPROACHES OF RADNOR STREET ROAD AND THE NORTHBOUND AND SOUTHBOUND APPROACHES OF EAGLE ROAD WITH A FLASHING FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION. FLASH WHEN THE EMERGENCY VEHICLE WAS APPROACHING WITH SUFFICIENT APPROPRIATE APPROACH. LOCATION OF THE EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLES, SHALL TERMINATE ALL GREEN PHASES, INCLUDING THE GREEN PHASE, AND RED PHASES, INCLUDING THE RED PHASE, IMMEDIATELY FOLLOWED BY THE "HANGING HORN" SIGNALS. THE SIGNALS SHALL REMAIN FLASHING.
- IF THE SIGNAL HAS BEEN ACTIVATED BY PEDESTRIAN PUSHBUTTON, AND THE SIGNAL IS IMMEDIATELY FOLLOWED BY THE "HANGING HORN" SIGNALS, THE SIGNALS SHALL TERMINATE THE PRE-EMPTION PHASE.
- 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 THE CUT OFF BEFORE PROCEEDING TO THE NEXT OPERATION PHASE 24.9 INTERVAL 1 SHALL FOLLOW.
- UPON COMPLETION OF PRE-EMPTION PHASES 2.4.6, OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 24.9 INTERVAL 1 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED. PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVED" OPERATION.



OPERATION NOTES:
SIGNAL TO DWELL IN PHASE 2+6 UNTIL ACTUATED BY PHASE 4+8

FIXED	MINIMUM	PASSAGE	MAXIMUM	MEMORY
4	4	4	25	L
4	4	4	25	L
4	4	4	25	L
4	4	4	25	L
4	4	4	25	L
4	4	4	25	L

for requisite wetlands permits or waivers pursuant thereto. All potential impacts on wetlands shall conform to applicable regulations, as amended.

(5) Editor's Note: Former § 120-20B(5), (6), (7) and (8), which immediately preceded this section, was repealed 5-28-1985 by Ord. No. 85-13. Transportation impact study.

(a) A transportation impact study shall be undertaken for all major subdivisions and land developments as defined in Subsection B(5)(c) below. This study will enable the Township to assess the impact of a proposed development on the local transportation system. Its purpose is to ensure that proposed developments do not adversely affect the transportation network and to identify any traffic problems associated with access from the site to the existing transportation network. The study's purpose is also to delineate solutions to potential problems and to present improvements to be incorporated into the proposed development. The study shall assist in the protection of air quality, the conservation of energy and the encouragement of public transportation.

(b) In accordance with the requirements of the Township, the traffic impact study shall be prepared by a qualified traffic engineer with previous traffic study experience. The procedures and standards for the traffic impact study are set forth in Subsection B(5)(d) below.

(c) Subdivisions and land developments that require a transportation impact study.

[1] A transportation impact study shall be required for all subdivisions and land developments that meet one or more of the following criteria:

[a] Residential: a development consisting of 50 or more dwelling units.

[Amended 10-22-1990 by Ord. No. 90-49]

[b] Commercial: a commercial building or buildings consisting of 50,000 square feet or more of gross leasable floor space.

[c] Office: a development consisting of 50,000 square feet or more of gross leasable floor space.

[d] Industrial: a development consisting of 50,000 square feet or more of gross leasable floor space.

[e] Institutional: all developments.

[2] The Board of Commissioners, at its discretion, may request the preparation of a traffic impact study for any other subdivision or land development.

(d) The transportation impact study shall contain, but not be limited to, the following information:

[1] General site description. The site description shall include the size, location, proposed land uses, construction staging and completion date of the proposed land development. If the development is residential, types of dwelling units and number of bedrooms shall also be included. A brief description of other major existing and proposed land developments within the study area shall be provided. The general site description shall also include probable socioeconomic characteristics of potential site users to the extent that they may affect the transportation needs of the site (i.e., the number of senior citizens).

[2] Transportation facilities description.

[a] The description shall contain a full documentation of the proposed internal and existing external transportation system. This description shall include proposed internal vehicular, bicycle and pedestrian circulation, all proposed ingress and egress locations, all internal roadway width and rights-of-way, parking conditions, traffic channelizations and any traffic signals or other intersection control devices within the site. The site design shall be shown to maximize potential public transportation usage to and from the development, such as providing adequate turning radii at all access points to allow a bus to enter the development. Bus shelter and sign locations shall be designated where appropriate.

[b] The report shall describe the entire external roadway system within the study area. Major intersections in the study area shall be identified and sketched. All existing and proposed public transportation services and facilities within a one-mile radius of the site shall also be documented. All future highway improvements, including proposed construction and traffic signalization, shall be noted. This information shall be obtained from the 12-Year Highway Capital Program for the Delaware Valley Region, the Radnor Township Comprehensive Plan and from the Pennsylvania Department of Transportation. Any proposed roadway improvements resulting from proposed surrounding developments shall also be recorded.

[3] Existing traffic conditions. Existing traffic conditions shall be measured and documented for all streets and intersections in the study area. Traffic volumes shall be recorded for existing average daily traffic, existing peak-hour traffic and for the subdivision's peak-hour traffic. Complete traffic counts at all major intersections in the study area shall be conducted, encompassing the peak highway and development-generated hour(s), and documentation shall be included in the report. A volume capacity analysis based upon existing volumes shall be performed during the peak hour(s) and the peak development-generated hour(s) for all roadways and major intersections in the study area. Levels of service shall be determined for each location. This analysis will determine the adequacy of the existing roadway system to serve the current traffic demand. Roadways and/or intersections experiencing Levels of Service E or F shall be noted as congestion locations.

[4] Transportation impact of the development. Estimation of vehicular trips to result from the proposal shall be completed for both the street system and the development-generated peak hours(s). Vehicular trip generation rates to be used for this calculation shall be obtained from the Trip Generation Rates Table, below. Editor's Note: The Trip Generation Rate Table is included at the end of this chapter. These development-generated traffic volumes shall be provided for the inbound and outbound traffic movements as estimated. The reference source(s) and methodology followed shall be cited. These generated volumes shall be distributed to the study area and assigned to the existing streets and intersections throughout the study area. Documentation of all assumptions used in the distribution and assignment phase shall be provided. Traffic volumes shall be assigned to all access points. Pedestrian volumes shall also be calculated, if applicable. If school crossings are to be used, pedestrian volumes shall be assigned to each crossing. Any characteristics of the site that will cause unusual trip generation rates and/or traffic flows shall be noted.

[5] Analysis of transportation impact. The total future traffic demand based on full occupancy of the proposed subdivision or land development shall be calculated. This demand shall consist of the combination of the existing traffic expanded to the completion year, the development generated traffic and the traffic generated by other proposed developments in the study area. A volume/capacity analysis shall also be conducted using the total future demand and the future roadway capacity. If staging of the proposed development is anticipated, calculations for each stage of completion shall be made. This analysis shall be performed using the peak highway hour(s) and peak development-generated hour(s) for all streets and major intersections in the study area. Volume/capacity calculations shall be completed for all major intersections. All access points and pedestrian crossings shall be examined as to the feasibility of installing traffic signals. This evaluation shall compare the projected traffic and pedestrian volumes to the warrants for traffic signal installation. Levels of service for all streets and intersections shall be listed.

[6] Conclusions and recommended improvements.

[a] All streets and/or intersections showing a Level of Service below C shall be considered deficient, and specific recommendations for the elimination of these problems shall be listed. This listing of recommended improvements shall include, but not be limited to, the following elements: internal circulation design, site access location and design, external street and intersection design and improvements and traffic signal installation and operation, including signal timing and transit-design improvements.

[b] Existing and/or future public transportation service shall also be addressed. A listing of all actions to be undertaken to increase present public transportation usage and improve service, if applicable, shall be included.

[c] The listing of recommended improvements for both streets and transit shall include, for each improvement, the party responsible for the improvement, the cost and funding of the improvement and the completion date for the improvement.

[d] The Planning Commission shall review the transportation impact study to analyze its adequacy in solving any traffic problems that will occur due to the land development or subdivision and make recommendations to the Board of Commissioners.

[e] The Board of Commissioners may decide that certain improvements contained in the study on or adjacent to the site are required for preliminary plan approval and, if acceptable to the applicant, may attach these conditions to the preliminary approval.

[f] The improvement plans shall not be submitted to the Pennsylvania Department of Transportation until such plans are approved by the Board of Commissioners. This submittal to the Pennsylvania Department of Transportation shall be accompanied by comments of the Planning Commission and the Delaware County Planning Commission.

(6) Acknowledgments.

(a) A letter indicating the availability of public sanitary sewer facilities from the appropriate utility, if applicable.

(b) A letter indicating the availability of central water supply from the appropriate utility, if applicable.

§ 255-21. Final plan for major subdivision.

A. Drafting standards.

(1) The plan shall be drawn at a scale of no less than one inch equals 100 feet.

(2) Dimensions shall be set in feet and decimal parts thereof; and bearings in degrees, minutes and seconds.

(3) Each sheet shall be numbered and shall show its relationship to the total number of sheets.

(4) Where any revision is made or when the plan is a revision of a previously approved plan, notations of revisions shall be dated.

(5) The boundary line of the subdivision or land development shall be shown as a solid heavy line.

(6) Final plans shall be on a sheet having a minimum size of 18 inches by 30 inches and a maximum size of 24 inches by 34 inches, and all lettering shall be so drawn as to be legible if the plan should be reduced to half size.

(7) All plans and surveys shall be prepared in accordance with the Act of May 23, 1945 (P.L. 913, No. 367), known as the "Professional Engineers Registration Law." Editor's Note: See 63 P.S. § 148 et seq.

[Added 10-22-1990 by Ord. No. 90-49]

B. The final plan shall show or be accompanied by the following information on individual sheets:

(1) Site plan showing:

(a) The name of the subdivision or land development, including the address, if available.

[Amended 10-22-1990 by Ord. No. 90-49]

(b) The name and address of the owner/applicant.

(c) The name, address and seal of the engineer or surveyor responsible for the plan.

(d) Zoning requirements, Editor's Note: See Ch. 280, Zoning. including:

SUBDIVISION OF LAND

255 Attachment 4

Township of Radnor

Trip Generation Rates (4)(5)(6)

Type of Land Use	Type of Development	Average Weekday Generation Rates	Peak-Hour Rates			Peak Shopping Hour Generated Rates		
			A.M. Out	In	Total	P.M. Out	In	Total
Residential	Single-family detached	9.5 per occupied D.U.	0.21	0.77	0.85	0.32	0.29	1.09
	Single-family attached	8.1 per occupied D.U.	0.18	0.65	0.73	0.28	0.25	0.93
	Apartment	6.9 per occupied D.U.	0.15	0.55	0.62	0.23	0.21	0.78
	Mobile home	6.1 per occupied D.U.	0.14	0.49	0.55	0.21	0.18	0.70
	Retirement village	3.3 per occupied D.U.	0.14	0.27	0.34	0.11	0.10	0.38
Commercial	Shopping center							
	Regional (GFA over 400,000 square feet)	33 per 1,000 square feet GFA	0.40	1.70	0.60	1.30	2.50	3.00
	Community (GFA 100,000 to 400,000 square feet)	58 per 1,000 square feet GFA	0.80	2.80	1.20	2.10	3.50	4.90
	Neighborhood (GFA less than 100,000 square feet)	84 per 1,000 square feet GFA	1.00	7.20	1.80	6.60	7.50	13.80
	Freestanding retail store	69 per 1,000 square feet GFA	0.60	4.70	1.00	5.00	5.40	9.70
	Fast-food restaurant	2,100 per restaurant	(2)	1.40	0.60	1.20	1.75	2.60
	Motel	10 per unit	0.30	0.38	0.60	0.22	0.40	0.60
	Medical offices	53 per 1,000 square feet GFA	(2)	2.80	1.80	2.80	1.00	5.60
	Business offices	10.3 per 1,000 square feet GFA	0.20	0.40	0.40	1.90	2.30	2.30
	Single building over 500,000 square feet GFA	4.2 per 1,000 square feet GFA	0.16	0.30	0.54	0.13	(1)	0.43
Industrial	Single building over 500,000 square feet GFA	4.9 per 1,000 square feet GFA	0.45	0.36	0.64	0.15	0.51	0.51
	Warehouse	5.5 per 1,000 square feet GFA	0.57	0.39	0.82	0.16	(1)	0.55
	Colleges	2.5 per student	0.17	0.05	0.20	0.12	(1)	0.17
Institutional	Junior college	1.4 per student	0.17	0.05	0.20	0.12	(1)	0.17
	High schools	1.4 per student	0.21	0.28	0.28	(2)	(1)	(2)
	Elementary schools	0.5 per student	(2)	(2)	(2)	(2)	(1)	(1)
	Hospitals	14 per bed	0.56	0.66	0.80	0.24	0.38	0.90
								1.30

- NOTES:
- (1) Not applicable; Peak coincides with a.m. or p.m. street peak hours.
 - (2) Data not available.
 - (3) Store peak, noon to 1:00 p.m.
 - (4) The rates shall be reviewed biennially by the Township Planner and the Planning Commission for any changes that may be appropriate. The applicant is required to use the rates where applicable. Where the appropriate data is not available, the developer shall provide the rates and document the appropriate source. If the developer requests to use significantly different rates than those given, he shall submit the rates and the specific justification to the Planning Commission prior to submission of the transportation impact study for its approval or denial.
 - (5) D.U. – dwelling unit; GFA – gross floor area.
 - (6) Sources:
 - A. "Guidelines for Driveway Design and Location," Traffic Engineering, February 1973.
 - B. Trip Generation by Land Use. Maricopa Assoc. of Governments, Urban Area of Maricopa County, Arizona, April 1974.
 - C. Caltrans Progress Reports on Trip Ends Generation Research Counis. Dept. of Transportation, State of California, 1970 through 1974.
 - D. "Trip Generation Study Provides Useful Preliminary Data," Traffic Engineering, March 1974.
 - E. "Traffic Generation and Fast Food Restaurants," Traffic Engineering, March 1975.